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CHANGES IN SUBSTITUTION OF BANK LOANS AND EU SUBSIDIES IN POLISH BUSINESSES

The aim of the article was to determine the degree of bank loan replacement by Polish businesses after profiting from EU help. The identification of similarities and differences was made among groups of enterprises that benefit or not from the state aid in the EU's successive financial perspectives, over the years 2007-2017. Changes in companies' assets and performance, and variables referring to the financial effectiveness, were analyzed. The logit model was used in order to define characteristics that have influence on the significance of determinants of financing with public subsidies. The cross-sectional nature of data allows for identification of a positive statistical relationship between subsidies and bank loans in medium-sized enterprises. In the course of the study it was established that companies receiving the state aid reduced their share of bank credits on balance sheet totals, as well as indebtedness in total. Over a period of time, the subsidizing has increased the importance and scope of using bank loans. State aid resources were used as a complementary source of capital for enterprises.

Key words: enterprise, bank loan, public subsidies, substitutability, complementarity

JEL Code: G02, M 21.

Introduction

The enterprises functioning within the European Union have at their disposal various forms of external financing. The demand on a specific source of capital depends on many factors, such as a company's development phase, investment needs, type of investment project, and chosen development strategy¹. Also the ways of acquiring each form of financing and their availability are diverse². The EU's financial perspectives, especially from years 2007-2013 and 2014-2020, created great opportunities to acquire co-financing for the activities of Polish enterprises. EU funds distributed on the union, national and regional levels are becoming more available. Subsidies are the main form of support while loans, sureties and guaranties are chosen to a lesser extent. Subsidies are more attractive financial alternatives for companies, especially in relation to bank loans, which are very popular in our financial system³. The attractiveness of public subsidies is generally due to the large amounts of capital injection, the opportunity to support innovative business ideas and investment tasks, as well as the lack of fees for using them. Assuming the use of subsidies in accordance with the assumptions of a project and

¹ K. Janasz, W. Janasz : Zarządzanie kapitałem w przedsiębiorstwie. Difin, Warszawa 2007, p.43.

² J. Kubiak H: Hierarchia źródeł krótkoterminowego finansowania przedsiębiorstwa. Wydawnictwo Akademii Ekonomicznej w Poznaniu, Poznań 2005, p.35.

³ M. Sołtysiak, P. Filip: Empirical analysis of the availability and changes in the use of bank loans by enterprises in selected countries of European Union. CEFÉ Technical University, Kosice 2018, p.69.

an agreement concluded with the entity which awarded the grant, subsidies become a non-returnable source of funding, which is a huge advantage in the area of financing. An important advantage of the EU subsidies is that they support investment activities for which raising capital, e.g. through a bank loan, would be significantly more difficult. On the other hand, in order to obtain public subsidies, certain requirements must be met, such as having the right qualifications and skills to submit applications, making own contributions, and taking the risk of losing time, strength and resources in the application process, often at the expense of ongoing operations and units' development. The capital structure of the companies may vary; however, the type of funding sources does not matter for investment decisions⁴.

Substitutability and complementarity of forms of funding

Changes in the attitudes and behavior of entrepreneurs towards forms of financing are subject to constant fluctuations, taking into account their openness, readiness to change, the effect of imitation, the need, willingness to adapt to the market and other factors. A closer analysis of these attitudes shows that changes in one area of the financial market (product), e.g. conditions for using bank loans, can cause changes in the approach to other financial products⁵. Bank loans and EU subsidies are currently popular forms of external financing, which may have a volatile contribution in the financing structure and funding of the needs reported by enterprises⁶. Changes may have a different nature of substitution, complementarity, and omission⁷. In economics, substitution products are goods and services that, thanks to similar features, functions or properties are replaced by each other in satisfying a specific need. Substitution goods compete with a given good and can replace it.⁸ In turn, complementary relationships are relationships based on mutual complementarity of products/services used to achieve the same goals⁹. Complementarity and substitutability may also occur between various forms of financing¹⁰.

