
Do European Union Funds Have an Impact on the Volume of Corporate Lending? The Case of the Czech Republic, Slovakia and Poland

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Beata Zofia Filipiak¹, Marek Dylewski²,
Marcin Kalinowski³, Grzegorz Krzykowski⁴

Abstract:

Purpose: The research problem of this article is to determine the existence of a direct relationship between the EU funds spent and the volume of bank lending in the corporate sector in the Czech Republic, Slovakia and Poland.

Design/Methodology/Approach: The statistical analysis aimed to achieve the objective of this study consisted in revealing some interesting associations between the variables: EU funding to individual countries and lending to non-financial companies in the category of short and long-term loans. A linear regression analysis procedure was carried out, and an additional tool to support the course of the study was a relationship analysis measured by the Pearson's product moment correlation coefficient of the individual variables.

Findings: The research hypothesis adopted was that EU funds significantly modify the market for credit services offered by banks and, therefore, EU funds have an impact on the volume of bank lending in the corporate sector. The absorption of EU funds, based on the observation of their disbursements in the countries concerned which are members of the Community, demonstrates basically a similar regularity. This is consistent with the process of the implementation of programmes under particular EU perspectives. However, EU funding for the Czech Republic and Slovakia has a similar structure, and it can be seen that an increase in funding is in line with a decrease in lending (short-term loans) while this phenomenon does not occur in Poland.

Practical Implications: The research results can be used by EU funds disposers as well as by banks authorities to create their future policy.

Originality/Value: Original research.

Keywords: European Union funds, corporate lending.

JEL Classifications: G11, G15.

Paper type: Research article.

¹Institute of Economics and Finance, University of Szczecin,
e-mail: beata.filipiak@usz.edu.pl ORCID: 0000-0002-5480-5264

²WSB University in Poznan, Poland, e-mail: mdylewski@wsb.szczecin.pl
ORCID: 0000-0003-0168-2798

³WSB University in Gdansk, Poland, e-mail: mkalinowski@wsb.gda.pl
ORCID: 0000-0001-8355-1569

⁴WSB University in Gdansk, Poland, e-mail: gkrzykowski@wsb.gda.pl
ORCID: 0000-0003-0321-7275

1. Introduction

EU aid programmes, the transfer of public non-refundable funds between countries is a matter for public opinion and public sector authorities in all the EU countries. Efficiency in spending EU funds seems to be a key issue. A lot is written on that subject in the source literature, pointing to allocations and expectations related to the use of EU funds (Structural Research Institute, 2011; Misiąg *et al.*, 2013; Sosińska-Wit, 2014; Gadziński, 2014; Sorychta-Wojczyk and Musioł-Urbańczyk, 2016; Vojtovič, 2016; Śliwka, 2016; Stricik, 2007). It is indicated that EU funds mitigated the impact of the financial crisis on the Polish, Czech and Slovak economies in the EU financial perspective in the period 2007-2013. Currently, the economies referred to above are faced with the opportunity offered by the potential inflow of funds in the 2014-2020 EU perspective.

The source literature lacks extensive research concerning analyses of the direct impact of EU funds on various spheres of the national economy. Also, there is a lack of extensive research on the impact of EU funds on various groups of actors, as well as on overall economies within the EU (Grima and Thalassinos, 2020; Thalassinos *et al.*, 2015a; 2015b; 2019). The priority (key) considerations include those concerning applications and projects supported with EU funds, impact on the labour market in the form of the number of jobs supported, R&D projects financed, or impact on human capital and the social sphere. All documents and information are evolving, and the research most frequently focuses on the impact of EU funds on GDP, employment and economic growth (Beutel, 2002; Hagen and Mohl, 2008; Kehagia, 2013; Claudiu and Goyeau, 2013; Rinaldi and Núñez 2017; Kaiser and Prange-Gstöhl, 2017). There are also views that EU funds do not contribute sufficiently to the development of the EU Member States, but these are not supported by concrete data (the exception is the raw data and forecasts of R&D expenditure in relation to GDP) (Czepiel, 2016).

The authors of this study address the problem of the co-occurrence of the lending activities undertaken by commercial banks with obtaining EU funds. They make an attempt to answer the question as to whether these EU funds that are assigned to particular EU countries have an impact on decisions taken by commercial banks concerning the volume of lending. Thus, they want to determine whether EU funds modify the credit services market. In the previous studies, there is a preliminary confirmation that EU funds in Poland have an impact on the form of the credit services market (Filipiak and Dylewski, 2019).

Poland is a country with a national currency and which has not yet adopted the euro. The authors intend to answer the following question: have these countries that functioned in the same economic and political system as Poland undergone the same political changes (political transformation)? They joined the EU structures at the same time, and they receive EU financial support (EU funds), there occur the same dependencies as in Poland (implicitly, relationships between the exposure of

dedicated funds and the volume of lending). Therefore, having conducted preliminary research in Poland (Filipiak and Dylewski, 2019) the results of the research will be deepened and compared with the results of similar observations in Slovakia and the Czech Republic.

In view of the motives referred to above (including the non-adoption of the single currency, the use of EU support and the political changes that have occurred), the selection of the states for the research seems to be appropriate. The research problem is to determine the existence of a direct relationship between the EU funds spent and the volume of bank lending in the corporate sector in the Czech Republic, Slovakia and Poland.

