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A Comparative Analysis of the Profiles of Entrepreneurs in Poland and Ukraine: Methodological Tools and Experience from Pilot Studies

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Abstract

The purpose of the article is to present the results of a parallel survey of entrepreneurs in Poland and Ukraine aimed at identifying and measuring their common and distinctive characteristics. The main research methods include a questionnaire, comparative analysis using the Chi-square independence test (set at a significance level of 0.05), and a focus group. Secondary methods included analysis and synthesis, induction and deduction, logical and historical reasoning, and the principle of concreteness of truth. The comparative quantitative analysis of the profiles of Polish and Ukrainian entrepreneurs serves as a contribution and adds value to the development of this academic and practical problem. By employing a well-founded epistemological triad of "national business cultures", "organizational (corporate) cultures", and "entrepreneurs' profiles", this study enhances the understanding of how to leverage the strengths of entrepreneurs in Poland and Ukraine. This analysis not only highlights the advantages but also aims to minimize the consequences of the relevant weaknesses, which are inherent to entrepreneurs globally. It provides a framework for implementing joint investment projects in the context of geopolitical challenges and the transformation of pan-European markets for goods and services.

Keywords: entrepreneur profiles, comparative analysis, questionnaire, general characteristics, distinctive characteristics, Poland, Ukraine

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Introduction

Unlocking the significant potential of interstate cooperation between Poland and Ukraine is crucial for fostering comprehensive, long-term integration between the enterprises of the two countries. This necessitates the establishment of effective professional contacts between managers and, in a broader sense, entrepreneurs in Poland and Ukraine. From an academic perspective, a prerequisite for establishing these relationships is the assessment of the competencies and, in general, the profiles of entrepreneurs in both countries.

Hanifan (1916), Bourdieu (1986), Campbell, Dunnette, and Hough (1990), and Kurz and Bartram (2002) among others, have analyzed classical theoretical developments on this issue situated within its broader scientific context. Additionally, comparative empirical expert assessments of various aspects of the activities of the world's leading companies, which are regularly conducted by the international consulting agency Hofstede Insights across more than 76 countries, reveal several underexplored and contentious aspects regarding the evaluation of entrepreneurs' profiles. These issues are largely influenced by the tendency to underestimate how national business cultures and models of organizational (corporate) cultures determine the profiles of business owners in a given country. Furthermore, the limitations of methodological tools for comparative assessments and the lack of research on specific countries present additional challenges.

In the context of the author's involvement in a Polish–Ukrainian project entitled "National business cultures of Poland and Ukraine: improving the scientific and practical foundations of cooperation in European and world markets" (2020–2021), funded by the Polish National Agency for Academic Exchange and the Ministry of Education and Science of Ukraine, a methodology was developed to compare entrepreneurs' profiles from different countries. This methodology is currently undergoing state registration in Ukraine as an intellectual property asset of the research project team.

Between 2022 and 2023, the methodology was further refined within the framework of a project entitled "The Excellence Initiative – Research University" initiated by the Polish Ministry of Higher Education for Ukrainian academics. The theme of the project is "Theory and practice of comparative analysis of entrepreneurial profiles (on the example of Poland and Ukraine". Additionally, it aligns with a project from the Polish National Science Center entitled "Corporate culture in the conditions of the modern crisis: the content of transformational changes as the basis for the modification of management."

The experience gained from implementing these projects provides theoretical, methodological, and practical foundations for the assertion that conducting a comparative assessment of entrepreneurs' profiles is essential. This assessment should consider the characteristics of national business cultures and organizational (corporate) cultures of these countries.

The purpose of the article is to highlight the methodological tools developed for conducting a comparative assessment of entrepreneurs' profiles, along with the conclusions drawn from pilot surveys – a parallel survey of entrepreneurs conducted in Poland and Ukraine.

The results of comprehensive scientific and practical research in this area are of significant importance for developing the strategies and tactics of foreign economic activity for Polish and Ukrainian enterprises. These findings become even more relevant as Polish companies implement large international investment projects for the reconstruction of Ukraine after the Russian–Ukrainian war.

Materials and Methods

The practical aspects of developing the profile of entrepreneurs still require systematic research. The general theoretical foundations for this research are rooted in the theory of social capital established by Hanifan (1916) and Bourdieu (1986). Currently, there is no well-established definition of the term "entrepreneur profile". In the late 1980s and early 1990s, Campbell, Dunnette, and Hough (1990) introduced the concept of "specialist competence" as a central component. Subsequently, Kurz and Bartram (2002) argued for the need to consider potential opportunities when characterizing profiles, highlighting the need to reflect the operational conditions faced by business managers as well as the results they achieve.

In a more general context, many valuable insights into this issue can be found in the foundational works of Hofstede (1980; Minkov and Hofstede 2014), Hampden-Turner and Trompenaars (1995; 2011), Lewis (1999), and Rapaille (2004). These studies, which analyze national business cultures and organizational (corporate) cultures, became the basis for the emergence and development of economic comparative studies.

Such research usually focuses on understanding the activities of entrepreneurs in areas such as organization, planning, and management; conflict resolution in business; as well as building effective communication strategies both with the far external environment and the near external business environment. Research in this field is typical for adherents of both Western (Anglo-Saxon) (Armstrong 2011; *Culture Clash*… 2011) and Eastern (Japanese) management (Ouchi 1981; Ravasi and Schultz 2006).

A comprehensive analysis of theoretical and applied developments on this topic reveals two fundamental issues. First, contemporary economic comparative studies often examine entrepreneurs' profiles within the context of organizational (corporate) cultures, neglecting the broader influence of national business cultures. Second, the initial message of Campbell, Dunnette, and Hough (1990) regarding a competency-based approach is not fully adhered to. This approach advocates for identifying competencies (skills and qualities) that are universally applicable and shared across different business cultures (Campbell, Dunnette, and Hough 1990).

To overcome these shortcomings, other research has studied in depth the competency component of the profiles of Polish and Ukrainian entrepreneurs (Glinkowska and Chebotarov 2018; Glinkowska, Chebotarov, and Chebotarov 2018). The theoretical and methodological basis for the development of the analysis is based on the substantiated epistemological triad of "national business culture", "organizational (corporate) culture", and "entrepreneur profile"

(Glinkowska-Krauze, Kaczmarek, and Chebotarov 2020; Glinkowska-Krauze, Chebotarova, and Chebotarov 2023). This triad is holistic and reflects the real logic and sequence of the formation of phenomena embodied in these categories. This approach made it possible to develop a methodology for comparing the profiles of entrepreneurs (managers), to conduct appropriate parallel surveys in Poland and Ukraine (Chebotarov and Chebotarov 2021; Glinkowska-Krauze et al. 2022), and to investigate the evolution of cross-cultural marketing management in the context of the information economy (Czapla et al. 2023b).

The economic and statistical foundations for comparing the profiles of Polish and Ukrainian entrepreneurs were laid by Aczel and Sounderpardian (2005), well-known mathematical scholars. Their works represent the most well-known approach to mathematically interpreting general and specific characteristics of economic processes.

Based on a detailed analysis of the advantages and disadvantages of previous research on this topic, we refine the research methodology. This refinement was informed by the insights gained from a pilot study of entrepreneurs in Poland and Ukraine. The primary goal of the study was to develop and test a preliminary methodology for surveying entrepreneurs, collecting empirical material and best practices for in-depth face-to-face interviews. The study formed the basis for the development of a broad (mass) survey of not only entrepreneurs but also members of the expert community and organizations involved in regulating economic activity.

In the first stage of the research (which aims to establish a theoretical and methodological framework), benchmarking the profiles of entrepreneurs, we defined the concept of the "entrepreneur profile" based on the competence-based paradigm developed by Campbell, Dunnette, and Hough (1990) and Kurz and Bartram (2002). Given the interdisciplinary and intercultural content of our study, we employed the methodology developed by Glinkowska-Krauze et al. (2023), which has already been used to study the epistemological triad mentioned earlier. This first stage primarily used general academic methods such as analysis, synthesis, induction, deduction, comparison, and generalization.

Before presenting the second stage of the research – the results of the survey of Polish and Ukrainian entrepreneurs we provide a detailed explanation of the research sample and the changes introduced. Our research adhered to the generally accepted methodology for conducting economic, social, and statistical studies while also addressing the well-known methodological critiques of Hofstede (1980; Minkov and Hofstede 2014) and Hampden-Turner and Trompenaars (1995; 2011) regarding the lack of information about respondent characteristics in their studies. Therefore, in order to confirm the feasibility and transparency of our pilot studies, we provide detailed information on the sample size by firm size (Table 1), the sample size by economic sector (Table 2), and the structure of the respondents by gender (Table 3).

This approach preserves the methodological integrity of the research and ensures that the aggregate macro-factors of the contemporary economy are thoroughly considered in the presented material. On the one hand, the analysis includes not only large enterprises, as in the studies of Hofstede and Trompenaars, but also small and medium-sized enterprises. On the other hand, in sectoral terms, the respondents represent all major sectors of the economy: manufacturing;

trade, finance, and financial intermediation; the service sector and the IT sector, with roughly equal quantitative shares in the surveys for both countries.

A survey and interview questionnaires were used as the research tool. Lewis (1999) emphasized the effectiveness of using interviews to analyze economic comparative issues. In our pilot study, most survey questionnaires were administered directly within the enterprises, allowing for data collection in their natural environment. This approach was logically complemented by the focus group method; Rapaille (2004) noted the high value of using this method in research contexts.

To ensure the representativeness of the research sample, the regional characteristics of the two countries, specifically the macro-regions adopted for the research, were also considered. In Poland, entrepreneurs from the Łódzkie (central region), Lubelskie (in the east of the country), Pomorskie (in the north), Wrocławskie (in the west) and Małopolskie (in the south) voivodships were interviewed. In Ukraine, entrepreneurs were surveyed in the Poltava region (in the center of the country), parts of the Luhansk and Donetsk regions (in the east of the country), the Kyiv region (in the north), the Lviv region (in the west) and the Odesa region (in the south), all of which were not occupied at the time of the survey.

Additionally, the initial part of the survey questionnaires included a question about the respondents' nationality, nationality and religion, with respondents voluntarily answering the question about their religious affiliation.

The implementation of the project involved surveying entrepreneurs using two specially developed survey questionnaires. The first questionnaire, entitled "Test (pilot) analysis of entrepreneurs with their self-assessment of national business cultures, organizational (corporate) cultures, and profiles of entrepreneurs in their countries," contained 18 general questions aimed at collecting background material and was open-ended in nature. The second questionnaire, entitled "Analysis and evaluation of national business cultures, organizational (corporate) cultures and entrepreneurial profiles," was structured as a closed questionnaire. It comprised 21 questions on specific managerial and organizational aspects of their business activity. The respondents were asked to select one of three provided answers. A total of 684 respondents in Poland and 561 respondents in Ukraine were surveyed.

To give an overview and visual presentation of the results of the pilot study, nine questions were selected from the two questionnaires that directly related to the essence of the entrepreneurs' profiles. The answers to these questions formed the basis for the economic, social, and statistical analysis. The answers to the other questions, which were related to the institutional aspects of entrepreneurship in both countries, their national business and organizational (corporate) cultures, served as a general basis for analyzing various aspects of management and organizational aspects of business activity.

The approach outlined above for justifying our research sample provides a strong theoretical, methodological and practical basis for concluding that this sample is highly representative and the results can be extrapolated to the general population of entrepreneurs in Poland and Ukraine.

To analyze the similarities and differences in the characteristics (competencies, traits, and qualities) of Polish and Ukrainian entrepreneurs, we employed the chi-square independence test at a significance level of 0.05. This widely used statistical test guarantees the reliability and representativeness of our pilot study's findings.

Results

The theoretical and methodological considerations in this paper, based on empirical research related to the "national business culture", "organizational culture", and "entrepreneurial profile" triad mentioned above, allowed us to define these concepts clearly. According to Glinkowska-Krauze, the profile of an entrepreneur is, in general terms, a set of professional, psychological and physical competencies that an entrepreneur-manager must possess to fulfill his professional duties (Glinkowska-Krauze et al. 2023).

That definition not only encapsulates the content of the competency approach to the issue of the entrepreneur profile, but it also provides the rationale for conducting comparative academic and practical research. Such research primarily involves justifying the selection of a survey sample from which results can be extrapolated and inferences made with a sufficiently high degree of reliability concerning the general population of entrepreneurs in a given country. This approach was implemented in this paper. Factors that characterize the business environment of these countries are presented in Tables 1, 2 and 3.

Table 1. Research sample size by company size

Questionnaire 1	Poland	Ukraine
SME sector	194	303
Large enterprises	88	84
Total:	282	387

Source: own elaboration.

Sample sizes by sector are summarized in Table 2.

Table 2. Survey sample sizes by sector

Questionnaire 1	Poland	Ukraine
Production	48	125
Trade, finance, brokerage	123	138
Industry and services	99	90
IT	12	34
Total:	282	387

Source: own elaboration.

As can be seen from the data in Table 2, the survey respondents were entrepreneurs representing all areas of the national economies of Poland and Ukraine, including manufacturing, trade, the financial sector and brokerage, services, and IT. The number of respondents who participated is also comparable, both for each country as a whole and within each specific group.

Sample size by gender is summarized in Table 3.

Table 3. Structure of respondents by gender

Questionnaire 1	Poland	Ukraine
Women	143	88
Men	139	299
Total:	282	387

Source: own elaboration.

Table 4. Results of the survey based on questionnaire 1, for manufacturing enterprises in Poland and Ukraine

Statement		% indications		Chi-Square Test Value	p-value
		Production			
		Poland	Ukraine		
1	Transparent planning, organization, and control in the company	16.7	24.0	1.088	0.297
2	Complex business hierarchy and fuzzy functions at different levels of management	18.8	78.4	52.299	<0.001
3	Predominantly autocratic management style	18.8	80.8	57.670	<0.001
4	Predominantly nonstandard approach to management	20.8	67.2	30.051	<0.001
5	Predisposition to reasonable compromise and mutual concessions	12.5	71.2	48.268	<0.001
6	Discomfort with uncertain situations and a desire to avoid risk by any means possible	18.8	28.8	1.820	0.177
7	Willingness to achieve longterm goals, "working for the future"	12.5	84.0	77.107	<0.001
8	Strict adherence by managers to job duties and contracts	14.6	27.2	3.053	0.081
9	Influence of emotional factors on business communication and commercial negotiations	12.5	40.8	12.573	<0.001

Notes: Differences between Poland and Ukraine were assessed on the basis of the Chi-Square test of independence of variables, with significance set at the 0.05 level.
Source: own elaboration.

Regarding manufacturing companies, owners from Ukraine (78.4%) report complex business hierarchies and blurred functions at different levels of management significantly more often than their Polish counterparts (18.8%) (chi2 (1, 669) = 52.299, $p < 0.001$). Additionally, a "predominantly autocratic management style" was significantly more frequently indicated by Ukrainian respondents (80.8%) than Polish respondents (18.8%), also showing a significant statistical difference (chi2 (1, 669) = 57.670, $p < 0.001$).

The Ukrainian respondents (67.2%) were significantly more likely than the Polish respondents (20.8%) to indicate the presence of predominantly non-standard management approaches (chi2 (1, 669) = 30.051, p < 0.001). Furthermore, the "Willingness to make reasonable compromises and mutual concessions" was significantly more often indicated by Ukrainian respondents (71.2%) than by Polish respondents (12.5%) (chi2 (1, 669) = 48.268, p < 0.001). Willingness to achieve long-term goals by "working for the future" was significantly more often indicated in Ukraine (84.0%) than in Poland (12.5%) (chi2 (1, 669) = 77.107, p < 0.001). Influence of emotional factors on business communication and commercial negotiations was indicated significantly more often in Ukraine (40.8%) than in Poland (12.5%) (chi2 (1, 669) = 12.573, p < 0.001).

Table 5. Results of the survey based on questionnaire 1 for commercial, financial, and intermediary enterprises in Poland and Ukraine

Statement		% indications		Chi-Square Test Value	p-value
		Trade, finance, brokerage			
		Poland	Ukraine		
1	Transparent planning, organization and control in the company	44.7	20.3	17.890	<0.001
2	Complex business hierarchy and fuzzy functions at different levels of management	43.1	83.3	45.923	<0.001
3	Predominantly autocratic management style	46.3	58.7	3.984	0.046
4	Predominantly nonstandard approach to management	29.3	73.9	52.021	<0.001
5	Predisposition to reasonable compromise and mutual concessions	50.4	87.0	41.162	<0.001
6	Discomfort with uncertain situations and a desire to avoid risk by any means possible	44.7	21.0	16.738	<0.001
7	Willingness to achieve longterm goals, "working for the future"	48.0	34.1	5.217	0.022
8	Strict adherence by managers to job duties and contracts	40.7	21.0	11.880	<0.001
9	Influence of emotional factors on business communication and commercial negotiations	48.0	47.1	0.020	0.889

Notes: Differences between Poland and Ukraine were assessed on the basis of the Chi-Square test of independence of variables, with significance set at the 0.05 level.
Source: own elaboration.

Table 6. Results of the survey based on questionnaire 1 for service-type enterprises in Poland and Ukraine

Statement		% indications		Chi-Square Test Value	p-value
		Service industry			
		Poland	Ukraine		
1	Transparent planning, organization and control in the company	36.4	25.6	2.565	0.109
2	Complex business hierarchy and fuzzy functions at different levels of management	33.3	62.2	15.791	<0.001

Statement		% indications		Chi-Square Test Value	p-value
		Service industry			
		Poland	Ukraine		
3	Predominantly autocratic management style	28.3	72.2	36.416	<0.001
4	Predominantly nonstandard approach to management	47.5	76.7	16.947	<0.001
5	Predisposition to reasonable compromise and mutual concessions	33.3	81.1	43.693	<0.001
6	Discomfort with uncertain situations and a desire to avoid risk by any means possible	32.3	48.9	5.381	0.020
7	Willingness to achieve longterm goals, "working for the future"	36.4	66.7	17.320	<0.001
8	Strict adherence by managers to job duties and contracts	38.4	24.4	4.228	0.040
9	Influence of emotional factors on business communication and commercial negotiations	33.3	52.2	6.890	0.009

Notes: Differences between Poland and Ukraine were assessed on the basis of the Chi-Square test of independence of variables, with significance set at the 0.05 level.
Source: own elaboration.

For service industry companies, Ukrainian respondents (62.2%) indicated complex business hierarchies and blurred functions at different levels of management significantly more often than Polish respondents (33.3%) (chi2 (1, 669) = 15.791, $p < 0.001$). A predominantly autocratic management style is significantly more common in Ukraine (72.2%) than in Poland (28.3%) (chi2 (1, 669) = 36.416, $p < 0.001$). The respondents from Ukraine (76.6%) significantly more frequently indicated a predominantly non-standard approach to management than those from Poland (47.5%) (chi2 (1, 669) = 16.947, $p < 0.001$). Additionally, Ukrainian respondents (81.1%) were more likely than Polish respondents (33.3%) to report a predisposition to reasonable compromise and mutual concessions (chi2 (1, 669) = 43.693, $p < 0.001$).

The situation is similar regarding discomfort in uncertain situations and the desire to avoid risks. Ukrainians (48.9%) indicated this factor significantly more frequently than Poles (32.3%) (chi2 (1, 669) = 5.381, $p = 0.020$). The inclination to achieve long-term goals through "working for the future" was significantly more frequently indicated by Ukrainians (66.7%) than Poles (36.4%) (chi2 (1, 669) = 17.320, $p < 0.001$). Conversely, Polish respondents (38.4%) indicated significantly more frequently than Ukrainian respondents (24.4%) that managers strictly perform their duties and contracts (chi2 (1, 669) = 4.228, $p = 0.040$). Respondents from Ukraine (52.2%) indicate the influence of emotional factors on business communication and commercial negotiations significantly more frequently than from Poland (33.3%) chi2 (1, 669) = 6.890, $p = 0.009$.

Table 7. Results of the survey based on questionnaire 1 with reference to IT companies in Poland and Ukraine

	Statement	% indications		Chi-Square Test Value	p-value
		Information Technology (IT)			
		Poland	Ukraine		
1	Transparent planning, organization and control in the company	16.7	52.9	4.749	0.029
2	Complex business hierarchy and fuzzy functions at different levels of management	58.3	50.0	0.247	0.619
3	Predominantly autocratic management style	75.0	38.2	4.804	0.028
4	Predominantly nonstandard approach to management	8.3	70.6	13.855	<0.001
5	Predisposition to reasonable compromise and mutual concessions	25.0	70.6	7.603	0.006
6	Discomfort with uncertain situations and a desire to avoid risk by any means possible	50.0	17.6	4.815	0.028
7	Willingness to achieve longterm goals, "working for the future"	16.7	47.1	3.440	0.064
8	Strict adherence by managers to job duties and contracts	41.7	29.4	0.606	0.436
9	Influence of emotional factors on business communication and commercial negotiations	75.0	20.6	11.576	<0.001

Notes: Differences between Poland and Ukraine were assessed on the basis of the Chi-Square test of independence of variables, with significance set at the 0.05 level.
Source: own elaboration.

Analysis of IT entrepreneurs showed that Ukrainian respondents (52.9%) indicated significantly more transparent planning, organization, and control in the company than the Polish respondents (16.7%) (chi2 (1, 669) = 4.749, p = 0.029). In contrast, Poles (75.0%) significantly more frequently indicated a predominantly autocratic management style than Ukrainians (38.2%) (chi2 (1, 669) = 4.804, p = 0.028). A predominantly non-standard approach to management was significantly more frequently indicated by Ukrainians (70.6%) than Poles (8.3%) (chi2 (1, 669) = 13.855, p < 0.001). A similar relationship was also observed for the predisposition to reasonable compromise and mutual concessions – this factor was significantly more frequently indicated by the Ukrainian respondents (70.6%) than by the Poles (25.0%) (chi2 (1, 669) = 7.603, p = 0.006). In the case of discomfort in uncertain situations and the desire to avoid risks, the Polish respondents (50.0%) indicated this factor significantly more frequently than their Ukrainian counterparts (17.6%) (chi2 (1, 669) = 4.815, p = 0.028). Finally, as for the influence of emotional factors on business communication and commercial negotiations, the Polish entrepreneurs (75.0%) indicated this factor significantly more frequently than the Ukrainians (20.6%) chi2 (1, 669) = 11.576, p < 0.001.

A generalized conclusion drawn from the results of the pilot study of entrepreneurs in the four sectors of the national economies of Poland and Ukraine, based on the theoretical and methodological foundation for the comparative analysis of entrepreneurial "profiles", can be formulated as follows.

There is every epistemological reason to conclude that the answers given by the respondents in Poland and Ukraine, as well as the conclusions drawn from the analysis of the survey results, can be extrapolated with a high degree of reliability to the general population of entrepreneurs in each country. The research established both a theoretical and empirical basis for the respective comparative assessments of the "profiles" of entrepreneurs in Poland and Ukraine.

The qualitative characteristics of these profiles accurately reflect the responses of respondents from the production sectors of both countries. The differences in the responses of respondents from those in the service and intermediary sectors, when compared to the characteristics of entrepreneurs from the production sectors, do not qualify as significant. The relatively large differences in the responses from entrepreneurs in the IT sector compared to those from the manufacturing, services, and intermediary sectors (which were noted in both countries). These differences can be explained by the inherent characteristics of the information economy and the ongoing evolution of business practices in this area, which is characteristic of all countries in the world.

Discussion

While our findings show that the role of the 'Family'-type model of organizational culture by Hampden-Turner and Trompenaars is the most characteristic and dominant in both countries, they contradict Hofstede Insights' conclusions about the proximity of the national business cultures of Poland and Ukraine. This discrepancy can be attributed to Hofstede Insights' focus on expert assessments, as their detailed research focuses on the most developed countries or is commissioned by leading global corporations. Nonetheless, the conclusion about the proximity of the national business cultures of Poland and Ukraine aligns with those of Lewis, who foresaw the growing role of Central and Eastern European countries and reflected this in his well-known triangle, as discussed by Czapla et al. (2023a).

A number of underexplored and contentious aspects of comparative economic studies, particularly those analyzing the "profiles" of entrepreneurs in different countries, pose significant challenges to developing relevant practical recommendations. Future research in this area could expand to include a broader context, including entrepreneurs and managers not only in Poland and Ukraine but also in other countries in the Eastern European sub-region, for example, Slovakia, Lithuania, Latvia, and Estonia.

Conclusions

Comparing the results of surveys conducted simultaneously among entrepreneurs in Poland and Ukraine provides a basis for generalized conclusions about the characteristics of the "profiles" of entrepreneurs in the two countries. They are characterized by both stable common traits and several important distinguishing features, which form the core purpose of this research. The identified most significant common characteristics can be summarized as follows:

There is a clear prevalence of collective forms in organizing and conducting business under the condition that different categories of entrepreneurs participate.

There is a tendency towards autocratic models of business building.

A strong organizational culture characterized by widely shared norms and values.

The comparative analysis of the entrepreneurial "profiles" based on the survey results provides both theoretical and methodological insights, as well as academic and practical grounds to conclude that these profiles are primarily determined by two fundamental factors: the similarity in national business cultures and the essence of the "Family" model as the most typical organizational (corporate) cultures of both countries.

The differences mainly concern the following characteristics:

Polish entrepreneurs are comfortable operating in the absence of a high power distance and transparency of the business environment, both internally and externally.

Ukrainian entrepreneurs typically exhibit a relatively high level of masculinity and uncompromising attitudes in organizing and implementing their business activities.

There is a clear focus among Ukrainian entrepreneurs on achieving commercial interests in the short to medium term.

Based on these commonalities and differences, it is advisable to approach the formation of management teams for developing and implementing large joint Polish-Ukrainian projects with these insights in mind. This includes joint business activities within the framework of trans-border cooperation between border voivodeships and regions of Poland and Ukraine, which also remains outside the "field of vision" of most researchers.

As a result, several key recommendations and proposals for business structures in both countries emerge, representing a new added value of the research. For example, in the implementation of joint, inter-state, large-scale infrastructure projects, ceteris paribus, it makes sense to appoint Polish experts to senior positions in finance and management roles. However, with regard to technical-technological and engineering aspects, Ukrainian specialists would hold an advantageous position, ceteris paribus. Subsequently, it would be beneficial to entrust the development and direct marketing support for infrastructure projects mainly to Ukrainian specialists. Meanwhile, Polish experts would be better able to develop and implement PR policies that support such projects.

Joint Polish–Ukrainian business formations assembled on such a basis will objectively have some competitive advantages in the predicted reconfiguration of the international division of labor. This shift, which will be particularly evident on the European continent, will arise as a result of geopolitical changes and the new configuration of energy resource markets and supply chains and transport and logistics services.

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Analiza porównawcza profili przedsiębiorców w Polsce i Ukrainie: narzędzia metodologiczne i doświadczenia badań pilotażowych

Celem artykułu jest przedstawienie wyników równoległego badania przedsiębiorców w Polsce i Ukrainie, mającego na celu identyfikację i określenie miary ich wspólnych i odrębnych cech. Głównymi metodami badawczymi, z pomocniczym wykorzystaniem ogólnych metod naukowych jedności analizy i syntezy, jedności indukcji i dedukcji, jedności logicznej i historycznej oraz zasady konkretności prawdy, są: metoda kwestionariuszowa, metoda analizy porównawczej z wykorzystaniem testu niezależności chi-kwadrat, dopuszczająca poziom istotności 0,05, oraz metoda grup fokusowych. Przeprowadzona porównawcza analiza ilościowa profili polskich i ukraińskich przedsiębiorców stanowi wkład i wartość dodaną do rozwoju tego problemu naukowego i praktycznego. Podejścia, metody i wnioski z takiej analizy, wraz z wykorzystaniem uzasadnionej epistemologicznej triady „narodowych kultur biznesowych" – „kultur organizacyjnych (korporacyjnych)" – „profili przedsiębiorców", pozwalają na skuteczniejsze wykorzystanie zalet przedsiębiorców w Polsce i Ukrainie, a także na minimalizowanie konsekwencji istotnych słabości, które są takie same dla przedsiębiorców wszystkich krajów, w ramach realizacji wspólnych projektów inwestycyjnych w kontekście wyzwań geopolitycznych i transformacji paneuropejskich rynków dóbr i usług.

Słowa kluczowe: profile przedsiębiorców, analiza porównawcza, kwestionariusz, ogólna charakterystyka, cechy charakterystyczne, Polska, Ukraina

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Optimal Shares of NFT, DeFi and Bitcoin on Czech, Hungarian, and Polish Equity Markets

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Abstract

The purpose of the paper is to present the results of the research on the potential inclusion of different types of crypto assets, such as Bitcoin, NFTs (Non-Fungible Tokens), and DeFi (Decentralised Finance), within optimal portfolios to help reduce variance or increase returns compared to equity investments. The analysis includes comparisons of different crypto assets and countries, specifically the Czech Republic, Hungary, and Poland.

The author constructs optimal equity-crypto portfolios in the Markowitz environment for the period from 16 February 2021 to 8 January 2024, which was adjusted to NFT data availability from this date. Calculations are conducted under two scenarios: minimizing portfolio variance and maximizing returns.

The research demonstrates that Bitcoin, NFTs and DeFi can be part of a well-diversified equity portfolio, primarily due to their low correlation with equity markets in the Czech Republic, Hungary and Poland.

The paper is important for investors seeking diversification possibilities. Although diversification has been increasingly difficult recently due to increasing correlation coefficients between assets, new asset classes, such as crypto assets, have been created, offering new potential for portfolio creation. The conclusions drawn may also be vital for policymakers who should consider them when formulating regulations concerning systematic risk.

The paper contributes value in four aspects. 1) The paper demonstrates that including NFTs, DeFi and Bitcoin in a stock portfolio creates diversification benefits for most portfolios. This is partially due to their slightly higher returns but mostly because of the lower risk that results from the low correlation of crypto assets with traditional markets. 2) Optimal shares of crypto assets differ depending on the equity and the crypto involved. 3) The paper considers Czech, Hungarian, and Polish markets while existing papers concentrate mostly on the American market. 4) The paper shows that there are minimal connections between the Czech, Hungarian, and Polish equity markets and crypto assets.

Keywords: NFT, DeFi, Bitcoin, optimization, diversification, Czech Republic, Poland, Hungary

JEL: C1, F3, G1

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Introduction

There are numerous papers devoted to portfolio diversification through different optimization methods. Most authors concentrate on the United States (e.g., Ma et al. 2020; Aliu, Bajra, and Preniqi 2022, p. 452; Osman et al. 2023; Youssef et al. 2023; Houda et al. 2024), Eurozone countries (e.g., Poljašević and Grujić 2022) Gulf and BRICs markets (Bejaoui et al. 2023) the Indian market (e.g., Aggarwal, Santosh, and Bedi 2018) and Middle East markets (e.g., Kumaran 2022). They often neglect Poland, the Czech Republic, and Hungary. Therefore, this paper addresses these countries for portfolio construction with crypto assets.

Recent events such as the COVID-19 pandemic, the Russia–Ukraine war, and rising energy costs have increased connections between markets and made it more difficult to hedge against risk (Aharon and Demir 2022; Maitra et al. 2022; Kumar et al. 2023; Ugolini, Reboredo, and Mensi 2023). Consequently, there is a greater demand for assets that can help create diversified portfolios. Baur, Hong, and Lee (2018) highlighted Bitcoin's low correlation with traditional markets and noted its popularity as a financial instrument often applied as a speculative asset rather than as a means of exchange. This raises the question of whether it can be part of a well-diversified portfolio. Polat (2023) noticed that both NFTs (Non-Fungible Tokens) and DeFi (Decentralised Finance) have totally different risk-return parameters than traditional assets, which suggests that these assets could be used in the optimization of traditional portfolios.

The purpose of the paper is to present the results of research on the potential inclusion of different types of crypto assets, such as Bitcoin, NFTs, and DeFi, within optimal portfolios to reduce variance or increase returns compared to equity investments. The author investigates whether these crypto assets can behave as portfolio diversifiers, specifically assessing their ability to increase returns or decrease risk in a stock portfolio. The hypothesis posits that these crypto assets can be used as part of well-diversified portfolios both as risk reducers and return intensifiers. Additionally, the research reveals minimal connections between Czech, Hungarian and Polish equity markets and crypto assets. The conclusions align with Damianov and Elsayed (2020), who showed that while including cryptos in equity portfolios is beneficial, it should be done cautiously. However, the conclusions contrast with Osman et al. (2023), who argued that Markowitz investors should not use equity when they can invest in cryptos.

Literature review

Many papers highlight the high risks connected with crypto assets. Kajtazi and Moro (2019) noted that while Bitcoin can improve portfolio results thanks to increased returns, it does not contribute to risk reduction. They also note its speculative nature. Aliu et al. (2020) further underscore the high risk of cryptocurrencies compared to equities. Corbet, Lucey, and Yarovaya (2018) demonstrated that Bitcoin exhibits bubble-like behavior. Smales (2022) points out that both higher returns and higher risk attract investors to the cryptocurrency market.

Some researchers argue that cryptocurrencies, NFTs and DeFis can be used to construct optimally diversified portfolios. Ma et al. (2020) performed stock portfolio optimization using stocks from five companies from the American market within the Markowitz framework and five cryptocurrencies. They concluded that crypto assets reduce risk and increase returns for the portfolio. Aliu et al. (2020) showed equity diversification benefits for some developed European countries. Khaki et al. (2023) used the mean-variance optimization technique as well as higher central moments to show that cryptocurrencies may give some risk diversification advantages for traditional assets.

Aliu, Bajra, and Preniqi (2022) suggested constructing stock-crypto portfolios in the US market to achieve a better return than for stocks and a lower risk than for crypto, operating within Markowitz's theory. Ko et al. (2022) showed that NFTs offer a stock portfolio diversification within a Markowitz context. Houda et al. (2024) used a DCC-GARCH model to assess the potential of applying NFTs in American stock portfolios for diversification benefits. They concluded that it is worth considering NFTs in stock portfolios to gain diversification advantages. Sharma, Rawat, and Kaur (2022) indicated that cryptocurrencies can minimize investment risk in stocks due to negative correlations between these markets. This paper finds low correlations between stock markets and crypto assets, and some are negative. This suggests that cryptocurrencies can be employed in portfolio diversification as risk minimizers.

Ali, Umar, and Gubareva (2024) asserted that investors may use NFTs to diversify American stock portfolios. This paper extends this analysis to include DeFi and Bitcoin across different equity markets. Aharon and Demir (2022) noted that NFTs are independent of equities, suggesting that they may serve as effective optimizing assets. Youssef et al. (2023) showed that adding cryptocurrencies helps improve portfolio parameters, especially for investors who are not risk averse; however, their research was for American equity only. This paper demonstrates that for equities from the Czech Republic, Hungary, and Poland, the same rule applies.

Poljašević and Grujić (2022) showed that the Markowitz model has many virtues, allowing for the creation of optimal portfolios based on historical returns using equity from eurozone countries and Bitcoin. Aggarwal, Santosh, and Bedi (2018) showed that Bitcoin can be used to optimize portfolios in the Indian equity market, while Kumaran (2022) showed that cryptocurrencies can be used as portfolio diversifiers and give a higher return for Middle Eastern stock markets. Damianov and Elsayed (2020) showed that although Bitcoin's correlation with traditional assets (global industry sectors) is close to zero, its higher returns are accompanied by high volatility. They suggest that the optimal share of Bitcoin in a minimum variance portfolio is only 1% only, and conclude that the real share of Bitcoin in a portfolio depends on the investor's views on the future of crypto assets.

The literature frequently mentions low or no correlation between crypto and equity markets. For example, Baur, Hong, and Lee (2018) showed that Bitcoin is uncorrelated with stocks, even during periods of financial turmoil. Lee, Guo, and Wang (2018) highlight the low correlation of cryptocurrencies with the S&P 500 index, while Borri (2019) also confirmed the low correlation of cryptocurrencies with traditional markets.

Bejaoui et al. (2023) established that there are some connections between Gulf and BRICS stock markets and cryptocurrencies, including NFTs and DeFi. They also found similar but weak connections for Poland, the Czech Republic and Hungary regarding crypto assets. However, their study did not construct diversified portfolios as this paper does.

Other studies indicate that the correlation tends to rise during specific market situations. For example, Yousaf, Jareño, and Tolentino (2023) showed that the connectedness between DeFi assets and the American equity market increased during the COVID-19 pandemic. Similarly, Xia, Li, and Fu (2022) pointed out that NFTs are more linked to traditional assets during extreme market conditions.

Methodology

This paper constructs optimal equity-crypto asset portfolios within the Markowitz framework. Each index (PX – the index of major stocks from the Prague Stock Exchange, BUX – the index of blue chip stocks from the Budapest Stock Exchange and WIG20 – the index of 20 biggest companies from the Warsaw Stock Exchange) – see Chart 1) is diversified with each crypto asset (Bitcoin, NFT Index, DeFi Pulse Index – see Charts 2, 3, and 4). Optimization employs both variance minimization and return maximization. The results do not change even when short selling is not permitted; however, this restriction does not apply to NFTs or DeFis.

The research period spans from 16 February 2021 to 8 January 2024, which aligns with the availability of NFT data. Daily data are used, with NFT and Bitcoin data extracted from www.coinmarketcap.com, DeFi Pulse data from www.coincodex.com, and stock quotations from www.stooq.com. The WIG20 index was downloaded in USDs, while the PX and BUX indices were downloaded in local currencies and recalculated into USDs using currency rates from www.stooq.com.

Before the optimization procedure, logarithmic returns and descriptive statistics were calculated. All calculations were conducted in American dollars, so the conclusions show the American perspective. Including the currency rate risk may alter these findings.

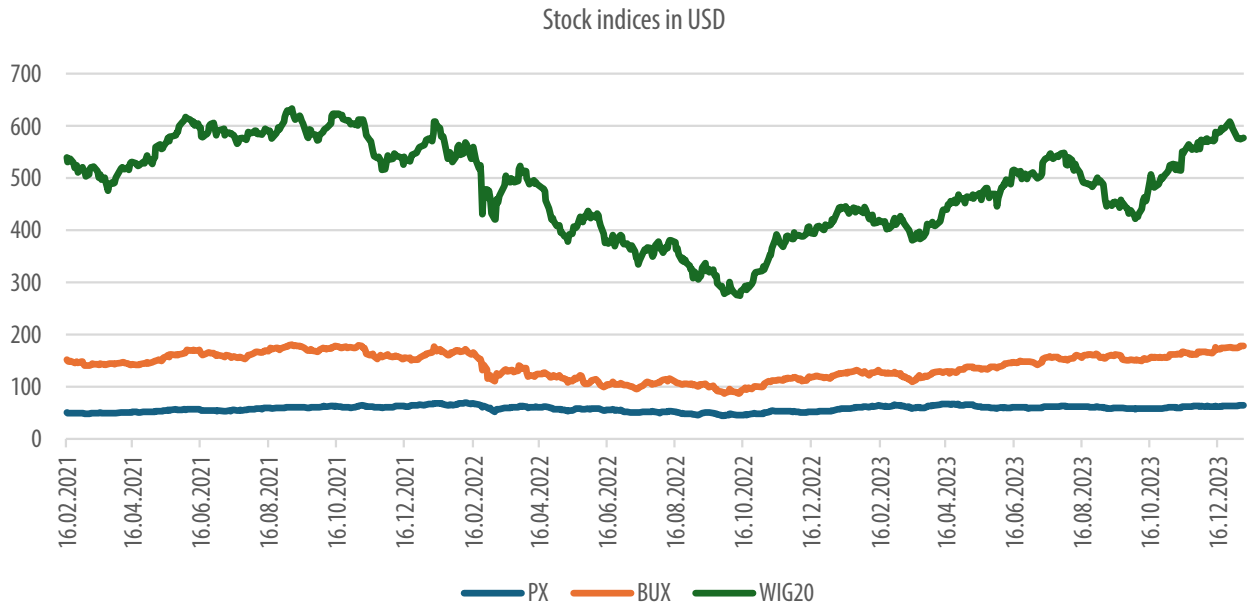

Chart 1. PX, BUX, and WIG20 daily quotations in USD from 16 February 2021 to 8 January 2024

Source: author's own analysis based on data from Stooq n.d.

Chart 2. Bitcoin daily quotations from 16 February 2021 to 8 January 2024

Source: author's own analysis based on data from CoinMarketCap n.d.

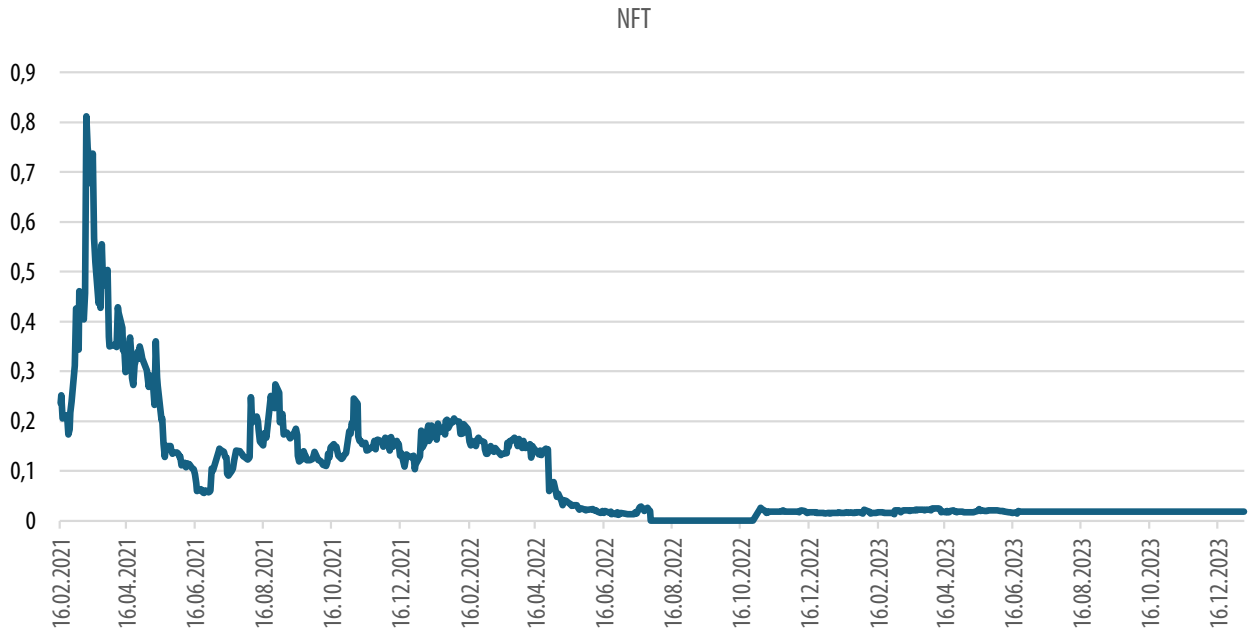

Chart 3. NFT Index daily quotations from 16 February 2021 to 8 January 2024

Source: author's own analysis based on the data from CoinMarketCap n.d.