Studies of a chosen trend of research focus on determining the role of each form of funding, the cost and availability of external financing, and development strategies of companies through their diversification¹¹. Although there are differences between

⁴ F. Modigliani, M.H. Miller : The Cost of capital, corporate finance and the theory of investment. American Economic Review 48/1958, p. 265, D.J. Denis, V. Mihov T: The choice among bank debt, non-bank private debt, and public debt: Evidence from new corporate borrowings. Journal of Financial Economics, 70(1)/2013, p. 28.

⁵ L.Jinhyuk, P.Jeaok: Pricing of complementary goods as implicit financial arrangement. Journal of Economics 55/2014, p.131.

⁶ A. Białek-Jaworska, A. Dzik-Walczyk, N. Nehrebecka: Determinanty finansowania działalności przedsiębiorstw kredytem bankowym: Metaanaliza. Bank i Kredyt 46(3), 2015, p. 253-298.

⁷ J. Marzec, M. Pawłowska: Substytucja między kredytem kupieckim i bankowym w polskich przedsiębiorstwach – wyniki empiryczne na podstawie danych panelowych. Bank i Kredyt 43 (6), 2012, p. 31.

⁸ Z. Dach: Mikroekonomia. Uniwersytet Ekonomiczny w Krakowie, Kraków 2012, p.101.

⁹ A.N. Berger, A. Cowan, W.S. Frame: The surprising use of credit scoring in small business lending by community banks and the attendant effects on credit availability, risk, and profitability. Journal of Financial Services Research 39(1-2) /2011, p. 1-17.

¹⁰ M. Lett : Structural models of complementary choices. Springer Science Business, New York 2014, p.210.

¹¹ Y. Altunbas, D.Marques, B. Zhussupova : Capital market frictions and bank lending in the EU. In: Frontiers of banks in a global economy. Palgrave Macmillan, Studies in Banking and Financial Institutions, London 2010, p.186.

subsidies and a bank loan, their economic interactions can be complex in business practice. The nature of the influence of grant and loan instruments can be considered in relation to the institution providing capital, i.e. a public institution (EU, government) and a private institution (credit institution, bank). The National Bank of Poland (NBP) analyses indicate that the sector of non-credit financial institutions does not create significant threats to commercial banks, as it is not a significant source of financing the economy in Poland.¹² However, in crisis situations there may be restrictions in supply on the credit market resulting in a reduction in lending, mainly for smaller companies and market shortages¹³.

There is evidence indicating the importance of state programs in the development of entrepreneurship in the economies of Eastern Europe and Central Asia¹⁴. Evaluations of the influence of public subsidies in developed economies focus on their role in strengthening research and development activity.¹⁵ Other studies indicate that the inclusion of public subsidies increases the scope for launching start-ups¹⁶. Since public interventions have become a common practice aimed at supporting the development of individual entrepreneurs, it is necessary to check whether public subsidies have measurable effects and additional effects, or just replace paid and repayable financing. Numerous analyses modeling the interactions between public and private instruments financing a company's development show that higher costs of external financing increase the optimal subsidy rate with an intensive interaction¹⁷. Some emphasize that the intensity of state aid (contribution of the financial value of the project), and not the absolute amount, significantly affects the development of companies and their potential¹⁸. In addition, emphasis is placed on the interaction between public subsidies and other forms, and the financial constraints of companies. Public funds combined with national institutional financing can help stimulate innovation in enterprises¹⁹. While reviewing the literature and previous studies, the following thesis was put forward that public intervention of decision-makers, focused on the policy of supporting enterprises, can help accelerate the development of these enterprises. Research was conducted to examine this thesis.

The aim of the study was to analyze and evaluate the use of non-returnable EU public aid in the financing of Polish enterprises over the years 2007-2017, in the context of identifying whether this was a change indicating the substitutability of application, or complementarity with bank loans. It was important to determine whether the state of

¹² NBP. Raport o stabilności systemu finansowego, Departament Stabilności Finansowej, Warszawa, 2018.

