Małgorzata Pawłowska[1]

The determinants of growth in bank loans in the EU-15 and the CEE-11 after the global financial crisis[2]

Summary

The aim of this research is to investigate the issue of asymmetry of the credit market determinants of bank loans between the CEE-11 countries (Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, Rumania) and the other countries (Austria, Belgium, Denmark, Finland, France, Greece, Italy, Spain, the Netherlands, Ireland, Luxembourg, Germany, Portugal, Sweden, the United Kingdom) after the global financial crisis (GFC) of 2008. For the analysis, we used annual bank-level data which is collected from the BankSope Orbis database and macroeconomic data on GDP growth from the European Central Bank. The panel data covers the period 2011–2016 and regards commercial banks and savings banks that operated in the EU countries. Using the methodology of panel regression (fe), this study finds differences in the determinants of growth in loans for two groups of countries after the global financial crisis.

Keywords: banks, credit growth, concentration, foreign ownership, EU-15, CEE-11
JEL: F36, G2, G21, G34, L1

1. Introduction

The experience of the global financial crisis (GFC) of 2008 and its aftermath reinforced the importance of macro-prudential policy to keep economies of the EU countries on the path of sustainable long-term economic growth. Therefore, a number of questions need to be addressed to develop the banking sector's potential contribution to sustainable growth of the economy. Loans are the main banking product used to finance the real economy. Furthermore, financing by loans plays an important role in economic development. Research concerning

[1] Warsaw School of Economics, Collegium of Socio-Economics.

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the determinants of credit demand and supply has become a key topic in many economic publications, but the operational goals of researchers can vary.

The aim of this research is to investigate the issue of asymmetry of the credit market determinants of bank loans between the Central and Eastern European countries (CEE-11) and the other EU countries after the GFC. We compare the credit market determinants of loans among the CEE-11 countries (the Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovakia, Slovenia, Hungary, Bulgaria, Rumania, Croatia) and among the EU-15 countries (Austria, Belgium, Denmark, Finland, France, Greece, Spain, the Netherlands, Ireland, Luxembourg, Germany, Portugal, Sweden, the United Kingdom, Italy)[3]. The determinants of banks' performance include mainly the market structure variables such as: concentration in the banking sector (indicators CR5 and HHI)[4] and a share of foreign bank, but we also investigate the impact of profitability and capitalization.

This paper consists of three parts and a summary. The first part is a broad literature review concerning the link between the market structure, foreign banks and lending. The second part presents data and empirical models. The third part presents the results of the analysis based on the panel data. The summary provides the conclusions that we made.

2. Motivation, existing literature and hypothesis

The years before the GFC were a period of rapid change within the EU banking sector; the ownership structure changed and the consolidation processes intensified.

Since the late 1990s, CEE countries has been playing the role of a host country for banks from a number of countries in Western Europe. An important feature of the banking sectors of CEE countries was a high level of concentration and foreign presence as opposed to the highly developed banking sectors in Western Europe (see Figure 1). The CEE banking sectors are relatively small in comparison to the other EU sectors and have relatively simple traditional business models.

[3] Banks from Malta and Cyprus have been removed from the survey. In these countries there is a large concentration and a large share of foreign capital, and have never been the transition countries.

[4] The share of the five largest banks' total assets (CR5); the Herfindahl-Hirschman index for assets (the sum of the squares of the market share of individual banks (HHI).

The impact of foreign banks is unambiguous. On the one hand, the pre-GFC evidence suggests that foreign bank participation brought many benefits to developing countries including financial stability[5]. On the other hand, the GFC highlights the role of multinational banks in the transmission of shocks across countries. In addition, foreign banks can be a channel through which shocks in one country are transmitted and affect the supply of credit in another country. Claessens and Van Horen[6] found that during the GFC foreign banks reduced credit more sharply as compared to domestic banks, except when foreign banks dominated the host banking systems. Popov and Udell[7] found evidence of the international transmission of the crisis shock to transition countries and showed that transition country firms' access to credit during the crisis was affected by the balance sheet conditions of foreign parent banks. Cull and Soledad Martinez Peria[8] found that in the CEE countries during the GFC, foreign loan growth fell more than that of private domestic banks and also that state-owned banks increased their loans during the crisis.

