

## Foreign Bank Origins and Efficiency in the Central and Eastern European Banking Sector

Artem PIATKOV\* – Ignacio JIMÉNEZ-HERNÁNDEZ\*\* –  
Francisco Javier SÁEZ-FERNÁNDEZ\*\*\*

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### Abstract

*The main goal of this study is to analyse whether the source of capital in foreign participation in the domestic banking markets of countries that joined the EU after 2004 influences the evolution of efficiency levels in domestic banks and, consequently, the efficiency levels within these markets. It assesses the level of activity of foreign commercial banks in the aftermath of the 2008 – 2012 financial crisis and explores its relationship with banking sector efficiency. The study focuses on 13 countries, including Central European, South-Eastern European and Baltic states. Using the Data Envelopment Analysis (DEA) method, the research aims to determine whether foreign banks have gained or lost influence in these markets and the foreign countries that have the best performing banks in these markets. Furthermore, it provides insights into the potential influence of sources of foreign capital on the overall performance of domestic banking markets, indicating how competition could drive high-achieving foreign banks to outperform in their established markets.*

**Keywords:** *European Union, banking sector, foreign and domestic capital, efficiency*

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\* Artem PIATKOV, Odesa I. I. Mechnykov National University, Department of World Economy and International Economic Relations, Dvoryanska Str. 2, Room 68, 65082 Odessa, Ukraine; e-mail: pyatkov.artiom@stud.onu.edu.ua

\*\* Ignacio JIMÉNEZ-HERNÁNDEZ, corresponding author, University of Granada, Department of Economics, Paseo de Cartuja, 7, Beiro, 18011 Granada, Spain; e-mail: ignaciojimenez@ugr.es

\*\*\* Francisco Javier SÁEZ-FERNÁNDEZ, University of Granada, Department of International and Spanish Economy, Paseo de Cartuja, 7, Beiro, 18011 Granada, Spain; e-mail: fjsaez@ugr.es

## **Introduction**

Much has been written in the academic literature about the influence of the coexistence in banking markets of foreign and domestic institutions. At the end of the 1990s, some regions of the world attracted foreign capital to their banking markets and the presence of these foreign banks promoted the efficient management of the domestic banks (Jiménez-Hernández et al., 2019). As far as we know, no study to date has conducted a more detailed analysis of the distribution by place of origin of these foreign banks, and how foreign capital may have more positive or negative effects depending on its geographical origin. In this respect, this research seeks to shed light on the various ways in which the presence of different foreign banking models in the countries that entered the European Union (EU) from 2004 is influencing the evolution of the efficiency levels of the domestic banking sector.

The globalization of the world financial system is one of the most dynamic components of the overall process of modernity and is playing a growing role in global development. The banking system is a guarantor of states' financial security, but its dependence on world markets makes it sensitive to global financial crises. As the economic growth of the state depends on the efficiency of the national and international banking sector (Yin et al., 2020), the assessment of the processes of expansion of foreign capital in the banking sector is becoming increasingly important.

The banking sector is made up of a diverse range of banks in terms of their functions and tasks, as well as operational activities. Acting on the basis of various laws, as well as the domestic tradition and culture of banking, these banks determine the model of financial intermediation in a given country. The evolution of the banking sector is not only interesting in itself, it is particularly important in the context of the relationship between the development of the financial system, including the banking system, and economic growth. Essentially, it is argued in theoretical and empirical research that financial development can stimulate or inhibit economic growth (Nguyen, 2021; Guru, 2019).

If the activities of banks lead to a better allocation of resources in the economy, the banking sector is economically effective; it drives social and economic development. Banks increase the welfare of consumers (allowing them to better distribute consumption over time) and contribute to the growth of production and efficiency in the entire economy by supplying economic processes with capital. On the other hand, banks played a negative role in the context of the recent financial and economic crises. In the good economic situation and the influx of significant money resources in the run up to the crisis, banks developed financial engineering. They offered access to cheap consumer loans and complex financial products, without

paying sufficient attention to the solvency of customers and their limited knowledge of financial news. The development of the banking sector is in the socio-economic interest, but the experiences of the recent financial crisis prove that it should be assessed not only in terms of the size of the banking sector and the scope of its activities, but also in terms of effectiveness in performing the financial intermediation function and providing financial stability (Demirgüç-Kunt et al., 2020).

The study of the development of the banking systems of countries that joined the EU from 2004 has attracted the attention of a large number of economists. In particular, Horobet et al. (2021), Chumachenko et al. (2021), Horvatova (2018) and Kozak and Wierzbowska (2021) explored the role of the banking sector in economic growth and also assessed the financial stability of different categories of banks in Central and Eastern Europe (CEE) in the face of the ongoing negative effects of the recent crises. Kozak and Wierzbowska (2021) and Istaiteyeh and Milhem (2022) also considered in detail which category of commercial banks (foreign or domestic) are more efficient and the economic factors that determine the difference in performance.

The objective of this paper is twofold: on the one hand, it attempts to analyse whether foreign commercial banks are more or less active in the markets of the CEE countries that have joined the EU since 2004, following the financial crisis of 2008 – 2012. On the other hand, this study aims to show whether this greater or lesser foreign activity has led to more or less efficient behaviour of the banking sector in these countries and, more specifically, which foreign banks are leading in these markets.

For this purpose, we limited the analysis to 13 countries: the countries of Central Europe (Czech Republic, Poland, Hungary, Slovakia and Slovenia), the Baltic states (Lithuania, Latvia, Estonia) and the countries of South-Eastern Europe (Romania, Bulgaria, Croatia, Malta and Cyprus). All of these countries became members of the EU between 2004 and 2013 and are also members of the North Atlantic Treaty Organization (NATO) (except Malta and Cyprus). The Central European countries and the Baltic States share a cultural and political alliance that aims to develop advanced economic cooperation as well as enhance their integration with the EU. We then established the period of analysis as the time between the recovery from the global financial crisis and the beginning of the subsequent global social and economic crisis caused by the coronavirus disease. Finally, we identified the origin of the global ultimate owners of the banks in these countries, to shed light on how foreign banks are influencing domestic banking markets.

