FEATURES OF CAPITAL INVESTMENT IN INNOVATION: THE CASE OF INDUSTRIAL SMES IN THE GUAM MEMBER COUNTRIES

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ABSTRACT

The article aimed to empirically substantiate the features of capital investment in innovation depending on financial stability for Industrial SMEs in the GUAM. We differentiated the levels of financial stability of industrial SMEs in the region: high, medium, and low. We have determined the positive effect of capital investments in innovation at all levels of financial stability using regression modeling. Regardless of financial strength and capital intensity, investing in innovation provides higher performance indicators for companies than investing in the renewal of fixed assets without modernization. The increase in the efficiency of capital investments in SMEs is more significant for financially stable and less capital-intensive companies than for companies with low financial stability and high capital intensity. Identifying the features of the relationship between the financial stability of SMEs and capital investment will allow the development of effective strategies for economic collaboration within the framework of GUAM.

Keywords: GUAM; industrial SMEs; capital investment; innovation; financial sustainability

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INTRODUCTION

In 2006, based on a joint communiqué of the heads of Georgia, Ukraine, Azerbaijan, and Moldova, the Organization with these countries (GUAM) for Democracy and Economic Development (Ministry of development of communities, territories, and infrastructure of

Ukraine, 2023). The organization's task is to launch a non-intermediary free trade zone and transport corridor, deepening economic ties between the organization's countries. The countries have positioned common strategic interests, despite significant differences in the directions of foreign economic policy: Moldova, Georgia, and Ukraine are striving for economic integration with the European Union, while Azerbaijan is building various balanced economic ties with the West and Russia (Eurasian Research Institute, 2020; JAM news, 2022).

Until 2017, the activities of the organization were passive. Still, after the military conflict between Russia and Ukraine, the member countries initiated an economic and political rapprochement in GUAM as a platform capable of satisfying many needs in achieving democracy and economic development (Efendiev, 2022). This was a significant step towards the renewal of economic cooperation, particularly in industrial development and capital investment. But in current conditions, many destructive factors hinder the development of effective economic collaboration in GUAM. First, poverty remains a significant problem for the GUAM member countries due to the region's poor social security and massive structural and youth unemployment (an average of 14% across countries). Especially when it comes to countries like Moldova (26.8%) and Georgia (21.3%) (The World Bank Group, 2023a). The intensified trend of labor emigration demonstrates that the problem has not been solved and carries risks to socio-economic cooperation. SMEs in the GUAM countries is a crucial driver of socio-economic cooperation and development. They are the most important source of employment (over 65% on average across countries) and provide more than 38% of gross value added (OECD, 2019; OECD, 2022; European Commission, 2021; EU4Business, 2022).

Industrial SMEs in the GUAM member states rank first in employment and the third largest source of GDP (OECD, 2019; OECD, 2022; European Commission, 2021; EU4Business, 2022). But industrial SMEs are characterized by low development potential. The industry's outdated material and technological base determines the enterprises' low competitiveness, aggravated by low labor productivity and unfair competition from state-owned enterprises. But, the global economic crisis caused by the COVID-19 pandemic and the war unleashed by Russia in Ukraine is increasing pressure on the financial sustainability of industrial SMEs in Georgia, Ukraine, Azerbaijan, and Moldova.

Secondly, there were still no significant achievements due to the scale and complexity of joint projects that require a large amount of funding and time (Eurasian Research Institute, 2020). In this case, the solution may be shorter-term economic cooperation projects, which are achieved in a shorter period and can demonstrate the effectiveness of the organization and its vitality (GUAM, 2019). We study the problems of capital investment by SMEs in the industry in Georgia, Ukraine, Azerbaijan, and Moldova intending to develop effective strategies for economic cooperation and forming a free trade area.