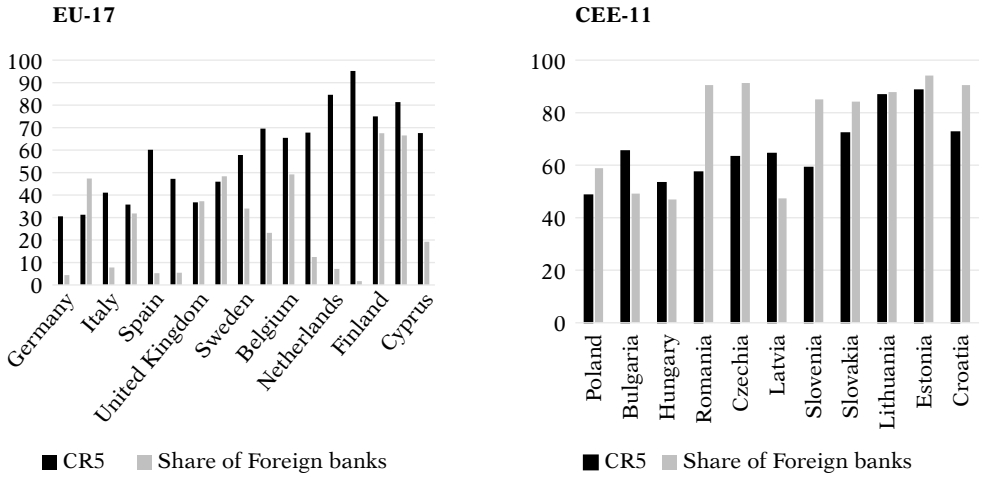

Figure 1. Banking concentration and foreign presence for EU-28 in 2016 (%)

Source: Own calculations on the ECB data.

5 J.P. Bonin, I. Hasan, P. Wachtel, *Privatization matters: Bank efficiency in transition countries*, "Journal of Banking and Finance" 2005, vol. 29(8–9), pp. 2155–2178.

6 S. Claessens, N. Van Horen, *Impact of Foreign Banks*, DNB Working Paper no. 370, 2013.

7 A. Popov, G.F. Udell, *Cross-border banking, credit access, and the financial crisis*, "Journal of International Economics" 2012, vol. 87(1), pp. 147–161.

8 R. Cull, M.S. Martinez Pería, *Bank Ownership and Lending Patterns during the 2008–2009. Financial Crisis Evidence from Latin America and Eastern Europe*, "Journal of Banking and Finance" 2013, vol. 37(12), pp. 4861–4878.

Furthermore, Cull et al.[9] found that foreign-owned banks are more efficient than domestic banks, promote competition in host banking sectors, and stabilize credit in the case of idiosyncratic shocks. Finally, Allen et al.[10] examined the interactions of bank lending dynamics with domestic, foreign, and global crises along with changes in ownership in the CEE banking sector. They found the impact of the ownership structure on banks' lending activities in CEE was conditional upon the type of crisis. Furthermore, they argue that deposit growth and profitability ratios are significant for credit growth during both normal economic times and crisis periods, regardless of the crisis type. Pawłowska[11] describes an important role of bank size and market structure for the EU banks. Empirical results based on panel data covering the period of 2004–2012 show that the banking sectors within the EU are not homogeneous and, also, that there is asymmetry between the performance of the EU-15 and EU-12 banking sectors. Finally, Kouretas and Pawłowska[12], using a GMM estimator, found the differences between determinants of different types of loans in the CEE-11 countries against all EU-28 and EU-17.

These studies focused on increased participation of foreign banks and increased concentration in emerging markets during times of financial distress. Therefore, we divided the EU countries into two groups (CEE-11 countries and EU-15 countries) and examined the following main hypothesis and auxiliary hypotheses.

The main hypothesis H0: Determinants of bank loans for two groups of countries (CEE-11 and EU-15) were different.

Auxiliary hypotheses:

H1: The relationship between bank concentration and growth in loans is positive for the EU-15 countries and is negative for the CEE-11 transition countries.

H2: The size has a negative impact on growth in loans mainly in the EU-15 countries.

