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DISAGGREGATED IMPACT ANALYSIS OF TRADE ON GROWTH: THE ROLE OF FINANCIAL OPENNESS IN NIGERIA

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Key words: export, financial openness, growth, import, oil, trade.

Abstract

This paper decomposes and estimates the impact of foreign trade on economic growth and evaluates the relevance of financial openness in the relationship in Nigeria using annual time series data between 1987 and 2020. The key findings of the paper are that although trade positively drives economic growth, the effect is due largely to the contribution of the non-oil export component in the long run and short run. This, however, does not rule out the fact that non-oil import over the long run and short run or the overall value of import in the long run lead to a high economic growth in the economy provided higher degree of financial openness is tolerated. In that, subject to broadening the scope of financial openness, Nigeria's participation in international trade will result in rapid economic growth both in the long run and short run.

SZCZEGÓŁOWA ANALIZA WPŁYWU HANDLU NA WZROST GOSPODARCZY: ROLA OTWARTOŚCI FINANSOWEJ W NIGERII

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Słowa kluczowe: eksport, otwartość finansowa, wzrost, import, ropa naftowa, handel.

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Abstrakt

W artykule przedstawiono i oszacowano wpływ handlu zagranicznego na wzrost gospodarczy oraz oceniono znaczenie otwartości finansowej w relacjach w Nigerii na podstawie danych rocznych szeregów czasowych z lat 1987-2020. Najważniejsze wnioski są takie, że chociaż handel pozytywnie napędza wzrost gospodarczy, to efekt ten w dużej mierze wynika z wkładu komponentu innego niż eksport ropy w długim i krótkim okresie. Nie wyklucza to jednak, że długoterminowy i krótkoterminowy import ropy lub ogólna długoterminowa wartość importu prowadzą do wysokiego wzrostu gospodarczego w gospodarce, z jednoczesnym tolerowaniem wyższego stopnia otwartości finansowej. W związku z tym po rozszerzeniu zakresu otwartości finansowej udział Nigerii w handlu międzynarodowym będzie skutkował szybkim wzrostem gospodarczym, zarówno w długim, jak i krótkim okresie.

Introduction

Following the World War II, global trade drastically increased with more countries opening up their economies to foreign trading. However, rapid growth in the world trade often raises questions on its possible impact on the economic growth of the global economy, particularly among the trade participating economies. Both the classical and the neo-classical economists emphasize the importance of international trade in economic growth and development through specialization, diffusion of ideas and innovation gains that trade offers. Trade is a powerful tool for achieving outstanding economic growth. It stimulates both regional and within-country economic transformation (Hallaert, 2010).

Through expanded and diversified global trade, the economies of the Asian Tigers (Hong Kong, Taiwan, Singapore and South Korea) achieved robust economic growth and were able to sustain same over decades. Similarly, China became a driving force of the Asian economy following enlisting in the membership of the World Trade Organization (WTO) in the early 2000s. Many Economists argue that the trade-aided economic growth achieved by many advanced countries of the world is largely attributed to the composition and pattern of their trade.

Specifically, the rapid and sustained economic growth of the economies of Japan, Korea, Taiwan, and China began with import substitution and a strong preference for exports policies with each of these economies establishing a pro-export regime with a significant increase in the value of export goods exceeding those of other developing economies. The composition of the exports was largely services and manufactured goods while imports were restricted to knowledge or technology and primary products considered essential for advancing industrialization.

On the contrary, it is also argued that the nature and composition of external trade of the developing countries hamper the extent to which trade is beneficial they focus more on primary products exports alongside substantial imports of refined commodities which ought to have been produced locally (Todaro

& Smith, 2014). Expectedly, therefore, in the Middle East, Africa, and Latin America, primary product exports accounted for a sizable fraction of gross domestic products (GDP).

In some of the countries, a significant proportion of the economy's income accrues from the overseas sales of primary commodities (Todaro & Smith, 2014). In several of the oil producing countries in the regions like Nigeria and Libya, the sale of crude oil products accounted for over 70% of the national income. This imposes substantial economic costs including subjecting the economy to adverse shocks and instability with a negative impact on economic growth. Although largely contradictory in their submissions, evidence is abundant in the literature on the possible impact of trade on economic growth across the developing countries (Aremo & Arambada, 2021; Kong, Peng, Ni, Jiang & Wang, 2020; Musila & Yiheyis, 2015).

In differing from previous studies which focused on the direct impact of foreign trade on growth, and in some cases, alongside trade liberalization effects (Leitao, 2012); trade impacts on growth due to financial development (Gokmenoglu & Taspinar, 2015) and macroeconomic policy and quality of institutions (Wacziarg, 2001) in the home economy, this paper looked at the disaggregated effects of trade on economic growth in Nigeria, and the extent to which the relationship, with respect to each of the components and sub-components of trade, is dependent on the level of financial openness in the country.

The increasing financial openness in Nigeria is evident in the broadening of her export and import base occasioned by increased foreign capital inflows. According to Aremo and Arambada (2021), financial openness is an important factor determining Nigeria's subjectivity to and its participation rate in external trade which in turn determines the level of economic growth. Regrettably, an increase in foreign trade may not enhance economic growth because the associated foreign financial flows increases the level of volatility of trade. This paper, therefore, seeks to contribute to addressing the gap in the literature on the role of trade and financial openness on economic growth in Nigeria.

Literature Review

On the theoretical frontier, one thread in the controversy holds that international trade comes with static and dynamic gains. The static gains perspective borders on the Heckscher-Ohlin theorem and the principle of comparative advantage (Cruz, 2008; Anderson & Babula, 2008). Iyoha and Okim (2017) describe static gains as the short run benefits countries obtain shortly after embracing external trade. On this premise, economic growth and welfare improvements are attributed to specialization gains like enhanced efficiency in production attributable to the comparative advantage, and gains

in consumption in the form of improved commodities choices at a reduced price (Were, 2015). Thus, (Iyoha & Okim, 2017; Were, 2015) asserted that as an engine of growth and development, international trade ensures attainable gains in nations' welfare. Dynamic gains, on the other hand refer to both the medium and long run (negative and positive) gains from international trade (Lawrence & Weinstein, 1999). Following the Ricardian trade theory, Kong et al. (2000) maintain a view rooted in the export-led growth hypothesis which postulates that rapid economic growth achievement is due to the practice of outward-based international trade policies. Growth in exports leads to growth in the economy by stimulating investment and technical change on one hand, and by causing positive demand spillover across other sectors on the other hand.

Grossman and Helpman (1990) posit that the degree of trade openness determines the level of economic growth through improvement in the transfer of new technologies and productivity enhancement. Smith (1776) and Marshall (1890) submitted that the economic progress of a nation is dependent on international trade. However, the opposing thread in the controversy maintains that external trade could be a drag on economic growth especially in developing countries owing to dumping and exposure of the domestic economy to external adverse shocks (Zahonogo, 2016). Young (1991) and Redding (1999) also claimed that foreign trade might reduce an economy's long run growth especially if the country focuses on sectors with comparative disadvantage.

The empirical frontier equally presents divergent results. In a cross-country study, were (2015) found a positive and significant impact of trade on economic growth for the developed and developing countries, but the impact is insignificant in the case of Least Developed Countries (LDCs). Yanikkaya (2003) established a positive role of trade on economic growth conditioned on channels like technology transfer and comparative advantage in developing countries. Giles and Williams (2000) found enormous evidence that trade has a significant positive effect on growth in several of the cross-country studies sampled. Focusing on the export component of trade in Africa, Fosu (1990) found that export improves economic growth in African Countries and Yelwa and Diyoke (2013) found same for the ECOWAS sub-region. On the Contrary, Ulasan (2015) established that trade is not robustly significantly related to economic growth.

Zahonogo (2017) showed that in sub-Saharan Africa, the presence of a trade threshold below which an increase in trade had a positive effect on economic growth in the region and above which the effect tended to decline. Moyo and Khobai (2018) suggested that trade openness had a negative effect on economic growth in the long run in the Southern African Development Community (SADC). Relatedly, Chang and Mendy (2012) showed a significant positive effect of trade on economic growth in the SSA.

For studies involving time series, Musila and Yiheyis (2015) concluded that trade negatively impacts on economic growth in Kenya. Ogbokor and Meyer (2017) suggested a long run relationship, and that export promotes economic

growth than trade (import plus export) in South Africa. Malefane and Odhiambo (2018) found a long run positive and significant impact of trade on South Africa's economic growth.

In Nigeria, Ekpo and Egwaikhide (1994) and Fajana (1979) established a positive relationship between exports and economic growth. Iyoha and Adamu (2011), Obadan and Okojie (2010), Arodoye and Iyoha (2014) established a positive impact of trade on growth.

Theoretical Model, Methodology and Data

The augmented Solow model shows that the impact of physical capital accumulation and growth of population (labour) is greater on per capita income if human capital accumulation is considered in the basic Solow model (Mankiw, Romer & Weil, 1992). Functionally,

$$g_t = f(K_t, L_t, H_t) \quad (1)$$

with g_t representing per capita income growth, L_t is labour, and H_t is human capital. Each of these variables is assumed to be positively related to income.

Empirical Model Specification

From equation (1), the study's empirical model is stated as:

$$\ln g_t = \alpha_0 + \alpha_1 \ln K_t + \alpha_2 H_t + \alpha_3 \ln T_t + \alpha_4 F_t + e_t \quad (2)$$

note that, g is the per capita income used a proxy for economic growth, K is the physical capital stock, H represents human capital (measured by secondary school enrolment rate), and T and F stand for external trade and financial openness respectively, all measured at time t . e_t is the error term. Note that g , K and T are in the log form. Financial openness is measured by total flows of foreign direct investment as a fraction of GDP (Aremo & Arambada, 2021; Estrada, Park & Ramayandi, 2015):

$$\ln g_t = \alpha_0 + \alpha_1 \ln K_t + \alpha_2 H_t + \alpha_3 \ln T_t + \alpha_4 F_t + \alpha_5 \ln(T \cdot F)_t + e_t \quad (3)$$

To examine the disaggregated effects of trade on growth, T (trade) in equations (2) and (3) is decomposed into import and export components with oil and non-oil exports and imports as sub-components.

Estimation Methods

The Autoregressive Distributed Lag (ARDL) approach is applied to equations (2) and (3). The ARDL method is an important and quite a very useful technique especially if the underlying variables are a combination of different orders of integration. A representation of the general form of the ARDL of equations (2) and (3) is:

$$\Delta(g_t) = \beta_0 + \sum_{\tau=1}^q \beta_1 \Delta g_{(t-\tau)} + \sum_{\tau=0}^q \beta_2 \Delta \mathbf{X}_{(t-\tau)} + \delta_1 g_{(t-1)} + \delta_2 \mathbf{X}_{(t-1)} + e_t \quad (4)$$

$$\begin{aligned} \Delta(g_t) = \beta_0 + \sum_{\tau=1}^q \beta_1 \Delta g_{(t-\tau)} + \sum_{\tau=0}^q \beta_2 \Delta \mathbf{X}_{(t-\tau)} + \\ \sum_{\tau=0}^q \beta_3 \Delta W_{(t-\tau)} + \delta_1 g_{(t-1)} + \delta_2 \mathbf{X}_{(t-1)} + \delta_3 W_{(t-1)} + e_t \end{aligned} \quad (5)$$

where \mathbf{X} represents all the explanatory variables in equation (2) and W stands for interaction of financial openness and trade. The long run and short run estimates are derived from equations (4) and (5) provided the variables are co-integrated. The long run parsimonious model of equation (4) is:

$$g_t = \alpha_0 + \alpha_1 \mathbf{X}_t + e_t \quad (6)$$

and its parsimonious short run model is:

$$\Delta(g_t) = \lambda_0 + \sum_{\tau=1}^i \lambda_1 \Delta(g_{(t-\tau)}) + \sum_{\tau=0}^j \lambda_2 \Delta(\mathbf{X}_{(t-\tau)}) + \gamma \text{ECM}_{(t-1)} + e_t \quad (7)$$

Also, the long run parsimonious model of equation (5) is:

$$g_t = \alpha_0 + \alpha_1 \mathbf{X}_t + W_t + e_t \quad (8)$$

$$\Delta(g_t) = \vartheta_0 + \sum_{\tau=1}^i \vartheta_1 \Delta(g_{(t-\tau)}) + \sum_{\tau=0}^j \vartheta_2 \Delta(\mathbf{X}_{(t-\tau)}) + \sum_{\tau=0}^k \vartheta_3 \Delta W_{(t-\tau)} + \pi \text{ECM}_{(t-1)} + e_t \quad (9)$$

In equations (7) and (9), γ and π are measures of the speed of adjustment between the short run and long run. Akaike info criterion is used for lag order selection. For the long run (co-integration) test, the ARDL Bound co-integration method is adopted with the critical values obtained from Narayan (2004).

Data Sources

The study employed annual time series dataset between 1987 and 2020, a post adoption of Structural Adjustment Programme (SAP) period. Nigeria experienced significant flows of trade across the globe following the implementation of SAP policy. Data sourced are oil and non-oil export values, oil and non-oil import values, and total export and import values collected from the Central Bank of Nigeria Annual Statistical Bulletin. Data on physical capital stock was sourced from PenWorld table. The human capital and financial openness data were obtained from World Bank Development Indicators (WDI).

Results

The results on the time series property of each of the variables in the model are presented in Table 1 with the p -value of the associated statistics in parenthesis. Other than the oil export and non-oil import variables which are level-stationary, all other variables are first-differenced series.

