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Comparing the Efficiency of European Banking Sectors from the Financialisation Perspective Using the DEA Method

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Abstract

Research background: The importance of the financial sector for the real economy has increased as there has been a transition from industrial capitalism to financial capitalism in recent years. The increasing importance of the financial sector is referred to as financialisation, and it is undoubtedly associated with finance, financial operations, or an increase in the importance of profits generated by financial activities. Financialisation is a long-term process characterised by the growth of the banking sector.

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Purpose of the article: This article compares the effectiveness of banking sectors in the European Union (EU) countries from the financialisation perspective.

Methods: The study determined the efficiency of the banking sectors for the 28 EU countries using an input-oriented, non-radial BCC model in 2017 and assessed changes in the efficiency of the entities studied using the Malmquist index between 2008 and 2017.

Findings & value added: With certain outlays and effects, the banking sectors of seven countries were effective in 2017 from the financialisation perspective: Cyprus, Denmark, France, Luxembourg, Malta, Sweden, and the United Kingdom. The effectiveness of individual inputs for the banking sectors from each country was then determined, and benchmark leaders were identified. The analysis of the dynamics of changes in the efficiency of the banking sectors showed that Sweden had the highest values of the Malmquist index between 2008 and 2017 (where efficiency increased by 37.7%).

Keywords: banking sector, efficiency, financialisation, DEA

JEL: G21, N20

Introduction

The search for the sources of the 2007–2008 financial crisis[1] has increased interest in the relationship between the financial sphere and the real economy. A concept that explains such links is financialisation, which is connected with the characteristics of the financial sector (in which financialisation is visible).

Financialisation is most often defined as the growth of the financial sector in relation to the real manufacturing sector (Stockhammer 2012). In the literature, this is described as the transition of the economy from industrial capitalism to financial capitalism (van der Zwan 2014). The dominance of the financial sector is evident through the growing role of financial motives, financial markets, and financial institutions in the functioning of national economies and the international economy (Epstein 2005). There is an emerging trend of profiteering in the economy, especially through financial channels and not primarily from the use of productive activities (Krippner 2011).

The term financialisation first appeared in the early 1990s (Vercelli 2013). The intellectual pioneer in identifying this process is Magdoff (Magdoff and Foster 2014), who noted that capital shifted to the financial sphere due to reduced investment opportunities in the productive sphere (Franc-Dąbrowska 2019). Financialisation, alongside globalisation, became part of the neoliberal doctrine in which the market played a unique role. The financial market is characterized as a realm of perfect competition, efficiency, stability, self-regulation, wealth generation, and the capacity to oversee and guide other markets, all while offering avenues for savings allocation (Palley 2013).

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1   The term financial crisis itself points to financial phenomena as its cause. The specific role of the financial sphere in causing crises has been described by Turner (2016) and Laeven and Valencia (2016).

The large number of definitions that describe financialisation indicates that it is a concept that is difficult to define precisely, and according to Dünhaupt (2011), no single definition can be identified. Financialisation is undoubtedly associated with finance, financial operations that focus on new financial instruments, or an increase in the importance of profits generated by financial activities rather than operations realized in the real economy.

Some believe that the growth of the financial sector translates into economic growth and that finance follows economic growth. We believe that financialisation is a long-term process characterised by the growth of the banking sector.

Taking the above into account, **this study aims** to compare the effectiveness of banking sectors in the 28 European Union (EU) countries in 2017 from the financialisation perspective. We chose 2017 as the end of the research period to examine how the effectiveness of financialisation changed in the decade after the beginning of the 2008 financial crisis. Limiting the study period to 2017 was also due to the introduction of IFRS 9 (International Financial Reporting Standard 9 – Financial Instruments) in 2018 (*IFRS 9 Implementation by EU Institutions*, 2021). The implementation of IFRS 9 practices by European countries, particularly regarding credit risk, resulted in changes to the way this risk is managed, through tighter credit policies, which has affected the efficiency of the banking sectors. As the dynamics of changes in efficiency are analysed, we had to ensure data comparability.

Using the non-parametric method called DEA (Data Envelopment Analysis), we aim to **verify the hypothesis** that the countries of Central and Eastern Europe (CEE) have ineffective banking sectors compared to the other banking sectors from the EU. The use of the non-parametric DEA method to assess banking sector efficiency requires that specific outlays and effects be determined. The inputs selected for calculating the efficiency index were household consumption expenditure, employment of people aged 24–64, and the link between bank deposits and GDP. The effects of the banking sector that were selected were loans to the private sector, loans granted by financial institutions, mortgage loans, and loans to enterprises. Using the Malmquist index, the study also determined the non-radial efficiency of banking sectors in the BCC (Banker, Charnes, Cooper) model, focusing on expenditures for 2017, and the dynamics of changes in banking sector efficiency between 2008 and 2017.

The article is organised as follows. It begins with an introduction, while the next section provides an overview of the literature on financialisation. The methodology is presented in the next section before presenting the findings of the study. The last part includes a discussion and conclusions.

What is financialisation?

In the economic literature, there are numerous definitions of financialisation and its causes. Kim (2011) and Palley (2008) see financialisation as a process in which the financial markets, institutions and elites gain increasing influence on economic policy and performance. In contrast, Seccareccia (2012) believes that the financial markets have taken on a leading role in economic systems based on bank financing. According to Álvarez (2012) and Greenwood and Scharfstein (2013), financialisation has been the growing power of financial capital since the 1980s. Krippner (2011) believes that it is a tendency to achieve higher profits in the economy through the financial sector rather than through production. Turbeville (2014) defines it as a process during which the scale and significance of financial instruments and transactions increase compared to the overall economy. According to Montgomerie and Williams (2009), financialisation is the next stage of the development of capitalism, under which financial investments play an important role.