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[9] R. Cull, M.S. Martinez Pería, J. Verrier, *Bank Ownership: Trends and Implications*, IMF Working Paper no. 17/60, 2017.

[10] F. Allen, K. Jackowicz, O. Kowalewski, Ł. Kozłowski, *Bank lending, crises, and changing ownership structure in Central and Eastern European countries*, "Journal of Corporate Finance" 2017, vol. 42, pp. 494–515.

[11] M. Pawłowska, *Does the Size and Market Structure of the Banking Sector have an Effect on the Financial Stability of the European Union?*, "The Journal of Economic Asymmetries" 2016, vol. 4, pp. 112–127.

[12] G.P. Kouretas, M. Pawłowska, *The impact of market structure of the banking sector on the growth of bank loans in the EU after the global financial crisis*, Narodowy Bank Polski, Working Papers no. 274, 2018.

3. Data and model specification

In case to estimate the impact of market structure of various bank loans in EU countries, we take annual bank-level data which are collected from the Bankscope database and macroeconomic data from ECB. The (unbalanced) panel includes commercial banks and savings banks that were operating in CEE-11 countries (the Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovakia, Slovenia, Hungary, Bulgaria, Rumania, Croatia) and the other countries EU-15 (Austria, Belgium, Denmark, Finland, France, Greece, Spain, the Netherlands, Ireland, Luxembourg, Germany, Portugal, Sweden, United Kingdom, Italy) over the period 2010–2016[13].

After reviewing the data for errors, we are left with about 16,217 bank-year observations the period 2010–2016. Table 1 provides summary statistics (mean and standard deviation (SD)) for all variables in the model for EU, EU-15 and CEE-11. Data are observed yearly from 2010–2016.

We investigated the impact of market structure measures on credit growth based on tree panel data sets: Panel A: includes the EU-15 banks, Panel B: includes the CEE-11 banks and Panel C: includes all EU banks based on following equation:

$$\Delta Loans_{itc} = \alpha + \mu * market\ structure_{t-1,c} + \sum_{j=1}^{N} \beta_{j*} Bank\text{-}Specific\ Variables_{itc} + \\ + \lambda_1 * macro\ variables_{t-1,c} + \lambda_{2\Delta} i_{t-1,c} + \varepsilon_{itc} \quad (1)$$

where the dependent variable $Loans_{itc}$ is the annual change in the stock of total gross loans (in logs) for each bank i and for each year t. Loans are express in euro.

As *market structure* measures we use:

- the concentration of the banking sector which was defined as a share of the 5 largest credit institutions in total assets (CR5tc) for each year t in country c and as the Herfindahl-Hirschman index for assets, the sum of the squares of the market share of individual banks (HHItc) for each year t in country c.
- Also, we investigated the impact of foreign presence on credit growth SFBtc. The presence of foreign banks is defined following Claessens and Van Horen[14]:
- as the percentage of foreign banks assets in total banks assets in each year t in country c SFBtc.

[13] Banks from Malta and Cyprus have been removed from this research.

[14] S. Claessens, N. Van Horen, op.cit.

Due to that the share of foreign capital and concentration are strongly correlated, these variables are included in the separate regressions.