Due to the high importance of industry in the countries, building the industry's capacity seems to be one of the most important strategic tasks for transforming the economy and countries' economic cooperation (Eurostat, 2023). **B**ecause of the need to implement the goals of sustainable development and integration into the EU and to strengthen cooperation with the EU, industrial SMEs in the GUAM member states, in addition to ensuring economic growth, increasing employment, and expanding production, have to solve much more complex tasks of environmental and social importance (United Nations Economic Commission for Europe, 2021). Technological modernization, resource, and energy efficiency improvement should become the basis of an effective industrial policy in the countries ГУАМ, which is impossible without external financial influences on SMEs (United Nations Economic Commission for Europe, 2021). In current conditions, investment in innovation is decisive; one might say the only driver of the successful production activities of industrial SMEs and countries' economic cooperation.

The GUAM member countries are regions with an economy in transition, experiencing significant difficulties accessing external financing. This is also true for industrial SMEs. The financial conditions are currently underdeveloped, with total infrastructure investment needs in the billions of euros. High-interest rates on borrowed capital and significant government borrowing from local banks have almost eliminated the ability to lend to industrial

enterprises and businesses in these countries (The World Bank Group, 2023b). The lack of alternative borrowed capital in countries has led to an active government policy to reduce taxes and increase government assistance to foreign companies to attract investment. FDI is low in most countries in the region, and the return to the region's economy is characterized by a small positive effect (The World Bank Group, 2023b). This is explained by the fact that investment initiatives fall on the non-tradable sector of the economy (financial industry, telecommunications, real estate, etc.) with a low level of growth in export potential and productivity. Except for Azerbaijan, investments are mainly directed to the energy sector, represented only by large companies (US Department of state, 2021).

Under the current conditions, public policy should be aimed at attracting capital investment in the innovation base of industrial SMEs in the GUAM member countries. This will help organize technological re-equipment of the industry, increase SMEs' competitiveness and financial stability, create global value chains, and develop a common trading area between countries. For this study, capital investment means investing in expanding the business, increasing productivity, and resource efficiency. As of the beginning of 2022, the capital investment in the GUAM member countries was a country average of less than 20% of GDP, and for industrial SMEs, it is significantly lower (The Global Economy, 2023). The smallest share is typical for Ukraine (less than 14%) and Azerbaijan (17.3%). In these countries, just about 10% of SMEs invest capital in R&D (The World Bank Group, 2023b). Scholars such as Xu et al. (2020) and Liu, Chen, and Yang (2022) emphasized the positive effect on the company's stability with increased capital investment. Since this type of investment resource serves as a differentiated source of financing for modernization and technological re-equipment, but at the same time, many scientists have proven that capital investments increase the vulnerabilities of the company's financial stability (Wang, Li & Xing, 2014). Therefore, it can be assumed that industrial enterprises are characterized by increased capital intensity, material intensity, and low capital productivity compared with other sectors of the economy; increasing capital investment can increase the risk to the company's financial stability. And given today's global economic stress and the EU energy crisis, the capital investment could undermine the industry's financial health.

Our research contributes to numerous aspects of developing the conceptual framework for the investment process. We stressed the importance of a comprehensive study of the relationship between a company's financial strength and the priority of an innovative investment strategy. Which is modified not in terms of efficiency but in terms of value orientations of investment as the company's solvency increases.

LITERATURE REVIEW

Studying the relationship between capital investments in innovation, technological re-equipment, the company's financial stability, and financial performance attracted many scientists' attention (Xu et al., 2020, Liu, Chen & Yang, 2022; Wang, Li & Xing, 2014; Onegina et al., 2020). Previous research has focused more on the nature of the personal impact of the level of corporate financial performance on a company's investment spending. The financial stability of a company determines the availability of financial resources, the company's solvency, and profitability (Yerdavletova et al., 2020). Less financially sound companies have fewer opportunities to invest and focus on building liquidity to restore solvency (Liu, Chen & Yang, 2022). Research by Xu et al. (2020) and Nie, Ruan and Shen (2020) confirmed that companies tend to reduce capital investments and reorient investment spending on financial assets when the financial condition worsens. Even though this type is an investment with a high-risk probability, it is characterized by increased liquidity. Speculating in uncertain conditions incentivizes companies to invest in financial assets (Huang, Luo & Peng, 2021).