The methodology that we use in this work is based on the Data Envelopment Analysis (DEA) method (Charnes et al., 1978). In order to implement the methodology, we first observe a sample of banks, which make use of a set of inputs to

produce a set of good outputs. Next, we split the banks in the sample into two groups according to their ownership origin: foreign or domestic.

Based on the results obtained, we aim to show whether foreign banks gained or lost market share in the banking markets of the CEE countries that joined the EU after 2004, and try to answer the question: Foreign banks of which origin (EU, other European countries, North America, Asia) performed better in these markets? In addition, we offer an initial interpretation of whether certain sources of foreign capital could have positively or negatively influenced the performance of the host countries' banking markets. The underlying hypothesis is that if foreign banks that entered a particular domestic market perform better than those that entered other markets, then the former market will perform better overall than the latter markets. In other words, as a result of competition, foreign banks that perform better in a specific market will push the domestic market to improve its performance.

## **1. Analysis of Recent Research and Publications**

The study of the efficiency and influence of foreign banks on countries' banking sector has attracted the attention of a large number of scholars. In particular, Nițoi et al. (2021), Badulescu and Moruțan (2019), Novickytė and Drożdż (2018), Rupeika-Apoga et al. (2018), and Nahtigal (2018) examined the positive and negative aspects of the presence of foreign banks in the banking sectors of CEE countries (including the Baltic states). Pataccini (2020) also emphasized the involvement of banks with foreign capital in the financialization of the Baltic economies.

Nițoi et al. (2021) conducted an extensive study of external banking activities in 11 CEE countries (all EU member states) over the period 2000 – 2016. The foreign banks' predominance clearly contributed to the competitiveness and efficiency of the banking sector. At the same time, an excessively high proportion of foreign banks in the CEE banking sector made the banking sector in these countries too vulnerable to liquidity shocks associated with interbank and wholesale markets. Under these circumstances, Central banks had to resort to exercising prudential regulation in order to preserve economic and financial stability and strengthen cooperation with the government.

Nahtigal (2018) noted the merits of the foreign banks' involvement in the CEE banking sector, which include the introduction of new technological innovations and novel banking products, as well as the implementation of new corporate governance practices.

However, according to Chen et al. (2019), this also leads to higher costs for domestic banks, as they are eager to compete with foreign banks in an effort to protect their position in the markets, which in turn leads to an increase in the rate of financial risk. The arrival of foreign banks may sideline domestic banks, forcing them to increase investment in advanced technology as well as employee training. Thus, increased costs are passed on to higher overheads, but it takes some time to realize the benefits. Subsequently, losses are possible, at least in the short term; but offering new features, along with employee training and funding for new technology, can improve the performance of a domestic bank and help maintain its financial stability over the long term.

Badulescu and Moruțan (2019) conducted a study of the evolution and development of foreign banks in the banking systems of 11 CEE countries, which joined EU from 2004. In their article, they analysed the relationship between the evolution of foreign banks and changes in a number of macroeconomic indicators (GDP dynamics, inflation and unemployment) in the period 1996 – 2013. Their study demonstrated that the presence of foreign banks in CEE countries can help reduce inflation, unemployment, and interest rates on private sector lending, but these declines are less significant during a crisis than a non-crisis period.

Erina and Erins (2020) employed DEA to measure the performance of seven countries' banking sectors that have joined the EU since 2004: the Czech Republic, Poland, Hungary, Lithuania, Latvia, Slovakia and Slovenia. They concluded that when assessing economic efficiency based on a model of pure technical efficiency (BCC) (Banker et al., 1984), the most efficient banks are in the Czech Republic, Poland, Lithuania and Slovenia, while the lowest efficiency indicator is calculated for Latvian commercial banks. Efficiency indicators are higher for the BCC model (output is not constant) than for the CCR model (returns to scale are constant) (Charnes et al., 1978).

Novickytė and Drożdż (2018) used DEA to investigate the effectiveness of Lithuanian banks and assessed the banks' performance in a context of low lending rates. The share of the foreign banks' holdings in the Lithuanian banking sector significantly exceeded those of local banks and rose at a steadily high rate between 2012 and 2016. Performance indicators calculated under variable returns to scale (VRS) demonstrated that domestic banks outperformed their foreign counterparts. However, foreign (mostly Scandinavian) banks' technical efficiency indicators were much better than those of local banks. In general, large foreign banks seemed to be more consistent in their business models than smaller Lithuanian banks.

Milenkovic et al. (2022) used DEA to assess the level of efficiency of commercial banks in the Western Balkan countries. Their study revealed that large banks outperform smaller ones in intermediary activities, leading to the absorption of

smaller commercial banks by larger, more effective intermediaries. Based on their findings, it can be concluded that large commercial banks are able to maintain their position in the financial market of the Western Balkan region, whereas small banks with low efficiency are more likely to be taken over by large banks.

Rupeika-Apoga et al. (2018) identified the serious dependence of Latvia's economy on the stability and development of the banking sector, in which foreign banks play a significant role. Lending and liquidity risks, scale, yield and efficiency were found to be the major bank-specific factors determining the stability of banks in Latvia. From 2003 to 2016, Nordic-owned banks fared better than their non-Nordic counterparts. Given Latvia's GDP growth forecasts, lending recovery, and banks' ability to maintain sufficiently high margins and increase non-interest income, the overall profitability opportunities for Nordic-owned banks are expected to remain positive. The contrast in the behaviour of foreign banks in times of calm and times of crisis, caused by the influence of the host country and the country of origin, was also revealed, raising the need to regulate the correct ratio of domestic and foreign banks in the banking sector.

Pataccini (2020) pointed out the significant role of foreign banks in the capitalization and development of the Baltic economies. Foreign banks facilitated the swift expansion of "financial strings" across lending markets, which greatly boosted the economic development of those economies. Foreign banks also contributed to building confidence in the banking system of the Baltic states, making it more stable. However, a negative aspect was the heavy dependence of these countries on foreign lending, which in turn increased the sensitivity of countries to external shocks.

## **2. Methodology**

Since the mid-20th century, efficiency studies have proposed numerous methods to evaluate the efficiency of observed units (Koopmans, 1951; Debreu, 1951; Farrell, 1957) in a wide range of industries, including the banking sector. These include parametric approaches (Stochastic Frontier Approach, SFA; Distribution Free Approach, DFA; and Thick Frontier Approach, TFA) and non-parametric (DEA and Free Disposal Hull, FDH) ones.