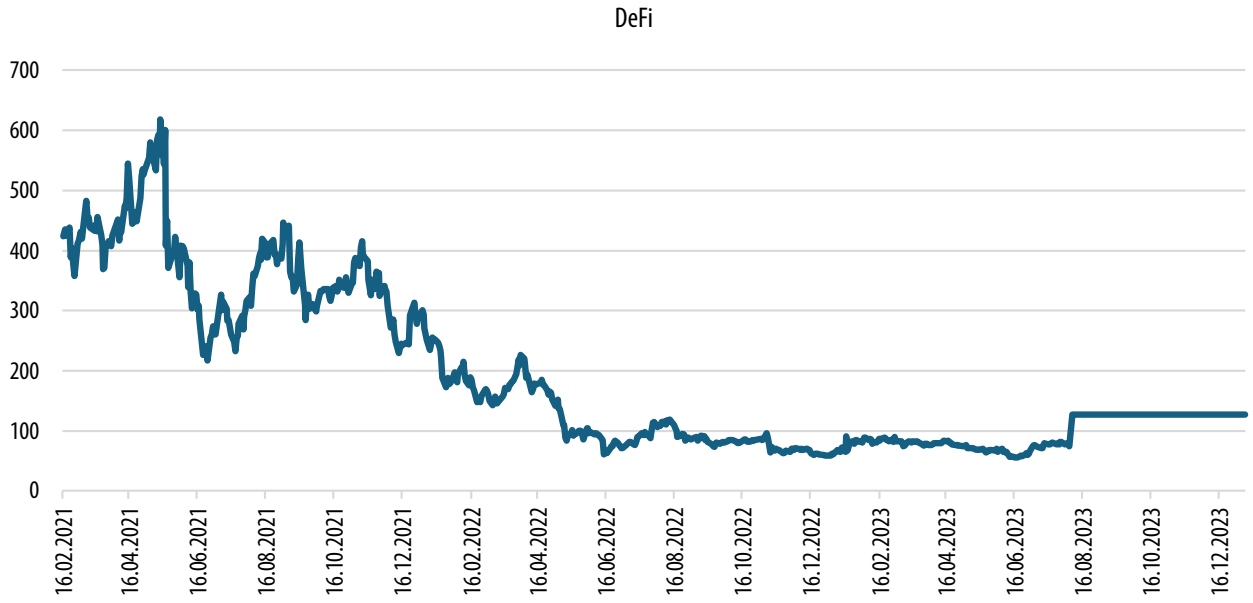

Chart 4. DeFi Pulse Index daily quotations from 16 February 2021 to 8 January 2024

Source: author's own analysis based on data from CoinCodex n.d.

Following Aliu et al. (2020), Ma et al. (2020), and Osman et al. (2023), the well-known Markowitz theory (Markowitz 1952) is applied for optimization. This theory serves as the foundation for the classical theory of finance. It assumes that investors are risk-averse, meaning that at a given risk level, they will choose higher returns, while at a specific level of return, they will choose lower risk.

Logarithmic returns are calculated with the following formula:

$$R_t = \ln(q_t) - ln(q_{t-1}), \tag{1}$$

where:
q_t – asset quotations at time t,
q_{t-1} – asset quotations at time t – 1.

Pearson correlation coefficients (ρ) are calculated, and the significance of these coefficients is tested by setting the following null hypothesis:

$H_0 : \rho = 0$ – the correlation coefficient is not statistically significant.

Against the alternate hypothesis:

$H_1 : \rho \neq 0$ – the correlation coefficient is statistically significant.

The test statistic is:

$$t = \frac{\rho\sqrt{n-2}}{\sqrt{1-\rho^2}}, \tag{2}$$

where:
n – sample size,
n – 2 – degrees of freedom.

The applied significance level is set at 5%.

Two optimization procedures follow the following rules:

1. The purpose is to minimize variance under the following assumptions:
   - $s_1 + s_2 = 1$, where s_1 and s_2 are optimal shares of equity and crypto assets, respectively;
   - $R_p \geq R_{\text{avindex}}$, where R_p represents portfolio return, and R_{avindex} denotes the average return index during the examined period.
2. The purpose is to maximize returns under the following assumptions:
   - $s_1 + s_2 = 1$, where s_1 and s_2 are optimal shares of equity and crypto assets, respectively;
   - $V_p \leq V_{\text{avindex}}$, where V_p is the portfolio variance, and V_{avindex} is the average index variance during the examined period.

Optimization goals for both procedures are achieved by adjusting the portfolio shares of equity and crypto assets. The assumptions are structured to allow short selling to be mathematically treated as negative shares of assets in a portfolio. However, the results show that short selling is not recommended for constructing an optimal portfolio.

Portfolio variance is calculated as in the Markowitz theory (Markowitz 1952, p. 81):

$$V_p = s_1^2 v_1 + s_2^2 v_2 + 2 s_1 s_2 \sqrt{V_1} \sqrt{V_2} \rho_{12}, \tag{3}$$

where:
v_1 – average variance on equity during the examined period,
v_2 – average variance on crypto asset in the examined period,
ρ – correlation coefficient between assets used in the portfolio construction.

Portfolio returns are weighted averages on returns on the assets that comprise it:

$$R_p = s_1 R_1 + s_2 R_2, \tag{4}$$

where R_1 and R_2 are returns on equity and crypto assets, respectively.

Research results

Preliminary research

The first stage of the research involved calculating Pearson correlation coefficients for the examined assets. Their low values indicate potential opportunities for portfolio optimization (see Table 1). PX shows positive correlations that are low and close to zero correlations with Bitcoin (0.16), NFT (0.07) and DeFi (0.18), some of which are not significant. The correlations between Bitcoin and PX and between DeFi with PX are statistically significant (p = 0.00); however, the PX correlation with NFT is not. The correlation between BUX and Bitcoin is 0.11, which is significant a p = 0.00. The correlation coefficient between BUX and DeFi is also low (0.17) but significant at p = 0.00. BUX and NFT are weakly correlated (0.01) and not significant. The WIG20 has low correlation coefficients with Bitcoin (0.21) and DeFi (0.20), both of which are statistically significant at p = 0.00. WIG20 is insignificantly correlated with NFT, similar to PX and BUX.

These results suggest that all crypto assets can serve as diversifiers for Czech, Hungarian, and Polish equity markets. Consequently, these findings are applied in the portfolio optimization in the next part of the research. All correlations between stock indices are average and significant, so they would not serve as good diversifiers compared to cryptocurrencies.

Table 1. Correlation matrix for the examined assets

	DeFi	NFT	WIG20	BTC	BUX	PX
DeFi	1					
NFT	–0.06 (0.0897)	1				
WIG20	0.20 (0.0000)	–0.03 (0.8120)	1			
BTC	0.64 (0.0000)	–0.04 (0.5610)	0.21 (0.0000)	1		
BUX	0.17 (0.0000)	0.01 (0,9907)	0.59 (0.0000)	0.11 (0.0019)	1	
PX	0.18 (0.0000)	0.07 (0,6741)	0.57 (0.0000)	0.16 (0.0000)	0.62 (0.0000)	1

Source: author's own analysis.

Table 2 presents the main descriptive statistics relevant to this research. All means for stock indexes are negative (PX is –0.04, BUX is –0.02, and WIG20 is –0.01). The average returns for crypto assets are much higher: the mean for NFT is 0.36, for DeFi, it is 0.22, and for Bitcoin, it is 0.01. This suggests that they may succeed in return maximizing the equity-crypto portfolio. Simultaneously, variances for crypto assets are much higher than for stocks. However, considering low or non-existing correlations, they might be used to minimize portfolio variance. The highest variance is for NFT (3185.59), followed by DeFi (38.45) and Bitcoin (16.02). Variances in stock markets are as follows: 3.95 for WIG20, 3.73 for BUX, and 1.66 for PX.

Skewness and kurtosis are additionally provided, although they are not used by Markowitz. However, they also provide insights into risk characteristics. Higher kurtosis indicates more extreme values, understood as being far away from the standard normal distribution. NFT and DeFi have extremely high kurtosis levels (326.46 and 15.86, respectively), followed by BUX (0.85) and Bitcoin (7.32). Interestingly, variance-based risk assessment differs slightly from kurtosis-based assessments. In the former case, all crypto assets are riskier than equity; in the latter, Bitcoin is less risky than BUX.

Regarding skewness, which measures distribution asymmetry, negative values indicate undesirable fat tails on the left side. Both NFT and DeFi exhibit negative skewness. Surprisingly, Bitcoin has a positive asymmetry (0.54), which is even higher than for PX (0.33) and WIG20 (0.31) but lower than for BUX (0.92). In summary, skewness and kurtosis do not show as high risk for Bitcoin as variance does compared to equity.

Table 2. Descriptive statistics for the examined assets

	DeFi	NFT	WIG20	BTC	BUX	PX
Mean	0.22	0.36	–0.01	0.01	–0.02	–0.04
Standard deviation	6.20	56.44	1.99	4.00	1.93	1.29
Variance	38.45	3185.59	3.95	16.02	3.73	1.66
Skewness	–0.19	–0.73	0.31	0.54	0.92	0.33
Kurtosis	15.86	326.46	9.54	7.32	10.85	7.35

Source: author's own analysis.

Portfolio optimization with the minimum variance assumption

The next step of the research is conducting portfolio optimizations. Table 3 presents results for the assumption of minimum variance. Optimized Bitcoin shares in all equity portfolios are all lower than equity shares. It stands at 5.10% for the Czech Republic, 15.94% for Hungary, and 13.54% for Poland. Such shares allow for increased portfolio returns compared to portfolios consisting solely of equities, albeit sometimes only slightly.

The goal was to achieve a lower average daily portfolio variance than for single equity, which was achieved in all cases. Variance decreased in all cases: from 1.66 to 1.62 for PX, from 3.73 to 3.27 for BUX, and from 3.95 to 3.65 for WIG20. Although variances diminished, returns did not change significantly. When Bitcoin is included in the equity portfolio, PX rises from –0.04 to –0.03, so the average daily return is less negative. BUX also rose, from –0.023 to –0.018, while the WIG20 increased from –0.01 to 0.00.

For NFT, in the PX portfolio, the optimal share is equity only. Adding NFT to PX does not increase returns but significantly reduces variance from 3185.59 to 3.72. Analogically, adding NFT to BUX reduces variance to 3.73 and only slightly increases the portfolio return. The optimal share of NFT in the BUX portfolio is 0.1. The optimal NFT share in the WIG20 portfolio is 0.23. Including NFT in the WIG20 portfolio slightly increases the return from –0.01 to 0.00 and substantially decreases the variance from 3185.59 to 3.94.

Optimal shares of DeFi are 0.50% for PX, 8.70% for BUX, and 4.03% for WIG20. Portfolio optimization with crypto assets results in a slight increase in returns, from –0.04 (PX), –0.02 (BUX) and –0.01 (WIG20) to 0.00 in all examined cases. Variance does not change for PX, but it decreases for BUX from 3.73 to 3.41 and for WIG20 from 3.95 to 3.89.

To sum up, incorporating crypto assets into equity portfolios significantly reduces variance in most cases while slightly increasing returns.

Table 3. Equity and crypto asset portfolio optimization results for the minimum variance assumption

	Czech Republic	Hungary	Poland
Bitcoin			
Bitcoin share [%]	5.10	15.94	13.54
Equity share [%]	94.90	84.06	86.45
Bitcoin average daily historical return [%]	0.01	0.01	0.01
Equity average daily historical return [%]	–0.04	–0.023	–0.01
Assumed minimum diversified portfolio return for optimization process [%]	–0.04	–0.02	–0.01
Diversified portfolio average daily return [%]	–0.03	–0.018	0.00
Bitcoin average historical variance	16.02	16.02	16.02
Equity average historical variance	1.66	3.73	3.95
Diversified portfolio variance	1.62	3.27	3.65
NFT			
NFT share [%]	0	0.10	0.23
Equity share [%]	1	99.90	99.77
NFT average daily historical return [%]	0.36	0.36	0.36
Equity average daily historical return [%]	–0.04	–0.023	–0.01
Assumed minimum diversified portfolio return for optimization process [%]	–0.04	–0.023	–0.01
Diversified portfolio average daily return [%]	–0.04	–0.022	0.00
NFT average historical variance	3185.59	3185.59	3185.59
Equity average historical variance	1.66	3.728	3.95
Diversified portfolio variance	1.66	3.725	3.94
DeFi			
DeFi share [%]	0.50	8.70	4.03
Equity share [%]	99.50	91.30	95.97
DeFi average daily historical return [%]	0.22	0.22	0.22
Equity average daily historical return [%]	–0.04	–0.02	–0.01
Assumed minimum diversified portfolio return for optimization process [%]	–0.04	–0.02	–0.01
Diversified portfolio average daily return [%]	0.00	0.00	0.00
DeFi average historical variance	38.45	38.45	38.45
Equity average historical variance	1.66	3.73	3.95
Diversified portfolio variance	1.66	3.41	3.89

Source: author's own analysis.

Portfolio optimization with the maximum return assumption

The results of portfolio optimization for the assumption of maximum return are presented in Table 4. The goal of the optimization is to maximize return without increasing equity variance. The optimal shares of crypto assets are 1.88 for PX, 6.25 for BUX, and 7.04 for Poland. Including Bitcoin in the equity portfolio results in a slight increase in average daily returns: for PX, it rises from –0.0357 to –0.0349, for Hungary from –0.023 to –0.021, and for WIG20, from –0.0095 to –0.0084. Portfolio variances remain unchanged for those of the equity portfolios.

For NFT, only BUX can be optimized, with an optimal NFT share of 0.19%. This allocation allows the average daily return to increase slightly from –0.023 to –0.022, while variance remains at the same level as that of the 100% equity portfolio.

DeFi's optimal shares are as follows: 1.02% for PX, 17.40% for BUX, and 8.06% for WIG 20. Constructing crypto equity portfolios results in a slight increase in average daily return: PX rises from –0.04 to –0.03, BUX increases from –0.02 to 0.02, and WIG20 rises from –0.01 to 0.01. Variances remain the same.

In summary, adding crypto assets to equity portfolios to maximize returns allows for slight increases in most returns without any changes in variance values.

Table 4. Equity and crypto asset portfolio optimization results for the maximum return assumption

	Czech Republic	Hungary	Poland
Bitcoin			
Bitcoin share [%]	1.88	6.25	7.04
Equity share [%]	98.12	93.75	92.96
Bitcoin average daily historical return [%]	0.01	0.01	0.01
Equity average daily historical return [%]	–0.0357	–0.023	–0.0095
Assumed maximum diversified portfolio variance for optimization process [%]	1.66	3.73	3.95
Diversified portfolio average daily return [%]	–0.0349	–0.021	–0.0084
Bitcoin average historical variance	16.02	16.02	16.02
Equity average historical variance	1.66	3.73	3.95
Diversified portfolio variance	1.66	3.73	3.95
NFT			
NFT share [%]	0	0.19	0
Equity share [%]	1	99.81	1
NFT average daily historical return [%]	0.36	0.36	0.36
Equity average daily historical return [%]	–0.04	–0.023	–0.01

	Czech Republic	Hungary	Poland
Assumed maximum diversified portfolio variance for optimization process [%]	1.66	3.728	3.95
Diversified portfolio average daily return [%]	–0.04	–0.022	–0.01
NFT average historical variance	3185.59	3185.59	3185.59
Equity average historical variance	1.66	3.73	3.95
Diversified portfolio variance	1.66	3.73	3.95
DeFi			
DeFi share [%]	1.02	17.40	8.06
Equity share [%]	98.98	82.60	91.94
DeFi average daily historical return [%]	0.22	0.22	0.22
Equity average daily historical return [%]	–0.04	–0.02	–0.01
Assumed maximum diversified portfolio variance for optimization process [%]	1.657	3.73	3.95
Diversified portfolio average daily return [%]	–0.03	0.02	0.01
DeFi average historical variance	38.45	38.45	38.45
Equity average historical variance	1.66	3.73	3.95
Diversified portfolio variance	1.66	3.73	3.95

Source: author's own analysis.

In summary, incorporating crypto assets into a diversified portfolio can reduce variance or slightly increase average daily returns, although the latter change is small. Thus, crypto assets should be used for variance reduction thanks to their very low or no correlation with equity. This perspective aligns with Ma et al. (2020), who argue that crypto assets should be applied as risk-minimizing tools.

However, exceptions are observed for NFTs in the Czech Republic (for both minimum variance and maximum return portfolio) and in Poland (for the maximum return portfolio). In these cases, optimal portfolios consist of 100% equity. These findings contrast with Osman et al. (2023), who postulate that when investors consider cryptocurrencies in a Markowitz framework, they should not include equity when constructing an optimal portfolio.

Conclusions

The correlation between financial assets has significantly increased recently, particularly during crises. This trend makes portfolio diversification increasingly difficult, highlighting the need for investors to explore new strategies. The purpose of the research was to determine whether Bitcoin, NFT, and DeFi can be integrated into optimal crypto-equity portfolios to reduce variance or boost return compared to equity-only investments. The research compared results

for the three crypto assets in the Czech Republic, Hungary, and Poland. Calculations were conducted for both minimum portfolio variance and maximum return objectives.

The three crypto assets can be used as a part of well-diversified portfolios; however, their shares are generally small. Notable exceptions are NFTs in the Czech Republic for both minimum variance and maximum return portfolio, and NFTs in Poland for the maximum return portfolio. In these cases, the optimal portfolio is 100% equity. The paper also demonstrates that crypto assets should be used for variance reduction, thanks to their very low or no correlation with equity. The increase in portfolio return from diversification is relatively low.

These conclusions align with Aggarwal, Santosh, and Bedi (2018), Aharon and Demir (2022), and Ali, Umar, and Gubareva (2024), who stated that crypto assets can be used when constructing optimized portfolios. They are also in line with Damianov and Elsayed (2020), who suggest that it is beneficial to include cryptos in equity portfolios, but it should be done to a limited extent. The conclusions are also in accordance with Sharma, Rawat, and Kaur (2022), who stated that crypto assets should primarily be applied as risk-minimizing tools. These perspectives contrast with Osman et al. (2023), who argued that Markowitz investors should not use equity when they can invest in cryptocurrencies.

The results presented in the paper add value in several ways. First, they demonstrate that including NFT, DeFi and Bitcoin in stock portfolios in Poland, the Czech Republic, and Hungary creates diversification benefits for most portfolios, primarily by reducing risk since the increase in returns is relatively small. Second, optimal shares of crypto assets vary depending on which equity from which country is used. Third, there are notable differences in optimal shares between different countries' equities and different crypto assets. The paper additionally shows that there are minimal connections between the Czech, Hungarian, and Polish equity markets with crypto assets.

The paper is important for investors seeking diversification possibilities. Although such opportunities have decreased in recent years, new financial instruments, such as crypto assets, have emerged which may fill this gap. The conclusions may also be vital for policymakers who should consider these assets when developing regulations related to systematic risk.

Further research should focus on examining portfolio equities from other Eastern European countries, as this part of the world has not been fully examined yet. Additionally, other cryptocurrencies and crypto assets and different methodologies could be used.

A limitation of the study is that Markowitz's portfolio theory does not consider transaction costs and assumes that historical returns are repeated in the future. Furthermore, average daily returns and variances are calculated, while real profits may differ from average values and depend on the investment horizon.

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Optymalne udziały NFT, DeFi i Bitcoina w portfelach akcji na rynku czeskim, węgierskim i polskim

Celem artykułu jest prezentacja wyników badań, które weryfikują, czy różne rodzaje kryptoaktywów, takie jak Bitcoin, NFT i DeFi, mogą stanowić część optymalnego portfela pozwalającego na redukcję wariancji lub maksymalizację stopy zwrotu w porównaniu z inwestycjami wyłącznie w akcje. Porównano wyniki badań dla różnych kryptoaktywów oraz różnych krajów – Republiki Czeskiej, Węgier i Polski.
Skonstruowano optymalne portfele złożone z akcji i kryptoaktywów w środowisku Markowitza w okresie badawczym od 16 lutego 2021 do 8 stycznia 2024 roku, który rozpoczął się od momentu dostępności danych dotyczących NFT. Obliczenia przeprowadzono przy założeniu minimalizacji wariancji portfela oraz maksymalizacji stopy zwrotu.
Pokazano, że Bitcoin, NFT orz DeFi mogą stanowić elementy dobrze zdywersyfikowanego portfela akcji, szczególnie ze względu na ich niską korelację z rynkami akcji w Czechach, na Węgrzech i w Polsce.
Wnioski wynikające z artykułu są ważne dla inwestorów poszukujących możliwości dywersyfikacji kapitału. Chociaż dywersyfikacja portfela staje się ostatnio coraz trudniejsza z powodu rosnącej korelacji pomiędzy poszczególnymi rynkami, jednocześnie powstają nowe rodzaje aktywów, jak krypto, które – jak się okazuje – tworzą nowy potencjał dla kreacji zdywersyfikowanego portfela. Wnioski są także istotne dla organów ustawodawczych, które powinny je brać pod uwagę, tworząc prawo dotyczące ryzyka systemowego.
Zaprezentowane w artykule wyniki badań tworzą wartość dodaną dla dotychczasowych ustaleń zawartych w literaturze przedmiotu na cztery sposoby. Po pierwsze, pokazano, że włączenie do portfela NFT, DeFi i Bitcoina pozwala na odniesienie korzyści z dywersyfikacji w większości badanych przypadków. Uzyskuje się to dzięki nieco wyższym stopom zwrotu, ale przede wszystkim dzięki znacznie mniejszej wariancji w porównaniu do inwestowania w tzw. aktywa tradycyjne. Po drugie, dowiedziono, że optymalne udziały akcji i kryptoaktywów różnią się od siebie w zależności od tego, które kryptoaktywo zostało wzięte do portfela oraz który kraj podlega analizie. Po trzecie, artykuły naukowe koncentrują się na innych rynkach (głównie amerykańskim), natomiast w niniejszym opracowaniu skupiono się na rynku czeskim, węgierskim i polskim. Po czwarte, wykazano, że istnieją bardzo niewielkie powiązania pomiędzy rynkiem kryptoaktywów a badanymi rynkami akcji.

Słowa kluczowe: optymalizacja, dywersyfikacja, NFT, DeFi, Bitcoin, Polska, Czechy, Węgry

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Prospects for BLER Development in the New Countries of the EU

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Abstract

The objective of the article is to determine the prospects for the development of BLER (board-level employee representation) in the new EU countries. To achieve this goal, a critical analysis of the literature on the subject and relevant legal regulations was used. In the old countries of the EU, employee representation in corporate governance bodies has a well-established position. It is generally supported by trade unions, as well as employers and their organizations. In the new EU countries, however, the situation is different. Half of these countries do not have such representation based on legal legislation. In the remaining countries, the results of the transformation period included solutions modeled on Western countries, mainly on the German experience. In the following years, however, mainly due to the 2007–2008 global financial crisis, the scope of such representation was gradually curbed. Thus, the transformation was not followed by this type of solution taking root.

Employee representation in corporate governance bodies is an important element of the democratization of labor relations, and it usually brings tangible benefits to enterprises. Therefore, it is becoming extremely important to popularize it in the new EU countries. The considerations in the article lead to the conclusion that in the near future, these countries will not be able to popularize such solutions on their own; hence, the proposal to develop an appropriate EU Directive obliging member states to popularize such solutions on mandatory principles. The chances of developing such a Directive significantly increased after the United Kingdom left the EU.

Of the 14 countries under consideration, as many as 9 are post-communist countries and we will devote most of our attention to them in this article.

Keywords: corporate governance, BLER, employee participation, trade unions, European Union

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Introduction

In post-communist countries, the changes in the political system, which were accompanied by changes in the economic system in the late 1980s and early 1990s, also influenced changes in industrial relations. In these countries, employees had some forms of influence on the company's activities, although this influence was often merely illusory and exercised under the control of the communist parties. The systemic changes meant that, in the initial period, the previous regulations ceased to apply while new ones had not yet appeared. However, new industrial relations were soon developed based on existing patterns from other countries (Soulsby, Hollinshead, and Steger 2017).

During the transformation period, there were attempts to adapt Western methods, both in privatized companies and in those created from scratch. However, these attempts were not always successful, and the adaptations were and still are confronted with serious difficulties (Hyman 2018). The decisive factor involved the conditions that had existed previously in particular countries, and that appeared at the beginning of the transformation. Due to a lack of other options, these post-communist countries built their competitiveness on cheap labor, and this competitiveness required that wages and labor standards be kept low. They were also the main factors that attracted foreign direct investment to these countries. This approach left no room for strong trade unions to represent employees' interests (Mrozowicki 2014). The new political class, which originated mainly from former opposition organizations and included trade union activists, quickly forgot about the employees and began to represent the interests of employers, who gained a strong position in the new conditions. The decline in the position of trade unions also resulted from the abrupt introduction of free market conditions, increasing unemployment, worsening living standards, and intensifying work (Korkut et al. 2016).

The position of trade unions in the post-communist countries was clearly differentiated. Here, significant differences between the "people's democratic" countries and former republics of the USSR can be pointed out (Leszczyński 2015). In the former (Bulgaria, Czechia, Hungary, Poland, Romania and Slovakia), trade unions were significantly stronger, although not necessarily more numerous. They possessed what could be called trade union awareness and conducted dialogue with employers. In the latter (Estonia, Latvia and Lithuania), however, the position of trade unions was much weaker, especially in relation to employers' organizations. As people often lacked trade union awareness during the transformation period, they were perceived as a vestige of the communist system.

This position of trade unions had a significant impact on the scope of employee representation in corporate governance bodies. Such representation constitutes an important element of labor relations in the old countries of the EU. It is included in indirect forms of participation because employees elect representatives to the company's strategic decision-making bodies. It is the representation of the staff in these bodies itself that is the essence of BLER (board-level employee representation). In the Western literature, BLER means "employee representation in any supervision model, as long as employees have the right to representation in the company's strategic decision-making body" (Munkholm

2018, p. 1). Staff representatives usually have the same rights and responsibilities as other board members, and they usually receive remuneration similar to other board members. In the West, they are often called workers' directors.

Employee representation in company bodies has a well-established position in the old countries of the EU, often dating back to the 1970s. Employee representatives typically serve on supervisory boards and less often on company management boards. They usually constitute 1/3 of the board. However, Germany is unique in that they are members of the board on a parity basis in large enterprises; they are accepted by both employees (trade unions) and employers. Research indicates a number of positive results that such representation brings both to employees and the company, including that staff representatives in company bodies usually help improve the company's economic results (Kim, Maug, and Schneider 2018) and impact company value in various phases of the business cycle (Kleinknecht 2015). They also extend the decision-making time horizon (Smith 1991), including long-term investments (Waddington and Conchon 2016), facilitating smoother passage through crises and a higher sustainable development index (Jackson and Petraki 2011). Furthermore, employee representation enhances the monitoring of managers (Conchon, Gold, and Kluge 2010) and increases corporate social responsibility (Gelter 2016). Recent research has additionally shown that high employee representation on the board helps prevent tax avoidance strategies (Vitols 2021).

This study aims to determine the prospects for the development of BLER in the new countries of the EU. It starts by identifying the scope of BLER in the mentioned countries before analyzing how it developed from the beginning of the political/economic transformation to the present. The subsequent stages of BLER implementation are presented against the background of the accompanying and changing political, economic, and social conditions.

The scope of BLER in the new countries of the EU

The scope of BLER in the new EU countries is both varied and very modest. Only in seven of the fourteen countries that joined the EU in 2004 and later does employee representation in company bodies have a legislative basis. In Munkholm's (2018) classification of the EU countries according to the scope of BLER, Slovakia and Hungary were in Category IV, the highest category. Croatia, Czechia, Finland, and Slovakia are included in Category III, while Poland finds itself in Category II, where BLER is limited to public companies and some private companies. Thus, it transpires that even in countries where legislation guarantees the participation of employee representatives in corporate governance, this participation is very diverse and generally modest.

BLER legislation does not exist in Bulgaria, Cyprus, Estonia, Lithuania, Latvia, Malta, or Romania. Of course, it does not mean that such representation does not exist there at all. It may occur in individual enterprises on a voluntary basis if initiatives in this area are accepted by both employers and employees (trade unions). In this case, they usually take the form of collective agreements or other types of bilateral agreements.

The weakness of BLER in the first group of countries may be evidenced by the lack of a stable legal framework that was created at the beginning of the transformation. More than 30 years after the beginning of the transformation, it is clear that BLER has not taken root in the organizational structures of enterprises and, more precisely, in corporate governance structures (Zybała 2019). This is evidenced by the continually changing regulations pertaining to corporate governance. Typically, they not only fail to strengthen the position of BLER, but they often weaken it or lead to attempts to eliminate it.

The beginning of the transformation was particularly important here when privatization and the creation of new enterprises intensified. A new political class was also being born. New rules for the economy, including the way enterprises function, were developed from scratch. Existing Western patterns were used, with German, American, and Scandinavian ones being the most important. Individual countries used these patterns to varying degrees, which is why different varieties of BLER can be found. The German model, which was used by Hungary and the former Czechoslovakia, proved to be the most effective (Yeoh 2007, pp. 57–75). Initially, mainly due to the strong involvement of American trade unions, the American model was also popularized, especially in Poland and Romania, although the Scandinavian model, which was supported mainly by the intellectual elites, was also widely discussed in Poland. However, it was not applied as the mentality of Polish employers and Polish trade unions differed significantly from their Scandinavian counterparts.

The main reason for the weak establishment of BLER in the legal provisions of the post-communist countries was the lack of political will of the new authorities, which mainly originated from opposition circles and included trade union leaders. The new trade unions generally distanced themselves from other forms of employee representation, which they saw as competition. This may explain the resistance of trade unions in adopting solutions regarding BLER. It was also influenced by the way changes were implemented in individual countries, including the way the privatization was carried out, for example, voucher privatization in Czechoslovakia, managerial privatization in Hungary, or shock therapy in Poland. Each country created its own, usually unique solutions regarding the scope of BLER, including the number of employee representatives in company bodies, how these people were elected, and their decision-making powers.

Phases of BLER development

The development of BLER in the new EU countries can generally be divided into two stages. The first one falls on the last decade of the 20th century, i.e. at the beginning of the transformation in post-communist countries, and ended with the global financial crisis (GFC) of 2007–2008, although it occurred much earlier in some countries. The second stage mainly concerns the changes that resulted from the crisis and that continue to the present day.

The scope of employee participation in individual countries at the time of change in the political and economic system influenced the first stage of BLER development. The level of advancement in such participation impacted the solutions regarding BLER during

the initial period of the transformation (Stollt and Kluge 2006). For example, in Hungary, enterprise boards with a high representation of employees of 50% appeared as early as 1988. A two-level corporate governance structure was also introduced, with a supervisory board and the company's management board. In companies with over 200 employees, they were able to elect 1/3 of the board members (Neumann 2018). These changes clearly referenced the German model of corporate governance, with only minor adjustments made in this respect in 1992 and 1997 during the initial transformation period.

As mentioned above, BLER had a legislative basis in only seven countries, albeit the scope of representation was diverse (Kohl and Platzer 2004). Commercial codes, laws on enterprises, and other laws constituted the basis for employee representation in company bodies. Most often, they ensured employee representation on supervisory boards at 1/3 of the board's composition, a level that dominates in the old countries of the EU. In Czechia, Slovakia, and Slovenia, company articles of association might extend such representation to 50% of the board. In Slovenia, until 2000, in companies employing more than 1,000 people, employee representatives constituted half of the board. However, the chairman of the supervisory board was always a representative of the shareholders and also had a casting vote in the event of an equal number of votes.

A much more modest range of BLER occurs in Poland. The Commercial Code that was in force until 2000 did not provide for such representation, nor des the Commercial Companies Code that replaced it. The obligatory nature of the participation of employees' representatives in company supervisory boards has been provided for by privatization laws since 1990. The first law, of July 1990, guaranteed employee representatives 1/3 of the seats on the supervisory board of companies wholly owned by the State Treasury; such participation was intended to overcome their resistance to privatization (Ustawa o prywatyzacji przedsiębiorstw państwowych). This level of participation was guaranteed only until the state sold more than half of the shares.

The second law, of August 1996, provided for two-person employee representation in a five-person supervisory board (Ustawa o komercjalizacji i prywatyzacji przedsiębiorstw państwowych). The main difference from the previous one was that such representation would not disappear, even if the state sold all its shares to private investors. The Law defines the scope of such representation as 2 to 4 people, depending on the size of the council. The law, therefore, causes considerable confusion in matters of supervision, obliging privatized companies to retain employee representatives on their boards while other companies do not have such an obligation.

The countries also differed regarding the size of the enterprise that would entitle employees to have representation on the board (Stollt and Kluge 2006). In Slovakia and Czechia, it applied to enterprises with at least 50 employees, while in Hungary, the minimum was 200 employees. In Slovenia, employees theoretically (but also practically) had the right to such representation in all companies with a supervisory board. The law specified that such a council should be established in a company that met one of the following criteria: their share capital exceeded €1.7 million, the company employed more than 500 employees, its shares were publicly traded, or if the company had more than 100 shareholders. As a result, almost all companies had supervisory boards.

These countries differed significantly in the way that workers' representatives were elected to supervisory boards (*Worker Representation…* 2005). In Czechia and Slovakia, they were elected by the staff in general elections. Trade unions and employees had the right to nominate candidates (10% of signatures). In Czechia, the company's management and the works council also had this right. A representative of a trade union organization who was not a company employee could become a member of the board. However, in state-owned enterprises, only a company employee could be elected to the board. The banking sector was given special treatment in Czechia, since the Banking Law already provided for employee representation on the management board.

A different method of selecting staff representatives existed in Hungary and Slovenia, where selection was carried out by the works council (European Commission 2005). In Hungary, workers' representatives were nominated by works councils or central works councils. In each case, however, they were obliged to listen to the opinions of trade unions. Formally, workers' representatives were appointed by the general meeting of shareholders (shareholders' meeting), which was obliged to appoint candidates if they met the formal requirements. As a result, employee representatives were mainly official activists of works councils and trade unions. In Slovenia, employee representatives on the council were also appointed and dismissed by the works council.

Staff representatives on supervisory boards had the same rights and obligations as other board members, and this related both to private and state-owned enterprises. In Slovenia, in enterprises employing over 500 employees, the works council nominated a worker director who, after obtaining the approval of the supervisory board, became a member of the management board. The director was a member of the management board responsible for staff social matters and human resources management.

The second stage of BLER development took place at the beginning of the 20th century, with more significant changes occurring following the GFC. These changes included a decline in trade union memberships, limitations to the scope of collective agreements, and their impact on public policy being marginalized, to name but a few (Ivlevs and Veliziotis 2017). The new EU countries felt the effects of the crisis less than Western countries, which may be related to the lack of integration these countries had with global capitalism (Hyman 2018).

In almost all of the countries analyzed, either the BLER situation deteriorated, or attempts were made to move in this direction. In Slovenia, in 2001, the provision on the parity of the supervisory board was repealed based on the interpretation of the Constitutional Tribunal. Since then, staff representation has constituted 1/3 of the board.

Severe restrictions on BLER were also made in Hungary. The 2006 legal regulations replaced the obligation for employee representation on company supervisory boards by moving decisions on this matter to an agreement between the works council and company management. This meant that the works council could waive employee representation on the supervisory board. At the same time, the mandatory dualistic model of corporate governance was abandoned. As a result, many companies stopped having a supervisory board, automatically

eliminating BLER. However, it should be added that previous regulations had never been fully respected. It is estimated that fewer than 50% of companies obliged to have employees as members of supervisory boards met such requirements. The Law of 2012 further restricted BLER by stipulating that the supervisory board could function without employee representatives (Neumann 2018).

Changes in Czechia followed the same direction. The legal solutions of 1991 that had been favorable to BLER did not translate into practical results. Companies rarely had supervisory boards, and therefore, employees were rarely represented on the company's supervisory bodies. Additionally, employee representatives were often managers. A greater share of employee representatives did occur in the mining industry. However, the provisions lasted only until 2012, when the right-wing government amended the Commercial Code, abolishing the obligation of employee representation in supervisory authorities. This did not apply to state-owned companies, however. Employee representation on supervisory boards was restored in 2017, although this time, the requirement for such representation applied to companies with more than 500 employees. Staff representatives were supposed to constitute 1/3 of the board. Additionally, companies were able to use a monistic model of corporate governance, i.e., without a supervisory board. For many companies, this change in the supervision model was dictated by the desire to get rid of employee representation.

The situation is different in Slovakia, where the regulations regarding BLER have not changed. Considering the universality of BLER regulations and the low threshold for companies obliged to include employees on the board (50), Slovakia has the widest BLER coverage among the studied countries. In practice, however, the enforcement of these regulations leaves much to be desired. It is estimated that 1/4 of companies do not fully comply with the regulations, e.g., by limiting the number of employee representatives on boards. It can be added that the powers of Slovak supervisory boards are quite limited (Kluge and Stollt 2006, p. 91).

The rules regarding BLER in Poland have also not changed, although an attempt to eliminate them was made in 2010. This occurred during a period when the number of companies with BLER was systematically decreasing, mainly due to privatization efforts implemented under the Law of 1991. In most cases, employee representatives were removed from boards once 50% of the shares were sold. Therefore, it can be stated that the scope of BLER in Poland is the weakest among the seven countries. The latest research shows that staff representatives are on supervisory bodies in fewer than 200 enterprises in Poland. Their participation is so marginal that BLER is not present in the wider awareness of social partners (Owczarek, Pańków, and Pławecka 2021, p. 26).

It should not come as a surprise that the GFC negatively impacted BLER in most new EU countries. Crises often lead to increased economic difficulties, including the decline of many enterprises[1]. In such situations, employers tend to adopt more rigid attitudes towards employees, which is often reflected in a reduced influence of employees on decision-making.

1 The crisis also negatively affected the work relationships in the old EU countries. Although no reduction in indirect participation took place, collective negotiations clearly suffered (Johnstone, Saridakis, and Wilkinson 2019).

Employers' organizations usually exert influence on national authorities to legalize statutory limitations on employees' rights in managing the enterprise. This trend can be viewed as a general pattern; however, it does not apply uniformly across all countries and may manifest to varying degrees.

The considerations outlined above have been summarized in Table 1, which lists the analyzed countries based on the current strength of employee representation in supervisory bodies and the supervision models used. The strength of employee representation is divided into three categories: (2), (1) and (0)[2].

- Category (2) includes countries with the highest level of employee authority in corporate governance, which is statutory and applies to both public and private enterprises.
- Category (1) includes countries where employee authority is limited to either private companies or state-owned companies.
- Category (0) refers to countries that lack a legal framework for employee representation in supervisory authorities. Such representation can only occur on a voluntary basis.

The supervision models presented in the table include dualistic, monistic and mixed approaches. The mixed model is emerging as the predominant approach in the analyzed countries.

Table 1. Employee representation in supervisory bodies in the new EU countries

Model of Supervision	Position of the representation	Countries
Dualistic Model	2	Slovakia
	1	Poland
	0	Estonia, Latvia
Monistic Model	2	–
	1	–
	0	Cyprus, Malta
Mixed Model	2	Finland, Slovenia, Croatia, Hungary, Czechia
	1	–
	0	Lithuania, Romania, Bulgaria

Source: author's elaboration based on Skorupińska-Cieślak 2021, p. 227.

2 The literature also divides EU countries into a larger number of categories from the perspective of staff representation in corporate governance. For example, Waddington and Conchon (2016) proposed four categories while Gold and Waddington (2019) proposed five.

The perspectives of introducing BLER in the remaining new EU countries

The declining participation of employee representatives in supervisory bodies is evident in Cyprus and Malta, almost exclusively affecting state-owned enterprises. Both countries use a monistic governance model with a board of directors, yet they lack legislation that mandates employee representation on these boards. In Cyprus, high-level trade union representatives sporadically serve on the boards of directors of state-owned companies. In Malta, such participation is limited to 11–13 mainly state-owned enterprises and is declining due to privatization. In these enterprises, staff representatives have the same rights and obligations as other directors.

In Estonia, Latvia, and Lithuania, employee representation in supervisory bodies is virtually non-existent. This absence may be surprising in Estonia, which follows a dualistic supervision model. Although there is no legal requirement for such representation, it can still exist in individual companies through collective agreements. So far, however, companies have rarely used this option, largely due to the strong opposition from employers' organizations that argue that the presence of employees on the board would disrupt operations. While trade union organizations support staff representation, they remain too weak to make fundamental changes in this area.

The situation is even worse in Latvia, where the position of trade unions has declined significantly since the country gained independence in 1991, especially in private companies. The diminished status of trade unions means that collective agreements at the industry level are practically non-existent. Therefore, it is not possible to establish employee representation there. Consequently, employee representation on supervisory boards of companies is not even taken into consideration.

A different situation occurs in Lithuania, where companies can choose between a monistic and dualistic supervision model. Although no legal regulations are currently in place in this area, they did exist at the beginning of the transformation. Between 1990 and 1994, the Law on State-owned Enterprises gave employees the right to appoint up to 2/3 of the supervisory board. However, the employees were not prepared for this role, leading to a negative reception from both employers and, importantly, employees. Consequently, legislation was amended to eliminate employee representation on supervisory boards, and there is no foreseeable opportunity for its reintroduction in the near future.

BLER is also absent in Bulgaria and Romania. In Bulgaria, staff representatives can attend shareholders' meetings, although only with an advisory vote. In Romania, trade union representatives have the right to participate in management board meetings to discuss professional, economic, social and sporting issues. Again, their vote is only advisory (Skorupińska-Cieślak 2023, p. 61).

