

Market Structure and New Technology: case from the Loan Markets in the EU

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Małgorzata Pawłowska^{*,**} (G. Kouretas)

Poster Session

*SGH, ** Work in Progress. Please do not quote without permission.

Motivation & Research Questions

Motivation

- Entry of foreign banks into local markets was a worldwide phenomenon during the last decades and had the impact on **market structure** of the banking sector and attracted much attention in the literature
- Macroprudential policy and micro-level policies after the financial crisis of 2009
- Impact of **new technology** on lending market

The research questions are the following:

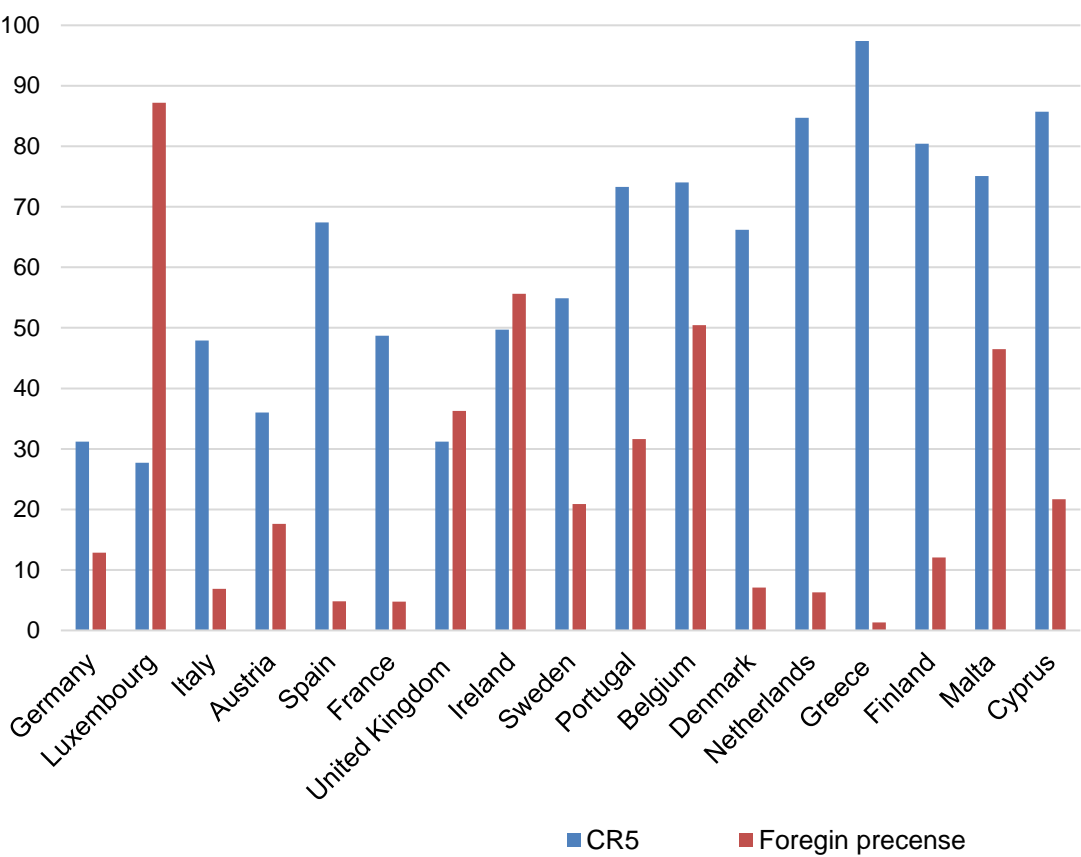
- ✓ Does the market structure influence the effects of macroprudential policy and micro-level policies in the EU's banks?
- ✓ What is the impact of the new technology on credit growth?
- ✓ Can we capture differences in EU countries and for different type of the loans (residential mortgage loans, consumer loans and corporate loans)?