We employ the widely-used frontier approach with non-parametric DEA techniques in order to determine the Farrell technical efficiency scores. These results provide us with an average efficiency level for each type of bank and country in the region under study. The FDH approach (Deprins et al., 2006) is best suited to detecting clear cases of inefficiency, but DEA (Charnes et al., 1978) adopts a convex technology and applies linear programming for enveloping the data to construct

empirical production frontiers and evaluate relative efficiency. Conversely, FDH is based on the principle of weak dominance and envelops the data with a non-convex staircase-hull (Tauchmann, 2012). DEA has been employed in a large number of papers (Emrouznejad and Yang, 2018; Paradi and Zhu, 2013; Aiello and Bonanno, 2018).

In order to implement the methodology, let us first assume that we observe a sample of  $k = 1, \dots, K$  banks that make use of a set of  $N$  inputs, represented by  $x = (x_1, \dots, x_N)$ , to produce a set of  $M$  outputs, namely  $y = (y_1, \dots, y_M)$ . It is also assumed that inputs and outputs are all non-negative. The technology employed by the banking sector to transform inputs into outputs is formally described as:

$$T = \{(x, y) \in R_+^{N+M} \mid x \geq 0; y \geq 0; x \text{ can produce } y\} \quad (1)$$

Additionally, we assume that the technology satisfies the axioms originally proposed by Shephard (1970), including the possibility of inaction, no free lunch, free disposability of inputs, strong disposability of outputs and convexity. Taking into account this description of the technology, Farrell's input-oriented technical efficiency (Farrell, 1957) can be expressed as:

$$\text{Technical efficiency} = \text{Min} \varphi \mid (\varphi x, y) \in T \quad (2)$$

Under the assumption of variable returns to scale (Banker et al., 1984), the technical efficiency of DMU  $k'$  can be evaluated from the following program:

$$\text{Min}_{\varphi^k} \varphi^k$$

Subject to:

$$\sum_{k=1}^K \lambda_k x_{kn} \leq \varphi^k x_{k'n} \quad n = 1, \dots, N \quad (i)$$

$$\sum_{k=1}^K \lambda_k y_{km} \geq y_{k'm} \quad m = 1, \dots, M \quad (ii) \quad (3)$$

$$\sum_{k=1}^K \lambda_k = 1 \quad k = 1, \dots, K \quad (iii)$$

$$\lambda_k \geq 0 \quad (iv)$$

where  $\varphi^k$  is the input-oriented technical efficiency of DMU $_k$ ,  $y_{km}$  is the amount of the  $m^{\text{th}}$  output ( $m = 1, \dots, M$ ) produced by DMU $_k$ ,  $x_{kn}$  is the amount of the  $n^{\text{th}}$  input ( $n = 1, \dots, N$ ) consumed by DMU $_k$ , and  $\lambda_k$  is the weight assigned to DMU $_k$  ( $k = 1, 2, \dots, K$ ). Moreover, variable returns to scale are implicit through restriction (iii), therefore each bank is compared to another observed observation – or the linear combination of the activity of two or more observations in the sample – of a similar size.

### 3. Data, Variables and Sample

Our empirical study uses data from Moody’s Analytics BankFocus, a global database containing information on approximately 46,600 banks. It combines information from Bureau van Dijk and Moody’s Investors Service with Moody’s Analytics expertise, resulting in a dataset suitable for cross-country evaluations and providing comprehensive coverage of our selected banking markets for the analysis.

After removing banks with missing data for certain variables and eliminating duplicate observations (the Orbis Bank Focus database occasionally contains duplicates for specific banks), our final dataset includes data from 238 commercial banks. These banks operated during the years 2013 to 2020 and come from 13 countries that joined the EU after 2004. Given the seven-year observation period and missing data for some banks in specific years, our final dataset includes a total of 1,679 observations. Out of the 62 national banks, 105 foreign banks, and 82 banks without information on the origin of capital, our final database contains information on 60 national banks, 100 foreign banks, and 78 banks without information on the origin of capital.

To describe the banking production function, we have implemented the intermediation approach (Sealey and Lindley, 1977), which views banks as intermediaries between savers and investors. In this role, they gather deposits and funds on one side and allocate them as different types of loans and other assets. This is the standard approach for describing the bank production function (Jiménez-Hernández et al., 2019).

Hence, in line with previous papers (Henriques et al., 2020), our description of the technology includes Staff expenses to represent labour, non-earning assets to represent physical capital, in addition to equity and customer deposits as two financial inputs. Conversely, the outputs include gross loans and financial assets (Bhatia et al. 2018). Table 1 shows some descriptive statistics.

Table 1  
**Sample Descriptive Statistics** (in constant 2019 USD million)

	Mean	Standard deviation
<b>Inputs</b>		
Equity	518.8	1084.1
Customer deposits	3472.6	7104.3
Non-earning assets	631.8	1825.2
Staff expenses	45.3	94.9
<b>Outputs</b>		
Gross loans	3171.5	6285.6
Financial Assets	1013.9	2180.2

Source: Authors’ elaboration based on data from Moody’s Analytics BankFocus.



According to the information provided by the Moody's Analytics BankFocus dataset, in our sample of 1679 observations, there are 438 observations belonging to domestic banks, while 733 correspond to foreign banks, and the remaining 508 observations cannot be identified. Table 2 shows the representation of the domestic and foreign banks included in the sample. Note that in Slovakia all the banks in the database are foreign.

**Table 2**  
**Domestic and Foreign Banks Representation**

	<b>Domestic</b>	<b>Foreign</b>	<b>n.a.</b>	<b>Total</b>
Bulgaria	47	64		<b>111</b>
Croatia	39	72	49	<b>160</b>
Cyprus	30	51	118	<b>199</b>
Czech Republic	49	84		<b>133</b>
Estonia	20	23		<b>43</b>
Hungary	46	62	15	<b>123</b>
Latvia	38	32	16	<b>86</b>
Lithuania	8	18	8	<b>34</b>
Malta	24	18	14	<b>56</b>
Poland	89	83	284	<b>456</b>
Romania	16	115	4	<b>135</b>
Slovakia		63		<b>63</b>
Slovenia	32	48		<b>80</b>
<b>Total</b>	<b>438</b>	<b>733</b>	<b>508</b>	<b>1679</b>

*Source:* Authors' elaboration based on data from Moody's Analytics BankFocus.