This question is of relevance and it is addressed in the literature as empirical studies on the effects of regional asymmetries on corporate finance that are very scarce, and hence this research is highly relevant since Poland is not alone in facing significant regional disparities (Palacín-Sánchez *et al.*, 2013; Filipiak and Dylewski, 2019). Many countries, such as Spain, Italy, Australia, the United States, China, India, Brazil, and Russia present differences in the regional institutional environment (di Pietro *et al.*, 2018). In view of geopolitical similarities, membership in economic communities, will the Czech Republic, Slovakia and Poland exhibit the same similarities in terms of market response to the intervention related to the change in the structure of financing of enterprises caused by an increased use of EU funds? Will the financial institutions of the Czech Republic, Slovakia and Poland react to the availability of cheaper resources or direct development grants for companies that are derived from EU funds? There is a lack of empirical research in this area and, as already indicated, the EU policy is intended to contribute to the levelling of financial asymmetries between regions and countries.

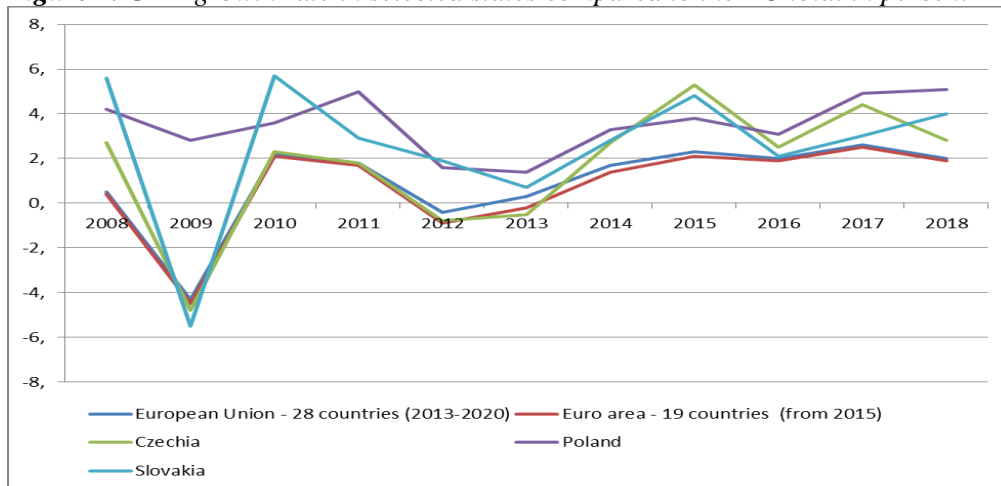
2. Theoretical Background

In the first years of the Czech Republic, Slovakia and Poland's membership in the European Union (2004-2006), the impact of EU funds on the economy was rather insignificant and, starting from 2007, a strong correlation between the value of EU funds and the main macroeconomic indicators was observed. Also, in this period, there was an increase in gross fixed assets expenditure (Rutkiewicz, 2011; Šikulová, 2014). It should be emphasized that the research conducted indicates that the importance of EU funds for the economy in the first years of the common policy was relatively insignificant, as it was related to the low involvement of EU funds in that period. This situation was evident both in Poland and other states that were joining the EU, including Slovakia and the Czech Republic.

It has also been estimated that the greatest increase in GDP growth occurred in the years of 2010-2014. The same period also saw a strong increase in investments (Dudas, 2010; Rutkiewicz, 2011; Barič, 2017). The impact of EU funds on GDP

intensifies with an increase in the intensity of the absorption of EU funds, with a peak in the last years of the perspective, and then it weakens (Figure 1).

Figure 1. GDP growth rate in selected states compared to the EU total in percent



Source: Eurostat.

The analysis of the data presented above clearly indicates that the GDP increases with an increased inflow of EU funds to individual countries. There is also a clear decrease in GDP on the boundary between two EU financial perspectives (one ending in 2013 and a new one beginning). In 2015, the Financial Perspective of 2007-2013 ended definitively (the $n+2$ rule, which means the eligibility of expenditure from EU projects for two more years starting from the end of the financial perspective, i.e., if projects with funds granted until the end of 2013 were implemented, then from the Financial Perspective of 2007-2013, expenditure could be incurred until the end of 2015) and from that moment on, a clear decrease in GDP is evident. Launching of new calls and the implementation of projects in the 2014-2020 Perspective reversed these trends, but not as significantly as in the previous Perspective. Starting from the year 2017, a decrease in GDP has been observed in the Czech Republic, in line with the trend in the entire EU, and there is an opposite situation in Poland and Slovakia, where GDP growth is still noticeable.

Maintaining a higher level of GDP compared to the baseline scenario would be possible, with other factors remaining unchanged, assuming that the absorption of cohesion policy funds continues on the current level, or if these funds are replaced by adequate own resources (Kaczor and Soszyński, 2011; Morvay, 2016; Ancyparowicz, 2017). The role of EU funds in improving the quality of life of residents is also growing (Czudec, 2017). This role of EU funds, as a factor that positively changes regions and society, mitigates poverty and supports levelling of social differences and opportunities, is undeniable.

The European Union, through various programmes, seeks to support national economies as well as the economy on the common European market (Cristea and Thalassinos, 2016; Rupeika-Apoga *et al.*, 2018). Support for enterprises is one of the most important objectives of individual Member States in the field of supporting the regional development as well as stimulating an improvement of GDP as a measure of economic development. The system of supporting the development of enterprises includes various instruments. The most frequently mentioned ones include financial and non-financial instruments (Filipiak and Ruszała, 2009) and programmes that support enterprise based on the use of European Union funds. Enterprises have access to direct support (in particular, through grants and subsidies) and to indirect support through various targeted programmes. Direct support programmes include those financed from the EU Structural Funds. Indirect instruments include, among others, tools that facilitate access to credits and loans (Leonski, 2015). This remains an unexplored field, and hence no strong theory exists that would explain the relationships between these variables, debt and EU funds (Grima and Thalassinos, 2020).