Reasons for the weakening position of BLER in the new EU countries

The analysis of the reasons for the waning position of BLER in the post-communist countries begins with an examination of their political, social and economic contexts before the political and economic transformation. These contexts varied greatly, with the most pronounced differences observed between the former Soviet republics and the people's democratic countries. In all cases, however, economic and social relations were dominated by communist parties, characterized by almost universal trade union membership and almost 100% turnout in parliamentary elections. During this period, the management of the politicized trade unions engaged with management on social matters rather than on working conditions (Zybała 2019). In some of the studied countries, changes began to emerge in the late 1980s; economic difficulties prompted democratization in the workplace, notably in Hungary and Poland.

In all post-communist countries, the beginning of the transformation brought a decline in membership and, therefore, in the position of trade unions, resulting in fewer collective agreements and reduced impact on public policy. These changes are closely linked to democratization efforts and accession to the EU. Membership in trade unions ceased to be compulsory, leading to significant declines in union participation; entire sectors of the economy became union-free in some countries. Between 1995 and 2016, a dramatic decline in unionization was observed, falling from approximately 60–70% to approximately 10–12% (Zybała 2019, p. 267). Trade unions were often viewed as remnants of the communist system, which discouraged employees from considering union membership. Trade union activists were also to blame, unable to change their outlooks or modernize the unions. As a result, they increasingly failed to represent the emerging new working class with its aspirations and needs.

The change in the political and economic system, as well as the associated privatization, resulted in increased employee empowerment, giving them the opportunity to participate in decisions. However, this occurred in only a few countries. Generally, there was little interest in this shift from employers and their organizations, trade unions, or the employees themselves. The emerging political class also showed a lack of interest.

Employers were happy to reclaim power within their enterprises after years of being constrained by party committees. In communist economies, the most important decisions were made externally and dictated by central plans, meaning enterprises had no control over production types or volumes, raw material purchases, or the sale of finished products. Additionally, important personnel decisions were made outside the company. Therefore, after regaining power, employers were reluctant to share it with employees (Rudolf 2008).

Trade unions were also not interested in employee participation in management. As mentioned earlier, they saw BLER as competition and tried to maintain a monopoly on employee representation. This led them to oppose other forms of representation. Their stance contrasted significantly with that of most trade unions in the West, which are the main advocates

for the development of BLER[3]. This was confirmed by Zybała's (2019) research on the Visegrad countries. Trade union members unanimously stated that the development of BLER was not a priority and that they focused on issues related to wages, employment, and working conditions.

Initiatives of the European Federation of Trade Unions aimed at changing this traditional mindset largely fell short. This mindset was evident in the implementation of the EU Directive on works councils. Under pressure from national trade unions, individual countries often adopted the minimum conditions set out in the Directive. Poland serves as a particularly illustrative example, where works councils were initially subordinated to trade unions[4].

However, it is difficult to agree with Waddington and Conchon (2016) that the weakening position of trade unions did not have a major impact on the decline in the scope and position of BLER in the countries of Central and Eastern Europe.

Employees themselves were not interested in participating in decision-making. This can be attributed to both the relatively low level of education of employees, especially during the initial period of transformation, and the lack of preparation for work in supervisory authorities, as employees has practically no involvement in decision-making during the communist era. Under these conditions, establishing BLER, especially given its wide scope, was likely to end in failure, as seen in Lithuania. The combination of low education levels, declining living standards, and job uncertainty meant that employment and fair pay were top priorities for workers. Strikes during the early transformation period primarily focused on these demands.

The lack of interest in participation can also be explained by employees' negative attitudes towards employers. Often influenced by trade unions, employees viewed involvement in company activities and decision-making as merely assisting the managers, who were already paid to run the company. This mindset excluded employees from engaging in problem-solving within the company. In contrast, Western countries embraced the view that both employees and management were "in the same boat" and everyone would lose their jobs if the company went bankrupt.

Focusing on the economic transformation, the political class that emerged from opposition and trade unions also did not treat BLER's problems as a priority. Moreover, there was no bottom-up pressure to introduce representative solutions. Employee demands were mainly

3 British trade unions are an exception here, since they approached the corporate governance reform introduced in 2018 granting employee participation in the management without enthusiasm. The reform did not bring expected results, and the blame for the failure of the reform was put by its authors on the very lack of involvement of the trade unions (Villiers 2021).

4 The first law passed by the Sejm in 2006 granted trade unions with the right to elect the members of the board wherever such unions existed. In case there were no unions, the candidates for the board had to get the support of at least 10% of the staff. In case of trade unions having been established in such an enterprise, the board was dissolved and the trade unions elected a new board. The Constitutional Tribunal ordered for the change of some of the provisions of the law to be made. The Sejm amended the law in 2009. By virtue of the law, the whole staff elects the members of the board (Rudolf and Skorupińska 2012, pp. 26–27).

aimed at improving living conditions and increasing employment, not at changing company management structures. As a result, a participation vacuum was created: previously existing forms of participation disappeared without new ones taking their place. This vacuum may also be related to the dominance of small and medium-sized enterprises in Central and Eastern Europe, where staff representation was usually less common, as well as the extensive gray economy (Williams 2015).

Tomasek (2022) highlights another problem of such representation. Staff members on supervisory or management boards can expect much higher remuneration than before, making them interested in serving on the council for as long as possible. Therefore, they are anxious to cultivate good relations both with other council members and with the management, whose proposals they usually support to secure future recommendations for re-election. Management may emphasize their "constructive" cooperation, which could mean that they do not necessarily represent their constituents, i.e., employees.

This observation was confirmed by Zybała (2019), where one respondent stated, "If an employee-representative joins the supervisory board, he or she is more willing to play the role of a manager than a 'real' employee representative." To avoid such a situation, their cooperation with both employees and trade unions is important. Cooperating with the trade unions, in particular, can provide them with an appropriate position on the board, access to necessary information, and other support. However, this approach requires the support of trade unions for BLER (Tomasek 2022).

Summary

The above considerations provide information on the BLER situation in the new EU countries. They also show observable trends in this area, which unfortunately do not paint an optimistic picture. Over the past 30 years since the beginning of the transformation and 20 years since most of the studied countries acceded to the EU, BLER has not taken root in these countries. While there were initially promising developments in some countries, subsequent years brought regression that continues to this day. Many of these countries not only failed to implement BLER but also neglected to initiate discussions about it. Thus, hopes for the gradual spread of BLER have proven to be in vain.

This situation can be partially attributed to failed attempts to standardize staff representation on supervisory bodies across the EU (Rudolf 2020). Initially, the climate for harmonizing BLER legislation was quite favorable. Until 1972, three of the then six member states, namely France, Germany and the Netherlands, supported this process. This period was the most conducive for such harmonization; however, the necessary determination to achieve this goal was lacking.

The situation became more complicated after the United Kingdom joined the EU. An attempt was made to standardize BLER when preparing the Social Charter of the European Community, signed in Strasbourg in 1989. However, the UK did not sign it, meaning that it was

not included in the Treaty of Rome. Instead, the principles of the Charter were incorporated into the Maastricht Treaty of 1992 as a Protocol and an Agreement on Social Policy was attached. Unfortunately, the Charter lacked binding authority, and its provisions were not enforceable. As a result, countries joining the EU did not have to align their corporate governance systems with the European BLER.

Current prospects for the development of BLER in the new EU countries are not very optimistic, at least in the near future. The analysis presented in the article shows that most of these countries have no chance of introducing such solutions on their own. Employers and their organizations, as well as the political class, are against them. Additionally, weakening trade unions are not enthusiastic, seeing BLER as competition. Efforts by the European Trade Union Federation were ineffective since they failed to convince the trade union organizations in the studied countries to adopt BLER. In this context, a suitable EU Directive obliging member states to introduce BLER may be the best option.

However, this will still be extremely difficult, although not impossible. One must remember that corporate governance structures in many EU countries took decades to achieve their final shape, resulting from long-term evolution and clashes of political, social, and economic views. These structures are deeply embedded in national institutional frameworks. Therefore, in the harmonization process, it is necessary to consider the existing power structure in a given country and establish effective methods for legislating and decision-making. In collective labor law and employment relations, methods and regulations are often closely related to existing power structures. As Munkholm points out, changes to EU legislation on collective labor law and industrial relations, including BLER, "should take into account the existing structures, traditions, values and culture of the existing social order and the business environment in the member states" (Munkholm 2018, p. 11).

Harmonization in these conditions is likely to face strong resistance, mainly from employers and their organizations, but also from some trade unions and political parties. Strong opposition may be expected in countries where there are no statutory regulations on labor relations. Therefore, regulations addressing this issue must be flexible and consider the social, economic, and political conditions of each country. Both the preparation and implementation of the Directive should be spread over time to accommodate these factors.

The prospects for adopting such a Directive increased following the departure of the UK, which was the main opponent of these types of solutions. Any optimism regarding the potential for these measures stems from the EU's historical experience with this matter. For instance, the Directive on European Works Councils took approximately 30 years to develop before it was adopted in 1994 (Directive 1994/45). Another notable example includes the 2002 Directive on informing and consulting employees (Directive 2002/14/EC), which established works councils. These examples give hope for the mandatory introduction of BLER in the EU member states.

So far, a significant first step has been taken with the adoption of the statute for a European company in 2001, which includes provisions for extensive employee participation (Council Directive 2001/86/EC).

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Perspektywy rozwoju BLER w nowych krajach UE

Artykuł ma na celu określenie perspektyw rozwoju BLER w nowych krajach UE. Przy realizacji tego celu zastosowano krytyczną analizę literatury przedmiotu oraz odpowiednich regulacji prawnych. Przedstawicielstwo pracownicze w organach nadzoru korporacyjnego ma w starych krajach UE ugruntowaną pozycję. Jest ono popierane zarówno przez związki zawodowe, jak i przez pracodawców i ich organizacje. Inaczej sytuacja wygląda w nowych krajach UE. Połowa z nich nie posiada takiej reprezentacji opartej na ustawodawstwie prawnym. W pozostałych krajach okres transformacji zaowocował rozwiązaniami wzorowanymi na krajach zachodnich, głównie na doświadczeniach niemieckich. Jednak w następnych latach, głównie pod wpływem kryzysu z lat 2007–2008, zakres takiego przedstawicielstwa był stopniowo ograniczany. Procesy transformacji nie spowodowały więc zakorzenienia się tego rodzaju rozwiązań w analizowanych krajach.
Przedstawicielstwo załogi w organach nadzoru korporacyjnego stanowi z jednej strony ważny element demokratyzacji stosunków pracy, z drugiej zaś przynosi najczęściej wymierne korzyści przedsiębiorstwom. W związku z tym jego upowszechnienie w nowych krajach UE staje się niezwykle istotne. Zawarte w artykule rozważania prowadzą do wniosku, że w najbliższej perspektywie wspomniane kraje nie są w stanie upowszechnić samodzielnie tego rodzaju rozwiązań. Stąd propozycja wypracowania odpowiedniej dyrektywy UE, zobowiązującej kraje członkowskie do upowszechnienia tego rodzaju rozwiązań na zasadach obligatoryjnych. Szanse na wypracowanie takiej dyrektywy znacznie wzrosły po opuszczeniu Unii przez Wielką Brytanię.
Z 14 krajów, które stanowią przedmiot rozważań, aż 9 to kraje postkomunistyczne i im poświęcono najwięcej miejsca w artykule.

Słowa kluczowe: nadzór korporacyjny, BLER, partycypacja pracownicza, związki zawodowe, Unia Europejska

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The Relationship between Social Capital and the Market Integration of Farms – Examples from Central and Eastern Europe

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Abstract

The economic situation of farms is determined by a number of factors, which have been widely described in the literature. One factor is market integration, which shapes the farmer's position in the food supply chain. The involvement of farmers in the integration may be related to their social capital, although this hypothesis has not been fully verified. Thus, the aim of the article is to assess the relationship between the level of social capital and the market integration of farms in selected Central and Eastern European (CEE) countries. The analysis includes Poland, Romania, Lithuania, Serbia and Moldova, and the sample consists of a total of 3160 farms. Data were collected personally by the authors through face-to-face interviews with farm managers. Based on these data, the authors' market integration index was calculated and the level of social capital of farms was determined. A comparative analysis of average market integration indices for farms with different degrees of social capital was then carried out separately for each country. The Mann-Whitney U-test and the Kruskal-Wallis test were used to determine the significance of differences. The findings reveal that the highest value of the market integration was recorded for those farmers who were most strongly 'socialised', i.e. who participated in long-life education, took part in social events and were members of various organisations. A very important implication of this is that by strengthening social capital, farms aim

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to strengthen integration into the market, which can consequently lead to improved economic performance.
Therefore, mitigating regional disparities and increasing the average level of agricultural performance in CEE countries should include measures to increase social capital on farms, i.e. providing workshops, training, and exhibitions, as well as supporting agricultural producer organizations, promoting rural housewives' circles, and organising social events, among others. Such activities can be financed both from the second pillar of the common agricultural policy and from local government budgets. The contribution of the research focuses on the rarely undertaken subject matter of the relationship between social capital and market integration in farms. The added value consists of 1) a comparative analysis of five CEE countries and 2) an estimation of the authors' indicators of social capital and market integration of farms, which could be used in the future for similar research.

Keywords: market integration, social capital, agriculture, farms, Central and Eastern European countries

JEL: Q12, Q13, R11, R12

Introduction

Social capital plays a key role in agriculture and rural development (Rivera et al. 2018), especially when there is a lack of other forms of capital, like machinery or money (Michalewska-Pawlak 2010). The positive effect of social capital on building a farm's market orientation has been rarely tested empirically, although there are numerous indications that such a relationship exists. According to recent research, social capital plays an important role in various agricultural and non-agricultural value chains (e.g. Jones et al. 2008; Guinjoan, Badia, and Tulla 2016; Knickel and Maréchal 2018; Trigkas, Partalidou, and Lazaridou 2021). Some articles focus directly on social capital in agriculture and rural development in Central and Eastern Europe (CEE). For example, the level of social capital in Polish agriculture and rural areas was analysed by Gajowiak (2013), Spychalski (2013), and Jarosz-Angowska, Angowski, and Kijek (2015). In Romania, social capital was examined from the perspective of cooperatives and associations of livestock farmers (Georgescu 2016). Some studies are also devoted to social capital in Lithuanian agriculture and rural areas (e.g. Droždz, Vitunskienė, and Novickytė 2021).

However, to the best of our knowledge, there are few surveys devoted simultaneously to social capital and market integration from the perspective of farmers from Central and Eastern Europe (CEE). Thus, the article aims to assess the relationship between the level of social capital and market integration of farms in selected Central and Eastern European countries. The analysis includes Poland, Romania, Lithuania, Serbia and Moldova, and the sample comprises 3160 farms. The farm data were collected in 2020.

Given the history of the development of the economic and social sciences, the concept of social capital is relatively new, introduced in 1916 by Lyda J. Hanifan with reference to rural educational centres (Fukuyama 2003). Hanifan defined social capital as a set of intangible community values, including goodwill, sympathy and social intercourse between members of the local community and their families, which together form a social unit. In our research, we will focus on an individual's social capital, which is understood as an individual's network of social connections that may contribute to the economic benefits obtained by that individual. To determine

the level of social capital and the degree of market integration in the surveyed farms, we constructed our own indices. Therefore, the added value of the research focuses on: 1) the rarely undertaken subject matter of the relationship between social capital and market integration in farms, 2) the spatial scope of the research (CEE countries), and 3) estimating our indicators of social capital and market integration of farms.

In the first part of the article, we focus on various studies on the topic of social capital and market integration in agriculture. Next we show our methodology and data set. In the next section, we identify the links between social capital and market integration in CEE farms. The article concludes with a discussion and conclusion.

The concept of social capital

Many analyses indicate that cooperation between farmers is too weak and develops too slowly (Perepeczko 2006). An important reason for this may lie in poorly formed social capital, understood as trust, cooperation skills and social relations (Kwilinski, Lyulyov, and Pimonenko 2023). Some of the first significant research on social capital was conducted by Bourdieu (1986), Coleman (1988) and Putnam (2001). The results of the analysis of numerous reports related to human capital indicate that this factor significantly improves a country's economic performance (Knack and Keefer 1997), the results of local communities (Ostrom 2000), and organizational and unit performance (Nahapiet and Ghoshal 1998; Lazega and Burt 1995; Kwilinski et al. 2019; Kuzior and Kwilinski 2022). Additional elements that determine the quality of social capital are the norms encoded at the local community level, which influence the behaviour of members of this community (Putnam 2011).

Social capital can be perceived both in positive and negative senses. According to some researchers, a higher level of social capital allows for a greater ability to plan, while a lower level means that new activities can be implemented only when individual benefits are perceived. It was also observed that higher levels of social capital encourage activities that develop this capital (Cecchi and Basile 2007).

Most research on social capital highlights its variability depending on the complexity of social structures. For example, more complex societies cope better with problems such as poverty, and it has been confirmed that rural households cope much better in such societies. However, the complexity of society itself is not a sufficient factor to alleviate social problems; factors that simultaneously build social capital are necessary (Scuderi et al. 2023). Research conducted in Austria revealed significant differences in informal social capital between urban and rural areas. Residents of rural areas have more social contact with people performing blue-collar work. Furthermore, in rural societies, regular interactions with at least three family members per week positively influence well-being through the enhancement of social capital (Glatz and Bodi-Fernandez 2020).

A significant number of studies mention trust, defined as belief in the proper conduct of others, as a crucial variable (Trigkas, Partalidou, and Lazaridou 2021). Findings regarding human capital in rural and urban areas are mixed. Many studies suggest that social capital in rural areas

has a higher value because people in these areas trust each other more, maintain friendships, interact frequently with each other, show voluntary commitment and sometimes there are also strong family ties (Jones et al. 2008). It is assumed that trust is the basis for building a network of connections, and it is also related to participation in social life, involvement in volunteering and social interactions, as well as a sense of security and tolerance. In the above-mentioned studies, selected social groups were surveyed using a six-point Likert scale. One variable often used to express the level of social capital is membership in voluntary associations. However, there are reports in the literature indicating that this indicator of social capital is overestimated. The main reason for this observation is the diverse nature of voluntary associations (Skorbiansky and Camp 2021).

One prominent form of social capital is its binding aspects, characterised by frequent relationships that foster a higher level of trust and support, leading to the development of network structures (Putnam 2001; Adler and Kwon 2002). Another aspect of social capital is its ability to create bridges, which helps establish connections with people outside one's immediate group (Piwek and Joinson 2016).

Research conducted in central Romania has shown that there are numerous connections between financial, social, human and development capital. This indicates that to have a beneficial impact on the development of regions, it is necessary to have a multi-directional impact on all indicated capitals, otherwise, we risk falling into an environmental trap. In particular, prioritising the development of social, human and financial capital are crucial due to their strong potential to influence other capitals (Mikulcak et al. 2015).

The importance of social capital in rural areas has also been highlighted in European Union programs aimed at countries of the former socialist bloc (Kloczko-Gajewska 2015). The review of research on social capital shows that variables often used as indicators of social capital include the number of social organizations and the level of residents' involvement in the activities of these organizations (Wojewódzka-Wiewiórska 2015).

Market integration in agriculture and the role of social capital

Economic integration is the process of merging economies that results from the desire of the entities that form them to improve their efficiency. Many aspects support the integration of farmers, including producers joining together to increase their bargaining power, enabling them to secure higher prices for their products while reducing prices for production inputs. They may also have easier access to external sources of financing (Bieniek-Majka 2019).

Horizontal integration creates opportunities for joint investment in equipment that supports production and distribution. The effectiveness of horizontal integration depends on its level. Thus, better organization among producers is essential for reducing transaction costs and competing more effectively in the market. On the agricultural side, voluntary participation in unions often results from farmers' informed decisions (Stępień et al. 2022).

When selling agricultural products, producers can use the intermediation of agents, dealers, and wholesalers; they can also sell products on stock exchanges and at auction. However, this strategy means that much of the economic surplus that arises in food supply chains is captured by intermediaries. To reduce these losses, farmers can participate in vertical integration by increasing their influence in shaping transactions in marketing channels. Vertical integration facilitates easier regulation of market balance (demand-supply) and contributes to the formation of a stable, specialised resource base. By strengthening their relationships with buyers, farmers can reduce production risks by ensuring reliable product collection and potentially increasing the sale prices of their products. From the farmer's perspective, vertical integration can be achieved through several strategies:

- Entering into a contract (contractual integration), i.e. signing contracts with customers and setting out the terms and conditions of transactions.
- Acquiring ownership (capital integration) and starting food processing, ending with food retailing.
- Participation in legal forms of collective activity, e.g. cooperatives and associations (Wyrzykowska 2004).

Stępień et al. (2022) underlined that creating a coordinated production and sales system can be seen as an effort to improve the economic performance and maintenance of farms. This coordinated system includes establishing durable, long-term relationships with contractors, shortening the supply chain, developing integrated forms of distribution and enhancing both vertical and horizontal integration. The development of connections between agricultural producers and the market is determined by many factors. Stępień et al. note that the scale of production and the agricultural area of the farm are key variables. Building coordinated forms of activity is particularly important for small-scale family farms. In contrast, large specialized units benefit from economies of scale, allowing them to achieve lower production costs and higher product prices without needing permanent market connections.

Smaller actors often struggle to participate adequately in the distribution of the added value created along the food supply chain. The economic surplus they obtain during transactions is not optimally allocated in input-output flows, as a significant portion 'leaks' to other market participants, including intermediaries, processors, wholesalers, retailers and, finally, consumers (Bardos, Ferto, and Szabo 2003). This situation results from structural imperfections within the agribusiness sector, where competition exists between generally small-scale agricultural producers and oligopolistic structures on the consumer side. This dynamic should encourage producers to integrate, especially in Central and Eastern Europe, where small-scale producers form the basis of the agrarian structure. Unfortunately, the current level of market organisation and institutional solutions remain insufficient, and mental barriers – such as the fear of losing ownership and freedom – are ingrained in the minds of farmers (Guth, Bieniek-Majka, and Maican 2019).

In this context, it is necessary to harness the potential of the social capital that resides in rural communities. Social capital can foster agriculture and rural development (Midgley 2013) by improving individuals' capacities to organise themselves (Portes and Landlot 2000). Van der Ploeg

and Marsden (2008), Karlsson and Stough (2012) and Phillips (2015) highlighted the importance of social capital in integrated agriculture and rural development strategies. For instance, bonding social capital – derived from family and friends – can significantly influence the adoption of new technologies in the network. Van der Ploeg and Marsden (2008) and von Münchhausen and Knickel (2010) conceptualised social capital as one of the key building blocks of what they called the 'rural web'. They argued that these building blocks need to come together to respond to the challenges faced by rural economies to improve the sustainability of rural livelihoods and their prosperity (Rivera et al. 2018). Given this context, it is not surprising that social capital plays an important role in agricultural market integration and integrated rural development strategies (Phillips 2015; De los Ríos, Rivera, and García 2016).

Data and methods

Spatial scope and data set

The research covers Central and Eastern Europe, where a common feature is the high share of family farms with small areas of farmland and a low scale of production (the Czech Republic and Slovakia are exceptions in the region). These countries followed a similar path of systemic transformation from a centrally managed to a free market economy. This shift resulted in the privatization of agricultural land in the 1990s, moving socialized ownership to private ownership. The end result was a dual structure of agriculture, where a large group of semi-subsistence agribusinesses operates alongside a small number of high-subsistence agribusinesses (Stępień and Maican 2020). The latter group face the problem of income disparity, primarily due to their unequal treatment in food supply chain flows (Czyżewski and Stępień 2018). Our research highlights the potential for enhancing economic performance through greater market integration.

Among the countries surveyed, Romania has the highest number of farms, accounting for more than 30% of all farms in the EU (Eurostat 2023). Despite this, it has the smallest agricultural area and economic strength, as measured by standard output (SO; see Table 1). Poland ranks second in terms of farm numbers but boasts the highest economic strength. Lithuania is distinguished by having the largest land area of the surveyed countries. In all cases, the proportion of small farms – defined as those with less than 10 hectares of agricultural area- – is relatively high, ranging from 65% in Moldova to 96% in Romania. On average, the share across the EU is 75% and is influenced by countries such as Greece, Portugal, Hungary, Bulgaria, Croatia, and Poland. The share of farms with low economic strength – below 8000 SO – is also high, ranging from 64% in Poland to 94% in Romania. The fragmented agrarian structure, which is common to these countries, results in weak market power for agricultural holdings.

Table 1. Basic characteristics of farms in the analysed countries

Specification*	Poland	Romania	Lithuania	Serbia	Moldova
Total number of farms (thousands)	1,301.5	2,887.1	132.1	569.3	369.7
Including smaller than 10 hectares of agricultural area (%)	74%	96%	70%	88%	65%
Average farm size (hectares of agricultural area)	11.3	4.4	22.1	6.1	6.8
Average economic size (SO** in thousands of euros)	20.6	4.2	17.4	9.1	N/A
Share of farms smaller than 8 SO	64%	94%	75%	86%	N/A

* Data for: Poland, Romania and Lithuania for 2020, Serbia and Moldova for 2018.

** SO – the standard output of an agricultural product (crop or livestock) is the average monetary value of the agricultural output at farm-gate prices, in euros per hectare or per head of livestock. Each product has a regional SO coefficient, calculated as a five-year average value over a specified reference period. The total SO for a farm is determined by summing the SO per hectare of crops and per head of livestock, providing a measure of its overall economic size, expressed in euros.

Source: authors' elaboration based on Eurostat 2024 (Poland, Romania, Lithuania); National Bureau of Statistics of the Republic of Moldova 2024; Statistical Office of the Republic of Serbia 2024.

Survey data collected in 2020 from the following groups were used for the study: 710 farms in Poland, 1,000 in Lithuania, 900 in Romania, and 550 farms each in Serbia and Moldova (Stępień 2024). The sample size was determined by the project and the budget allocated for that period. A combination of purposive and random sampling methods was used. In the first stage, farms that met the study criteria were selected from a database of several thousand farms cooperating with agricultural advisory centres/agencies. Subsequently, a random group was selected. The selection criteria included the following parameters:

- agricultural area up to 20 hectares;
- SO up to €25,000.

The land size threshold was determined through brainstorming sessions with experts participating in the study. It is acknowledged that various sources suggest different thresholds for small farms, often five hectares (Davidova 2014; Galluzo 2015; Lowder, Skoet, and Raney 2016). However, this approach may be more applicable to African or Asian countries; in Europe, even in CEE countries, it potentially excludes larger farms that still operate on a small scale. The 20-hectare threshold was used by Gruchelski and Niemczyk (2016). Furthermore, adopting an economic size criterion makes it possible to exclude farms with a relatively small area but intensive production (e.g. industrial pig or poultry farming) while including slightly larger farms engaged in extensive production (e.g. cereal farms). Additionally, the €25,000 SO threshold aligns with the EU classification in the Farm Accountancy Data Network system (FADN 2018).

These two criteria of small (minor) farms are most often met by family farms, which is a very heterogeneous group. Family farms are characterised not only by land ownership and agricultural activities but also by employing family members as their labour force. Eurostat defines family farms as those where 50% or more of the regular agricultural labour force is provided by family members (Eurostat 2023). We therefore adopted this additional criterion in our research, allowing us

to exclude managers who, although formally defined as farmers (e.g. they belong to the agricultural social security system), work outside agriculture in practice.

After collecting the data and eliminating erroneous or incomplete answers and outlier observations, we retained a total of 3,575 holdings for further analysis: 672 from Poland, 838 from Romania, 998 from Lithuania, 523 from Serbia and 544 from Moldova (data available at https://doi.org/10.18150/RFEHAO).

Table 2. Basic characteristics of the farms

Specification	Poland	Romania	Lithuania	Serbia	Moldova
Production (€ per year)	12,100 (5,050)*	8,650 (6,025)	7,501 (4,440)	6,570 (3,637)	7,690 (5,057)
Total area (hectares of agricultural area)	11.1 (5.3)	7.6 (5.4)	10.4 (5.9)	6.2 (2.4)	6.3 (3.0)
Labour input (FWU**/farm)	1.61 (0.70)	1.46 (0.67)	1.10 (0.62)	1.65 (0.84)	1.54 (0.87)

*Number in brackets – standard deviation.

**FWU – Family Work Unit is the unit of measurement representing the work supplied by family members on each farm. One FWU is equivalent to the work of one person, full-time, for one year (e.g. 2120 hours in Poland).

Source: authors' elaboration based on survey data collected in 2020.

Table 2 shows the basic statistics for the farms surveyed. The average production values range from just over €6500 in Serbia to just over €12,000 in Poland. Agricultural land area varies from more than 6 hectares of agricultural area in Serbia and Moldova to 11 ha in Poland. These results differ from the data for total agricultural holdings presented in Table 1, which encompasses the whole population; in contrast, the survey population is restricted by specific criteria. Additionally, the differences between individual values (maximum and minimum) are smaller in our survey sample, suggesting that the group is relatively homogeneous and justifies a comparative analysis. However, the data vary significantly within each country, as evidenced by the high standard deviation values relative to the mean.

Methods

The research was conducted in several stages. The first stage involves survey interviews with farms, focusing on four areas: economic and production issues, environmental issues, socio-demographic factors, and the relationship of farms to the market. Prior to the survey proper, a pilot study was conducted on a select group of farms from each country to eliminate errors and clarify questions the respondents did not understand. The actual survey was carried out by staff from the agricultural advisory centres after receiving detailed instructions on how to conduct the questionnaire. The data were collected through face-to-face interviews, with both the interviewers and farm managers participating personally. The completed forms were handed over to the researchers, who cleaned and coded the data.

In the second stage, we developed a market integration index. This synthetic index incorporates the following elements:

1. The ratio of sold production to total farm agricultural production: A higher value indicates stronger market integration, thus increasing the index value.
2. The distribution channels for agricultural products: farmers selected from three possible options:
   A. Directly to the customer (e.g. from the farm, at the market, or at festivals).
   B. Using one intermediary channel (e.g. retail shop or restaurant).
   C. Using multiple intermediaries (e.g. selling to a collection point or processing plant). The assumption is that fewer intermediaries correlate with greater market integration and a higher index value.
3. The subjective evaluation of the farm's market position (bargaining power): Farmers rated their bargaining power in sale transactions on a Likert scale from 1 (very weak) to 5 (very strong). A higher score reflects a stronger market position and increases the index value.
4. Subjective evaluation of the farm's market position in purchase transactions: Similar to point 3, this assesses farmers' perceptions of their market position when purchasing means of production.
5. Type of sales contracts: Farmers indicated their contract type from three options:
   A. No formal contract (ad hoc).
   B. Short-term contracts (financial year).
   C. Long-term or renewed contracts: it is assumed that longer-lasting contracts indicate stronger market integration and thus increase the index.
6. Type of contract for input purchases: This follows the same structure as point 5.

Each element was scored from 0 to 1, resulting in a total score ranging from 0 to 6. The index was then scaled from 0 to 1. The elements of the synthetic index are shown in Table 3.

Table 3. Elements of the synthetic farm market integration index

Elements of the farm market integration index
1. Ratio of sold production to total farm production
2. Distribution channels for agricultural products
3. Subjective assessment of a farm's market position in sales transactions
4. Subjective assessment of a farm's market position in purchase transactions
5. Durability of sales contracts
6. Durability of purchase transactions

Source: authors' elaboration.

In the third stage, the level of social capital of farms was determined. According to Bourdieu and Wacquant (1992), 'Socialisation in this context is considered as having a permanent network of more or less institutionalised forms of acquaintance, mutual contact with people or group membership'. Three variables from the questionnaire were used for this assessment:

1. Farm managers' participation in training and lifelong education: This variable assesses the person's affiliation with specific groups encountered during these training sessions, courses, and lifelong education programs.
2. Farm managers' participation in cultural events: This includes attendance at cinemas, theatres, museums, concerts, festivals, and other similar activities. Here, 'participation' is defined as systematic participation rather than occasional attendance.
3. Farm manager's participation in professional organisations: This encompasses involvement in associations, clubs, interest groups, charities and other similar entities.

For each 'yes' response, the farmer received 1 point, resulting in a total score ranging from 0 to 3. The relationship between the level of a farm's social capital and the market integration index was then assessed. The results were presented separately for each element of social capital, as well as for the overall socialisation potential.

Next, to test the significance of differences between the mean market integration indices and each element of social capital in farms from each country, the Mann-Whitney U test was used. The qualitative predictors were the indexes for each element of social capital (0 for non-participation or 1 for participation); the dependent variables were the indicators of farm market integration. The Mann-Whitney test is the non-parametric equivalent of the Student's t-test for independent samples and was chosen because the data distribution did not meet the criterion of fitting a normal distribution, as confirmed by the Shapiro–Wilk test. This test is also appropriate when the quantitative variable is ordinal. The Mann-Whitney U test also does not require the assumption of equality of the groups being compared or homogeneity of variances within groups (Simsek 2023). The study met the assumptions for applying this test, namely:

- The dependent variable was measured on at least an ordinal scale (market integration index).
- Observations in the analysed groups were independent of each other, meaning that a person who belonged to one group could not belong to another compared group.
- The size of the compared groups was 2 (0 or 1, as shown in Table 4).

Finally, to test the significance of differences between the mean market integration indices at different levels of socialisation in each country, the Kruskal-Wallis test was used. This test is non-parametric and is applied to compare at least three groups regarding a quantitative variable, i.e., the indicators of farm market integration in this study (Simsek 2023). Because the Kruskal-Wallis test does not indicate which aggregations differ from each other, multidimensional post-hoc tests with Bonferroni correction were used to assess the significance of the differences in the dependent variable vector between groups of farms that differed in social capital levels (0, 1, 2, or 3 criteria for the social capital index) (Denkowska 2007). The calculations were performed using SPPS software.

Table 4. Numbers of farms that met the criteria to determine their level of social capital in each country (0 – did not participate, 1 – participated)

Criterion of level of social capital	Poland		Romania		Lithuania		Serbia		Moldova	
	0	1	0	1	0	1	0	1	0	1
1 – farm manager's participation in training, courses, lifelong education...	359	313	830	169	653	185	475	47	260	284
2 – farm manager's participation in cultural events...	484	188	221	778	279	559	173	350	175	369
3 – farm manager's participation in professional organisations...	616	56	522	477	614	224	344	179	191	353

Source: authors' elaboration based on survey data collected in 2020.

As Table 4 shows, farms in Moldova had the highest level of social capital (i.e. the share of 'yes' answers for all three criteria) at 62%, followed by Romania (48%), Lithuania (39%), and Serbia (37%). Farms in Poland had the lowest level, at only 28%.

Results and discussion

The countries surveyed have an average level of market integration, with a weighted average of 0.50 (on a scale from 0 to 1) based on the number of interviews conducted in each country. Poland achieved the highest score at 0.66, followed by Romania, Moldova and Serbia. Lithuania recorded the lowest index at 0.40. Poland's first place can be attributed to a fairly efficient contracting mechanism, a growing interest of farmers and processors in various forms of cooperation, and support for integration within the rural development policy (Guzdek and Petryk 2016; Nasalski 2019; Chorób 2022). Market integration brings tangible economic benefits to agricultural producers due to higher selling prices of agricultural products and increased income (Stępień and Polcyn 2021).

In contrast, agricultural integration in Lithuania has developed intermittently over recent decades due to farmers' reluctance to cooperate. This leads to weak bargaining power in both input and output markets (Droždz, Vitunskienė, and Novickytė 2021). Additionally, low levels of agricultural financing have been pointed out as a concern (fi-compass 2020).

The level of social capital across the surveyed countries is assessed as low, with a weighted average of 1.25 (on a scale from 0 to 3). This time, Poland scored the lowest at 0.82, while Moldova scored the highest at 1.85. In Poland, only slightly more than 8% of farms reported that their managers were members of various organisations. At the other extreme was Moldova, with 64%. Moldova and Poland achieved the highest share of holdings for the attribute 'long-life learning participation' (51.6% and 46.6%, respectively), while Serbia had the lowest participation rate (only 9.2%). For the attribute 'social events', all countries, except Poland, scored relatively high, with scores above 65% (Lithuania even reaching 78%). The full results for the integration and social capital index are presented in Table 5.

Table 5. Results for the index of market integration and social capital in the countries studied

Specification	Poland	Romania	Lithuania	Serbia	Moldova
Index of market integration; (0;1) range	0.66	0.52	0.40	0.47	0.48
Social capital index; (0;3) range	0.82	1.15	1.42	1.10	1.85
The share of farms for a given element of social capital (%):					
–long-life learning	46.6	22.1	16.9	9.2	51.6
–social events	28.0	66.7	77.9	66.9	67.1
–membership in organisations	8.3	26.7	47.7	34.2	64.2

Source: authors' calculations based on survey data collected in 2020.

Figure 1 presents the average values of the integration index for selected responses to the questions on social capital. It is evident that, in all cases, farms' market integration is higher when the manager responded 'yes' to questions about participation in long-life education, participation at social events and membership in various types of organisations. The only exception is the 'long-life education' variant for Romania, where the index level remained the same (0.52) regardless of whether the answer was 'yes' or 'no'. The biggest difference in index value between 'yes' and 'no' responses was observed for the 'membership' category, with an average of 0.09. For the 'social events' category, it was 0.06, and for 'education', it was 0.03.

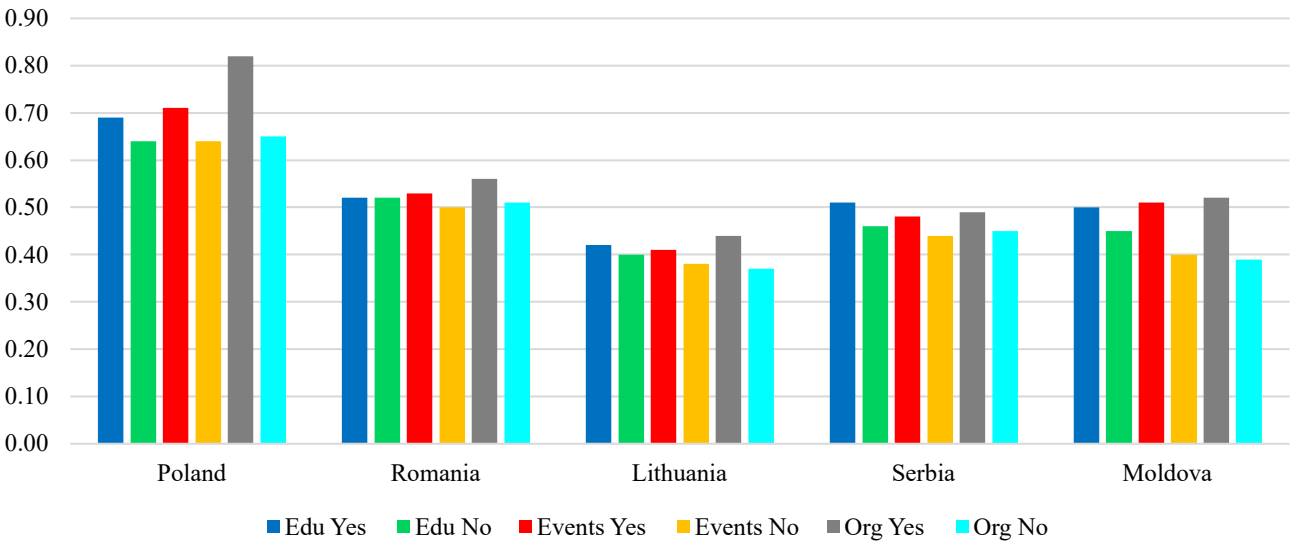

Figure 1. Average values of farms' integration index for selected social capital answers

Source: authors' elaboration based on survey data collected in 2020.

Next, the significance of differences between the mean market integration indexes and each element of social capital was estimated (Table 6).

Table 6. Statistical significance of differences in the mean market integration index for selected social capital answers (between 'yes' or 'no' answers)

Criterion of social capital	Poland	Romania	Lithuania	Serbia	Moldova
	p-value				
1 – farm manager's participation in training, courses, lifelong education...	**<0.001**	0.236	**0.017**	**0.009**	**<0.001**
2 – farm manager's participation in cultural events...	**<0.001**	0.303	0.138	**<0.001**	**<0.001**
3 – farm manager's participation in professional organisations...	**<0.001**	**<0.001**	**<0.001**	**0.013**	**<0.001**

* Mann-Whitney U-test p-level – differences are significant at $p < 0.05$. Bold p-values indicate statistically significant differences.

Source: authors' calculations based on survey data.

Regardless of the social capital criterion (1, 2 or 3), farms in Poland, Serbia and Moldova exhibited statistically significant differences in the market integration index between answers 'yes' and 'no'. No such differences were observed for the second criterion in Lithuania and for the first and second criteria in Romania (see Table 6). For all countries, a statistically significant difference was observed for criterion 3 (participating (or not) in various types of organisations). It can, therefore, be concluded that this factor is of key importance for integrating farms with the market.

Figure 2 presents the average market integration index values for the different levels of 'total socialisation' of the farm manager. The highest value of the integration index was recorded for farmers who were most strongly 'socialised', i.e. those who participated in long-life education, took part in social events and were members of various organisations (this is number 3 in the figure). This was observed for all analysed countries. Conversely, farmers who were the least 'socialised', i.e. those who were not participants in any of the above (number 0), achieved, on average, the lowest market integration index values. The difference is most evident in Poland, where the gap between levels 3 and 0 was 0.23, and the smallest difference was observed in Romania, at 0.07.

The next step was to determine whether the differences observed in Figure 2 were statistically significant. The results of these calculations are presented in Table 7. The table shows that, in Poland and Moldova, the differences are statistically significant for all comparison groups. As socialisation increases for each successive level (from 0 to 3), the level of market integration of farms significantly rises. In Lithuania, the differences are statistically significant for four out of the six pairs, while in Serbia, they are significant for three. Notably, Romania is the only country where no significant differences were found among any of the comparison groups.