#### **4. Results**

This study aims to examine how the origin of capital in foreign participation in the banking markets of EU member countries after 2004 impacts the efficiency levels of domestic banks and, consequently, the overall market efficiency. The results for the technical efficiency of the sample banks in the selected countries have been obtained from program (3). To begin, we examine the evolution of total assets across the set of countries for domestic and foreign banks.

When analysing the Central European countries (Poland, the Czech Republic, Hungary, Slovakia, Slovenia) it should be noted that the banking sectors of three of those five countries are dominated by foreign capital. The share of foreign capital also tends to increase in the period 2014 – 2020 (a slight decline in the assets of foreign banks is observed in 2017 in Poland and Slovakia) (Figure 1). A feature of the banking system of Slovakia is the high proportion of banks with foreign capital (about 93%) (Yakubovskiy et al., 2022a). In Hungary, there is a significant increase in domestic bank assets in 2019 – 2020, which is a consequence of the Hungarian government's policy (in effect since the early 2010s) to increase the

share of domestic banks in the banking sector (more than 50% as of 2020) (Sebok and Simons, 2021). In Slovenia, domestic commercial banks hold more than 60% of assets in the banking sector.

**Figure 1**  
**Average Assets**



Source: Authors' elaboration based on data from Moody's Analytics BankFocus.

Foreign-owned banks also dominate in all three Baltic States, with their share growing steadily between 2014 and 2020, but in Latvia the trend in the share of foreign banks' assets is rather volatile (with a significant increase in 2020). The share of domestic commercial banks' assets in Latvia decreased significantly from 2015 to 2018, but in the period 2019 – 2020 there was a significant increase in domestic assets.

Some states in South-Eastern Europe (most notably Romania) show a dominance of domestic capital in the banking sector. In Romania, an increase in domestic bank assets is observed over the entire period. In Croatia, conversely, foreign banks appear to be dominant throughout the period. In Malta, there was a steady decline in foreign bank assets over the period 2015 – 2018 against a background of rising domestic assets. An interesting situation is observed in Cyprus, where foreign banks were dominant between 2013 and 2018, but with a marked increase in domestic bank assets from 2018 on, and since 2019 domestic commercial banks have a slightly larger market share in the banking sector.

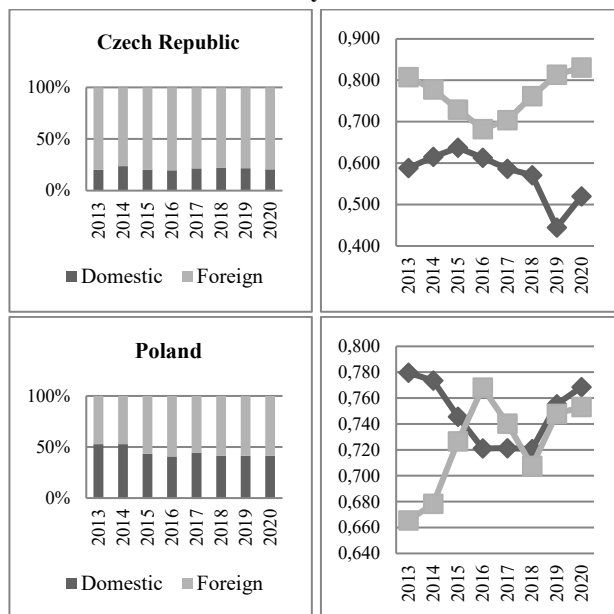
Figure 2 shows that, in general, the efficiency levels achieved by banks with foreign capital are higher than those of domestic banks in the Czech Republic throughout the study period. The increase in the efficiency level of banks with foreign capital has influenced the positive dynamics of the Czech market, given the decline in the efficiency level of domestic banks. The share of foreign banks in terms of percentage of total assets allows the evolution of this type of bank to have a greater impact on the Czech market. The trend is quite different in Hungary, where banks with domestic capital dominate (their share of total assets is growing and amounted to 69% in 2020). The increase in the efficiency level of domestic banks in parallel with the fall of this indicator for foreign-owned banks also has an impact on the entire national banking market.

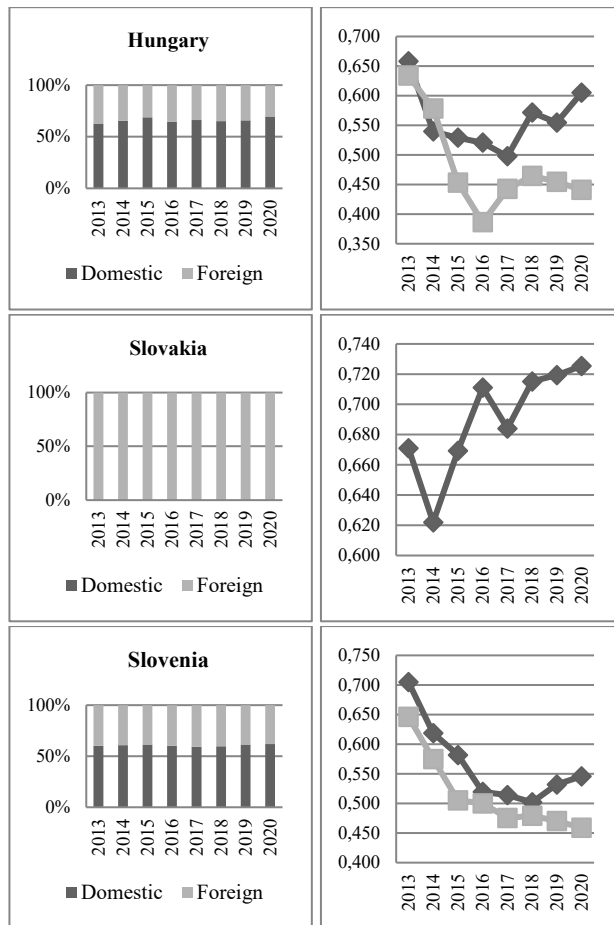
In Poland, the sector is relatively balanced compared to the aforementioned countries. After a reduction in the share of assets of banks with domestic capital in 2014 – 2015, this indicator did not drop below 40%. The efficiency level of domestic banks, meanwhile, was marginally higher than the same indicator for foreign-owned banks in 2018 – 2020. In 2020, government support helped domestic-capital banks to focus heavily on supporting their customers. Thus, domestic banks demonstrated high efficiency and made a significant contribution to supporting the entire banking sector (Yakubovskiy et al., 2022b). Slovakia's banking sector (in relation to the country's GDP) is one of the smallest in the EU. In our final data sample, we do not have information about any commercial banks with domestic capital in Slovakia. Foreign banks, on the other hand, have shown an increase in the level of efficiency since 2014 (except for a drop in 2017). The Slovak market is entirely dependent on the performance of foreign-owned banks.