One of the most important barriers that affect the development of enterprises, including SMEs in particular, is considered to be a capital barrier, i.e., restrictions in access to external sources of financing (Rossi, 2014; Morvay, 2016; Sobolewski, 2018). An impeded access to these sources results primarily from a relatively low level of the company's assets and generation of low income, which often does not provide sufficient security to guarantee the return on the capital (Filipiak and Ruszała, 2008; Rossi, 2014; Sobolewski, 2018; Raport, 2018). These factors also constitute a determinant that makes it impossible to obtain funds, e.g., in the form of a share or bond issue. Capital barriers may also be associated with high costs of obtaining specific forms of financing; for example, for loans, these may include interest rates, fees, commissions, insurance or additional collateral costs (Majkova, 2008; Gorczyńska, 2014).

A capital barrier may appear in varying degrees of intensity in the individual phases of the company life cycle (Gorczyńska, 2014; Rossi, 2014). This means that the banking sector, as one of the key components of the financial system, has a direct impact on the financial structure of firms since its mission is to provide them with resources (Demirgüç-Kunt and Maksimovic, 1999; di Pietro *et al.*, 2018). A developed financial sector facilitates access to debt, given that it channels savings into credit more efficiently. Moreover, as Diamond (1984) and di Pietro *et al.* (2018) argue, these intermediaries enjoy economies of scale in obtaining information about client companies. This allows them to reduce the problems of asymmetric information, which are especially pronounced for SMEs.

The business sector, when seeking capital, in the absence or limited possibilities to take out a credit or to obtain funds directly from the financial market, uses indirect instruments in the form of loans and loan guarantees as well as grants and subsidies

in the form of projects obtained and co-financed through EU programmes (Živělová *et al.*, 2002; Rossi, 2014; Pociovalisteanu *et al.*, 2010; Ugurlu *et al.*, 2014).

It should be noted that over time, the structure of capital changes in various ways, depending on the size of companies, their specificity and industry, as shown by research conducted in different countries (van'tHul, 2014; Rossi 2014; Raport, 2018). The source literature also indicates that it depends on a number of factors, and the following in particular: on the national (regional) level, on the industry and enterprise level (Bates, 1971; Titman and Wessels, 1988; Ang, 1991; Petersen, Rajan, 1994; van'tHul, 2014; di Pietro *et al.*, 2018). Studies related to national and enterprise level factors suggest that there are differences in the capital structure of SMEs and large companies and that the leverage ratio is a function of several enterprise characteristics (van'tHul, 2014; Rossi, 2014). This survey result suggested that the debt is higher in less developed countries (Pietro *et al.*, 2018).

The change in the structure of capital financing companies may be influenced, among others, by EU funds distributed for specific purposes, but also by the level of development within the community (Mokhova and Zinecker, 2013). On the one hand, EU funds make it possible to even out differences in the development of companies in less developed regions (such as Poland, Slovakia or the Czech Republic) with highly developed EU countries (such as Germany, France). On the other hand, by increasing the competitiveness of enterprises, through access to lower-interest loans, as well as through access to subsidy money (within the framework of EU projects), they may distort the money and the capital market. Ecke and Türck (2006) emphasized positive aspects of the impact of cohesion policy on economic growth and regions convergence. The source literature states that *“Increased bank funding costs and debt-to-asset ratio of borrowers are negatively related to an access to finance. Use of government subsidies improves access to finance”* (Öztürk and Mrkaic, 2014).

Enterprises, while having access to capital in the market, which is not interest bearing or its price is much lower than the money offered by banks and financial institutions, will seek to obtain capital at a more favourable price. As research shows, banking procedures, as well as formal requirements imposed by banks and financial institutions, constitute a significant constraint for enterprises, especially SMEs, to take advantage of the offer of these institutions (European Small, 2018). Moreover, there is a view in the literature that *“commercial credit for small firms in times of tightening conditions complements, and not substitutes, bank loans”* (Psillaki and Eleftheriou, 2014).

There is no doubt that EU funds do have an impact on GDP, on local and regional development and on the competitiveness of businesses, although they are not intended to distort the market mechanism. Nevertheless, they undoubtedly distort the market both on money demand and money supply sides. No direct relation between EU funds and the policy of banks towards enterprises has been demonstrated in the

literature, taking into account e.g., the structure of enterprises in Poland. The research has shown that there are problems with economic relations and mechanisms of inner democracy, their value systems, traditions, morale and procedures (Vojtovič, 2016), so microenterprises have the greatest problems using EU funds.

In the EU Financial Perspective of 2007-2013, one of the objectives of the projects implemented was to improve the innovativeness and competitiveness of enterprises and, within this framework, to improve the environment in which enterprises operate and to facilitate their access to external financing by creating instruments aimed at building a friendly institutional and capital environment, leading to the development of existing and new enterprises, and SMEs in particular. In the current EU Perspective (2014-2020), it was assumed that financial instruments would be used in the process of the implementation of EU funds by moving away from traditional subsidy support offered to beneficiaries to the support of financial intermediaries (e.g. loan funds, guarantee funds or municipal funds), which transfer funds to final recipients.

It needs to be stressed that once the financial instruments have been repaid, they continue to be used for the same purpose. This means that, in the new Perspective, they will complement those funds that are primarily intended to support SMEs (Programme implementation..., 2018). A large portion of the EU funds for poorly developed EU Member States will (and already is) directed to SMEs as financial instruments. At this stage, it is not yet possible to precisely indicate the target volume, but it is certainly necessary to indicate that it will be supplemented with funds from the old EU Perspective. Thus, EU funds have a significant impact on capital requirements in the form of, for example, loans from the business sector, as support is provided directly through project co-financing and indirectly through financial instruments. One needs to bear it in mind that EU funding for projects will require a contribution on the part of the enterprise.