A short roadmap to EU banking sectors' development

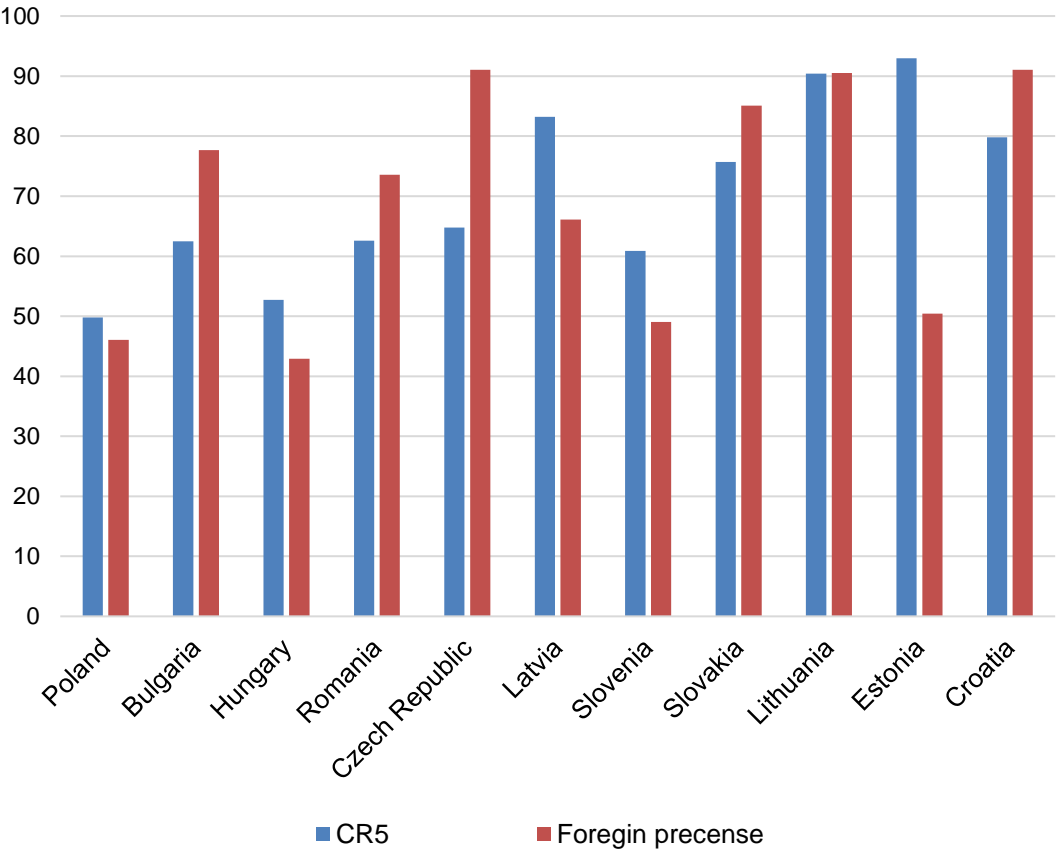
- **First:** the banking sectors of the EU countries are not homogeneous [Pawłowska, 2016]. We can see a lot of differences in the banking sectors of the so-called old and new EU member states, EU-12 (Cyprus, Czech Republic, Estonia, Lithuania, Latvia, Malta, Poland, Slovakia, Slovenia, Hungary, Bulgaria, Romania), and the countries of the so-called old union, EU-15 (Austria, Belgium, Denmark, Finland, France, Greece, Spain, the Netherlands, Ireland, Luxembourg, Germany, Portugal, Sweden, United Kingdom, and Italy). Important feature of the banking sectors of CEE countries is a high level of concentration and small size of banks as opposed to the highly developed banking sectors in Western Europe.
- **Second:** the banking sector of CEE is foreign banks dominate. Most banks were privatized in all transition economies by the end of '90s.
- **Third:** financial crisis of 2008 which had the impact on regulation architecture. Substantial improvement/changing of the regulatory framework.
- **Fourth:** new technology companies influence the structure of the financial services market through the number and size of market participants, entry and exit barriers, and the availability of information and technology to all market participants. According to the FSB [2019, pp. 3-4], financial innovations may affect the structure of the financial services through: impact on the profitability of banks; entry of large, renowned technology companies into the area of financial services [BigTech]; provision of important services by third parties.