Table 1. Summary statistics on the characteristics of EU banking sector

2010–2016 EU					
Variables	Obs	Mean	(SD)	Min	Max
Total gross loans	16217	12.85	2.561	0	20.9
SFB	16217	19.262	20.731	1.73	96.405
CR5	16217	42.013	13.169	30.563	95.23
La	16217	13.599	2.342	1.609	21.541
Net Loans /deposit	15854	79.340	67.334	0	991.15
ROA	16224	0.454	4.204	–82.32	81.28
ROE	16187	3.795	26.149	–328.88	979.76
tier 1	9769	18.154	22.663	–6.7	29.15
GDP	16217	0.562	1.555	–0.093	25.67
Ir	16217	4.192	1.126	2.224	11.938
2010–2016 EU-15					
Variables	Obs	Mean	(SD)	Min	Max
Total gross loans	15269	12.814	2.569	0	20.8997
SFB	15269	15.165	14.363	1.7348	79.8522
CR5	15269	40.713	12.252	30.562	95.23
La	15269	13.544	2.364	1.60943	21.5405
Net Loans /deposit	14701	80.121	67.806	0	991.15
ROA	15008	0.716	5.894	–82.83	76.93
ROE	15008	4.299	27.392	–266.63	979.76
tier 1	9273	18.108	23.101	–6.7	729.15
GDP	15008	0.559	1.274	–0.093	8.4
Ir	15008	4.049	0.691	2.224	7.949
2010–2016 CEE-11					
Variables	Obs	Mean	(SD)	Min	Max
Total gross loans	948	13.419	2.218	2.079	17.667
SFB	951	74.879	19.653	6.915	96.405
CR5	951	60.762	11.382	43.687	90.635
La	990	14.148	1.869	6.8	18.945
Net Loans /deposit	905	78.755	62.437	0	766.03
ROA	990	–0.257	10.987	–76.48	30.29
ROE	988	–1.084	59.89	–328.9	33.08
tier 1	441	18.906	11.878	0.43	79.19
GDP	951	0.134	0.312	–0.03	1.47
Ir	870	7.407	2.234	3.37	11.938

Source: Own calculations on the basis of Bankscope, EBC and Eurostat data.

In regressions, we also used control variables denote the bank performance as *Bank-Specific Variables*$_{itc}$:

- the ratio of total net loans to total deposit (netloanstodepfunditc) for each bank i for each year t in country c.
- the tier1 ratio (core-capital to risk-weighted assets, tier1itc) as an indicator of a bank's risk behavior (the higher the capital ratio, the greater the risk aversion) for each bank i for each year t in country c.
- the bank profitability ratio denotes: the return on assets ratio ROAitc, for each bank i and for each year t in country c[15].

As the *Bank-Specific Variables* we also use the "size" of each banks, which was defined as follows:

- The log of total assets (laitc) for each bank i for each year t in country c.
- Also, as the "size" of each banks we use measure of relative market power which was defined as follows:
- The share of bank assets in the total assets (mpitc) for each bank i and each year t in country c.

Cyclical factors significantly influence the growth of credit. Also, interest rates are one of the main factors influencing cost of credit. The interest rate cycle is closely positively correlated with the economic cycle. The macro variables are defined as follows:

- the growth of the gross domestic product (yoy) for each year *t* in country *c* (GDP_{tc}), as the effect of the business cycle on bank loans.
- the annual changes in weighted average interest rates for particular types of loans: mortgage loans, consumer loans and corporate loans Δir_{tc} for each year *t* in country *c*, as the effect of the price of the credit.

The α is a constant term, ε_{itc} denotes the error in the model, and φ, μ, λ, a_3, and b_j are the regression coefficients.

4. Results of panel data analysis

In order to carry out the investigation of the issue of asymmetry of the credit market determinants of bank loans between the CEE-11 countries and the EU-15

[15] The additional estimations were calculated with the return on equity (ROE) as a dependent variable without core capital ratio for each banking sector *i* for each year *t* in country *c*, to determine the robustness, (see also, M. Pawłowska, op.cit.).

countries, after the global financial crisis we provided panel data estimations. The correlation coefficients are estimated for a sample of the EU-15 countries and CEE-11 and for all EU across the period 2010–2016. For estimations we used a *reghdfe estimator*, which performs (almost) the same procedure with xtreg FE model, but much faster and more efficient. The procedure Reghdfe is linear and instrumental-variable/GMM regression absorbing multiple levels of fixed effects[16]. In case to investigate the asymmetry of the credit market determinants between the CEE-11 countries and the EU-15, we performed three estimations for the model separately to avoid any alignment of variables based on equation (1):

- two for market structure: as share of the 5 largest credit institutions in total assets (CR5) and for the Herfindahl-Hirschman index for assets (HHI),
- and one for foreign presence: the percentage of foreign banks assets in total banks assets (SFB).

Tables 2–4 present the results of regressions using a *reghdfe estimator* for three groups of countries. For all model estimations, the coefficient of determination R^2 coefficient were around and above 60%.

