

JAN KOLEŚNIK

jan.kolesnik@sgh.waw.pl

SGH Warsaw School of Economics. Institute of Banking at Collegium of Socio-Economics

162 Niepodległości St., 02-554 Warsaw, Poland

ORCID ID: <https://orcid.org/0000-0003-2182-5645>

## *Foreign Capital in Polish Banks – Its Contribution to Systemic Risk and Level of Concentration*

**Keywords:** systemically important banks; systemic risk; foreign capital; Polish banking sector

**JEL:** G01; G21; G28

**How to quote this paper:** Koleśnik, J. (2023). Foreign Capital in Polish Banks – Its Contribution to Systemic Risk and Level of Concentration. *Annales Universitatis Mariae Curie-Skłodowska, sectio H – Oeconomia*, 57(3), 157–175.

### **Abstract**

**Theoretical background:** An important source of systemic risk in the banking system is the ownership structure, especially the ratio of foreign capital, which affects not only the results of individual banks but also the situation of the entire sector during the financial crisis. The effects of foreign capital engagement in a local banking system not always have to be exclusively positive. In particular, this refers to the systemic risk contribution of foreign capital in the national banking system as well as foreign capital concentration and potential systemic risk transfer through foreign capital. These threats are becoming especially important for the Polish banking sector, where foreign capital to assets ratio – despite its gradual decrease since 2008 – is still higher than 40%.

**Purpose of the article:** The aim of this article is to assess foreign capital systemic risk contribution in the Polish banking system and the scale of threat posed by possible transfer of this risk through foreign capital.

**Research methods:** Two methods were employed in this study, i.e. (1) supervisory measure of individual banks' systemic risk contribution, including the guidelines of the European Banking Authority, and (2) SRISK% measure, which shows which part of the systemic capital shortfall is generated by which bank. The systemic capital shortfall, on the other hand, is defined as a sum of additional own funds necessary to meet the regulatory minimum should a 40% fall of total capitalisation of the banking system occur within

the subsequent 6 months. At the same time, owing to the application of both of the above methods, we could draw on their strengths while eliminating the identified weaknesses.

**Main findings:** Our analyses did not indicate that the level of foreign capital concentration in the Polish systemically important banks may contribute to systemic risk transfer through foreign capital. Although all Polish banks owned by foreign capital, identified as systemically important, are subsidiaries of the banks which – in their home countries – are also considered as systemically important, their contribution to the Polish systemic risk is generally a few times lower than systemic risk contribution of their parent institutions, with the exception of one bank, which should be carefully monitored by the Polish financial safety net. The rising systemic risk contribution of the banks owned by foreign capital and identified as systemically important in the Polish banking system should not be a matter of concern thanks to the diversified share of individual banks in it. The conclusions drawn in the study are important both in terms of the policies adopted by the safety net institutions and from the point of view of further improvement of systemic risk measures, especially those assessing the contribution of individual banks to this risk.

## Introduction

Until the outbreak of the last global financial crisis in 2008, systemic risk was considered to be fully exogenous, i.e. beyond the control of any individual institution. The experience of the crisis has shown, however, that an apparently specific risk may spread across the system and become a systemic risk due to the interconnectedness between financial markets and institutions (Greenbaum et al., 2015). Systemic risk is multifaceted and therefore it is not possible to identify the key factor causing this risk, which would be timeless and universal (ECB, 2017). The sources of the systemic risk in the banking sector can be divided into three main groups:

- trans-sectoral, i.e. related to behavioural and socio-political factors, unreliable government policies and operation of the financial safety net, as well as interactions between different sectors and markets,

- sectoral, i.e. resulting both from disruptions to the market and instruments development and from the unreliability of the institutions surrounding the banking sector, as well as the impact of a parallel banking system,

- individual, i.e. related to materialisation of individual risk in individual banks, unreliability of microprudential regulations and disclosure obligations (Koleśnik, 2019).

Among both the sectoral and individual factors, the ownership structure appears to be a special one, in particular, the foreign capital ratio, which affects not only the financial results of individual banks but also the situation of the entire sector during the financial crisis. The scale of development of the banking market in a country and foreign capital engagement in this market create a feedback loop. This means that a developed banking market attracts foreign capital and encourages it to increase its direct presence on this market, while, on the other hand, the foreign capital ratio has a positive impact on the development of this market (through the know-how transfer and access to international markets) (Zaleska & Kondraciuk, 2019). The policies adopted by the host country government is quite important, if not key at times. They can favour some forms and areas of foreign capital presence in the national banking system (Goyer & Valdivielso del Real, 2014). However, even if the state is active in this area, the effects

of foreign capital engagement in the local banking system are not always exclusively positive, especially in terms of foreign capital contribution to the systemic risk in the national banking system and its concentration as well as a possible systemic risk transfer through foreign capital. These threats are becoming especially serious for the Polish banking sector, where foreign capital to assets ratio – despite its gradual decrease since 2008 – is still higher than 40%. It should be remembered that the entire Polish banking sector is linked to the global and European banking sector, and disturbances and crises in these markets have an indirect impact on it. In the case of banks owned by foreign capital, however, this impact is direct and the situation of their parent entities determines their stability and development opportunities. Thus, the problems of banking sectors in home countries can be transferred through them to the Polish banking sector.

The above conclusion has determined our research goal, i.e. the assessment of foreign capital systemic risk contribution in the Polish banking system and of the threat posed by a potential risk transfer through foreign capital. First, we will identify the Polish systemically important banks, which are controlled by foreign capital. An in-depth analysis of the sources and their concentration will be then carried out (including both the home country and the systemic importance of a foreign parent institution).

## Literature review

The impact of foreign banks on the stability of the banking systems in the host countries is not only diversified but also changes with time while the degree of the host country's economic development and the features of the foreign bank play the main role. As a rule, the presence of foreign banks positively affects the entire banking sector in the host country and leads to an increase in the supply of credit in the economy. Clearly negative effects occur mainly in less developed countries, where foreign banks had a limited share in the market and in the countries where the system of credit reference system is not adequate. Negative effects are seen also in a situation where foreign banks come from remote home countries (Koleśnik, 2019).

Most of the analyses of the impact of banks with foreign capital on the situation of the host country banking sector focus on their competitive advantage and on the positive influence of foreign banks on the development of crediting action and heightened profitability of these banks in the host country. The problem of the impact on risk and stability is relatively less often analysed, usually only in the context of crediting action development. It is interesting to note the analysis by Chen et al. (2017), where the authors focused solely on the risk generated by foreign banks in 32 countries classified as emerging economies in the years 2000–2013. The results have shown that banks with foreign capital are exposed to a much greater risk (measured as Z-score) than their national counterparts. The impact of the presence of foreign capital in the bank ownership structure on the stability of the entire banking sector in a country was also studied by Lee et al. (2016). These analyses are important since – contrary to most

research related to individual countries or to a small group of countries – they refer to practically all the developing countries. Nonetheless, their results have brought about a series of recommendations which are not universal but depend on the scale of banking sector development.