Banking Concentration and Foreign Presence for EU [%]

EU-17



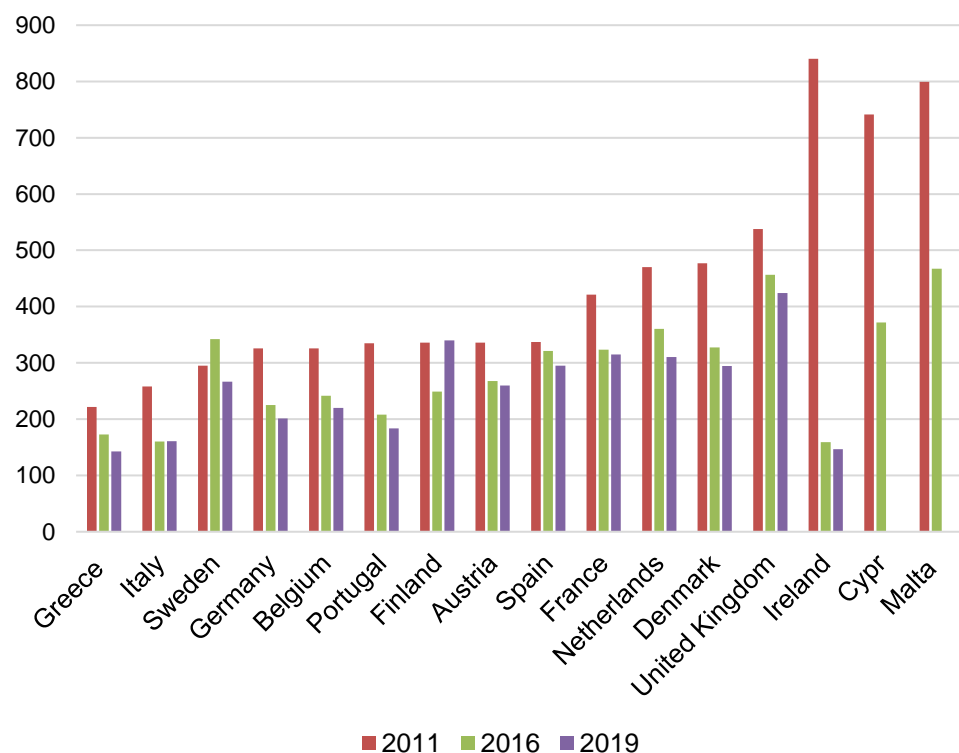
CEE-11



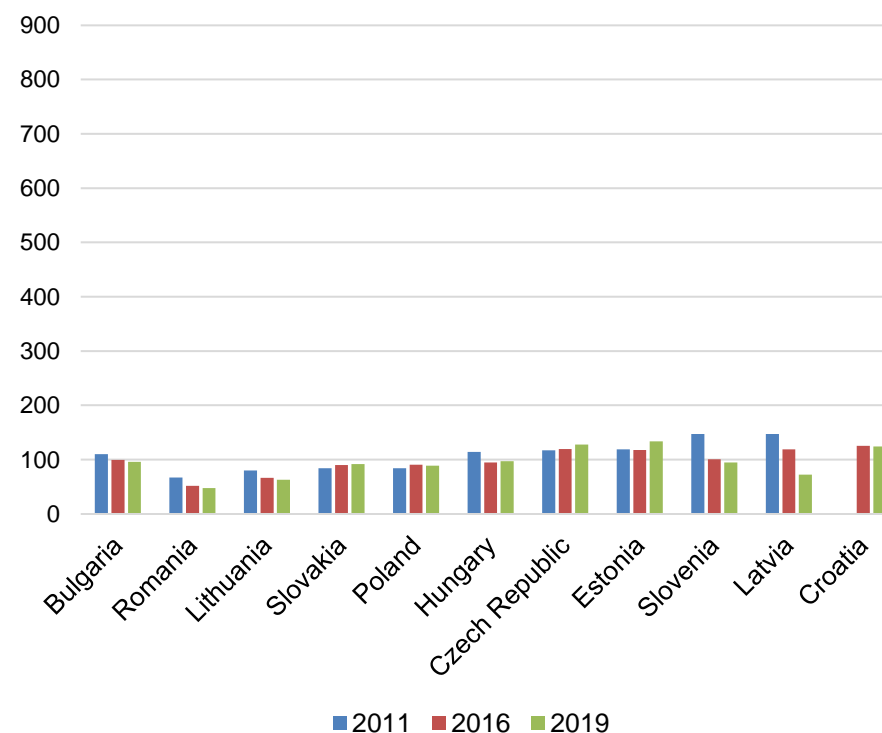
Source: ECB. Note: data for 2019.