Bloom (2009), based on the concept of options and the theory of dynamic trade-off, focused on the fact that financial stability is directly proportional to the level of capital investments of companies and the nature of their assets. Violating financial stability for the company increases the value of waiting for investment opportunities. But Vo and Le (2017) argued that the waiting strategy duration increases the risk of ceding investment opportunities to competitors and reduces the competitiveness of the business.

Companies in the growth stage tend to actively

pursue capital investments, most of which are directed toward innovation (Bloom, 2014). Using as the example of Chinese enterprises, it has been proved that the companies' priority with increasing financial stability, especially with higher capital intensity, is an investment in R&D and technical re-equipment (Liu, Chen & Yang, 2022).

Neskorodeva and Pustovgar (2015) took a different point of view, arguing that the underlying reason for a company's low level of financial stability is the low productivity of fixed assets and high overhead costs associated with their maintenance. Then, the way out of the company from the crisis is a renewal and modernization of fixed assets, which is impossible without real investment. Another reason for the low level of financial stability may be the lack of product demand (Yerdavletova et al., 2020). To eliminate these issues, investments in innovations (product and technological) are necessary (Duong et al., 2022).

Unlike capital investments, investments in innovations imply an increase in the efficiency of production factors. If the R&D project is successfully implemented, it guarantees a significant return on invested capital (Duong et al., 2022). Even under financial constraints, investment in innovation, especially by companies in material-intensive industries, can be the basis for economic stabilization and competitiveness (Bonanno, Ferrando & Rossi, 2022; Gulaliyev et al., 2016). Whereas for high-tech companies, investment in innovation has a time lag (Qi, 2020).

However, various combinations of investment cost components indicate a complex causal relationship between capital investments and the company's financial stability. Empirical studies show that investing in an R&D campaign is generally more conservative due to cash flow uncertainty (Liu, Chen & Yang, 2022).

The capital investment market in the GUAM member countries is at a very early stage of development, especially concerning SMEs, and investment opportunities are currently limited. We attempted to justify the effectiveness of capital investment in innovation, depending on the financial stability of industrial SMEs in these regions.

RESEARCH METHODS

The empirical study was based on SMEs reporting data from the Manufacturing, mining and quarrying, and other industries in the GUAM member states (Georgia, Ukraine, Azerbaijan, Moldova) for 2017-2022. The study sample did not include transnational, international companies or companies with branches or divisions in other countries. The number of companies studied (Table 1) indicates the sufficiency of the sample (Taherdoost, 2017). During 2017-2022, the same companies were studied. Over time, the decrease in their number is due to the inability to establish feedback with companies or their bankruptcy (which is especially important for Ukraine).

Table 1: The number of companies that were included in the study sample

Country	Number of companies					
	2017	2018	2019	2020	2021	2022
Georgia	528	522	519	513	510	508
Ukraine	493	488	485	479	475	427
Azerbaijan	642	637	630	616	614	605
Moldova	471	464	458	451	494	490

The t-criterion and the Chow test were used to determine the characteristics of companies' capital investments depending on their level of financial stability and capital intensity. As a basis for assessing the structure of capital investments and the effectiveness of investments in innovation, we used the classification (Sestacovscaia, 2013). And we used the following measures of internal reporting by SMEs in Georgia, Ukraine, Azerbaijan, and Moldova:

- investment in the renewal of fixed assets in the company without their modernization for 01.11.2017-01.11.2022 (Inv_{ren});
- investments in the modernization of fixed assets in the company, their technological improvement (investments in technological innovations) for 01.11.2017-01.11.2022 (In_{tec});

- investments in updating the company's product range (investments in product innovations) for 01.11.2017-01.11.2022 (In_{pr});
- capital investments in the company for 01.11.2017-01.11.2022 (In_{pr})

Investment in innovation in this study refers to the modernization of fixed assets, their technological improvement, and investment in the renewal of the company's product range.