Thorough studies on the impact of the ownership structure on credit policies and on the stability of the sector during the last global financial crisis, carried out by De Haas and Van Lelyveld (2014), have demonstrated that the banks which are subsidiaries of foreign banks limited their crediting action about three times more than other national banks did. The analyses by Feyen and Gonzalez del Mazo (2013) have shown, however, that the European banks have limited their activity in highly-developed countries to a greater extent than they did in developing countries. This situation was due to the fact that the engagement in developing countries when the crises broke out was approx. 8 times smaller than in highly-developed countries. The biggest decrease was recorded for the highly-developed European countries. In Poland and in other countries which joined the European Union in 2004, the ownership structure of the banking sector was an important, however not the most significant factor determining the scale of crediting action during the last global financial crisis (Epstein, 2013). The lower scale of crediting action as compared to other countries, where foreign capital ratio in the banking sector was considerable, was due to the fact that the parent banks treated these markets as second home markets (Epstein, 2014b). Other analyses of the role of foreign capital during the last financial crisis in the banking systems of 11 East and Central European countries (including Poland), being EU Member States, have shown that in terms of a larger scale of crediting action in these countries, the most important factor was not the home country of the bank's owner (foreign capital or private national capital) but the liquidity ratios (positive correlation) and the size of the bank, level of credit risk and reliance on market financing (negative correlation). During the crisis, the key determinant of crediting action development was, on the other hand, the liquidity level and capital adequacy ratios, the only difference being the fact that banks with national capital attached greater importance to maintaining an adequate liquidity level contrary to the foreign capital banks which could rely on liquidity support from the other international group members (Laidroo, 2016). The research covers 108 banks operating in eleven CEE countries and shows that growing bank's size and market share positively affect its efficiency. Additionally, higher concentration of the banking market has a similar effect (Kozak, 2020). Studies on the impact of the ownership structure of the banking sector on the country's economic situation also pointed out that when comparing the share of domestic capital with foreign capital, the type of domestic capital should be taken into account. According to Flejterski and Postuła (2022), in the banking sectors of EU countries, including Poland, instead of the exclusivity of one or the other form of ownership, one has to seek an intelligent balance between state-owned banks and those controlled by private capital.

The scale of foreign capital ratio in the banking system cannot be therefore treated as the most important, universal parameter affecting the stability of a given sector. The

last global financial sector has proven that in many highly-developed countries with low foreign capital ratio in the banking system, the problems were most significant, whereas in the developing countries or countries undergoing transformation with a high level of foreign capital, disruptions in their respective banking sectors were relatively mild. Nonetheless, part of the countries which did not suffer considerably as a result of the crisis noticed that in crisis situations, the impact on a banking sector dominated by foreign capital may be hindered (Epstein, 2014a).

Therefore, while the literature contains many studies on the impact of foreign banks on the development of crediting action and bank profitability in the host country, there is a lack of analyses on the contribution of foreign capital to systemic risk in the host banking system. There is also a lack of research on the transfer of this risk via foreign capital. Previous research conducted, for example, by McLemore et al. (2022) only referred to the issue of transfer of systemic risk via global exposures. The existing research gap identified in this way will be filled with the following study on the Polish banking sector.

### **Research methods**

Evaluation of foreign capital contribution to systemic risk in the Polish banking system and the level of threat posed by a possible risk transfer through foreign capital will involve identification of Polish systemically important banks (O-SIBs), controlled by foreign capital as well as an in-depth analysis of the sources and their concentration (taking into account both the home country and the systemic importance of the foreign parent institution). This will allow us to verify the research hypothesis whether the degree of foreign capital concentration in the Polish systemically important banks may favour the transfer of systemic risk through foreign capital. To this end, a simple supervision measure of evaluation of individual banks' systemic risk contribution, as well as the SRISK% complex measure will be used.

The supervision measure of evaluation of individual banks' systemic risk contribution, applied in Poland by the Polish Financial Supervision Authority includes the European Banking Authority (EBA) guidelines of 16 December 2014, which take into account ten obligatory parameters divided into four categories, i.e. size, importance (including substitutability / financial system infrastructure), complexity / cross-border activity and interconnectedness, while relevant weight is attached to each parameter. The first advantage of this method is the fact that – despite being a systemically important banks identification method which was standardised at the EU level – each Member State may use any number of facultative indices set out in the EBA guidelines, along with the obligatory parameters. For Poland, the facultative parameter is the importance of a bank for the institutional protection system this bank belongs to. Owing to the application of this parameter, the banks heading cooperative banks' associations are identified as O-SIBs. In terms of further analysis

of foreign capital contribution to systemic risk in the Polish banking system, the fact that the above method of identification of systemically important banks allows us to determine an individual bank's systemic risk contribution in the national banking sector. This is possible because the total number of points of all the banks always equals 10,000, where the number of base points ascribed to a given bank reflects its systemic risk contribution in the national banking sector. This scoring is directly translated into the amount of additional capital buffer, which is imposed on the O-SIBs. The other advantage this method offers is the fact that the results obtained may be used to analyze the degree of threat posed by a possible risk transfer through foreign capital, as this method was standardized at the EU level. Its only drawback is that this method cannot be applied to the parent banks outside the EU, whose reporting format does not comply with the EBA guidelines. Additionally, since most national banking supervisory authorities – due to the COVID-19 pandemic – did not disclose or did not change – where necessary – the base points awarded for the year 2019, an arithmetic mean for the years 2018 and 2020 was applied to the year 2019.

The second research method used to verify the hypothesis is the SRISK% measure, which indicates which part of the systemic capital shortfall is generated by a given bank. The systemic capital shortfall is defined as a sum of additional own funds, necessary to meet the regulatory minimum should a 40% decline of total capitalisation of the banking system occur within the subsequent 6 months:

$$SRISK\%_{it} = \frac{SRISK_{it}}{SRISK_t} \text{ if } SRISK_{it} > 0,$$

and zero otherwise, where:

$$SRISK_t = \sum_{i=1}^N (SRISK_{it})_+,$$

where  $(x)_+$  denotes  $\max(x, 0)$  and  $SRISK_{it}$  is defined as:

$$SRISK_{it} = kD_{it} - (1 - k)W_{it}(1 - LRMES_{it})$$

where  $W_{it}$  is the market value of equity,  $D_{it}$  is the book value of debt,  $LRMES_{it}$  is the Long-Run Marginal Expected Shortfall and  $k$  is the prudential capital fraction (8% for banks in Africa, Asia and Americas and 5.5% for banks in Europe) (Brownlees & Engle, 2017).