In Slovenia’s banking sector, there was a decline in the efficiency levels of both domestic and foreign banks up to 2018, but in 2019 – 2020 the performance of domestic banks improved, which had a positive impact on the entire market.

There are several factors underpinning the higher efficiency of foreign banks in the Czech Republic. Firstly, the country’s banking sector is characterized by the strong presence of foreign banks (79.48% in 2020), as well as a high concentration of total banking assets in the top three banks. The second factor is connected with the branches of both types of banks. Domestic bank branches are scattered throughout the country, which requires a large workforce and eventually leads to bloat and inefficiency of labour. On the other hand, the offices of foreign banks are mainly located in large cities in the Czech Republic, so the labour requirements are not the same as those of local banks (Saravia, 2021). Finally, the investment activities of domestic banks tend to be riskier than those of foreign banks. Domestic banks tend to move their funds to the lending sector, which has a higher risk than other investments, while foreign banks are more focused on moving funds into securities and interbank placements.

Figure 2  
Asset Shares and Efficiency Scores

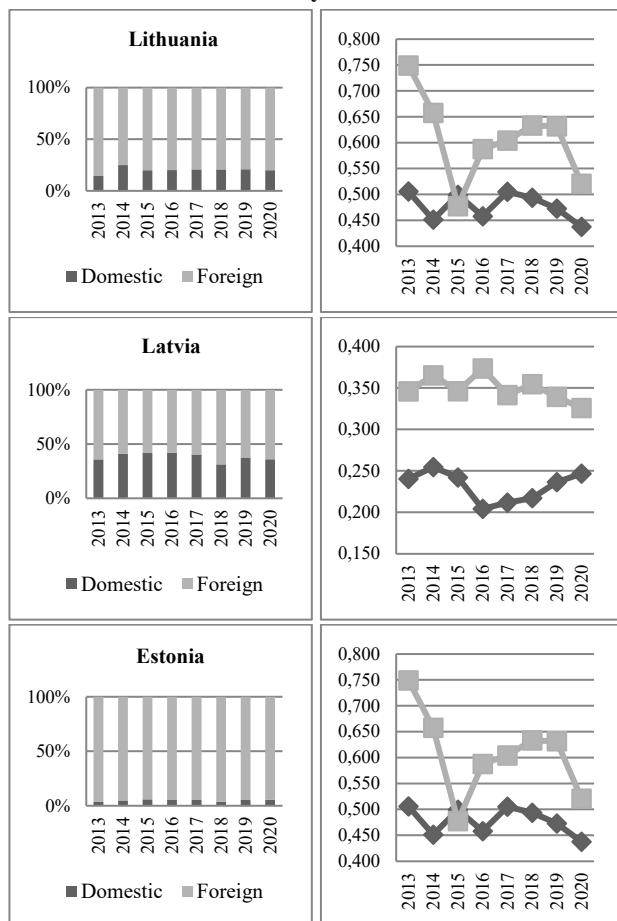




Source: Authors' elaboration based on data from Moody's Analytics BankFocus.

According to the data below (Figure 3), we can conclude that the banking systems of the Baltic states are clearly dominated by foreign capital (except Latvia, where in some years the share of banks with domestic capital amounted to more than 40%). In Lithuania and Estonia, the share of domestic banks' assets is below 20% throughout the period (in 2019, the ratio was around 11% in Lithuania and 3.5% in Estonia). The technical efficiency of domestic banks in Lithuania peaked in 2017 (the second highest result after 2013), but there was a marked decline in the following years, while the efficiency of foreign banks was at a consistently high level until 2019. Then came a decline in the efficiency of both foreign and domestic banks. In Estonia, foreign banks performed better throughout the period (except 2015). In Latvia, despite the high share of domestic banks' assets (over 35% in 2020), their efficiency performance was lower than that of foreign banks, although this difference gradually narrowed. Overall, foreign banks dominate the Baltic banking sector in terms of both asset size and efficiency.