¹³ C. Masiak, A. Moritz, F. Lang : European SME financing: an empirical taxonomy. In: Moritz A., Block J., Golla S., Werner A. (eds) Contemporary developments in entrepreneurial finance. FGF Studies in Small Business and Entrepreneurship, Springer, Berlin 2019, p. 175.

¹⁴ He Y, Li B: Government financial subsidies in the influence of public housing under the PPP Financing Model. In: Wang J., Ding Z., Zou L., Zuo J. (eds) Proceedings of the 17th International Symposium on Advancement of Construction Management and Real Estate. Springer, Berlin -Heidelberg 2014, p. 295.

¹⁵ S. Mateut: Subsidies, financial constraints and firm innovative activities in emerging economies. Small Business Economics. Volume 50, Issue 1/2018, p. 131–162.

¹⁶ A. Kałowski, J. Wysocki : Start-up a uwarunkowania sukcesu, Oficyna Wyd. SGH, Warszawa 2017, p. 43.

¹⁷ L. Becchetti, A. Castelli : Investment—cash flow sensitivities, credit rationing and financing constraints in small and medium-sized firms. Small Business Economics 35/2010, p. 477.

¹⁸ Raport o pomocy publicznej w Polsce udzielonej przedsiębiorcom w 2017 roku. Departament Monitorowania Pomocy Publicznej UOKiK, Warszawa 2018, p. 23.

¹⁹ R. Cole: Bank credit, trade credit or no credit: evidence from the surveys of small business finances. MPRA Paper, 24689/2010, <http://mpra.ub.uni-muenchen.de/24689>.

change could be determined and the nature of the relationships and interactions of these forms of funding could be predicted based on the characteristics of the chosen sample under study and the scope of the study²⁰. The analysis was based on financial data obtained from the Info-Credit database for Polish companies active on the market since 2007. The reporting years 2007-2017 were taken as a period of analysis. The sample was selected using the targeted method while maintaining the representativeness of the Polish economy, determined on the basis of the structure of non-financial entities of the Central Statistical Office of Poland (GUS) in terms of size, location for macro regions and type of activity existing in the initial year of the undertaken research. After the elimination of incomplete financial data from the annual separate reports, the study covered 3435 enterprises.

Forms of external financing – results

At the stage of identifying the research problem, an important initial goal was to answer the question of which companies use financing methods and what is the scope of that use. By using information about the forms of capital obtained from outside, it was possible to determine decision preferences in the area of foreign capital allocation, assess the popularity of forms of funding, and define to what extent companies benefit from the support of EU funds. The changes may indicate some trends in the business enterprise sector.

Table 1. Scope of enterprise use by forms of financing and their changes

Number of enterprises		Research interval						2017/2007 (%)
		2007-2009		2010-2013		2014-2017		
		N	%	N	%	N	%	
Acquired projects with EU support	0	3089	89,4	2710	78,4	2900	84,4	-5,0
	1-2	351	10,1	660	19,1	432	12,6	8,6
	3 and more	15	0,5	85	2,3	103	3,0	2,4
Long-term loans		1374	40,0	1317	38,4	1351	39,3	-0,7
Short-term loans		1847	53,8	1996	58,1	1995	58,1	4,3
Trade credit		3150	91,7	3217	93,7	3222	93,8	2,1
Leasing		0	0	156	4,5	199	5,8	5,8
Other forms		249	7,2	455	13,3	609	17,8	10,6

Source: Author's own calculations.