To measure financial stability, the amount and growth rate of the company's assets, equity capital, Current Ratio, Return on Equity, and Return on Assets (Yerdavletova et al., 2020; Nashtaei, Choube & Talemi, 2016) for 2017-2022 were used.

Companies' financial stability level was used as a grouping variable to assess the structure and effectiveness of capital investments. We determined the financial stability indicators using the trapezoidal membership function (formulas 1-3).

$$p_{i\,L} = \begin{cases} 1, \ FS_{i\,min} \le FS_i \le FS_{i\,t1} \\ \dfrac{FS_{i\,t2} - FS_i}{FS_{i\,t2} - FS_{i\,t1}}, \ FS_{i\,t1} < FS_i < FS_{i\,t2} \\ 0, \ FS_{i\,t2} \le FS_i \le FS_{i\,max} \end{cases} \quad (1)$$

$$p_{i\,M} = \begin{cases} 0, \ FS_{i\,min} \le FS_i \le FS_{i\,t1} \\ \dfrac{FS_i - FS_{i\,t1}}{FS_{i\,t2} - FS_{i\,t1}}, \ FS_{i\,t1} < FS_i < FS_{i\,t2} \\ 1, \ FS_{i\,t2} \le FS_i \le FS_{i\,t3} \\ \dfrac{FS_{i\,t4} - FS_i}{FS_{i\,t4} - FS_{i\,t3}}, FS_{i\,t3} < FS_i < FS_{i\,t4} \\ 0, \ FS_{i\,t4} \le FS_i \le FS_{i\,max} \end{cases} \quad (2)$$

$$p_{i\,H} = \begin{cases} 0, \ FS_{i\,min} \le FS_i \le FS_{i\,t3} \\ \dfrac{FS_i - FS_{i\,t3}}{FS_{i\,t4} - FS_{i\,t3}}, FS_{i\,t3} < FS_i < FS_{i\,t4} \\ 1, \ FS_{i\,t4} \le FS_i \le FS_{i\,max} \end{cases} \quad (3)$$

where $p_{i\,L}$ – the probability of referring the i-th indicator of financial stability to a low level, $p_{i\,M}$ - to an average, $p_{i\,H}$ - to a high level;

FS_i – a value of the i-th financial stability indicator;

$FS_{i\,min}$, $FS_{i\,max}$ – the minimum and maximum values, respectively, of the i-th indicator of financial stability in the study sample;

$FS_{i\,min} \le FS_i \le FS_{i\,t1}$ – low level of the i-th indicator of financial stability according to statistically significant t-test;

$FS_{i\,t2} \le FS_i \le FS_{i\,t3}$ – medium level of the i-th indicator of financial stability according to statistically significant t-test;

$FS_{i\,t4} \le FS_i \le FS_{i\,max}$ – high level of the i-th indicator of financial stability according to statistically significant t-test;

$FS_{i\,t1} < FS_{i\,t2} < FS_{i\,t3} < FS_{i\,t4}$.

The integral indicator of the company's financial stability was calculated by the formula (4):

$$FSI = \sum_{i=1}^{n} (p_{i\,L} \times k_L + p_{i\,M} \times k_M + p_{i\,H} \times k_H), \quad (4)$$

where FSI - is an integral indicator of the company's financial stability;

k_L, k_M, k_H – Conditional estimates for low, medium, and high indicators, respectively. To measure the entire possible range of the integral indicator [0; 1], in this study, the following values of conditional estimates were used: $k_L = 0$, $k_M = 0.5$, $k_H = 1$. Unlike Krawczak and Szkatuła (2020), who limited the range of the integral indicator;

n – the number of indicators in which the level of financial stability is determined ($n=6$).

The type of the membership function, the ranges of the private indicators, the integral indicator of the company's financial stability, and the company's capital intensity were determined using the t-test for independent samples.

Regression models were built to assess the impact of investment in innovation on profitability (return on equity, return on assets) and companies' labor productivity.