Table 1

Summary result of the stationary test
Methods: Augmented Dickey-Fuller (ADF)

Variables	Level		First difference	
	C	$C \& T$	C	$C \& T$
$\ln g$	-1.508 (0.51)	-2.461 (0.34)	-3.421 (0.02)	-3.362 (0.07)
$\ln K$	-1.282 (0.63)	-2.022 (0.57)	-4.320 (0.00)	-4.286 (0.00)
$\ln X_0$	-3.069 (0.04)	-0.958 (0.94)	-4.731 (0.00)	-5.120 (0.00)
$\ln X_n$	-0.967 (0.75)	-2.902 (0.17)	-6.222 (0.00)	-6.115 (0.00)
$\ln M_0$	-2.295 (0.17)	-1.363 (0.85)	-5.727 (0.00)	-6.483 (0.00)
$\ln M_n$	-2.723 (0.08)	-2.472 (0.34)	-7.850 (0.00)	-8.535 (0.00)
$\ln T$	-2.443 (0.14)	-1.633 (0.76)	-5.632 (0.00)	-4.596 (0.00)
H	-1.447 (0.55)	-0.879 (0.95)	-10.113 (0.00)	-10.209 (0.00)

Note: C means constant, and $C \& T$ stands for constant and trend assumption.

Source: own study.

The empirical results are presented in Tables 2 to 9. The first component of each of the tables shows the results of the long run tests of the basic models. The results suggest the presence of co-integration at a 5% level in all the models, hence, there is a long run relationship between trade and economic growth in the models. The second component of each of the tables contains the estimated long run and short run coefficients of the disaggregated and aggregated direct and indirect impact of trade on growth.

In Table 2, the direct effect of non-oil and oil exports components of trade on growth is reported. Non-oil export has a positive impact on economic growth at a significance level of 5% both in the long run and short run. On the contrary, the oil export component of trade has a negative and statistically insignificant long run and short run coefficients implying that improvement in oil-based export may not lead to increased economic growth over time. This is explained by the fact that non-oil exports are less volatile and reliable compared to the oil-based exports.

Table 2

Direct impacts of exports (oil vs. non-oil) on growth

ADRL Bound co-integration results						
Critical values	lower bound			upper bound		
1%	4.28			5.80		
5%	3.06			4.22		
10%	2.53			3.51		
$F_{\text{lng}}(\cdot): 8.95$						
$K = 4$						
The long run and short run estimates						
Variables	short run impact			long run impact		
	coefficient	s.e.	prob.	coefficient	s.e.	prob.
$\ln K$	-0.343	0.242	0.17	-1.561	1.386	0.27
$\ln X_n$	0.033*	0.012	0.01	0.151*	0.041	0.00
$\ln X_0$	-0.008	0.011	0.45	-0.037	0.040	0.37
H	0.001*	0.0004	0.01	0.009*	0.002	0.00
ECM	-0.219	0.071	0.00	–	–	–
β	–			34.27	19.79	0.09
s.e.			0.0265			
Breusch-Godfrey autocorrelation test				$F(1.766)$, prob. 0.19		
Heteroskedasticity Test: White				$F(0.917)$, prob. 0.50		

***, ** and * denote statistically significant at 10%, 5% and 1% levels respectively.

Source: own study.

In line with the human capital model of Mankiw, Romer and Weil (1992), the coefficient of human capital (school enrolment) is positive and statistically significant. On the other hand, the impact of physical capital is not statistically different from zero in the long run and short run. One reason for this is the current efforts at transitioning the Nigerian economy to a knowledge-based economy which has engendered the erosion of the fundamental role of physical capital in economic growth in recent years. The model's speed of adjustment of roughly 22% per annum suggests a low convergence rate.

In Table 3, the effect of financial openness on the relationship between growth and trade (non-oil versus oil exports) is reported. Contrary to logical expectation, the result suggests that increasing the degree of financial openness does not reinforce the positive impact of non-oil exports on economic growth over the short run and long run. This is because most of the foreign funds inflows in the economy go to the oil sector at the expense of the real sector. This is true from the fact that the coefficient of the interactive term of oil-based export and financial openness is positive and statistically significant over the long run and short run, suggesting that improvement in opening up of the economy to global funds flows is necessary for oil-based exports to have a positive long run and

Table 3

The effect of financial openness

Variables	Short run Impact			Long run Impact		
	coefficient	s.e.	prob.	coefficient	s.e.	prob.
$\ln K$	-0.167	0.402	0.68	-0.490	1.176	0.68
$\ln X_n$	0.101*	0.033	0.01	0.294*	0.077	0.00
$\ln X_n \cdot F$	-0.029**	0.013	0.04	-0.083**	0.032	0.02
$\ln X_0$	-0.072**	0.028	0.02	-0.308*	0.102	0.01
$\ln X_{0(-1)}$	0.050*	0.013	0.00	—	—	—
$\ln X_0 \cdot F$	0.036**	0.014	0.02	0.125*	0.043	0.01
$\ln X_0 \cdot F_{(-1)}$	-0.007***	0.003	0.07	—	—	—
H	0.001**	0.0004	0.04	0.008*	0.001	0.00
$H_{(-1)}$	-0.001*	0.001	0.01	—	—	—
F	-0.192*	0.060	0.01	-0.844**	0.337	0.02
$F_{(-1)}$	0.096**	0.043	0.04	—	—	—
ECM	-0.342*	0.091	0.00	—	—	—
β	—			20.67	16.64	0.23
s.e.			0.0209			
Breusch-Godfrey autocorrelation test				F(0.090), prob. 0.91		
Heteroskedasticity test: white				F(0.834), prob. 0.63		

***, ** and * denote statistically significant at 10%, 5% and 1% levels respectively.

Source: own study.

short run impact on economic growth in Nigeria. However, with a lag this impact becomes negative hence, there is no sure evidence that the extent to which the non-oil export contributed to economic growth in the past is dependent on the level of global financial funds inflows in Nigeria.

Table 4 reports the direct effect of the import component of trade (non-oil versus oil imports) on growth in Nigeria. In the short run, both the immediate and past values of non-oil imports positively contributed to economic growth in Nigeria. Contrarily, the impact of non-oil imports in the long run though positive, is not statistically significant. In other words, the positive impact of non-oil imports on growth may not be sustainable. In the case of oil-based imports component of trade, it is negative and statistically significant in the long run and

Table 4

Direct impacts of imports (oil versus non-oil) on growth

ADRL Bound co-integration results						
Critical values	lower bound			upper bound		
1%	4.28			5.80		
5%	3.06			4.22		
10%	2.53			3.51		
$F_{\text{lng}(\cdot)}: 7.04$						
$K = 4$						
The long run and short run estimates						
Variables	short run impact			long run impact		
	coefficient	s.e.	prob.	coefficient	s.e.	prob.
$\text{Lng}_{(-1)}$	-0.1101	0.130	0.41	–	–	–
$\text{lng}_{(-2)}$	0.268**	0.120	0.04	–	–	–
$\ln k$	0.026	0.639	0.97	2.684	1.619	0.11
$\ln K_{(-1)}$	-4.840	4.006	0.24	–	–	–
$\ln M_n$	0.051**	0.019	0.02	0.192	0.165	0.26
$\ln M_{n(-1)}$	0.027*	0.010	0.01	–	–	–
$\ln M_0$	-0.042***	0.022	0.07	-0.229	0.150	0.14
H	0.001*	0.0002	0.00	0.009*	0.003	0.01
ECM	-0.182*	0.045	0.00	–	–	–
β	–			-26.87	22.94	0.26
s.e.			0.022			
Breusch-Godfrey autocorrelation test				$F(0.409)$, prob. 0.53		
Heteroskedasticity Test: White				$F(0.245)$, prob. 0.99		

***, ** and * denote statistically significant at 10%, 5% and 1% levels respectively.

Source: own study.

it implies that increasing oil imports can dampen economic growth in Nigeria. However, we found no evidence on such in the long run since the coefficient was positive and insignificant. Similar to the exports model estimated, there is no statistical evidence that physical capital contributed positively to economic growth; rather, it is an increase in human capital that fosters economic growth over time. The estimated speed of adjustment of the model is about 18 per cent per year.

From Table 5, in the long run and short run, economic growth increased positively and significantly due to increase in non-oil imports with growth in financial openness over time. However, even with an increased rate of financial openness in the country, there is no statistical evidence that a rise in oil imports will facilitate economic growth over the short run and long run.

Table 5

The effect of financial openness

Variables	Short run impact			Long run impact		
	coefficient	s.e.	prob.	coefficient	s.e.	prob.
$\ln G_{(t)}$	0.189	0.143	0.20	–	–	–
$\ln K$	-0.596	0.408	0.16	-3.660	-3.661	0.26
$\ln M_n$	-0.053***	0.026	0.06	-0.324	0.266	0.24
$\ln M_n \cdot F$	0.057*	0.011	0.00	0.636**	0.305	0.05
$\ln M_0$	0.056*	0.018	0.01	0.671***	0.342	0.06
$\ln M_0 \cdot F$	-0.057*	0.011	0.00	-0.659*	0.305	0.04
H	0.0004	0.0003	0.21	0.007*	0.002	0.00
F	-0.065	0.038	0.10	-0.402	0.396	0.32
ECM	-0.163**	0.080	0.05	–	–	–
β	–			62.39	44.28	0.18
s.e.				0.022		
Breusch-Godfrey autocorrelation test				$F(0.528)$, prob. 0.60		
Heteroskedasticity Test: White				$F(0.831)$, prob. 0.63		

***, ** and * denote statistically significant at 10%, 5% and 1% levels respectively.

Source: own study.

Table 6 highlights the estimated results on the impact of oil plus non-oil exports and imports on growth. Based on the estimated results, it is obvious that the total of imports has a negative short run impact on economic growth but the relationship is not statistically significant at a conventional level. However, there is a positive impact of total exports on economic growth at 10 per cent in the short run. The short run convergence to long run takes approximately 28 per cent per annum.

Table 6

Direct impacts of trade (total import versus export) on growth

ADRL Bound co-integration results						
Critical values	lower bound			upper bound		
1%	4.77			6.67		
5%	3.35			4.77		
10%	2.75			3.99		
$F_{\ln g}(\cdot)$: 8.95						
$K = 4$						
The long run and short run estimates						
Variables	short run impact			long run impact		
	coefficient	s.e.	prob.	coefficient	s.e.	prob.
$\ln K$	-1.358	0.858	0.13	-4.850**	2.310	0.05
$\ln T_m$	-0.038	0.024	0.12	-0.135	0.089	0.15
$\ln T_x$	0.035***	0.019	0.07	0.125	0.079	0.13
H	0.001	0.0004	0.16	0.006*	0.002	0.01
ECM	-0.280*	0.093	0.01	–	–	–
β	–			0.04	0.021	0.02
s.e.			0.028			
Breusch-Godfrey autocorrelation test			$F(0.112)$, prob. 0.89			
Heteroskedasticity Test (White)			$F(1.556)$, prob. 0.19			

***, ** and * denote statistically significant at 10%, 5% and 1% level; estimated with atrend.
Source: own study.

Table 7 presents results on the importance of financial openness in the relationship between trade (total imports versus exports) and growth. The result showed that growth in financial openness failed to quash the short run negative effect of imports on growth in the previous year. The results further revealed that an increase in total import (oil and non-oil) increases economic growth with an increase in financial openness, albeit only in the long run. The relationship is statistically significant at 10%. In the case of exports, financial openness does not contribute to improved impact of total exports on economic growth over time.

The estimated impact of aggregate external trade (import plus export) on growth is summarized in Table 8. The estimated results suggested that the previous and current values of external trade have a statistically significant short run positive impact on economic growth in Nigeria. In the long run, there is no statistical evidence that the overall trade exerts a positive impact on growth in Nigeria.

Table 7

The effects of financial openness

Variables	Short run Impact			Long run Impact		
	coefficient	s.e.	prob.	coefficient	s.e.	prob.
$\ln G_{(-1)}$	0.179	0.156	0.28	–	–	–
$\ln K$	0.402	0.804	0.63	17.20**	6.797	0.03
$\ln K_{(-1)}$	-3.789*	1.253	0.01	–	–	–
T_m	-0.138*	0.047	0.01	-2.384***	1.139	0.06
$\ln T_{m(-1)}$	0.063***	0.030	0.06	–	–	–
$\ln T_m \cdot F$	0.033	0.020	0.13	0.786***	0.415	0.08
$\ln T_m \cdot F_{(-1)}$	-0.010**	0.004	0.02	–	–	–
$\ln T_x$	0.051	0.052	0.35	1.484	0.931	0.14
$\ln T_{x(-1)}$	-0.037	0.030	0.24	–	–	–
$\ln T_x \cdot F$	-0.028	0.021	0.21	-0.651	0.383	0.12
F	-0.068	0.048	0.18	-1.615	1.101	0.17
$F_{(-1)}$	0.129**	0.045	0.02	–	–	–
H	0.0001	0.0004	0.80	0.001	0.003	0.79
ECM	-0.112**	0.041	0.02	–	–	–
β		–		-229.03	94.31	0.03
s.e.			0.020			
Breusch-Godfrey autocorrelation test				$F(0.794)$, prob. 0.48		
Heteroskedasticity Test: White				$F(1.071)$, prob. 0.47		

***, ** and * denote statistically significant at 10%, 5% and 1% levels respectively.

Source: own study.