3. Research Objective, Methodology and Data

The aim of this paper is to identify and assess the relationship between the volume of EU funds absorbed by the individual countries under examination and the volume of lending in the corporate sector in the Czech Republic, Slovakia and Poland. These countries belong to a common economic group known as the Visegrad Group states. Therefore, in order to achieve the research objective, specific literature was used, frequently published in the Visegrad Group states (Poland, the Czech Republic and Slovakia).

The data related to the value of EU funding came from the EUROSTAT databases. The temporal scope of the study covered the previous (2007-2013) and the current EU Financial Perspectives (2014-2020). The dependent variable (explanatory) used in the analyses was the data on lending in the countries studied. This was derived from the databases of the national banks of the Czech Republic, Slovakia and

Poland. Bank lending was categorized into two levels: short and long term. Long-term loans are understood as those granted for a period exceeding one year, and short-term loans are granted up to one year. In the primary data from the Czech Republic and Slovakia, the medium term level is additionally distinguished in the category of long term lending.

However, considering data homogeneity, in the case of the Czech Republic and Slovakia the two levels, 1 to 5 years and over 5 years, are combined and referred to as the “long term“ level. The period covered by the study in this paper is 2009 - 2019. Data for the Czech Republic and Slovakia was obtained monthly from January 2009 to August 2019 but for Poland it was a half-year term in the same years. Due to the heterogeneity of lending reporting in the individual countries, the semi-annual data for Poland has been unified into monthly data by supplementing using a sequential method, that is the missing data is replaced by the nearest non-missing data.

A similar supplementation was made in the case of the data related to EU subsidies. As raw data containing the volume of EU funds transferred is annual, it was supplemented to monthly data using a sequential method. An additional characteristic that needs to be merged within the three countries is the heterogeneity of the currency. The data for the Czech Republic and Poland is provided in national currencies and it was converted into euro in order to be integrated. The exchange rate tables of the Central banks in these countries were used as the basis for the conversions.

The statistical analysis aimed to achieve the objective of this study consisted in revealing some interesting associations between the variables: EU funding to individual countries and lending to non-financial companies in the category of short and long-term loans. A linear regression analysis procedure was carried out, and an additional tool to support the course of the study was a relationship analysis measured by the Pearson’s product moment correlation coefficient of the individual variables identified in the study.

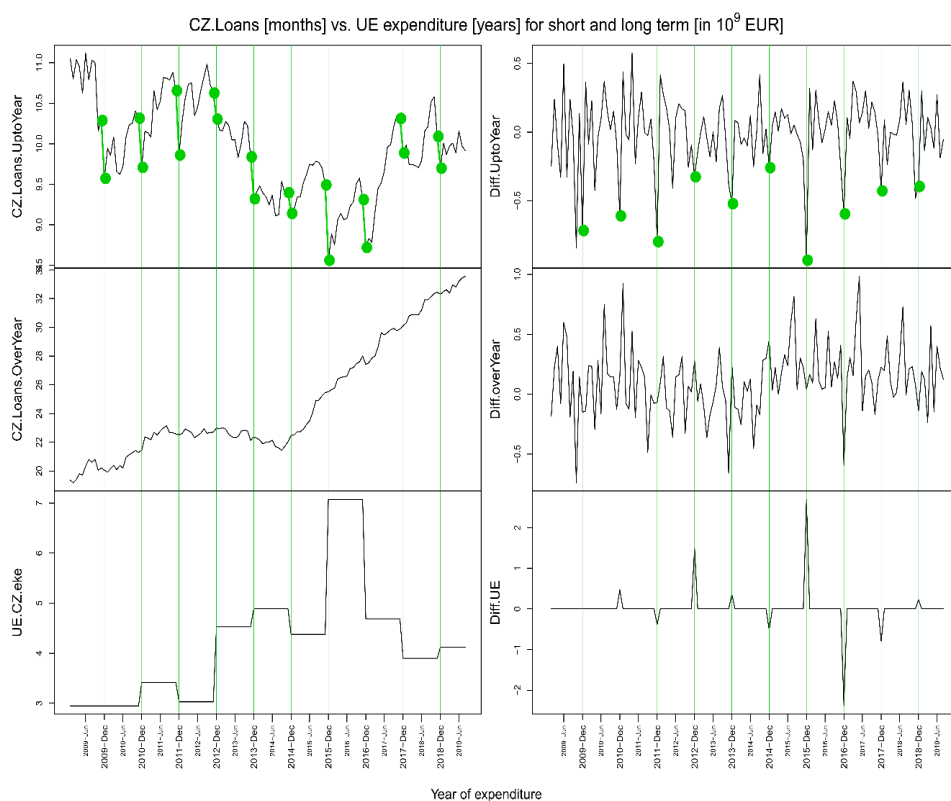
4. Research Results

The analysis of linear relationship was carried out separately for each country (i.e., the Czech Republic, Slovakia and Poland). The response (dependent) variables was short-term credit lending or long-term credit lending. In each model, the explanatory variable (independent) was the same value of EU support funds. The first analysis of the variables examined was conducted for the Czech Republic. The data concerning the variables examined is presented in Figure 2(A-F).

When looking for an estimation of the relationship between the linear correlation of the absorption volume of EU funds and the volume of lending in the Czech Republic, it can be clearly seen that the implementation of European programmes

was delayed, and thus the demand for credit funds from entrepreneurs in terms of their own contribution to the projects could also occur along with the progress of project implementation. It should be borne in mind that the volume of financial support for the projects also resulted from the possibility of pre-financing of the projects. The dynamics of changes in long-term loans until the end of 2014 exhibited even decreasing trends. A clear increase in the value of long-term loans may have resulted from launching the companies' own contributions to projects co-financed with European funds. The increase in the subsequent years may be interpreted by the fact that, having experience with the Financial Perspective of 2007-2013, individual countries undertook activities and programmes in the next Perspective (2014-2020) faster.