Size of the EU banking sector in relation to GDP [%]

EU-17



CEE-11

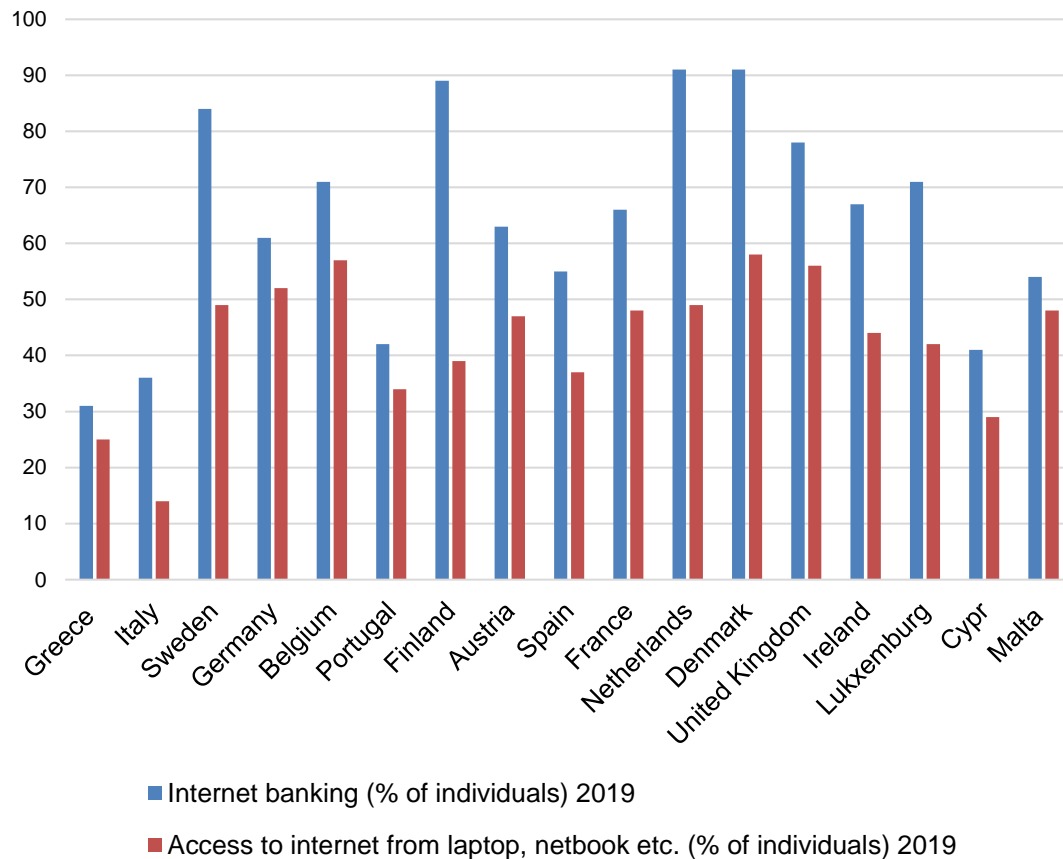


Source: own calculation based on ECB. Note: Luxemburg in 2019 about 1500%.