Table 8

Direct effect of trade (export + import) on growth

ADRL Bound co-integration results						
Critical values	lower bound			upper bound		
1%	4.54			6.37		
5%	3.13			4.61		
10%	2.58			2.86		
$F_{\ln G}(\cdot): 4.93$						
$K = 4$						
The long run and short run estimates						
Variables	short run impact			long run impact		
	coefficient	s.e.	prob.	coefficient	s.e.	prob.
$\ln G_{(-1)}$	0.312***	0.165	0.07	–	–	–
$\ln G_{(-2)}$	0.555*	0.157	0.00	–	–	–
$\ln K$	-1.115	0.829	0.20	-7.001*	1.296	0.00
$\ln T$	0.024***	0.016	0.06	-0.023	0.020	0.27

cont. Table 8

$\ln T_{(t-1)}$	0.034	0.016	0.04	–	–	–
H	0.0004	0.0004	0.30	0.002	0.001	0.17
F	0.040*	0.005	0.00	0.006	0.008	0.45
ECM	-0.606*	0.170	0.00	–	–	–
β	–			114.73	18.89	0.00
s.e.			0.024			
Breusch-Godfrey autocorrelation test				$F(2,383)$, prob. 0.12		
Heteroskedasticity Test: White				$F(0.492)$, prob. 0.89		

***, ** and * denote statistically significant at 10%, 5% and 1% levels respectively; estimated with a trend.

Source: own study.

However, when trade is interacted with financial openness, the estimated current value of the interacted coefficient turned out positive and statistically significant over the short run and long run. Intuitively, we say that financial openness is critical to the dimension of impact of trade on economic growth in Nigeria. But this is not the case in the previous period as the lagged value of the interacted term was negative and statistically significant as shown in Table 9.

Table 9

The effect of financial openness

Variables	Short run impact			Long run impact		
	coefficient	s.e.	prob.	coefficient	s.e.	prob.
$\ln K$	0.022	0.811	0.98	9.386**	3.777	0.02
$\ln K_{(t-1)}$	-0.778*	0.291	0.00	–	–	–
$\ln T$	-0.059**	0.028	0.05	-0.576**	0.257	0.04
$\ln T_{(t-1)}$	0.049*	0.018	0.01	–	–	–
H	0.00004	0.0003	0.92	0.005	0.003	0.14
$\ln T F$	0.003	0.003	0.92	0.126**	0.058	0.04
$\ln T F_{(t-1)}$	-0.013*	0.003	0.00	–	–	–
F	-0.053	0.043	0.24	-1.772*8	0.810	0.04
$F_{(t-1)}$	0.166*	0.043	0.00	–	–	–
ECM	-0.143*	0.046	0.00	–	–	–
β	–			-117.44	52.04	0.03
s.e.			0.020			
Breusch-Godfrey autocorrelation test				$F(0.02)$, prob.0.97		
Heteroskedasticity Test: White				$F(0.61)$, prob. 0.83		

***, ** and * denote statistically significant at 10%, 5% and 1% levels respectively.

Source: own study.

Policy Implication

1. The non-oil export component of trade is a good policy lever. Its expansion will promote rapid economic growth over the short run and long in Nigeria.

2. Boosting non-oil imports will lead to an improved economic growth. However, the positive impact of non-oil import on growth is limited to the short run and, therefore, it is not sustainable.

3. Promoting oil imports is detrimental to economic growth in Nigeria. Imports, in general, cannot ensure a lasting economic expansion in the country.

4. Financial openness matters for a positive and significant impact of imports on economic growth. Hence, allowing for a greater degree of global funds inflows would enable imports to contribute positively to economic growth.

5. Thus, subject to the implementation of the policy of financial openness, Nigeria's participation in international trade will result in rapid economic growth both in the long run and short run.

Conclusion

The motivation of the paper stemmed from the unresolved debate in the literature on whether trade is a booster economic growth in the developing economies as seen in the advanced economies of the world. It is obvious from the results obtained that while trade indeed matters for accelerating economic growth, the non-oil export is the dominant component through which increase in trade positively impacts economic growth in Nigeria. This, however, does not rule out the fact that non-oil import over the long run and short run or the overall import in the long run could also serve as boost to economic growth, provided a higher degree of financial openness is tolerated in the economy.

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Annex

Relationship	Directions of flow	<i>F</i> -stat (prob.)	Remark
Growth & trade	$G \rightarrow T$	0.75 (0.47)	no Granger causation
	$T \rightarrow G$	4.62(0.01)	unidirectional
Growth & human capital	$G \rightarrow H$	0.05 (0.95)	no Granger causation
	$H \rightarrow G$	3.26 (0.02)	unidirectional
Growth & financial openness	$G \rightarrow F$	0.20(0.82)	no Granger causation
	$F \rightarrow G$	0.24(0.78)	
Trade & financial openness	$T \rightarrow F$	4.16 (0.01)	bidirectional
	$F \rightarrow T$	2.37 (0.03)	



THE EVOLUTION OF PUBLIC DEBT, GROSS DOMESTIC PRODUCT AND INFLATION RATE IN POLAND IN 2015-2021

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Abstract

The research aimed to assess the amount of public debt, GDP, and inflation in Poland and to forecast it for the period 2022-2026. The amount of public debt in the years under study, and two macroeconomic measures, GDP and inflation, were analyzed.

The research was conducted based on data obtained from the Central Statistical Office, the Ministry of Finance, and Eurostat. One of the main research objectives of the study was to find a relationship between the level of GDP and public debt. To this end, vertical analysis of the acquired data was carried out and Pearson linear correlation coefficients were calculated. Another important aspect addressed in the study was the magnitude of average annual inflation rates, compared to the volume of public debt. To this end, the focus was on carrying out a vertical analysis of the variables that made it possible to find relationships between inflation and public debt. The focus

was also on examining the share of public debt in GDP for Poland related to selected EU member states. The analysis was carried out in three countries each with a high and low correlation of the indicator under study.

The analysis carried out allowed for the confirmation of the hypotheses put forward in this study that public debt is correlated with both GDP and the level of inflation in Poland. The estimated forecasts made it possible to conclude that the public debt will gradually increase over the next 5 years.

KSZTAŁTOWANIE SIĘ DŁUGU PUBLICZNEGO, PRODUKTU KRAJOWEGO BRUTTO ORAZ POZIOMU INFLACJI W POLSCE W LATACH 2015-2021

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Słowa kluczowe: PKB, prognoza długu publicznego, prognoza budżetu państwa, budżet państwa, inflacja.

A b s t r a k t

Celem pracy było zbadanie zależności między poziomem długu publicznego w Polsce a wartością wybranych wskaźników makroekonomicznych, takich jak inflacja i PKB. Przeanalizowano wielkość państwowego długu publicznego, PKB i stopy inflacji, a także związek występujący między tymi kategoriami, sporządzono też prognozę badanych mierników na lata 2022-2026.

Badania przeprowadzono na podstawie danych uzyskanych z Głównego Urzędu Statystycznego, Ministerstwa Finansów oraz Eurostatu. Jednym z głównych celów badawczych było znalezienie związku między poziomem PKB a długiem publicznym. W tym celu przeprowadzono pionową analizę pozyskanych danych i obliczono współczynniki korelacji liniowej Pearsona. Innym ważnym aspektem poruszonym w badaniu była wielkość średniorocznych stóp inflacji w porównaniu z wielkością długu publicznego. W tym celu przeprowadzono pionową analizę tych zmiennych. W pracy skoncentrowano się również na zbadaniu udziału długu publicznego w PKB Polski w odniesieniu do wybranych krajów członkowskich UE. Analizę przeprowadzono w trzech krajach o wysokiej i niskiej korelacji badanego wskaźnika.

Wyniki przeprowadzonej analizy pozwoliły na potwierdzenie postawionych hipotez, stanowiących, że dług publiczny jest skorelowany zarówno z PKB, jak i z poziomem inflacji w Polsce. Oszacowane prognozy pozwoliły stwierdzić, że dług publiczny będzie stopniowo wzrastał w ciągu najbliższych pięciu lat.

Introduction

It is difficult to determine the direct reasons for the significant increase in public debt in recent years because the literature on the subject indicates the complex nature of the process of accumulation of public debt over a long period. Undoubtedly, the method of calculating the debt and including it in the statistics as the actual value is of key importance in determining it, due to the complex scope of legal regulations regarding this issue. However, when taking into account the level of debt, i.e. determining the size of public debt, special emphasis was placed on taking into account the actual debt, disregarding the significant level of potential and hidden debt (Tobera, 2019, p. 314).

In the 1990s, the issue of public debt was already raised, mainly regarding countries that were undergoing political transformation, including Poland (Połomka & Zaleska, 2015, p. 167). The increase in debt intensified especially during the COVID-19 pandemic, which reached Poland in 2020. Therefore, the question arises whether there is a relationship between public debt and macroeconomic indicators. As examples of macroeconomic factors, the level of inflation and GDP were selected. The research aimed to assess the GDP, the level of inflation, and the level of public debt in Poland.

Literature Review

Considerations on budget balance and state debt were systematized with the development of classical economics. According to Piątkowski (2020, p. 35-38), these views were based on the considerations of Adam Smith. Smith (2007, p. 343-605) touched on this topic in two books of his considerations. In Book IV, he touched upon the issues of fiscal policy, and in particular the issues of the tax system. Book V, on the other hand, described issues related to public debt. Smith's views contained in it testify to a deep analysis of this phenomenon and the reference of a given phenomenon to the economic situation of the time. He showed two approaches, on the one hand, as a supporter of the multi-market approach, Smith negatively assessed the budget deficit of both monarchies and republics. Smith based his conclusions on the experience of other countries that had financial problems as a result of debt. Tax increases, corruption of money, revolutions, and state insolvency were some of the main factors in the consequences of debt. It could also lead to the collapse of financial systems. From a different point of view, Smith presented an analysis of the occurrence of budget deficits and their effects. As one of the main factors determining changes in the perception of debt, he indicates the transformation of economies from natural to commodity ones. The appearance of luxury goods caused a change in the behavior of the rulers. They stopped focusing on the hoarding of wealth and began

to surround themselves with luxury goods, which contributed to a significant increase in the demand for financial resources. As a result of changes in the development of the economy and the financial sector, it caused the then rulers to incur debt and thus lost their financial stability. The loans that were granted to them did not reduce the purchasing power of merchants, but increased it, which significantly contributed to the development of the market economy. Thus, according to Smith, the loans mentioned above are undesirable elements in a market economy, but they are inevitable in a market economy (Smith, 2007, p. 343-605). Another representative of classical economics is David Ricardo, who pointed out that government spending harmed the efficiency of the economy. He argued that spending reduces capital accumulation. In his theory, he questions the existence of the public finance sector and is in favor of financing expenses from imposed taxes. He also created a theory in which he justifies that public debt has no real impact on economic processes. It assumed that together with the increase in state debt, the increase in household savings would increase. However, Ricardo's theory aroused much controversy in connection with the theory of the infinite horizon (Moździerz, 2008, p. 1-35). The views of the classics enjoyed great popularity and recognition for many years. However, over time, under the influence of wars, they ceased to describe the present economic situation. The changes taking place required the verification of classical views. The introduction of Keynes' views caused rapid changes. They were introduced during the Great Depression, and Keynes showed an opposite view of the economy. He focused his main attention on the fact that it is not the supply that generates demand, but that demand is primary. He also noted that it is the lack of demand in the economy that is the main factor in the creation of unemployment and recession in the economy. He also drew attention to the fact that entrepreneurs in times of crisis are unfavorably inclined to take risks related to investing. Thus, Keynes proposed that government spending should supplement global demand since maintaining effective demand in the economy is more important than maintaining budget balance. In his theory, Keynes also explained that in times of economic downturn, a negative balance is a neutral phenomenon (Keynes, 2003, p. 119, 220). Keynesian ideas were put into practice for the first time during the Great Depression. Economists did not agree on the validity of this theory, but it is worth noting that in the first period, according to Keynesian principles, the level of public debt was low and its negative effects were not felt (Moździerz, 2008, p. 1-35). Both mainstream economic theories only partially explain the consequences of the use of public debt. In practice, both approaches were used, but the experience gained in this way did not determine the advantage of one of them (Piątkowski, 2020, p. 40).

According to Piątkowski (2020, p. 47), the first of the potential sources of the impact of public debt on the level of inflation is the impact of the risk of insolvency of the public finance sector on the price level. In the event of a risk, there is a likelihood of an increase in market interest rates and an increase in tax burdens.

An increase in interest rates results in a significant increase in the cost of obtaining funds to cover the deficit, and thus it is felt by the entire economy. The financial market is based mainly on reputation and the decline in trust in the state translates into the perception of the economy as a whole. Thus, the increase in the price of money is expressed by the market interest rate. Such a situation causes an increase in the costs of economic activity and has an impact on the increase in the level of prices. As another factor influencing public debt, Piątkowski (2020, p. 48) distinguishes the currency risk related to foreign debt. Sudden drops in the value of a currency strongly affect the current price level. It is worth emphasizing, however, that in the case of developing countries such as Poland, the exchange rate depends mainly on the inflow and outflow of foreign capital, stock exchange investments and treasury bonds. The presence of high foreign debt entails two main phenomena. Firstly, it is necessary to offer a high-interest rate on bonds, which leads to an inflow of capital resulting in the strengthening of the national currency, thus contributing to lowering the level of inflation (applies to countries with a floating exchange rate). On the other hand, in the case of countries with a fixed exchange rate, there will be an increase in the supply of the domestic currency, which will lead to an increase in inflation. The increase in demand for foreign currencies and the decline in investor confidence contribute to the weakening of the domestic currency. According to Piątkowski, inflationary pressure may cause a rapid increase in the level of inflation (the price of many products, including fuel, is strongly dependent on the level of the exchange rate). This can be seen in the example of countries where currency crises occurred. It shows that this mechanism is very common in this case. It is also worth noting that inflation is a complex phenomenon influenced by several factors. The process of impact of public debt on inflation and the economy as a whole differs depending on the phase of the economic cycle in which they are incurred. In a period of rapid growth in the economy, inflationary pressure is strong, so the pressure caused by debt is additionally strengthened.