Different definitions of financialisation accompany its various measures, such as the size of the financial sector as a percentage of GDP (Kedrosky and Stangler 2011), the income of rentiers, interest and dividends of non-financial corporations (Stockhammer 2004), or the share of financial sector salaries to private sector salaries (Freeman 2010). It also includes employment in finance as a percentage of total employment, and the share of value-added generated in the financial sector as a proportion of total value-added generated by the country's economy, among many others.

Interest in financialisation first appeared in the late 1970s and increased during the financial crisis in 2008 (Engelen 2008; Turbeville 2014). The literature focuses on defining it (conceptualisation) (van der Zwan 2014), how it is manifested (Ramos 2017) and measured (Assa 2012), as well as its consequences (Turbeville 2014), scale (Deeg and O'Sullivan 2009) and impact on developing economies, usually highly developed countries (Epstein and Jayadev 2005; Assa 2012; Kus 2012; Akkemik and Özen 2014; Tomaskovic-Devey, Lin, and Meyers 2015).

There are also studies on the impact of the banking sector on the real economy. The literature analyses the extent to which institutional reforms (including the liberalisation of the banking sector and the protection of creditors and shareholders) caused financial market development and how the expansion of bank credit and securities markets affected economic development. Pagano (2014) stated that growth factors in the real economy include increased availability of external financing, which affects the origination and development of businesses, and more efficiently allocating capital. Many economists have studied the correlation between the development of the financial market and economic growth, investigating the causes and effects, and therefore, analysed data on the level

of countries, industries and companies (King and Levine 1993a; 1993b; Guiso, Sapienza, and Zingales 2004; Beck, Degryse, and Kneer 2014).

However, there remain research gaps, which prompted us to investigate the effectiveness of financialisation, limited to the banking sector, using the DEA method. This required us to consider the practical conditions and the conclusions of theoretical research. The DEA method and its potential use to study the effectiveness of the financial sector, especially the banking sector, are described later in the paper.

Banking sector efficiency

Efficiency is an area of interest in many academic disciplines, including economics and finance. However, due to its interdisciplinary nature, it is difficult to unambiguously define (Żabski 2017). The general approach found in the literature indicates that efficiency is the ratio of effects (the results of an entity's activities) to inputs (what is used to produce these effects). An effective entity is the one that best converts inputs into effects (Kosmaczewska 2011).

The results from efficiency studies depend on the inputs and outputs adopted. The various configurations make it possible to obtain several efficiency measures, e.g., labour productivity or capital intensity (Kozłowska 2014). It can be measured using indicative, parametric, and non-parametric methods. When studying the efficiency of banking sector entities, it is necessary to indicate what type of efficiency is considered, e.g., technical efficiency, revenue efficiency, cost efficiency, organisational efficiency, or financial efficiency (Perek 2014).

When studying banking sector efficiency, it is also necessary to identify inputs and effects. There are different approaches in the literature to attributing variables that describe the banking sector to inputs or effects. When selecting variables, two approaches are most commonly used: the bank as an intermediary (i.e., it makes a transfer between entities with excess cash and those that request credit products) and the bank as a producer (i.e., it offers services to customers) (Mielnik, Ławrynowicz, and Szambelańczyk 2004).

Based on studies on the efficiency of banking sectors or banks, it is possible to identify the variables used for research using the DEA method in different approaches to the role of the bank. In the case of inputs, the most frequently considered variables are staff expenditure, the number of employees, the value of deposits, operating costs, and the value of fixed assets. These inputs indicate the important role of employment as an input to achieve effects in the banking sector. There are also two balance sheet categories that symbolise a bank's assets and liabilities. The whole is complemented by the operating costs incurred. The outlays have an impact on the size of the effects. The most frequent

are the value of loans, the value of deposits, interest income, and non-interest income. Among the effects, loans are significant, as they generate a proportion of interest income. Effects complement non-interest income. Deposits often appear as both inputs and effects, as they can be understood differently. On the one hand, they represent the value of funds raised by the bank for lending. In this sense, deposits can be understood as a kind of input. On the other hand, adopting the concept of the bank as an intermediary, deposits are an effect of the bank's activities (the amount of funds the bank has managed to raise) (Stępień 2015).

Research methodology

In the 1970s, Charnes, Cooper, and Rhodes (1978, pp. 429–444) developed a method of determining effectiveness based on the quotient of the weighted sum of multiple effects and the weighted sum of multiple inputs. The method they proposed was called DEA. In this method, the weighted sums of P inputs (x_{pj}) and R effects (y_{rj}) are compared separately for each analysed object ($j = 1, ..., J$), also called a DMU (Decision-Making Unit).

The efficiency of each object is determined based on the distance from the empirical limit of technological possibilities, the so-called effectiveness curve. The efficiency of the object is measured by the efficiency factor, denoted as θ. It expresses the link between empirical and optimal technology. Fully effective units lie on the effectiveness curve ($\theta = 1$). This means that they effectively convert inputs into results. Units below the curve are considered ineffective ($\theta < 1$). The input-oriented CCR model[2] can be used (there is also an effect-oriented variant). Its dual form for an object of number o is as follows:

$$\theta_o \rightarrow \min, \tag{1}$$

$$\sum_{j=1}^{J} x_{pj}\lambda_j \leq \theta x_{pj}, \tag{2}$$

$$\sum_{j=1}^{J} y_{rj}\lambda_j \geq y_{rj}, \tag{3}$$

$$\lambda_j \geq 0, \tag{4}$$

where:

λ_j – linear combination coefficients.

2   CCR is taken from the names of the authors: Charnes, Cooper, Rhodes.

When solving the model given by formulas (1)–(4), we look for the minimum value of θ_o – the input multiplier of the o-th object, which determines the proportional reduction of each input while maintaining the current level of effects.