Figure 2(A-F). Volume of lending for short term (A), long term (B), EU spending (C) and its variability (D, E, F) in the Czech Republic



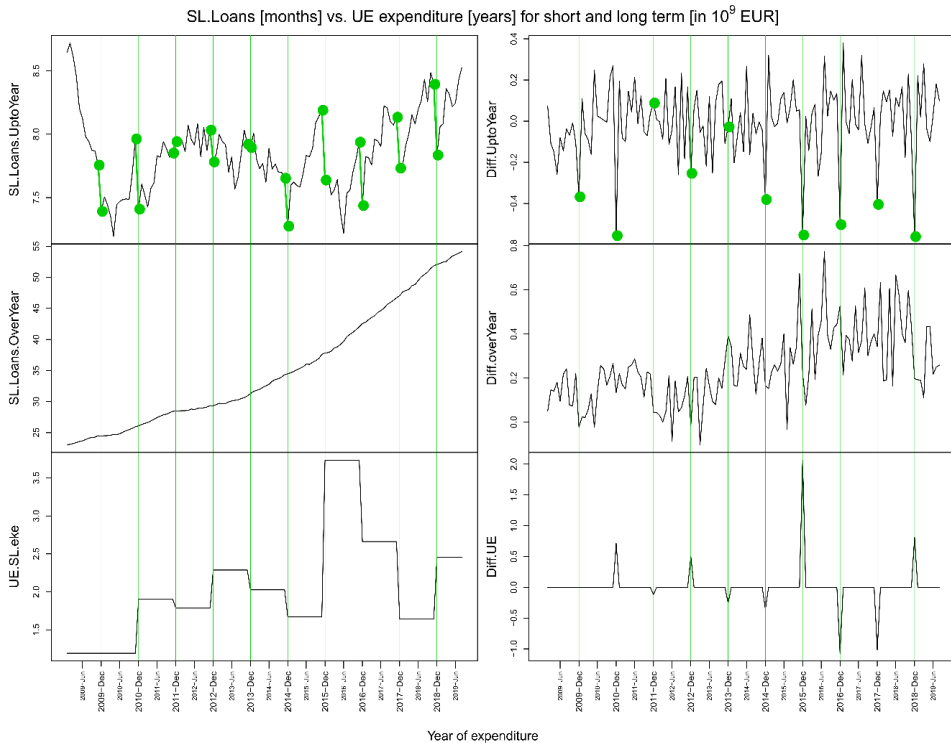
Note: *Diff.UptoYear*: variability of lending (short-term loans); *Diff.OverYear*: variability of lending (long-term loans); *Diff.UE*: variability of EU spending.

Source: Authors' own research.

Nevertheless, the opposite trend is noticeable for short-term loans, especially when the previous Financial Perspective (2007-2013) ends and the new EU Financial Perspective (2014-2020) begins. A large inflow of reimbursement funds from the

2007-2013 Perspective is evident, which may have released the funds of companies involved in the operational aspect of the projects implemented. The increase in lending starting from the year 2016 may suggest a need for financing of operational activities due to the recurring low level of the disbursement of EU funds for programmes and projects in the 2014-2020 Perspective and the need to ensure the sustainability of the projects implemented. There is also a cyclical decline in short-term lending at the end of each year (November – December, Figure 2A). However, it is difficult to interpret this phenomenon in relation to the use of EU funds. This seems to be a calendar effect related to the functioning of the company and the intensification of expenses and settlements at the end of the year. The next analysis carried out concerns in Slovakia. The data concerning this country is presented in Figure 3(A-F).

Figure 3(A-F). Volume of lending for short term loans (A), long term loans (B), EU spending (C) and its variability (D, E, F) in Slovakia



Note: *Diff.UptoYear*: variability of lending (short-term loans); *Diff.OverYear*: variability of lending (long-term loans); *Diff.UE*: variability of EU spending.

Source: Authors' own research.

In Slovakia, similar trends can be observed as in the Czech Republic. The implementation of the European programmes was also greatly delayed; therefore, also in this case the demand for funds on the part entrepreneurs for their own contribution to the projects could also occur along with the progress of the project

implementation. However, the dynamics is clearly increasing. A clear increase in long-term loans may also have resulted in connection with own contributions to projects co-financed by European funds. Like in the Czech Republic, the increase in lending in the subsequent years may be interpreted by the fact that, having experience with the first full EU Financial Perspective of 2007-2013, the individual countries started sooner their activities and programmes under the new Financial Perspective of 2014-2020.

The opposite trend (negative dynamics) is also observed for short-term loans, especially at the time when one perspective ends and another EU financial perspective begins. A large inflow of reimbursement funds from the 2007-2013 Perspective is also noticeable, which may have released the funds of companies involved in the operational aspect of the projects implemented. That is, along with an increase in the inflow of EU funds, the demand for short-term loans decreased. The increase in the value of short-term loans starting from 2016 may also suggest a need for financing of operational activities due to the recurring low level of the disbursement of EU funds for programmes and projects in the new 2014-2020 Perspective and the need to ensure the sustainability of the projects implemented. It is also data for Slovakia that demonstrates a decrease in the volume of lending at the end of each year. As expected, this phenomenon is independent of the direction of changes in the value of EU funds in the subsequent years. The data for Poland is presented in Figure 4(A-F).