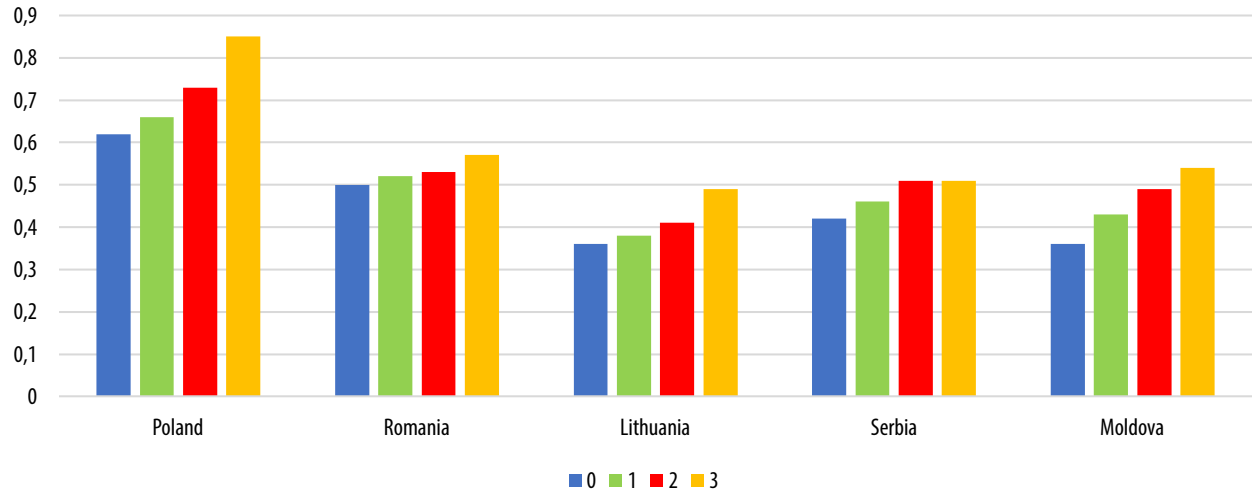

Figure 2. Average values of the integration index for the level of farms' social capital

* 0 means that the manager chose 'No' for the three questions about social capital, and 3 – 'Yes' was given three times.

Source: authors' elaboration based on survey data.

Table 7. Statistical significance of the differences between the market integration index for the various levels of socialisation (from 0 to 3)

Differences between various social capital groups	Poland	Romania	Lithuania	Serbia	Moldova
	p-value (Bonferroni method)				
Difference between 0 and 1	**.010**	1.000	.979	**.025**	**.024**
Difference between 0 and 2	**.000**	1.000	**.033**	**.000**	**.000**
Difference between 0 and 3	**.000**	.163	**.000**	.074	**.000**
Difference between 1 and 2	**.000**	1.000	.275	**.021**	**.000**
Difference between 1 and 3	**.000**	.055	**.000**	1.000	**.000**
Difference between 2 and 3	**.017**	.278	**.000**	1.000	**.000**

* Differences are significant at $p < 0.05$; bold p-values indicate statistically significant differences.

Source: authors' calculations based on survey data.

Generally, our findings confirm that higher social capital within farms contributes to greater market integration, a trend observed across CEE countries, with Romania being an exception. This finding aligns with Jones et al. (2008), Knickel and Maréchal (2018), Guinjoan, Badia, and Tulla (2016), and Trigkas, Partalidou, and Lazaridou (2021), all of whom noted that social capital plays an important role in various agricultural and non-agricultural value chains. The creation of such chains cannot take place without market integration of the farm. Our analysis is also supported by Farkas (2021), who revealed that rural communities with strong social capital can use their endogenous resources to improve their economic performance. They also have an advantage over communities with weak social capital. The use of these endogenous resources may translate into higher market integration of farms (Smędzik-Ambroży and Sapa 2022). Given the relatively low levels of social capital found among the farms under study, particularly in Poland, Lithuania and Romania, it is important to emphasise the need to increase social engagement among these entities, which should translate into enhanced market integration and an improved economic situation.

Conclusion

Agricultural income is a fundamental metric for assessing the financial performance of farms, the standard of living and social well-being. Economic outcomes are influenced by the volume of production sold and the prices received during transactions. Since these prices depend on the farmer's position in the supply chain, it follows that market integration positively determines the economic position of agricultural producers. It is particularly important for CEE countries, where small-scale farming and fragmented agrarian structures predominate.

This paper estimated indicators of social capital and market integration among farms in selected CEE countries based on data collected through face-to-face interviews with farm managers. In line with the main objective of the study, we examined the relationship between social capital levels and market integration among farms in these countries. The results showed that farmers who were strongly 'socialised', i.e. who participated in long-life education, took part in social events and were members of various organisations, exhibited the highest levels of market integration.

The identification of this relationship represents a significant contribution to the field and the most important added value of the research. The universal nature of our conclusions is underscored by the inclusion of data from five countries in the region. It can be concluded that empowering farms solely through agricultural production is insufficient to build market orientation; rather, social participation is crucial for increasing market integration.

Thus, farmers should actively engage in lifelong learning, participate in social events, and join organisations and associations. Additionally, a supportive institutional environment must be created to encourage farmers to strengthen their social activities. This could include programmes to support interest groups, social clubs, sports organisations and other clubs, and joint training initiatives or courses organised by local authorities or business entities. Furthermore, it is essential to widely promote best practices and the economic benefits of social participation through local media.

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Relacje kapitału społecznego i integracji rynkowej gospodarstw rolnych – przykład krajów Europy Środkowo-Wschodniej

Sytuacja ekonomiczna gospodarstw rolnych determinowana jest przez wiele czynników, szeroko opisywanych w literaturze przedmiotu. Jednym z takich czynników jest integracja rynkowa, kształtująca pozycję rolnika w łańcuchu dostaw żywności. Zaangażowanie rolników w procesy integracyjne może być związane z ich kapitałem społecznym, choć hipoteza ta nie została w pełni zweryfikowana. Celem artykułu jest zatem ocena relacji pomiędzy poziomem kapitału społecznego a integracją rynkową gospodarstw rolnych w wybranych krajach Europy Środkowo-Wschodniej. Analiza obejmuje Polskę, Rumunię, Litwę, Serbię i Mołdawię, a próba składa się łącznie z 3160 gospodarstw rolnych. Dane zostały zebrane za pomocą wywiadów bezpośrednich, w których osobiście uczestniczyli ankieterzy i kierownicy gospodarstw. Na podstawie tych danych obliczono autorski wskaźnik integracji rynkowej i określono poziom kapitału społecznego gospodarstw rolnych. Następnie przeprowadzono analizę porównawczą średnich wskaźników integracji rynkowej dla gospodarstw o różnym stopniu kapitału społecznego oddzielnie dla każdego kraju. Do zbadania istotności różnic wykorzystano test U Manna-Whitneya oraz test Kruskala-Wallisa. Zgodnie z wynikami badań można stwierdzić, że najwyższą wartość wskaźnika integracji rynkowej odnotowano dla tych rolników, którzy byli najsilniej „uspołecznieni", tj. uczestniczyli w kształceniu ustawicznym, brali udział w wydarzeniach społecznych i byli członkami różnych organizacji. Można zatem stwierdzić, że wzmacniając kapitał społeczny, gospodarstwa rolne dążą do zwiększenia integracji z rynkiem, co w konsekwencji może prowadzić do poprawy wyników ekonomicznych. Dlatego łagodzenie dysproporcji regionalnych i zwiększanie średniego poziomu wydajności rolniczej w krajach Europy Środkowo-Wschodniej powinno obejmować działania mające na celu zwiększenie kapitału społecznego w gospodarstwach rolnych, m.in. poprzez organizowanie warsztatów, szkoleń, wystaw, wspieranie organizacji producentów rolnych, promowanie kół gospodyń wiejskich, organizowanie imprez towarzyskich itp. Takie działania mogą być finansowane zarówno z drugiego filaru wspólnej polityki rolnej, jak i z budżetu samorządów lokalnych. Wkład przedstawionych w artykule badań koncentruje się na rzadko podejmowanej tematyce badania relacji między kapitałem społecznym a integracją rynkową w gospodarstwach rolnych. Wartość dodana składa się z analizy porównawczej pięciu krajów Europy Środkowo-Wschodniej oraz oszacowania autorskich wskaźników dotyczących kapitału społecznego i integracji rynkowej gospodarstw rolnych, które mogłyby być wykorzystane w przyszłości do podobnych badań.

Słowa kluczowe: integracja rynkowa, kapitał społeczny, gospodarstwa rolne, kraje Europy Środkowej i Wschodniej

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Earnings Manipulation in Times of COVID-19: Evidence from European Union Countries

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Abstract

The coronavirus pandemic has caused the world's worst crisis. No other situation in recent history has had such a negative impact on the global economy. Consequently, companies have been forced to adapt to the new circumstances and strive in this drastically changing world.
The objective of this study is to analyze the impact of the COVID-19 pandemic on earnings management practices in the context of European Union countries. We applied accruals-based methodology, and to estimate discretionary part of accruals we used Dechow, Sloan, and Sweeney model.
Our results confirm that companies reduced earnings management activities during COVID compared to pre-pandemic. This reduction is influenced by the economic situation of the country and companies, as well as by whether or not they are listed on the stock markets. In particular, we observed that the impact of COVID-19 on the change in manipulation is lower in countries with higher GDP, as well as in listed companies and those with negative results.
Our findings have both theoretical and practical implications for the practices of earnings management in European Union countries in times of pandemic. We contribute to the literature by improving understanding of the quality of corporate financial reporting during the COVID-19 period, one of the most important crisis occurred in recent history.

Keywords: earnings management, COVID-19, discretionary accruals, comparative analysis, European Union

JEL: G01, M41, O52, O57, P52

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Introduction

The global outbreak of the COVID virus in 2020 has led to immense impacts on all aspects of life, particularly on economic activities. This has resulted in a multiple effects, to name a few: disruptions in international trade and the implementation of national lockdowns, significant declines in product demand, heightened uncertainty due to media coverage, the spread of information (Haroon and Rizvi 2020), and extreme volatility for companies, affecting shareholders worldwide (Ali et al. 2022). As a result, there has been a sudden disappearance of investors and continued poor forecasts. This has forced many previously prosperous and thriving companies to adapt to the new situation.

In this context, companies must have responded to these unexpected circumstances. Previous earnings management literature has demonstrated that firms often manipulate their reported earnings during different crises in order to mitigate the impact of adverse market conditions (see, e.g., Choi, Kim, and Lee 2011; Cimini 2015; Callao, Jarne, and Wroblewski 2020). Therefore, it is a possible that companies were utilizing accounting discretion in attempt to adapt to the new conditions brought about by the current epidemic.

Thus, the aim of our study is to examine the impact of the COVID-19 pandemic on earnings management practices in the context of European countries. The coronavirus pandemic has triggered the worst crisis worldwide, including in European economies. This has exposed structural weaknesses and gaps in services, economic activity, and social protection. No situation in recent history has had such a negative impact on all of the world's economies, disrupting trade, supply chains, a collapse in international tourism and essential services, leading to widespread unemployment, many businesses closures, and an increase in poverty. This situation exposes businesses to unfavorable conditions simultaneously. Our research question therefore focuses on whether firms have changed their earnings management strategies in response to the pandemic, specifically examining how firms managed earnings just before and in the COVID-19 period.

The results confirm the impact of COVID-19 on earnings management practice in European countries. Specifically, there are significant differences in earnings manipulation between the periods: before COVID and COVID periods. Further analysis reveals that companies reduced their earnings management activities in the COVID period compared to before COVID period, particularly in France, Greece, Portugal, and Spain.

Additionally, after controlling for the effect of some economic and business variables, it is observed that the impact of COVID-19 on changes in manipulation is less pronounced in countries with higher GDP, as well as in listed companies and those with negative financial results.

We make several contributions to the literature on earnings management. Firstly, our study provides additional evidence on the impact of COVID-19 on earnings management. While there are currently several studies addressing this issue, the impact of the coronavirus has been significant and there is a need for more comprehensive results, detailed analysis and additional evidence. Improving our comprehension of the accuracy of corporate financial reporting during the COVID-19 pandemic is crucial.

Secondly, this study makes a significant contribution to the existing literature on corporate responses to COVID-19. Although there is a growing literature (Susak 2020; Usheva and Vagner 2020; Duc, Hiep, and Thanh 2021; He and Jianqun 2021; Buitink 2022), this is one of the few studies to examine earnings management practices in Jianqun relation to ongoing pandemic in the context of European Union countries. While there are studies that examine the impact of the coronavirus on individual European countries such as Croatia, Slovakia, United Kingdom, as far as we know, there is only one study that provides a global analysis of different countries from around the world (Buitink 2022). Our study investigates the behavior of managers in twelve European countries.

Finally, previous studies have only examined the impact of COVID-19 on earnings manipulation considered 2020 as a pandemic period. Therefore, since COVID-19 emerged in 2020 but spanned more than a year, previous studies may not have fully captured the true impact of the pandemic. This limitation has been acknowledged by some authors; see for example, Hsu and Yang (2022). In our study, we consider two-year observation period (2020 and 2021) to more accurately measure the impact of COVID-19.

The remainder of this paper is organized as follows: Section 2 reviews the existing literature on earnings management in times of COVID-19 and develops our research hypotheses. Section 3 explains our sample selection process. Section 4 describes our methods and data. Section 5 presents our results, and Section 6 concludes.

Literature review and research hypotheses

The COVID-19 pandemic began on the eve of 2020 when multiple cases of pneumonia were reported. Just a few months later, a global pandemic was declared due to the alarming spread and severity of the virus (World Health Organization 2020). This event was unpredictable, as no similar crisis has occurred in decades. While there have been different financial crises in different countries with varying impacts on economies, the coronavirus was an unprecedented event with a sudden and intense impact on economic activity and financial markets worldwide (Susak 2020).

The COVID-19 outbreak has had a significant impact on the economy, and led immediate economic crisis. Previous research has examined the impact of economic crises on earnings management; however, these studies have shown inconclusive results. For instance, while some studies, such as Da Silva et al. (2014), Flores et al. (2016), Callao, Jarne and Wroblewski (2020), have found an increase in earnings management during financial and economic crises, others, including Filip and Raffournier (2014), Cimini (2015), and Chintrakarn, Jiraporn, and Kim (2018) have documented a decline in earnings management during the economic crises. This decline has been attributed to poor firm performance, which reduces the usefulness of earnings management.

However, the economic crisis caused by COVID-19 is not comparable to any of the previous crises in the last decades. It was sudden and was caused by non-economic factors, resulting in significant economic and social consequence worldwide, as noted by Susak (2020). In the light of this, we will briefly discuss existing studies that have examined the impact of COVID-19 and its main outcomes in various countries.

The first group of studies confirms that companies are more likely to engage in earnings management during the COVID crisis. Susak (2020) conducted a study on the impact of COVID-19 on companies in Croatia. His empirical findings support the hypothesis that the aforementioned changes in the regulatory framework during the exceptional pandemic circumstances had a statistically significant positive effect on the relationship between earnings management and financial reporting delay. Similar results were found by Usheva and Vagner (2020) in their analysis of the impact of COVID-19 on Slovak companies.

In 2021, He and Jianqun conducted a study on the impact of the COVID-19 outbreak on Chinese listed companies. Their findings revealed an increase in accrual-based earnings management, indicating a higher level of earnings manipulation due to the negative effects of the coronavirus. In 2022, Ryu and Chae investigated whether distribution and service companies in Korea maintained the quality and reliability of their accounting information despite the economic changes brought about by the pandemic. The results of their analysis showed that these companies engaged in more earnings management during the COVID-19 period compared to before, suggesting their awareness of the uncertainty surrounding future business performance as the pandemic continued.

The second group of studies shows contradictory results, with some confirming a negative effect of COVID-19 on earnings management. For example, Duc, Hiep, and Thanh (2021) conducted a study on firms in Vietnam and found that during the pandemic, companies reduced their fraudulent behavior in financial statements. Similarly, Aljawaheri et al. (2021) studied firms in Iraq and also found a negative impact of earnings manipulation during the COVID-19 period. Buitink (2022) reached a similar conclusion in a study of 17 countries, including Taiwan, the United States, South Korea, China, Turkey, Sweden, Canada, Israel, Germany, Denmark, Finland, the United Kingdom, the Netherlands, Ireland, Brazil, Switzerland, and France.

Other studies have found no significant difference in earnings management as a result of the COVID-19 pandemic (Azizah, Wahyoeni, and Zoebaedi 2021; Hsu and Yang 2022; or Tenripada et al. 2022).

However, it should be noted that there is a limited number of studies and the results are not conclusive. Additionally, the majority of studies suggest that the pandemic did have an impact on earnings management. Therefore, our hypothesis, in its alternative form, is:

H_1: The outbreak of COVID-19 has led to changes in earnings management practices in the context of EU countries.

Sample selection and analysis period

The accounting and financial data were collected from Bureau Van Dijk's Amadeus database, which contains historical financial data from the annual reports of European companies.

The purpose of this article is to examine the phenomenon of earnings management in the context of European Union countries, specifically focusing on twelve countries[1] with data available

1 The initial sample considered all European Union countries (27 countries); nevertheless, because of the limitation of the database (missing data, outliers) we had to discard other European Union countries.

in the Amadeus database: Austria, Belgium, Finland, France, Germany, Greece, Italy, Netherlands, Poland, Portugal, Spain, and Sweden.

The analysis covers the period from 2017 to 2021, with the years 2017 to 2019 representing the period *before COVID-19* and its impact on companies. This is a period immediately prior to the outbreak of the pandemic. The years 2020 and 2021, referred to *COVID-19 period*, and are used to assess the direct impact of pandemic on company activities.

Thus, our final sample includes a total of 5,218 firms, which amounts to 26,090 firm-year observations (for each firm there are five observations: 5 years). For each variable, outliers were eliminated; the mean plus/minus three times the standard deviation. Table 1 shows the composition of our final sample.

Table 1. Composition of the sample: number of companies and total of observations by country

	Number of companies in our sample	Total number of observations
Austria	308	1,540
Belgium	376	1,880
Finland	563	2,815
France	487	2,435
Germany	361	1,805
Greece	111	555
Italy	1,637	8,185
Netherlands	83	415
Poland	166	830
Portugal	198	990
Spain	208	1,040
Sweden	720	3,600
	5,218	26,090

Source: author's own analysis.

Methodology

This study aims to evaluate the impact of the COVID-19 outbreak on earnings management in companies from twelve European Union countries. Various methods for measuring earnings management (*EM*) can be found in the literature, such as studies conducted by Dechow, Ge, and Schrand (2010) or Callao, Jarne, and Wroblewski (2014). Our study utilizes an accruals-based methodology and measures earnings management through discretionary accruals.

Accruals are defined as the portion of revenues and expenses that do not include receipts and payments, and are calculated directly as the difference between profit and operating cash flow. Total accruals are composed of non-discretionary accruals (*NDA*), which are the part of accruals that are difficult to manipulate, and discretionary accruals (*DA*), which are easier to manipulate; hence $TA = NDA + DA$. Since the discretionary and nondiscretionary components of accruals

are not directly observable, we use the model developed by Dechow, Sloan, and Sweeney (1995) to estimate them (equation 1)[2].

$$\frac{TA_{it}}{A_{it-1}} = \alpha_0 \frac{1}{A_{it-1}} + \alpha_1 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \alpha_2 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it}, \quad (1)$$

where:
TA_{it} represents the total accruals of firm i in period t, calculated as the difference between earnings (E) and cash flow from operations (CFO): $TA_{it} = E_{it} - CFO_{it}$.
ΔREV_{it} represents the change in revenue of firm i in period t compared to $t - 1$.
ΔREC_{it} represents the change in receivable of firm i in period t compared to $t - 1$.
PPE_{it} represents the property, plants and equipment of firm i in period t.
A_{it-1} represents the total assets of firm i in period $t - 1$, and is used as a deflator to avoid heteroscedasticity problems.
ε_{it} is the error term for firm i in period t.

Discretionary accruals (DA_{it}) are the residual of equation 1 and they are calculated by equation 2, where a_0, a_1, a_2 are the estimated values for the coefficients α_0, α_1 and α_2:

$$\frac{DA_{it}}{A_{it-1}} = \frac{TA_{it}}{A_{it-1}} - \left(a_0 \frac{1}{A_{it-1}} + a_1 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + a_2 \frac{PPE_{it}}{A_{it-1}} \right). \quad (2)$$

Once DA are obtained as a measure of earnings management, in order to evaluate the impact of the Covid outbreak on *DA*, first, we do a **descriptive analysis**. This includes calculating the magnitude of manipulation (mean of *DA*) and the direction of earnings management practices, either income-increasing or income-decreasing (sign positive or negative of *DA*). We analyze data for two periods: *before COVID period* (2017–2019) and *COVID period* (2020–2021).

After confirming that *DA* do not follow a normal distribution, we conduct a **Wilcoxon rank test** to determine if there is significant differences in earnings management between the two periods. To do this, we first calculate the absolute values of *DA* for each year and then, we calculate the means separately for *before COVID period* (the mean of the absolute value of *DA* for 2017–2019) and *COVID period* (the mean of the absolute value of *DA* for 2020 and 2021). Subsequently, we apply the test.

Finally, in order to test if COVID-19 had an effect on *DA* and if other variables (such as the economic position of countries, and economic and financial position of companies) influenced this possible effect, we built a **regression analysis model** (equation 3):

2 Callao, Jarne, and Wroblewski (2017) confirm that this model is the most popular accrual model used by authors in the earnings management literature to measure the discretionary component of accruals. They analyzed 195 papers and found that this model was used in about 30% of the studies.

$$absDA_{it} = \beta_0 + \beta_1 COVID + \beta_2 GDP_{it} + \beta_3 LOSS + \beta_4 LISTED_{it} + \beta_5 LIQU_{it} + \beta_6 SOLV_{it} + \beta_7 ROA_{it} + \beta_8 COVIDxGDP_{it} + \beta_9 COVIDxLOSS_{it} + \beta_{10} COVIDxLISTED_{it} + \beta_{11} COVIDxLIQU_{it} + \beta_{12} COVIDxSOLV_{it} + \beta_{11} COVIDxROA_{it}. \quad (3)$$

The **dependent variable**, $absDA_{it}$, represents the absolute value of discretionary accruals for firm *i* in period *t* and is used as a proxy for earnings management. We have chosen to use the absolute value of *DA* because our focus in on the impact of COVID-19 on earnings management, rather than the direction in which earnings are managed (i.e. whether they are inflated or deflated). Therefore, the sign of the variable is not relevant to our objective[3].

The **independent variable** is *COVID*. It is a dichotomous variable that takes a value of 1 for fiscal year: 2020 and 2021 (*COVID period)*, and the value of 0 for observations from 2017 to 2019 (*before COVID period*). A similar methodology has been used in Aljawaheri et al. (2021), Duc, Hiep, and Thanh (2021) or Buitink (2022), among others. We expect earnings management to have been affected by pandemic, making the *COVID* variable significant. However, previous studies have reached conflicting results on the direction of this impact (the increase or decrease), so we cannot determine the expected sign.

Control variables: as mentioned above, we include certain variables to control for the impact of the macroeconomic environment and certain aspects of companies. These variables are:

- *GDP*: this is the natural logarithm of each country's GDP per capita. We introduce this macroeconomic variable to take into account that the different economic position of different European countries can affect to earnings management by companies. According to Naceur, Ghazouani, and Omran (2007), GDP directly reflects the real state of the economic environment. Several studies, such as those by Shen and Chih (2005), Chih, Shen, and Kang (2007), and Callao, Jarne, and Wroblewski (2020) suggests that strong local markets constrain earnings management. Other research also supports this finding. For example, Shen and Chih (2005) and Chih, Shen, and Kang (2007) confirmed that higher GDP per capita reduces the extent of earnings management. In other words, firms in wealthier countries are generally less likely to engage in earnings management. However, Conrad, Cornell, and Landsman (2002), Cohen and Zarowin (2007) argue that firms have a greater tendency to engage in earnings management during a good economic situation. This concern is based on the observations that investors' reaction to earnings disappointment is more adverse during an economic upturn. The findings of Conrad, Cornell, and Landsman (2002) have also motivated the studies conducted by Rajgopal, Shivakumar, and Simpson (2007) who confirmed that earnings management

3 Warfield, Wild and Wild (1995) point out that the absolute value of (unsigned) discretionary accruals is a good proxy for the combined effect of income-increasing and income-decreasing earnings management. There are many studies that have used unsigned discretionary accruals including Warfield, Wild, and Wild (1995), Becker et al. (1998), Bartov, Gul, and Tsui (2000), Klein (2002), Lin and Paananen (2005), Callao, Jarne, and Wroblewski (2021), among others.

is higher when the economy is doing well. Therefore, the expected the relationship between GDP and earnings management is inconclusive.

- *LISTED*: it is a dichotomous variable that takes a value of 1 if a firm is listed and 0 if it is not. We include this variable to assess the difference in the extent of earnings management between listed and unlisted companies in European countries. We expect a positive relationship with the dependent variable. Previous studies have suggested that listed and unlisted firms differ in their approach to earnings management due to factors such as investor pressure, market pressure, and shareholder influence on managers of listed companies. Some of these studies include Rangan (1998), Degeorge, Patel, and Zeckhauser (1999), Vander Bauwhede and Willekens (2003), Ball and Shivakumar (2006), Burgstahler, Hail, and Leuz (2006), and Givoly, Hayn, and Katz (2010), among others.
- Additionally, we include four variables that reflect the economic and financial situation of companies and their overall performance. These variables can demonstrate their resilience to the negative effects caused by COVID-19:
  - *LIQU*: it is the liquidity ratio for firm *i* in period *t*, which is defined as the ratio of current assets to current liabilities.
  - *SOLV*: it is the solvency ratio for firm *i* in period *t*, defined as the ratio of total assets to total liabilities.
  - *LOSS*: it is a dichotomous variable that takes value of 1 if the company´s earnings is negative, and 0 otherwise.
  - *ROA*: it is the return-on-assets ratio for company *i* in period *t*, defined as the ratio of operating profits to total assets.

We believe that better liquidity, solvency and profitability of the company, the less earnings management is expected. This is supported by previous studies such as Sweeney (1994), Iatridis and Kadorinis (2009), Charitou, Lois, and Santoso (2012). So, we expect the coefficients for LIQ, SOLV and ROA to be negative, while the coefficient for the LOSS variable to be positive.

Finally, we include six new variables as a product of COVID variable and each of the rest of variables (COVID x Z, with Z = GDP, LISTED, LIQU, SOLV, LOSS, ROA). Our goal is to test the influence of these variables on the impact of COVID on earnings management. As *COVID* is a dichotomous variable, with a value of 0 for observation from 2017 to 2019 (*before COVID period*), we cannot predict the sign of the coefficients for these variables. The unprecedented nature of this crisis makes it difficult to anticipate the influence of these variables on earnings management.

Table 2 presents descriptive statistics for the variables included in the regression.

The descriptive statistics show that the highest value of discretionary accruals is 0.4991, while the lowest value is 0.0000. As for the liquidity, solvency or ratio of return on assets, the mean values indicate adequate level of indices. We must take into consideration that the descriptive statistics also enclose the period *before COVID*. The minimum values of the following indices show a very unfavorable situation of the companies and correspond to the *COVID period* of the companies.

The descriptive statistics of GDP (gross domestic product) refers to the mean value of the logarithm of GDP per capita, where 11.0061 refers to Sweden, with the highest GDP per capita, and 9.5371 corresponds to Poland with the lowest GDP per capita. The variables: *COVID x GDP, COVID x LIQU, COVID x SOLV,* and *COVID x ROA* are conditioned by the Covid period; therefore, we may observe reduced values of means in the pandemic period.

Table 2. Descriptive statistics for variables in equation (3)

	Mean	Max	Min	St. Dev
AbsDA	0.0233	0.4991	0.0000	0.0271
GDP	10.5706	11.0061	9.5371	0.3046
LIQU	1.8661	6.9991	0.0001	1.2321
SOLV	1.9542	6.9776	0.0054	0.9715
ROA	0.1400	0.7473	–0.0505	0.0962

Source: author's own analysis.

Table 3 shows the frequencies for dichotomous variables in equation (3). The sample consists of 40% of the observations from the *COVID period* (years: 2020 and 2021), and 60% from the period before the pandemic (period of 2017–2019). Additionally, 17.78% of firms reported a loss in at least once during our sample period. However, when considering only the *COVID period*, this percentage increases to 72.97% of the firms reporting a loss. Lastly, our sample is composed of 18.36% of listed companies.

Table 3. Frequencies for dichotomous variables in equation (3)

Variable		% affirmative
COVID	2020–2021	40.00
	2017–2019	60.00
LOSS	Loss company	17.78
	No loss company	82.22
LISTED	Listed companies	18.36
	Unlisted companies	81.64

Source: author's own analysis.

The correlations between the variables in regression (3) are shown in Table 4. As can be seen, the correlations between the variables are low or moderate and the signs of the correlations are mostly expected.

Table 4. Results of correlation analysis between the variables included in the regression

	COVID	*GDP*	*LOSS*	*LISTED*	*LIQU*	*SOLV*	*ROA*	*Covid x GDP*	*Covid x LOSS*	*Covid x LISTED*	*Covid x LIQ*	*Covid x SOLV*	*Covid x ROA*
COVID	1												
GDP	−0.0458**	1											
LOSS	0.0456**	−0.0497**	1										
LISTED	0.0340**	−0.0938**	0.1173**	1									
LIQU	0.0390	0.0353**	−0.0148*	−0.0201**	1								
SOLV	0.0422**	0.0311	−0.0226**	0.0209**	−0.0147	1							
ROA	−0.0309**	0.1737**	−0.0815**	−0.1755**	0.0215**	−0.0941**	1						
COVID x GDP	0.3993*	0.0704**	0.0438**	−0.0022	0.0608	0.0624	0.0944	1					
COVID x LOSS	0.3604**	−0.0265**	0.3327**	0.0721**	−0.0493	0.0706	−0.0655**	0.3576**	1				
COVID x LISTED	0.3448**	−0.0389**	0.0915**	0.2937**	−0.0119	0.0124*	−0.1042**	0.3413**	0.2313**	1			
COVID x LIQ	0.0339	0.0237**	−0.0089	−0.0127*	0.5321**	−0.0829	0.0436*	0.0351**	−0.0625	−0.0672	1		
COVID x SOLV	0.4894**	0.0251**	0.0222**	0.0199	−0.0324	0.5047**	−0.0492**	0.4892**	0.1761**	0.1833**	0.0128*	1	
COVID x ROA	0.3067**	0.1156**	−0.0197**	−0.0785**	0.0296	−0.0421**	0.4474**	0.4111**	0.1814**	0.1272**	0.0392**	0.2908**	1

* Significant at 0.05.

** Significant at 0.01.

Source: author's own analysis.

Results

Descriptive analysis

First, we analyze the extent of earnings management (represented by the mean of DA) during two time periods: *before COVID period* (2017–2019) and *COVID period* (2020–2021). Table 5 presents the means of DA values for each country and for the EU countries as a whole during these two periods. We note that, overall, earnings management was lower in *COVID period* for sample of whole European countries. Additionally, in *before COVID period,* manipulation was used to increase earnings, but this changed in *COVID period*, with earnings being managed downward.

If we do an analysis by country, we can observe some cases (Greece, Poland, Portugal, Spain and Sweden) where earnings management declined in *COVID period* (absolute value of mean of DA is lower), In other countries, such us Belgium, Finland, Germany, and Netherlands, the earnings management raised in *COVID period* (absolute value of mean of *DA* is higher),

In contrast, other countries such as Belgium, Finland, Germany, and the Netherlands saw an increase in earnings management in *COVID period*, with a higher absolute value of the mean of *DA* and with earnings-decreasing practices in both periods (negative means).

In Austria and France, the earnings management declined in *COVID period* and the direction of manipulation shifted from earnings-increasing to decreasing earnings. However, in Italy, the companies increased their earnings management and the sign changed from earnings-decreasing *before COVID* to earnings-increasing in *COVID period.*

In summary, it can be confirmed that companies across Europe have altered their earnings management practices due to the impact of COVID-19. A consistent trend was observed in all European countries except Italy. The changes observed in DA in the *COVID period* resulted in lower reported earnings compared to what would have been shown if the manipulation had been continued.

Table 5. Means of DA before and in COVID period by country

Means of DA	Before COVID period	COVID period
	2017–2019	2020–2021
Austria	0.00132	−0.00085
Belgium	−0.00713	−0.00864
Finland	−0.00223	−0.00352
France	0.00422	−0.00155
Germany	−0.00469	−0.00918
Greece	0.01670	0.01073
Italy	−0.00044	0.00119
Netherlands	−0.00192	−0.00508
Poland	0.00789	0.00476

Means of DA	Before COVID period	COVID period
	2017–2019	2020–2021
Portugal	0.00717	0.00688
Spain	0.01092	0.00883
Sweden	0.00412	0.00296
All sample countries	0.00110	–0.00014

Source: author's own analysis.

In Table 6 we present the percentages of firms in different European countries that engaged in earnings-increasing and earnings-decreasing practices during the two distinct periods. Our findings indicate that, prior to the coronavirus outbreak, a higher number of companies utilized earnings management to increase their earnings. Across all European countries, the proportion of companies exhibiting positive signs of discretionary accruals was significantly greater than those showing negative signs.

In France, Portugal, Sweden, and Poland, twice as many companies managed their earnings upward compared to those that managed them downward. In Spain, this percentage increased to 76.3%, while in Greece, the number of companies employing earnings management to increase their earnings was more than four times the number of companies using it to decrease their earnings. Therefore, we can determine that, before the pandemic, the predominant strategy among European companies was to manage their earnings to order to increase them.

However, in *COVID period,* companies have altered their earnings management practices. In all countries included in the study, with the exception of Italy and Poland, there has been a decrease in the percentage of companies engaging in upward earnings management. In Poland, the proportion of firms engaging in both upward and downward earnings management has become almost equal in both periods. Nevertheless, in Italy, the majority of companies have continued their strategy of earnings-increasing in response to the pandemic.

We also observe that, among the countries where there has been a decline in the percentage of companies engaging in upward earnings management in *COVID period*, only Belgium and Germany have seen more companies managing their earnings downwards than upwards.

Table 6. Nature of earnings management by country: earnings increasing vs. earnings decreasing in COVID-19 and before (%)

	Before COVID period		COVID period	
	2017–2019		2020–2021	
	Positive DA	Negative DA	Positive DA	Negative DA
All sample countries	61.9	38.1	59.3	40.7
Austria	53.9	46.1	51.1	48.9
Belgium	51.3	48.7	49.9	50.1
Finland	53.1	46.9	52.3	47.7

	Before COVID period		COVID period	
	2017–2019		2020–2021	
	Positive DA	Negative DA	Positive DA	Negative DA
France	63.6	36.4	55.2	44.8
Germany	51.6	48.4	44.2	55.8
Greece	80.8	19.2	76.1	23.9
Italy	57.5	42.5	61.4	38.6
Netherlands	57.4	42.6	51.8	48.2
Poland	70.5	29.5	70.2	29.8
Portugal	64.8	35.2	63.1	36.9
Spain	76.3	23.7	74.8	25.2
Sweden	62.5	37.5	61.1	38.9

Source: author's own analysis.

Based on the results of the descriptive analysis, it can be concluded that companies in most European countries were affected by the exceptional situation of the COVID-19 outbreak. As a result, they tended to manage their earnings less in *COVID period*, while also being more inclined to manage them downward before pandemic.

Wilcoxon test results

In order to determine whether there are statistically significant differences in earnings management between the two periods analyzed, we conduct the Wilcoxon test. The results, shown in Table 7, indicate a significant difference at 5% level between the periods *before COVID* and *in COVID-19* in the sample countries as a whole. Moreover, we can conclude that earnings management decreased in *COVID period,* as evidenced by the higher number of companies and mean rank for negative ranks (*COVID period-before COVID period*).

When examining companies from various countries individually, the results of the Wilcoxon test indicate significant differences in earnings management between the two periods for Belgium, France, Germany, Greece, Portugal, Spain, and Sweden. In three of these countries (Belgium, Germany, and Sweden), there was an increase in earnings management *in COVID* period, as evidenced by a higher number of companies and a higher mean rank for positive ranks (*COVID period-before COVID period*). Conversely, in France, Greece, Portugal, and Spain, there was a decrease in manipulation in COVID-19 period. However, for companies from Austria, Finland, Italy, Netherlands, and Poland, there were no statistically significant differences in earnings management between the two time periods.

Table 7. Results of Wilcoxon test

	COVID-Before COVID	N	Mean Rank	Sum of Ranks	Z	Asymp. Sig. (2-tailed)
All sample countries	Negative Ranks	2697[a]	2 610.93	7 041 689.00	– 2.146[a]	0.032**
	Positive Ranks	2521[b]	2 607.97	6 574 682.00		
Austria	Negative Ranks	170[a]	150.21	25 536.00	– 1.114[a]	0.265
	Positive Ranks	138[b]	159.78	22 050.00		
Belgium	Negative Ranks	185[a]	180.68	33 425.00	– 0.955[a]	0.098***
	Positive Ranks	191[b]	196.08	37 451.00		
Finland	Negative Ranks	301[a]	276.15	83 120.00	– 0.968[a]	0.333
	Positive Ranks	262[b]	288.73	75 646.00		
France	Negative Ranks	266[a]	245.94	65 421.00	– 1.933[a]	0.053***
	Positive Ranks	221[b]	241.66	53 407.00		
Germany	Negative Ranks	159[a]	172.18	27 376.00	– 2.668[a]	0.008*
	Positive Ranks	202[b]	187.95	37 965.00		
Greece	Negative Ranks	72[a]	56.60	4 075.00	– 2.845[a]	0.004*
	Positive Ranks	39[b]	54.90	2 141.00		
Italy	Negative Ranks	816[a]	828.06	675 693.00	– 0.279[a]	0.780
	Positive Ranks	821[b]	810.00	665 010.00		
Netherlands	Negative Ranks	45[a]	44.40	1 998.00	– 1.158[a]	0.247
	Positive Ranks	38[b]	39.16	1 488.00		
Poland	Negative Ranks	89[a]	80.99	7 208.00	– 0.447[a]	0.655
	Positive Ranks	77[b]	86.40	6 653.00		
Portugal	Negative Ranks	125[a]	103.13	12 891.00	– 3.766[a]	0.000*
	Positive Ranks	73[b]	93.29	6 810.00		
Spain	Negative Ranks	120[a]	107.69	12 923.00	– 2.365[a]	0.018**
	Positive Ranks	88[b]	100.15	8 813.00		
Sweden	Negative Ranks	338[a]	360.00	121 681.00	– 1.451[a]	0.095***
	Positive Ranks	382[b]	360.94	137 879.00		

[a] COVID period < Before

[b] COVID period > Before

* Significance at 1%.

** Significance at 5%.

*** Significance at 10%.

Source: author's own analysis.

Regression results

Table 8 presents the results of regression (3) on the impact of COVID-19 on earnings management activities in European Union countries.

The coefficient for the COVID variable is negative (–0.021) and significant at 10%, indicating that firms reduced their earnings management activities *in COVID period* compared to the period before COVID. This finding is not in line with some previous research on the impact of COVID on earnings management, such as Susak (2020), He and Jianqun (2021), Ryu and Chae (2022), and Tenripada et al. (2022), which suggest that earnings management behavior increases as companies face financial difficulties. However, Duc, Hiep, and Thanh (2021) found similar results to ours. As the authors note, this result is easily understandable. Due to the effects of COVID-19, companies' operations were disrupted, and investors and the market are more understanding of the impact of the pandemic and show greater tolerance for companies' poor performance. As a result, managers are less likely to engage in earnings management during the pandemic period than before.

Similarly, Azizah, Wahyoeni, and Zoebaedi (2021) have confirmed that the global COVID pandemic has made managers more cautious in their company management. While companies have continued to engage in earnings management during the pandemic, the numbers have been significantly smaller compared to *before COVID*. As the author explains, this is due to the fact that if managers strive to show strong company performance during the pandemic, even if it is not reflective of the actual situation, it may raise suspicion from various stakeholders such as the public, analysts, auditors, investors, and shareholders. Such aggressive actions by managers can also jeopardize their position within the company.

The GDP variable is also significant, with a positive coefficient of 0.008 at a 1% level of significance. This suggests that companies in wealthier countries engage in more earnings management compared to those in countries with lower GDP. This finding is not consistent with the previous literature on earnings management, such as Shen and Chih (2005) and Chih, Shen, and Kang (2007). However, Zamanianfar et al. (2021) argue that this result can be attributed to the decrease in GDP growth, which has led corporate executives to choose earnings management in order to mitigate the negative impact of macroeconomic conditions. In times of economic downturn, managers may feel pressure to maintain positive expectations and avoid creating uncertainty about economic conditions, even when the economy is performing well. This is important for maintaining investors' confidence and avoiding potential negative consequences for the company.

All European countries have suffered severe production losses due to COVID-19 crisis. Nevertheless, it is expected that companies will respond more efficiently to adverse circumstances under better macroeconomic conditions. This may lead managers in these economies to adopt more earnings management practices, as our results confirm.

The variables LISTED, LOSS, and ROA are all significant at 1% in explaining the earnings management, and the coefficients have the expected signs. The first two have a positive coefficients (0.006 for LISTED and 0.008 for LOSS), while ROA has a negative coefficient (–0.003). This indicates that

listed companies and those with a weaker economic position are more likely to engage in earnings management practices. On the other hand, the variables LIQU and SOLV are not significant, suggesting that the specific financial situation does not explain earnings management.

Previous studies have found consistent results regarding the impact of listing on earnings management. Rezaee (2005) and Givoly, Hayn, and Katz (2010), along with other researchers, have confirmed that listed companies are primarily motivated by economic pressures and incentives to meet stock market requirements and investor expectations when they engage in earnings management. Prior literature also suggests that firms reporting losses and worse economic position are more likely to engage in earnings management (Alhadab and Clacher 2018).

Table 8. Ordinary least squares regression results

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Significance
	B	Std. Error	Beta		
(Constant)	– .055	.008		– 7.296	.000
COVID	– .021	.012	-.389	– 1.829	.067
GDP	.008	.001	.085	10.431	.000
LISTED	.006	.001	.085	10.577	.000
LIQU	2.541E-8	.000	.002	.217	.828
SOLV	9.031E-5	.000	.008	1.002	.317
LOSS	.008	.000	.117	16.761	.000
ROA	– .003	.001	-.101	– 12.438	.000
COVIDxGDP	.002	.001	.374	1.752	.080
COVIDxLISTED	.001	.001	.011	1.329	.084
COVIDxLIQU	4.721E-8	.000	.002	.255	.799
COVIDxSOLV	7.236E-5	.000	.005	.556	.578
COVIDxLOSS	.002	.001	.013	1.762	.078
COVIDxROA	.000	.000	.010	.878	.380
F-value	128.578*				

$$absDA_{it} = \beta_0 + \beta_1 COVID + \beta_2 GDP_{it} + \beta_3 LOSS + \beta_4 LISTED + \beta_5 LIQU_{it} + \beta_6 SOLV_{it} \quad (3)$$

Source: author's own analysis.