The CCR model assumes constant economies of scale, and the measure calculated here is called total technical efficiency. However, the study used an input-oriented model with variable scale effects. If variable effects of scale are required, then the BCC model (Banker, Charnes, and Cooper 1984, pp. 1078–1092) is used, in which models (1)–(4) are supplemented with an additional constraint of the form:

$$\lambda_1 + \lambda_2 + \ldots + \lambda_J = 1. \tag{5}$$

The classic approach to the DEA method assumes equal, proportional changes to all inputs or outputs. However, this assumption can be challenged. The starting point is Russell's efficiency, thanks to which the non-radial efficiency can be determined. In this case, the efficiency indicator in the input-oriented model is most often the average of partial efficiencies in relation to individual inputs. Non-radial efficiency assumes that the partial efficiency due to a given input (or effect) may be different for each input (effect), while the partial efficiency of a single input (effect) is still radial (Färe et al. 2016, pp. 123–130).

The information obtained after solving the models that make up the DEA method is static. Investigating changes in effectiveness over time requires special dynamics indices, such as Malmquist productivity indexes (Bogetoft and Otto 2011). They are based on the Shephard distance, which is the inverse of the optimal value of the objective function, oriented on the effects of the CCR model. These indices for periods t and t+1 are determined as follows:

$$M_t\left(x_t, y_t, x_{t+1}, y_{t+1}\right) = \frac{D_t\left(x_{t+1}, y_{t+1}\right)}{D_t\left(x_t, y_t\right)}, \tag{6}$$

$$M_{t+1}\left(x_t, y_t, x_{t+1}, y_{t+1}\right) = \frac{D_t\left(x_{t+1}, y_{t+1}\right)}{D_{t+1}\left(x_t, y_t\right)}, \tag{7}$$

where:

x_t, x_{t+1} – inputs in periods t and $t + 1$;

y_t, y_{t+1} – effects in periods t and $t + 1$;

D – the Shephard distance.

The index illustrated by formula (6) compares the efficiency in two periods using technologies from period t as a benchmark. In turn, the index represented by formula (7) takes technologies from period $t + 1$ as a reference point. In practice, the geometric mean of these indices is used for interpretation.

The Malmquist productivity index can be broken down into two components: the technical efficiency index (TE) and the technical change index (TC). The former measures a relative change in effectiveness without changing the position of the efficiency curve. The latter defines a relative change in efficiency related to the technological progress that took place between the research period and the base period (Pinto de Abreu et al. 2012, pp. 1937–1943).

Färe et al. (1994, pp. 66–83) and Ray and Desli (1997, pp. 1033–1039) proposed adjustments to calculate the Malmquist index for the BCC model. This article uses the Färe and Grosskopf approach.

The DEA method is also applied to estimate the effectiveness of the banking sector and its components. Optimizing efficiency can be understood in two ways: reducing inputs to achieve the current effects or increasing the effects using the inputs at the current level (Cooper, Seiford, and Tone 1999). Research conducted using DEA focuses on assessing the effectiveness of banking sectors and banks. This application is important in view of the topic of this study. In banking sector research, the DEA method is often one of two or three methods that allow research goals to be achieved more precisely. Some of these methods verify the relevance of the inputs and/or outputs included in DEA. Others are an extension of effectiveness research and combine non-parametric methods with parametric ones. To apply the DEA method, it is important to identify the variables that best describe the banking sector or banks.

To determine the effectiveness of the surveyed entities, it was necessary to define the inputs and effects of the banking sector. The following variables were defined in the inputs used by the economy in the banking sector:

- Household consumption expenditures, which reflect changes in household behaviours. Increased consumer spending is often the result of easy access to credit money (Řepková 2014). It also means that the greater the consumption, the greater the demand for credit.

- Employment of people aged between 20–Population ageing has an impact on the development of various market sectors, including financial services (Enste, Naegele, and Leve 2008, pp. 330–331).

- Bank deposit to GDP ratio. Referring to the research on the effectiveness of banks, we adopt the "intermediation" approach proposed by Sealey and Lindley (1977), where deposits should be treated as an intermediate input used in the production of the final banking product, i.e., credit.

The effects of the banking sector primarily include credit products, as described by Jordà, Schularick, ad Taylor (2014), Pagano (2014), and Guo et al. (2020). Based on those papers, the following banking sector effects related to financialisation were selected:

- domestic credit to the private sector,

- private credit by deposit money banks and other financial institutions,

- mortgages,

- corporate loans.

Oliveira and Tabak (2005) presented an interesting approach to variable choice. The variables adopted for their study had an impact on their results, so they should sufficiently describe the processes taking place in decision-making units. For this reason, the study should be extended to use other inputs and outputs to properly compare the results.

A low positive correlation between inputs and outputs is preferred in the DEA method. To determine the correlation between the indicators presented above, Pearson's linear correlation coefficient was used. The correlation indicates that inputs and outputs are not fully correlated with each other.

The research was conducted in two parts:

1. Determining the non-radial efficiency in the input-oriented BCC model for 2017.

2. Determining the dynamics of changes in the efficiency of the surveyed entities using the Malmquist index for 2008 and 2017.

Results

The study attempted to determine the effectiveness of financialisation in the banking sectors of EU countries using the DEA method. The results of the input-oriented BCC model[3] are presented in Table 1.

The first stage of interpretation is to identify effective and ineffective objects. Effective banking sectors, from a financialisation perspective, are those that are on the efficiency curve. Those sectors have an efficiency index equal to The effectiveness of the examined units in terms of financialisation means that in the examined group, they best use the inputs of the banking sector, and thus achieve better results. By contrast, ineffective banking sectors are those whose effectiveness ratio is lower than This means that ineffective banking sectors are below the efficiency curve.

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3   The calculations were made in the R computing environment using the deaR package.