Among the studied Ukrainian companies in 2022, there is a sharp decline in return on equity, return on assets, and labor productivity due to the war in Ukraine. The values checked using the Dixon test indicate the presence of extreme importance for 2022. In this regard, the data of Ukrainian companies for 2022 were not included in the sample for building regression models.

The stationarity of the data we confirmed using the extended Dickey-Fuller test (Table 2). Using the Granger causality test, we determine the direction of causal relationships between the investment amount in innovation, labor productivity, return on equity, and return on assets (Rajbhandari and Zhang, 2021) (Table 3). EViews 10 was used to test the data for stationarity and determine causal relationships

between investment in innovation and the performance of companies in Georgia, Ukraine, Azerbaijan, and Moldova.

Table 2: Stationarity of researched indicators for companies in Georgia, Ukraine, Azerbaijan, Moldova

Indicator	Integration level	Probability of non-stationarity	Indicator	Integration level	Probability of non-stationarity
ST_{ROE}	1	0.02	ST_{Intec}	1	0.00
ST_{ROA}	1	0.01	ST_{Inpr}	1	0.01
ST_{LP}	1	0.03			

ST_{Intec} – standardized value of the investment amount for the modernization of fixed assets in the company and their technological improvement;

ST_{Inpr} – standardized value of investment amount in the renewal of the company's product range;

ST_{ROE} - a standardized value of return on equity;

ST_{ROA} - standardized value return on company assets;

ST_{LP} - a standardized value of the company's labor productivity

Source: Authors' finding

The extended Dickey-Fuller test confirmed data stationarity at the 1st level of integration. The probability that the time series is non-stationary does not exceed 0.05.

Table 3: Causal relationships between investment in innovation and the company's financial stability

Relations	Probability of no relationship	Relations	Probability of no relationship	Relations	Probability of no relationship
$ST_{Intec} \rightarrow ST_{ROE}$	0.02	$ST_{Intec} \rightarrow ST_{LP}$	0.00	$ST_{Inpr} \rightarrow ST_{ROA}$	0.03
$ST_{Intec} \rightarrow ST_{ROA}$	0.02	$ST_{Inpr} \rightarrow ST_{ROE}$	0.04	$ST_{Inpr} \rightarrow ST_{LP}$	0.00

→ the influence direction of independent variables on dependent ones. The table shows statistically significant causal at p=0.05.

Source: Authors' finding

The probability of no connection does not exceed 5%, which indicates the statistical significance of those shown in Table 3. We determined that investment in innovation is a statistically significant cause of changes in labor productivity, return on equity, and return on assets of companies in Georgia, Ukraine, Azerbaijan, and Moldova.

RESULTS AND DISCUSSION

Empirically, we determined three primary levels of financial stability of SMEs in Georgia, Ukraine, Azerbaijan, and Moldova (Table 4).

Table 4: Structure of capital investments depending on the level of financial stability for SMEs in Georgia, Ukraine, Azerbaijan, and Moldova at 01.11.2022

Indicators	Level of financial stability			Level of financial stability		
	Low	*Medium*	*High*	*Low*	*Medium*	*High*
	The ranges of the integral indicator			The ranges of the integral indicator		
	[0; 0.23]	[0.31; 0.57]	[0.71; 1]	[0; 0.23]	[0.31; 0.57]	[0.71; 1]
	Georgia			*Moldova*		
% of companies	39.91	37.45	15.68	44.01	36.21	13.68
w_{Invren}	86.97	81.88	75.30	89.46	83.54	78.68
w_{Intec}	8.98	13.11	18.05	7.52	11.73	15.32
w_{Inpr}	4.05	5.01	6.65	3.02	4.73	6.00