Importantly, it is possible to apply the SRISK% measure, contrary to the supervision measure of evaluation of systemic risk contribution of individual banks both in the case of American and European banks, although a modification is necessary (another value of  $k$  parameter has to be adopted) due to the differences between American and European bank accounting standards. The only – although quite important – limitation of the SRISK% measure is the fact that it shows which part

of the systemic capital shortfall is generated by which bank. Therefore, if a shock scenario does not generate a shortfall, the SRISK% measure for all the banks in a given sector will equal zero. Simultaneous application of the simple supervision measure of evaluation of individual banks' systemic risk contribution and the complex SRISK% measure to verify the hypothesis allowed us to draw on their advantages while eliminating the drawbacks described above.

## Results

### Systemic risk contribution of the banks owned by foreign capital identified as systemically important in the Polish banking system

Identification of systemically important banks in Poland by means of a simple, supervision measure of evaluation of individual banks' systemic risk contribution, compliant with the EBA guidelines, has shown that both their number and contribution of individual banks to the systemic risk in the Polish banking sector varied considerably in the years 2016–2022 (Table 1).

**Table 1.** Systemic risk contribution of the banks identified as systemically important in the Polish banking system

| Bank  | Systemic risk contribution (%) |      |      |      |      |      |      |
|---|--------------------------------|------|------|------|------|------|------|
|   | 2016                           | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| Alior Bank SA                               | –                              | –    | 3.7  | –    | –    | –    | –    |
| Bank Handlowy w Warszawie SA                | 5.8                            | 5.2  | 4.4  | 5.3  | 5.4  | 6.1  | 6.0  |
| Bank Millennium SA                          | 4.2                            | 3.6  | –    | –    | 3.7  | 3.5  | 3.9  |
| Bank Polska Kasa Opieki SA                  | 11.4                           | 10.3 | 10.5 | 11.1 | 11.3 | 12.2 | 11.6 |
| Bank Polskiej Spółdzielczości SA            | 2.2                            | 2.4  | 2.6  | 2.7  | 3.0  | 2.8  | 1.6  |
| BNP Paribas Bank Polska SA                  | 4.0                            | 4.2  | 4.7  | 5.2  | 5.2  | 5.7  | 5.7  |
| Deutsche Bank Polska SA                     | –                              | 4.1  | 4.0  | –    | –    | –    | –    |
| Getin Noble Bank SA                         | 3.9                            | 3.6  | –    | –    | –    | –    | –    |
| ING Bank Śląski SA                          | 7.7                            | 8.4  | 9.5  | 9.3  | 9.6  | 10.6 | 10.1 |
| mBank SA                                    | 9.5                            | 11.0 | 9.3  | 10.6 | 9.7  | 9.3  | 9.6  |
| Powszechna Kasa Oszczędności Bank Polski SA | 13.7                           | 13.7 | 15.8 | 16.0 | 16.2 | 17.5 | 19.1 |
| Raiffeisen Bank Polska SA                   | 4.0                            | –    | –    | –    | –    | –    | –    |
| Santander Bank Polska SA                    | 9.8                            | 10.4 | 9.6  | 12.2 | 12.1 | 11.8 | 12.1 |
| SGB-BANK SA                                 | 1.2                            | 1.4  | 1.6  | 1.6  | 1.8  | 1.8  | 0.7  |
| Foreign capital banks                       | 56.6                           | 46.9 | 41.5 | 42.5 | 45.8 | 47.1 | 47.4 |

– means that the bank was not identified as systemically important in a given year

Source: Author's own study based on (KNF, 2022).

On the basis of the data presented in Table 1, banks with foreign capital were identified and their systemic risk contribution in the Polish banking system was assessed, considering the home country of the capital, using the SRISK% method, i.e. contribution of a given bank to the systemic capital shortfall (Table 2).



**Table 2.** Systemic risk contribution of individual banks owned by foreign capital, identified as systemically important in the Polish banking system

| Bank                         | SRISK% |      |      |       |       |       |       |
|------------------------------|--------|------|------|-------|-------|-------|-------|
|                              | 2016   | 2017 | 2018 | 2019  | 2020  | 2021  | 2022  |
| Bank Handlowy w Warszawie SA | 0.00   | 0.00 | 0.00 | 0.00  | 2.01  | 0.00  | 0.00  |
| Bank Millennium SA           | 10.65  | 0.00 | 0.00 | 20.60 | 10.04 | 2.18  | 27.95 |
| Bank Polska Kasa Opieki SA*  | 0.00   | –    | –    | –     | –     | –     | –     |
| BNP Paribas Bank Polska SA   | n/d    | n/d  | n/d  | n/d   | n/d   | n/d   | n/d   |
| Deutsche Bank Polska SA      | n/d    | n/d  | n/d  | n/d   | n/d   | n/d   | n/d   |
| ING Bank Śląski SA           | 0.00   | 0.00 | 0.00 | 0.00  | 5.47  | 0.00  | 0.00  |
| mBank SA                     | 5.22   | 0.00 | 0.00 | 8.27  | 18.09 | 36.03 | 48.61 |
| Raiffeisen Bank Polska SA**  | bd     | bd   | –    | –     | –     | –     | –     |
| Santander Bank Polska SA     | 0.00   | 0.00 | 0.00 | 0.00  | 7.89  | 0.00  | 0.00  |
| Total                        | 15.87  | 0.00 | 0.00 | 28.87 | 43.50 | 38.21 | 76.56 |

\* in 2017, Bank Polska Kasa Opieki SA ceased to be owned by foreign capital

\*\* in 2018, Raiffeisen Bank Polska SA ceased to operate

Source: Author's own study based on <https://vlab.stern.nyu.edu> as of April 2, 2023.

Application of SRISK% as a measure of systemic risk contribution of individual banks owned by foreign capital, identified as systematically important in the Polish banking system indicates that this contribution is much lower than it is when the supervision method of identification of systemically important banks is applied. Before the final evaluation of combined contribution of banks owned by foreign capital, identified as systemically important in the Polish banking sector, the scale of capital shortfall in these banks which could occur in a crisis situation in relation to the Polish GDP should be analysed. Such a comparison will allow us to determine the potential scale of threat to the stability of the Polish financial system generated by these banks (Table 3).