In Table 2, a positive and significant coefficient (μ_2) is found for EU-15. It means that concentration – measured in terms of the share of the five largest banks' total assets (*CR5*) – had a positive and significant influence on the growth in loans in the EU-15 countries. Also, in Table 2 a negative and significant coefficient (μ_2) is found for the CEE–11. It means that concentration – (CR5) – had a negative and significant influence on the growth in loans in the CEE-11 countries.

The above results were confirmed for Herfindahl-Hirschman index. In Table 3, a positive and significant coefficient (μ_2) is found for EU-15. It means that concentration – measured by HHI index (*HHI*) – had a positive and significant influence on the growth in loans in the EU-15 countries. Also, in Table 3 a negative and significant coefficient (μ_2) is found for the CEE-11. It means that concentration – (HHI) – had a negative and significant influence on the growth in loans in the CEE countries.

In Table 4, an insignificant coefficient (μ_2) is found for EU-15. It means that *foreign presence* (1) – measured in terms of the percentage of foreign banks' assets in total banks assets (*sfb*) – had an insignificant influence on the growth in loans in EU-15.

In Tables 2, 3 and 4 for the *Bank-Specific Variables*, a negative and significant coefficient (β_j) is found for the *tier1 r*atio (core capital to risk-weighted

[16] Estimator reghdfe is a generalization of areg for multiple levels of fixed effects (including heterogeneous slopes).

assets, $tier1_{itc}$) and a positive and significant coefficient (β_j) is found for the bank profitability ratio (the return on assets ratio ROA_{itc}) for the EU-15 countries. It means that greater risk aversion had a negative and significant influence on the growth in loans and that greater return on assets had a positive and significant influence on the growth in loans in the EU-15 countries.

Finally, the bank "size" – measured in terms of an individual institution's log of total assets (*la*) – negatively influenced the growth in loans for the CEE-11 countries. This result may confirm that the size of individual banks is important for growth of loans.

In the next step, we measured whether economic growth has an impact on credit growth. However, for all estimations, coefficient λ_1 was insignificant.

All the above results allowed for a positive verification of hypotheses *H1 and H2*, and finally H0 that determinants of bank loans for two groups of countries (CEE-11 and EU-15) were different.

Table 2. Empirical results for *market structure* (CR5)

	EU-15	CEE-11	EU
VARIABLES	D.lgrossloans	D.lgrossloans	D.lgrossloans
tierl	–0.002**	–0.004	–0.002**
	(0.0010838)	(0.0075442)	(0.0010397)
ROA	0.031***	0.033**	0.031***
	(0.0045652)	(0.0099367)	(0.0038039)
netloanstodepfund	0.001**	0.001	0.001
	(0.0001055)	(0.0005123)	(0.0001001)
L. GDP	0.009	0.331	0.007
	(0.0053137)	(0.2707916)	(0.0046944)
L. CR5	**0.008***	**–0.024***	**0.006**
	(0.0038083)	(0.0115812)	(0.0037304)
L.mp	–0.047	–1.224	–0.038
	(0.5240132)	(1.4748693)	(0.4725885)
LD.ir	–0.022	0.009	–0.010
	(0.0392004)	(0.0188565)	(0.0263634)
Observations	2,118	222	2,34
R-squared	0.572	0.661	0.573

Source: Own calculations. Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3. Empirical results for *market structure* (HHI)

	EU-15	CEE-11	EU
VARIABLES	D.lgrossloans	D.lgrossloans	D.lgrossloans
tierl	–0.002**	–0.004	–0.002**
	(0.0010870)	(0.0078159)	(0.0010387)
ROA	0.030***	0.034**	0.030***
	(0.0045890)	(0.0104188)	(0.0038666)
netloanstodepfund	0.001*	0.001	0.001
	(0.0000893)	(0.0005127)	(0.0000993)
L. GDP	0.006	0.327	0.005
	(0.0035286)	(0.2708179)	(0.0033330)
L. HHI	5.241**	–7.581*	4.865**
	(1.9520331)	(3.4372222)	(1.9444636)
L.mp	–0.528	–0.970	–0.470
	(0.7206763)	(1.3891293)	(0.6387755)
LD.ir	–0.026	0.007	–0.010
	(0.0362882)	(0.0171008)	(0.0259908)
Observations	2,118	222	2,34
R-squared	0.578	0.656	0.578