The impact of public debt on economic growth after the aftermath of the financial crisis has become a topic of consideration for many economists. The significant increase in budget burdens prompted reflection on whether the safe level of debt, ensuring a constant pace of economic growth, has already been exceeded. The main variables differentiating the impact of public debt on GDP growth include the share of debt in GDP, the level of economic development of the country, and the occurrence of debt crises in the earlier period (Karmela, 2019, p. 74-95). In his research, Karmela (2019, p. 74-95) assuming that the current level of GDP per capita growth should not affect the lagged level of the public debt ratio, limited the problem of reverse causality. The ratio of public debt to GDP in the previous year was correlated with its value in the current year and as such a variable to some extent limits the problem of endogeneity. He noted that the method of eliminating these two problems has not yet been

developed, which, however, does not raise doubts of some researchers (cf. e.g. Reinhart, Reinhart & Rogoff, 2012). Karmela (2019, p. 74-95) also indicated that the estimation results of the models presented by him may indicate a non-linear relationship between economic growth and the size of public debt. The analysis carried out by Karmela (2019, p. 74-95) proved that high public debt is correlated with low economic growth.

Research Methods

State public debt (PDP) is an indicator of public finance sector debt, determining the number of liabilities incurred by individual units of the sector on the financial market (including the banking market). Therefore, this indicator takes into account the consolidation process, i.e. the elimination of mutual liabilities within the sector (e.g. the value of loans granted from the state budget to local governments, loans to the Social Insurance Fund or treasury securities held in the portfolios of public finance sector units is not taken into account) (Marchewka-Bartkowiak, 2022).

The inflation rate can be defined as an indicator of the increase in the prices of goods and services in the economy. Thus, it informs us about the average price increase in the market. The consequence of inflation is a decrease in the purchasing power of money, and thus a decrease in its value (for the same amount of money we can buy fewer goods and services).

Gross domestic product (GDP) is a measure reflecting the economic situation in the economy. It is the most commonly used measure, even though it is widely criticized because it does not properly reflect the level of wealth in the country and the level of wealth of the average citizen, it indicates the strength of the economy in the world.

Hypothesis 1: The rate of inflation increases with the increase in public debt.

Hypothesis 2: There is a relationship between public debt and GDP.

The empirical analysis focused on verifying the coexistence of the phenomenon of high GDP and the level of inflation and public debt, as well as on observing and determining whether there is a cause-and-effect relationship between these phenomena. For this purpose, the Pearson linear correlation coefficient and the vertical analysis of the results were calculated. It is worth noting, however, that there are many limitations to the study of the relationships between these variables, and unfortunately, economists do not agree on how to do it (Kamela, 2019, p. 74). Based on the forecast determined using the trend line, an analysis was carried out regarding the size of the debt for the years 2022-2026.

The study analyzed data obtained from the Ministry of Finance, the Central Statistical Office, Eurostat, and literature on the subject, both domestic and foreign.

Research Results

The research hypothesized H1 that the inflation rate increases with the public debt. The level of public debt and inflation in Poland for the years 2015-2021 are presented in Figure 1. It can be seen that the value of inflation in the analyzed period fluctuates while maintaining an upward trend. In 2015 and 2016, we could note the phenomenon of deflation in Poland. The values for the analyzed years were respectively -0.9% and -0.6%. The level of public debt for 2015 was PLN 877,275.5 million, while in 2016, the debt amounted to PLN 965,201.5 million. Thus, it can be seen that along with the increase in public debt, the level of inflation increased by 0.3 percentage points per year. Public debt in 2016 increased by 10.02% compared to the previous year. In 2017, the level of inflation in Poland increased sharply compared to the previous year. The average annual inflation for Poland in 2017 was 2%, i.e. it increased by 2.6 percentage points compared to the previous year. The amount of public debt in 2017 recorded a decrease in value compared to 2016, the debt for 2017 amounted to PLN 961,836.3 million, which was a decrease of 0.34% compared to 2016.

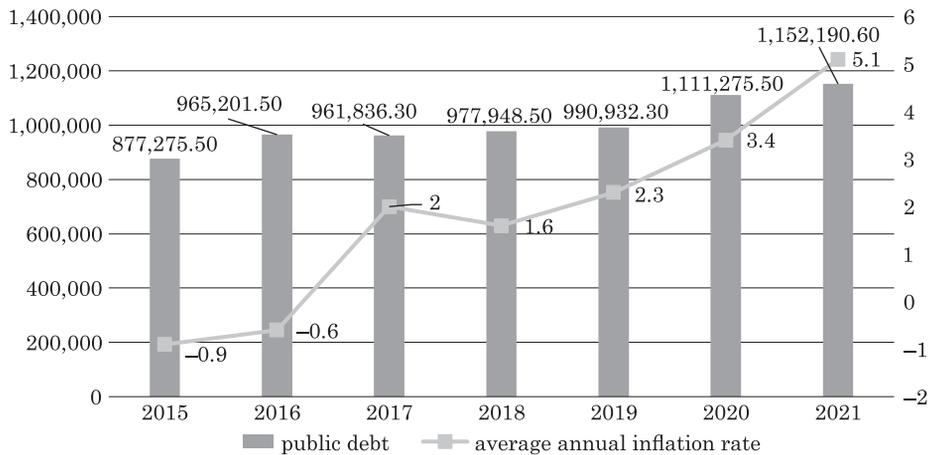


Fig. 1. Comparison of average annual inflation rates to the size of public debt in Poland in 2015-2021
Source: based on data from the Ministry of Finance and Statistics Poland.

It can therefore be seen that 2017 was the only year among those surveyed to record such a sharp increase in inflation and a decrease in the value of public debt compared to the previous year. Inflation in 2018 was at the level of 1.6%, at the same time recording a decrease of 0.4 percentage points compared to 2017. In 2018, the country's debt amounted to PLN 977,948.5 million, which resulted in an increase in the debt volume compared to 2017 by 1.7%. Since 2018, the size of public debt has shown an upward trend, the same situation can be observed

in the average annual inflation value in Poland. Therefore, it can be concluded that the H1 hypothesis put forward in the study has been confirmed, because in the analyzed period the level of inflation increases along with the public debt. This was also confirmed by Piątkowski (2020, p. 190) in his book. He focused on four potential ways in which public debt affects inflation. The first one was the risk of insolvency in the public finance sector. His analysis showed that in Poland in the years 2001-2018, the risk of insolvency of the public finance sector, despite periodic fluctuations, decreased. This included, among others, the fact that the ratio of public debt to GDP was growing, but did not exceed 60% of GDP. The second direction of the impact of public debt on the level of inflation associated with currency risk. The analysis carried out showed that in the analyzed period this impact decreased, although in periods of economic downturn the debt parameters affecting the currency risk significantly deteriorated. The third way of influencing the level of inflation identified by Piątkowski (2020, p. 190) was its impact on the crowding-out effect. In his research, he showed that public debt did not increase the crowding-out effect. This effect occurs but is not the result of public sector activity. The fourth identified relationship between public debt and the level of inflation was related to the risk of debt monetization. An analysis by Piątkowski (2020, p.190) showed that Polish public debt carries this risk. At the same time, however, forecasts indicate that the impact of debt on inflation will increase in periods of economic downturn, and its strength will depend on the degree of deterioration of the public finance balance. Therefore, the issue of the impact of debt on the level of inflation will also be relevant in the future. Research conducted by Piątkowski (2020, p. 44-60) indicated a moderate and decreasing impact of public debt on inflation processes, but at the same time on the occurrence of risk factors in the future. Research conducted in the future, taking into account the rapidly growing inflation, may be particularly interesting.

The research hypothesized H2 that there is a relationship between public debt and GDP. The size of the level of public debt and GDP in Poland for the years 2015-2021 are presented in Figure 2. It can be seen that the value of GDP in Poland for the analyzed period maintained an upward trend, similarly, in the case of the size of public debt, the values also show an upward trend.

There is a certain relationship between GDP and the size of public debt. The only exception, in the analyzed period, in which the increase in the size of GDP was not accompanied by an increase in the size of public debt, was 2017. To determine the relationship between the size of public debt and GDP in Poland, in the period under study (2015-2021) the correlation between the given values was examined. For this purpose, the Pearson linear correlation coefficient was used, the purpose of which was to determine the linear relationship between the given variables. By definition, the correlation coefficient is in the range of (-1.1). In the case of the analysis of the coefficient for variables such as GDP and public

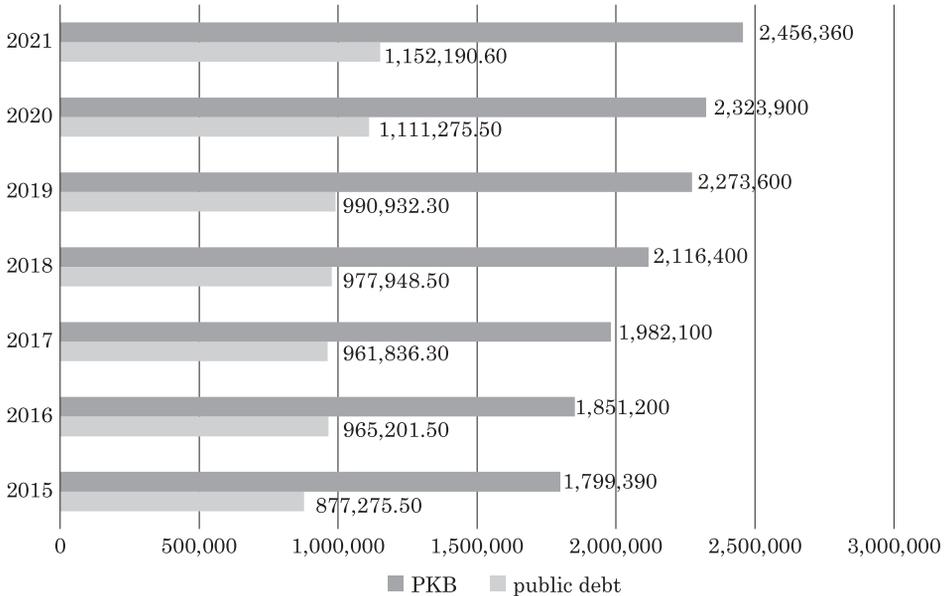


Fig. 2. Comparison of GDP to public debt (PLN million) in 2015-2021

Source: based on data from Statistics Poland and the Ministry of Finance.

debt, the value of the Pearson coefficient was at the level of 0.897. For the Pearson linear correlation, the greater the absolute value of the coefficient, the stronger the relationship between the examined variables. Thus, the analyzed coefficient of $0.897 < 1$ shows a large positive linear relationship between the size of public debt and GDP in the analyzed period.

To sum up, the H1 hypothesis put forward in the study can be confirmed that there is a relationship between public debt and the size of GDP.

To ensure sustainable development, it is necessary to ensure financial stability in the European Union by maintaining a reasonable share of public debt in GDP. Therefore, according to the Treaty on the Functioning of the European Union, public debt should not exceed 60% of GDP. As a result of Karmela's calculations (2019, pp. 74-95), he obtained theoretical threshold values for the maximum ratio of public debt to GDP per capita ranging between 67.3% and 77%.

Figure 3 shows the forecast of the share of public debt in the GDP by setting the trend line for the next 5 years.

The highest value can be observed in 2020, where the share of public debt in GDP amounted to 57.1%, which oscillated around the maximum allowable share of public debt in GDP amounting to 60%. The smallest share can be observed in 2019, where this value is 45.6%. Based on the forecast calculated using the trend line, it can be seen that the share of public debt in GDP over the years 2022-2026 will fluctuate around 60%, but will not exceed the maximum allowable.

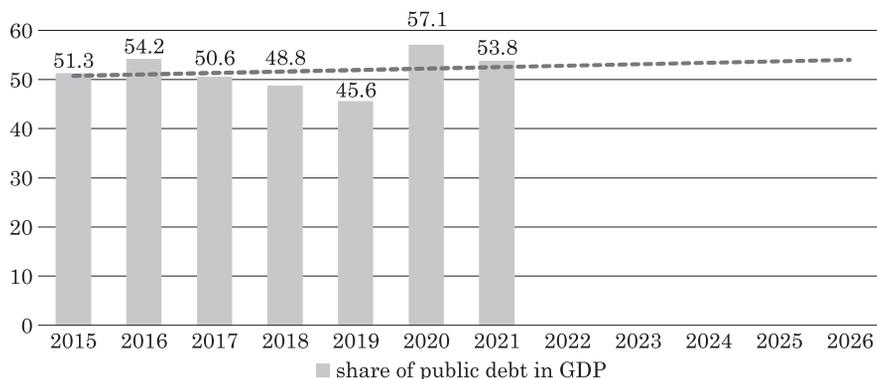


Fig. 3. Forecast on the share of public debt in % of GDP for 2022-2026 in Poland, determined using a trend line

Source: based on Eurostat data.