**Table 3.** Capital shortfall of individual foreign capital banks, identified as systemically important, in relation to the Polish GDP

| Bank                         | SRISK/GDP (%) |      |      |      |      |      |      |
|------------------------------|---------------|------|------|------|------|------|------|
|                              | 2016          | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| Bank Handlowy w Warszawie SA | 0.00          | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 |
| Bank Millennium SA           | 0.03          | 0.00 | 0.00 | 0.08 | 0.22 | 0.01 | 0.03 |
| Bank Polska Kasa Opieki SA*  | 0.00          | –    | –    | –    | –    | –    | –    |
| BNP Paribas Bank Polska SA   | n/d           | n/d  | n/d  | n/d  | n/d  | n/d  | n/d  |
| Deutsche Bank Polska SA      | n/d           | n/d  | n/d  | n/d  | n/d  | n/d  | n/d  |
| ING Bank Śląski SA           | 0.00          | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 |
| mBank SA                     | 0.02          | 0.00 | 0.00 | 0.03 | 0.40 | 0.09 | 0.02 |
| Raiffeisen Bank Polska SA**  | n/d           | n/d  | –    | –    | –    | –    | –    |
| Santander Bank Polska SA     | 0.00          | 0.00 | 0.00 | 0.00 | 0.17 | 0.00 | 0.00 |
| Total                        | 0.05          | 0.00 | 0.00 | 0.11 | 0.96 | 0.10 | 0.05 |

\* in 2017, Bank Polska Kasa Opieki SA ceased to be owned by foreign capital

\*\* in 2018, Raiffeisen Bank Polska SA ceased to operate

Source: Author's own study based on <https://vlab.stern.nyu.edu> and <https://ec.europa.eu/eurostat/data/database> as of April 2, 2023.



To summarize the results of the study of the combined systemic risk contribution of banks owned by foreign capital, identified as systemically important in the Polish banking sector, we need to refer to the analysis carried out both using the supervision method of individual banks' systemic risk contribution as well as to the SRISK% measure and the level of SRISK in relation to the Polish GDP. As a point of reference, the share of these banks in the assets of the Polish banking system was adopted (Table 4).

**Table 4.** Contribution of banks owned by foreign capital, identified as systemically important in the Polish banking sector

| Parameter   | Year  |       |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|-------|-------|
|   | 2016  | 2017  | 2018  | 2019  | 2020  | 2021  | 2022  |
| Share in the group of banks identified as O-SIB (%)           | 66.7  | 58.3  | 54.5  | 55.6  | 60.0  | 60.0  | 60.0  |
| Systemic risk contribution per O-SIB identification model (%) | 56.6  | 46.9  | 41.5  | 42.5  | 45.8  | 47.1  | 47.4  |
| SRISK%  | 15.87 | 0.00  | 0.00  | 28.87 | 43.50 | 38.21 | 76.56 |
| SRISK/PKB (%)   | 0.05  | 0.00  | 0.00  | 0.11  | 0.96  | 0.10  | 0.05  |
| Share in the assets of the Polish banking sector (%)          | 51.30 | 40.00 | 42.80 | 43.30 | 41.20 | 40.40 | n/d   |

Source: Author's own study based on (KNF, 2022), <https://vlab.stern.nyu.edu> and <https://ec.europa.eu/eurostat/data/database> as of April 2, 2023.

#### Sources of foreign capital in the Polish banks vs. systemic risk transfer

The evaluation of the systemic risk contribution of foreign capital in the Polish banking system was based on an in-depth analysis of the sources (countries) of its origin and the importance of these individual sources. Moreover, a potential systemic risk transfer through foreign capital was also assessed. As a result of this analysis, we concluded that foreign capital to assets ratio in the Polish banking system has been gradually decreasing since 2008, when it reached its maximum of approx. 73% (KNF, 2017). This downward trend was seen also in the period 2016–2021. However, it resulted both from the transactions of the so called repolonization, i.e. taking over – by the Polish capital – the banks which until then had been owned by foreign capital (the largest of these transactions was the acquisition of the controlling stake of Bank Polska Kasa Opieki SA by PZU S.A. and by PFR S.A. from UniCredit S.p.A., finalised in 2017), as well as a considerable limitation of activity by, e.g. Deutsche Bank Polska SA. As a result, at the end of 2021, foreign capital share in the Polish banking sector fell below 43%. In the period under analysis, the structure of countries of foreign capital origin changed. This was due to the abovementioned repolonization of Bank Polska Kasa Opieki SA, which caused the Italian capital to completely withdraw from the Polish market; in 2016, the Italian capital to assets ratio was over 10%. German capital share also fell below 9%, while the share of capital from Spain, the Netherlands, Germany, Portugal and the USA remained

practically at the same level (Table 5). At the end of 2021, the countries of capital origin could be divided into three groups. The first one included countries whose share oscillated between 5 and 11%, i.e. Spain, Germany, the Netherlands, France and Italy (until 2016). The second group was made of Portugal and the USA, whose share was between 1 and 5%. The countries in the last group had a share which did not exceed 1%, while the total capital to assets ratio in the Polish banking sector was less than 2.5% at the end of 2021.

**Table 5.** Countries of origin of foreign capital in the Polish banking sector (foreign capital to assets ratio in the sector)

| Country of origin of foreign capital | Foreign capital to assets ratio in the sector (%) |      |      |      |      |      |
|--------------------------------------|---|------|------|------|------|------|
|                                      | 2016  | 2017 | 2018 | 2019 | 2020 | 2021 |
| Spain                                | 8.8   | 8.6  | 10.8 | 10.3 | 9.6  | 9.4  |
| Germany                              | 10.7  | 10.2 | 9.4  | 9.4  | 9.0  | 8.9  |
| The Netherlands                      | 6.6   | 6.9  | 7.3  | 7.9  | 8.1  | 7.9  |
| France                               | 7.1   | 7.0  | 7.7  | 7.6  | 7.1  | 7.1  |
| Portugal                             | 4.0   | 4.0  | 4.2  | 4.8  | 4.2  | 4.1  |
| Italy                                | 10.4  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| USA                                  | 3.7   | 3.3  | 3.4  | 3.3  | 3.2  | 3.0  |
| Other                                | 5.3   | 5.5  | 4.2  | 3.0  | 2.5  | 2.3  |
| Total                                | 56.6  | 45.5 | 47.0 | 46.3 | 43.7 | 42.7 |

Source: Author's own study based on (KNF, 2022).