Figure 3  
Asset Shares and Efficiency Scores

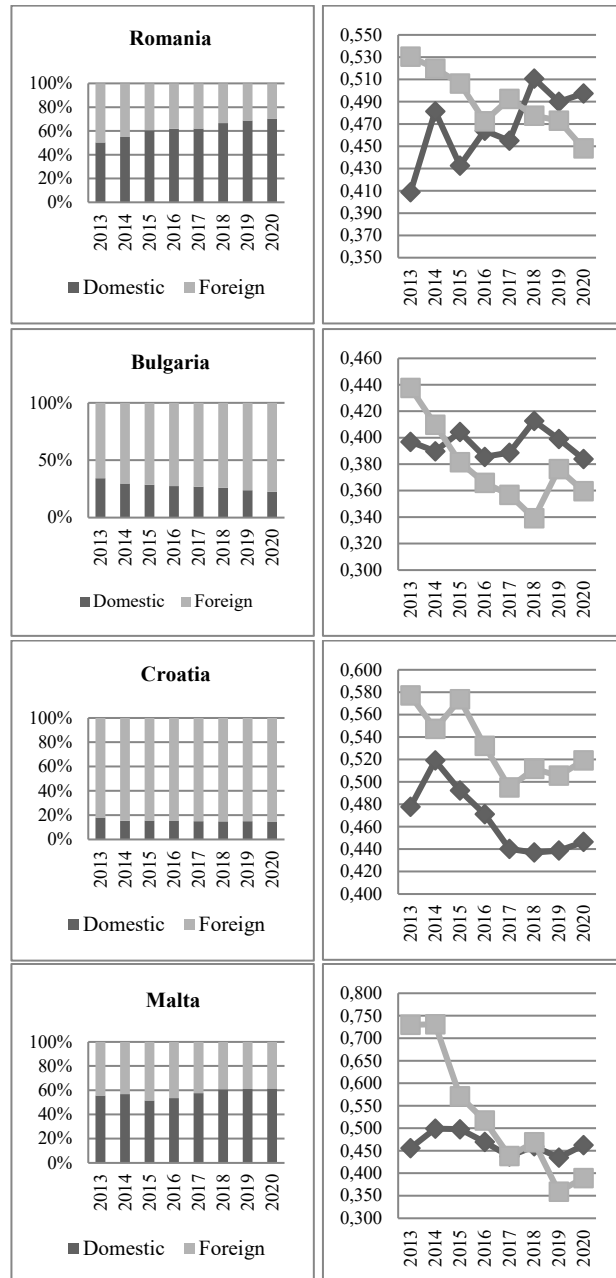


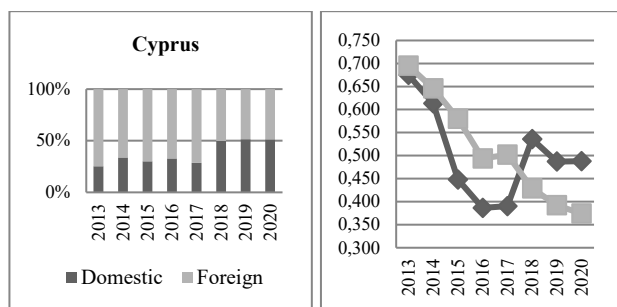
Source: Authors' elaboration based on data from Moody's Analytics BankFocus.

A completely different trend is observed in the countries of South-Eastern Europe than in Central Europe and the Baltics (Figure 4). The technical efficiency of domestic commercial banks in these states is higher than that of foreign-owned banks (despite the fact that foreign banks outperform domestic banks in terms of assets). In Romania, the share of domestic banks' assets in the banking sector increased over the period, exceeding 70% in 2020; this had an impact on their efficiency level, which was higher than that of foreign-owned banks. Malta and Cyprus saw a similar situation with domestic banks' share of assets increasing and their efficiency rising, while foreign banks' performance fell. An interesting trend is observed in Bulgaria, where despite the decline in the share of domestic banks' assets (22% in 2020) their efficiency remains higher than that of foreign banks. In

Croatia, the dominance of banks with foreign capital is observed throughout the period and their efficiency level is consistently higher.

Figure 4  
Asset Shares and Efficiency Scores





Source: Authors' elaboration based on data from Moody's Analytics BankFocus.

Taking into account all observations of banks with foreign and domestic origins, foreign banks (0.560) exhibit higher average technical efficiency levels compared to domestic banks (0.519). It is important to perform statistical tests on these two sample sets to validate the differences. According to the results of the Kolmogorov-Smirnov test (Table 3), the difference in group efficiency between foreign and domestic banks is statistically significant at a 5% confidence level ( $p$ -value = 0.01522), providing enough evidence to reject the null hypothesis. In other words, there is statistical evidence to conclude that the two samples ("Domestic" and "Foreign") do not come from the same distribution. Additionally, the Mann-Whitney-U-Test yielded a  $p$ -value of 0.001891, indicating a significant difference in the central locations (medians) of the "Domestic" and "Foreign" samples, further supporting the hypothesis that they do not share the same distribution.

Table 3  
Statistical Significance of the Differences in Group Efficiency

	Kolmogorov-Smirnov test ( <i>KS-statistic</i> ) <sup>(2)</sup>	Mann-Whitney-U-Test ( <i>W-statistic</i> ) <sup>(3)</sup>
Foreign versus Domestic	0.094(0.015)**	143131(0.001)***

Note: <sup>(1)</sup>  $P$ -values are in parentheses; \*\* and \*\*\* mean significance at 5% and 1%, respectively.

<sup>(2)</sup> Null hypothesis: the two samples have the same distribution; the exact  $p$ -values are computed.

<sup>(3)</sup> Null hypothesis: the two samples are drawn from the same population.  $Z$ -statistic adjusted for ties.

Source: Authors' elaboration.

Table 4 shows the distribution by total assets of foreign ownership in the countries that have joined the EU since 2004. The table also presents the performance of banks with capital from different regions (EU, rest of Europe, North America and Asia). In the Czech Republic, Slovakia, Lithuania, Estonia and Croatia, the share of banks whose capital comes from EU countries exceeds 80% (in Slovakia this indicator is 100%, and in Estonia 95.69%). The lowest shares of banks with capital from EU countries are seen in Malta (32.66%), Hungary (39.28%) and Slovenia (44.25%), which, however, confirms the dominance of capital from EU member states.