After analyzing the impact of COVID on earnings management, we can see that the variables COVIDxGDP, COVIDxLOSS and COVIDxLISTED are significant at 10% and the sign of their coefficients is positive. This suggests that in *COVID period*, there was a decrease in earnings management but it was less pronounced in firms from more prosperous countries (–0.021+0.002), in listed firms (–0.021+0.001) and in loss-making firms (–0.021+0.002). It is important to note that while the coefficients are still negative, they are less negative, indicating a less significant decrease in manipulation. However, this does not necessarily mean that earnings management was higher than *before COVID period*.

Literature has shown that given the differences in the economic and institutional conditions in the different countries, the companies respond to macroeconomic instability through earnings management tactics differently, see for example, Leuz, Nanda, and Wysocki (2003), Geiger, Quirvan, and Hazera (2007), Reverte (2008), Tylsch (2009), among others.

These variations can be attributed to factors such as the level of development of the capital market in each country, the level of pressure from investors on companies, and the economic and financial conditions of firms in different European markets. Therefore, based on the above results we can confirm our hypothesis: there were changes in earnings management because of the COVID outbreak. These changes were conditioned by the economic situation of the country and by the particular economic situation and visibility of each company.

Conclusions

Since the outbreak of COVID-19, companies have been facing increased uncertainty and deteriorating business outcomes. This complex situation has made companies more susceptible to the temptation to respond to balance sheet numbers through earnings management practices. The purpose of this study is to examine the impact of COVID-19 on earnings management practices of companies in European Union countries. Specifically, we aim to determine whether firms have altered their earnings management strategies in response to the pandemic, which has caused a global economic crisis and created unfavorable conditions for firms.

Having controlled for the effect of some economic and business variables on earnings management, our results confirm the impact of COVID-19 on earnings management activities of sample firms. Due to the COVID outbreak, all European countries analyzed have changed their earnings management activity, as we verified significant differences between *before COVID* and *COVID* periods. In fact, a detailed analysis confirms that EU companies have generally reduced their earnings management activities during the *COVID period* compared to the pre-COVID period. Thus, in the pandemic, companies continued to engage in earnings management, but in much smaller volumes than *before COVID*. This activity is particularly pronounced in France, Greece, Portugal and Spain.

Secondly, the decrease in earnings manipulation caused by the pandemic has been mitigated by certain factors, specifically the country's macroeconomic conditions, the status of being a publicly listed company and reporting losses.

Further research could be extended to other European countries to determine the specifics of different corporate and legal environments, and consider the use of measures that could capture other aspects of financial reporting quality. Additionally, it might be intriguing to extend the analysis to other countries beyond the European Union.

Lastly, our research provides preliminary findings on the topic. Only two years of accounting data are currently available. As data for more years become available, further investigation into impact of COVID-19 on financial reporting quality in post-pandemic years would be recommendable.

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Kształtowanie wyniku finansowego w czasach COVID-19. Doświadczenia krajów Unii Europejskiej

Pandemia COVID-19 spowodowała najgorszy kryzys w skali światowej. Żadna inna sytuacja w najnowszej historii nie miała tak negatywnego wpływu na globalną gospodarkę. W związku z tym firmy musiały dostosować się do nowych okoliczności i przetrwać w tym drastycznie zmieniającym się świecie. Celem niniejszego badania jest analiza wpływu pandemii COVID-19 na praktykę kształtowania wyniku finansowego w krajach Unii Europejskiej. Zastosowano metodologię opartą na rozliczeniach międzyokresowych, a do oszacowania uznaniowej części rozliczeń międzyokresowych wykorzystano model Dechowa, Sloana i Sweeneya.

Wyniki badania potwierdzają, że firmy ograniczyły działania związane z kształtowaniem wyniku finansowego w czasie pandemii COVID-19 w porównaniu do okresu przed pandemią. Wpływ na to miała sytuacja gospodarcza państw i firm, a także to, czy firmy te były notowane na giełdach. W szczególności zaobserwowano, że wpływ pandemii na zmiany w kształtowaniu wyniku finansowego był mniejszy w krajach o wyższym PKB, a także w spółkach giełdowych i tych osiągających niekorzystne wyniki finansowe.

Zaprezentowane wyniki badań mają zarówno teoretyczne, jak i praktyczne implikacje dla praktyki kształtowania wyniku finansowego w krajach Unii Europejskiej w czasie pandemii. Wnoszą również wkład do literatury przedmiotu, zwiększając poziom zrozumienia wagi jakości sprawozdawczości finansowej firm w okresie pandemii COVID-19, jednego z najważniejszych kryzysów, jakie miały miejsce w najnowszej historii.

Słowa kluczowe: kształtowanie wyniku finansowego, COVID-19, uznaniowe rozliczenia międzyokresowe, analiza porównawcza, Unia Europejska

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Food Processing Industries in Visegrad Countries in Global Value Chains (1995–2018)

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Abstract

The aim of the article is to evaluate the position in global value chains (GVCs) of food processing industries in the Visegrad countries (V4; Poland, Czechia, Hungary and Slovakia) between 1995 and 2018. To identify the intensity and forms of integration in GVC of these industries in each country and to compare it to the other V4 countries, we employed complex methods to measure the importance of foreign demand, (backward and forward) participation and position in GVCs, the territorial context of integration, and shifting patterns of the integration into GVCs using data from the TiVA database.

Our findings revealed variations in the integration of food processing industries in GVCs in the V4 countries. Common characteristics and trends were observed (e.g., increasing participation) until the Great Recession before stalling, increasing integration into European value chains, and absorption of foreign value added mostly from services industries. These trends are consistent with findings from previous studies.

A significant contribution of this study is that it reveals how food exports from the Czech Republic, Hungary and Slovakia are mostly linked to increased GVC participation. Notably, food processing industries in Hungary and Slovakia have continued to increase their participation in GVCs even after the Great Recession. Given the evidence of beneficial economic outcomes from increased participation in GVCs, this implies that the food processing industries in Hungary and Slovakia will become more competitive. Food industries in Poland and Hungary are positioning themselves relatively more downstream in the GVCs, while shifts in the Czech Republic and Slovakia are increasingly upstream. Given evidence of beneficial economic outcomes from increased participation in GVCs being more downstream in the GVCs, the V4 countries will need to evaluate how their trajectories may impact the future wellbeing of businesses and employees working in these industries.

Keywords: European Union, fragmentation of production, participation, value added, vertical specialization

JEL: F14, F15, F20

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Introduction

In recent decades, one of the most important economic processes in the world economy is the increasing fragmentation in the production of goods and services, resulting in a deeper international division of labor and larger returns from specialization. World trade and production are increasingly structured around, and affected by, what is commonly referred to as global value chains (GVCs) (De Backer and Miroudot 2013; Gereffi 2014).

For countries in economic transition in Central Europe, foreign direct investments and trade within GVCs have been considered one of the most important vehicles of economic development and competitiveness (Kersan-Škaabić and Barisic 2023) since the introduction of the market economy and their liberalization in the early 1990s. In these transitional economies, integration within GVCs was promoted as a vehicle of technological development, with the potential to foster the growth of knowledge-based industries and further lead to their specialization in higher-value-added industries. This integration aims to enable their convergence with developed economies (Jurčić, Franc, and Barišić 2020).

It is understandable that these higher-value-added industries, such as automobiles, electronics, pharmaceuticals, and services, received significant attention and were intensively studied in literature in the Central and Eastern European (CEE) context (Kaminski and Ng 2005; Ženka and Pavlínek 2013; Cieślik, Biegańska, and Środa-Murawska 2016; 2019; Cieślik 2017; 2019; Antalóczy, Gáspár, and Sass 2019; Nacewska-Twardowska 2022; Venger, Romanovska, and Chyzhevska 2022). However, other industries in the region are becoming integrated into global value chains.

The agri-food sectors became increasingly organized within GVCs, led by food processors and retailers (De Backer and Miroudot 2013). Final food products consumed are increasingly organized across multiple countries and make use of inputs sourced from around the world. However, it is necessary to emphasize that the nature of products and processes in agri-food chains differ from those in other sectors. Transactions in agri-food chains are characterized by 1) frequency and time playing a critical role in production and logistics, 2) high uncertainty and high specificity of assets at various levels in the chain, and 3) factors such as the perishability of raw and intermediate processed products in the food supply chain (Trienekens 2011). Interactions among actors at different levels of the value chain thus become complicated, and more complex types of coordination relationships can be found. It is therefore relevant to argue that the integration of the agri-food sectors in the GVC will have a different character than for sectors that are traditionally associated with GVCs, such as engineering or electronics.

Additionally, as indicated by the OECD (2020), international trade in agriculture and food products plays a key role in providing consumers with greater choice and nutrition, lowering prices and production costs, and increasing supply. For producers, global markets send signals that drive efficient production decisions and generate substantial income and earning opportunities across the globe. In this context, GVCs link agriculture producers to consumers in different regions. The way the agri-food trade system is organized and the policies that influence it are thus of key interest and importance to policymakers.

It is also acknowledged that industries downstream in the GVC (e.g., food processing industries) play an increasing role in the systems of food production, including traceability and quality control systems, alternative marketing, and production contracts (Reardon and Timmer 2007). Thus, increased integration into GVCs increases the influence of this vertical governance system and creates a new set of factors in food systems. It is also important to keep in mind that the current aims of the European Union's (EU) agricultural policy highlight not only production/food security aspects but also social and environmental aspects. Integrating food processing industries into GVCs thus also becomes part of this complex "equation."

Research on firms' GVC integration in CEE countries has experienced a rapid rise in the last decade (Cieślik, Biegańska, and Środa-Murawska 2016; 2019; Cieślik 2017; 2019; Nacewska-Twardowska 2022; Kohut 2023; Kuzmenko and Cechura 2023). Despite the unique role and strategic position that food products play in our society when compared to other products of manufacturing industries, as well the attributes of agri-food chains that differ from those in other sectors, to the best of the authors' knowledge, no recent research has explored in detail the integration into GVCs of food processing industries in the CEE countries also known as the Visegrad countries (V4), specifically Poland, the Czech Republic, Hungary, and Slovakia. Given the specific developmental path of these countries since the 1990s, exploring the GVC integration in the food processing industries provides an interesting case for analysis.

To fill this gap and to provide a valuable contribution to government agri-food and industrial policies, this paper aims to evaluate the position in GVCs of food processing industries in the V4 between 1995 and 2018.

In this ex-post study, we use a globally consistent set of country and industry-level data on the integration of the goods processing sectors in GVCs to identify trends and comparisons to the overall economy in the V4 countries. The research covers an extended period from transformation and restructuring in the 1990s, the accession to the EU in 2004, the Great Recession (2008–2010), and post-recession recovery until just before the COVID-19 pandemic. This research provides important insights into the development pathways in CEE countries.

Theoretical background

Global value chains can be defined as a range of activities dispersed across various countries that firms and workers engage in to bring a product from its conception to its end use (Gereffi and Fernandez-Stark 2018). Hummels, Ishii, and Yi (2001) defined GVCs as the series of stages of production of a commodity or service that encompass at least two international borders. The rise of GVCs has many policy implications in areas related to trade, investment, and industrial development. Dicken (2011) concludes that the growing integration of the sectors/regions in GVCs increases the influence of this vertical system and creates a new set of factors that influence the firm's and the sector/region's performance. There is also emerging evidence from Constantinescu, Mattoo, and Ruta (2019) and Ignatenko, Raei, and Mircheva (2019) that GVCs are even more beneficial for income growth and productivity than traditional trade. An OECD study (OECD 2016) highlights that a large share of employment in OECD countries (and their

key trading partner countries) relies on consumption taking place abroad, and this share has increased. A majority of these jobs originate in the service sector.

The rising fragmentation in production and the deeper international division of labor have been driven by the reduction of trade barriers, among other factors (Nenci et al. 2022). Accession to the EU was crucial to the emergence of conditions that were conducive to production fragmentation. Kaminski and Ng (2005) provided empirical support to the conclusion that Central Europe has become integrated into global, mostly EU-based networks of production and distribution.

There is a group of studies that have analyzed GVC participation of EU member states from different vantage points. Kersan-Škabić (2017) found a high level of participation of member states in GVCs with a predominance of backward linkages. They found that about 80% of value added in gross exports or final demand originates from other EU member countries. In another study, Kersan-Škabić and Barisic (2023) concludes that backward participation dominates, implying a high level of dependence of the production process in the EU on the import of intermediates (i.e., production inputs) from abroad. Vakhal (2023) suggests that EU membership has a positive impact on GVC embeddedness, whereas non-EU economies are still integrated into their own local downstream value chains.

Cieślik, Biegańska, and Środa-Murawska (2016) and Cieślik (2017) investigated the GVC integration of CEE countries between 2000 and 2009. They concluded that post-socialist countries differ in their levels of participation in GVCs, and countries that have stronger links with Western European countries, especially Germany, are more integrated. They also concluded that most CEE exporters are positioned in downstream segments of production rather than upstream markets. Furthermore, Cieślik (2019) analyzed the GVC connections of CEE countries in the electronics industry and found a dependence on industry exports of Chinese electronics. She concluded that in exports from the electronics industry, CEE countries have become more dependent on value added from China than from the EU. Nacewska-Twardowska (2022) concluded that the share of foreign value added in Polish exports was consistent with global trends, demonstrating Poland's deep commitment to global production chains.

Recently, Dellink, Dervisholli, and Nanci (2020) and Nenci et al. (2022) summarized evidence about the impact of GVC participation on agri-food sectors (although with significant variations across countries). Their summary concluded that while participation of these sectors in GVCs increased before the Great Recession, further integration stalled afterward. They also identified that the long-term increase in GVC participation came with an overall rise in gross exports in agriculture and food commodities, but roughly two-thirds of the export value was not part of a GVC. Further, they found that a boost to GVC participation in the food sector led to increased value-added creation in (mostly) foreign service sectors.

Lim (2021) found that modern agrarian economies were leapfrogging the manufacturing sector to directly develop their agriculture and services sectors through their participation in agri-food GVCs. Recent evidence showed that greater agri-food GVC participation was associated with an increase in agricultural employment growth and that positive job creation impact was mainly driven by the processed food industries downstream of GVCs rather than the raw commodity sector upstream (Lim and Kim 2022).

Materials and methods

The data used in this paper come from the Trade in Value Added (TiVA) database (TiVA 2023). It contains a selection of principal indicators that track the origins of value added in exports, imports, and final demand. Indicators are available for 45 industries within a hierarchy based on ISIC Rev. 4 (Martins Guilhoto, Webb, and Yamano 2022). In this study, exports, imports, and production encompass food products, beverages, and tobacco as defined in the TiVA database, and they are in line with a hierarchy based on ISIC Rev. 4.

The analysis also compares food processing industries in the individual V4 countries and to the economies of V4 countries as a whole (where meaningful). This allows us to compare trends in the food processing industry and trends in the overall economy of these countries. The period covers 1995 to 2018 (before the COVID-19 pandemic).

Following recent empirical studies in global value chains (e.g., Hummels, Ishii, and Yi 2001; Koopman et al. 2010; Johnson and Noguera 2012; Cieślik, Biegańska, and Środa-Murawska 2016; Borin and Mancini 2020; Nacewska-Twardowska 2022), alternative empirical approaches are employed to investigate the effects of production fragmentation in the food processing industries in the V4 countries.

The Export Orientation index is used to analyze the share of country/industry value added that meets foreign final demand (FFDDVA). It reflects the measure of a country/industry's reliance on foreign final demand. It is defined as exported domestic value added (DVA) from the country/industry that meets foreign final demand as a percentage of the total value added produced by the country/industry (VALU).

$$\text{Export Orientation index} = \frac{\text{FFDDVA}}{\text{VALU}} \times 100. \tag{1}$$

Foreign value added (FVA) was historically the first indicator used in the literature by Hummels, Ishii, and Yi (2001) to measure a country's participation in GVCs, and it is known as the vertical specialization or backward participation index. It helps assess foreign suppliers' share in the total value of a country/sector's exports. It is considered a measure of backward linkages in the analysis of GVCs. It is defined as the FVA of a country/sector embodied in the country/sector's total gross exports. For the country analysis, the denominator is total exports, and for the industry analysis, the denominator is industry exports for a given country.

$$\text{Backward participation index} = \frac{\text{FVA}}{\text{EXGR}} \times 100. \tag{2}$$

The forward participation index uses the indicator of domestic value added sent to third economies (IV) and represents the country's domestic value added content embodied in the gross exports of industry in foreign countries. It is often considered a measure of forward linkages in analyses of GVCs.

$$\text{Forward participation index} = \frac{\text{IV}}{\text{EXGR}} \times 100. \quad (3)$$

Following Koopman et al. (2010), Johnson and Noguera (2012) and Borin and Mancini (2020), these metrics (DVA, FVA and IV) can be used to measure overall GVC participation and GVC position more precisely.

$$\text{GVC}_{\text{participation}} = \frac{\text{FVA} + \text{IV}}{\text{EXGR}}. \quad (4)$$

The GVC participation index indicates the share of a country's exports that is part of a multi-stage trade process. The higher the index, the greater the country's participation in a GVC. The measure of GVC participation can be used together with the GVC position index. The position index shows the location (vertical specialization) of the country in the production chain.

$$\text{GVC}_{\text{position}} = \ln\left(1 + \frac{\text{IV}}{\text{EXGR}}\right) - \ln\left(1 + \frac{\text{FVA}}{\text{EXGR}}\right). \quad (5)$$

A positive value (IV is higher than FVA) means the country lies upstream in the GVC. A negative value (IV is smaller than FVA) signals that it lies downstream. A country that exports raw materials or intermediate products lies upstream in the GVC; a country that uses a large portion of imported intermediate products to produce final goods for export lies downstream.

Results and discussion

The food processing industries in the V4 show differences when compared according to the value of production, performance, and the level of integration into the international business environment (Table A1 in Appendix). Approximately two-thirds of the total production and export of food processing industries in the V4 countries comes from Poland. Slovakia has a smaller value of production and trade when compared to the other V4 countries. Poland and Hungary maintained their position as net exporters between 1995 and 2018. On the other hand, the Czech Republic and Slovakia were net importers during the same period. In the period under review, the value of production and trade increased in all V4 countries. Production and trade increased especially between 2005 and 2008, immediately after the V4 joined the EU in 2004.

Calculating industry openness reveals increases in the integration of V4 food processing industries into the international business environment. The inflow of foreign direct investments stimulated sectoral integration into the structures of the Common Single Market. As a result of these changes, the openness of food processing industries in all four V4 countries increased. The openness score of the food processing industry in Poland was lower when compared to the other V4 countries, although larger markets, such as the Polish market, typically have lower openness scores.

Importance of foreign demand

The export orientation index was calculated to assess the extent to which food processing industries in the V4 countries rely on foreign markets to consume their production (Table 1).

Poland's share of value added in the food processing industry directed toward final foreign demand increased from 13.8% in 1995 to 40.5% in 2018. Similarly, the indices in the Czech Republic, Hungary and Slovakia reached 41.8%, 43.6%, and 40.9%, respectively, in 2018. This shows a significant increase in the orientation of V4 countries' food processing industries towards foreign markets, with approximately 40% of domestic value added embodied in foreign final demand. In the case of Slovakia, the results indicate an interesting situation: while there is an increasing orientation toward foreign markets, its trade deficit in food processing is widening.

Table 1. Export orientation Index for food processing industries and overall economies in Poland, Czechia, Hungary and Slovakia, selected years, %

		1995	2000	2003	2005	2010	2015	2018
Poland	F	13.8	14.0	17.0	20.1	28.1	39.2	40.5
	T	19.8	21.4	24.6	25.7	27.9	33.5	36.4
Czech Republic	F	25.1	22.0	20.8	30.1	36.2	44.7	41.8
	T	31.4	35.3	31.7	37.2	37.6	43.2	42.5
Hungary	F	21.9	30.2	25.2	28.7	40.7	45.4	43.6
	T	29.3	38.6	34.3	36.1	42.8	47.7	46.1
Slovakia	F	21.3	16.6	19.6	32.8	35.7	38.7	40.9
	T	34.6	34.7	37.7	41.6	39.0	42.6	43.4

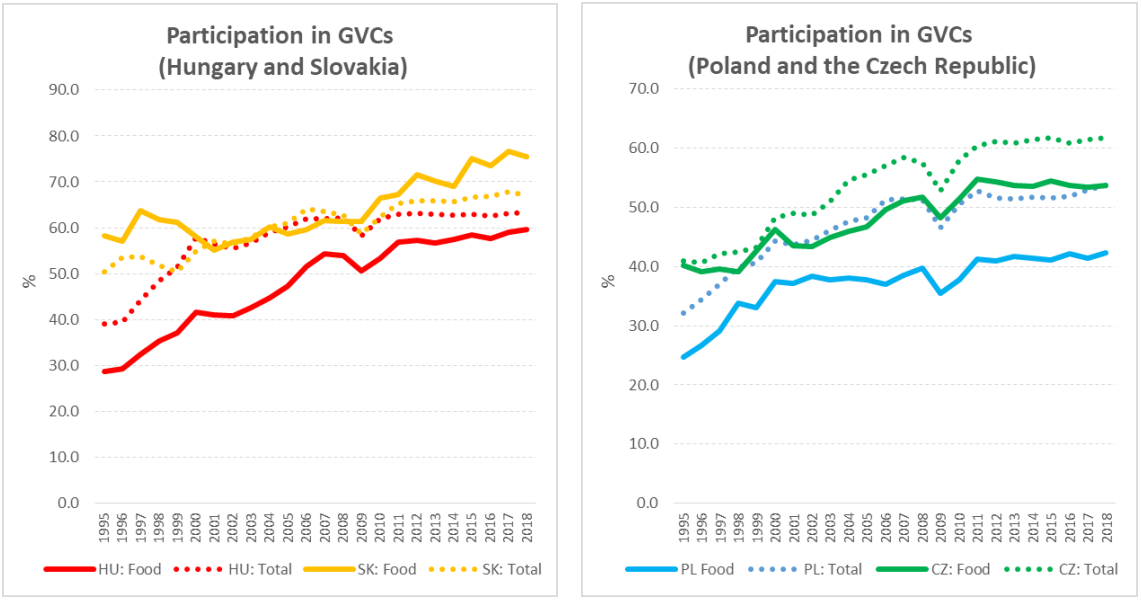
Note: F – Food processing industry; T – the overall economy.

Source: authors' elaboration, based on data retrieved from TiVA 2023.

When comparing these export orientation indices to the overall economies of V4 countries, the importance of foreign markets was smaller for food processing industries at the beginning of the period under review. However, food processing industries increased their dependence on foreign markets after the V4 acceded to the EU. At the end of the period, the food processing industry in Poland was even more reliant on foreign markets than was typical for the Polish economy.

Participation in GVCs

The participation of V4 food processing industries in GVCs increased in the first half of the period under review until the Great Recession (Figure 1).



Note: Food – Food processing industry; Total – the overall economy.

Figure 1. Participation of V4 countries in GVCs for food processing industries and overall economies, selected years, %

Source: authors' elaboration, based on data retrieved from TiVA 2023.

In Poland and the Czech Republic, further integration essentially stalled in the subsequent period. This trend is in line with the results of existing studies (e.g., Nenci et al. 2022). On the other hand, the food processing industries in Hungary and Slovakia showed increasing GVC participation in the period after the Great Recession. The effects of the 2008 crisis are noticeable in all V4 countries. Food processing industries in V4 countries reveal lower participation in GVCs when compared to the overall economy, with the exception of Slovakia, which shows a slightly higher participation in GVC.

Long-term increases in GVC participation usually come with an overall rise in gross exports (Figure 2). The composition of gross exports is divided into backward-linked GVC exports, forward-linked GVC exports and non-GVC related exports. The backward-linked GVC exports are the sum of foreign value added across industries and countries, while the forward-linked exports are a part of domestic value added that will later be re-exported by the destination country. Non-GVC exports do not flow through GVCs; instead, they are absorbed in the destination country. In Poland, non-GVC-related exports still account for the dominant share (57.6%) of exports. By contrast, GVC-related exports make up 53.7% in the Czech Republic, 59.5% in Hungary, and 75.4% in Slovakia. The rapid rise in food exports of smaller V4 countries is thus linked to the increase in GVC participation (especially in Slovakia).

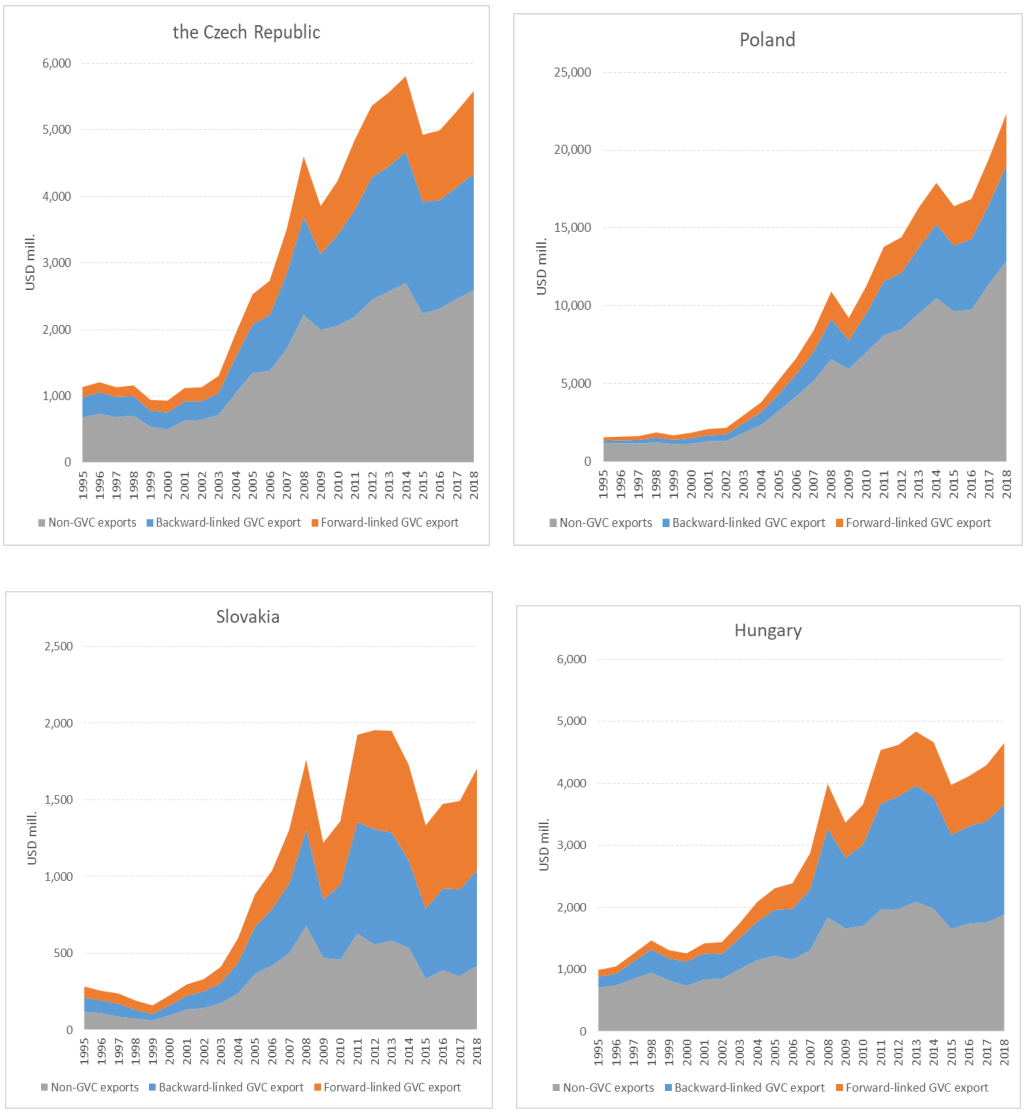


Figure 2. Exports and GVC participation of food processing industries in the V4 countries, 1995–2018, USD millions

Source: authors' elaboration based on data retrieved from TiVA 2023.

Another valuable way to further analyze and map the participation of V4 food processing industries in GVCs is to understand how they are positioned within GVCs. The domestic value added embedded in exports of a country's trading partners, along with the foreign value added used to create these exports, show whether a country is moving up or down a GVC.

Backward participation in the GVC

Backward participation refers to foreign value added and expresses the buyer's perspective or sourcing side in the GVC, where an economy imports intermediate inputs to produce exports. Backward participation has increased in the food processing industries in all V4 countries. However, its level started to stagnate in the Czech Republic, Hungary and Slovakia following the Great Recession. In contrast, Poland's index value seems to have increased throughout the entire period under review. Additionally, when comparing smaller countries to the largest economies like Poland, some degree of caution is necessary because the latter is relatively self-sufficient. Hence,

the proportion of foreign value added in their exports is much lower than in smaller countries with less developed internal markets.

When comparing the food processing industries' backward participation in GVCs to the general situation in the whole economy of V4 countries, backward participation is generally less intensive. This again indicates that the food processing industries in these countries import fewer intermediate inputs to produce exports compared to the whole economy.

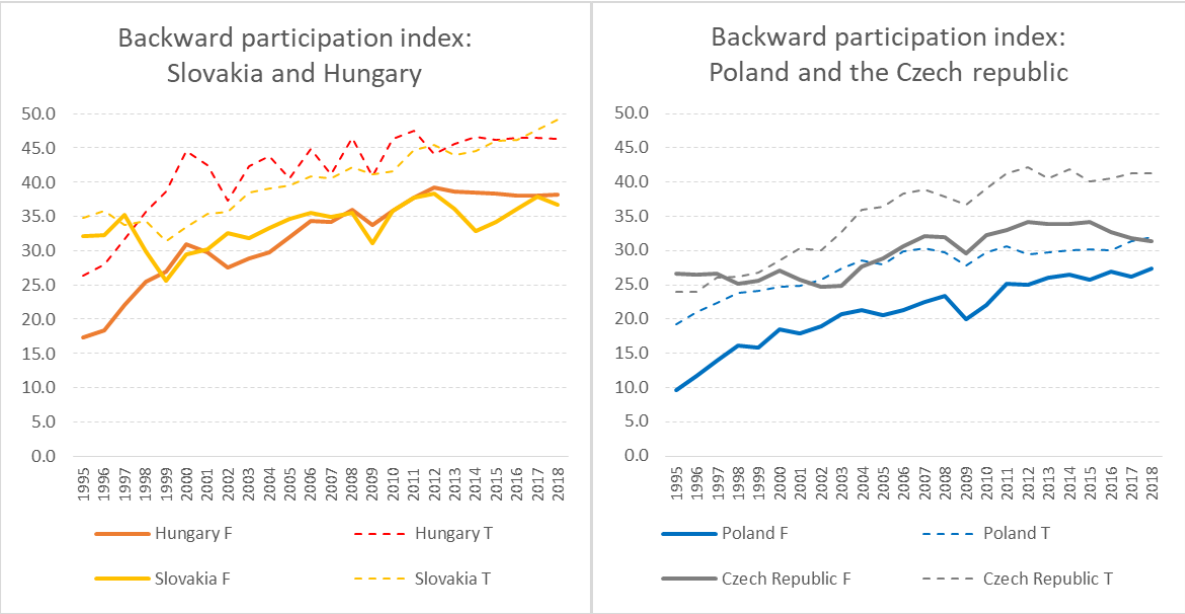


Figure 3. Backward participation indices of the food processing industry in Poland, the Czech Republic, Hungary, and Slovakia 1995–2018)

Source: authors' elaboration based on data retrieved from TiVA 2023.

The exports of food processing industries can stimulate value added creation in some other sectors. In the food processing industries, the largest share of imported sectoral foreign value added is provided by services (Table 2).

Table 2. Origin (industry) of foreign value added in V4 food processing industry exports; selected years, (%)

Industry (ISIC Rev. 4)	1995	2000	2003	2005	2010	2015	2018
Poland							
Agriculture, hunting, forestry and fishing	11.1	11.0	9.6	9.8	13.6	13.4	14.9
Food products, beverages and tobacco	3.5	3.3	3.4	4.3	5.6	7.0	6.5
Manufacturing (excl. food., bev. and tob.)	33.2	29.7	30.5	28.1	22.8	22.4	21.9
Total Business Sector Services	38.1	42.9	44.4	43.9	43.4	45.6	44.8
Czech Republic							
Agriculture, hunting, forestry and fishing	16.6	15.8	13.9	14.8	14.4	14.5	14.6
Food products, beverages and tobacco	5.0	4.9	5.7	7.1	6.9	6.6	5.8
Manufacturing (excl. food., bev. and tob.)	23.7	21.8	22.2	19.5	19.1	19.9	20.5
Total Business Sector Services	43.5	45.6	46.3	45.7	46.1	47.6	47.1

Industry (ISIC Rev. 4)	1995	2000	2003	2005	2010	2015	2018
Hungary							
Agriculture, hunting, forestry and fishing	8.5	7.1	6.8	6.8	8.1	8.8	9.4
Food products, beverages and tobacco	3.2	2.2	2.0	2.8	3.7	3.9	3.6
Manufacturing (excl. food., bev. and tob.)	31.8	33.7	31.3	28.0	24.4	24.4	24.7
Total Business Sector Services	43.6	43.8	47.5	47.3	47.8	48.6	47.6
Slovakia							
Agriculture, hunting, forestry and fishing	13.0	9.5	8.6	9.9	20.2	15.7	13.8
Food products, beverages and tobacco	4.9	4.3	4.4	6.6	7.2	4.9	6.0
Manufacturing (excl. food., bev. and tob.)	27.0	28.0	28.0	27.3	20.4	25.1	25.0
Total Business Sector Services	39.9	42.4	45.9	42.1	38.0	41.9	44.1

Source: authors' elaboration, based on data retrieved from TiVA 2023.

In all V4 countries, the share is similar, at around 45%, and the share of foreign services in imported value added increased during the period under review. This means that any boost to agri-food GVC participation in these countries contributes to increased value added creation (job creation) in certain foreign service sectors. Similarly, the boost to agri-food GVC participation in non-V4 countries leads to increased value added creation in services, agricultural, and other manufacturing sectors in the V4. The significant foreign value added inputs are (understandably) agricultural commodities and the share ranges between 9.4% in Hungary to 14.9% in Poland.

Forward participation in GVCs

The forward participation of food processing industries has steadily increased in the Czech Republic and Hungary, with similar values of value for the overall economy of these countries. The situation in Poland and Slovakia differs, however. Forward participation in Poland increased at the beginning of the period under review. However, since joining the EU, forward participation of the food processing industry has decreased, contrary to the trend in the overall Polish economy.

After Slovakia joined the EU, the forward participation of the Slovakian economy stagnated. Conversely, forward participation in the Slovakian food processing industry has significantly increased. This change in forward linkages of the food processing industry contrasts with trends in the other V4 countries. The difference between the change of participation in the food processing industry and in the overall economy in Poland and Slovakia indicates the existence of sector-specific factors that shape how these countries' food industries integrate into GVCs.

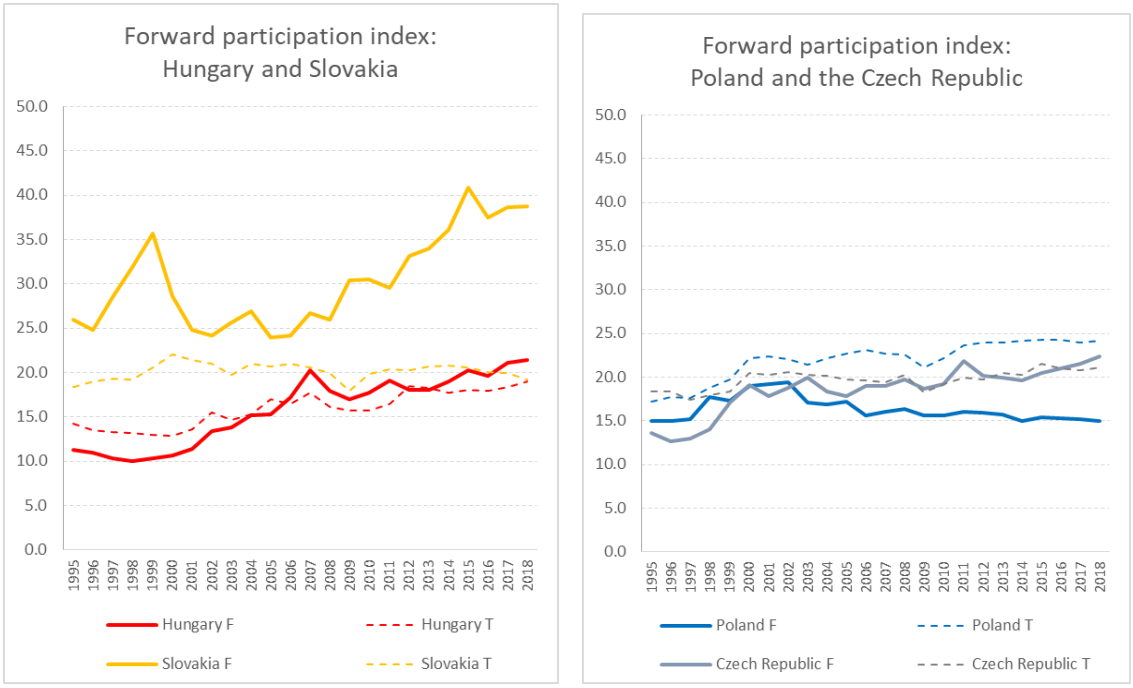


Figure 4. Forward participation indices of the food processing industry in Poland, the Czech Republic, Hungary, and Slovakia 1995–2018)

Source: authors' elaboration, based on data retrieved from TiVA 2023.

Territorial context of the integration into the GVC

Increasing interest in Regional Value Chains (cf. Elia et al. 2021; Kersan-Škabić and Belullo 2021) has gained momentum due to the increasing protectionism that has resurfaced among several global powers as well as the need for redundant regional and domestic supply chains for critical supplies that were exposed by the COVID-19 pandemic. Understanding the relative participation of V4 countries in relation to the rest of Europe vs the Rest of the World will be important for future strategic positioning of food processing industries in these countries (Table 3).

The foreign value added in the exports of V4 food processing industries mostly comes from the EU (Table 3). In 2018, Poland's food processing industry sourced 58.4% of foreign value added from other EU countries, while the Czech Republic sourced 66.6%, Hungary 67.8%, and Slovakia 68.6%. Additionally, the majority of foreign value added was sourced from EU15 countries, especially Germany. The V4 countries also source inputs from each other.

Table 3. Origin (region) of foreign value added in exports and the destination of domestic value added in V4 food processing industry exports; selected years, %

		1995	2000	2003	2005	2010	2015	2018
Origin (region) of foreign value added in exports of food processing industry								
PL	EU28	60.7	59.9	64.9	61.0	55.7	58.1	58.4
	EU15	54.3	53.9	58.8	54.2	48.3	50.7	50.4
CZ	EU28	66.6	61.3	65.7	65.8	64.2	66.4	66.6
	EU15	51.9	49.3	52.4	49.7	48.1	48.2	48.8

		1995	2000	2003	2005	2010	2015	2018
HU	EU28	61.4	60.6	63.7	66.0	65.9	68.5	67.8
	EU15	53.7	52.4	54.9	54.0	48.9	48.9	48.3
SK	EU28	65.8	63.7	70.3	62.7	40.1	59.7	68.6
	EU15	37.8	43.7	46.4	37.9	23.1	35.1	41.4
Destination of domestic value added in exports of food processing industry								
PL	EU28	63.3	59.7	63.8	70.9	76.9	74.8	79.2
	EU15	58.4	46.7	49.4	50.9	57.5	54.9	61.2
CZ	EU28	66.1	77.0	78.3	80.2	82.5	80.5	82.1
	EU15	38.4	41.9	42.5	39.8	50.2	42.5	43.3
HU	EU28	74.6	69.1	70.4	69.6	76.2	75.3	77.5
	EU15	57.7	49.8	51.7	48.3	41.8	45.1	46.4
SK	EU28	78.7	81.3	81.4	85.6	90.3	89.2	89.4
	EU15	23.3	25.2	19.1	28.4	25.7	28.5	30.0

Source: authors' elaboration, based on data retrieved from TiVA 2023.

Table 3 also presents the domestic value added that is part of the exports of food processing industries in the V4 countries. The products from which the DVA is embedded may be used as intermediate products and re-exported, or they may be used as final products for consumption.

The share of DVA directed toward EU countries increased between 1995 and 2018, reaching 79.2% in Poland, 82.1% in the Czech Republic, 77.5% in Hungary, and 89.4% in Slovakia. The EU15 countries are important destinations for exports of DVA from food processing industry products, especially from Poland (61.2%). However, the new member states (EU13; not shown in the table) became important destinations of this DVA, especially after the EU's enlargement. Between 1995 and 2018, the share of EU13 countries as destinations for domestic value added increased from 4.9% to 18.0% in Poland, from 27.7% to 38.8% in the Czech Republic, from 16.9% to 31.1% in Hungary, and from 55.4% to 59.4% in Slovakia. In other words, a large proportion of imports and exports (and value added) are integrated within EU value chains; however, the exact territorial linkages and magnitude probably differ when comparing the V4 countries to each other.

The Shifting patterns of GVC integration

Although the participation index and indices of backward and forward participation provide information about the intensity and form of integration of food processing industries in GVCs, the combination of indicators of participation and position allows for a more comprehensive assessment of the trajectory of integration in additional contexts (Figure 5).