Table 1. Efficiency indicators of the banking sector in European Union countries in 2017 – results of the non-radial DEA method (the expenditure-oriented BCC model)

Country	Household consumption expenditures	Employment of people aged 20–64	Bank deposit to GDP ratio	Mean effectiveness
Austria	0.627	0.633	0.275	0.511
Belgium	0.486	0.504	0.317	0.436
Bulgaria	0.440	0.120	0.301	0.287
Croatia	0.412	0.232	0.222	0.289
Cyprus	1	1	1	1
Czech Republic	0.395	0.164	0.328	0.296
Denmark	1	1	1	1
Estonia	1	0.519	0.605	0.708
Finland	0.141	0.142	0.511	0.264
France	1	1	1	1
Germany	0.497	0.431	0.887	0.605
Greece	0.331	0.266	0.184	0.260
Hungary	0.232	0.084	0.354	0.223
Ireland	0.577	0.574	0.421	0.524
Italy	0.410	0.399	0.434	0.414
Latvia	0.917	0.430	0.390	0.579
Lithuania	0.558	0.284	0.411	0.417
Luxembourg	1	1	1	1
Malta	1	1	1	1
Netherlands	0.942	0.823	0.333	0.699
Poland	0.556	0.196	0.414	0.389
Portugal	0.120	0.075	0.385	0.193
Romania	0.200	0.066	0.518	0.261
Slovakia	0.497	0.221	0.278	0.332
Slovenia	0.614	0.395	0.311	0.440
Spain	0.610	0.483	0.394	0.495
Sweden	1	1	1	1
United Kingdom	1	1	1	1

Source: own study based on data from Eurostat, Bloomberg, and Thomson Reuters (2019) databases.

The results in Table 1 indicate that the banking sectors in the following seven countries were effective in 2017: Cyprus, Denmark, France, Luxembourg, Malta, Sweden,

and the United Kingdom. These banking sectors proved to be efficient in terms of all expenditures. Possible reasons for the effectiveness of each individual sector vary, and an explanation is given below[4]:

Cyprus – the banking sector consists mainly of banks that act as financial intermediaries while actively competing for clients. The evolution of the banking sector towards a regional financial centre made it possible to increase the differentiation of state budget revenues, which mainly came from tourism before. The greatest development of the financial sector came between 2004 and 2012, which was mainly related to regulatory arbitrage, favourable tax system, and the interest rate on bank deposits. Cyprus also has a high proportion of citizens per bank employee (1 bank employee per 78 inhabitants). The use of the banking sector as a benchmark must be limited due to its peculiarities. Additionally, it is hard to put technology from Cyprus into non-effective banking sectors.

Denmark – banking services are very popular in Denmark. Most adults have a bank account in at least one bank. The banking sector also plays an extremely important role in the economy, mainly because relatively high revenues contributed to the state budget as corporate tax. Between 2005 and 2014, employment in the banking sector decreased from 47,576 to 37,201 employees. In the case of financial assets, which also include deposits, an increase is noticeable.

France – the largest items in the assets of the French banking sector are debt securities and receivables. This results in relatively high effects determined by the value of the credit instruments.

Luxembourg – the banking sector is characterised by the highest ratio of sector assets to GDP in Europe. The results of this indicator are due to the large number of large credit institutions based in the country.

Malta – the most important group of banks in Malta are domestic banks, which are vital to the country's economy. They mainly provide credit and deposit services, and their results have a major impact on the results of the financial sector. The assets of the five largest banks are approximately 2.5 times greater than the country's GDP. The banking sector is characterised by a high level of loans and debt instruments in the asset structure.

Sweden – the Swedish banking sector is characterised by relatively high employment in relation to total employment in the economy. The structure of liabilities in this sector is characterised by a high share of liabilities to the non-financial sector, represented by

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4   Banking Structures Report, Reports in selected years, European Central Bank.

household deposits. Outlays in the form of employment and deposits translate into a high level of assets in the Swedish banking sector, exceeding the country's GDP.

United Kingdom – about 20% of banking activities in the world are conducted in this country's financial sector. This is because most banks that operate there conduct international activities. This sector is present in the Anglo-Saxon banking model in which investment banks play an important role. The results of British financial institutions were affected by the financial crisis, which reduced the value of deposits taken from the interbank market. On the other hand, the liabilities of British banks increased due to the increase in the value of deposits taken from households and non-financial corporations. There was a decline in the financial sector, although the efficiency of the sector indicates that the inputs are still being used effectively.

Estonia is an interesting case. Household consumption expenditure is effective, but the overall efficiency of the banking sector is understated by the other two inputs (employment and bank deposits).

The most ineffective banking sectors are in Portugal, Hungary, Greece, Romania, Finland, Bulgaria, Croatia, and the Czech Republic. In each of these countries, efficiency is below 0.3 (in comparison, the efficiency in countries with effective banking sectors is 1). Most of the ineffective facilities are banking sectors of the countries that joined the EU after 2000 – five were countries that had had a centrally planned economy. The low efficiency of the banking sectors in these countries was due to the ineffectiveness of expenditures related to the employment of working-age people.

The second stage of the research was to determine the efficiency of individual inputs used in the research. The entities which, in the overall assessment, are on the efficiency curve will be effective in terms of inputs. When considering individual inputs, we can say that entities use a given input ineffectively. Subsequently, the performance indicators for each of the inputs were interpreted. The first expenditure used in the study was households' consumption expenditure, which is used effectively in countries where the average efficiency is Again, Estonia's banking sector provides an interesting. It belongs to the group of ineffective entities, yet its efficiency index for these expenditures was Latvia and the Netherlands were also close to achieving 100% efficiency in using this input. The banking sectors in Portugal, Finland, Romania, and Hungary were the most ineffective based on households' consumption expenditure.