Table 4: Continued

	Azerbaijan			*Ukraine*		
% of companies	34.2	38.25	19.32	48.46	34.67	10.63
w_{Invren}	82.97	76.62	70.67	90.05	85.83	79.53
w_{Intec}	10.11	15.65	19.32	7.43	11.05	15.11
w_{Inpr}	6.92	7.73	10.01	2.52	3.12	5.36

w_{Invren} *– the share of investments in the renewal of fixed assets in the capital investments (%);*

w_{Intec} *– the percentage of investments in the modernization of fixed assets and their technological improvement in the capital investments (%);*

w_{Inpr} *– the portion of investments in updating the product range in capital investments (%)*

Source: Authors' finding

The results showed that in all countries, regardless of the industry, with the growth of financial stability, the priority of investing in industrial companies is shifting from investment in fixed assets without their modernization to investment in innovation. This trend is confirmed by a t-test whose empirical value of 3.11 exceeds the critical at a significance of 0.05. The findings are consistent with those of researchers such as Liu, Chen, and Yang (2022).

Companies with low financial stability - companies for which the primary financing is borrowed funds (> 90% of financing), companies are unprofitable and have inferior liquidity (Current Ratio <0.7). Under such conditions, the priority task for the company is to prevent bankruptcy, settle accounts with creditors, and form a reserve of liquid funds. The capital investments in these companies are focused on supporting production capacities through the renewal of fixed assets without their modernization. The share of innovation capital investments of such companies does not exceed 17.03%.

With average financial stability, companies form a reserve of liquid funds with a preventive purpose to ensure solvency in case of crises. For these companies, the share of investment in innovation in the investment structure is higher than for companies with low financial stability. The priority direction of investment is a renewal of fixed assets without modernization and with low company financial stability.

With high financial stability, companies are more inclined to invest in innovations: technology, and products. A large margin of companies' financial stability enables companies to implement riskier strategies and invest in innovative projects.

The construction of regression models (linear and non-linear) and the application of the Granger causality test (Table 3) did not allow us to identify a statistically significant impact of investments in the renewal of fixed assets without their modernization on the efficiency of SMEs. The effect of these investments on labor productivity and profitability is positive but statistically insignificant, p=0.05. This indicates that in Georgia, Ukraine, Azerbaijan, and Moldova, the condition of increasing labor productivity, the profitability of companies, and their financial stability is an investment in innovation.

Applying the Chow test and the constructed regression models made it possible to identify the different natures of the impact of capital investments in innovation on labor productivity and the profitability of SMEs, depending on companies' financial stability and capital intensity. The range of the company's capital intensity index [0; 1] is divided into low level [0; 0.29], medium [0.32; 0.58], and high [0.60; 1]. These are the levels between which there are statistically significant differences across the entire sample of the study according to the t-test at a significance p=0.05 (Table 5).

Table 5: Regression models for assessing the impact of capital investment in innovation on the performance of SMEs in Georgia, Ukraine, Azerbaijan, Moldova