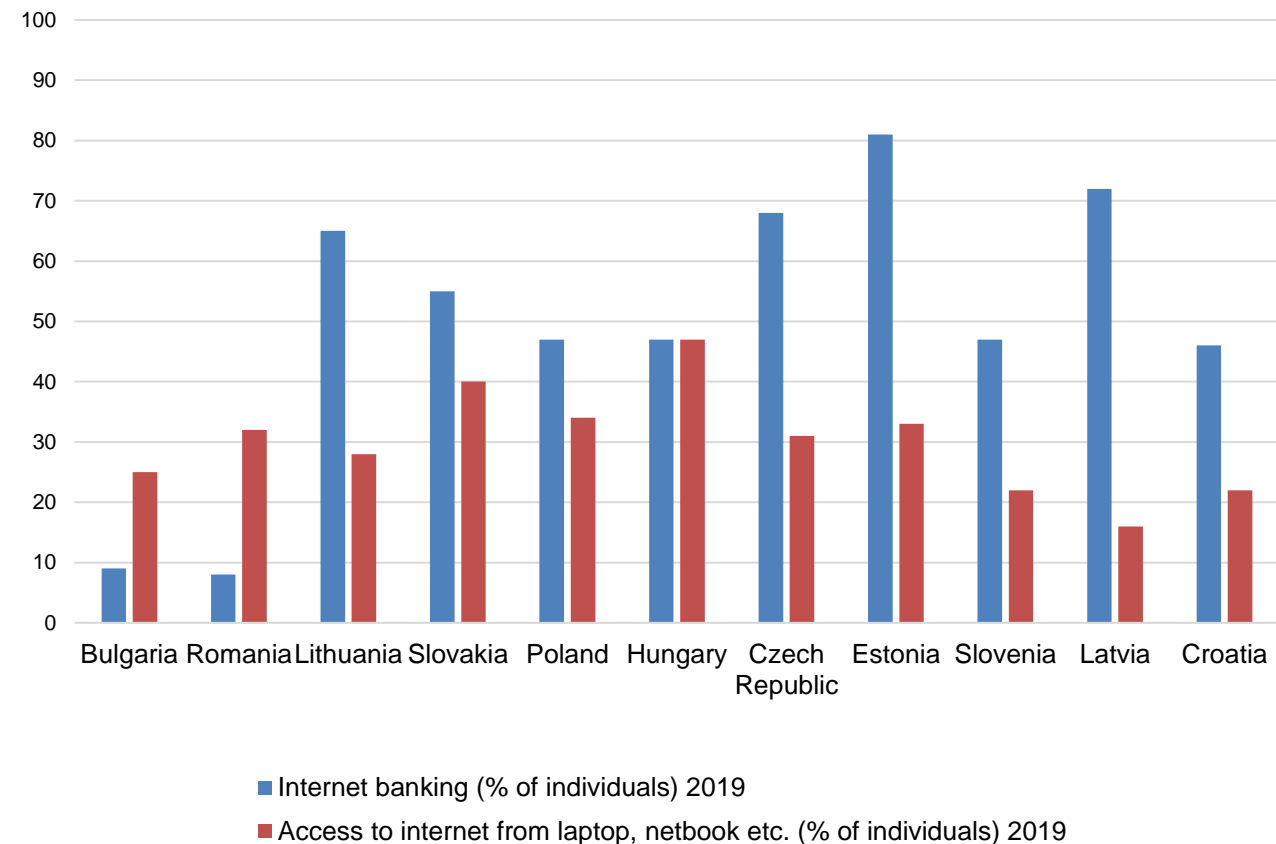
Access to Internet and Internet banking in 2019

[% of individuals]

Western Europe countries (EU-17)



Central and Eastern Europe countries (CEE-11)



Literature Review

- Kouretas and Tsoumas (JFS, 2016):
 - Findings: world data show that foreign bank presence exerts a positive impact on business regulations.
- Pawłowska et al. (IMFER, 2015):
 - Findings: intragroup links between banking institutions after the Lehman Brothers failure.
- Pawłowska (JEA, 2016):
 - Findings: paper describes the important role of size and market structure in 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, that there is asymmetry between the performance of the EU-15 and EU-12 banking sectors.
- Kouretas and Pawłowska (NBPWP, 2020):
 - Findings: using the methodology of panel regression this study finds differences of the determinants of the growth of loans for two groups of countries after the global financial crisis (EU-17 and the CEE-11).
- Pawłowska and Staniszewska (2021):
 - Findings: the consolidation of the banking sector leads to a reduction in competition due to the emergence of ever-larger banks; the FinTech sector, in turn, stimulates the level of competition not only in the banking sector, but also in the entire financial system.