The second banking sector input was the employment of working-age people. The Dutch banking sector is close to the effectiveness limit for this input. By contrast, the most ineffective banking sectors were in Romania, Portugal, Bulgaria, Finland, the Czech Republic, Poland and Hungary.

The last input was bank deposits, where Germany was close to the efficiency curve. By contrast, the most ineffective banking sectors in terms of expenditure in the form of employment were those in Greece, Croatia, Austria, and Slovakia.

Another area of analysis of the results of the DEA effectiveness study was benchmark leaders. To become effective, ineffective objects must change their technologies, e.g., by following the example of effective units. Thus, for each one, a formula is determined called the benchmarking formula, in which the inputs or effects are multiplied by the coefficients λj derived from optimisation. The benchmarking formula does not have to use all available effective units.

The benchmarking formula takes the form of a weighted sum of inputs, in which the lambdas are the coefficients. A benchmarking formula can be created for each ineffective object. However, due to their large number, the number of entities that need the technology of individual leaders should be given to create such a formula. Accordingly, we consider five leaders (Cyprus, France, Luxembourg, Malta, and the United Kingdom), whose technologies will allow ineffective countries to achieve the same effects with lower inputs. Among all 21 ineffective banking sectors, the Cyprus banking sector plays an extremely important role in assessing the degree of expenditure reduction – it appears in each benchmarking formula. The second banking sector is in France, which can be a role model for ten countries, followed by Great Britain (for six countries), Luxembourg (for three countries), and Malta (for one country).

The second part of the study analysed the dynamics of changes in banking sector efficiency between 2008 and dynamics analysis was performed using the Malmquist index

Table 2. Malmquist Index in the European Union Member States, 2008–2017

Country	Malmquist index	Change from innovation and technological progress	Change from a change of scale
Austria	0.924	0.820	1.128
Belgium	0.998	0.854	1.168
Bulgaria	0.868	0.768	1.131
Croatia	1.102	0.765	1.442
Cyprus	0.872	0.872	1.000

Country	Malmquist index	Change from innovation and technological progress	Change from a change of scale
Czech Republic	0.994	0.758	1.311
Denmark	0.937	0.937	1.000
Estonia	0.719	0.704	1.021
Finland	1.143	0.784	1.457
France	1.314	1.314	1.000
Germany	0.957	1.177	0.814
Greece	1.112	0.810	1.373
Hungary	0.678	0.761	0.892
Ireland	0.362	0.870	0.416
Italy	1.123	0.835	1.345
Latvia	0.516	0.735	0.702
Lithuania	0.684	0.768	0.891
Luxembourg	0.888	0.714	1.244
Malta	0.565	0.565	1.000
Netherlands	1.154	1.155	0.999
Poland	1.280	0.813	1.574
Portugal	0.765	0.817	0.936
Romania	0.944	0.763	1.237
Slovakia	1.278	0.764	1.674
Slovenia	0.726	0.773	0.939
Spain	0.734	0.865	0.848
Sweden	1.378	0.983	1.402
United Kingdom	0.931	0.931	1.000

Source: own study based on data from Eurostat, Bloomberg, and Thomson Reuters (2019) databases.

Table 2 presents the calculated Malmquist indices and the components of their decomposition between 2008 and 2017. The highest values were recorded for the banking sector in Sweden (an increase in efficiency by 37.7%), France (by 31.4%), Poland (by 28%), Slovakia (by 27.8%) and the Netherlands (by 15.4%). However, the lowest values were reported in Ireland (a decrease in efficiency by 63.8%), Latvia (by 48.4%), Malta (by 43.5%), Hungary (by 32.2%) and Lithuania (by 31.6%).

Changes in efficiency resulting from the change in the scale of operations, which had a positive impact on the Malmquist index, occurred in Slovakia (an increase of 67.4%), Poland (57.4%), Finland (45.7%), Croatia (44.2%) and Sweden (40.2%). The Malmquist index

performance decreased due to the change in the scale of operations in the banking sectors in Ireland (a decrease of 58.4%), Latvia (29.8%), Germany (18.6%) and Spain (15.2%). Efficiency gains caused by changes in technological progress were noted in the banking sectors in France (an increase of 31.4%), Germany (17.7%) and the Netherlands (15.5%). By contrast, they had a negative impact in Malta (a decrease of 43.5%), Estonia (29.6%), Luxembourg (28.7%) and Latvia (26.5%).

This study compares the effectiveness of financialisation between banking sectors in CEE and other EU countries. The non-parametric DEA method is often used to examine the effectiveness of banks, banking sectors, or financial systems. The output-oriented BCC model used is one of many methods in this type of research. Limiting the analysis to one model limits the possibilities of interpretation, although a similar approach was adopted by Oliveira and Tabak (2005) and Batir, Volkman, and Gungor (2017).

Other authors compare the results from different DEA models (see Řepková 2014; Svitalkova 2014). Some research supplements the effectiveness study with additional research methods, e.g., panel data analysis (Řepková 2015), the analysis of financial indicators (Tuškan and Stojanović 2016), or the Malmquist index (Da Silva Fernandes, Stasinakis, and Bardarova 2018). Following the example of other authors, the study with the non-parametric DEA method was supplemented with the Malmquist index, which makes it possible to indicate changes in efficiency between 2008 and As the results cover a relatively short period, the study could be expanded to include annual efficiency changes or a determination of effectiveness for several consecutive years.

The results of our study show the effectiveness of the financialisation of the banking sector in EU countries. The banking sectors of the following countries were found to be effective: Cyprus, Denmark, France, Luxembourg, Malta, Sweden, and the UK. The average efficiency for the EU banking sector and the average efficiency coefficients in the analysed period for individual countries were also presented. This study adopted an approach that included the efficiency of banking sectors in 2017 and the change in efficiency compared to 2008, which showed a change in efficiency after ten years.