Independent variable	Level of financial stability								
	Low			*Medium*			*High*		
	Dependent variable								
	ST_{LP}	ST_{ROA}	ST_{ROE}	ST_{LP}	ST_{ROA}	ST_{ROE}	ST_{LP}	ST_{ROA}	ST_{ROE}
Low capital intensity									
STIntec(-1)²	0.19	-	-	0.22	-	-	0.2	-	-
STIntec(-1)	0.31	-	-	0.28	-	-	0.3	-	-
STIntec(-2)²	0.38	0.35	0.56	0.36	0.32	0.55	0.38	0.14	0.54
STIntec(-2)	0.12	0.08	0.1	0.14	0.11	0.11	0.12	0.09	0.12
STIntec(-3)²	0.11	0.32	0.58	0.12	0.33	0.56	0.11	0.12	0.58
STIntec(-3)	-	0.1	0.11	-	0.09	0.13	-	0.1	0.11
STIntec(-4)	0.07	0.05	0.06	0.1	0.08	0.08	0.12	0.08	0.1
STInpr(-1)²	0.17	-	-	0.19	-	-	0.22	-	-
STInpr(-1)	0.13	-	-	0.11	-	-	0.08	-	-
STInpr(-2)²	0.19	0.3	0.44	0.17	0.28	0.43	0.16	0.04	0.41
STInpr(-2)	0.11	0.11	0.12	0.13	0.13	0.13	0.14	0.08	0.15
STInpr(-3)	0.06	0.04	0.08	0.08	0.08	0.09	0.06	0.07	0.07
STInpr(-4)	0.05	0.02	0.05	0.06	0.04	0.07	0.05	0.06	0.05
a_0	-0.9	-0.4	-1.12	-1.1	-0.5	-1.2	-1.1	-0.41	-1.33
Average capital intensity									
STIntec(-1)²	0.3	-	-	0.37	-	-	0.35	-	-
STIntec(-1)	0.18	-	-	0.11	-	-	0.13	-	-
STIntec(-2)²	0.38	0.35	0.28	0.23	0.43	0.45	0.51	0.48	0.45
STIntec(-2)	0.09	0.14	0.14	0.09	0.12	0.17	0.11	0.13	0.19
STIntec(-3)²	0.07	0.15	0.38	0.06	0.35	0.18	0.05	0.25	0.49
STIntec(-3)	-	0.1	0.11	-	0.11	0.14	-	0.15	0.16
STIntec(-4)	0.01	0.1	0.11	0.02	0.1	0.12	0.03	0.08	0.09
STInpr(-1)²	0.24	-	-	0.28	-	-	0.25	-	-
STInpr(-1)	0.06	-	-	0.03	-	-	0.04	-	-
STInpr(-2)²	0.18	0.26	0.19	0.17	0.25	0.38	0.17	0.32	0.4
STInpr(-2)	0.13	0.07	0.16	0.13	0.07	0.1	0.11	0.06	0.13
STInpr(-3)	0.04	0.06	0.03	0.05	0.05	0.1	0.06	0.06	0.07
STInpr(-4)	0.02	0.04	0.02	0.03	0.04	0.07	0.02	0.03	0.05
a_0	-0.7	-0.34	-0.75	-0.7	-0.51	-0.93	-0.9	-0.6	-1.18
High capital intensity									
STIntec(-1)²	0.19	-	-	0.2	-	-	0.24	-	-
STIntec(-1)	0.12	-	-	0.12	-	-	0.14	-	-
STIntec(-2)²	0.2	0.21	0.1	0.16	0.22	0.05	0.2	0.23	0.08
STIntec(-2)	0.1	0.09	0.15	0.14	0.08	0.2	0.13	0.08	0.2
STIntec(-3)²	0.07	0.15	0.16	0.05	0.24	0.23	0.04	0.2	0.24
STIntec(-3)	-	0.13	0.15	-	0.11	0.11	-	0.11	0.11
STIntec(-4)	0.05	0.06	0.07	0.03	0.05	0.08	0.02	0.05	0.08
STInpr(-1)²	0.17	-	-	0.14	-	-	0.16	-	-
STInpr(-1)	0.04	-	-	0.1	-	-	0.06	-	-
STInpr(-2)²	0.16	0.16	0.19	0.13	0.21	0.28	0.13	0.22	0.3
STInpr(-2)	0.05	0.13	0.12	0.07	0.1	0.1	0.08	0.1	0.1
STInpr(-3)	0.05	0.04	0.06	0.06	0.05	0.06	0.07	0.05	0.06
STInpr(-4)	0.03	0.02	0.03	0.03	0.03	0.04	0.02	0.03	0.04
a_0	-0.3	-0.23	-0.36	-0.6	-0.33	-0.61	-0.6	-0.41	-0.68

a_0 – free member in the model; in parentheses is the time lag (years)

Source: Authors' finding

The statistical significance of the models (Table 5):

- Statistical significance at *p=0.05* of independent variables, confirmed by t-test;
- F-criterion, the empirical values for all models exceed the critical ones at the significance p=0.05;
- normal distribution of variables.