Enterprises use many sources at the same time. Their volatility in time confirms adjustment to new financing options (Table 1). There was less interest in long-term loans and more interest in leasing and other modern forms of financing. High growth was noted in a group of other forms of funding (increase by 10.6%). A second significant growth was recorded in the group of enterprises benefiting from EU support. An increase

²⁰ EU subsidies will be used in the description interchangeably with the terms non-repayable state aid, subsidies, grants, public aid.

in enterprises benefiting from two and three EU support projects was found: 8.6% and 2.4%, respectively. In the group of companies benefiting from community funds, the largest number of enterprises benefited from the support at the end of the first financial perspective. Research in European countries during this period showed that, on average, the beneficiary received co-financing most often from two projects. However, higher quotas for public funding are found in the new member states²¹. Statistics determining the number of obtained EU projects in the studied group reveal statistically significantly higher average values of individual projects in the last financial perspective. Projects with the highest expenditures were usually carried out by small and medium-sized companies in education, public administration as well as in professional, scientific and technical activities. The number of enterprises implementing three or more projects accounted for only 3% of the total. The rate of change in the scale of such financing was similar to using a trade credit. A change in a short-term bank loan with a 4.3% growth rate indicates constant and stable loan financing, especially in the latest study interval.

The size of the company, related to an increase in the scale of operations, may determine the choice of funding sources (Table 2). The values of Chi-squared test and probability value ($p < 0,05$) allow to state that in each of the three time intervals there is a statistically significant differentiation of types of external financing depending on the size of the company.

Table 2. Diversification of financing methods, depending on the size of the company, including the use of bank loans and EU subsidies - the results of the test χ^2

Interval	Size of company	Type of external financing						χ^2 [p]
		Not found	Bank loans	EU subsidies	Bank loans and EU subsidies	Bank loans, EU subsidies, leasing	More sources (> 4)	
		The values						
2007-2008	Small	26,7	49,9	-13,9	-76,0	25,5	-12,1	125,33 [0,000]
	Medium	-24,2	-43,5	6,4	66,4	-13,3	8,2	
	Large	-2,5	-6,4	7,5	9,6	-12,2	3,9	
2010-2013	Small	24,4	74,4	58,1	-14,3	-105,1	-37,5	265,90 [0,000]
	Medium	-20,4	-74,9	-47,8	15,0	91,9	36,2	
	Large	-4,0	0,5	-10,3	-0,7	13,3	1,3	
2014-2017	Small	27,1	86,3	48,5	-2,2	-107,8	-51,9	293,68 [0,000]
	Medium	-23,1	-81,6	-43,8	3,4	95,7	49,4	
	Large	-4,0	-4,7	-4,6	-1,2	12,1	2,4	

Source: Author's own calculations.

²¹ In the EU, 17% of beneficiaries implement more than one project, 3% have more than five and only 1% more than ten (since 2007). The entrepreneurs from Spain and Italy are beneficiaries of the largest number of projects, J. Bachtrögler, C. Hammer, W. Heinrich, R.F. Schwendinger: Guide to the galaxy of EU regional funds recipients: evidence from new data. *Empirica*, Volume 46, Issue 1 /2019, p. 107.

The residuary numbers indicate that in small enterprises no source was used to a greater extent than in the others, or only one source was used, mainly from bank loans. This observation applies to the entire period under investigation. The increase in the use of EU budget funds in small companies took place only in the second financial perspective²². Among small companies, the number of those companies that used loans, subsidies and possibly a third source, e.g. leasing, decreased significantly during the second and third time intervals. This is demonstrated by the size of this segment of companies (-107,8). Empirical numbers in these cases are higher than those resulting from the theoretical distribution.

In the years 2007–2008, medium-sized companies used the combination and support of bank loans with available EU subsidies to a greater extent than in other companies. Medium-sized enterprises, more than the large-sized, were prepared to compete on the financial market for non-returnable state aid funds from the EU, which, given their activity, gave grounds for their stable development. In the opinion of the banks, state aid significantly limited the demand for loans on the part of enterprises²³. In the second and third time intervals, these companies also increased interest in new forms of external financing characterized by quantitative and structural diversification (three and more, including leasing, as well as other forms, mainly long-term). The number of small companies that used many sources also decreased significantly.