Conclusions

The growth of the banking sector and financialisation are important issues from the perspective of financial development and, therefore, for the economies of countries where that phenomenon is observed. The study empirically verified the effectiveness of banking sectors from the financialisation perspective in the EU states, based on the proposed set of inputs and outputs. This objective was achieved using the BCC DEA model and the Malmquist index, which required that the outlays and effects for banking sectors be determined. The outlays are household expenditures, employment in the economy, and the ratio of bank

deposits to GDP. The effects of financialisation in the developed model include credit to the private sector, the credit extended by financial institutions, mortgage credit and corporate credit extended by the banking sector.

The results of the study conducted for 2017 show the effectiveness of banking sectors from the financialisation perspective in Cyprus, Denmark, France, Luxembourg, Malta, Sweden, and the United Kingdom. This means that in these countries, the selected expenditures (based on the literature review) on the banking sector were best translated into the effects achieved by this sector. The largest changes in the efficiency of banking sectors from the financialisation perspective between 2008 and 2017 were observed in Sweden, France, Poland, Slovakia, and the Netherlands.

The hypothesis that CEE countries have ineffective banking sectors compared to other EU countries cannot be verified clearly. On the one hand, while the banking sector of each CEE country is ineffective, not all of them are more ineffective than other countries.

Countries where the banking sectors are effective from the financialisation perspective generally have well-developed banking sectors, converting effects into investments very well. However, countries where efficiency gains were observed show good conditions for the development of the banking sector in the longer term.

Limitations of the study include the variables applied and the use of only one DEA model. In the future, research should be extended with other models of nonparametric methods, like a super-efficiency model, or by examining the impact of Brexit or other significant factors that emerged after It will, therefore, be necessary to introduce new variables to describe financialisation. Due to the framework of this study, no attempt was made to determine detailed reasons for the results. This could also be an avenue for a subsequent study.

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References

Akkemik, K.A., Özen, Ş. (2014), *Macroeconomic and institutional determinants of financialisation of non-financial firms: Case study of Turkey*, "Socio-Economic Review", 12 (1), pp. 71–98, https://doi.org/10.1093/ser/mwt006

Álvarez, N. (2012), *The financialization of the Spanish economy: debt, crisis and social cuts*, paper presented at the Workshop on Debt, organized by Rosa Luxemburg Stiftung, Berlin, November 2012.

Assa, J. (2012), *Financialization and its Consequences: the OECD Experience*, "Finance Research", 1 (1), pp. 35–39.

Banker, R., Charnes, A., Cooper, W.W. (1984), *Some Models for Estimating Technical and Scale Efficiencies in Data Envelopment Analysis*, "Management Science", 30 (9), pp. 1031–1142, https://doi.org/10.1287/mnsc.30.9.1078

Batir, T.E., Volkman, D.A., Gungor, B. (2017), *Determinants of bank efficiency in Turkey: Participation banks versus conventional banks*, "Borsa Istanbul Review", 17 (2), pp. 86–96, https://doi.org/10.1016/j.bir.2017.02.003

Beck, T., Degryse, H., Kneer, C. (2014), *Is more finance better? Disentangling intermediation and size effects of financial systems*, "Journal of Financial Stability", 10, pp. 50–64, https://doi.org/10.1016/j.jfs.2013.03.005

Bogetoft, P., Otto, L. (2011), *Benchmarking with DEA, SFA, and R*, Springer, New York, https://doi.org/10.1007/978-1-4419-7961-2

Charnes, A., Cooper, W.W., Rhodes, E. (1978), *Measuring the efficiency of decision making units*, "European Journal of Operational Research", 2 (6), pp. 429–444, https://doi.org/10.1016/0377-2217 (78)90138-8

Cooper, W.W., Seiford, L.M., Tone, K. (1999), *Data Envelopment Analysis. A Comprehensive Text with Models, Applications, References and DEA-Solver Software*, Kluwer Academic Publishers, New York, https://doi.org/10.1007/b109347

Da Silva Fernandes, F., Stasinakis, Ch., Bardarova, V. (2018), *Two-stage DEA-Truncated Regression: Application in banking efficiency and financial development*, "Expert Systems with Applications", 96, pp. 284–301, https://doi.org/10.1016/j.eswa.2017.12.010

Deeg, R., O'Sullivan, M.A. (2009), *The Political Economy of Global Finance Capital*, "World Politics", 61 (4), pp. 731–763, https://doi.org/10.1017/S0043887109990116

Dünhaupt, P. (2011), *The Impact of Financialization on Income Distribution in the USA and Germany: A Proposal for a New Adjusted Wage Share*, "Microeconomic Policy Institute Working Paper", 7.

Engelen, E. (2008), *The Case for Financialization*, "Competition & Change", 12 (2), https://doi.org/10.1179/102452908X289776

Enste, P., Naegele, G., Leve, V. (2008), *The Discovery and Development of the Silver Market in Germany*, [in:] F. Kohlbacher, C. Herstatt (eds.), *The Silver Market Phenomenon. Business Opportunities in an Era of Demographic Change*, Springer, Heidelberg, pp. 325–339, https://doi.org/10.1007/978-3-540-75331-5_22

Epstein, G.A. (2005), *Introduction: Financialization and the World Economy*, [in:] G.A. Epstein (ed.), *Financialization and the World Economy*, Edward Elgar Publishing Limited, Northampton, pp. 3–17.

Epstein, G.A., Jayadev, A. (2005), *The rise of rentier incomes in OECD countries: financialization, central bank policy and labor solidarity*, "Financialization and the World Economy", 39.

Färe, R., Fukuyama, H., Grosskopf, S., Zelenyuk, V. (2016), *Cost decompositions and the efficient subset*, "Omega", 62, pp. 123–130, https://doi.org/10.1016/j.omega.2015.09.004

Färe, R., Grosskopf, S.M., Norris, S., Zhang, Z. (1994), *Productivity Growth, Technical Progress, and Efficiency Change in Industrialized Countries*, "The American Economic Review", 84 (1), pp. 66–83.