Source: Own calculations. Robust standard errors in parentheses, *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 4. Empirical results for market for *foreign presence*

	EU-15	CEE-11	EU
VARIABLES	D.lgrossloans	D.lgrossloans	D.lgrossloans
tierl	–0.003**	–0.004	–0.003**
	(0.0012071)	(0.0074892)	(0.0011572)
ROA	0.034***	0.032**	0.033***
	(0.0043059)	(0.0097594)	(0.0037586)
netloanstodepfund	0.001*	0.001	0.001
	(0.0000914)	(0.0004419)	(0.0000782)
L. GDP	0.000	0.306	0.002
	(0.0035927)	(0.2602585)	(0.0024423)
L. SFB	0.002	0.001	0.001
	(0.0024811)	(0.0008102)	(0.0009028)
L.la	–0.124	–0.363**	–0.123
	(0.0958835)	(0.1554931)	(0.0903449)
LD.ir	–0.028	0.011	–0.018
	(0.0387795)	(0.0226181)	(0.0222801)
Observations	2,093	222	2,24
R-squared	0.577	0.674	0.577

Source: Own calculations. Robust standard errors in parentheses, *** p < 0.01, ** p < 0.05, * p < 0.1.

However, the results of this research did not lead to any definite conclusions as to the role of foreign capital participation; the results showed rather an impact of bank size and concentration on the growth in loans. Therefore, it seems that the obtained results require a further, more comprehensive analysis of these determinants for particular types of loans by means of other econometric models.

5. Conclusions

This paper investigates the issue of asymmetry of the credit market determinants of bank loans between the CEE-11 countries (the Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovakia, Slovenia, Hungary, Bulgaria, Rumania, Croatia) and the EU-15 countries (Austria, Belgium, Denmark, Finland, France, Greece, Spain, the Netherlands, Ireland, Luxembourg, Germany, Portugal, Sweden, the United Kingdom, Italy) after the global financial crisis (GFC). The determinants of banks' loans mainly focus on concentration indicators and foreign ownership presence.

A comparative analysis of the credit market of the CEE-11 countries against all the EU and EU-15 found differences between determinants of loans for those groups of countries. However, the results of this research did not lead to any definite conclusions as to the role of foreign capital participation; the results showed rather an impact of bank size and concentration on the growth in loans. Based on a panel data analysis, this paper found that concentration of banks has a positive effect on the growth in loans in EU-15 and a negative effect on the growth of loans in CEE-11. Bank size has a negative effect on the growth in loans in the EU-11 countries.

This paper provides valuable insights for banking supervisors about the impact of the market structure on credit growth. The results confirm that banks are not getting bigger and that the bank size affects the supply of credit. Further research should focus on a deeper interpretation of the obtained results. In particular, this issue concerns different types of bank loans.

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Determinanty dynamiki kredytów bankowych w krajach UE-15 i CEE-11 po globalnym kryzysie finansowym

Streszczenie

Celem tego artykułu jest zbadanie różnic w determinantach wzrostu kredytów bankowych między 11 krajami Europy Środkowo-Wschodniej (Bułgarią, Chorwacją, Czechami, Estonią, Węgrami, Łotwą, Litwą, Polską, Słowacją, Słowenią, Rumunią) oraz 15 wybranymi krajami Unii Europejskiej (Austrią, Belgią, Danią, Finlandią, Francją, Grecją, Włochami, Hiszpanią, Holandią, Irlandią, Luksemburgiem, Niemcami, Portugalią, Szwecją, Anglią) po globalnym kryzysie finansowym z 2008 r. Do analizy wykorzystano roczne dane indywidualne z banków z bazy danych BankSope Orbis oraz dane makroekonomiczne dotyczące wzrostu PKB z Europejskiego Banku Centralnego. Dane panelowe obejmują lata 2011–2016 i dotyczą banków komercyjnych i banków spółdzielczych w państwach UE. Wykorzystując w niniejszym opracowaniu metodę regresji panelowej (fe), wykazano różnice w determinantach wzrostu kredytów dla dwóch grup państw po globalnym kryzysie finansowym.

Słowa kluczowe: banki, wzrost kredytów, koncentracja, własność zagraniczna, UE-15, CEE-11