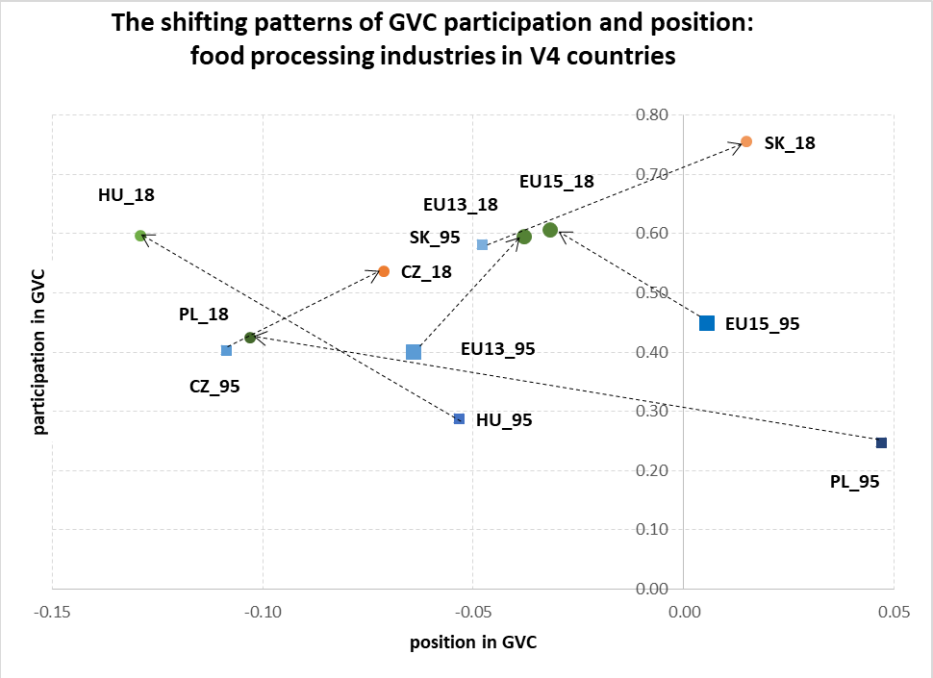


Figure 5. The shifting patterns of GVC participation and position of the food processing industries in V4 countries, 1995 and 2018

Note: EU 15: old EU Member States; EU13: new EU Member States (joined the EU in 2004, 2007, and 2013)

Source: authors' elaboration based on data retrieved from TiVA 2023.

The overall participation of the V4 economies in GVCs increased during the period under review, with these economies situated relatively downstream in the GVCs. Throughout this period, the V4 economies shifted more downstream (not presented here).

Food processing industries in the V4 countries increased their participation when comparing the beginning and end of the period under scrutiny. At the same time, Poland and Hungary are shifting their relative positions more downstream (this pattern is also typical for the EU15 member states). By contrast, the Czech Republic and Slovakia are moving their relative positions more upstream (the year-on-year changes are presented in Figure A1 in the Appendix).

Conclusion

The aim of the article was to evaluate the position of food processing industries in Visegrad countries in global value chains (GVCs) between 1995 and 2018.

During this period, these industries increased their integration into GVCs until the Great Recession, which aligns with the general trend of many countries observed globally (Nenci et al. 2022). However, further integration subsequently stalled for Poland and the Czech Republic. In contrast, the food processing industries in Hungary and Slovakia increased their participation, even after the Great Recession, mostly because of the increase in forward linkages. Based on existing studies (Constantinescu, Mattoo, and Ruta 2019; Ignatenko, Raei, and Mircheva 2019), we recognize that increasing participation in GVCs is generally more

beneficial for productivity and income growth than traditional trade. This suggests that the food industry in Hungary and Slovakia will become more competitive.

Our results further revealed that a dominant share of food export value from Poland still consists of non-GVC-related food exports. In contrast, GVC-related food exports were more significant in the Czech Republic, Slovakia and Hungary. The rapid rise of food exports of the smaller V4 countries is mostly linked to the increase in GVC participation, especially in Slovakia.

The territorial decomposition of imported and exported value added suggests that food industries in the V4 countries are increasingly integrated within the EU's Regional Value Chains. This is consistent with the results of Cieślik, Biegańska, and Środa-Murawska (2016). In these industries, the largest share of imported sectoral foreign value added was provided by service sectors, implying that exports of V4 food processing industries can stimulate value added creation in sectors in other EU countries. Consequently, any boost to agri-food GVC participation in V4 countries likely increases value added creation (and possibly job creation) in (mostly) service sectors in EU countries. This shows the high complexity of economic integration of the V4 in the EU, which goes beyond traditional trade assessments.

The combination of results of participation and position indices revealed shifting patterns of integration into the GVC of V4 food processing industries. Poland and Hungary are moving their relative position in GVCs more downstream, while the Czech Republic and Slovakia are moving upstream. When linking our results to recent evidence (Lim and Kim 2022), the relatively more downstream position of food industries in Poland and Hungary should be associated with positive job creation and agricultural employment impacts. However, the upstream shifts in the Czech Republic and Slovakia should have policymakers in these countries paying closer attention to this value chain evolution.

There are limitations in this research that should be considered. First, some of the V4 countries experienced a slowdown in their participation in GVCs after the Great Recession. However, since the indicators applied cannot draw causal inference, it is difficult to explain if most of the slowdown was due to the Great Recession or if some of it resulted from earlier gains from regional and GVC participation before the Great Recession that had already been extracted prior to EU accession.

Similarly, it is difficult to fully understand why some of the changes in position occur. For example, EU accession also resulted in an increasing number of value-added manufacturing establishments in the food industry in these countries being purchased by companies from outside the V4 (particularly from other EU member states). The changing participation and position of V4 countries in GVCs may be driven by how these non-V4 corporations are aligning/restructuring these establishments within their own supply chains.

Companies may be repositioning their food industry establishments in countries downstream because they want food industry products with weight-gaining processes (e.g., bottling of food and beverages) or products with high perishability geographically closer to high population centers to reduce transportation and shrinkage costs (Shaffer, Deller, and Marcouiller 2004). This may partly explain Poland's move downstream in GVCs.

Second, while much has been said about the value added gains from GVC trade, this research does not identify who owns that value added. It remains unclear if the value added gains from GVC participation in a country accrue to business owners and employees residing in that country or if ownership lies with multinational companies, resulting in the value added leaking outside the countries' borders. This raises questions about how value added is distributed upstream or downstream to owners of labor and capital. Many assumptions about the benefits of repositioning downstream come from research in non-food value chains. The idea that increasing valued added will correspond with higher employment and wages as a result of repositioning downstream may not hold for food value chains. For example, if there are potentially higher-paying jobs at earlier stages of food processing and lower-paying jobs downstream (particularly if downstream includes wholesaling and retailing portions of the value chain), then assuming that moving downstream may be a more desirable development strategy may need to be reevaluated.

GVCs will create an additional vertical system of governance and a new set of factors that influence the agri-food systems in V4 countries and their ability to deliver food production, as well as social and environmental goods and services. Given the current emphasis on environmental footprints, it opens up avenues for further research into how GVCs affect changes in the positioning of CEE countries within GVCs. The findings in this study can help inform industrial, agricultural, and trade policymakers when assessing liberalization trends and structural transformations within agribusiness sectors in their countries, as well as when assessing the potential benefits and risks.

Further research is also needed to study the COVID-19 pandemic and its aftermath to understand how COVID-19 disrupted the agri-food GVCs in the V4 countries or to what extent GVCs revealed robustness and resilience. Additionally, as noted by Nenci et al. (2022), recent slowdowns and reductions in global production fragmentation have raised new questions related to reshoring, diversification along GVCs, and regionalization as a consequence of reduced chain lengths.

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Branże przetwórstwa spożywczego krajów Grupy Wyszehradzkiej w globalnych łańcuchach wartości (1995–2018)

Celem artykułu było zbadanie pozycji w globalnych łańcuchach wartości (GVC) branż przetwórstwa spożywczego w krajach Grupy Wyszehradzkiej (w Polsce, Czechach, na Węgrzech i Słowacji) w latach 1995–2018. Aby zidentyfikować intensywność i formy integracji tych branż w GVC w każdym kraju oraz porównać je z innymi krajami V4, zastosowano złożone metody służące do pomiaru znaczenia popytu zagranicznego, dotychczasowej i przyszłej partycypacji i pozycji w GVC, terytorialnego kontekstu integracji oraz zmieniających się wzorców integracji w GVC przy użyciu danych z bazy danych TiVA.

Analiza ujawniła różnice w obszarze integracji branż przemysłu przetwórstwa spożywczego w GVC między krajami V4. Zaobserwowano wspólne cechy i tendencje (np. wzrost partycypacji aż do wielkiej recesji, a następnie wyhamowanie, rosnącą integrację w europejskich łańcuchach wartości i absorpcję zagranicznej wartości dodanej głównie z sektorów usługowych). Tendencje te są zgodne z wynikami poprzednich badań.

Istotnym wkładem tego badania jest to, że ujawnia ono, w jaki sposób eksport żywności z Czech, Węgier i Słowacji jest powiązany głównie ze zwiększoną partycypacją w GVC. Warto zauważyć, że przemysł przetwórstwa spożywczego na Węgrzech i Słowacji zwiększał swój poziom partycypacji w GVC, nawet po wielkiej recesji. Biorąc pod uwagę korzystne wyniki gospodarcze wynikające ze zwiększonego udziału w GVC, oznacza to, że przemysł przetwórstwa spożywczego na Węgrzech i Słowacji stanie się bardziej konkurencyjny. Przemysł spożywczy w Polsce i na Węgrzech pozycjonuje się coraz niżej w łańcuchach wartości, podczas gdy zmiany w Czechach i na Słowacji mają tendencję wzrostową. Biorąc pod uwagę dowody na korzystne wyniki gospodarcze wynikające ze zmniejszonego udziału w globalnych łańcuchach wartości, kraje V4 będą musiały ocenić, w jaki sposób kierunki ich działania mogą wpłynąć na przyszły dobrobyt przedsiębiorstw i pracowników z tych branż.

Słowa kluczowe: Unia Europejska, fragmentacja produkcji, partycypacja, wartość dodana, specjalizacja pionowa

Appendix

Table A1. The values of production, export, import and sectoral openness for the food processing industry in Poland, the Czech Republic, Hungary and Slovakia; selected years

	Units	1995	2000	2003	2005	2010	2015	2018
Poland								
Production	US Dollar, Millions	20,488.0	22,761.2	27,906.6	40,084.6	57,045.1	59,035.2	73,890.6
Export	US Dollar, Millions	1,568.5	1,863.6	2,992.4	5,247.7	11,285.3	16,407.6	22,361.6
Import	US Dollar, Millions	911.7	1,720.1	2,310.0	3,822.7	8,513.8	9,789.1	12,876.1
Openness^{F}	(EX + IM) / PROD. (%)	12.1	15.7	19.0	22.6	34.7	44.4	47.7
Openness^{T}		24.2	31.5	35.0	35.2	39.4	44.2	47.9
The Czech Republic								
Production	US Dollar, Millions	8,165.3	7,401.6	10,774.3	13,528.2	16,646.6	13,928.9	16,996.9
Export	US Dollar, Millions	1,135.9	931.6	1,302.9	2,530.0	4,235.3	4,926.5	5,584.5
Import	US Dollar, Millions	1,017.8	940.5	1,433.4	2,489.4	4,484.9	5,246.1	6,085.5
Openness^{F}	(EX + IM) / PROD. (%)	26.4	25.3	25.4	37.1	52.4	73.0	68.7
Openness^{T}		38.4	44.2	40.7	48.7	49.6	59.1	57.1
Hungary								
Production	US Dollar, Millions	7,778.0	6,246.3	9,909.7	11,130.9	11,569.7	11,203.8	13,117.6
Export	US Dollar, Millions	989.4	1,258.8	1,743.0	2,309.1	3,657.5	3,973.5	4,651.0
Import	US Dollar, Millions	462.6	596.0	977.1	1,765.8	3,054.9	2,991.2	3,787.2
Openness^{F}	(EX + IM) / PROD. (%)	18.7	29.7	27.4	36.6	58.0	62.2	64.3
Openness^{T}		37.0	62.0	57.2	53.9	68.6	76.7	75.3
Slovakia								
Production	US Dollar, Millions	2,395.5	2,145.3	2,976.9	3,484.4	4,437.6	3,997.7	4,673.5
Export	US Dollar, Millions	282.6	225.3	411.3	882.9	1,360.7	1,333.2	1,703.0
Import	US Dollar, Millions	430.4	435.6	623.1	1,533.7	3,012.6	2,762.6	3,694.8
Openness^{F}	(EX + IM) / PROD. (%)	29.8	30.8	34.7	69.4	98.6	102.5	115.5
Openness^{T}		45.9	45.2	52.3	62.1	59.7	65.8	66.7

Note: The openness is calculated as: (export + import) / production; Openness^{F} – gross trade openness of food processing industry; Openness^{T} – overall gross trade openness of the economy.

Source: own calculations, data from TiVA 2023.

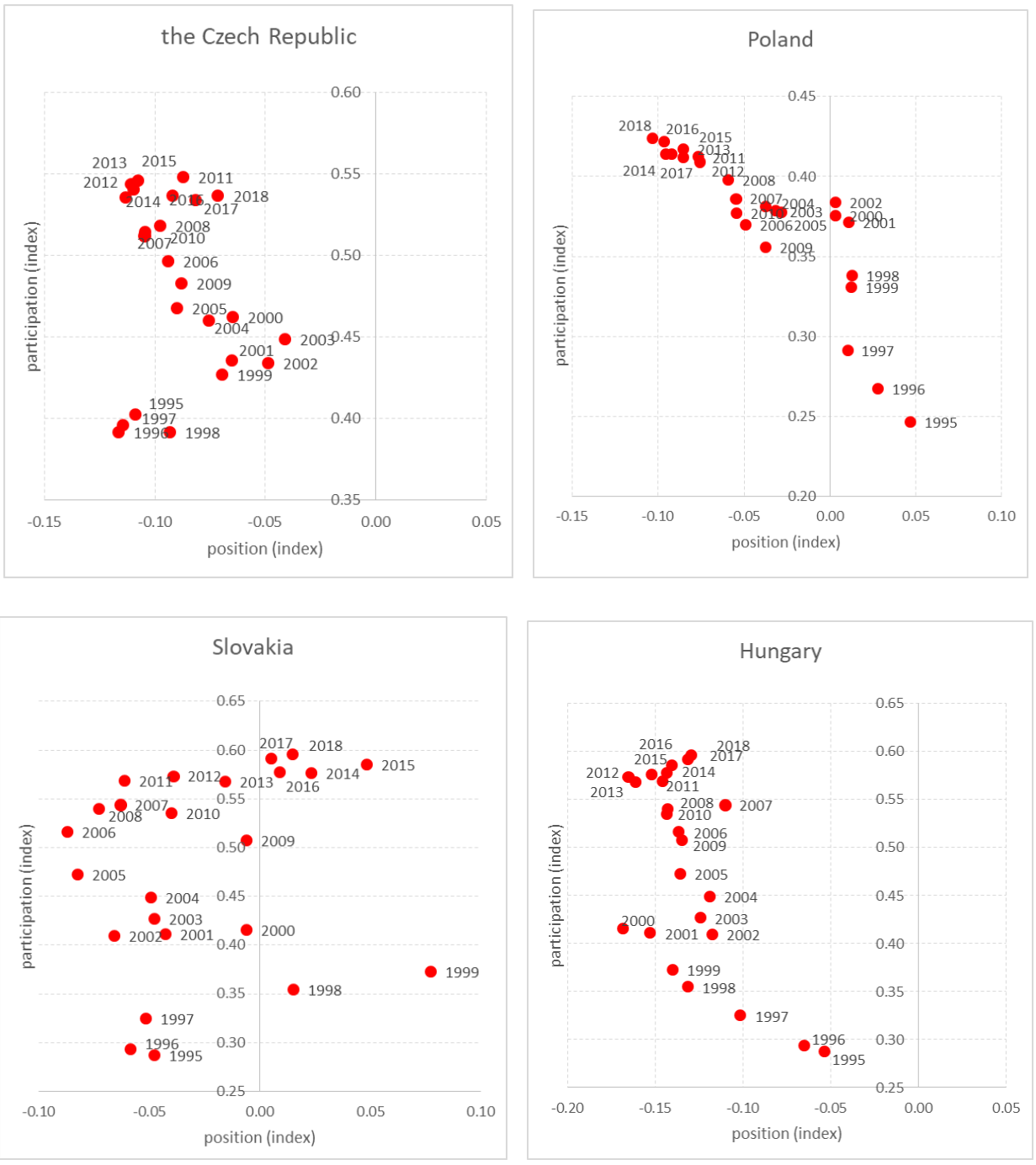

Figure A1. Shift in participation and position of food processing industries in Poland, the Czech Republic, Hungary and Slovakia, 1995–2018, index

Source: own calculations, based on data from TiVA 2023.

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Firm Performance and Dividends in State-owned Companies from CEE Countries – Are Polish SOEs Different?

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Abstract

In recent years, the focus on state-owned enterprises (SOE) has returned. SOEs are an important part of the post-socialist countries that comprise Central and Eastern Europe (CEE). However, there are still no consistent findings on SOEs' performance and dividend payouts, although the popular perception is that they have lower firm performance and pay higher dividends. The paper aims to ascertain the level of firm performance of dividend payments made by these enterprises. The research includes 132 companies from 12 CEE stock markets, with 743 firm-year observations for the 2017–2022 period. For a robustness check, several measures of state ownership and dividend payouts are implemented. The main research method is a General Linear Model with country- and year-fixed effects. The research demonstrates that state ownership has a negative impact on firm performance in CEE countries but a positive on dividend payouts. However, for the Polish subsample, state ownership has had a positive impact on profitability and no impact on dividend payouts.

Keywords: firm performance, dividend payouts, state-owned companies, SOE

JEL: G35, G38, P52

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Introduction

In recent years, the focus on state-owned enterprises (SOE) has returned. There has been an increase in the state of the economy, but there has also been an increase in research on SOEs.

There is a significant body of research on SOEs' firm performance but with inconsistent findings. These inconsistencies may be due to the type of countries included in the research, such as China or Western European nations. Additionally, the attitude of states to company assets can influence outcomes. On the one hand, the state might prioritize SOEs achieving high efficiency and maximizing dividends to boost budget revenues. High government budget revenues can then finance projects that are important for the government. On the other hand, a government might direct SOEs to invest in projects that are important for the government (presented as company capital expenses or CAPEX). In this scenario, efficiency and dividend payouts may be lower. Between these two extremes lies a spectrum of attitudes that can affect firm performance and dividend payouts.

The inconclusive nature of existing research highlights the need for studies that not only focus on the performance of SOEs but also examine their dividend payouts. However, research on the dividends paid by state-owned companies in CEE remains limited. These two factors provide a compelling rationale for this paper, which aims to determine the level of firm performance of dividend payments made by SOEs in CEE countries. Additionally, a Polish subsample is analyzed to explore the decline in dividend payouts by the Polish SOEs in recent years.

The research covers 12 CEE countries: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Serbia, Slovakia, and Slovenia. A total of 132 listed companies are included in the research, with 743 firm-year observations for the 2017–2022 period. For a robustness check, several measures of state ownership and dividend payouts are implemented. The main research method is a General Linear Model with fixed effects (year and country).

This paper contributes to the existing literature in several ways. First, some economists argue that government control over corporations can be detrimental to their operations. They contend that the government's multiple objectives are mixed with political considerations, which may divert companies from maximizing performance. The alternative view is that private owners typically view the company as a primary source for maximizing shareholder wealth and deriving private benefits from control. Our research adds to the discussion on private and government control. Second, we provide additional empirical evidence on dividend payouts and net profit distribution.

The rest of the paper is organized as follows: Section 2 presents the results of a literature review on SOEs, including firm performance and dividend payouts. Section 3 presents the methodology, while Section 4 provides the findings and discussion. The paper finishes with the conclusions.

Literature review on SOEs and dividends in SOEs

In recent years, the number of studies on SOE has increased. This increasing interest is mainly due to SOEs' prominent role in many economies, including those in Western Europe and CEE economies. The global financial crisis that started in 2008 further legitimized state intervention (Christiansen 2011, p. 5). The massive bailouts of banks and industrial firms heightened the state's involvement in enterprises, raising new questions about their management. SOEs remain signifcant economic players (Palcic and Reeves 2013, p. 118).

The presence of SOEs is especially important in CEE countries. They are post-socialist economies where radical transformation and privatization took place at the beginning of the 1990s. Additionally, the governments of once leading pro-market reform countries such as Hungary and Poland have expressed intentions to expand the state's role in the economies (Pula 2017, p. 310).

Pula (2017, pp. 314–316) analyzed Deloitte's list of the top 500 performing CEE companies in 2009, ranking firms by revenue from sales. His findings indicate that over 70% of the top ten companies are SOEs, almost 40% of the top 50, almost 30% of the top 100, and more than 20% of the top 500. Of the 29 SOEs listed in the top 500 CEE companies, half were Polish.

Böwer (2017, p. 5) found that for 11 CEE countries and Sweden, there are a total of 6,282 SOEs; Poland has 2097, Sweden has 1699, and Bulgaria and Romania each have around 800. Other countries have significantly fewer. Slovenia, Poland, and Sweden exhibit the largest shares of SOE output (approximately 8%), while large shares of employment in SOEs are found in Sweden, Bulgaria, and Slovenia (approximately 5%).

There are several studies on the firm performance of SOEs in CEE. Despite the common perception that state ownership is connected with lower firm performance, existing studies report inconsistent findings. Eforis and Uang (2015, pp. 7–8) found that state ownership is positively related to firm performance, demonstrating that governmental support is beneficial to firm growth in developing countries. Szarzec and Nowara (2017, pp. 380–387) found that the economic performance of state-owned companies is, on average, comparable to their private counterparts. Matuszak and Szarzec (2019, pp. 564–565) found that state-owned companies have lower firm performance. Berger et al. (2005, pp. 2196–2201) associate state ownership and state governance with inefficiencies and poor performance in Argentina.

The main theoretical framework for understanding the impact of state ownership on firm performance is agency theory. State owners often have multiple aims beyond profitability, including social and political goals (e.g., Hellman and Schankerman 2000, p. 574). The government exerts political or regulatory influence over SOEs to achieve these aims. For instance, governments might use their influence to maximize employment, even if hiring additional workers is not justified, and it might even want the company to invest in unprofitable projects. The state's intended role is to ensure public security, particularly within strategic sectors such as energy, transportation, telecommunication services, and broadcasting. This multifaceted approach can lead to lower financial firm performance of SOEs (Kabaciński, Kubiak, and Szarzec 2020, pp. 3176–3177).

Agency theory posits that managers employed by the state should exercise control on behalf of the government. However, these managers are often motivated by self-interest and will use state-owned company resources to promote their own personal interests (e.g., Shleifer and Vishny 1994, p. 996). Most studies have focused on the objectives of individual politicians, overlooking the aims of controlling shareholders (e.g., Hellman, Jones, and Kaufmann 2003, p. 764). Additionally, SEOs' low financial performance is linked to politicians' rent-seeking behavior (La Porta, Lopez-de-Silanes, and Shleifer 2008, p. 311).

Despite the insights these studies provide, there is a notable lack of research on dividend payouts made by SOEs. The existing literature indicates that state-owned European firms are characterized by high dividend payouts. Gugler (2003, pp. 1311–1313) analyzed the data for the 214 biggest Austrian companies from 1991 to 1999 and found that the dividend payout ratio (dividend to net profit) is higher for SOEs. Meanwhile, Truong and Heaney (2007, pp. 678–682) analyzed companies from 37 countries in 2007 and found that state ownership is positively related to dividends (dividend payout ratio and dividend to sale revenue) in countries with common law. Finally, Renneboog and Szilagyi (2020, pp. 14–16) analyzed 150 Dutch companies from 1996 to 2006. They found that the probability and level of dividend payouts (dividend payout ratio and dividend amount) increase as state ownership increases.

Recent research on dividend payouts in Chinese SOEs confirms the positive impact of state ownership on dividend payments (e.g., Wei, Zhang, and Xiao 2004, pp. 202–214; Wang, Manry, and Wandler 2011, pp. 369–371; Lam, Sami, and Zhou 2012, pp. 209–213; Lin, Chen, and Tsai 2017, pp. 5–7). There are also studies from other countries outside of Europe. For example, Alhileen (2020, pp. 180–182) found a positive and significant impact of government ownership on dividends per share for companies in Jordan. Similarly, Basri (2019, pp. 535–538) also found a positive impact of government ownership on the dividend payout ratio in Indonesia. By contrast, Al-Najjar and Kilincarslan (2016, pp. 16–24) revealed the negative impact of state ownership on the likelihood of dividend payouts, the dividend payout ratio, and the dividend yield of Turkish companies.

Several theories have been used to explain why SOEs pay higher dividends, including agency theory, signaling theory, and life cycle theory. According to agency theory, state-controlled corporations can be viewed as manager-controlled. In these companies, a double principal-agent problem exists, as the ultimate owners are the citizens. Although they do not control the company directly, their elected representatives do (or should). However, the large number of citizens leads to a tendency "to shirk" their monitoring responsibilities regarding politicians, and thus, the politicians may not actively monitor the companies the state owns.

These considerations suggest that principal-agent problems between managers and the citizen-'owners' of state-owned companies may be even greater than for private corporations. Elected politicians are held accountable for all government activities and have a vested interest in ensuring a steady flow of dividends from a company controlled by the state. The steady stream of dividends means less free cash flow in managers' hands to spend on unprofitable projects (Gugler 2003, p. 1301).

Alternatively, the asymmetry of information and the signaling theory might explain the managers' willingness to smooth dividends and make them reluctant to cut dividends. Due to the asymmetry of information between owners and managers, smooth and steady dividends can serve as a positive signal sent to shareholders to indicate that the company is performing well (Gugler 2003, p. 1301).

The life cycle theory of dividends can also help explain why SOEs tend to pay higher dividends. SOEs are typically older, larger, more mature, less risky, and often with lower investment opportunities. According to this theory, such companies opt for higher dividend payments to distribute excess cash to shareholders (Kowerski 2014, p. 280).

Recent discussions suggest that dividends may be used to control shareholders in SOEs to tunnel resources and cash flow from the company (Johnson et al. 2000, p. 25). The term "tunneling" refers to the transfer of resources out of a company to its controlling shareholder. It can manifest in various forms, including high salaries, personal loans, and, in some cases, outright theft. The term is used to describe the appropriation of assets by large shareholders who legally or illegally divert assets and profits for their own benefit.

Based on these considerations, we can formulate the following research hypotheses:

- **H1: State ownership negatively affects firm performance.**
- **H2: State ownership positively affects the dividend level.**

Research on Polish companies diverges from the general findings regarding the impact of state ownership on firm performance. For example, Aluchna and Kamiński (2017, pp. 494–497) and Guillaume (2018, pp. 34–35) found that state ownership has no statistically significant effect on performance. Kabaciński, Kubiak, and Szarzec (2020, pp. 3184–3187) found that while state companies achieve higher returns on assets compared to privately owned enterprises, they have less financial liquidity. Thus, it can be inferred that hypothesis H1 may not apply to Polish companies.

Research on dividends in Polish state-owned companies also provides a different perspective. Kowerski (2014, pp. 282–284) analyzed 136 companies listed on the Warsaw Stock Exchange (WSE) that paid dividends in 2013. He found that the dividends paid by 14 SOEs amounted to 11.4 billion PLN, representing 58.7% of the total value of dividends paid by the other listed companies (122). In contrast, Jabłoński and Kuczowic (2017, pp. 101–108) examined companies from the WIG20 index (the 20 largest companies listed on the WSE) from 2007 to 2015 and found that no significant difference in the dividend payout ratio between SOEs and private companies. Kaźmierska-Jóźwiak (2016, pp. 176–177) examined 64 WSE-listed companies between 2010 and 2015 and found no statistically significant impact of state ownership on the likelihood of dividend payouts. Wypych (2016, pp. 574–576) analyzed 117 companies that paid dividends between 2013 and 2015, revealing an overall dividend payout ratio of 68%, with SOEs at 64%. He noted that 50% of SOEs paid less than 25% of their net profit. Thus, we may conclude that hypothesis H2 does not apply to Polish companies.

Methodology

The paper aims to determine the level of firm performance and dividend payments of SOEs in CEE. Several variables describing the ownership structure and financial characteristics of the company were adopted. To provide a robustness check, several measures of state involvement and dividend payments were also included. The research covers a six-year period between 2017 and 2022. The years 2017, 2018, and 2019 are categorized as non-crisis years, while 2020, 2021, and 2022 are considered crisis years.

Table 1 presents the set of variables included in the research with their formula.

Table 1. The set of variables included in the research

Proxy	Variable	Measurement unit	Definition
State ownership	SOE	%	Percentage of shares owned by the state relative to the total number of shares
State ownership	SOE01	0,1	1 if the state is among the owners of the company; 0 otherwise
State ownership	SOErelative	%	Percentage of shares owned by the state relative to shares held by big owners (more than 5% of capital)
Firm Performance	Profitability	%	Net Profit to Total Assets
Dividend Payments	Div Ratio TA	%	Dividend Paid to Total Assets
Total Assets	Total Assets	€ millions	All data in national currency from the balance sheet were recalculated into euros
LnTA	Size		Natural logarithm of Total Assets
Cash holdings	Cash Ratio	%	Cash and its equivalents to Total Assets
Financial Leverage	Debt Ratio	%	Total Liabilities to Total Assets
CAPEX	CAPEX Ratio	%	Capital Expenditures CAPEX to Total Assets

Source: own elaboration.

The analysis starts with descriptive statistics. To assess the impact of the independent variables (state ownership) on the firm performance and dividend payouts, regression analysis is used as a statistical tool. General Linear Models with year and country fixed effects were employed. The general formula of the regression model is the following:

$$DV = \beta_0 + \beta_1 IV + \beta_2 CV + \varepsilon_i,$$

where:
DV – dependent variable vector, reflecting proxies for dividend payments: Div Ratio TA, and Profitability,
IV – independent variable vector, reflecting proxies for state ownership measured in three alternative ways: SOE, SOE01, SOErelative,
CV – control variable vector, reflecting the financial characteristics of the company (size, cash holdings, profitability, financial leverage, CAPEX expenditure),

β – coefficient estimate for the independent and control variables,
ε_n – random error term/residual variable.

To analyze the impact of state ownership, 12 models were developed based on different measures of state ownership (SOE, SOE01, SOErelative), separately for the total subsample of CEE companies and the Polish subsample. SPSS software was used for the analysis.

The research includes companies listed on stock market indices in CEE countries. Table 2 presents an overview of the countries with details about their stock markets and indices.

Table 2. The set of CEE stock markets and their indices

Country	Stock market name	Number of companies listed on the main market	Index of the stock market	Number of companies in the index	Number of companies with state ownership in the index
Poland	Warsaw Stock Exchange	449	WIG20	20	8
Czech Republic	Prague Stock Exchange	59	PX	9	2
Slovakia	Bratislava Stock Exchange	38	SAX	5	0
Hungary	Budapest Stock Exchange	41	BUX	15	3
Estonia, Lithuania, Latvia	Nasdaq Baltic Market	52	OMX Baltic 10	10	3
Slovenia	Ljubljana Stock Exchange	50	SBITOP	9	7
Croatia	Zagreb Stock Exchange	82	CROBEX	20	2
Romania	Bucharest Stock Exchange	85	BET20	20	9
Bulgaria	Bulgarian Stock Exchange	61	SOFIX	15	2
Serbia	Belgrade Stock Exchange	187	BELEX15	9	3
Total	x	1,104	x	132	39

Source: own elaboration based on hand-collected data.

The total number of companies included in the research is 132, and data on ownership and finances were hand-collected. This process involved reading 792 annual reports from the companies' websites. However, there are some cases (specific years and companies) where data on ownership and financial data were unavailable. As a result, the total number of firm-year observations for the 2017–2022 period is 743. For the Polish subsample, 124 firm-year observations were collected.

Research results and discussion

Table 3 presents the basic information on the descriptive statistics of the sample.

Table 3. Descriptive statistics of the sample

	mean	median	min	max	SD
SOE (%)	13.7	0.0	0.0	99.0	25.1
SOE01 (0,1)	0.3	0.0	0.0	1.0	0.5
SOErelative (%)	19.2	0.0	0.0	100.0	32.9
Profitability (%)	4.9	3.5	–65.6	57.7	7.1
Div Ratio TA (%)	2.7	1.0	0.0	154.9	7.4
Total Assets (€ millions)	8,963	664	0.4	328,251	30,479
Cash Ratio (%)	10.3	6.6	1.0	91.6	11.7
Debt Ratio (%)	55.6	53.2	0.3	168.3	27.9
CAPEX Ratio (%)	4.7	3.3	0.0	66.7	5.8

Source: own elaboration based on hand-collected data.

There are 39 companies with state ownership in the sample. Of these, 45% of the observations have state ownership exceeding 50%, 30% have state ownership between 20% and 50%, and 25% have state ownership below 20%.

The average annual profitability is approximately 5%, while the average annual dividend payout is approximately 3% of total assets.

Table 4 presents the results of the regression analysis (GLM with fixed effects) with Profitability as the dependent variable.

Table 4. Regression analysis results for Profitability as the dependent variable

	Total sample			Polish subsample		
	1	2	3	4	5	6
SOE	**–0.108****			0.133		
SOE01		**–0.100****			**0.205****	
SOErelative			**–0.109****			**0.179****
Size	–0.015	–0.004	–0.011	**–0.288***	**–0.355****	**–0.333****
Cash Ratio	**0.214*****	**0.211*****	**0.213*****	**0.184****	**0.195****	**0.189****
Debt Ratio	**–0.390*****	**–0.389*****	**–0.390*****	**–0.218****	**–0.224****	**–0.202***
Div TA	**0.109*****	**0.100*****	**0.106*****	**0.177****	**0.168***	**0.174****
CAPEX Ratio	0.047	0.044	0.047	0.023	0.025	0.014
R2	0.275	0.275	0.276	0.418	0.429	0.425
F-statistics p-value	13.708***	13.577***	13.718***	7.049***	7.381***	7.253***

	Total sample			Polish subsample		
	1	2	3	4	5	6
Fixed effects	Year- and country-FE	Year- and country-FE	Year- and country-FE	Year- FE	Year- FE	Year- FE

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Source: own elaboration based on hand-collected data.

For the total sample of companies, state ownership has a negative impact on profitability, no matter how state ownership is measured – absolute ownership, relative ownership, or as a dummy variable. This confirms our hypothesis H1, which posits that state ownership negatively impacts firm performance. However, this finding does not hold for the Polish subsample, where a positive impact on profitability is observable.

Table 5 presents the results of the regression analysis (GLM with fixed effects) with Div Ratio TA as the dependent variable.

Table 5. Regression analysis results for Div Ratio TA as the dependent variable

	Total sample			Polish subsample		
	7	8	9	10	11	12
SOE	0.135***			–0.084		
SOE01		0.050			–0.008	
SOErelative			0.098**			–0.056
Size	–0.022	–0.008	–0.017	–0.286*	–0.361**	–0.314*
Cash Ratio	0.031	0.039	0.035	–0.135	–0.133	–0.136
Debt Ratio	–0.162***	–0.184***	–0.172***	–0.203	–0.161	–0.184
Profitability	0.130***	0.121***	0.127***	0.209**	0.202*	0.209**
CAPEX Ratio	0.058	0.059	0.057	–0.210**	–0.235**	–0.221**
R2	0.138	0.125	0.131	0.314	0.310	0.312
F-statistics p-value	5.774***	5.174***	5.443***	4.489***	4.421***	4.451***
Fixed effects	Year- and country-FE	Year- and country-FE	Year- and country-FE	Year- FE	Year- FE	Year- FE

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Source: own elaboration based on hand-collected data.

For the total sample, there is a positive and significant impact of state ownership on dividend payouts. This impact is observable when state ownership is measured as a percentage (absolute or relative). However, simply having the state as an owner does not guarantee an impact on dividend payments. This finding confirms our hypothesis H2, which posits a positive impact of state ownership on dividend payment. Again, however, this finding does not hold for the Polish

subsample, where no statistically significant impact on dividend payment is observed. It seems that for the dividend payouts, it does not matter who the owner is – private or state.

To sum up, we find a negative impact of state ownership on firm performance (profitability) but a positive impact on dividend payments. However, this is true only for the total sample of CEE companies. When the Polish subsample is considered, higher state ownership correlates with higher profitability, but it seems that state ownership does not affect dividend decisions.

The explanation for the positive impact of state ownership on dividend payments in CEE countries (and the lack of such an impact for the Polish subsample) might lie in the relationships between large and minority shareholders. La Porta et al. (2000, p. 10) argued the interests of large-block investors are not necessarily aligned with other stakeholders. Consequently, large shareholders are likely to use their power to extract private benefits from the firm through practices such as tunneling. The conflict of interest between large and small shareholders arises from the potential takeover of the minority shareholders' property by large shareholders. Large shareholders frequently control the decisions through their appointed directors, incurring the most monitoring expenses. By contrast, minority shareholders are usually passive and not engaged in everyday company management but benefit from the actions of large shareholders through financial results (the free rider problem). Gugler and Yurtoglu (2003, p. 735) believe that smaller shareholders anticipate a takeover and thus demand higher dividends.

If large shareholders tunnel assets from the company via dividend payouts, then their ownership will positively impact dividend payments. Additionally, controlling shareholders seem to pay high dividends to build a reputation for not taking over minority shareholders. Firms that pay high dividends benefit from this enhanced trust by attracting greater minority investment later on. Large shareholders may adopt a minority-friendly dividend policy (Berzins, Bøhren, and Stacescu 2018, p. 1837). Several studies confirm that large shareholders prefer to pay high cash dividends to alleviate minority shareholder concerns about a takeover (Firth et al. 2016, p. 93; Anh and Tuan 2019, p. 133; Jiang et al. 2019, p. 2).

However, the interests of majority shareholders sometimes might be aimed at minimizing the payout dividends to minority shareholders. This is because controlling shareholders prefer to avoid profit distributions that treat all shareholders equally. Therefore, they pay lower dividends and keep the retained earnings within the corporation where they can redistribute a greater part of these earnings to themselves through other ways of tunneling, such as self-dealing or related party transactions. Empirical analyses reveal that firms make lower dividend payouts as the voting rights of the largest shareholder increase (Faccio, Lang, and Young 2001, pp. 63–69; Mancinelli and Ozkan 2006, pp. 274–276). The negative relationship between ownership concentration and the dividend was also demonstrated by Renneboog and Trojanowski (2007, pp. 54–55), Aoki (2014, pp. 626–630), and Sáez and Gutiérrez (2015, pp. 127–130).

Additionally, if dividends are part of government budget revenues, spending must follow strict budgetary rules. In contrast, spending by SOEs is subject to less stringent regulations. Making SOEs spend money on specific purposes gives the government more freedom in deciding what

purposes should be financed. In this way, SOEs' spending is a tool for achieving the political aims of the ruling party.

Conclusions

The paper aimed to determine the level of firm performance and dividend payments of SOEs (state-owned enterprises) in Central and Eastern European countries. The research demonstrated that in the CEE region, state ownership has a negative impact on firm performance but a positive impact on dividend payouts. However, for the Polish subsample, state ownership has a positive impact on profitability and no impact on dividend payouts. This suggests that the Polish government takes a unique approach toward state-owned companies.

Our findings have several implications. First, the impact of state ownership on firm performance might be important for investors. Understanding the economic influence of the state can enable them to make more informed investment decisions and evaluate their expected returns accordingly. Second, the economic aims associated with state ownership might be important for company employees and managers who might include the type of ownership in their everyday professional decisions. Third, policymakers should implement a clear information policy regarding state aims, methods of influence, and the final impact on state-owned companies.

This research is not without its limitations. It covers a relatively small number of companies from each country, sometimes as few as five in Slovakia, nine each in the Czech Republic, Slovenia, and Serbia, and ten for Estonia, Lithuania, and Latvia combined. Thus, it would be advisable to extend the sample to include more companies and a wider range of countries. Additionally, incorporating country and institutional characteristics could show how country differences affect financial decisions within companies.

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Wyniki finansowe i dywidendy w przedsiębiorstwach z własnością państwową w państwach Europy Środkowo-Wschodniej – czy polskie przedsiębiorstwa z własnością państwową są inne?

W ostatnich latach wraca zainteresowanie firmami z własnością państwa. Szczególną rolę odgrywają te firmy w gospodarkach postsocjalistycznych Europy Środkowo-Wschodniej. Jednak dotychczas prowadzone badania nie dają jednoznacznego obrazu uzyskiwanych wyników finansowych i dywidend wypłacanych przez te firmy. Powszechnie uważa się, że firmy z własnością państwa osiągają niższe wyniki finansowe i wypłacają wyższe dywidendy. Niniejszy artykuł ma na celu zidentyfikowania wpływu własności państwowej na wyniki finansowe i wypłacane dywidendy w krajach Europy Środkowo-Wschodniej. Do próby włączono wszystkie firmy wchodzące w skład indeksów giełdowych z 12 krajów Europy Środkowo-Wschodniej w łącznej liczbie 132 firm z 743 obserwacjami dla lat 2017–2022. Dla badania stabilności wyników zastosowano różne miary udziału państwa we własności. Główną metodą badań był ogólny model liniowy z efektami stałymi (dla krajów i badanych lat). Wyniki badań wskazują, że w krajach Europy Środkowo-Wschodniej własność państwa negatywnie oddziałuje na wyniki finansowe, ale pozytywnie na wypłacane dywidendy. Niemniej jednak dla grupy polskich podmiotów własność państwa pozytywnie wpływa na wyniki finansowe, ale nie ma wpływu na wypłacane dywidendy.

Słowa kluczowe: wyniki finansowe firm, wypłaty dywidend, firmy z własnością państwową, SOE

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The Operational Activities of EU Banking Groups and the Portfolio of Government Bonds during the COVID-19 Pandemic – the Case of Non-euro Area EU Countries

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Abstract

The objective of this article is to present the results of an analysis of how the form of activities of EU banking groups affected their decisions to purchase non-euro area EU government bonds during the COVID-19 pandemic. The dataset consists of the portfolios of government bonds (including both on- and off-balance sheet items) issued by non-euro area EU countries held by 93 EU banking groups (data aggregated at the highest group level). For each country surveyed, we analysed the structure of banks purchasing the bonds issued by that country and its evolution between 2019 and 2022, with purchasers broken down into domestic banks and EU banking groups operating in the relevant market through subsidiaries or branches. The analysis shows that, during the COVID-19 pandemic, the decisions to purchase the government bonds of non-euro area EU countries were primarily determined by the operational activities of these groups in the local markets. However, significant similarities were observed within the three country groups identified. The added value of the analysis is that it provides insights into the resilience of these banking groups against the 'moral suasion' exerted by non-euro area EU countries to purchase their government bonds. Notably, domestic banking groups exhibited the least resistance to this moral suasion, as evidenced by their increasing share of a specific issuer's government bonds within the portfolio held by all EU banking groups across nearly all surveyed countries.