Franc-Dąbrowska, J. (2019), *Financialization and speculation in agriculture – positive and negative aspects of the financialization of the economy*, "Annals of the Polish Association of Agricultural and Agribusiness Economists", XXI (3), pp. 73–81, https://doi.org/10.5604/01.3001.0013.3064

Freeman, R.B. (2010), *It's financialization!*, "International Labour Review", 149 (2), pp. 163–183, https://doi.org/10.1111/j.1564-913X.2010.00082.x

Greenwood, R., Scharfstein, D. (2013), *The Growth of Finance*, "Journal of Economic Perspectives", 27 (2), pp. 3–28, https://doi.org/10.1257/jep.27.2.3

Guiso, L., Sapienza, P., Zingales, L. (2004), *Does Local Financial Development Matter?*, "The Quarterly Journal of Economics", 119 (3), pp. 929–969, https://doi.org/10.1162/0033553041502162

Guo, L., Na, S., Tan, X., Gui, P., Liu, C. (2020), *Evolution of the Efficiency of Nationwide Commercial Banks in China Based on an SBM-Undesirable Model and DEA Window Analysis*, "Mathematical Problems in Engineering", 2020, https://doi.org/10.1155/2020/4682790

IFRS 9 Implementation by EU Institutions. Monitoring Report (2021), EBA/Rep/2021/35, https://www.eba.europa.eu/sites/default/files/document_library/Publications/Reports/2021/1024609/IFRS9%20monitoring%20report.pdf (accessed: 23.11.2023).

Jordà, Ò., Schularick, M., Taylor, A.M. (2014), *The Great Mortgaging: Housing Finance, Crises, and Business Cycles*, "NBER Working Paper Series", 23, https://doi.org/10.3386/w20501

Kedrosky, P., Stangler, D. (2011), *Financialization and Its Entrepreneurial Consequences*, "Ewing Marion Kauffman Foundation Research Paper", https://doi.org/10.2139/ssrn.1798605

Kim, Y. (2011), *A Short Empirical Note on Household Debt, Financialization, and Macroeconomic Performance*, "Working Papers from Trinity College, Department of Economics", 1107.

King, R.G., Levine, R. (1993a), *Finance and Growth: Schumpeter Might Be Right*, "The Quarterly Journal of Economics", 108 (3), pp. 717–737, https://doi.org/10.2307/2118406

King, R.G., Levine, R. (1993b), *Finance, entrepreneurship and growth. Theory and evidence*, "Journal of Monetary Economics", 32 (3), pp. 513–542, https://doi.org/10.1016/0304-3932 (93)90028-E

Kosmaczewska, J. (2011), *Analiza efektywności gospodarowania gmin wiejskich w kontekście rozwoju funkcji turystycznej z wykorzystaniem metody DEA*, „Zeszyty Naukowe SGGW w Warszawie. Ekonomika i Organizacja Gospodarki Żywnościowej", 90, pp. 131–141.

Kozłowska, J. (2014), *Zastosowanie metody DEA w analizie efektywności działania przedsiębiorstw usługowych*, „Zeszyty Naukowe Politechniki Śląskiej. Seria: Organizacja i Zarządzanie”, 73, pp. 305–317.

Krippner, G.R. (2011), *Capitalizing on Crisis: The Political Origins of the Rise of Finance*, Harvard University Press, Cambridge, https://doi.org/10.2307/j.ctvjk2x23

Kus, B. (2012), *Financialisation and Income Inequality in OECD Nations: 1995–2007*, "The Economic and Social Review", 43 (4, Winter), pp. 477–495.

Laeven, L., Valencia, F. (2016), *Systemic Banking Crisis Database: An Update*, "IMF Working Paper", 12 (163), https://doi.org/10.5089/9781475505054.001

Magdoff, F., Foster, J.B. (2014), *Stagnation and Financialization: The Nature of the Contradiction*, "Monthly Review", 66 (1), https://doi.org/10.14452/MR-066-01-2014-05_1

Mielnik, M., Ławrynowicz, M., Szambelańczyk, J. (2004), *Efektywność jako determinanta kapitalizacji banków spółdzielczych w Polsce w świetle założeń nowej umowy kapitałowej Komitetu Bazylejskiego*, „Ruch Prawniczy, Ekonomiczny i Socjologiczny”, LXVI (1), pp. 103–118.

Montgomerie, J., Williams, K. (2009), *Financialised Capitalism: After the Crisis and beyond Neoliberalism*, "Competition & Change", 13 (2), https://doi.org/10.1179/102452909X416999

Oliveira, C.V., Tabak, B.M. (2005), *An International Comparison of Banking Sectors: A DEA Approach*, "Global Economic Review", 34 (3), pp. 291–307, https://doi.org/10.1080/12265080500292633

Pagano, M. (2014), *Is Europe Overbanked? Czy w Europie jest za dużo banków?*, "mBank – CASE Seminar Proceedings" 132, "Zeszyty mBank – CASE", 132, https://www.case-research.eu/files/?id_plik=5080 (accessed: 15.11.2023).

Palley, T.I. (2008), *Financialization: What it is and Why it Matters?*, "Macroeconomic Policy Institute (IMK) in the Hans-Boeckler-Foundation Working Paper", 04.

Palley, T.I. (2013), *Financialization The economics of finance capital domination*, Palgrave Macmillan, London.

Perek, A. (2014), *Wykorzystanie metody DEA do oceny efektywności banków spółdzielczych w Polsce*, "Economics and Management", 3, pp. 222–235.