All banks owned by foreign capital, and identified as systemically important in the years 2016–2021, were subsidiaries from the countries where the capital to assets ratio in the sector exceeded 3%. Hence, in our analysis, it was necessary to compare the share of the banks owned by foreign capital, identified as systemically important in the Polish banking sector, with the systemic risk contribution of their parent institutions in the banking systems in their home countries. It has to be noted that all the parent institutions (except for the parent institution of Bank Handlowy w Warszawie SA) of the Polish banks owned by foreign capital and identified as systemically important in the Polish banking sector, originate in other EU countries, precisely from the euro area countries, which belong to the banking union, while banks from these countries are subject to the Single Supervisory Mechanism.

In the case of Spanish capital in the Polish banking sector, the only systemically important bank is Santander Bank Polska SA, which is a subsidiary of Banco Santander S.A. Banco Santander S.A. is identified as a systemically important bank not only in Spain but also was classified by the Financial Stability Board as a globally systemically important bank. Comparing the systemic importance of Santander Bank Polska SA and Banco Santander S.A., it has to be noted that the systemic risk contribution of the subsidiary in the Polish banking system was – in the period under analysis – approx. 4 times lower than the systemic risk contribution of the parent institution in the Spanish banking system. In the case of the SRISK% measure, the

disproportion between the Polish bank and its Spanish parent institution is even greater as its share in the capital shortfall (should the shock scenario occur) oscillated every year at 50%, while for Santander Bank Polska SA only in 2020 it did not equal zero, but never exceeded 9% (Table 6).

**Table 6.** Systemic risk contribution of the banks with Spanish capital as compared to their parent institutions

| Bank                     | Parameter   | Year |      |      |      |      |      |      |
|--------------------------|---|------|------|------|------|------|------|------|
|                          |   | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| Santander Bank Polska SA | systemic risk contribution per O-SIB identification model (%) | 9.8  | 10.4 | 9.6  | 12.2 | 12.1 | 11.8 | 12.1 |
|                          | SRISK%  | 0.0  | 0.0  | 0.0  | 0.0  | 7.9  | 0.0  | 0.0  |
| Banco Santander S.A.     | systemic risk contribution per O-SIB identification model (%) | 38.9 | 41.2 | 43.9 | 44.6 | 45.4 | 43.6 | 42.6 |
|                          | SRISK%  | 46.1 | 56.7 | 47.7 | 48.3 | 47.6 | 48.7 | 56.7 |
|                          | risk basket according to FSB (as a G-SIB)                     | 1    | 1    | 1    | 1    | 1    | 1    | 1    |

Source: Author's own study based on (KNF, 2022; EBA, 2022; FSB, 2022), <https://vlab.stern.nyu.edu> as of April 2, 2023.

In the case of the second most important source of foreign capital in the Polish banking system, i.e. German capital, its impact on systemic risk is materialised by mBank SA, which is a subsidiary of Commerzbank AG. In the years 2017–2018, Deutsche Bank Polska SA was also identified as an O-SIB; it is a subsidiary of Deutsche Bank AG. Comparing the systemic importance of mBank SA and that of Commerzbank AG, we should note that, according to the O-SIB identification model, the systemic risk contribution of mBank SA in the Polish banking system is higher than the systemic risk contribution of Commerzbank AG in the German banking system, and the difference between these contributions is growing. A similar trend can be observed applying the SRISK% measure. Until 2020, SRISK% was higher for Commerzbank AG, however, since 2021, this measure has been higher for mBank SA, reaching the double value of SRISK% level for Commerzbank AG in 2022. As for Deutsche Bank Polska SA and its parent institution, i.e. Deutsche Bank AG, it should be noted that their systemic risk contribution is incomparable. Deutsche Bank Polska SA was considered as a systemically important bank only for two years, but even then its systemic risk contribution did not exceed 5%, while Deutsche Bank AG not only is a systemically important bank in Germany (with a share of approx. 23% according to O-SIB classification, and SRISK% at a level of approx. 70%), but also in the global scale (FSB has now classed this bank in the second risk basket) (Table 7).

**Table 7.** Systemic risk contribution of the banks with German capital as compared to their parent institutions

| Bank                    | Parameter   | Year |      |      |      |      |      |      |
|-------------------------|---|------|------|------|------|------|------|------|
|                         |   | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| mBank SA                | systemic risk contribution per O-SIB identification model (%) | 9.5  | 11.0 | 9.3  | 10.6 | 9.7  | 9.3  | 9.6  |
|                         | SRISK%  | 5.2  | 0.0  | 0.0  | 8.3  | 18.1 | 36.0 | 48.6 |
| Commerzbank AG          | systemic risk contribution per O-SIB identification model (%) | 9.3  | 8.3  | 8.0  | 7.8  | 7.6  | 7.2  | n/d  |
|                         | SRISK%  | 18.5 | 18.9 | 23.1 | 22.7 | 23.2 | 24.5 | 22.3 |
|                         | risk basket according to FSB (as a G-SIB)                     | –    | –    | –    | –    | –    | –    | –    |
| Deutsche Bank Polska SA | systemic risk contribution per O-SIB identification model (%) | –    | 4.1  | 4.0  | –    | –    | –    | –    |
|                         | SRISK%  | n/d  | n/d  | n/d  | n/d  | n/d  | n/d  | n/d  |
| Deutsche Bank AG        | systemic risk contribution per O-SIB identification model (%) | 28.5 | 27.7 | 26.5 | 25.5 | 24.6 | 22.7 | n/d  |
|                         | SRISK%  | 67.0 | 74.3 | 69.3 | 70.0 | 59.5 | 61.2 | 70.1 |
|                         | risk basket according to FSB (as a G-SIB)                     | 3    | 3    | 3    | 3    | 2    | 2    | 2    |

– means that the bank was not identified as systemically important in the given year

Source: Author's own study based on (KNF, 2022; EBA, 2022; FSB, 2022), <https://vlab.stern.nyu.edu> as of April 2, 2023.

In the case of Dutch capital in the Polish banking system, ING Bank Śląski SA is the only systemically important bank. It is a subsidiary of ING Bank N.V., identified as a systemically important bank in the scale of the Netherlands as well as in the global scale. Comparing the systemic importance of ING Bank Śląski SA and ING Bank N.V., it has to be noted that the systemic risk contribution of a subsidiary in the Polish banking sector in the analysed period was approx. 4 times lower than the systemic risk contribution of the parent institution in the Dutch banking sector. In the case of the SRISK% measure for ING Bank Śląski SA, only in 2020 its level did not equal zero (5.5%), while for ING Bank N.V. it oscillated from 30 to 54% (Table 8).