Hypothesis

This study attempted to assess the impact of ***market structure*** and ***new technology*** on the development of bank lending. In particular, the impact of the use of digital technologies and mobile devices (*smartphones*) in banks on the dynamics of different types bank loans on EU was analysed.

Based on the studies reported in the literature, we divided the EU countries into two groups (CEE-11 countries and EU-17 countries) and examined the following hypothesis: *new digital technologies mainly affect the development of household loans.*

Econometric model

The model examines the impact of **market structure** and **new technology** on credit growth and follows by equation (1):

$$(1) \quad \Delta Loan_{i,t} = \gamma_c + \mu_t + \beta_1 GDP_{c,t} + \beta_2 X_{i,t} + \beta_3 MS_{c,t} + \beta_4 GDP_{c,t} * MS_{c,t} \\ + \alpha_1 Fintech1_{c,t} + \alpha_1 Fintech2_{c,t} + \alpha_2 (For_{i,t} * Fintech1_{c,t}) \\ + \alpha_3 (MS_{c,t} * Fintech1_{c,t})$$

where the dependent variable $\Delta Loans$ is the growth of log of loans to particular sector loans, which are express in euro: residential mortgage loans (**morloans**), consumer loans (**conloans**), corporate loans (**corloans**) for each bank i and for each year t .

Market structure is defined as follows:

- As market structure measures (*market structure*) is determined by taking the variable indicating concentration ratio *HHI* and *CR5 index* for each year t in country c .

The model also tests the effect of the macroeconomic situations on bank loans.

Vector of New Technology variables is broken down into two types of variables:

- *within* the banking sector (*FinTech1*) and *outside* the banking sector (*FinTech2*).

The Dependent and Explanatory Variables

The dependent variable under investigation is the **growth of banks' loans to the economy**:

- residential mortgage loans for each bank i and for each year t .
- consumer loans for each bank i and for each year t ,
- corporate loans for each bank i and for each year t .

Explanatory variables:

Bank-level control variables

- size (log of real assets) LA
- capitalization (ratio of equity to assets) CAR
- profitability (ratio of profits to total assets) ROA
- net loans to deposits ratio LTD
- Foreign bank ownership dummy variables FOR

Country-level control variables

- concentration ratio $CR5$ and HHI

Macro variables

- GDP growth rate

FinTech variables

As the variables describing the new technology ***within the banking sector*** (*FinTech1*) for each year t in a given country c we adopted:

- number of ATMs per 1000 km² (*ATM*);
- logarithm of the value of payment by card (*Card*);
- share of the number of individuals using the Internet for online banking in the population (*Internet1*);

As variables describing new technology ***from outside the banking sector*** (*FinTech2*) for each year t in a given country c we adopted:

- share of the number of individuals using the Internet in the population (*Internet2*);
- number of mobile phone subscriptions per 100 people (*Mobile*);
- number of secure web servers per 1 million people (*server*).

Data & Method of Estimation

Annual bank-level data are collected from the Bankscope-Orbis database

Macroeconomic data and the new technologies data are collected from various publicly available data sources: Eurostat, World Bank database, European Central Bank Statistical Data Warehouse database and IMF database.

The (unbalanced) panel includes commercial banks, savings banks and cooperative banks that were operating in the EU-17 countries and CEE-11 countries over the period 2004-2019

The countries included are:

- EU-17: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain, Sweden, UK
- CEE-11: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia.

We used the FE estimator and *reghdfe estimator*, which performs (almost) the same procedure with xtreg FE model, but much faster and more efficiently; *reghdfe* procedure is linear and instrumental-variable/GMM regression absorbing multiple levels of fixed effects. After reviewing the data for errors, we are left with 41,749 bank-level yearly observations.