Pinto de Abreu, U.G., Gonçalves Gomes, E., Correia Baptista Soares de Mello, J.C., Santos, S.A., Catto, D.F. (2012), *Heifer Retention Program in the Pantanal: a study with data envelopment analysis (DEA) and Malmquist index*, "Revista Brasileira de Zootecnica", 41 (8), https://doi.org/10.1590/S1516-35982012000800019

Ramos, R.A. (2017), *Financialization at the international level: evidence from emerging market economies*, "Economia e Sociedade", 26, https://doi.org/10.1590/1982-3533.2017v26n4art6

Ray, S.C., Desli, E. (1997), *Productivity Growth, Technical Progress, and Efficiency Change in Industrialized Countries: Comment*, "The American Economic Review", 87 (5), pp. 1033–1039.

Řepková, I. (2014), *Efficiency of the Czech Banking Sector Employing the DEA Window Analysis Approach*, "Procedia Economics and Finance", 12, pp. 587–596, https://doi.org/10.1016/S2212-5671 (14)00383-9

Řepková, I. (2015), *Banking Efficiency Determinants in the Czech Banking Sector*, "Procedia Economics and Finance", 23, pp. 191–196, https://doi.org/10.1016/S2212-5671 (15)00367-6

Sealey, C.W., Lindley, J.T. (1977), *Inputs, Outputs, and a Theory of Production and Cost Depository Financial Institutions*, "The Journal of Finance", 32 (4), pp. 1251–1266, https://doi.org/10.1111/j.1540-6261.1977.tb03324.x

Seccareccia, M. (2012), *Financialization and the transformation of commercial banking: understanding the recent Canadian experience before and during the international financial crisis*, "Journal of Post Keynesian Economics", 35 (2), https://doi.org/10.2753/PKE0160-3477350206

Stępień, K. (2015), *Dylematy pomiaru efektywności banków*, "Zarządzanie Finansami i Rachunkowość", 3 (2), pp. 97–110.

Stockhammer, E. (2004), *Financialisation and the slowdown of accumulation*, "Cambridge Journal of Economics", 28 (5), pp. 719–741, https://doi.org/10.1093/cje/beh032

Stockhammer, E. (2012), *Financialization, income distribution and the crisis*, "Investigación Económica", 71 (279), https://doi.org/10.22201/fe.01851667p.2012.279.37326

Svitalkova, Z. (2014), *Comparison and Evaluation of Bank Efficiency in Selected Countries in EU*, "Procedia Economics and Finance", 12, pp. 644–653, https://doi.org/10.1016/S2212-5671(14)00389-X

Tomaskovic-Devey, D., Lin, K.H., Meyers, N. (2015), *Did financialization reduce economic growth?*, "Socio-Economic Review", 13 (3), pp. 525–548, https://doi.org/10.1093/ser/mwv009

Turbeville, W. (2014), *Financialization and a new paradigm for financial markets*, Demos/New Economic Paradigms/Rockefeller Foundation, New York.

Turner, A. (2016), *Between Debt and the Devil. Money, Credit and Fixing Global Finance*, Princeton University Press, Princeton, https://doi.org/10.1515/9781400873326

Tuškan, B., Stojanović, A. (2016), *Measurement of cost efficiency in the European banking industry*, "Croatian Operational Research Review", 7 (1), pp. 47–66, https://doi.org/10.17535/crorr.2016.0004

Vercelli, A. (2013), *Financialization in a Long-Run Perspective. An Evolutionary Approach*, "International Journal of Political Economy", 42 (4), https://doi.org/10.2753/IJP0891-1916420402

Zwan, N. van der (2014), *Making sense of financialization*, "Socio-Economic Review", 12 (1), pp. 99–129, https://doi.org/10.1093/ser/mwt020

Żabski, Ł. (2017), *Zastosowanie nieparametrycznej metody DEA (Data Envelopment Analysis) do pomiaru efektywności spółek komunalnych*, "Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu", 481, pp. 152–169.

Porównanie efektywności europejskich sektorów bankowych w perspektywie finansjalizacji. Zastosowanie metody DEA

Wprowadzenie w tematykę badania: Wzrosło znaczenie sektora finansowego w stosunku do sfery realnej, w ostatnich latach nastąpiło przejście od kapitalizmu przemysłowego do kapitalizmu finansowego. Proces wzrostu znaczenia sektora finansowego określany jest mianem finansjalizacji. Zjawisko to niewątpliwie kojarzy się z finansami, operacjami finansowymi czy wzrostem znaczenia zysków generowanych przez działalność finansową. Przyjęliśmy, że finansjalizacja jest procesem długotrwałym, charakteryzującym się wzrostem sektora bankowego.

Cel artykułu: Porównanie efektywności sektorów bankowych w krajach Unii Europejskiej w perspektywie finansjalizacji.

Metody: Badanie polegało na określeniu efektywności sektorów bankowych dla 28 krajów europejskich, z wykorzystaniem nieradialnego modelu BCC zorientowanego na nakłady w 2017 roku oraz ocenie zmian efektywności badanych sektorów z wykorzystaniem indeksu Malmquista w latach 2008–2017.

Wyniki i wartość dodana: W rezultacie ustalono, że przy określonych nakładach i efektach sektory bankowe siedmiu krajów były w 2017 roku efektywne. Efektywne, w perspektywie finansjalizacji, sektory bankowe występowały na Cyprze, w Danii, Francji, Luksemburgu, na Malcie, w Szwecji i Wielkiej Brytanii. Następnie określono efektywność poszczególnych nakładów dla sektorów bankowych z każdego badanego kraju oraz wskazano liderów benchmarków. Analiza dynamiki zmian efektywności sektorów bankowych wykazała, że najwyższe wartości wskaźnika Malmquista między latami 2008 a 2017 obliczono dla Szwecji (wzrost efektywności o 37,7%).

Słowa kluczowe: sektor bankowy, efektywność, finansjalizacja, metoda DEA