In the years 2014-2017, large companies experienced a phenomenon of higher-than-expected interest in combining various external forms of financial supply, generally in terms of increasing the scope and forms of capital supply. The empirical numerical amount for this group was higher than resulting from theoretical distribution. Research shows that business experience, knowledge and skills allow managers of large companies to choose other, more appropriate ways of financing their business²⁴. Large enterprises, due to their resources, can more easily afford financing with more difficult external capital. For creditors, the resources of these companies are the guarantee for the return of funds. Repayable and payable external financing has a higher maturity requirement.

The next stage of the study analyzed companies that combined bank loans and EU public funding in financing methods. Changes in enterprises benefiting or not from EU public aid are presented against the background of changes in basic financial parameters recognized as average in the annual financial statements.

The used statistics indicate differences in the obtained results if these two opposing groups are compared (Table 3). Enterprises benefiting from state aid had large amounts of this source of funding. This is indicated by the average value of EU co-financing, which in this group was over 50% higher than the average total bank loans taken. Companies with higher revenues implement projects with a higher total value. The average value of a single

²² A. Jaworska: Porównanie perspektyw finansowych 2007-2013 i 2014-2020 w Unii Europejskiej na przykładzie Polski, wyd. Uniwersytet Warmińsko-Mazurski w Olsztynie, Olsztyn 2016, p. 19.

²³ Sytuacja na rynku kredytowym -wyniki ankiety do przewodniczących komitetów kredytowych, Departament Stabilności Finansowej Warszawa, NBP 2020

²⁴ G. Hernandez-Canovas, P. Martinez-Solano: Relationship lending and SME financing in the continental European bank-based system. *Small Business Economics* 34/2010, p. 46.

project for large companies is only about twice as high as for small entities²⁵. The share of non-returnable EU funding in the foreign capital structure was 22%, but only 7% in the entire capital structure. The average value of financing through bank loans was, in relation to enterprises that did not benefit from EU projects in the period, only by 5% lower, expressed as the average value. The ratio of short-term and long-term loans to the total of balance sheet of capital fluctuated around 19% and was slightly lower than in the group without funding. Companies from Section C - Industrial processing, and Section E - Water Supply, have taken more often the advantages of co-financing; then Sewage and Waste Management and Recultivation activities, and much less frequently, Section G - Wholesale and Retail Trade, Repair of Motor Vehicles, including motorcycles. This is probably due to the nature of EU assistance.

Table 3. Selected statistics for the resource and results of the companies benefiting and not benefiting from EU subsidies - average results (thousand PLN)

Financial positions	Possession EU projects		T-value	Df	Significance (p)	Valid	Standard deviation (SD)	F-ratio
	Yes	No						
Value of EU projects	11184	0,0	7,33957	2478	0,00000	561	66784	0,000
Loans (total)	7253	7686,5	-0,28850	1388	0,77300	396	19383	1,981
Assets (total)	175773	87358,0	4,32870	2478	0,00016	561	713529	5,967
Net revenues from sale of goods and materials	149350	71465,9	1,86335	2194	0,06256	511	163505	32,28
Net revenues from sale of products	111055	80241,7	2,03426	2285	0,04201	543	330848	1,209
Net profit (loss)	9383	5868,9	2,41448	2478	0,01583	561	50096	5,509
Loans /Liabilities	0,19	0,21	-2,04498	866	0,04115	303	0,1	1,488
EU subsidies/ /Liabilities	0,07	0,00	23,24377	2478	0,00000	561	0,1	0,000
Loans /Debt	0,35	0,40	-3,43862	866	0,00061	303	0,2	1,492
EU subsidies /Debt	0,22	0,00	14,32599	2478	0,00000	561	0,7	0,000

Source: Author's own calculations.

²⁵ J. Bachtröglger, C.Hammer, W.H.Reuter : Guide to the galaxy of EU regional funds recipients: evidence from new data. *Empirica* Volume 46, Issue 1/2019, p.13. .doi.org/10.1007/s10663-018-9427-5.