**Table 8.** Systemic risk contribution of the banks with Dutch capital as compared to their parent institutions

| Bank               | Parameter   | Year |      |      |      |      |      |      |
|--------------------|---|------|------|------|------|------|------|------|
|                    |   | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| ING Bank Śląski SA | systemic risk contribution per O-SIB identification model (%) | 7.7  | 8.4  | 9.5  | 9.3  | 9.6  | 10.6 | 10.1 |
|                    | SRISK%  | 0.0  | 0.0  | 0.0  | 0.0  | 5.5  | 0.0  | 0.0  |
| ING Bank N.V.      | systemic risk contribution per O-SIB identification model (%) | 38.3 | 39.7 | 39.9 | 40.1 | 40.3 | 39.5 | n/d  |
|                    | SRISK%  | 37.2 | 29.1 | 54.0 | 43.8 | 50.1 | 43.7 | 44.9 |
|                    | risk basket according to FSB (as a G-SIB)                     | 1    | 1    | 1    | 1    | 1    | 1    | 1    |

Source: Author's own study based on (KNF, 2022; EBA, 2022; FSB, 2022), <https://vlab.stern.nyu.edu> as of April 2, 2023.

Another source of foreign capital in the Polish banking system, with a contribution close to the Dutch share, is French capital with one bank identified as an O-SIB, i.e. BNP Paribas Bank Polska SA, a subsidiary of BNP Paribas. BNP Paribas is a systemically important bank both in the French and global scale (belonging to 2 or 3 risk basket). Its systemic risk contribution in France is approx. 5 times higher than the systemic risk contribution of its subsidiary BNP Paribas Bank Polska SA in the Polish systemic risk. In the case of SRISK% measure, its level for BNP Paribas oscillates between 30 and 40%, although this measure was not defined for BNP Paribas Bank Polska SA, which makes it impossible to compare the two banks (Table 9).

**Table 9.** Systemic risk contribution of the banks with French capital as compared to their parent institutions

| Bank                       | Parameter   | Year |      |      |      |      |      |      |
|----------------------------|---|------|------|------|------|------|------|------|
|                            |   | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| BNP Paribas Bank Polska SA | systemic risk contribution per O-SIB identification model (%) | 4.0  | 4.2  | 4.7  | 5.2  | 5.2  | 5.7  | 5.7  |
|                            | SRISK%  | n/d  | n/d  | n/d  | n/d  | n/d  | n/d  | n/d  |
| BNP Paribas                | systemic risk contribution per O-SIB identification model (%) | 24.7 | 24.5 | 24.8 | 25.3 | 25.9 | 27.3 | n/d  |
|                            | SRISK%  | 29.8 | 31.8 | 33.6 | 30.1 | 33.6 | 35.7 | 39.4 |
|                            | risk basket according to FSB (as a G-SIB)                     | 3    | 2    | 2    | 2    | 2    | 3    | 2    |

Source: Author's own study based on (KNF, 2022; EBA, 2022; FSB, 2022), <https://vlab.stern.nyu.edu> as of April 2, 2023.

AS shown above, the other group of countries where foreign capital in the Polish banks originates from is Portugal and the USA, whose share is at 1–5%. The Portuguese capital is a source of financing of one Polish bank identified as an O-SIB, i.e. Bank Millennium SA, which is a subsidiary of Banco Comercial Português. Banco Comercial Português is not a globally systemically important bank, however, its systemic risk contribution in the Portuguese system is growing and exceeds – according to O-SIB identification model – the level of 22%. In terms of SRISK%, from 2019, it would be 100% responsible for the capital shortfall which would materialise in the banking system should a shock scenario occur. Systemic risk contribution of its Polish subsidiary is approx. 6 times lower (in the years 2018–2019, it was not even identified as systemically important), while the SRISK% measure for Bank Millennium SA has never exceeded 23% (Table 10).

**Table 10.** Systemic risk contribution of the banks with Portuguese capital as compared to their parent institutions

| Bank                      | Parameter   | Year |      |       |       |       |       |       |
|---------------------------|---|------|------|-------|-------|-------|-------|-------|
|                           |   | 2016 | 2017 | 2018  | 2019  | 2020  | 2021  | 2022  |
| Bank Millennium SA        | systemic risk contribution per O-SIB identification model (%) | 4.2  | 3.6  | –     | –     | 3.7   | 3.5   | 3.9   |
|                           | SRISK%  | 10.7 | 0.00 | 0.00  | 20.6  | 10.0  | 2.2   | 28.0  |
| Banco Comercial Português | systemic risk contribution per O-SIB identification model (%) | 18.4 | 18.9 | 20.7  | 21.7  | 22.7  | 22.8  | n/d   |
|                           | SRISK%  | 79.7 | 56.8 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
|                           | risk basket according to FSB (as a G-SIB)                     | –    | –    | –     | –     | –     | –     | –     |

– means that the bank was not identified as systemically important in a given year

Source: Author's own study based on (KNF, 2022; EBA, 2022; FSB, 2022), <https://vlab.stern.nyu.edu> as of April 2, 2023.

The last country which is a source of foreign capital in the Polish banks identified as systemically important is the USA. The oldest Polish bank, Bank Handlowy w Warszawie SA is a subsidiary of Citigroup. Due to the fact that Citigroup (classed as a G-SIB) was not identified in its home country as an O-SIB on the basis of the EBA guidelines, a comparison of the systemic risk contribution of its Polish subsidiary referred to the systemic risk contribution of Citigroup in the American banking system can only be based on the SRISK% measure. Taking this measure into account, we can conclude that with its value for Citigroup oscillating between 19 and 25%, Bank Handlowy w Warszawie SA has never exceeded even 2% (Table 11).

**Table 11.** Systemic risk contribution of the banks with American capital as compared to their parent institutions

| Bank                         | Parameter   | Year |      |      |      |      |      |      |
|------------------------------|---|------|------|------|------|------|------|------|
|                              |   | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| Bank Handlowy w Warszawie SA | systemic risk contribution per O-SIB identification model (%) | 5.8  | 5.2  | 4.4  | 5.3  | 5.4  | 6.1  | 6.0  |
|                              | SRISK%  | 0.0  | 0.0  | 0.0  | 0.0  | 2.0  | 0.0  | 0.0  |
| Citigroup                    | systemic risk contribution per O-SIB identification model (%) | n/d  | n/d  | n/d  | n/d  | n/d  | n/d  | n/d  |
|                              | SRISK%  | 19.4 | 24.1 | 21.0 | 23.2 | 19.2 | 25.0 | 24.0 |
|                              | risk basket according to FSB (as a G-SIB)                     | 4    | 3    | 3    | 3    | 3    | 3    | 3    |

Source: Author's own study based on (KNF, 2022; EBA, 2022; FSB, 2022), <https://vlab.stern.nyu.edu> as of April 2, 2023.