Keywords: EU banking groups, government bonds, moral suasion, non-euro area EU countries

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Introduction

The rapid growth of banks' balance sheet exposures to domestic sovereign debt during the 2008 crisis in euro-area countries prompted both scholars and policymakers to speculate that this trend was partly driven by a phenomenon known as 'moral suasion'. This refers to informal pressure exerted by public authorities on banks to provide substantial support to the government by purchasing government bonds. While there has been considerable speculation about the prevalence of this mechanism, it was only the findings of Ongena, Popov, and Van Horen (2019, p. 346) that unequivocally confirmed its use. Their findings indicated that in euro-area countries particularly affected by the public finance crisis, domestic banks increased their exposure to domestic government bonds markedly more often than foreign banks. This effect was stronger for state-owned banks and for banks with an initially low exposure to such bonds.

To prevent governments from coercing banks into increasing their holdings of domestic government bonds beyond what was necessary for portfolio diversification, it would have been essential to strengthen banking union mechanisms and abandon the application of a 0% risk weight to European Union government bonds in capital adequacy calculations (Koleśnik 2019, p. 95). However, this did not happen, and with the outbreak of another crisis, this time sparked by the COVID-19 pandemic, the lack of mechanisms to effectively prevent the use of moral suasion became apparent.

To ascertain whether banks still yielded to moral suasion and which of them increased their government bond exposures even during the crisis, it is pertinent to narrow the scope of the study to only European Union (EU) countries that were not part of the euro area during the COVID-19 pandemic. This is primarily because the governments of these countries were unable to meet their pandemic-related needs by issuing bonds that would then be purchased by national central banks in virtually unlimited quantities under quantitative easing programmes. This is because, in contrast to euro area countries, which could rely on this type of support from the European Central Bank, non-euro area countries central banks launched quantitative easing programmes to a limited extent (e.g. Poland) or did not launch them at all (e.g. Denmark). For this reason, commercial banks purchasing such bonds had to face the fact that, should the crisis worsen, they would find it difficult to sell these bonds before their maturity.

To understand the factors that influenced the change in EU banking groups' exposure to government bonds of non-euro area countries, it is important to recognise the role of moral suasion. Susceptibility to moral suasion depends on the possibility of state interference in the bank's operations, which depends primarily on the bank's domicile. However, under the single banking licence regime, a bank registered in any EU country can operate in another through a branch or on a cross-border basis. These two forms of operation should be contrasted with having a subsidiary in another member state, and all three situations should be compared with the behaviour of local banking groups, if applicable.

This understanding shapes our research objective: to assess how the operational forms of EU banking groups influenced their decisions to purchase non-euro area EU government bonds during the COVID-19 pandemic. Furthermore, this study aims to evaluate the resilience of EU banking groups against moral suasion from non-euro area EU countries to purchase their government bonds.

Literature review

To confirm the existence of a research gap on the impact of the operational forms of EU banking groups on their decisions to purchase non-euro area EU government bonds during the COVID-19 pandemic, a literature review was conducted. This review encompassed three key areas: (1) the moral suasion exerted on EU banks during financial market disturbances, (2) banks' policies based on the form of exposure in the host country, and (3) the impact of the COVID-19 pandemic on banking operations.

The existing literature on the subject addresses moral suasion as a phenomenon where the authorities in financially distressed countries persuade local banks to continue financing domestic public debt. Ongena, Popov and Van Horen (2019, p. 346) identified two mechanisms underlying this phenomenon. First, moral suasion may arise as a natural reaction to the relationship between banks and the government; if banks are linked to or directly controlled by the government, they might be ready to respond to the government's needs. Secondly, moral suasion may be a natural reaction of relatively weak banks that either have a strong incentive to prevent excessive rises in government bond spreads, thereby keeping their financing costs under control, or anticipate needing government assistance in the near future.

However, other authors have pointed out that the increase in banks' interest in home country government bonds is not necessarily the result of moral suasion but the rational behaviour of such banks. They attributed a lower level of risk to home country bonds than to government bonds of other countries during the crisis. On the other hand, the scale of these purchases was also substantially driven by the large amount of liquidity provided by central banks (Pietrovito and Pozzolo 2023, p. 666). The use of moral suasion was further supported by the preferential treatment of government bonds in bank capital adequacy regulations in the EU (Bonner 2016, p. 1195). From the banks' perspective, purchasing EU government bonds was the easiest way to comply with increasing solvency requirements while maintaining good relations with governments that wanted to secure financing. However, a side effect was a reduction in lending to the real economy and a tightening of the interdependence of state budget situations and the stability of the banking system (Buch, Koetter, and Ohls 2016, pp. 1–15).

So far, research on moral suasion in the EU has focused on euro-area countries, particularly peripheral countries such as Greece, Italy, Ireland, Portugal, and Spain (Acharya and Steffen 2015, p. 215) or selected non-euro area countries (e.g. Denmark) (Eisl et al. 2022, p. 21). Studies on Central and Eastern European countries have mainly looked at the correlation between their government bond yields and those of euro-area countries (Stoupos and Kiohos 2022, p. 1).

Analyses of distortions in the EU banking sector during market disturbances have mainly focused on the behaviour of euro-area banks in the context of convergence of domestic interest rates and margins (Kleimeier and Sander 2022, pp. 1–3). While some studies have referred to the impact of economic and political uncertainty on CDS spreads of government bonds (Pan et al. 2024, pp. 143–145), they do not explain why an increase in economic and political uncertainty, which results in an increase in CDS spreads of government bonds, leads to an increase in interest in government bonds for some banks while causing a decrease in interest in others.

Additionally, recent research on the impact of the COVID-19 pandemic on sovereign default risk failed to explain why, despite the increase in this risk for many countries, some EU banking groups still increased their exposure to the government bonds of such countries (Augustin et al. 2022, p. 1251). Other analyses have focused on the impact of the sovereign risk premium on bank profitability among euro-area banks between 2005 and 2019. However, the conclusions mainly addressed the impact of low and negative interest rates on the net interest margin of euro-area banks (Junttila and Nguyen 2022, pp. 1–2).

To date, research has highlighted contagion as a primary risk, although mainly within the euro area. Most analyses have sought to determine the extent of the transmission of sovereign-to-bank risk in euro-area countries by observing how an increase in the risk of government bonds in one euro-area country affects the risk in banks in other euro-area countries. The results of these studies, which were based on an analysis of Italian government bonds, showed that an increase in the credit risk of the issuing country induced an increase in the credit risk of other countries, constituting one of the channels for the spread of contagion in euro area countries (Capasso et al. 2023, pp. 1–2). The effects of the European Central Bank's purchase of government bonds of euro-area countries have been analysed in a range of studies, indicating that it resulted in yields on government bonds of euro-area countries falling in a fairly uniform manner and even in lower yields on government bonds of non-euro area EU countries, notably Denmark and Sweden (Gnewuch 2022, p. 1).

Banks' policies during market disturbances, which depend on the form of exposure in the host country, have been the subject of several studies. However, they focused either solely on euro-area countries or on individual non-euro area EU countries (Koleśnik 2023, pp. 157–159). Additionally, they only distinguished the form of exposure between domestic banks and foreign banks (understood as both subsidiaries of non-EU banks and subsidiaries and branches of EU banking groups). The findings indicate that in some EU countries, domestic banks reduced lending more significantly than foreign banks and raised lending rates (Bofondi, Carpinelli, and Sette 2018, p. 696). This trend was mainly due to foreign banks' lower exposure to local government bonds and their access to financing through the home country's interbank market. However, these studies fail to address how EU banking groups behave based on their forms of exposure in a specific member state.

Some elements of analysis of the impact of a bank's business model in the relevant market and its government bond portfolio structure can only be found in the research by Baziki et al. However, their study did not provide any evidence that a larger portfolio of government bonds in the bank's home country increases its ex-post risk (Baziki, Nieto and Turk-Ariss 2023, pp. 1–2). Additionally, it only looked at the period before the COVID-19 pandemic. It did not explain when local banks increased their exposure to home country government bonds or which factors determined the purchase of these bonds by banks from other countries.

The above review confirms a significant research gap. Despite numerous studies addressing sub-issues such as (1) the moral suasion on banks in EU countries during financial market disturbances, (2) the influence of exposure forms on banking policies in host countries, and (3) the pandemic's impact on banking operations, there is no comprehensive analysis that combines all these themes in relation to the COVID-19 pandemic and EU banking groups operating in non-euro area countries.

Data and methods

We will assess the role of EU banking groups' business activities in their decisions to purchase non-euro area EU government bonds during the COVID-19 pandemic. We will do this by analysing data published by the largest EU banking groups that participate in the European Banking Authority's (EBA) periodic EU-wide transparency exercise. This data source was chosen not only because of its reliability but, above all, because it is aggregated at the highest level of the banking group. This aggregation allows for a comprehensive view of the entire portfolio of government bonds issued by a specific country, irrespective of which entity within the group currently holds them.

The time frame spans from 2019 to 2022, with 2019 serving as a reference point before the COVID-19 pandemic. This period provides a basis for analysing the changes in the portfolios of government bonds issued by non-euro area EU countries, while 2022 is considered the first year after the pandemic. Banks that did not operate continuously during this period, as well as UK banks due to Brexit, were excluded from this analysis.

In addition to data from the EU-wide transparency exercise, the study also used registers maintained by the EBA to identify whether a banking group is present in a host country through a subsidiary or a branch.

Finally, after accounting for these exclusions, we analysed the portfolios of government bonds (including both on- and off-balance sheet items) issued by non-euro area EU countries held by 93 EU banking groups. We analysed the structure of banks purchasing their bonds and how this evolved between 2019 and 2022 for each country, breaking down the purchasers into domestic banks and EU banking groups operating through subsidiaries or branches. The analysis only covered bond portfolios where the value of government bonds issued by a non-euro area EU country exceeded €1 million for a single issuer.

The impact of the COVID-19 pandemic on non-euro area EU government bond holds in EU banking group portfolios

The analysis reveals a heterogeneous group of countries whose government bonds were examined, although the most important common feature is that they remain outside the euro area. While three countries have joined the ERM II mechanism (Bulgaria, Croatia and Denmark), and two joined the banking union (Bulgaria and Croatia), Croatia subsequently joined the euro area on 1 January 2023, with Bulgaria set to follow on 1 January 2025. However, the above differences do not significantly impact the results of the study. A country's ERM II membership, as a precursor to euro adoption, did not automatically translate into increased interest in its government bonds. Instead, the country's credit rating was a greater driver. However, the country rating alone is irrelevant for the purchase of these bonds by the banks domiciled in EU countries (Zaleska 2020, p. 94). According to the current rules for calculating credit risk capital requirements, all government bonds issued by member states in their currencies receive a 0% risk weight, regardless of the rating (Table 1).

Table 1. Ratings of non-euro area EU countries by three global rating agencies and the risk weights assigned to their government bonds

Country	Sovereign credit rating according to			Risk weight of government bonds (%)
	Standard & Poor's	Fitch	Moody's	
Bulgaria	BBB	BBB	Baa1	0
Croatia	BBB+	BBB+	Baa2	0
Czech Republic	AA-	AA-	Aa3	0
Denmark	AAA	AAA	Aaa	0
Hungary	BBB-	BBB	Baa2	0
Poland	A-	A-	A2	0
Romania	BBB-	BBB-	Baa3	0
Sweden	AAA	AAA	Aaa	0

Source: Regulation (EU) No. 575/2013; Fitch Ratings 2024; Moody's 2024; S&P Global 2024.

Maintaining the same risk weight across member states with substantial rating differences between them remains highly controversial. However, for this study, it allows us to conclude that the identified changes in the portfolio composition of government bonds issued during the COVID-19 pandemic were likely driven by factors other than credit ratings. One such factor was the banking group's exposure to the non-euro area country's banking sector. The results below indicate that a group's presence in a country's banking market, either through a subsidiary or a branch, was a decisive factor in increasing or decreasing its exposure to government bonds, and whether the group was present through a subsidiary or a branch of a credit institution.

The countries surveyed were divided into three groups: (1) countries with no domestic banking groups (Bulgaria, Croatia and the Czech Republic), (2) countries with only branches of banking groups from other EU countries and domestic banking groups (Denmark and Sweden), (3) countries with domestic banking groups, as well as branches and subsidiaries of banking groups from other EU countries (Poland, Romania and Hungary).

Bulgaria, Croatia and the Czech Republic

In Bulgaria, only 17 EU banking groups held Bulgarian government bonds during the examined period. Of the nine groups whose portfolios held more than 1% of the total purchased by EU banking groups, only two (Raiffeisenbankengruppe and Nova Ljubljanska Banka) were not present in the Bulgarian banking market. Most of the others had subsidiaries (five groups) or branches (two groups) (Table 2).

Table 2. Bulgarian government bonds in the portfolios of EU banking groups

The group's country of origin	Banking group	Portfolio of Bulgarian government bonds (as a % of the portfolio of these bonds held by all EU banking groups)				Form of activity in Bulgaria
		2019	2020	2021	2022	
IT	UniCredit	45.3	40.7	40.0	41.0	S
BE	KBC Groep	27.6	26.2	24.3	34.8	S
AT	Raiffeisen Bank International	11.3	11.3	11.1	1.4	S
HU	OTP Bank	5.4	11.3	14.5	11.7	S
GR	Eurobank Ergasias	5.1	4.5	4.5	5.7	S
IE	Citibank Holdings Ireland	1.3	0.9	0.6	0.5	B
AT	Raiffeisenbankengruppe	1.1	1.0	1.0	0.8	–
NL	ING Groep	1.0	1.5	1.5	1.5	B
SI	Nova Ljubljanska Banka	1.0	0.8	0.8	0.7	–
	the other 8	1.0	1.9	1.6	1.8	

B = branch, S = subsidiary.

Source: author's calculations based on European Banking Authority 2024a; 2024b.

Analysis of the banking groups holding Bulgarian government bonds reveals that, despite the outbreak of the COVID-19 pandemic, the three largest holders maintained their market share. While UniCredit, the largest holder, saw a slight decrease in exposure (by nearly 5 percentage points (p.p.)) in 2020, it remained at that level after the end of the pandemic. Only Hungary's OTP Bank, which operates in Bulgaria through a subsidiary, doubled its share in the aggregate portfolio of all EU banking groups holding Bulgarian government bonds.

However, the combined exposure of EU banking groups operating in the country through subsidiaries did not change throughout the pandemic, accounting for approximately 95% of the aggregate portfolio. The exposure of the two groups operating through branches and those not operating in Bulgaria was marginal, although their holdings decreased by a factor of two during the pandemic. In summary, the form of activity of the EU banking group in Bulgaria had a decisive impact on portfolio size. The COVID-19 pandemic did not cause any significant change in the approach of EU banking groups to the purchase of Bulgarian government bonds.

In Croatia, the analysis showed that 15 EU banking groups held Croatian government bonds during the examined period. However, only seven of these groups had a share of Croatian bonds exceeding 1% of the total holdings held by EU banking groups. Notably, five of these seven groups were operating in Croatia through subsidiaries (Table 3).

Table 3. Croatian government bonds in the portfolios of EU banking groups

The group's country of origin	Banking group	Portfolio of Croatian government bonds (as a % of the portfolio of these bonds held by all EU banking groups)				Form of activity in Croatia
		2019	2020	2021	2022	
IT	UniCredit	41.6	38.4	37.5	27.8	S
IT	Intesa Sanpaolo	22.7	24.2	21.3	17.6	S
AT	Erste Group Bank	18.6	19.5	25.1	22.2	S
DE	Deutsche Bank	6.4	3.8	2.4	2.1	–
AT	Raiffeisen Bank International	6.0	6.0	6.4	6.9	S
HU	OTP Bank	2.7	6.7	5.5	21.9	S
FR	BNP Paribas S.A.	1.1	1.0	1.3	0.6	–
	the other 8	0.8	0.5	0.4	0.9	

S = subsidiary.

Source: author's calculations based on European Banking Authority 2024a; 2024b.

The analysis of Croatian government bond holdings in EU banking group portfolios indicates that the form of activities was a key factor in determining a banking group's exposure to Croatian government bonds. The aggregate portfolio of EU banking groups operating in Croatia through a subsidiary exceeded 90% of the value of the aggregate portfolio of Croatian government bonds held by EU banking groups. During the pandemic, this portfolio increased by almost 5 p.p. In contrast, the share of EU banking groups not operating in Croatia fell below 4% as a result of the pandemic.

Significant changes occurred in the shares of individual banking groups following the end of the COVID-19 pandemic. The leader, with the largest Croatian government bonds portfolio, remained UniCredit, although its share fell by almost 14 p.p. The same was also true for another Italian banking group, Intesa Sanpaolo, whose share fell by more than 5 p.p. At the other extreme, the Hungarian OTP Bank group's share increased by a factor of eight, from nearly 3% to almost 22%.

This increase aligns with the group's noticeable increase in interest during the pandemic in government bonds of neighbouring countries, including Bulgaria and Romania, where it also operates through subsidiaries. Thus, despite these individual differences, the overall trend during the COVID-19 pandemic was an increase in the share of Croatian government bonds held by EU banking groups operating in the country through a subsidiary.

Czech government bonds were held in the portfolios of 19 EU banking groups. Of these, only seven groups had a share exceeding 1% of the total Czech government bonds held by EU banking groups. Notably, all of these groups operated in the Czech Republic either through subsidiaries (five groups) or through branches (two groups) (Table 4).

Table 4. Czech government bonds in the portfolios of EU banking groups

The group's country of origin	Banking group	Portfolio of Czech government bonds (as a % of the portfolio of these bonds held by all EU banking groups)				Form of activity in the Czech Republic
		2019	2020	2021	2022	
BE	KBC Groep	65.4	34.1	32.9	31.6	S
AT	Erste Group Bank	19.0	34.4	40.4	38.7	S
FR	Société Générale	7.3	14.9	15.5	16.1	S
IT	UniCredit	3.0	5.5	4.2	7.2	S
AT	Raiffeisen Bank International	2.4	5.8	4.4	3.5	S
NL	ING Groep	0.5	2.2	0.1	1.0	B
IE	Citibank Holdings Ireland	0.1	1.2	1.1	1.0	B
	the other 12	2.3	1.8	1.3	1.0	

B = branch, S = subsidiary.

Source: author's calculations based on European Banking Authority 2024a; 2024b.

The conclusions of the analysis of the portfolio of Czech government bonds held by EU banking groups are similar to those regarding Croatian government bonds. Similarly, the portfolio of Czech government bonds in EU banking groups was concentrated (97%) in banking groups that operated in the Czech Republic through a subsidiary. Unlike Croatia, however, this share did not change during the pandemic. Despite this stability, as in Croatia, there were significant changes in the holdings of individual banking groups. KBC Groep, which was the leader before the pandemic, reduced its share by a factor of more than two, resulting in Erste Group Bank becoming the post-pandemic leader with a share of 38.7% (an increase of almost 20 p.p.). Aside from the KBC Groep, the portfolio of Czech government bonds in EU banking groups indicates that only groups operating in the local market are interested in purchasing local government bonds, and the scale of this exposure was determined by their operational structure; for example, the share of EU banking groups operating through branches was marginal.

Denmark and Sweden

In Denmark, the market is served not only by three Denmark-based banking groups, but also by branches of three other EU banking groups from other countries. No subsidiaries of foreign banking groups are present in the Danish market. Furthermore, during the analysed period, Danish government bonds (with a share exceeding 1% of the value of the aggregate portfolio held by EU banking groups) were found in the portfolios of four banking groups that do not even have a branch in Denmark (Table 5).

Table 5. Danish government bonds in the portfolios of EU banking groups

The group's country of origin	Banking group	Portfolio of Danish government bonds (as a % of the portfolio of these bonds held by all EU banking groups)				Form of activity in Denmark
		2019	2020	2021	2022	
FI	Nordea Bank	28.4	9.0	8.8	9.6	–
DK	Danske Bank	24.2	41.8	40.3	33.7	D
DK	Nykredit Realkredit	20.3	19.5	16.9	20.1	D
DK	Jyske Bank	11.3	13.6	12.0	8.5	D
SE	Skandinaviska Enskilda Banken	4.6	4.4	9.6	15.4	B
FR	Groupe Crédit Agricole	2.7	3.3	3.0	5.9	–
FR	BNP Paribas S.A.	2.0	3.0	2.5	4.7	B
FR	Société Générale	1.8	2.1	1.5	0.1	–
ES	Banco Santander	1.3	1.1	1.9	0.0	B
FR	Groupe BPCE	1.3	0.2	1.8	0.4	–
	the other 8	2.0	2.2	1.7	1.7	

B = branch, D = domestic.

Source: author's calculations based on European Banking Authority 2024a; 2024b.

The analysis of the portfolio of Danish government bonds held by EU banking groups is more complex than those for Bulgarian, Czech or Croatian bonds. This is due to the presence of three Denmark-based banking groups whose combined share in the Danish government bond portfolio held by all EU banking groups already exceeded 55% before the pandemic. During the pandemic, their combined rose to over 62%, reaching a temporary peak of almost 75% in 2019.

The most notable event occurred in 2019, when the Finnish banking group Nordea Bank, the largest holder at the time, reduced its portfolio by more than a factor of three (from 28.4% to 9.0%). However, while the two Danish banking groups (Nykredit Realkredit and Jyske Bank) hardly changed their shares, Danske Bank almost doubled its share, becoming the new leader. This clearly illustrates the different attitudes of banking groups that do not operate in a specific country (even through a branch) compared to those that are based in this country.

Interestingly, the sharp reduction in the Danish government bond portfolio did not involve groups other than Nordea Bank, which, like Société Générale and Groupe BPCE, did not have a branch in Denmark. In fact, Groupe Crédit Agricole even increased its share slightly. It is important to note that Nordea Bank's original exposure was several times higher than that of these other groups. Additionally, the combined share of Danish government bonds held by EU banking groups operating in Denmark through a branch increased from less than 8% before the pandemic to over 20% afterwards.

In summary, the case of the Danish bond portfolio confirms that the form of activity significantly impacts both portfolio size and the behaviour of the respective banking group during the COVID-19 pandemic.

The Swedish government bond market was similar to the Danish government bond market. This similarity was mainly due to the predominance of local banking groups among the nine banking groups holding Swedish government bonds, whose share in the aggregate portfolios of all EU banking groups exceeded 1% in the examined period. Local banking groups accounted for a combined share ranging between 70% and 76%, while the remaining Swedish government bonds were exclusively held by EU banking groups operating in the country through a branch. As in Denmark, there were no subsidiaries from banks from other EU countries (Table 6).

Table 6. Swedish government bonds in the portfolios of EU banking groups

The group's country of origin	Banking group	Portfolio of Swedish government bonds (as % of the portfolio of these bonds held by all EU banking groups)				Form of activity in Sweden
		2019	2020	2021	2022	
SE	Skandinaviska Enskilda Banken	30.9	31.3	35.1	37.6	D
SE	Kommuninvest	22.1	22.7	23.5	23.4	D
FI	Nordea Bank	13.1	7.1	7.5	7.7	B
DK	Danske Bank	12.1	16.2	13.1	12.9	B
SE	Svenska Handelsbanken	7.0	6.5	6.4	5.6	D
SE	Swedbank	6.1	8.3	4.9	4.1	D
SE	SBAB Bank	3.5	2.6	3.9	3.4	D
FR	Groupe Crédit Agricole	1.6	1.3	1.8	2.2	B
SE	Länsförsäkringar Bank	0.6	0.6	1.7	1.2	D
	the other 12	2.9	3.4	2.1	2.0	

B = branch, D = domestic.

Source: author's calculations based on European Banking Authority 2024a; 2024b.

During the COVID-19 pandemic, the share of local banking groups in the aggregate portfolio of Swedish government bonds held by EU banking groups increased to over 75%. This rise was primarily due to Skandinaviska Enskilda Banken, whose share increased by almost 7 p.p. In contrast, the shares of some local banking groups, such as Kommuninvest and Länsförsäkringar Bank, increased only slightly, while Svenska Handelsbanken, Swedbank and SBAB Bank experienced slight declines.

The combined share of EU banking groups operating through a branch and holding more than 1% of the value of Swedish government bonds held in EU banking groups' portfolios declined by 4 p.p. during the pandemic. However, this was mainly due to Nordea Bank, which reduced its share by almost a factor of two, with other such groups slightly increasing their share. This situation with the Nordea Bank group is unusual for the Swedish market but reflects a common trend

among most banking groups operating in non-euro area EU countries through branches. This shift was attributed to Nordea relocating its head office from Stockholm to Helsinki, which was completed just before the pandemic (in October 2018) (Nordea Bank 2018, p. 1), resulting in a change of the group's home country from Sweden to Finland, which reduced its interest in Swedish government bonds.

Poland, Romania and Hungary

The Polish government bonds held in the portfolios of EU banking groups present the most complex scenario for three reasons: (1) Numerous groups held these bonds: there were 37 in total, including 13 with a share in the aggregate of all portfolios that exceeded 1%, (2) these groups operated in Poland both as domestic banks (Powszechna Kasa Oszczędności BP and Bank Polska Kasa Opieki) and through subsidiaries and/or branches, and (3) Polish government bonds were in the portfolios of groups that did not operate in Poland.

The analysis did not include the portfolio of Polish government bonds held by the global Citibank group, as the Polish subsidiary (Bank Handlowy w Warszawie) was a direct subsidiary of the US company Citibank Overseas Investment Corporation throughout the examined period. It was not until 15 November 2023 that it became a subsidiary of the EU banking group Citibank Europe (Bank Handlowy w Warszawie 2023, p. 1) (Table 7).

When analysing the impact of EU banking groups' operational form on their interest in Polish government bonds during the COVID-19 pandemic, we should first consider the behaviour of domestic banking groups. Their actions were virtually identical to those of all banking groups in their home markets in the non-euro area EU countries surveyed. As a result of the pandemic, the share of Polish government bonds in the portfolios of domestic banking groups increased relative to the aggregate portfolios of all EU banking groups. For example, in Denmark, this increase was chiefly due to one group (Powszechna Kasa Oszczędności BP), while the other group (Bank Polska Kasa Opieki) slightly reduced its share.

Unlike Danish and Swedish government bonds, the combined share of Polish government bonds in the portfolios of domestic banking groups never exceeded 50% of the aggregate value held by EU banking groups. This is primarily due to the strong interest in Polish government bonds from EU banking groups operating in Poland through subsidiaries. The combined share of Polish government bonds held by seven groups of this type between 2019 and 2021 oscillated around 50%. However, it fell to below 45% in 2022, mainly as a result of two banking groups (BNP Paribas and Banco Comercial Português) drastically reducing their holdings in the Polish government bond portfolio. Banco Comercial Português completely abandoned these bonds in 2022), while other groups maintained their holdings at pre-pandemic levels (ING Groep) or slightly increased them (Commerzbank).

Table 7. Polish government bonds in the portfolios of EU banking groups

The group's country of origin	Banking group	Portfolio of Polish government bonds (as a % of the portfolio of these bonds held by all EU banking groups)				Form of activity in Poland
		2019	2020	2021	2022	
PL	Powszechna Kasa Oszczędności BP	26.9	26.5	31.4	36.0	D
PL	Bank Polska Kasa Opieki	13.2	13.7	12.4	11.4	D
ES	Banco Santander	10.6	12.3	12.7	11.3	S
FR	BNP Paribas S.A.	10.2	7.9	8.0	6.7	S/B
DE	Commerzbank	9.6	11.2	11.1	12.8	S
NL	ING Groep	9.5	11.2	9.3	9.7	S
PT	Banco Comercial Português	6.4	4.6	4.3	0.0	S
DE	Deutsche Bank	2.2	2.2	1.8	2.5	S
BE	KBC Groep	1.7	1.5	1.2	1.1	–
AT	Erste Group Bank	1.4	1.2	0.9	0.9	–
IT	UniCredit	1.4	1.2	0.9	1.3	–
FR	Société Générale	1.3	1.2	1.1	1.2	B
FR	Groupe Crédit Agricole	1.2	1.3	1.1	1.5	S
	the other 24	4.4	4.0	3.8	3.5	

B = branch, S = subsidiary, D = domestic.

Source: author's calculations based on European Banking Authority 2024a; 2024b.

Before the pandemic, the share of EU banking groups in the portfolio of Polish government bonds exceeded that of Polish banking groups by approx. 10 p.p. However, after the pandemic, the situation reversed, with the Polish banking groups having an almost 3 p.p. edge. Both for EU banking groups operating in Poland only through a branch (Société Générale) and the three groups without any branch in Poland, the combined share of portfolios of Polish government bonds in the aggregate portfolio held by all EU banking groups decreased by slightly more than 1 p.p. to just under 5.0%.

In summary, changes in the share of portfolios of each type of banking group in the aggregate portfolio of Polish government bonds depended on the form of activity of the group in Poland. Generally, domestic groups increased their exposure, groups operating through subsidiaries maintained their share at pre-pandemic levels, and groups operating through a branch or without a presence decreased their share.

The market for Romanian government bonds most closely resembles that of Polish government bonds among non-euro area EU countries. This is primarily due to the composition of major bondholders. Among the 11 EU banking groups holding Romanian government bonds with a share exceeding 1% in the aggregate portfolios of all EU banking groups, those that operated in Romania through a subsidiary or branch predominated. While the only local banking group did

have a significant presence in this market, its share was lower than that of local banking groups in the Polish government bond market (Table 8).

Table 8. Romanian government bonds in the portfolios of EU banking groups

The group's country of origin	Banking group	Portfolio of Romanian government bonds (as a % of the portfolio of these bonds held by all EU banking groups)				Form of activity in Romania
		2019	2020	2021	2022	
RO	Banca Transilvania	27.0	30.6	27.4	25.8	D
AT	Erste Group Bank	25.4	22.0	24.8	23.5	S
FR	Société Générale	12.4	11.9	11.8	7.6	S
IT	UniCredit	9.1	8.8	9.0	9.1	S
AT	Raiffeisen Bank International	7.7	7.7	9.4	8.3	S
IE	Citibank Holdings Ireland	6.5	4.8	3.8	3.9	B
NL	ING Groep	4.8	6.0	5.6	14.1	B
ES	BBVA	2.0	1.6	1.6	1.7	S
IT	Intesa Sanpaolo	1.7	1.5	1.6	1.3	S
GR	Alpha Bank	1.1	1.1	1.2	1.0	S
HU	OTP Bank	0.5	1.5	2.2	2.4	S
	the other 10	1.8	2.5	1.8	1.5	

B = branch, S = subsidiary, D = domestic.

Source: author's calculations based on European Banking Authority 2024a; 2024b.

Analysis of the behaviour of Romanian government bond holders during the COVID-19 pandemic shows that, with the outbreak of the pandemic in 2020, the share of the only Romanian banking group, Banca Transilvania, in the aggregate portfolio of Romanian government bonds held by EU banking groups temporarily increased. However, after the end of the pandemic, this share was slightly lower than before the outbreak. EU banking groups operating in Romania through a subsidiary behaved similarly; their share rose in 2021, and the fall in their share between the year after the pandemic and the year before was greater than that of Banca Transilvania.

The last group of entities with more than 1% of the value of the Romanian government in their portfolios comprised those operating in the country through branches. The first of these groups, Citibank Holdings Ireland, behaved typically for this type of entity during the pandemic in non-euro area EU countries, reducing its share by 2.5 p.p. In contrast, ING Groep behaved unusually, significantly increasing its exposure to Romanian government bonds from less than 5% before the pandemic to more than 14% afterwards. However, this increase was due to the overall scale of the group's activity in Romania, which is substantial despite the group operating in this market only through branches and not a subsidiary.

The Hungarian government bond market was similar to that of the Polish and Romanian markets. There were 12 banking groups whose share in the aggregate portfolios of all EU banking

groups exceeded 1% in the examined period. They included a local banking group (OTP Bank), EU banking groups operating through a subsidiary and/or a branch, as well as groups not directly present in the market (Table 9).

Table 9. Hungarian government bonds in the portfolios of EU banking groups

The group's country of origin	Banking group	Portfolio of Hungarian government bonds (as a % of the portfolio of these bonds held by all EU banking groups)				Form of activity in Hungary
		2019	2020	2021	2022	
BE	KBC Groep	20.6	19.4	20.2	10.4	S
AT	Erste Group Bank	19.4	10.4	24.6	11.3	S
IT	UniCredit	14.8	9.5	12.4	7.2	S
IT	Intesa Sanpaolo	12.4	4.8	6.3	3.8	S
AT	Raiffeisen Bank International	8.1	4.5	4.4	3.9	S
HU	OTP Bank	7.3	38.0	10.1	44.4	D
IE	Citibank Holdings Ireland	5.9	3.2	3.9	5.3	B
NL	ING Groep	4.1	1.7	2.6	3.1	B
FR	Groupe BPCE	2.5	1.6	3.2	2.0	–
FR	BNP Paribas S.A.	1.5	3.7	4.8	2.6	S/B
DE	Commerzbank	1.2	0.8	0.3	0.2	–
DE	Deutsche Bank	0.6	0.5	4.1	3.6	B
	the other 9	1.6	2.0	3.1	2.3	

B = branch, S = subsidiary, D = domestic.

Source: author's calculations based on European Banking Authority 2024a; 2024b.

The analysis of changes in the interest of Hungarian government bond holders during the COVID-19 pandemic is the most prominent example of the differing approaches of local banking groups compared to foreign ones. During the pandemic, the share of the Hungarian OTP Bank group in the aggregate portfolio of Hungarian government bonds held by EU banking groups increased from just over 7% to over 44%. This was, of course, accompanied by a nearly 39 p.p. fall in the share of EU banking groups operating only through a subsidiary. Interestingly, the share of EU banking groups operating through a branch, or through a branch and a subsidiary (BNP Paribas), increased by almost 3 p.p.

However, it is important to note that while the trend that was observed – an increase in the share of domestic banking groups holding Hungarian government bonds in the aggregate portfolios of all EU banking groups and a decrease in the share of EU banking groups – was also characteristic of the Polish and Romanian government bond markets, the scale of these changes was markedly different. The increase in OTP Bank group's share by more than a factor of six is unparalleled in other markets. This significant growth was due to the specific conditions in Hungary and the government's influence on the OTP Bank group's policy.

Discussion

To summarise, while it is difficult to identify universal conclusions for all non-euro area EU countries, significant similarities can be observed within the three country groups identified (Table 10).

Table 10. Changes in EU banking groups' shares in the aggregate portfolio of government bonds by type of banking activity during the COVID-19 pandemic

Group of countries	Bond issuer	Changes in EU banking groups' shares in the aggregate portfolio of government bonds by type of banking activity during the COVID-19 pandemic			
		domestic	subsidiary	branch	no activity
I	Bulgaria	n/a	no change	no change	no change
	Croatia	n/a	increase	n/a	decrease
	Czech Republic	n/a	no change	no change	n/a
II	Denmark	increase	n/a	increase	decrease
	Sweden	increase	n/a	decrease	n/a
III	Poland	increase	decrease	no change	decrease
	Romania	no change	decrease	increase	n/a
	Hungary	increase	decrease	increase	n/a

Source: author's calculations.

In the first group of countries, which have no domestic banking groups (Bulgaria, Croatia and the Czech Republic), only Croatia saw an increase in the share of subsidiaries of EU banking groups in the aggregate portfolio of government bonds held by all EU banking groups. In the other countries in this group, the COVID-19 pandemic did not cause any significant change in the approach of foreign banking groups to the purchase of local (Bulgarian and Czech) government bonds. It must be noted, however, that the group's form of activity had a decisive impact on the size of the portfolio held. In all these countries, the share of subsidiaries of EU banking groups accounted for more than 92% of the aggregate portfolio of government bonds held by all EU banking groups throughout the examined period.

In the second group of countries, which comprised domestic banking groups and branches of banking groups from other EU countries (Denmark and Sweden), there was an average increase of approx. 5.5 p.p. in the share of domestic banking groups in the aggregate portfolio of government bonds held by all EU banking groups as a result of the COVID-19 pandemic. The share of EU banking group branches increased for Danish government bonds but decreased for Swedish government bonds. Notably, if we exclude Nordea Bank – whose decreased interest in Swedish government bonds was mainly due to its head office relocating from Stockholm to Helsinki, thus changing the home country from Sweden to Finland – the share of branches in Sweden also increased. As in the first group of countries, domestic banking groups dominated the structure of holders of local government bonds. Their share ranged from 56–75% for Danish government bonds and from 70–76% for Swedish government bonds over the entire examined period.

In the third group of countries, where domestic banking groups, as well as branches and subsidiaries of banking groups from other EU countries, operated (Poland, Romania and Hungary), the share of domestic banking groups in the aggregate portfolio of government bonds held by all EU banking groups generally increased (or stabilised in the case of Romania) as a result of the COVID-19 pandemic. However, this increase was varied significantly. For Polish government bonds, it was only 7 p.p., while in Hungary, it was as much as 37 p.p., largely due to the general situation there and the government's influence on OTP Bank group's policies. In all the countries in this group, the share of subsidiaries of banking groups from other EU countries in the aggregate portfolio of government bonds held by all EU banking groups decreased throughout the examined period, and the share of branches of EU banking groups increased or stabilised (Poland). The share of banks with branches ranged between 9% and 18% for Romania and Hungary, respectively, and below 2% for Poland.

Conclusions

The analysis of the impact of the form of activities of EU banking groups on their decisions to purchase non-euro area EU government bonds during the COVID-19 pandemic led to the following conclusions:

1. The EU banking groups' decisions were largely determined by the nature of their activities in the local markets of the countries surveyed.
2. Given the significant differences in EU banking group activities among the non-euro area EU countries (i.e. domestic entities, subsidiaries, branches), it is difficult to identify universal conclusions for all these non-euro area EU countries. Nonetheless, significant similarities can be observed within the three country groups identified:
   A. In the non-euro area EU countries with no domestic banking groups (Bulgaria, Croatia and the Czech Republic), the COVID-19 pandemic did not result in any significant changes in the approach of EU banking groups to the purchase of local government bonds.
   B. In the non-euro area EU countries with domestic banking groups and only branches of banking groups from other EU countries (Denmark and Sweden), there was a marked increase in the share of domestic banking groups in the aggregate portfolio of government bonds held by all EU banking groups as a result of the COVID-19 pandemic.
   C. In non-euro area EU countries with domestic banking groups, as well as branches and subsidiaries of banking groups from other EU countries (Poland, Romania and Hungary), the share of the domestic banking groups in the aggregate portfolio of government bonds held by all EU banking groups generally increased (or stabilised) as a result of the COVID-19 pandemic. By contrast, the subsidiaries of banking groups from other EU countries decreased.

3. During the COVID-19 pandemic, domestic banking groups exhibited the lowest resistance to the moral suasion of non-euro area EU countries to purchase their government bonds. Their combined share in the portfolio of a specific issuer's government bonds held by all EU banking groups increased across nearly all the countries surveyed. However, an extreme case was Hungary, where government influence on the OTP Bank group's policies resulted in an increase in its share by more than a factor of six.

The objective of this research was to assess how the form of activities of EU banking groups impacted their decisions to purchase non-euro area EU government bonds during the COVID-19 pandemic. This objective was achieved through an analysis of portfolios of government bonds (including both on- and off-balance sheet items) issued by non-euro area EU countries and held by 93 banking groups from EU countries. For each country surveyed, we analysed the structure of banks purchasing the bonds issued by that country and how this evolved between 2019 and 2022, categorising the purchasers into domestic banks and EU banking groups operating through subsidiaries or branches.

The added value of the analysis is that it confirms the hypothesis that the decisions taken by EU banking groups during the COVID-19 pandemic to purchase the government bonds of non-euro area EU countries were determined by their activities in the local markets of the countries surveyed. However, given the significant differences in EU banking group activities among the non-euro area EU countries (i.e. domestic entities, subsidiaries, branches), specific conclusions were made separately for the three country groups that were identified among the countries surveyed.

Another added value of the analysis was also to indicate that domestic banking groups exhibited the lowest resistance of EU banking groups to the moral suasion of non-euro area EU countries to purchase their government bonds during the COVID-19 pandemic. Their combined share in the portfolio of a specific issuer's government bonds held by all EU banking groups increased across nearly all the countries surveyed. Our results Are consistent with similar research conducted after the 2008 crisis by Altavilla, Pagano and Simonelli (2017, p. 2103). They noted that moral suasion on banks is persistent and intensifies during disturbances and crises.

Further in-depth research into the moral suasion of non-euro area EU countries on banks operating within their borders would be beneficial. Such research should consider additional elements such as bank size, its systemic importance, and its solvency and liquidity parameters. It would also be interesting to simulate how changes in risk weighting of non-euro area EU government bonds based on their actual level of risk could affect the effectiveness of moral suasion.

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Forma działalności unijnych grup bankowych a portfel rządowych papierów wartościowych w czasie pandemii COVID-19 – przypadek krajów UE spoza strefy euro

Celem artykułu jest ocena wpływu formy działalności unijnych grup bankowych na decyzje w zakresie nabywania rządowych papierów wartościowych krajów UE spoza strefy euro podczas pandemii COVID-19. Efektem badania jest także określenie odporności unijnych grup bankowych na „perswazję moralną" krajów UE spoza strefy euro w zakresie nabywania ich obligacji skarbowych. Analizie poddano portfele skarbowych papierów wartościowych (obejmujące zarówno pozycje bilansowe, jak i pozabilansowe) wyemitowanych przez kraje UE spoza strefy euro, posiadane przez 93 grupy bankowe (dane agregowane na najwyższym poziomie grupy) z krajów należących do Unii Europejskiej. Przeprowadzone analizy wykazały, iż podczas pandemii COVID-19 decyzje podejmowane przez unijne grupy bankowe w zakresie nabywania skarbowych papierów wartościowych krajów UE spoza strefy euro co do zasady były uzależnione od formy działalności tych grup na rynkach lokalnych w badanych krajach, aczkolwiek istotne podobieństwa obserwowane były w ramach wyodrębnionych trzech grup krajów. Najniższa odporność unijnych grup bankowych na „perswazję moralną" krajów UE spoza strefy euro w zakresie nabywania ich obligacji skarbowych dotyczyła zaś krajowych grup bankowych, których łączne udziały w portfelu obligacji skarbowych danego emitenta, posiadanych przez wszystkie unijne grupy bankowe, wzrosła co do zasady we wszystkich badanych krajach.