Table 4. Summary of selected financial indicators of enterprises using and not using EU subsidies - average results (%)

Indicators	Possession EU projects		T-value	Df	Significance (p)	Valid	SD	F-ratio
	Yes	No						
ROA indicator	6,34	7,45	2,46467	2415	0,013783	554	7,4	1,782
ROE indicator	14,99	21,80	-0,37299	2415	0,709189	554	36,3	139,234
ROS indicator	4,80	5,04	-0,46965	2415	0,638650	554	15,5	3,366
Business profitability rate	5,78	5,92	-0,25917	2415	0,795525	554	16,0	2,919
Current liquidity ratio	2,76	3,30	-2,64070	2415	0,008327	554	3,5	1,626
Quick liquidity ratio	1,84	2,22	-2,50083	2415	0,012456	554	2,5	1,662
Inventory turnover rate [days]	60,50	87,68	-0,46517	2296	0,641857	543	313,0	18,600
Receivables turnover ratio [days]	52,26	57,81	0,65278	2415	0,513963	554	38,8	1,519
Liabilities turnover ratio [days]	83,60	74,20	2,06462	2415	0,039066	554	67,3	2,240
Debt level indicator	0,39	0,40	-1,10980	2415	0,267195	554	0,2	1,055
Solvency ratio	0,53	0,55	-1,82942	2415	0,067460	554	0,2	1,156

Source: Author's own calculations.

The group of enterprises benefiting from state aid in the form of submitted and implemented EU projects was also characterized by high value of assets, high revenues from basic operating activities, mainly from product sales, as well as a high level of generated net profit. These values turned out to be statically significant. Estimates of the average population from the sample distribution of average samples with the T-value test – the levels of significance are indicated by these relationships. The standard deviation of the studied populations defines narrow values around the mean of these parameters. Enterprises not using EU funds had a slightly higher burden on the capital structure and total repayable debt and bank loans. Loans accounted for 40% of the total debt of these companies.

Financing development with external capital can improve the efficiency of owned resources, but it also involves certain risks. Financial results and their relationships reflect the financial benefits obtained for enterprises and indicate potential threats. The key is to choose the right indicators for one's business. In analytical terms, enterprises benefiting from financing through projects from EU funds were characterized by better indicators for inventory turnover, trade receivables and payables as well as solvency ratios, although the nominal differences were not large. In average annual terms these units achieved paradoxically less favorable assessment parameters in the area of measuring profitability as

well as current and quick ratio. Significant relationships between the examined groups have been confirmed for the indicators of return on assets, current and quick ratio as well as total liabilities rotation. The components of these indicators were closely related to the use of non-returnable public aid in funding business operations, which is why statistical modeling was used to determine the final results.

Analysis of enterprises benefiting from co-financing from EU programs – a probit model

The presented analysis of descriptive statistics indicates a significant difference between companies reaching for co-financing from EU programs as compared to enterprises not doing so. The question arises how to synthetically characterize both groups of enterprises. To this end, a probit model was built to determine whether the company uses funding. In statistics, the probit model is a type of regression in which the dependent variable can have only two values. The model was estimated using the standard highest probability procedure²⁶. Data from the financial statements and financial indicators constituted a set of variables from which explanatory variables were selected. The sample consisted of all enterprises, of which exactly half benefited from EU funding. Such balancing of the sample was implemented to improve the assessment of model parameters.

The prediction includes previously calculated variables and co-financing amounts. In the first step, all variables were taken into the model. The number of 'correct predictions' was 69.2%, and Akaike's information criterion was 1224.67. In this way, the upper limit of achievable 'correct predictions' was obtained. Of course, only some of the variables were statistically significant, so using the parsimony principle, the variables contributing least to the model were rejected, trying to maintain a high number of correct predictions and obtaining statistical significance of the variables. In addition to statistical criteria, the interpretation of variables: nominal values, financial ratios and correlation coefficients of explanatory variables with the explanatory variable had a significant impact on the model's construction.