Table 4  
Source of Foreign Capital

	% Source of capital													Average
	Czech Republic	Poland	Hungary	Slovakia	Lithuania	Latvia	Estonia	Romania	Bulgaria	Slovenia	Croatia	Malta	Cyprus	
EU	85.83	48.18	39.28	100.00	88.26	52.22	95.69	74.08	75.85	44.25	87.89	32.66	65.84	<b>68.46</b>
Other Europe	0.43	0.19	0.00	0.00	0.00	3.79	0.00	1.34	2.22	5.07	0.28	0.00	0.83	<b>1.09</b>
North America	0.00	4.67	0.00	0.00	0.00	0.00	0.00	3.46	0.11	0.00	0.00	0.95	0.00	<b>0.71</b>
Asia	0.00	0.13	1.08	0.00	0.00	0.00	0.00	0.07	0.58	0.00	0.00	0.00	0.86	<b>0.21</b>
N/A	0.00	0.73	0.98	0.00	1.79	2.91	0.00	1.79	0.00	0.00	3.16	4.10	7.13	<b>1.74</b>
<b>Total Foreign</b>	<b>86.26</b>	<b>53.90</b>	<b>41.34</b>	<b>100.00</b>	<b>90.05</b>	<b>58.92</b>	<b>95.69</b>	<b>80.74</b>	<b>78.76</b>	<b>49.32</b>	<b>91.33</b>	<b>37.71</b>	<b>74.66</b>	<b>72.21</b>
	<b>Average efficiency level</b>													
EU	0.844	0.777	0.529	0.670	0.785	0.474	0.564	0.501	0.401	0.546	0.489	0.492	0.644	<b>0.594</b>
Other Europe	0.330	0.644	–	–	–	0.224	–	0.298	0.273	0.432	0.536	–	0.368	<b>0.388</b>
North America	–	0.540	–	–	–	–	–	0.381	0.566	–	–	1.000	–	<b>0.622</b>
Asia	–	0.466	0.730	–	–	–	–	0.270	0.345	–	–	–	0.434	<b>0.449</b>
<b>Total Foreign</b>	<b>0.587</b>	<b>0.607</b>	<b>0.629</b>	<b>0.670</b>	<b>0.785</b>	<b>0.349</b>	<b>0.564</b>	<b>0.363</b>	<b>0.396</b>	<b>0.489</b>	<b>0.513</b>	<b>0.746</b>	<b>0.482</b>	<b>0.552</b>

Source: Authors' elaboration based on data from Moody's Analytics BankFocus.

In Latvia (3.79%), Slovenia (5.07%), Bulgaria (2.22%), Romania (1.34%) and the Czech Republic (0.43%) there is a minimal presence of banks with capital from non-EU European countries. In Poland (4.67%) and Romania (3.46%), and to a lesser extent in Malta (0.95%), there are banks with capital from North America (mostly from the US, but also from the Cayman Islands). Banks with capital from Asia are found in Cyprus (7.13%), Malta (4.10%), Croatia (3.15%), Latvia (2.90%), Romania (1.79%), Lithuania (1.78%), and to a lesser extent in Hungary (0.98%) and Poland (0.73%).

The banks with capital from EU countries performed best in the Czech Republic, Poland, Slovakia, Lithuania, Latvia, Estonia, Romania, Slovenia and Cyprus. In Hungary, the efficiency level of banks with capital from Asia was significantly higher than those with capital from the EU. In Bulgaria and Malta, banks with North American capital had the best efficiency scores (even though their share in the countries' banking sector is only 0.11% and 0.95%, respectively). In Croatia, EU banks were second in efficiency to those from the rest of Europe (primarily San Marino). On average, banks from North America had the best efficiency ratio (0.622) mainly due to their strong performance in Malta (1.000). The efficiency score of EU banks (0.594) is more acceptable than scores of other regions because they account for the lion's share of the capital in all 13 countries studied.

Since banks with EU capital completely dominate in terms of asset share in the markets of the countries that have joined the EU since 2004, it is worth examining in detail the EU countries present and their performance levels (Table 5). It can be seen that banks with Swedish capital dominate in Lithuania (97.84%), Latvia (100.00%) and Estonia (72.95%). Banks with Austrian capital have a significant share in Slovakia (47.08%), Romania (44.04%), Hungary (37.67%), Croatia (33.54%) and the Czech Republic (27.97%). Belgian banks also have a major presence in the Czech market (31.59%) and Hungary (24.51), but less so in Slovakia (14.92%) and Bulgaria (16.50%). Banks with French capital are active in the Czech Republic (23.35%) and Romania (21.61%), and have a small market share in Poland (12.22%). Banks with Hungarian capital have a substantial market share in Slovenia (55.48%) and Bulgaria (26.68%), but less so in Croatia (6.88%) and Romania (3.73%). Banks with Italian capital have sizeable market shares in Croatia (59.25%), Bulgaria (36.65%), Hungary (37.38%), Slovenia (34.55%), Slovakia (24.86%), Romania (18.60%) and the Czech Republic (13.22%). Also noteworthy is the activity of banks from the UK in Malta (97.93%) and Estonia (27.05%) and a substantial share of banks with Dutch capital in Poland (20.10%), to a lesser extent in the Czech Republic (3.51%).

Table 5  
Source of Foreign Capital %

Capital origin	Czech Republic	Poland	Hungary	Slovakia	Lithuania	Latvia	Estonia	Romania	Bulgaria	Slovenia	Croatia	Malta	Cyprus	Average
Austria	27.97	0.00	37.67	47.08	0.00	0.00	0.00	44.04	0.00	9.97	33.54	0.00	0.00	15.41
Belgium	31.59	0.00	24.51	14.92	0.00	0.00	0.00	0.00	16.50	0.00	0.00	0.00	0.00	6.73
Cyprus	0.11	0.00	0.00	6.00	0.00	0.00	0.00	0.83	1.30	0.00	0.00	0.00	–	0.63
Czech Republic	–	0.00	0.00	7.14	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.57
Germany	0.24	26.40	0.26	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00	2.38
Denmark	0.00	0.00	0.00	0.00	2.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
Spain	0.00	28.77	0.00	0.00	0.00	0.00	0.00	3.86	0.00	0.00	0.00	0.00	0.00	2.51
France	23.35	12.22	0.18	0.00	0.00	0.00	0.00	21.61	0.00	0.00	0.00	0.00	0.00	4.41
Greece	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.64	14.86	0.00	0.00	0.00	27.42	3.76
Hungary	0.00	0.00	–	0.00	0.00	0.00	0.00	3.73	26.68	55.48	6.88	0.00	0.00	7.14
Ireland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	72.58	5.58
Italy	13.22	0.00	37.38	24.86	0.00	0.00	0.00	18.60	36.65	34.55	59.25	0.00	0.00	17.27
Netherlands	3.51	20.10	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.00	2.07	0.00	2.03
Portugal	0.00	11.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
Sweden	0.00	0.00	0.00	0.00	97.84	100.00	72.95	0.00	0.00	0.00	0.00	0.00	0.00	20.83
United Kingdom <sup>1</sup>	0.00	0.75	0.00	0.00	0.00	0.00	27.05	0.00	0.00	0.00	0.00	97.93	0.00	9.67
<b>EU 100 %</b>														

Source: Authors' elaboration based on data from Moody's Analytics BankFocus.