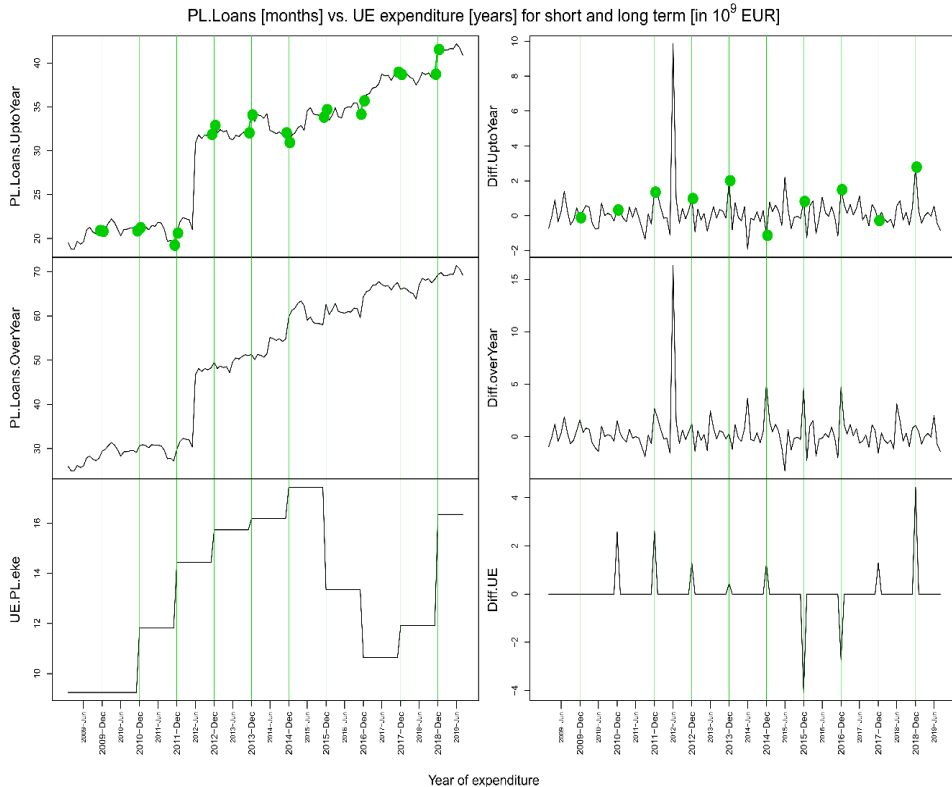
In Poland, there are fundamental differences compared to Slovakia and the Czech Republic, particularly in terms of the inflow of European funds. It can be observed that the implementation of European programmes is much faster in Poland than in the other countries examined; hence, and in this case, the demand for credit funds on the part of entrepreneurs in terms of their own contribution to projects could also occur along with the progress of project implementation. However, the dynamics is clearly growing with the indication that by 2011, this is even a leap forward. A clear increase in long-term loans in this case may also have resulted from the need of own contributions to projects co-financed with European funds. It is also worth to note the scale of the absorption of EU funds by Poland, which is the highest in the region.

As in the other countries, the increase in the subsequent years may be interpreted by the fact that, having experience in the first full Financial Perspective of 2007-2013, individual countries started sooner their activities and programmes in the new Perspective of 2014-2020. The pressure connected with the mid-term evaluation of the implementation of EU programmes conditioning the disbursement of EU funds in the subsequent years of the Financial Perspective of 2014-2020 (the risk of funds being forfeited) should be stressed, as well.

The trend in short-term loans is slightly different from that in the other countries surveyed. In the case of Poland, it cannot be observed that the inflow of EU funds (reimbursement in the scope of the projects implemented) releases the funds of

companies involved in the operational aspect of the projects implemented, and, quite on the contrary, this increases demand for these. That is, along with an increase in the inflow of EU funds, the demand for short-term loans increased.

Figure 4(A-F). *The volume of lending for short term loans (A), long term loans (B), EU spending (C) and its variability (D, E, F) in Poland*



Note: *Diff. Up toYear: variability of lending (short-term loans); Diff. Over Year: variability of lending (long-term loans); Diff. UE: variability of EU spending.*

Source: *Authors' own research.*

The increase starting from 2016 may also suggest a need for financing of operational activities due to the recurring low level of the disbursement of EU funds for programmes and projects in the new 2014-2020 Perspective and the need to ensure the sustainability of the projects implemented. The lending data in Poland was collected on a semi-annual basis and then adapted to a monthly basis. As a result, the potential effect of the fall of lending at the end of the year (November-December) was levelled out and it did not appear in the charts.

The global impact of the exposure of EU funds to short term lending in the individual countries was measured using the Pearson's product moment correlation coefficient. The results of this analysis are provided in Table 1. Additionally, a

unilateral 95% confidence interval for this coefficient was provided. Apart from the coefficient value (Rho) and the confidence interval, a null test of the coefficient was conducted. The test values (test t), the degree of freedom (df) and the extreme level of significance for rejecting the null hypothesis were also provided in Table 1.

Table 1. Pearson's product moment correlation coefficient (shortloans vs. EU funds)

Czech Republic	CZ.Loans.UptoYear vs. UE.CZ.eke			
	Pearson correlation coefficient Rho	df	test t	Pr(> t)
	-0.7147	126	-11.472	< 0.001
	Confidence interval	-1	-0.635	
Slovakia	SL.Loans.UptoYear vs. UE.SL.eke			
	Pearson correlation coefficient Rho	df	test t	Pr(> t)
	-0.1392	126	-1.5781	< 0.057
	Confidence interval	-1	0.0	
Poland	PL.Loans.UptoYear vs. UE.PL.eke			
	Pearson correlation coefficient Rho	df	test t	Pr(> t)
	0.4818	126	6.1719	< 0.001
	Confidence interval	0.3364025	1	

Note: CZ.Loans.UptoYear: short-term loans (up to 1 year) in the Czech Republic; SL.Loans.UptoYear: short-term loans (up to 1 year) in Slovakia; PL.Loans.UptoYear: short-term loans (up to 1 year) in Poland

Source: Authors' own research.