Summary

The problem of the growing public debt is a phenomenon that we have been struggling with for a long time not only in Poland but in the world. Debt is not something new, but the factors that make up its size can change, and thus its level constantly changes. The size of public debt in Poland in the period under review showed an upward trend, excluding 2017 when a decrease in the size of debt by 0.6% compared to the previous year can be observed. As one of the reasons for this phenomenon, a decrease in the foreign value of public debt was specified, the amount of which consists of debt incurred on account of securities, also incurred on account of loans and credits, and other debt of the public finance sector. In each of the above mentioned areas, a decrease in value was recorded compared to the previous year.

As a result of the research, it was found that with the increase in the level of state debt, the size of GDP increased. For the size of public debt in Poland, the forecast determined using the trend line has also been calculated for the years 2022-2026. Based on the data obtained, it can be seen that the value of public debt will increase. According to the presented forecast, Poland's debt in 2023 may reach PLN 1,200,000 million, while in 2026 it may fluctuate around PLN 1,400,000 million. Therefore, based on the data obtained, one can predict an increase in state debt in the coming years.

The size of public debt was also presented relative to the rate of inflation occurring in Poland in particular years of the analyzed period. Inflation in Poland in 2015-2021 fluctuated while maintaining an upward trend. In the analyzed period, an exception was noted in which the inflation rate decreased compared to the previous year, i.e. 2018. In the analyzed year, the value of average annual

inflation decreased by 0.4 percentage points compared to the previous year. The size of public debt in the analyzed period also showed an upward trend, excluding the above-mentioned year 2017. Thus, based on the analysis carried out, the relationship between the increasing public debt and the inflation rate in Poland can be seen. In light of the conducted research, further questions arise about the future in the event of such a huge inflation jump in 2022. This may be a contribution to further research.

Based on the conducted research, it can be concluded that the hypotheses have been confirmed. Therefore, it is necessary to constantly control the indicators and review the national rules limiting the amount of public debt in terms of their effectiveness, efficiency, and impact on the economy.

Translated by Andrzej Rzeszutek

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OPERATING SURPLUS AND ITS IMPORTANCE IN FINANCING LOCAL GOVERNMENT TASKS ON THE EXAMPLE OF MUNICIPALITIES OF THE MAŁOPOLSKIE VOIVODESHIP

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JEL Classification: H2, H72, H62.

Key words: fiscal policy, municipal budget, own revenue, operating surplus, tasks of the local government.

Abstract

The operating surplus is a positive subtraction result of the revenue and current expenditures of a local government units. The level of operating surplus determines the scope and quality of task implementation, as well as investment and development opportunities of a local government unit. In periods of economic slowdown, the surplus can serve as a kind of buffer and guarantee for the continuous and effective functioning of a local government unit. The aim of the research was to assess the operating surplus and the ability to perform local government tasks based on the balance of current revenue and expenditure in the current economic conditions. The analysis was carried out on the example of the municipalities of the Małopolskie Voivodeship in Poland, and the research period covered the years 2014-2021. According to the conducted research, the most dynamic situation in the operating surplus development took place in urban municipalities. These municipalities maintained the highest average level of operating surplus, but it was characterized by large fluctuations, e.g. in 2020 due to the COVID-19 pandemic. This may result from the fact of high budget revenues and the widest range of obligatory tasks, as well as from the sensitivity to economic changes of budget revenues that are significant in cities. As a consequence, the implementation of tasks in a continuous manner and at a constant level of quality in periods of downturn may be at risk in the case of these cities, and the lower level of operating surplus may force these local governments to incur liabilities.

NADWYŻKA OPERACYJNA I JEJ ZNACZENIE W FINANSOWANIU ZADAŃ SAMORZĄDU TERYTORIALNEGO NA PRZYKŁADZIE GMIN WOJEWÓDZTWA MAŁOPOLSKIEGO

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Kody JEL: H2, H72, H62.

Słowa kluczowe: polityka fiskalna, budżet gminy, dochody własne, nadwyżka operacyjna, zadania samorządu terytorialnego.

Abstrakt

Nadwyżka operacyjna stanowi dodatnią różnicę między dochodami i wydatkami bieżącymi jednostki samorządu terytorialnego. Poziom nadwyżki operacyjnej determinuje zakres i jakość realizacji zadań, a także możliwości inwestycyjne oraz rozwojowe jednostki. W okresach spowolnienia gospodarczego nadwyżka może służyć jako swoisty bufor i gwarancja ciągłego i efektywnego funkcjonowania jednostki samorządu terytorialnego. Celem badań była ocena nadwyżki operacyjnej oraz możliwości realizacji zadań samorządu terytorialnego na podstawie salda dochodów i wydatków bieżących w aktualnych uwarunkowaniach gospodarczych. Analizy przeprowadzono na przykładzie gmin województwa małopolskiego, a okres badawczy obejmował lata 2014-2021. Jak wynika z przeprowadzonych badań, najbardziej dynamiczna sytuacja w kształtowaniu się nadwyżki operacyjnej wystąpiła w gminach miejskich. Gminy te utrzymywały najwyższy przeciętny poziom nadwyżki operacyjnej, charakteryzował się on jednak dużymi fluktuacjami, np. w 2020 r. w związku z pandemią COVID-19. Może to wynikać z wysokich dochodów budżetowych oraz z najszerszego zakresu zadań obligatoryjnych, a także z wrażliwości na zmiany koniunkturalne istotnych w miastach dochodów budżetowych. W konsekwencji realizacja zadań w sposób ciągły i na stałym poziomie jakości w okresach dekonjunktury może być w przypadku tych miast zagrożona, a niższy poziom nadwyżki operacyjnej może zmuszać te samorządy do zaciągania zobowiązań.

Introduction

One of the basic principles of the local government system in Poland is the possibility of independent financial management. However, it depends on having stable sources of revenue (Kwaśny, 2019, p. 106). In Poland, they are subject to the regulations contained in the Act on the revenue of local government units (2003), but the Constitution itself (1997) indicates four groups of revenue of local government units (LGU's). These are own revenues, subsidies, subventions and foreign funds (Gornowicz & Wichowska, 2017, p. 63). These revenues are used to carry out the tasks assigned to LGU's, which determine the expenditure of the local government, and thus the quantity and quality of public services provided (Wichowska, 2022, p. 136, 137).

The basic classification of revenues, but also budgetary expenditure of local government units, due to their purpose, divides them into current (operational) and property. The first group of revenues and expenditures is characterized by their relationship with the current activity of the LGU. In this regard, the Act of Public Finance (2009) introduced the principle of balancing the operating budget of local government units. It is of fundamental importance for the functioning of local government in Poland, because it is associated with the possibility of local government tasks and the possibility of indebtedness of local government (Kwaśny, 2017, p. 230).

Considering the above, in the current discussion on the financial situation of local government in Poland, the issue of the difference between revenues and operating expenditure (operating surplus or deficit) is often raised. In November 2022, Bank Gospodarstwa Krajowego published a report entitled "Sustainable development against the backdrop of investment challenges and the financial situation of Polish local governments". The presented research shows that most municipalities expect that in 2022 the operating surplus will be lower than in 2021. One of the reasons for this state of affairs, indicated by local governments, is the increase in current expenditure and lower revenues from participation in personal income tax. In the opinion of the municipalities, the increase in current expenditure will be largely related to the rising prices of energy and energy resources. The first quarterly budget reports from 2022 seem to confirm the opinions of budget practitioners. The problem of the amount of the operating surplus discussed in this article seems to be an important and current issue from the theoretical and practical point of view (Bank Gospodarstwa Krajowego, 2022).

Therefore, this article aims to assess the operating surplus and the performance of local government tasks based on the balance of current revenue and expenditure in the current economic conditions. The analyzes were carried out on the example of the municipalities of the Małopolskie Voivodeship in Poland, and the research period covered the years 2014-2021, which was largely dictated by the years of implementation of the multiannual financial framework of the European Union. The article adopts the method of critical literature analysis and financial analysis of budgetary revenues and expenditures of municipalities in the Małopolskie voivodship. For this purpose, basic financial indicators based on the operating result of the budget and used for the financial assessment of local government units were used.

The article consists of several parts. The first part contains theoretical considerations on the concept of operating surplus in local government units and the theoretical significance of operating surplus in the implementation of the tasks of LGU's. The next part is empirical and is based on the analysis of the operational results of municipalities in the Małopolskie Voivodship during the research period. The article ends with a summary and conclusions.

The Concept of Operating Surplus in the Budget of a Local Government Unit

The operational budget is a type of local government budget, which has been distinguished due to the distinction in it of current revenue and expenditure, i.e. those that are implemented in a period of less than one year. On the contrary, it can be said that this budget includes revenues and expenses that are not related to investment activity (Krzemińska, 2018b, p. 91). The result of this budget is the operating balance of the local government budget.

There is no legal definition of operating surplus in Polish law. It is assumed, however, that it is a positive subtraction result of the revenue and current expenditures. A negative result indicates an operating deficit. Pursuant to the Act of Public Finance (2009), current revenues are all revenues of local government units that are not property revenues. The latter group includes: subsidies and funds earmarked for investments, revenue from the sale of property and revenue from the transformation of perpetual usufruct right into ownership right. A similar definition was adopted by the legislator in the field of current expenditure – current expenditures included those that are not property expenditures. These include expenditures for investments and investment purchases, which include programs financed from foreign funds – including from the EU or EFTA, which are not refundable. In addition, they are also expenditures for the purchase and subscription of shares or stocks and making contributions to commercial law companies (Korolewska, 2022).

In the legal and financial literature, it is indicated that the operating result of the budget is of significant cognitive importance. It illustrates the financial situation by indicating to what extent local government units can cover current expenditures with their current revenues. It informs about the possibility of carrying out tasks, carrying out investments, as well as the possibility of repaying liabilities by a given LGU. It indicates the financial resources that are at the disposal of the LGU to finance investments or repay liabilities after making obligatory current expenditures, including repayment of debt servicing costs. Therefore, maintaining a high level of financial surplus is beneficial. The negative result of the operating budget indicates that the LGU is unable to finance its tasks, which exceed its capabilities. If the LGU wants to implement them, it must do so by incurring debt or selling its own assets (Kwaśny, 2018, p. 234; Krzemińska, 2018a, p. 63, 64).

The Act of Public Finance (2009) introduced the obligation to balance the budget in the operational part. It concerns both the planning phase and the implementation of the budget. However, Art. 242 also introduces the possibility of adjusting the current operating result through the operating surplus from previous years or free funds on the current account of the municipality (Maj-Waśniowska & Cycoń, 2012, p. 193). As Kowalska *et al.* (2018, p. 123), such

a regulation led to an increase in operating surpluses in local governments in recent years, but it was done through restrictions on the use of reliefs and exemptions in local taxes and fees.

The Role of Operating Surplus in the Implementation of Tasks of Local Government

The stable financial situation of the LGU allows it to carry out its tasks in a continuous manner, which does not adversely affect its budget – especially on the financial liquidity and long-term solvency of the local government unit. The financial stability of local government units, and in particular the availability of financial resources, enables their effective allocation, and thus the distribution of public services adequate to the needs and the socio-economic development of the LGU. In this context, it is particularly important to maintain an appropriate amount of current financial resources, which in the event of disturbances from the external environment of the unit (especially from the market), will not result in the loss of the ability to perform the tasks of local government units at the current level and repayment of liabilities. As indicated by Surówka & Winiarz (2018, p. 458), the permanent adequacy of funds for the tasks performed is more important for local government units than financial independence. It can be concluded that the state of local government finances, including the level of operating surplus, will determine (Cyrbut & Gałęcka, 2020, p. 20; Wichowska & Ostrowska, 2018, p. 342; Wierzbicka *et al.*, 2021):

- current financing of own and commissioned tasks of LGU's;
- continuous and effective provision of public services by LGU's;
- regulating the liabilities of LGU's.

In accordance with the above, the operating surplus is of particular importance in the implementation of current tasks (current expenses), but in the long-term perspective it will also affect the development of the entity and investment capabilities. Maintaining high current revenues by LGUs is of key, but not the most important importance in assessing the situation of the unit. This must be done in relation to current expenditure. Local government units are differentiated in terms of internal conditions that will determine the level of current expenditure. Only their implementation (and including them in the balance of the operating budget) will make it possible to assess the financial condition and development and investment opportunities of local government units (see Wichowska & Lizińska, 2022). As indicated by Cyrbut & Gałęcka (2020, p. 23, 24), the operating surplus and its increase are a positive phenomenon and can be a starting point for strategic decisions.

As Dylewski (2017, p. 76) pointed out, the ability of LGUs to generate free funds on a permanent basis is of great importance in assessing the financial situation of local government units based on the operating surplus parameter.

This is due to the fact that these funds may be a source of financing new tasks of a current and property nature, and on the other hand may be a source of repayment of debt liabilities incurred to finance the former (free cash flow).

One of the most common uses of operating surplus is to cover operating costs. Most local governments use the operating surplus for current operations and for capital investments such as building renovations or new equipment. In this case, the operating surplus may turn out to be necessary as an own contribution when granting a loan or paying a commission or obtaining EU funds. Many local governments allocate part of the operating surplus, for example, to co-finance tasks in the field of education or public transport. The operating surplus may also be used for tasks in the field of municipal infrastructure and optional tasks in the field of social and cultural activities. Maintaining a high level of surplus can be particularly helpful during economic downturns when additional funds can help local governments overcome reduced local tax and levy revenues. Another way to use the operating surplus may be to control inflationary pressure in current operations (debt repayment, purchase of goods and services at an unchanged level). It allows for greater flexibility in the implementation of tasks and absorbing the negative effects of inflation (see Surówka & Winiarz, 2018, p. 458).