To summarize the results of the analysis of the systemic risk contribution of foreign capital banks compared to their parent institutions, it should be noted that the systemic risk contribution of the Polish subsidiaries is generally a few times lower than the systemic risk contribution of their parent institutions. mBank SA is

an exception, where the ratio between its systemic risk contribution compared to that of its parent institution exceeds 100%, which means that this is the only case of a potential systemic risk transfer through foreign capital. The analysis did not include Bank Handlowy w Warszawie SA – a subsidiary of Citigroup – since Citigroup did not undergo the O-SIB identification process based on the EBA guidelines in its home country (USA) (Table 12).

**Table 12.** Ratio between systemic risk contribution of the Polish O-SIBs owned by foreign capital to the systemic risk contribution of their parent institutions in their home countries (%)

| Bank  | Year |      |      |      |      |      |      |
|---|------|------|------|------|------|------|------|
|   | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| Bank Millennium SA / Banco Comercial Português  | 23   | 19   | –    | –    | 16   | 15   | n/d  |
| BNP Paribas Bank Polska SA / BNP Paribas        | 16   | 17   | 19   | 21   | 20   | 21   | n/d  |
| Deutsche Bank Polska SA / Deutsche Bank AG      | –    | 15   | 15   | –    | –    | –    | –    |
| ING Bank Śląski SA / ING Bank N.V.              | 20   | 21   | 24   | 23   | 24   | 27   | n/d  |
| mBank SA / Commerzbank AG                       | 102  | 133  | 116  | 136  | 128  | 129  | n/d  |
| Santander Bank Polska SA / Banco Santander S.A. | 25   | 25   | 22   | 27   | 27   | 27   | 28   |

– means that the bank was not identified as systemically important in the given year

Source: Author's own study based on (KNF, 2022; EBA, 2022).

## Discussions

The results of the analysis obtained using the methods chosen to measure systemic risk contribution of the banks owned by foreign capital and identified as systemically important in the Polish banking system allowed us to draw the following conclusions:

1. In the group of banks identified as systemically important, using the model compliant with the EBA guidelines, i.e. considering the ten obligatory parameters divided into four categories: size, importance (including substitutability / financial system infrastructure), complexity / cross-border activity and interconnectedness, as well as one facultative parameter (importance of the bank for the institutional protection scheme of which it is a member), banks with foreign capital are dominant. In 2016, two thirds of the banks in this group were owned by foreign capital, while after a temporary low in the years 2017–2018, since 2020 this share has been stable at 60%.

2. Risk contribution of the banks owned by foreign capital and identified as systemically important in the Polish banking system is high, and still in 2016 it exceeded 56%. Only from 2017, when Bank Polska Kasa Opieki SA was taken over from the Italian capital by the Polish capital, this share dropped – by almost 10 percentage points – below 47%, and in the subsequent year – below 42%. From 2019, it started to rise and in 2022, even exceeded 47%. Evaluation of these changes referred to the change of risk contribution of the O-SIBs owned by foreign capital in the assets of



the Polish banking sector has shown a negative trend from 2019, i.e. a constantly increasing risk contribution of these banks despite a systematic decrease of their participation in the assets of the Polish banking sector (from 43.3 to 40.4%).

3. Application of the complex measure SRISK% has indicated that the total risk contribution of the banks owned by foreign capital and identified as systemically important in the Polish banking system dropped to 0% in 2017. From 2018, when it stayed at the same level, it started to rise significantly to reach 76% in 2022. It should be noted, however, that this measure has a special structure, which determines the systemic capital shortfall of a bank, defined as an amount of additional own funds, necessary to meet the regulatory minimum if a 40% fall of total capitalisation of the banking system occurs in the subsequent 6 months. Such an abrupt increase of the total SRISK% of the foreign capital-owned banks identified as systemically important in the years 2018–2022 is due to the fact that in the period 2017–2018 the total SRISK for the Polish banking sector stood at 0, which implied a lack of capital gap in extreme circumstances described above. Therefore, individual banks had a zero share in this gap (SRISK%). Only when the gap emerged, this share became non-zero. Moreover, in the years 2018–2021, Getin Noble Bank SA, a Polish capital bank had an important, though decreasing share.

On the basis of the analysis of the sources (countries) of its origin and importance of individual sources, the potential systemic risk transfer through foreign capital was assessed. The countries, where the capital originated, were divided into three groups. The first one included countries falling into the range of 5–11%, i.e. Spain, Germany, the Netherlands, France and Italy (until 2016). The second group included Portugal and the USA, whose share ranges between 1 and 5%. The last group consisted of the remaining countries, whose individual share was no greater than 1%, while the total share was below 2.5% of the Polish banking sector's assets at the end of 2021. A high degree of diversification within the first group was positive. The share of individual countries in this group oscillates from 21 to 28%. Likewise, in the second group, the share of the two countries is at a similar level. Thus, we cannot identify a risk which would be caused by an excessive concentration of foreign capital sources. The dominant role of the EU capital should also be viewed as a positive factor. A much more important issue is the potential systemic risk transfer through foreign capital. The comparative analysis of risk contribution of the banks owned by foreign capital and identified as systemically important in the Polish banking system as compared to their parent institutions in the systemic risk of the home countries' banking sectors led to the following conclusions:

1. All the (seven) Polish banks owned by foreign capital and identified as systemically important are subsidiaries of banks which – in their home countries – are classed as systemically important. Moreover, in the case of five of them, their parent institutions were also identified by the Financial Stability Board as globally systemically important banks.

2. Risk contribution of the Polish subsidiaries is generally a few times lower than that of their parent institutions, with mBank SA being an exception. The ratio between its risk contribution and the risk contribution of the parent institution in Germany exceeds 100%. This means that this is the only case of potential systemic risk transfer through foreign capital, which should be carefully monitored by the Polish safety net institutions (both the Financial Supervisory Authority as a microprudential supervisory body and the Financial Stability Committee as a macroprudential supervisory body).

## Conclusions

The research goal of the article was to assess the risk contribution of foreign capital in the Polish banking system and the scale of threat posed by potential risk transfer through foreign capital. This goal was achieved by identifying Polish systemically important banks, controlled by foreign capital and an in-depth analysis of the sources and their concentration (considering both the home country and a systemic importance of the foreign parent institution). Application of both simple supervisory measure to assess the risk contribution of individual banks and the SRISK% measure, the research hypothesis was rejected since it was not demonstrated that the degree of foreign capital concentration in the Polish systemically important banks may encourage systemic risk transfer through foreign capital. Although all the Polish banks owned by foreign capital and identified as systemically important are subsidiaries of the banks which are also identified as systemically important in their home countries, their risk contribution in the Polish banking system is generally a few times lower than that of their parent institutions. One bank (mBank SA) is an exception, where the ratio between the risk contribution and the risk contribution of the parent institution in the German banking system exceeds 100%. This means that this is the only case of potential risk transfer through foreign capital. However, the scale of this threat is rather small. Nevertheless, this case should be carefully monitored by the Polish financial safety net (both micro- and macro-prudential supervision).