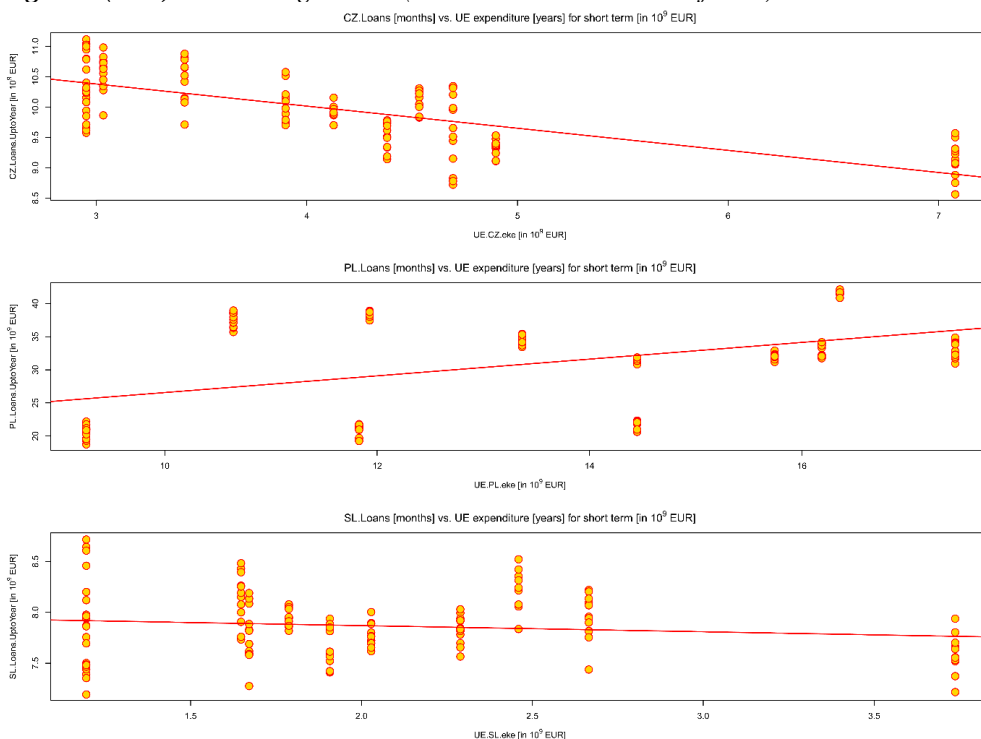
For the Czech Republic, the correlation coefficient is substantial (Rho = -0.7147) and it is statistically significant (t-test; $t[126]=-11.472$; $p<0.001$). The left-side 95% confidence interval for this correlation is from -1 to -0.635. This is suggested by the fact that the EU funds were substitutionary in relation to short-term loans.

For Slovakia, the correlation is also negative, yet not as significant as for the Czech Republic (Rho = -0.1392) and (t-test; $t[126]=-1.5781$; $p<0.06$). The left-hand 95% confidence interval for this correlation is wider, ranging from -1 to 0.0. The relationship between EU funds and the value of short-term loans is, as in the case of the Czech Republic, negative yet significantly weaker.

In Poland, we observe a reaction that is opposite to that in the Czech Republic and Slovakia. There is a reaction of lending growth (short-term loans) to the reduction of EU financing. The Pearson correlation coefficient is positive (Rho = 0.4818), and this correlation is statistically significantly non-zero (t-test; $t[126]=6.1719$; $p<0.001$). This phenomenon is a certain anomaly in relation to the natural processes of goods substitutability.

On the next stage of the analysis of empirical data, an attempt was made to establish the linear dependence of the variables examined. In this context, a linear regression analysis was performed. The regression lines for the volume of lending in the Czech Republic, Slovakia and Poland in relation to EU expenditure are presented in Figure 5(A-C) in the form of linear regression. As expected on the basis of the correlation coefficients calculated, the behaviour of the regression line will be ambiguous and it will reflect the directions of changes in the impact of EU exposure on credit funds received on the basis of the correlation coefficient.

Figure 5(A-C). *Linear regression (short-term loans vs. EU funds)*



Note: *UE.CZ.eke: EU funds spent in the Czech Republic; UE.SL.eke: EU funds spent in Slovakia; UE.PL.eke: EU funds spent in Poland; CZ.Loans.UptoYear: short-term loans (up to 1 year) in the Czech Republic; SL.Loans.UptoYear: short-term loans (up to 1 year) in Slovakia; PL.Loans.UptoYear: short-term loans (up to 1 year) in Poland.*

Source: *Authors' own research.*

The values of linear regression coefficients are provided in Table 2.

Table 2. *Linear regression coefficients (short-term loans vs. EU funds)*

CZ.Loans.UptoYear vs. UE.CZ.eke	Residuals:				
	Min	1Q	Median	3Q	Max
	-1.03746	-0.30741	-0.01399	0.36364	0.72177

	Coefficients:				
		Estimate	Std. Error	t value	Pr(> t)
	(Intercept)	11.47101	0.13789	83.19	<0.001
	UE.CZ.eke	-0.36431	0.03176	-11.47	< 0.001
	Adjusted R-squared:				
		0.507			
SL.Loans.UptoYear vs. UE.SL.eke	Residuals:				
	Min	1Q	Median	3Q	Max
	-0.72249	-0.19821	-0.01108	0.18285	0.80121
	Coefficients:				
		Estimate	Std. Error	t value	Pr(> t)
	(Intercept)	7.99042	0.08300	96.268	< 0.001
	UE.SL.eke	-0.06054	0.03836	-1.578	< 0.117
	Adjusted R-squared:				
		0.0116			
PL.Loans.UptoYear vs. UE.PL.eke	Residuals:				
	Min	1Q	Median	3Q	Max
	-11.488	-4.590	-1.670	6.466	11.641
	Coefficients:				
		Estimate	Std. Error	t value	Pr(> t)
	(Intercept)	13.9467	2.7717	5.032	<0.001
	UE.PL.eke	1.2620	0.2045	6.172	< 0.001
	Adjusted R-squared:				
		0.226			