Operating Surplus in Municipalities of the Małopolskie Voivodeship and the Potential for Independent Implementation of Tasks

There were 182 municipalities in the Małopolskie Voivodeship in 2014-2021. Among them, there were 14 urban municipalities, 46 urban-rural municipalities and 122 rural municipalities. In the analyzed period, the number of municipalities that reached the current budget deficit was small. In 2014, there were 3 municipalities, in 2015 – 2, and in the years: 2016, 2019 and 2021, one municipality each. In the remaining years, there was no deficit in any of the municipalities. It can therefore be concluded that the municipalities of the Małopolskie Voivodeship were characterized by maintaining an operating surplus, which should be clearly assessed positively. This is also confirmed by the fact that some municipalities planned a current deficit, but the implementation of revenues and implementation of current expenditures allowed for a positive budget result. The last two years of the research period are especially noteworthy, in which a deficit was planned in 16 and 30 municipalities, respectively, but ultimately only in 2021 a deficit was recorded in one municipality. Certainly, these results can be associated with the uncertain situation resulting from the COVID-19 pandemic, which hindered budget planning, as well as with the planned changes in the personal income tax. Detailed data on the number of local governments that achieved an operating surplus or deficit, broken down by plan and budget execution, are presented in Table 1.

Table 1

The number of municipalities in the Małopolskie Voivodeship according to the plan and the result of the operating budget in 2014-2021

Operating budget result	Number of local governments units achieving a given operating budget result in 2014-2021								Average
	2014	2015	2016	2017	2018	2019	2020	2021	
Planned deficit	11	9	6	9	14	7	16	30	12.75
Deficyt execution	3	2	1	0	0	1	0	1	1
Planned surplus	171	173	176	173	168	175	176	152	170.5
Surplus execution	179	180	181	182	182	181	182	181	181

Source: own elaboration based on Regional Accounting Chamber in Krakow data.

In the analysis of the operating surplus, apart from the fact of its occurrence, its level and trends in this area are also important. Figure 1 shows the average levels of the operating surplus in the municipalities of the Małopolskie Voivodeship, distinguishing their type in thous. PLN in subsequent years. Among the analyzed municipalities, the highest average operating surplus levels were recorded by urban municipalities. The average level of the surplus in these municipalities in 2014-2021 was PLN 35,047 thousand. In these municipalities in 2014-2019, the average level of operating surplus remained at a relatively stable level. Only in 2015 there was a significant decrease (by over PLN 11,500 thousand). But in 2019, the average level of the surplus returned to a comparable level from

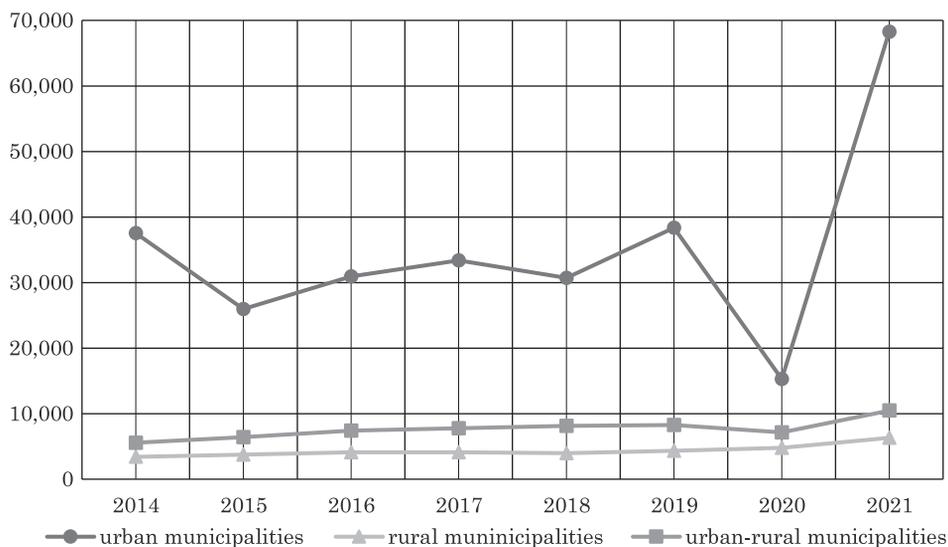


Fig. 1. The average level of the operating surplus by type of municipality in the municipalities of Małopolskie Voivodeship in 2014-2021 (PLN thousand)

Source: own elaboration based on Regional Accounting Chamber in Krakow data.

2014. After experiencing the first year of the COVID-19 pandemic, the operating surplus in 2020 was at the lowest average level in the entire research period (PLN 15,280 thousand). In 2021, municipal municipalities recorded a very large increase in the average level of operating surplus, which amounted to slightly more than PLN 68,275 thousand. The average level of the surplus in urban municipalities was influenced by the result of the operating budget of Kraków. Omitting it from the analyzes would mean that the average level of operating surplus in urban municipalities of the Małopolskie Voivodship would not exceed the level of this indicator from 2019.

The situation was different in the other two types of municipalities. In urban-rural municipalities of the Małopolskie Voivodship, a relatively stable average level of operating surplus was observed – it ranged from PLN 5,563,000 to PLN 10,465,000, and its average level for the research period amounted to PLN 7,646,000. In the case of these municipalities, 2020 was characterized by a slight decrease in the surplus (except for 2014 – it was the year with its lowest level). As in the case of urban municipalities, this situation can be associated with the financial consequences of combating the COVID-19 pandemic. However, the year 2021 brought an improvement in the situation.

The last group of analyzed municipalities are rural municipalities. In their case, no significant changes in the average level of operating surplus were observed. Its level fluctuated between PLN 3,406 and 6,309 thousand. The average level of operating surplus in rural municipalities in the analyzed period amounted to PLN 4,344 thousand. At the same time, it is a group of municipalities generating a lower level of surplus. In the case of this group of municipalities, it may be related to the specific and stable revenue structure of rural municipalities, which are less susceptible to the economic situation than in the case of urban or urban-rural municipalities. These municipalities did not experience a decrease in the surplus due to the financial impact of the COVID-19 pandemic.

Among the indicators used to assess the financial situation of local government units used by the Ministry of Finance, several of them refer to the operating surplus. One of them is the share of the operating surplus in the total current revenue of local government units. This ratio determines the extent to which the entity could incur new liabilities in relation to its current revenue. The higher the value of this ratio, the greater the investment opportunities or the greater the possibility of increasing current expenditures. A negative value of the indicator indicates that the local government unit does not generate an operating surplus. The formation of the above the indicator in individual types of municipalities in the Małopolskie Voivodship is presented in Figure 2.

For most of the years of the research period, the lowest average share of the surplus in current revenue was characteristic of urban municipalities. Only in 2019 and 2021 it was higher than the other groups of municipalities. Rural

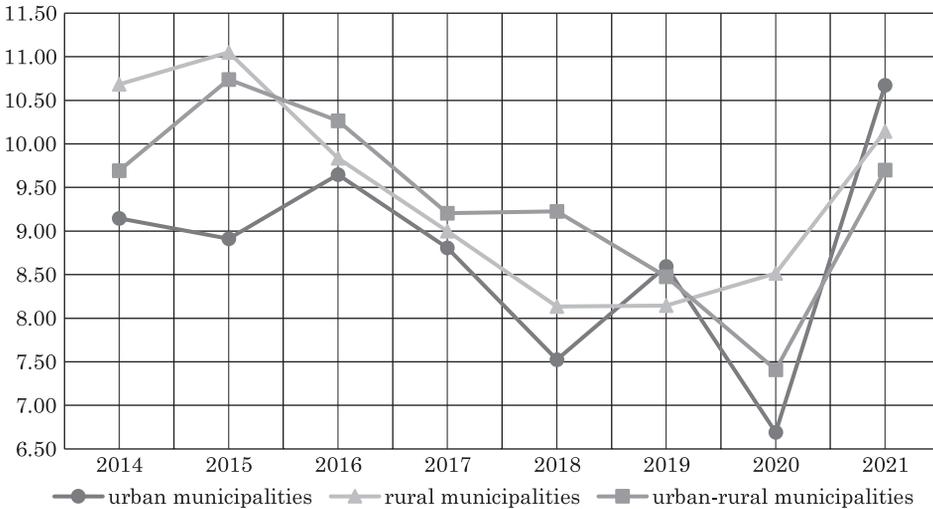


Fig. 2. Average share of the operating surplus in total current revenue by type of municipality in the municipalities of Małopolskie Voivodship in 2014-2021 [%]

Source: own elaboration based on Regional Accounting Chamber in Krakow data.

and urban-rural municipalities were characterized by a differentiated position in relation to the analyzed indicator. Initially, its highest level could be observed in rural municipalities (until 2015), then until 2018 – in urban-rural municipalities, and in 2020 – in rural municipalities. It can also be noted that in the analyzed period, the highest average share of the operating surplus in total current revenue was characteristic of urban-rural municipalities (9.44%), the average level – rural municipalities (9.34%), and the lowest – urban municipalities (8.75). When analyzing the average share of operating surplus in total operating revenues, the significant decrease recorded in 2020 in urban and urban-rural municipalities is noteworthy. The only municipalities that recorded an unknown increase in the indicator this year were rural municipalities. Therefore, the earlier conclusion can be confirmed that the group of these municipalities was the least affected by the effects of the pandemic, which did not reduce their budget surplus.

The last analyzed indicator is the level of operating surplus per municipal inhabitant. This indicator expresses how much potential available funds per inhabitant can be allocated to the implementation of tasks for the benefit of inhabitants. It also makes it possible to make the results realistic by the size of the population, which has a large impact on the level of revenue and expenditure of municipalities. The indicator, like the two previous ones, is stimulative. The evolution of the average level of the operating surplus per capita of individual types of municipalities in the Małopolskie Voivodship in 2014-2021 in PLN is presented in Figure 3.

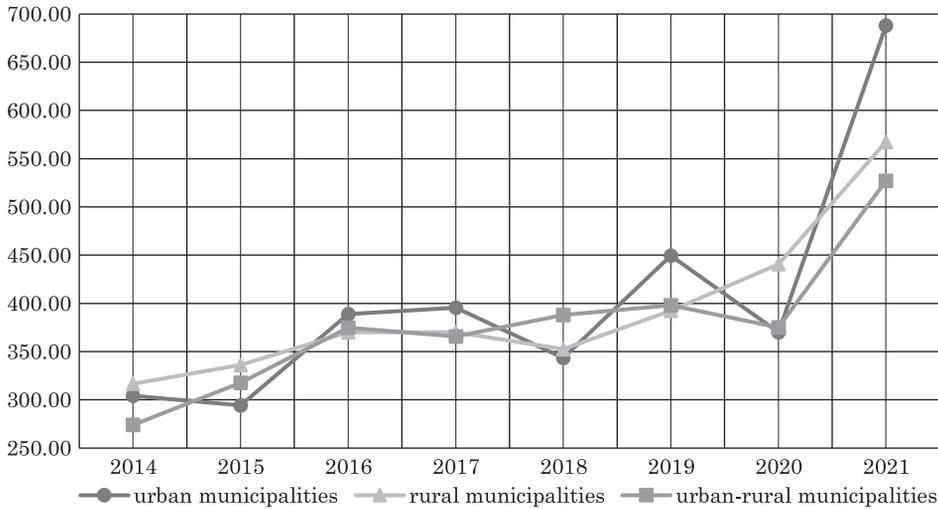


Fig. 3. Average level of operating surplus per capita by type of municipality in municipalities of Małopolskie Voivodship in 2014-2021 [PLN]

Source: own elaboration based on Regional Accounting Chamber in Krakow data.

As it results from the data presented in Fig. 3, the development of the average level of the operating surplus per capita in particular types of municipalities in the Małopolskie Voivodship has similar tendencies. The relatively highest average level of the analyzed indicator was maintained in urban municipalities and amounted to PLN 404. However, in other groups of municipalities, it was not significantly lower – in rural municipalities it amounted to PLN 393, and in urban-rural municipalities – PLN 377. As in the case of the previously analyzed indicator, the average level of operating surplus per capita deteriorated in 2020 in urban and urban-rural municipalities. Its further growth was observed in rural municipalities. This proves that the indicated municipalities are more susceptible to changes in revenue and expenditures during periods of social or economic crises, and that the ability to carry out tasks with the available funds decreases. It is also noteworthy that 2021 was characterized by a significant increase in the operating surplus in all types of municipalities.

Conclusions

As the review of the literature shows, the operating surplus is of great importance in the implementation of local government units' tasks – both current and investment ones. It may also affect the ability of LGUs to incur liabilities and to maintain long-term socio-economic development. In periods of economic slowdown, it can serve as a kind of buffer and guarantee for the continuous and

effective functioning of a local government unit. Its analysis may be of particular importance in periods of economic downturn, as it is the first litmus test of their financial situation. The state of the operating budget may prove to be a more important message for making financial decisions, e.g. about incurring liabilities, than the financial independence indicator. Particular importance of this indicator can be observed in urban municipalities.