For the financial indicators for each of the groups (profitability, financial liquidity, debt, activity), the indicator that had the highest p-value in the probit model, based on indicators from a given group, was searched for. The indicators that best served the prediction were asset profitability (with a plus sign), quick ratio (with a plus sign), debt level indicator (with a minus sign) and receivables turnover ratio (with a plus sign). Nominal variables from the financial statements were treated similarly. After taking into account the previously mentioned criteria, a probit model was built, for which the number of 'correct predictions' was 56.3%, and the Akaike information criterion was 1424.78. The marginal effect was determined for average variable values. The model results are summarized in Table 5.

²⁶ M. Gruszczyński: *Modele i prognozy zmiennych jakościowych w finansach i bankowości*. Monografie i Opracowania nr 490, Oficyna Wydawnicza Szkoły Głównej Handlowej, Warszawa 2001, p.89.

Table 5. Results of the enterprise probit model

Description	Coefficient	Standard error	Marginal effect	<i>z</i>	<i>p-value</i>	
Constant	-0,0593454	0,0441103		-1,3454	0,17850	
Assets	1,059e-06	4,98935e-07	4,21528e-07	2,1225	0,03379	**
Liabilities and reserves	-2,19735e-06	8,15248e-07	-8,74638e-07	-2,6953	0,00703	***
Net profit/ net loss	8,61794e-06	2,92603e-06	3,4303e-06	2,9453	0,00323	***
Net revenues from the sale of products	1,17183e-06	3,6756e-07	4,66439e-07	3,1881	0,00143	***

Source: Author's own calculations.

The results of model estimation are consistent with descriptive statistics of enterprises benefiting from EU funding. On average, these enterprises have more than twice as many assets, over 70% more revenue from the sale of products, goods and materials, and nearly 60% more profits, with these differences being statistically significant. The overall debt ratio is on average statistically significantly lower in this group of enterprises. This is reflected in the parameter assessment marks, because replacing debt with equity and expanding the sources of funding with equity increases the likelihood of receiving funding. If we relate these two strategies to the interpretation of marginal effects calculated in relation to average values, it turns out that the probability of receiving funding increases 1.27 times faster when the first strategy is used and it results from the quotient of marginal effects. An indicator of return on equity and return on assets can be created from the model variables. In both cases, these indicators had a lower level among companies that received funding, so that only the second indicator was significantly lower. This certain lack of consistency results from the fact that the nominal values, which testify to the size of the company, were much more important for the prediction of the fact of receiving funding.

The second step in modeling the enterprise benefiting from the assistance of EU programs is the prediction of the amount of funding. For this purpose a classic multiple regression model was built. It was largely expected that the variables that served to assess the likelihood of obtaining funding would serve just as well when estimating the amount of funding. The results turn out to be very interesting in terms of assessing whether EU funds are substitutionary or complementary to a bank loan. The adjusted coefficient of determination was 0.632894. The results of the estimation are presented in Table 6.

Table 6. Results of the multiple Regression model

Description	Coefficient	Standard error	t-Student	p-value	
Constant	-6675,4	3489,52	-1,9130	0,05671	*
Long-term loans	0,998899	0,345341	2,8925	0,00410	***
Short-term loans	1,17736	0,098816	11,9146	<0,00001	***
Assets	0,247694	0,0194571	12,7303	<0,00001	***
Liabilities and reserves	-0,491969	0,0325157	-15,1302	<0,00001	***

Dependent variable (Y): Volume co-financed from EU programs in thousands of PLN. Estimation (Classical Least Squares)

Source: Author's own calculations.