Słowa kluczowe: unijne grupy bankowe, obligacje skarbowe, perswazja moralna, kraje UE spoza strefy euro

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Pricing-to-market as an Example of Price Differentiation in European Markets

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Abstract

The aim of the research is to assess the degree of the pricing-to-market (PTM) strategy used in selected European countries, focusing on selected groups of consumer goods.
The study uses a literature review in the field of macroeconomics and international finance, as well as statistical and econometric methods.
The results of the research confirmed the occurrence of PTM in selected European countries, although the level differed significantly between countries. There is a positive correlation between the level of PTM and a country's level of economic development. The highest PTM levels occurred for homogeneous rather than heterogeneous consumer goods.
Our findings are extremely important, especially from the perspective of international companies. Understanding the elasticity of demand in different markets helps businesses set prices that maximize revenue. Setting prices too low or too high can affect how a brand is perceived in the market. By employing a PTM strategy, businesses can balance profitability with market competitiveness.
To date, no comprehensive research has been conducted into PTM strategies in European markets. Therefore, this research fills the gap in this area, constituting a significant contribution to empirical research in the field of pricing strategies.

Keywords: pricing-to-market, pricing strategy, price differentiation

JEL: D4, L11, P42

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Introduction

Businesses use pricing strategies to determine and alter the cost of their goods and services, with competitive pricing, value-based pricing, and markup pricing all prevalent pricing tactics. International pricing strategies entail determining the costs of goods and services for various overseas markets. Businesses going global need to select a pricing plan that fits the needs of the local market while also being in line with their overarching business objectives (Victor et al. 2018, p. 77). The following are a few often employed international pricing techniques:

A. Cost-based pricing. In this approach, the price is determined by factoring in the costs of manufacturing, shipping, and selling in addition to a profit margin. Though it might not always be competitive in the local market, it guarantees that all costs are covered.

B. Market-based pricing. Pricing that is based on the market's willingness to pay is also known as competition-based pricing.

C. Penetration pricing. This frequently entails determining prices in relation to competitors after evaluating their prices. In markets with intense competition, it is essential. This is related to setting a lower price when entering a new market in order to draw clients and swiftly increase market share.

D. Price skimming. This strategy, which differs from penetration pricing, entails setting a high starting price for a new product, particularly if it has special features. As competitors enter the market or the product becomes more widely used, the price is gradually lowered.

E. Economy pricing. This strategy is the practice of reducing expenses and providing goods at the most affordable price. It is a tactic that low-cost producers and mass markets frequently employ.

F. Premium pricing. That is a marketing tactic in which a product or service is positioned as premium or luxury by charging a high price. The intended consumer base for these goods typically believes that higher costs correspond to better quality.

G. Freemium pricing. This strategy is especially common for online services and entails providing basic services at no cost and charging for more sophisticated features or functionalities.

H. Geographic pricing. Prices are determined by a product's geographic location, taking into account local market conditions and shipping costs. When setting product prices, a company may also assess changes in the market demand.

I. Value-based pricing. Rather than taking into account the true cost of production, prices are set based on customer perceptions of the worth of the good or service. This necessitates a thorough understanding of the target market and the importance that different features and benefits hold for them.

J. Bundle pricing. This is the practice of offering a number of goods or services together at a lower cost than if you were to buy them separately. This may work well in markets where customers value good bargains.

K. Psychological pricing. This tactic is predicated on the notion that consumers are psychologically impacted by particular prices. For example, if a product is priced at €9.99 rather than €10, it may appear more reasonable.

L. Discounted or promotional pricing. In order to increase sales, temporary price reductions are provided. These reductions may be attributed to seasonal variations, stock clearance, or market testing.

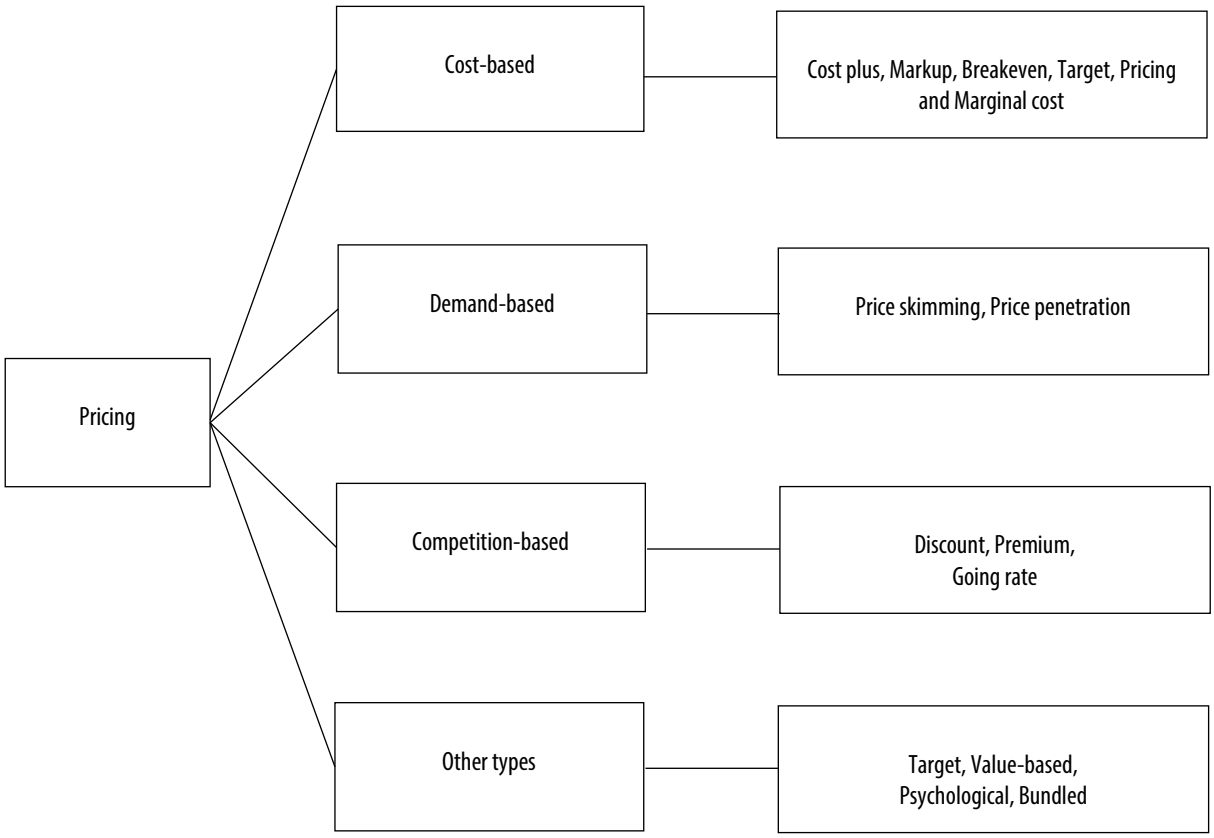

Figure 1. Company pricing strategies

Source: *The Ultimate Guide*... n.d.

Seven main elements determine a company's pricing strategy. These elements, which together make up the "7 C's of Pricing Strategy", are important at national and worldwide levels (Schill and Nixon 2024, p. 177).

A. Costs. A thorough grasp of all expenses associated with providing the product, such as those for creation, creativity, production, distribution, storage, advertising, and labor, among others. Costs rise as a result of international transportation and associated expenses for handling, insurance, and freight. Then there is taxation. Customs duties and turnover taxes, such as the local VAT, may apply, which might lead to price increases.

B. Competition. A thorough and current examination of rivals' offerings, pricing, and brand in the global market, as well as the positioning of the company in relation to them.

C. Customers. Due to various cultural differences and other considerations, customers abroad will perceive the product's worth differently from those in home markets. Additionally, clients can now easily compare online costs with domestic rates in real time.

D. Cultural differences. When deciding on an international pricing strategy, it is important to have a thorough grasp of the cultures and demands of the people living in other countries, as well as how they value the brand and products in comparison to those of rivals.

E. Channels of distribution. If distribution channels are extended, more individuals – such as importers and wholesalers – will handle the goods, leading to a rise in distribution complications and costs.

F. Currency Rates. This refers to the intricacies of dealing with numerous currencies, which are prone to variations in exchange rates, along with conversion expenses.

G. Control of government. In certain places, such as China and even certain European nations, bureaucracy and governmental rules and regulations may be burdensome and intricate. Some nations regulate the prices of goods, including food, gasoline, and medications.

The concept and essence of pricing-to-market

The majority of the literature on exchange rate pass-through is driven by a common finding in empirical studies, which is that import prices, even over the long term, do not fully respond to changes in the exchange rate. A partial pass-through to import prices indicates how traded goods deviate from the law of one price (LOP). The LOP states that homogeneous goods, regardless of where they are sold, must sell for the same price when their prices are converted to a common currency in competitive markets free from official trade barriers and transportation costs. Pricing-to-market (PTM) or trade costs may be the cause of a LOP violation. In other words, PTM is the capacity of firms with monopolistic competition to (intentionally) engage in price discrimination by varying their prices according to the destination markets (Rama and Vika 2019, p. 3).

Krugman (1987) first proposed the idea of PTM to explain why relative prices of identical goods in various markets differ due to fluctuations in exchange rates. Krugman defines PTM as the relative price differences for the same goods on different foreign markets that result from fluctuations in exchange rates (Krugman 1987, pp. 1–11). In the literature, setting prices according to the market is frequently linked, either directly or indirectly, to the insufficient transfer of exchange rate changes to prices. Froot and Klemperer (1989) claim that PTM happens when exporters raise their

export prices in terms of the domestic currency rather than decreasing prices in this currency during a period of temporary appreciation of the currency (Froot and Klemperer 1989, p. 2).

However, Ghosh and Wolf (1994) and Goldberg and Knetter (1997) define PTM as follows: exporters reduce their margins to limit the impact of changes in exchange rates on export prices rather than fully transferring the changes in exchange rates onto export prices. To further explain the PTM phenomenon, Knetter (1993, pp. 2–4) draws on the idea of stabilizing prices in the local currency (also known as Local Currency Pricing, or LCP). He states that, as a result of exchange rate fluctuations, rather than establishing margins, exporters would rather stabilize prices in local currency than maintain a fixed margin.

Marston (1990, p. 11) provides a slightly different definition of PTM. He states that PTM occurs when exporters lower their export prices in their own currency on the international market when that currency appreciates to avoid excessive price increases for exported goods in the buyer's currency. However, Gil-Pareja (2003) does not specify the kind of price discrimination he refers to when he defines PTM as the occurrence of international price discrimination induced by changes in exchange rates (Gil-Pareja 2003, p. 9).

The definition of PTM in this work refers to the specific adjustment of the exporter's margin in reaction to a shift in the domestic currency's exchange rate relative to the importer's currency. PTM occurs when an exporter restricts price increases for an importer whose currency has depreciated against the exporter's currency, thereby stabilizing prices in the importer's currency (Khalaf and Kichian 2000). To maintain market share, a foreign supplier may alter its margin rather than the price of its goods (Leigh and Rossi 2002, pp. 9–10).

Because there is an incomplete pass-through of exchange rate changes to prices, the prices of imported goods rise or fall less in the event of the domestic currency depreciating (appreciating) than predicted by standard models.

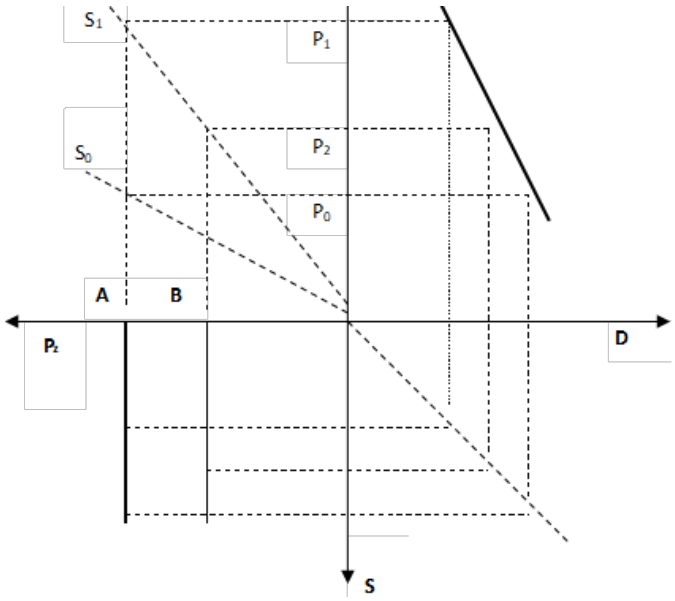

Figure 2. The incomplete transmission of exchange rate changes to import prices

Source: Marczewski 2002, p. 45.

Figure 2 illustrates how the depreciation of the importer's currency (an increase in the exchange rate from S0 to S1) does not cause the importer's price to change from P0 to P1; instead, it adjusts to P2, where P2 < P1. This occurs in the context of high price elasticity of import supply and standard price elasticity of import demand (equal to 1). Consequently, the price, expressed in foreign currency, decreases by the amount of AB for the foreign exporter. The exporter's margin will also decrease as a result. The difference in prices that a company sets for the same product on its home and international markets is known as a price gap, and it can only exist in certain situations.

A price gap can only exist for a limited amount of time, as the possibility of price arbitrage between domestic and foreign markets restricts this timeframe. Price arbitrage involves simultaneously buying a good at a lower cost on one market and selling it at a higher cost on another in order to profit. Additionally, the wider the price gap in the absence of price arbitrage, the more exchange rate volatility businesses should anticipate (Anderton, Baldwin, and Taglioni 2003, p. 4).

Antras and Staiger (2012) give another definition, describing PTM as the ability to set different prices in the domestic and foreign markets. This price discrimination is practiced by monopolistically competitive firms in order to take advantage of international pricing differences. Therefore, we can say that PTM is the way that companies adjust prices for different markets to exploit international price differences.

The motives of a pricing-to-market strategy

The interplay of supply and demand variables can be used to explain the causes of PTM. Demand models typically assume that PTM is contingent upon the structural characteristics of a given market, specifically the convexity of the exporter's demand curves (Fedoseeva 2013, p. 12). Knetter (1989) posits that in a monopolistic market, there exist two potential reasons for which the optimal export price may vary.

First, shifting marginal costs (where production costs are affected by fluctuations in exchange rates) can lead to adjustments to marginal costs, which will eventually have an equal impact on prices across all markets. The second reason is that the exporter's margin has changed (various margins are set by the exporter in various markets). Changes in the exporter's established price margin above marginal costs are associated with PTM. The import price will drop by the same amount as the exchange rate changes if the exporter's margin is greater than the marginal cost and foreign demand is defined by constant price elasticity.

Consequently, if the exporter's established margin remains constant across all markets, price discrimination will not take place under these circumstances. However, changes in the price converted into the importer's country's currency and changes in the price elasticity of demand mean that variations in the exporter's margin will be contingent on fluctuations in the exchange rate. As a result, the variation in the price elasticity of the foreign demand for exported goods determines the extent of price discrimination. Additionally, the inclination to select the PTM approach rises as demand price elasticity rises but falls as supply price elasticity rises (Anderson 2003).

The relative significance of a PTM strategy is also influenced by the market's structure, the organization of the company's costs, and its production methods. Due to the significant expenses associated with entering the market (such as advertising and setting up a distribution network), businesses that are already present in the market have some degree of monopoly power. Companies that are looking ahead must decide whether to increase market share, which will boost future profits or to increase current profits by making the right price adjustments.

Furthermore, in addition to the supply and demand factors that explain the PTM phenomenon, some economists, including Krugman (1987), Froot and Klemperer (1989) and Kasa (1992), also include exporters' expectations regarding changes in exchange rates in explaining the reasons for using this strategy, both periodic and permanent (Ok-Sun 2006, pp. 1–12).

In other words, rather than encouraging foreign companies to gain market share, a temporary strengthening of the home currency encourages them to raise their margins. Conversely, a sustained strengthening of the national currency pushes foreign businesses to lower their cost of goods sold to capture more market share. Additionally, ongoing national currency appreciation encourages new businesses to enter a particular market, expanding the selection of goods available for purchase. Consequently, this influences the degree of price elasticity of demand for the products that businesses sell and, consequently, the profits they make (Herzberg, Kapetanios, and Price 2003, p. 6).

Consequently, significant variations in the exchange rate could potentially encourage the entry of new businesses into a particular market, thereby potentially influencing price shifts within that market. In this situation, businesses might be prepared to adjust their margins to keep their market share. On the other hand, Dornbusch (1987) contends that the extent of export goods' diversification, the number of competitors and their strategic alliances, and the market's structure all influence the magnitude of PTM (Tantirigama 2003, p. 14).

When exporters have a small share of the foreign market or the market is not competitive enough to raise prices, setting prices according to the market most frequently occurs. In other words, PTM is highest in highly monopolized industries where exporters have a small share of the foreign market and thus little power to influence market prices. PTM is lowest in competitive industries overall, but because exporters typically control the majority of the market, exchange rate changes are almost entirely passed through to prices across all markets (Penkova and Hosewood 2002, p. 11). Furthermore, market-driven pricing is most frequently observed in trade between businesses that are members of the same capital group and when trade is subject to quantitative restrictions (Kenny and McGettigan 1996, p. 3).

According to Gil-Pareja (2003), there are two primary justifications for utilizing the PTM approach. First, strategic price discrimination among exporters drives PTM. Because exchange rates fluctuate, exporters adjust their prices accordingly to maximize their profits in various markets. For instance, if demand elasticity, market share, cost adjustments, and anticipated exchange rate fluctuations are taken into account when justifying the use of PTM, then exporters' strategic price discrimination is the rationale behind the adoption of PTM tactics.

Second, price stickiness causes PTM. Delays between changes in exchange rates and the calculation of export prices based on those changes lead to PTM. In this scenario, exporters do not genuinely aim for price differentials across markets; rather, the variations in export product prices across markets stem exclusively from variations in exchange rates (Gil-Pareja 2003, p. 6).

However, Bergin and Feenstra (2001, p. 8) contend that the widely accepted practices of long-term contract conclusion, market segmentation, and currency selection for foreign trade invoices may give rise to price rigidity and, as a result, the adoption of price-setting strategies based on market conditions.

The pricing-to-market model

Combining the models developed by Gagnon and Knetter (1995, p. 2) and Feenstra, Gagnon, and Knetter (1996, p. 3) results in the following PTM model. The model considers businesses that aim to maximize profits while offering unique products to various markets. The PTM strategy is applicable since this model presupposes market segmentation and, consequently, the impossibility of arbitrage between these markets. It also assumes that there is imperfect competition, that price is a strategic variable, and that using the gradual margin adjustment strategy to set prices will result in partial equilibrium. In this instance, maximizing the business's profit can be summarized as follows:

$$\max_{P_i} \ (\sum_{i=1}^{n} P_i X_i - C(\sum_{i=1}^{n} X_i, W)), \tag{1}$$

$$s.t \ \ \mathrm{X_i} = f_i(P_i / S_{i,} P_i^{sub}, N_i), \tag{2}$$

where:
P_i – price of the goods expressed in the exporter's currency;
X_i – the volume of demand for a given product (which is a function of the exporter's price expressed in the importer's currency);
S_i – exchange rate (which is the price of the importer's currency expressed in the exporter's currency);
P_i^{sub} – price of substitute goods expressed in the importer's currency;
N_i – total demand for all goods;
C – total cost function;
W – price index of semi-finished products used to produce the finished product, expressed in the exporter's currency.

There are no close substitutes for the exported goods, no strategic connections between suppliers of goods, and the exporter treats the prices of competitive goods as constant. In this case, setting prices at the following level is the first requirement needed for the exporter to make money:

$$P_i = MC(\frac{n_i}{n_i - 1}), \tag{3}$$

where:
MC – marginal cost;
n_i – price elasticity of demand for a given good, expressed as:

$$n_i = -(\Delta X_i / \Delta P_i)(P_i / X_i). \tag{4}$$

The price and margin of the exporter are dictated by the price elasticity of demand in different target markets, which is contingent upon the demand structure. A price discrimination model consistent with PTM requires a particular demand structure where the price elasticity of demand is not constant since pricing rules are dependent on the convexity of demand.

As demonstrated by formula (3), changes in the exporter's margin and marginal costs affect changes in the prices of exported goods. It can be inferred that marginal costs are independent of the market to which the goods are exported, assuming that the exporter's goods are identical in each market. This indicates that all target markets experience the same changes in marginal costs. Furthermore, this implies that PTM is only reflected in changes in exporter margins on target markets (Adolfson 1999, p. 4).

In each target market, the exporter's price (expressed in the exporter's currency) is equal to the costs plus the exporter's constant margin if there is constant price elasticity of demand. Consequently, in this instance, any fluctuations in the exchange rate are entirely reflected in the prices expressed in the importer's currency. Therefore, there are no variations in export prices that are connected to conditions in the intended market, such as shifts in market share or exchange rates. As a result, since both margin and marginal costs are constant across all markets, there can be no price discrimination. Conversely, if a market's demand is elastic and local prices rise due to the depreciation of the national currency, the exporter's margin contracts, meaning that changes in the exchange rate are not entirely reflected in prices.

Assuming that the exporter's margin is variable and that changes to it are contingent upon the circumstances present in the target market (i.e., variable price elasticity of demand), this implies that the exporter adjusts its margin to stabilize prices expressed in local currency when exchange rates fluctuate. To identify the variables that influence the exporter's price adjustments in response to exchange rate fluctuations, it is essential to consider scenarios where marginal costs are both differentiated and constant.

$$\frac{\Delta P_{it}}{\Delta S_{it}} \cdot \frac{S_{it}}{P_{it}} = \frac{\Delta n_{it}}{\Delta (P_{it} / S_{it})} \cdot \frac{(P_{it} / S_{it})}{n_{it}} \cdot \left[n_{it} - 1 + \frac{\Delta n_{it}}{\Delta (P_{it} / S_{it})} \cdot \frac{(P_{it} / S_{it})}{n_{it}} \right]^{-1}. \tag{5}$$

The degree to which changes in prices expressed in local currency impact the price elasticity of demand determines how much an exchange rate change affects prices. When the export price remains constant ($(\Delta P_{it}/\Delta S_{it})(S_{it}/P_{it}) = 0$), the transmission of exchange rate changes to prices

in the importing country's currency is considered complete. This is known as constant price elasticity of demand.

The existence of a positive value for the expression in brackets is the second prerequisite for optimizing the exporter's profits. If the price elasticity of demand increases as the price expressed in local currency increases, the entire equation is positive, indicating that the export price is adjusted to the change in the exchange rate. To maintain prices expressed in local currency and prevent the decline in the price competitiveness of exported goods, the exporter's margin must adjust in response to the appreciation of the exporter's currency, lowering the price expressed in that currency.

The possibility of changes in marginal costs due to changes in the exchange rate means that formula (5) should be accompanied by an expression showing the elasticity of marginal costs to changes in the exchange rate. This equation then takes the following form:

$$\frac{\Delta P_{it}}{\Delta S_{it}} \cdot \frac{S_{it}}{P_{it}} = \left[\frac{\Delta n_{it}}{\Delta (P_{it} / S_{it})} \cdot \frac{(P_{it} / S_{it})}{n_{it}} + (n_{it} - 1) \cdot \left(\frac{\Delta MC_{it}}{\Delta S_{it}} \cdot \frac{S_{it}}{MC_{it}} \right) \right] \cdot \left[n_{it} - 1 + \frac{\Delta n_{it}}{\Delta (P_{it} / S_{it})} \cdot \frac{(P_{it} / S_{it})}{n_{it}} \right]^{-1} \quad (6)$$

The devaluation of the exporting country's currency raises export prices more than if marginal cost remained constant. This occurs when changes in the exchange rate result in an increase in the marginal cost. As a result, the effect of exchange rate changes on prices expressed in local currency is limited. Therefore, the elasticity of marginal cost to exchange rate changes is inversely proportional to the pass-through effect of exchange rate changes on prices.

Given the assumption that marginal costs are contingent upon supply, the ideal price level within a particular market is contingent upon the volume of sales in other target markets. Consequently, when deciding on a pricing strategy, the demand in each target market should be considered. This also implies that changes in marginal cost balance the impact of exchange rate fluctuations on prices, whether they are fully or partially passed through. Thus, when the exporter's currency appreciates, the price expressed in local currency rises, which in turn reduces the demand for the exporter's goods. Reducing production helps to lower marginal costs and prices if the marginal cost of production rises in these circumstances.

This indicates that there is a negative correlation between the elasticity of marginal costs to changes in production levels and the effect of passing on exchange rate changes to prices (Adolfson 1999, p. 8). Using the first-order Taylor approximation of the expression $\ln(n_i/n_i - 1)$ around the average value and the logarithm of the equation, we get the following expression:

$$\ln P_{it} = \beta_0 + \beta_1 \ln MC_{it} + \beta_2 \ln SH_{it} + \beta_3 \ln S_{it} + \beta_4 \ln P_{it}^{sub}, \quad (7)$$

where:
β_0 – the transfer of all constant expressions from the Taylor model,

SH – market share (volume of goods exported divided by the total volume of goods imported into a given market, or X_i/N_i).

The disaggregated producer price index (PPI) can be used as an empirical proxy for marginal costs if changes in the exchange rate cause changes in marginal costs (e.g., due to changes in the prices of imported intermediates used to produce the exported goods). The direct impact of exchange rate fluctuations on export prices is represented by the exchange rate change coefficient β_3, while the indirect effect associated with changes in marginal costs is not included. Changes in marginal costs have both direct and indirect effects on pricing policies, which are captured by the marginal cost factor β_1. Furthermore, a consistent, uniform exporter margin across all target markets is included in the producer price index in addition to marginal costs.

The exporter's long-term pricing strategy is defined as expression (7), which is static and ignores any gradual adjustments of export prices to changes in explanatory variables. In the short run, however, there is a departure from (7), as potential economic shocks (such as fluctuations in the exchange rate) prompt both producers and consumers to adjust appropriately. Assuming that supply-side cost adjustments exist, the pricing process can be incorporated into a new model where price fluctuations are contingent upon both short-term (previous changes in explanatory variables) and long-term cointegration relationship deviations.

The pricing-to-market strategy in Europe

According to Krugman's (1987) definition, PTM is not observed when changes in the price of the exported good do not accurately reflect changes in exchange rates. The following formula is used to calculate the extent of PTM:

$$\lambda = \frac{\%\Delta P_A^{Ex}}{\%\Delta S} \div \frac{\%\Delta P_B^{Ex}}{\%\Delta S}, \tag{8}$$

where:
λ – pricing to market coefficient;
P_A^{Ex} – prices of exported goods in Country A;
P_B^{Ex} – prices of exported goods in Country B;
S – exchange rate.

The exporter's PTM does not occur if $\lambda = 1$. Conversely, PTM is present when $\lambda \neq 1$. In other words, PTM does not exist if the exchange rate transmission to the prices of goods exported to Countries A and B is equal. Furthermore, even if changes in exchange rates are not fully reflected in the prices of goods exported to these markets, PTM might not materialize.

Data on PTM strategies refer to the pricing strategies used by German exporters of consumer goods in 34 selected European countries. Calculations show that PTM did not occur only in France. This means that German exporters set the prices of exported goods at the same level as on the German market. In other countries, PTM occurred, but the level varied significantly.

Table 1. Average exchange rates and pricing-to-market coefficients for consumer goods in European countries, 2023

	GDP per capita in USD	Average exchange rate (€1 in terms of national currency)	PTM coefficient (λ)	Existence of PTM
Luxembourg	143,304	1	1.23	Yes (negative)
Ireland	137,638	1	1.32	Yes (negative)
Switzerland	89,537	0.96	1.58	Yes (negative)
Norway	82,264	11.45	1.15	Yes (negative)
Denmark	74,958	7.456	1.27	Yes (negative)
Netherlands	73,317	1	1.08	Yes (negative)
Iceland	69,833	144.46	1.71	Yes (negative)
Austria	69,069	1	1.04	Yes (negative)
Sweden	66,209	11.84	1.02	Yes (negative)
Belgium	65,813	1	1.02	Yes (negative)
Malta	63,481	1	0.81	Yes (positive)
Finland	59,869	1	1.13	Yes (negative)
France	58,765	1	1.00	No
Italy	54,259	1	0.93	Yes (positive)
Cyprus	53,931	1	0.83	Yes (positive)
Slovenia	51,407	1	0.84	Yes (positive)
Spain	50,472	1	0.88	Yes(positive)
Lithuania	49,245	1	0.74	Yes (positive)
Czechia	49,025	24.38	0.85	Yes (positive)
Poland	45,538	4.59	0.60	Yes (positive)
Estonia	45,236	1	0.91	Yes (positive)
Portugal	45,227	1	0.83	Yes (positive)
Hungary	43,601	386.43	0.69	Yes (positive)
Croatia	42,873	1	0.69	Yes (positive)
Slovakia	42,228	1	0.89	Yes (positive)
Türkiye	41,881	28.86	0.36	Yes (positive)
Romania	41,029	4.96	0.54	Yes (positive)
Latvia	40,892	1	0.81	Yes (positive)

	GDP per capita in USD	Average exchange rate (€1 in terms of national currency)	PTM coefficient (λ)	Existence of PTM
Greece	39,864	1	0.81	Yes (positive)
Bulgaria	33,780	1.95	0.55	Yes (positive)
Montenegro	28,002	1	0.59	Yes (positive)
Serbia	26,074	117.20	0.60	Yes (positive)
North Macedonia	21,391	61.52	0.50	Yes (positive)
Albania	19,556	106.85	0.62	Yes (positive)

Negative – export prices are set above the price in the exporting country.

Positive – export prices are set below the price in the exporting country.

Source: own study based on Statistisches Bundesamt 2023.

The highest PTM occurs in the most economically developed countries due to the relatively high income of consumers. If the price elasticity of demand for the exported products decreases as prices rise, the exporters increase markup during currency appreciation. This shows that export prices are set above the price in the exporting country (PTM is negative). By contrast, the lowest PTM occurs in the least developed European countries due to the relatively low income of consumers. This means that companies differentiate the prices of the same goods on different foreign markets depending on consumers' income in a given country. In this way, the prices of goods exchanged internationally adjust to the prices set in the target markets. This shows that exporters decrease profit margins (by lowering local currency prices) during currency appreciation to protect market share.

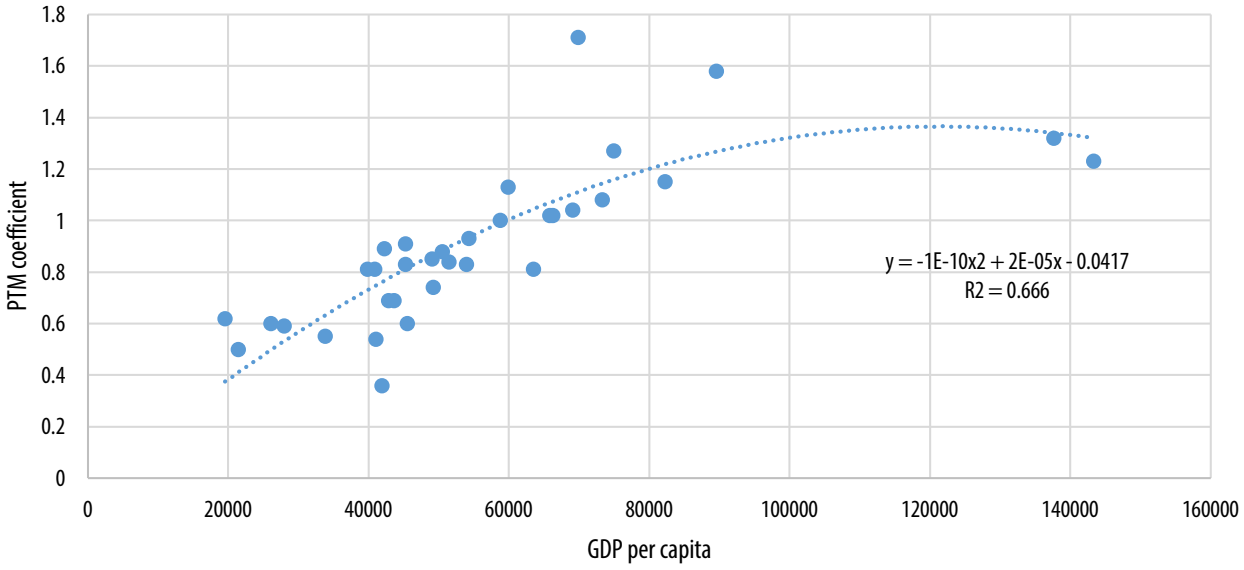

Figure 3. GDP per capita in USD, and the PTM coefficient in European countries, 2023

Source: own calculations based on Statistisches Bundesamt 2023.

The highest PTM coefficients (mainly negative) occur for alcoholic beverages because these products are generally treated as consumer goods with relatively low price elasticity of demand,

as there are no close substitutes. Therefore, in this respect, consumer demand responds relatively little to changes in the prices of these goods due to habits, traditions, or customs. However, the lowest PTM rate (mainly positive) occurs for tobacco products, meat and fish. These products are largely treated as first-need products with many substitutes, and the full transfer of exchange rate changes to prices could significantly reduce the demand for these goods.

Table 2. Average pricing-to-market coefficients for consumer goods in European countries, 2023

Country	Food and non-alcoholic beverages	Bread and cereals	Meat	Fish	Dairy products and eggs	Fruits, vegetables and potatoes	Alcoholic beverages	Tobacco	Clothing and footwear
Luxembourg	1.12	1.07	1.14	0.85	1.18	1.10	1.21	0.73	1.10
Ireland	1.07	1.03	0.90	0.71	1.16	1.00	2.31	2.22	0.99
Switzerland	1.51	1.48	1.88	1.44	1.43	1.25	1.51	1.19	1.42
Norway	1.19	1.06	1.09	0.72	1.27	1.32	2.52	1.88	1.13
Denmark	1.10	1.28	0.77	0.95	1.15	0.98	1.64	1.13	1.31
Netherlands	0.91	0.80	0.89	0.70	0.93	0.87	1.13	1.25	1.06
Iceland	1.33	1.35	1.51	0.90	1.59	1.19	3.41	1.69	1.41
Austria	1.00	1.02	1.01	0.99	0.93	0.92	0.99	0.79	1.04
Sweden	0.96	0.95	0.83	0.93	0.88	0.98	1.57	0.90	1.13
Belgium	0.99	0.94	1.00	0.84	0.97	0.91	1.30	1.14	1.05
Malta	1.10	1.04	0.84	0.76	1.24	1.11	1.42	0.75	1.00
Finland	1.03	1.11	0.90	0.92	1.02	0.97	2.44	1.35	1.17
France	1.01	0.92	1.07	0.84	0.92	1.08	1.14	1.62	1.07
Italy	0.97	1.01	0.92	0.73	0.99	1.00	1.02	0.76	1.06
Cyprus	1.02	0.99	0.75	0.80	1.22	1.00	1.35	0.66	0.91
Slovenia	0.95	1.00	0.86	0.73	1.04	0.82	1.19	0.67	0.97
Spain	0.93	0.95	0.76	0.70	1.00	0.90	1.11	0.72	0.84
Lithuania	0.96	0.97	0.69	0.72	1.13	0.87	1.24	0.68	1.02
Czechia	0.91	0.87	0.74	0.80	0.97	0.83	1.24	0.84	1.20
Poland	0.71	0.70	0.56	0.73	0.75	0.65	1.06	0.54	0.93
Estonia	1.02	1.00	0.85	0.85	1.05	0.98	1.45	0.71	1.23
Portugal	0.95	0.87	0.75	0.71	1.07	0.91	1.27	0.77	1.02
Hungary	0.93	0.92	0.67	0.77	1.08	0.88	0.92	0.72	0.86
Croatia	0.97	1.06	0.72	0.77	1.00	0.85	1.36	0.61	0.99
Slovakia	1.00	0.94	0.78	0.86	1.08	0.96	1.15	0.66	1.00
Türkiye	0.60	0.51	0.53	0.38	0.87	0.48	2.04	0.23	0.28

Country	Food and non-alcoholic beverages	Bread and cereals	Meat	Fish	Dairy products and eggs	Fruits, vegetables and potatoes	Alcoholic beverages	Tobacco	Clothing and footwear
Romania	0.69	0.57	0.55	0.69	0.99	0.57	1.03	0.72	0.93
Latvia	0.99	0.97	0.70	0.75	1.13	0.82	1.49	0.65	1.06
Greece	1.01	1.00	0.80	0.79	1.35	0.81	1.78	0.63	1.08
Bulgaria	0.84	0.66	0.62	0.57	1.22	0.74	1.04	0.43	0.79
Montenegro	0.87	0.77	0.61	0.75	1.02	0.95	1.60	0.40	1.03
Serbia	0.92	0.77	0.71	0.79	1.11	0.95	1.45	0.45	0.99
North Macedonia	0.68	0.66	0.60	0.54	0.84	0.59	1.06	0.30	0.78
Albania	0.88	0.77	0.69	0.71	1.24	0.82	1.62	0.43	1.01

Source: own study based on Statistisches Bundesamt 2023.

Therefore, the level of PTM also varied significantly in the surveyed countries due to individual groups of consumer goods. Notably, the PTM strategy was not used for "fruits, vegetables and potatoes" in Ireland, Italy and Cyprus, "food and non-alcoholic beverages" in Austria and Slovakia, "meat" in Belgium, "bread and cereals" in Estonia, Slovenia, and Greece, "dairy products and eggs" in Spain and Croatia, and "clothing and footwear" in Malta.

Table 3. Correlation coefficients between GDP per capita and PTM in European countries, 2023

PTM coefficient	GDP per capita
General	0.73
Food and non-alcoholic beverages	0.56
Bread and cereals	0.53
Meat	0.57
Fish	0.37
Dairy products and eggs	0.25
Fruits, vegetables and potatoes	0.54
Alcoholic beverages	0.27
Tobacco	0.67
Clothing and footwear	0.35

Source: own study based on Statistisches Bundesamt 2023.

The highest correlation coefficient was recorded between GDP per capita and "tobacco", while the lowest was for "dairy products and eggs".

Conclusion

Pricing-to-market is a strategy used by businesses to set prices for their products or services based on market conditions rather than production costs. The goal is to maximize profits by optimizing pricing in different international markets. This strategy is often employed by businesses engaged in international trade to remain competitive and capture market share. PTM is related to market-based pricing, which means that prices are determined by market conditions, demand, and competition rather than production costs. This allows businesses to adapt to different pricing structures in various markets.

PTM also takes into account exchange rate changes. In international markets, businesses need to consider currency exchange rates. Adjusting prices to account for fluctuations in exchange rates can help maintain competitiveness and profitability. A PTM strategy is connected to competitive position and involves analyzing competitors' pricing strategies in different markets. Businesses can adjust their prices to position themselves competitively and gain an advantage in specific regions. PTM also pays attention to local factors. Consideration of local factors such as consumer preferences, purchasing power, and cultural influences is crucial. Prices may be adapted to align with these factors and meet the expectations of local consumers.

The results of the research confirmed the occurrence of PTM in 34 European countries, although the level differed significantly between countries. There was a positive correlation between the level of PTM and the level of economic development of the country.

Because of their comparatively high consumer incomes, the most economically developed nations have the highest PTM, while the least developed European nations have the lowest PTM because of their comparatively low consumer income. This implies that businesses set different pricing for identical products on various international markets based on consumer income levels in those nations. Therefore, the prices of items traded globally adapt to the prices established in the target markets. This demonstrates how, in order to maintain market share during periods of currency appreciation, exporters reduce their profit margins (by lowering local currency prices).

Moreover, it was revealed that the highest level of PTM occurred in the case of homogeneous rather than heterogeneous consumer goods. This is related to different levels of price elasticity of demand in the case of these two commodity groups. Moreover, this result may indicate that goods classified as homogeneous can potentially differentiate themselves based on their intrinsic quality (e.g., coffee). Therefore, companies are able to set different margins in different markets. On the other hand, in the case of goods described as heterogeneous, there may be apparent differences in the quality of these products. This may be the result of using different marketing techniques or the subjective feelings of consumers (Rollo 2012, p. 12).

Understanding the elasticity of demand in different markets helps businesses set prices that maximize revenue. In markets where demand is more price-sensitive, pricing strategies may differ. Brand image is another essential factor for PTM strategy. Thus, businesses must also consider the impact of pricing on their brand image. Setting prices too low or too high can affect how a brand is perceived in the market. The trade-off that businesses believe exists between

boosting future profits through market share growth and boosting current profits through greater markups influences pricing strategies. This trade-off could force businesses to use pricing tactics that, in the near term, might not seem optimal. It is notable that the evidence on pricing-to-market is less pronounced over especially lengthy timeframes, allowing for several intervening price revisions.

The added value resulting from the research is two-fold. First, it highlights significant differences in the scale of PTM in highly developed economies and in countries with an average level of development. Second, it demonstrates how PTM varies depending on the degree of homogeneity or differentiation of the goods exported by the countries studied. To date, no comprehensive research has explored PTM strategies in European markets. Therefore, this research fills the gap in this area, constituting a significant contribution to empirical research on pricing strategies. Further research from a microeconomic standpoint could determine whether PTM impacts are confined to differentiated products or also apply to homogeneous goods. Such research should be performed across highly developed, developing, and low-developed countries for comparative purposes.

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Pricing-to-market jako przykład zróżnicowania cen na rynkach europejskich

Celem podjętych badań jest ocena stopnia stosowania strategii pricing-to-market (PTM) w wybranych krajach europejskich, ze szczególnym uwzględnieniem tego zjawiska w odniesieniu do określonych grup dóbr konsumpcyjnych.
W artykule wykorzystano przegląd literatury z zakresu makroekonomii i finansów międzynarodowych oraz metody statystyczne i ekonometryczne.
Wyniki przeprowadzonych badań potwierdziły występowanie zjawiska PTM w wybranych krajach europejskich, choć poziom tego zjawiska różnił się istotnie pomiędzy krajami. Wykazano dodatnią korelację pomiędzy poziomem PTM a poziomem rozwoju gospodarczego kraju. Najwyższy poziom PTM występował w przypadku dóbr konsumpcyjnych jednorodnych, a nie heterogenicznych.
Wyniki badań są niezwykle istotne, szczególnie z punktu widzenia firm międzynarodowych. Zrozumienie elastyczności popytu na różnych rynkach pomaga firmom ustalać ceny, które maksymalizują przychody. Ustalanie zbyt niskich lub zbyt wysokich cen może mieć wpływ na postrzeganie marki na rynku. Stosując strategię PTM, przedsiębiorstwa dążą do zrównoważenia rentowności z konkurencyjnością na rynku.
Do chwili obecnej nie przeprowadzono kompleksowych badań nad zjawiskiem strategii pricing-to-market na rynkach europejskich. Tym samym niniejsze badanie wypełnia istniejącą lukę w tym obszarze, stanowiąc istotny wkład w badania empiryczne z zakresu strategii cenowych.

Słowa kluczowe: pricing-to-market, strategia cenowa, różnicowanie cen