A quadratic function describes the impact of investment in innovation on companies' profitability and productivity. The positive effect of investment in innovation on labor productivity is manifested with a time lag of 1-4 years on the profitability of companies - 2-4 years. A time lag of 1 year is because time must pass when innovations are integrated into the production process and begin to generate income. When assessing the impact of investments in innovation on the profitability of companies, the minimum time lag is the payback period of assets, so it is longer than when investments begin to generate income. The maximum time lag is because investments in innovations provide a positive effect over a certain period when technologies or a range of products have competitive advantages, the positive impact of which exceeds the overhead costs associated with the depreciation of technologies, an increase in maintenance costs.

When building models (Table 5), we did not take into account the data of Ukrainian companies for 2022. Including these data in the overall sample would lead to a distortion of the results due to a significant deterioration of companies in 2022 for reasons unrelated to investment (violation of logistics, loss of sales markets, damage to property, expenses for business relocation, etc.). It was also not possible to statistically study the role of investments in improving the efficiency of Ukrainian companies based on data for 2022 only due to a time lag (Table 5). The calculated correlation coefficients between the share of investments in innovations (technological and product) and economic performance indicators of Ukrainian companies for 2022 (with a lag of 6 months) have indicated the presence of a statistically significant relationship (correlation coefficient 0.66-0.71). For other countries, this coefficient was 0.41-0.52. The results have indicated that investment's role in innovation in ensuring companies' efficiency and financial stability is especially relevant for Ukraine during the war and post-war reconstruction. Capital investments in innovations, especially digital ones, allow not only to increase demand and productivity but also to ensure safe working conditions in war conditions, to protect tangible assets from destruction (Sanders et al., 2020).

For financially stable and less capital-intensive SMEs, the increase in efficiency is more significant than for companies with low financial stability and high capital intensity with the same amount of investment in innovation. For companies with high financial stability and low capital intensity, the maximum elasticity of labor productivity from investment in innovation was 3.55%, Return on Equity 3.86%, and Return on Assets 2.60%. For companies with low financial stability and high capital intensity, these indicators amounted to 2.13%, 1.79%, and 1.97%, respectively.

CONCLUSION

The obtained results of the empirical study allowed us to conclude that capital investments in innovation positively impact the company's financial stability, even at a low level. With the increasing financial stability of industrial SMEs, the priority of capital investment is shifting from supporting production capacities by investing in fixed capital without its modernization to expanded reproduction and implementing innovative projects. Regardless of the financial stability, capital investment in innovation in the medium and long term provides higher performance indicators for industrial SMEs than investment in the renewal of fixed assets without their modernization.

Labor productivity and profitability grow faster as a capital investment in innovation increases. The lower return on investment in innovation at the initial stages of investment is due to the additional costs associated with integrating innovations into production without an appropriate infrastructure. A further increase in capital investment in innovation leads to increased labor productivity and profitability.

Consequently, industrial SMEs with low and medium financial stability, especially those with a reasonably capital-intensive production, are not interested in making capital investments in innovation due to a lack of funds and because of the priorities of managers' decisions. The lack of funds can be solved by providing targeted state subsidies for the innovative development of

companies. Also, the legislators can propose the base of preferential taxation for foreign investors to attract FDI for industrial SMEs with low and medium financial stability. To encourage managers finance innovation projects, it is recommended to use various incentives. It can be based on the cross-cultural characteristics of the countries' evaluation of salary bonuses for managers, career development for managers, and development of the company's corporate responsibility at the expense of income received from the investment.

The proposed events will contribute to the innovative development of the national economies of the GUAM member countries, as well as the search for new points of connection. It will not only allow promoting of the economic interests of some countries or coordination of transit potential but deepening economic cooperation.

It should be noted that the results obtained are based on a sample of SMEs from the industrial sector in Georgia, Ukraine, Azerbaijan, and Moldova. This limits the possibility of their implementation in other industries and regions of the world, as well as for large industrial enterprises. Features of the interaction of financial stability and capital investment in innovation in large enterprises and SMEs will be considered in our following scientific papers.

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