It turned out that the key variables for assessing the amount of EU aid are the value of short- and long-term loans. No other system of variables without these two variables allows to estimate the amount of co-financing as well as the above-mentioned model. Note that, similarly to the probit model, replacing foreign capital with equity capital and increasing the sources of financing with equity capital leads to an increase in the amount of funding. While interpreting the assessment of parameters, we get that with the first strategy, the replacement of 1,000 PLN debt through equity increases the level of funding by 0.49 thousand PLN; whereas with the second strategy, increase in equity by 1,000 PLN increases the level of co-financing by 0.25 thousand PLN at *ceteris paribus*. The amount of co-financing increases almost twice as fast when the first strategy is used and it results from the quotient of assessments of parameters. An interesting conclusion arises when we juxtapose model results with the results of statistical tests. The emergence of EU assistance significantly reduced the relative share of loans in the balance sheet total and foreign capital, which means substitutability between EU funds and loans. On the other hand, assessments of the model parameters indicate that as soon as the company receives funding, it goes hand in hand with almost a zloty-to-a-zloty (assessment of parameters close to one) with a bank loan. Enterprises benefiting from the aid are on the one hand less dependent on a bank loan (smaller share of loans in foreign capital), but on the other hand they take larger loans on average, if it is possible to co-finance with EU funds, which in turn allows for carrying out investments that would have been too heavy a burden if they had been implemented only with the help of a bank loan.

Summary

The research found that changes in bank loan substitution and subsidies in enterprises result from changes in the socio-economic environment related to the possibilities of obtaining financing from EU assistance funds in subsequent financial perspectives. The emergence of EU assistance in enterprises reduced the share of loans on the balance sheet total and foreign capital. This indicates substitutability between EU funds and a bank loan. Public aid funds for small enterprises as the main source of funding were significant, especially immediately after the period of the first financial perspective, after 2014.

Complementarity between lending and public financing was found in large and medium-sized enterprises that use state aid. Replacing payable forms of financing with non-returnable funds increases the likelihood of receiving more funding, as does expanding funding sources. The assessment of the parameters of the employed econometric models indicates that if the possibility of co-financing with EU funds existed in enterprises, the level of credit level increased simultaneously. Thus, a phenomenon of supplementation between the examined forms of financing was found in enterprises that had used EU funding at least once. On average, companies take out larger loans. The phenomenon of complementarity between subsidies and bank loans took place to a greater extent in medium-sized companies. EU funds have in no way rendered banking products superfluous to the financial needs of enterprises, and it can be said that they have even led to an increase in lending. This can be a good omen for the development of Polish enterprises and strengthening their market position. External assistance from EU grants strengthens the Polish financial system on a complementary basis. The thesis that public intervention focused on the policy of intentional support of enterprises may help accelerate the development of these enterprises has been positively verified.

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Zmiany w substytucji kredytu bankowego i dotacji UE w polskich przedsiębiorstwach

Streszczenie

Celem artykułu było określenie stopnia zastępowania kredytu bankowego przez polskie przedsiębiorstwa w sytuacji korzystania z pomocy unijnej. Identyfikacja podobieństw i różnic została przeprowadzona w grupach przedsiębiorstwa korzystających i nie korzystających z pomocy publicznej, w następujących po sobie perspektywach finansowych UE tj. w latach 2007-2017. Analizie poddano zmiany w zasobach majątkowych i wynikowych przedsiębiorstw oraz zmienne dotyczące efektywności finansowej. Wykorzystano model logitowy w celu określenia cech wpływających na istotność determinant finansowania dotacjami publicznymi. Przekrojowy charakter danych pozwala zidentyfikować pozytywny statyczny związek między dotacjami a kredytami bankowymi w średnich przedsiębiorstwach. W toku badań ustalono, że uzyskanie pomocy publicznej w przedsiębiorstwach obniżyło udział kredytów bankowych w sumie bilansowej jak i zadłużeniu ogółem. W dłuższym okresie otrzymane dofinansowanie spowodowało wzrost znaczenie i zakresu korzystania z kredytów bankowych. Środki pomocy publicznej były komplementarnym źródłem zasilenia kapitałów przedsiębiorstw.

Słowa kluczowe: przedsiębiorstwo, pomoc publiczna, kredyt bankowy, komplementarność.
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