According to the conducted research, the most dynamic situation in the development of the operating surplus in the municipalities of the Małopolskie Voivodship in 2014-2021 characterized urban municipalities. These municipalities maintained the highest average level of operating surplus compared to other municipalities and the highest average level of operating surplus per capita. However, when analyzing the average shares of the operating surplus in current revenue, it can be concluded that these municipalities were characterized by the lowest level (except for 2019 and 2021). This may be due to the fact that these municipalities perform a large range of tasks and may conduct a tax policy on a wider scale in terms of reliefs, exemptions or redemptions – in contrast to other municipalities. In addition, this fact may be related to the high sensitivity to economic changes of the budget revenues that are important in cities. As a consequence, the implementation of tasks in a continuous manner and at a constant level of quality in periods of economic downturn may be at risk. A lower level of operating surplus may force these local governments to incur liabilities.

The lowest and, at the same time, the most stable levels of the operating surplus in the municipalities of the Małopolskie Voivodship were characteristic of rural municipalities. These municipalities did not experience a significant deterioration of their financial situation due to the COVID-19 pandemic, as evidenced by the average level of indicators: the share of operating surplus in current revenue and the average level of operating surplus per capita. In the first year of the pandemic, these indicators were at the highest level in these municipalities. Based on the research results, it can be concluded that the scope of tasks performed by rural municipalities is not susceptible to changes in the external environment, and thus to social and economic crises. This is due to the fact that the group of these municipalities is characterized by the smallest range of sentences and the most stable tax base compared to other groups of municipalities.

Urban-rural municipalities were also characterized by a relatively stable situation in terms of the analyzed indicators. They were characterized by higher levels than rural municipalities and slightly higher fluctuations due to the COVID-19 pandemic. It can therefore be concluded that the financial situation of urban-rural municipalities is more susceptible to external factors than in the case of rural municipalities. In their case, as in urban municipalities, it may be necessary to supply debt funds to budgets in periods of economic downturn in order to carry out tasks at an unchanged level.

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HURRICANE RISK AND PROPERTY INSURANCE IN POLAND

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JEL Classification: G22, G52.

Key words: catastrophic risk, hurricane risk, insurance against elements, property insurance.

Abstract

The objective of this paper is to identify the current situation and the trends in the market of property insurance offering protection against hurricane risk. This paper presents data on strong winds in January and February 2022 in Poland and the damage caused by them. Information from the General Headquarters of the National Fire Service, from the Energa Group of Companies and from individual insurance companies was used. The analysis was performed for insurance market data, and it focused on group 8, Section II (insurance against the element risk). To this end, the Annual Reports of the Polish Insurance Chamber and the Financial Supervision Authority for the past five years were used.

Climate changes carry with them catastrophic phenomena whose frequency is growing. These include hurricanes, which have been causing multi-million property losses in recent years. Insurance companies include various aspects in the protection, which enables the policyholder to customize the product to their needs. Clients opt for this type of protection increasingly often. The gross written premium in insurance against elements and the number of active insurance policies is growing. The premium amount increased by more than 46% during the study period, and the number of active insurance policies increased by nearly 19%.

RYZYKO HURAGANU A UBEZPIECZENIA MAJĄTKOWE W POLSCE**Joanna Bak**Wydział Nauk Ekonomicznych
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Kody JEL: G22, G52.

Słowa kluczowe: ryzyka katastroficzne, ryzyko huraganu, ubezpieczenia od żywiołów, ubezpieczenia majątkowe.

Abstrakt

Celem artykułu jest identyfikacja bieżącej sytuacji i trendów na rynku ubezpieczeń majątkowych związanych z zabezpieczeniem na wypadek ryzyka huraganu. Przeanalizowano dane dotyczące wichur i szkód nimi spowodowanych, które wystąpiły w styczniu i lutym 2022 roku w Polsce. Wykorzystano dane Komendy Głównej Państwowej Straży Pożarnej, Grupy Kapitałowej Energa oraz poszczególnych ubezpieczycieli. Przeanalizowano dane dotyczące rynku ubezpieczeń, skupiając uwagę na grupie 8, Działu II (ubezpieczenia od ryzyka żywiołów). W tym celu wykorzystano raporty roczne Polskiej Izby Ubezpieczeń oraz Komisji Nadzoru Finansowego z ostatnich pięciu lat.

Zmiany klimatu niosą ze sobą coraz częściej występujące zjawiska o charakterze katastroficznym. Jednym z nich jest huragan, który w ostatnich latach powoduje wielomilionowe straty majątkowe. Ubezpieczyciele włączają w ochronę różne aspekty tego zjawiska, dając możliwość ubezpieczającemu dopasowania produktu do indywidualnych potrzeb. Klienci coraz częściej sięgają po tego typu ochronę. Składka przypisana brutto w ubezpieczeniach od żywiołów i liczba czynnych polis ubezpieczeniowych wykazują tendencję rosnącą. Na przestrzeni badanych lat odnotowano wzrost składki o ponad 46% i czynnych polis ubezpieczeniowych o blisko 19%.

Introduction

Climate change is a fact. Scientists leave no doubt about it. We, as humanity, are at a critical moment, which should be the turning point in our actions aimed at containing the factors that stimulate natural disasters (Kwaśnicki, 2020). "Natural disasters are phenomena brought about by the action of natural forces, which cause natural and economic damage to the area affected by them. If people die as a result of them, they are called cataclysms" (*Trzęsienia ziemi...*, 2021). The most common types of natural disasters include floods, hurricanes, earthquakes, fires, avalanches and volcanic eruptions. Catastrophic events cause a whole range of damage. The economic damage is increasingly often emphasized, and solutions to minimize it are being sought.

According to the Weather, Climate & Catastrophe Insight 2020 Annual Report (2021), the costs generated by natural disasters in 2020 amounted to 268 billion dollars, with 64% of that sum not being covered by insurance. The same report for 2021 indicates that the costs incurred because of such events had increased and points out that the economic loss caused by cataclysms

in 2021 was estimated at 343 billion dollars. Insurance covered 38% of the damage – 130 billion dollars. Despite a slightly larger portion of the damage covered by insurance, the global protection gap amounted to 213 billion dollars (62% of uninsured damage) (*Weather, Climate...*, 2022). Similar data can be found in publications of Munich Re or estimates made by the Swiss Re Institute (Skibińska, 2022). According to the latter, 2020 was the fifth most costly year for the insurance industry since 1970 (*Natural Catastrophes...*, 2022).

The highest costs – 40 billion dollars – were generated by last year's hurricanes in the Atlantic (USA and Central America). Floods in China resulted in a loss of 32 billion dollars and fires on the west coast of the USA – 20 billion. Smaller losses (13 billion USD) were caused by the cyclone Amphan in India, Bangladesh and Sri Lanka, floods in India (10 billion USD) and the locust invasion, which ravaged Eastern Africa (8.5 billion USD). The greatest loss in Europe was caused by hurricanes Ciara and Alex (5.9 billion USD) (Skibińska, 2022, after Christian Aid). The impact of climate change is also felt in Poland. Weather phenomena of a devastating force not seen before are increasingly frequent. The beginning of 2022 brought hurricane-force winds in a span of several days. These events inspired the authors to take up the subject.

The objective of this paper is to identify the current situation and the trends in the market of property insurance offering protection against hurricane risk.

This paper presents data on gales which took place in January and February 2022 in Poland and the damage caused by them. Data from the General Headquarters of the National Fire Service, the Energa Group of Companies and individual insurance companies were used, compiled and analysed. The analysis was performed for insurance market data, and it focused on group 8, Section II (insurance against the element risk). To this end, the Annual Reports of the Polish Insurance Chamber and the Financial Supervision Authority for the past five years were used.

The Risk of Hurricanes and the Damage They Cause

The risk of hurricanes has been dealt with by scientists of many disciplines. This paper does not deal with the genesis of the phenomenon, but it focuses on its definition used in the insurance business, which has an impact on the economic outcome of wind of extreme force. Considering this, one has to be aware that whether wind can be called a hurricane depends on its speed. There are considerable differences already at this stage. Currently, there are 26 insurance companies on the Polish market which offer insurance against hurricanes or strong winds. The insurance market and its trends are described by Ryszard Stempel in a publication *Performance of the Polish insurance sector in the second decade of the 21st century* (Stempel, 2020). The most popular

in terms of the gross written premium in 2022 were: PZU SA, TUiR WARTA SA and STU ERGO HESTIA SA (KNF, 2022). Following are the differences in defining the risk of a hurricane by these insurance companies:

1. The definition used by PZU SA, a product called “PZU Dom”: “Hurricane – wind whose speed is not lower than 13.8 m/s, as determined by the Institute of Meteorology and Water Management (Instytut Meteorologii i Gospodarki Wodnej – IMGW), which causes massive damage. If an opinion from the IMGW cannot be obtained, the presence of a hurricane is ascertained by the PZU based on actual facts and the size of damage it caused at a spot or in its vicinity” (*Ogólne warunki ubezpieczenia PZU Dom*, 2021);

2. The definition used by TUiR WARTA SA, a product called “WARTA Dom”: “Strong wind – the movement of the atmospheric air at a speed not lower than 17.5 m/s (63 km/h), caused by an uneven distribution of the atmospheric pressure, causing massive damage” (*Ubezpieczenia mieszkaniowe*, 2021). It is noteworthy that the insurance company does not use the word “hurricane”, but “strong wind”, which is often the case in insurance offers on the Polish market.

3. The definition used by STU ERGO HESTIA SA, a product called “ERGO 7”: “Hurricane – the action of wind whose speed is not lower than 15 m/s, which causes massive damage” (*Wszystko o ubezpieczeniu...*, 2022).

According to these definitions, wind speed is the decisive factor in classifying it as a hurricane. It is essential in the loss adjustment process. It is the decisive factor in recognizing the liability for damages of the insurance company, which has a direct impact on awarding compensation. Those who suffered a loss often wonder what the reason for these differences is. One has to bear in mind that a large majority of property insurance types, especially those concerning houses and flats owned by individuals, are voluntary. Insurance companies construct their products with the use of their own risk estimation algorithms, hence the differences in the offers. Therefore, one should always read the General Terms and Conditions of Insurance before taking out insurance to make it suit one’s needs. The importance of the issue is demonstrated by the events of early 2022 and the loss suffered by many households, companies and institutions.

The Government Security Centre issued 11 alerts warning of strong wind within the first seven weeks of 2022, three of which were for the whole country. The situation on 29 and 30 January was particularly difficult. There was an atmospheric front in the whole country, with a strong wind with gusts exceeding 100 km/h in the north and 90 km/h in the centre and in the south of the country. According to the National Fire Service data, it was the strongest wind for years (Komenda Główna Państwowej Straży Pożarnej, 2022). There were thousands of events and related interventions all over Poland. Selected data are presented in Table 1 to demonstrate the scale of the phenomenon and the damage it caused.

Damage and interventions recorded by the fire service provide very important information to insurance companies. It is used as the basis for developing insurance products and modifying existing offers (usually by adding some

Table 1

Fire brigade interventions caused by strong wind on 29-31 January 2022

No.	Intervention type	Number of interventions	Range (whole country/voivodeship)
1.	Damaged roofs	1,394	whole country
2.	Damaged roofs	324	Wielkopolskie
3.	Damaged roofs	230	Śląskie
4.	Ripped-off roofs	107	whole country
5.	Felled tree – fatalities	1	whole country
6.	Felled tree – injured individuals	12	whole country
7	Interventions total, including on 30.01.2022	18,000 16,387	whole country
8.	Interventions total	2,352	Zachodniopomorskie
9.	Interventions total	2,165	Pomorskie
10.	Interventions total	2,113	Wielkopolskie
11	Interventions total	1,506	Mazowieckie

Source: prepared by the author based on data from the National Fire Service.

clauses). Catastrophic events of increasing intensity and the growing damage they cause – both to property and to individuals, have brought about an increase in policy prices. According to data provided by EIB insurance brokers, the prices of such insurance products had increased in early 2022 by 15% compared to the same period of the previous year. The prices are expected to grow further, by several dozen percent, which particularly applies to policies for entrepreneurs (Rydlewska & Sasik, 2022).

Strong winds often result in electric power disruptions. This is a serious problem now that nearly all devices that people use are powered by electricity. This applies both to individual and institutional clients. The beginning of 2022 saw massive power failures caused by strong winds. The second attack of a hurricane on 19 February was particularly damaging. The data provided by the Energa-Operator company were not good. Selected information is shown in Table 2.

Power disruptions caused by violent weather phenomena have been given increasing attention by people who assess the insurance risk. Insurance companies monitor the issue from many angles. When calculating the risk exposure, the cause of the damage and the chain of events that affect its extent are taken into account. This chain of events which caused the risk of power disruptions during the period in question is usually as follows: a strong wind felled a tree, which fell on a land power line and broke it. According to the National Fire Service data, there were 24,866 interventions around the country on 19 February 2022, in which the firefighters had to remove felled trees, including over two thousand in the Warmińsko-Mazurskie Voivodeship. Insurance increasingly

Table 2

Information on the power supply grid failures on 19 February 2022

No.	Item	Number
1.	Consumers affected by power disruptions: in the whole country including up to 24.02.2022 in the Warmińsko-Mazurskie Voivodship	350,000 880 8,200
2.	High voltage line failures (in the whole country)	70
3.	Medium voltage line failures (in the whole country)	588
4.	High voltage substations without power supply (in the whole country)	50
5.	Medium and low voltage substations without power supply: in the whole country in the Warmińsko-Mazurskie Voivodship	13,000 700

Source: prepared by the author based on data from Energa-Operator (2022).

often covers damage caused by overvoltage associated with power disruptions (including mainly thawing of goods and materials) and – which is becoming a trend in property insurance – loss generated by disruptions in the business activity (Rydlewska & Sasik, 2022). It is noteworthy that falling trees cause damage of a much greater extent: to roofs, buildings, structures, tombstones in cemeteries, etc. Most insurance companies operating in the Polish market, including (the three largest ones) PZU SA, TUiR WARTA SA and STU ERGO HESTIA SA offer protection against this risk. It is important that the client should know the difference with respect to protection and check the Terms and Conditions of Insurance to see if it is adequate to their needs. It is sometimes necessary to expand the scope of protection by an additional insurance clause, which entails a higher premium.