Empirical results for HHI:

	EU-17	CEE – 11	EU	EU-17	CEE – 11	EU	EU-17	CEE – 11	EU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	<i>morloans</i>			<i>conloans</i>			<i>corloans</i>		
ROA	0.022***	0.022**	0.022***	0.004	0.008*	0.005	0.014	0.010***	0.010*
	(0.005)	(0.011)	(0.004)	(0.007)	(0.005)	(0.004)	(0.011)	(0.003)	(0.005)
Tier1	-0.002***	-0.005*	-0.003***	0.005**	-0.009	0.004	-0.002*	0.000	-0.002**
	(0.000)	(0.003)	(0.000)	(0.003)	(0.007)	(0.002)	(0.001)	(0.001)	(0.001)
LTA	0.010***	0.008**	0.009***	0.011***	-0.005	0.006**	0.012**	0.010***	0.012***
	(0.001)	(0.004)	(0.001)	(0.003)	(0.004)	(0.002)	(0.005)	(0.002)	(0.003)
LTD	-0.001	0.001***	0.001***	0.001	-0.001	0.001	0.001	-0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LA	0.293***	-0.024	0.229***	0.415***	0.278***	0.372***	0.008	-0.016**	0.003
	(0.035)	(0.119)	(0.033)	(0.091)	(0.102)	(0.071)	(0.009)	(0.007)	(0.007)
GDP	0.024	-0.309***	0.007	-0.015	-0.312***	-0.031	-0.069*	-0.028	-0.034
	(0.017)	(0.091)	(0.017)	(0.033)	(0.092)	(0.026)	(0.040)	(0.050)	(0.028)
MS	-2.910***	-6.848	-1.695*	2.348*	3.042	1.654	2.131	1.318	0.928
	(0.934)	(9.220)	(0.869)	(1.379)	(3.310)	(1.039)	(1.351)	(1.881)	(0.906)
MS*GDP	0.165	0.378	0.076	0.000	0.005***	0.001	0.001*	0.000	0.001
	(0.109)	(0.442)	(0.154)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
For	-0.215**	-0.241	-0.014	0.323**	0.063	0.178**	0.083	-0.221*	-0.080
	(0.108)	(0.164)	(0.053)	(0.158)	(0.153)	(0.079)	(0.416)	(0.124)	(0.183)
FinTech1	0.004	-0.006	0.005**	0.000**	-0.000	0.000***	0.000	-0.000	0.000**
	(0.003)	(0.011)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FinTech2	-0.008***	0.003	-0.007***	0.004*	0.006*	0.004**	-0.002	0.005	-0.005*
	(0.002)	(0.012)	(0.002)	(0.002)	(0.003)	(0.002)	(0.006)	(0.004)	(0.003)
FinTech1*For	0.000	-0.000	-0.001**	-0.010**	-0.005	-0.006**	-0.000	-0.001	-0.000
	(0.000)	(0.002)	(0.000)	(0.005)	(0.003)	(0.003)	(0.001)	(0.001)	(0.000)
FinTech1*MS	0.000***	-0.000	0.000*	-0.000	-0.000	-0.000*	-0.000	-0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs	3,183	461	3,617	1,856	830	2,686	2,976	870	3,846
Number of groups	983	122	1,095	623	217	840	823	224	1,047
R2	0.64	0.509	0.73	0.55	0.576	0.545	0.33	0.53	0.57

*** p<0.01, ** p<0.05, * p<0.1. Source: own calculations using the STATA program.

Conclusions

- The aim of this research is to examine the issue of asymmetry of the credit market determinants between the CEE countries and the EU-17 countries. The determinants of banks loans included *market structure* and *new technology* which offer an alternative funding source for businesses and consumers.
- This study showed different determinants of the growth of various types of loans for two groups of countries (CEE-11 countries and the EU-17 countries) in the context of market structure and new technology.
- The results obtained on the basis of the model allowed for a positive verification of the hypothesis that new digital technologies mainly affect the dynamics of consumer loans; furthermore this study supports sectoral approach in a macroprudential policy.
- A further direction of research it should be a deeper interpretation of the obtained results based on extended panel data and econometric models such as panel VAR.

Thank you for your attention