<sup>1</sup> The United Kingdom was part of the EU during the years selected in this study.

Table 6  
Average Efficiency Level

Capital origin	Czech Republic	Poland	Hungary	Slovakia	Lithuania	Latvia	Estonia	Romania	Bulgaria	Slovenia	Croatia	Malta	Cyprus	Average
Austria	0.736	-	0.581	0.831	-	-	-	0.683	-	0.623	0.594	-	-	0.675
Belgium	0.883	-	0.484	0.705	-	-	-	-	0.389	-	-	-	-	0.615
Cyprus	0.941	-	-	0.617	-	-	-	0.402	0.253	-	-	-	-	0.553
Czech Republic	-	-	-	0.351	-	-	-	-	-	-	0.393	-	-	0.372
Germany	1.000	0.853	0.573	-	-	-	-	-	0.451	-	-	-	-	0.719
Denmark	-	-	-	-	1.000	-	-	-	-	-	-	-	-	1.000
Spain	-	0.704	-	-	-	-	-	0.473	-	-	-	-	-	0.588
France	0.693	0.865	0.528	-	-	-	-	0.491	-	-	-	-	-	0.644
Greece	-	-	-	-	-	-	-	0.587	0.425	-	-	-	0.503	0.505
Hungary	-	-	-	-	-	-	-	0.487	0.427	0.459	0.451	-	-	0.456
Ireland	-	-	-	-	-	-	-	-	-	-	-	-	0.784	0.784
Italy	0.850	-	0.478	0.848	-	-	-	0.557	0.459	0.554	0.520	-	-	0.610
Netherlands	0.802	0.918	-	-	-	-	-	0.329	-	-	-	0.414	-	0.616
Portugal	-	0.850	-	-	-	-	-	-	-	-	-	-	-	0.850
Sweden	-	-	-	-	0.571	0.474	0.491	-	-	-	-	-	-	0.512
United Kingdom <sup>2</sup>	-	0.474	-	-	-	-	0.636	-	-	-	-	0.570	-	0.560
<b>EU</b>	<b>0.844</b>	<b>0.777</b>	<b>0.529</b>	<b>0.670</b>	<b>0.785</b>	<b>0.474</b>	<b>0.564</b>	<b>0.501</b>	<b>0.401</b>	<b>0.546</b>	<b>0.489</b>	<b>0.492</b>	<b>0.644</b>	<b>0.593</b>

Source: Authors' elaboration based on data from Moody's Analytics BankFocus.

<sup>2</sup> The United Kingdom was part of the European Union during the years selected in this study.

Concerning the analysis of efficiency indicators (Table 6), it is worth noting that banks with Swedish capital operated more efficiently in Lithuania (0.571) than in the other Baltic states. However, the best level of efficiency in Lithuania was shown by banks from Denmark (1.000), with only 1.94% of the market share of assets. The efficiency of banks with Austrian capital was very high in Slovakia (0.831) and the Czech Republic (0.736), but slightly worse in Romania (0.683) and Slovenia (0.623). The situation is fairly similar for banks with capital of Belgian origin (the best efficiency indicators are seen in the Czech Republic, with 0.883 and Slovakia with 0.705) and Italian origin (the Czech Republic with 0.850 and Slovakia with 0.848).

French-capital banks performed better in Poland (0.853), while Hungarian banks performed much worse in Romania (0.487) and Slovenia (0.459). Dutch-capital banks showed very strong performance in Poland (0.918) and the Czech Republic (0.918), with much poorer performance in Romania (0.329). Banks with British capital were more efficient in Estonia (0.636) than in Malta (0.570), despite the smaller share of capital in the Estonian market. Banks with capital from Germany showed strong performance in the Czech Republic (1.000) and Poland (0.853), but a somewhat poorer performance in Hungary (0.573).

Among the countries that had capital in at least two countries, the highest efficiency indicators were observed for German (0.719), Austrian (0.675), French (0.644), Dutch (0.616) and Italian (0.610) banks. The worst performing banks were those with Czech (0.372) and Hungarian (0.456) capital.

## Conclusions

This study primarily analyses the differences and interactions between foreign and domestic banks operating in a selection of countries that have joined the EU since 2004. Additionally, the analysis aims to identify whether the origin of this capital, from a regional and global perspective, determines the performance of foreign banks operating in these countries. Given that our initial results indicated that the majority of foreign banks were from Europe, it seemed sensible to examine the specific European countries that had a more significant presence in these banking markets, and to explore which European countries were exerting a stronger influence on the efficiency of these markets. The results suggest that the source of capital influences the efficiency levels of banks, resulting in distinct trends across various regions.

In Central European countries, the performance of foreign-owned banks has had a significant impact on the banking landscape, often resulting in higher efficiency levels due to their presence. In the Baltic states, foreign-owned banks have

largely dominated the sector, presenting higher efficiency levels compared to their domestic counterparts in most cases. However, in South-Eastern Europe, the banking sector is characterized by the dominance of domestic banks, which present higher efficiency levels than foreign-owned banks.

The findings indicate that the majority of countries have a significant presence of banks with capital from EU countries. They also provide insights into the dominance of banks from specific EU countries, including Swedish-capital banks in the Baltic states, as well as Austrian, Belgian, French, Hungarian, Italian, British, and Dutch banks in various markets. These observations shed light on the influence of particular EU countries on the banking landscape in the region.

The efficiency analysis reveals variations in the performance of banks with capital from different countries. Swedish-capital banks demonstrated superior efficiency in Lithuania, while Austrian-capital banks excelled in Slovakia and the Czech Republic. Belgian-, Italian-, and French-capital banks performed well in specific countries, with variations in efficiency indicators. Additionally, banks with Dutch and British capital exhibited diverse levels of efficiency in different markets. Among countries with capital in at least two locations, German, Austrian, French, Dutch, and Italian banks displayed the highest efficiency indicators. In contrast, Czech- and Hungarian-capital banks ranked among the lowest performers in terms of efficiency.

Emphasizing the need for future investigation in this field, the findings of this study are preliminary. To achieve a deeper understanding of the impact of foreign banks on the markets under analysis and to provide a more precise assessment of the role of foreign capital in shaping these countries' banking systems, more advanced methods should be employed.

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