The other practical recommendation for the Polish financial security net institution, resulting from the above analysis, is to turn their attention to the rising risk contribution of the banks which are owned by foreign capital and identified as systemically important in the Polish banking system. This contribution has been rising steadily since 2019 to exceed 47% in 2022, despite a systematic fall of their share in the assets of the Polish banking sector (below 41%). A mitigating factor is a low level of risk concentration resulting from the diversification of risk contribution of the individual banks in the Polish banking system (the biggest contribution of an individual bank is approx. 12%).

The last practical guideline both for the financial safety net institutions and for the researchers measuring the systemic risk is to further improve the measures, espe-

cially the measures of individual banks' risk contribution. Two measures were used in this study due to the weaknesses of each of these methods, which we identified. However, a simultaneous application of the supervisory measure of individual banks' risk contribution and the complex SRISK% measure allowed us to benefit from their strengths while eliminating the weaknesses. Nonetheless, further study on systemic risk measuring methods is necessary.

## References

- Brownlees, Ch., & Engle, R. (2017). SRISK: A conditional capital shortfall measure of systemic risk. *The Review of Financial Studies*, 30(1), 48–79. doi:10.1093/rfs/hhw060
- Chen, M., Wu, J., Jeon, B. N., & Wang, R. (2017). Do foreign banks take more risk? Evidence from emerging economies. *Journal of Banking & Finance*, 82, 20–39. doi:10.1016/j.jbankfin.2017.05.004
- De Haas, R., & Van Lelyveld, I. (2014). Multinational Banks and the Global Financial Crisis. Weathering the Perfect Storm? *Journal of Money, Credit, and Banking*, 46(s1), 333–364. doi:10.1111/jmcb.12094
- EBA. (2022). *Other Systemically Important Institutions (O-SIIs)*. Retrieved from <https://www.eba.europa.eu/risk-analysis-and-data/other-systemically-important-institutions-o-siis->
- ECB. (2017). *Financial Stability Review*. Retrieved from <https://www.ecb.europa.eu/pub/pdf/other/financialstabilityreview201705.en.pdf>
- Epstein, R.A. (2013). Central and East European bank responses to the financial 'crisis': Do domestic banks perform better in a crisis than their foreign-owned counterparts? *Europe-Asia Studies*, 65(3), 528–547. doi:10.1080/09668136.2013.779453
- Epstein, R.A. (2014a). Assets or liabilities? The politics of bank ownership. *Review of International Political Economy*, 21(4), 765–789. doi:10.1080/09692290.2014.912990
- Epstein, R.A. (2014b). When do foreign banks "cut and run"? Evidence from west European bail-outs and east European markets. *Review of International Political Economy*, 21(4), 847–877. doi:10.1080/09692290.2013.824913
- Feyen, E., & Gonzalez del Mazo, I. (2013). European bank de-leveraging and global credit conditions. *Policy Research Working Paper*; 6388. The World Bank. Retrieved from <https://openknowledge.worldbank.org/entities/publication/7f9e2413-ba8d-50db-9d5c-a2b21fe3f3e3>
- Flejterski, S., & Postuła, M. (2022). Banks ownership and development indicators prior to the COVID-19 pandemic. A comparative study. *Annales Universitatis Mariae Curie-Skłodowska, sectio H – Oeconomia*, 56(4), 23–39. doi:10.17951/h.2022.56.4.23-39
- FSB. (2022). *Global Systemically Important Financial Institutions (G-SIFIs)*. Retrieved from <https://www.fsb.org/work-of-the-fsb/market-and-institutional-resilience/global-systemically-important-financial-institutions-g-sifis/>
- Goyer, M., & Valdivielso del Real, R. (2014). Protection of domestic bank ownership in France and Germany: The functional equivalency of institutional diversity in takeovers. *Review of International Political Economy*, 21(4), 790–819. doi:10.1080/09692290.2014.910539
- Greenbaum, S., Thakor, A., & Boot, A.W.A. (2015). *Contemporary Financial Intermediation*. Amsterdam – Tokyo: Elsevier Academic Press.
- KNF. (2017). *Raport o sytuacji banków w 2016 roku*. Retrieved from [https://www.knf.gov.pl/knf/pl/komponenty/img/RAPORT\\_O\\_SYTUACJI\\_BANKOW\\_2016\\_54435.pdf](https://www.knf.gov.pl/knf/pl/komponenty/img/RAPORT_O_SYTUACJI_BANKOW_2016_54435.pdf)
- KNF. (2022). *Przegląd adekwatności wskaźnika bufora innej instytucji o znaczeniu systemowym*. Retrieved from [https://www.knf.gov.pl/knf/pl/komponenty/img/Przegląd\\_adekwatności\\_wskaźnika\\_bufora\\_innej\\_instytucji\\_o\\_znaczeniu\\_systemowym\\_80606.pdf](https://www.knf.gov.pl/knf/pl/komponenty/img/Przegląd_adekwatności_wskaźnika_bufora_innej_instytucji_o_znaczeniu_systemowym_80606.pdf)
- Koleśnik, J. (2019). *Bankowe ryzyko systemowe – źródła i instrumenty redukcji*. Warszawa: Difin.

- Kozak, S. (2020). Are larger banks more efficient in the Central Eastern European countries? *Annales Universitatis Mariae Curie-Sklodowska, sectio H – Oeconomia*, 54(2), 31–40. doi:10.17951/h.2020.54.2.31-40
- Laidroo, L. (2016). Bank ownership and lending: Does bank ownership matter? *Journal Emerging Markets Finance and Trade*, 52(2), 285–301. doi:10.1080/1540496X.2015.1095032
- Lee, C.-C., Hsieh, M.-F., & Yang S.-J. (2016). The effects of foreign ownership on competition in the banking industry: The key role of financial reforms. *Japan and the World Economy*, 37–38, 27–46. doi:10.1016/j.japwor.2016.02.002
- McLemore, P., Mihov, A., & Sanz, L. (2022). Global banks and systemic risk: The dark side of country financial connectedness. *Journal of International Money and Finance*, 129, 102734. doi:10.1016/j.jimonfin.2022.102734
- Zaleska, M., & Kondraciuk, P. (2019). Theory and practice of innovation development in the banking sector. *Financial Sciences*, 24(2), 76–87. doi:10.15611/fins.2019.2.06