Note: UE.CZ.eke: EU funds spent in the Czech Republic; UE.SL.eke: EU funds spent in Slovakia; UE.PL.eke: EU funds spent in Poland; CZ.Loans.UptoYear: short-term loans (up to 1 year) in the Czech Republic; SL.Loans.UptoYear: short-term loans (up to 1 year) in Slovakia; PL.Loans.UptoYear: short-term loans (up to 1 year) in Poland.

Source: Authors' own research.

The interpretation of the coefficients contained in Table 2 will begin with the coefficient of determination (adjusted R-squared). This coefficient is of a technical structure independent of the random nature of the phenomenon analysed. While treating it as a measure of variability of the explanatory variable (lending) in relation to the explanatory variable (EU funds), we may say that especially in the case of the Czech Republic ($R^2=50.7\%$), yet also in the case of Poland ($R^2=22.6\%$), the linear model presented can be accepted as adequate and it can be used in the interpretation of the phenomenon examined. The use of the model in the description of lending dependence and EU financing is worse in the case of Slovakia ($R^2=1.16\%$).

Descriptive statistics for residuals point to a symmetric nature of the distribution of data around the regression line for all the countries and, despite trimming missing observations, the model can be treated as being useful. The estimates of the

parameters of intercepts (β) allow one to accept numerical suggestions concerning a decrease or increase in lending depending of the EU funds exposure. For the Czech Republic, an increase in funding by a unit (109 EUR) results in a decrease in lending by 0.36 units. The fall in Slovakia is much smaller at 0.06 units. In Poland, there is an increase by 1.2 units.

The calculation of statistical significance for these relationships requires adding to the model assumptions concerning probabilistic distributions of the quantities analysed. In the model presented, it was assumed that errors are independent of the gauss distribution with a zero expected value and one variance. This allowed one to determine the levels of significance and to provide confidence intervals for the parameters of the model. For the Czech Republic and Poland, all the matching parameters are statistically significant ($p < 0.001$). For Slovakia, on the other hand, we cannot speak of any significant changes in lending depending on the exposure of EU funds.

5. Conclusion

In view of the research objective accepted, the research hypothesis was adopted that EU funds significantly modify the market for credit services offered by banks and, therefore, EU funds have an impact on the volume of bank lending in the corporate sector.

The absorption of EU funds, based on the observation of their disbursements in the countries concerned and which are members of the Community, demonstrates basically a similar regularity. This is consistent with the process of the implementation of programmes under particular EU perspectives. The first of the Perspectives analysed: 2007-2013, including the principle of n+2 year use of funds, is the first full financial perspective in the countries analysed. It is clearly evident that the implementation of programmes and the transfer of funds was gradual, with minimum implementation in the initial period of the Perspective. The highest level of fund absorption is at the end of the Perspective, i.e. in 2015. This regularity can be observed in all of the countries. Poland is an exception here, where more or less in the middle of the 2007-2013 Perspective, the absorption of EU funds clearly accelerated. Due to the accumulation of EU funds spending in the 2007-2013 Perspective, a mid-term evaluation was adopted in the new Perspective to prevent any accumulation of disbursements at the end of the Perspective.

EU funding for the Czech Republic and Slovakia has a similar structure, and it can be seen that an increase in funding is in line with a decrease in lending: short-term loans. This phenomenon does not occur in Poland.

Therefore, the basic conclusion is that it is only in the case of Poland that the correlation coefficient of the variables is positive. This is completely different than in the case of the Czech Republic and Slovakia, where the correlation coefficients

are negative. It can therefore be concluded that in the Czech Republic and Slovakia, over the whole period covered by the research, the value of short-term loans to companies decreases with an increase in the value of EU funds used. In Poland, on the other hand, the opposite is true. It is difficult to interpret this phenomenon unequivocally. However, it seems that it should be further investigated in depth.

In addition to this, based on the charts, it is to be suggested that for the Czech Republic and Slovakia, there is a clear cyclical decline in (short-term) lending in December compared to November. These drops are statistically significant (exact binomial test; $p < 0.011$). Due to the higher interval of the data, this phenomenon cannot be confirmed for Poland.

When answering the questions as to whether the absorption of EU funds significantly distorts the credit market in the countries examined, it can be stated that this phenomenon is noticeable in relation to short-term loans in the Czech Republic and Slovakia but not in Poland. As regards the relation between the volume of EU funds flowing into the individual countries and the volume of long-term loans, no significant relation was observed; however, EU funds can be pointed out as a kind of catalyst in support of lending considering the expected own financial contribution to EU projects.

The research carried out demonstrates that although Poland, the Czech Republic and Slovakia belong to the Visegrad Group, the Czech Republic, Slovakia and Poland do not exhibit the same similarities in terms of a market response to the intervention related to a change in the financing structure of enterprises caused by an increased use of EU funds. While considering Slovakia and the Czech Republic one may talk about visible similarities, financial institutions and entrepreneurs react slightly differently to the availability of cheaper resources or direct development subsidies for enterprises which are derived from EU funds. Our research has confirmed that EU funds are used to reduce financial asymmetries between regions and countries. Nevertheless, response to the availability of these funds varies among the Visegrad countries covered by the study.

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