Insurance Against Elements in Light of Market Reports

Increasingly violent weather phenomena are reflected in insurance statistics. An analysis of data from the past five years reveals certain trends and consumer responses to catastrophic events. Table 3 shows data on insurance against damage caused by elements. It focuses on group XVIII of Section II (Insurance and Reinsurance Activity Act; Ustawa o działalności ubezpieczeniowej i reasekuracyjnej, 2015), leaves out damage related to motor vehicles and includes insurance of houses and flats and holiday homes.

The size and popularity of an insurance market is usually described by the number of active policies during a specific period and the amount of the gross written premium. Table 3 shows that the gross written premium in group XVIII is growing steadily – by 46.3% during the period under study. At least two causes of this can be identified. First, the extent and the sudden nature

Table 3

Gross written premium, amount of compensation, the number of active policies and the number of events in insurance against damage caused by elements in 2017-2021

Specification	2017	2018	2019	2020	2021	Q1 2022
Group VIII Insurance against damage caused by elements, not classified in groups 3-7 – gross written premium (kPLN)	3,017,397	3,302,784	3,547,079	3,934,708	4,414,609	1,403,601*
Gross written premium (kPLN) – insurance of flats and holiday homes*	1,321,936	1,392,192	1,483,738	1,653,351	1,892,559	534,629
The number of active policies – insurance of flats and holiday homes*	11,712,267	12,358,138	13,691,286	13,182,295	13,905,278	15,461,416 including those taken out during the period under study: 4,124,152
The amount of compensation paid (kPLN) – insurance of flats and holiday homes*	496,045	469,771	542,607	635,651	832,123	226,257
The number of events – insurance of flats and holiday homes*	305,851	256,329	289,315	315,945	362,462	101,713

Source: prepared by the author based on data from the *Financial Supervision Authority and the Polish Insurance Chamber.

of catastrophic damage increased, which stimulated interest in this type of product among potential policyholders. Second, the value of the damage grows, inducing a response from insurance companies, which increases the policy prices (Michalski *et al.*, 2016). This is also reflected in data on the gross written premium in flat and holiday home insurance. These data should be viewed from multiple angles, and the gross written premium should be juxtaposed with the number of active policies, the number of events and the amount of compensation paid.

There was a powerful hurricane over Bory Tucholskie in August 2017, which resulted in nearly 10 million cubic metres of felled and broken trees and nearly 120 thousand ha of damaged forests, including 39.2 thousand ha which required complete renewal. “The greatest tragedy happened near the village of Suszek in the Jakubowo forest district (Rytel Forest Inspectorate), where two girl scouts were killed at a camp in the forest.” (*To było piekło...*, 2021). Apart from that, hundreds of houses and other buildings were destroyed. All of this stimulated

interest in insurance protection of their property. Hence, the growth of the number of policies in 2018-2019. The number of active policies decreased slightly in 2020, by 3.8% compared to 2019. This was caused both by the COVID-19 pandemic and by the absence of such dramatic experience in 2019 as in 2017. Some people had to save money, so they were not willing to take out voluntary insurance policies. Unfortunately, the pandemic did not stop the extreme weather phenomena. A lot of damage was caused by wind, including local whirlwinds, in 2021, especially in summer. This number had increased by 15% compared to 2020, and the amount of compensation paid increased by kPLN 196,472 i.e. by 31%.

When analysing the number of policies, one should pay attention to Q1 of 2022. The number of active policies in the period was the highest for five years – 15,461,416. Interestingly, this number is largely affected by the number of policies taken out in early 2022, when as many as 4,124,152 agreements were signed. In this case, the experience of strong winds (the recorded number of events was high compared to previous years) contributed to an increase in the interest in insurance protection.

Conclusions

Climate change and its effects are a fact. Currently, it is necessary to develop and implement solutions to alleviate the economic effects of events brought about by elements. The most prominent in this context is an instrument which makes it possible to compensate for damage, i.e. insurance against catastrophic risks. This paper shows that the damage caused by hurricanes alone can be huge. As in January 2022, when one hurricane-force wind damaged or ripped off the roofs of 1,500 houses. In February, 350 thousand households suffered from power disruptions lasting two days on average, which – apart from limitations of everyday activities – resulted in property damage: the thawing of goods and materials and disruption in production and service processes.

Insurance companies expand their offers to include more cover options. Including the effects of thawing and disruptions in activities is becoming a trend. Studies show that people are increasingly aware of the economic effects of the damage, and they are seeking ways of limiting them. The gross written premium increased by 46.3% during the period under study, while the number of active policies increased by 18.7%. When analysing consumer behaviour, one cannot fail to see that an increase in the interest in insurance protection is largely caused by catastrophic events. One such example is an increase in the number of policies taken out in Q1 2022. Therefore, the insurance industry is facing an important challenge in educating and encouraging people to use insurance protection against the risk of damage caused by the elements.

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APPLICATION OF THE 6D HOFSTEDE MODEL IN AN ANALYSIS OF THE POLISH AND PORTUGUESE BUSINESS CULTURE

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Abstract

Business management in a culturally diverse environment, that is acting in different business cultures, is one of the major challenges facing managers nowadays. Cultural differences among societies have been known to exist for ages, but a holistic view of their impact on the business culture in particular countries, development of cultural typologies and studies into the nature of interactions between the business and organisational culture date back to the 1980s. The acceleration of social, technological and demographic changes, a more rapid process of globalisation as well as some disturbances, such as the COVID-19 pandemic, the war in Ukraine or the intensifying rivalry between China and the United States of America, increase organisational uncertainty. Such changes require a new cultural sensitivity as well as new, modified systems of values. The objective of this

study has been to determine and compare the Polish and Portuguese business cultures. To this end, the contemporary Polish and Portuguese business cultures have been analysed according to the 6D Hofstede model.

WYKORZYSTANIE MODELU 6D HOFSTEDE W ANALIZIE POLSKIEJ I PORTUGALSKIEJ KULTURY BIZNESOWEJ

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Słowa kluczowe: kultura organizacji, kultura biznesu, model 6D Hofstede.

Abstrakt

Zarządzanie w zróżnicowanym kulturowym środowisku, działanie w różnych kulturach biznesowych to jedno z głównych wyznań współczesnych menadżerów. Samo zjawisko różnic w kulturach społeczeństw jest znane od wieków, jednak holistyczne spojrzenie na jej wpływ na kulturę biznesową poszczególnych krajów, stworzenie typologii kulturowych, badanie charakteru interakcji między kulturą biznesową a organizacyjną datuje się dopiero na drugą połowę lat osiemdziesiątych XX wieku. Przyspieszenie zmian społecznych, technologicznych, demograficznych, proces globalizacji, ale również jego zakłócenia w postaci pandemii COVID-19, wojny na Ukrainie, czy zaostrzająca się rywalizacja między Chinami a Stanami Zjednoczonymi Ameryki Północnej, powodują zwiększenie niepewności organizacyjnej. Zmiany te wymagają nowej wrażliwości kulturowej, często nowych, zmodyfikowanych systemów wartości. Celem opracowania jest określenie i porównanie polskich i portugalskich kultur biznesowych. Aby osiągnąć ten cel, współczesne polskie i portugalskie kultury biznesowe przeanalizowano według modelu 6D Hofstede.

Introduction

The 21st century is called a century of discontinuity. The number, depth, frequency and unpredictability of changes in all areas of human activity have rendered the traditional solutions used in management practice insufficient (Niedzielski, 2019, p. 160). The need to face new challenges as well as social, economic and technological changes means that the key factor in development or

even survival consists of the systems of values adopted by organisations. Hofstede, a Dutch scholar, spoke even about the programming of the human mind. Owing to the socialisation process, as an element of many social groups and infinitely intricate interactions man creates own operational system (Sent & Kroese, 2022, p. 17). This system helps people to act as it enables everyone to undertake effective and efficient action by providing ready schemes of action, stereotypical reactions and assessments. The degree to which this system is adjusted to the requirements of the contemporary world allows for more or less effective activities carried out by individuals, groups or organisations. The relevant literature contains many classifications and models of culture, which enable us to gain a better insight into the complex world of values and their influence on behaviour on all levels of an organisation (Siemiński, 2020, p. 13-17).

Organisational Culture

The importance of business organisational culture was first acknowledged in the early 1950s. In industrial companies, it served to explain the causes underlying a low-productivity environment, and why certain rules and procedures failed to improve unhealthy relationships between superiors and subordinates (Kassem, Ajmal, Gunasekaran & Helo, 2018, p. 119). Organisational culture is an interdisciplinary concept, which lacks one uniform definition, model or approach. The main reason is the high interdisciplinarity of the research, to which anthropology, psychology, sociology or management sciences have made a considerable contribution. However, what all definitions share is that organisational culture is defined through interactions of its members (Soni, Jhajharia & Nag, 2022, p. 7032). The term 'culture' in relation to an organisation was first used in 1951 by Jaques, who defined it as a customary and traditional way of thinking and acting, shared to various degrees by all members of the organisation and which new members of the organisation will have to learn and at least partly accept so as to be embraced by the organisation (Schlemendson, 2005, p. 346). Schein, a classic culture scholar and the creator of its best-known model, understood organisational culture as a set of procedures, a template of basic assumptions, which has been created, discovered or further developed by a group through mutual interactions and a learning process, in order to deal with problems of external adaptation and internal integration (Schein, 2004, p. 17). It is possible to encounter the concept that corporate culture is a type of a company's identity, reflection of human predispositions, ways of thinking and acting in a company. It influences man's consciousness and subconsciousness, and manifests in both these spheres (Lorincova, Miklasik & Hitka, 2021, s. 221).

There are three main taxonomic approaches to organisational culture presented in the literature: the dimensions approach; interrelated structure approach; and typology approaches. The dimensions approach is characterised

by using scales. Relating culture to other constructs or features of an organisation and, to a lesser degree, to single variables is typical of the interrelated structure approach. Typological approaches are based on predefined key features, which divide organisations into certain categories (Dauber, Fink & Yolles, 2012, p. 2, 3).

One of the classifications most often referred to is that proposed by Hofstede (2001). In the early stage of his research, Hofstede proposed a four-dimensional model described by levels: 1) power distance, 2) individualism, 3) masculinity, and 4) uncertainty avoidance. During later studies, the model was expanded by adding such dimensions as 5) long-term orientation, and 6) indulgence (Honrado, 2020, p. 68; Lee, Chernikov, Nagy & Degtereva, 2022, p. 2; Heydari, Laroche, Paulin & Richard, 2021, p. 2). Hofstede's work has long been 'considered a reliable proxy by numerous researchers in numerous fields' (Pikhart & Koblizkovam 2017, p. 4). Although this model was created to describe national cultures, it can be successfully applied in descriptions of organisational cultures (Czerska, 2016, p. 188, 189).

6D Hofstede Model Treated

Power distance is defined as the extent to which less influential members (subordinates) of an organisation expect and accept the unequal distribution of power. This dimension characterises the approach of an organisation to inequality (Saha & Nanda, 2022, p. 10663). In cultures with high power distance, inequality is as something obvious, arising from the nature of life. Employees have little discretion. Power is the source of prestige and is superior to ethics (Pukin, 2020, p. 167). In cultures with low power distance, it is thought that people should be equal and hierarchy is the inequality of roles but not of people. Subordinates and managers work hand in hand. Power relies on legality, should be ethical and is subject to scrutiny (Adanivic, 2022, p. 3).

Conceptually, individualism as a dimension describing relationships between an individual and the community (Hofstede, 2001, p. 209), particularly the extent to which people are independent decision-making individuals or to which they are embedded in their groups (Triandis & Gelfand, 2012, p. 499). In collective cultures, people perceive themselves as closely connected with their internal group, tend to adopt the norms and responsibilities dominant in the group as guidelines, and attach much value to their relationships with other members of the group (Siemiński, Wędrowska & Krukowski, 2020, p. 72, 73). Individualistic cultures replace the dependence of an individual on particular support groups, especially family and friends, with a more anonymous form of dependence on impartial institutions and universal norms. Inter-community bonds and responsibilities persist, but they are chosen rather than imposed (Beugelsdijk & Welzel, 2018, p. 1481).

The dimension denoting masculinity refers to the stereotypical approach to gender. It specifies whether a society presents more masculine features, such as competitiveness and assertiveness, rivalry, struggle, etc., or more feminine ones, such as modesty, support, empathy or care for others (Su, 2022, p. 58). In masculine cultures, main decisions are usually made at the top of an organisation and employees are not actively engaged in management due to frequent job changes and the lack of identification with the organisation. In cultures where more importance is attached to feminine values, labour policy is more family friendly, and balance between professional and family duties is maintained (Sun, Kim & Zhao, 2022, p. 9).

Uncertainty is an unavoidable part of everyday life. All cultures try to control uncertainty with the help of technology, beliefs, rules and rituals, arriving over time at different mechanisms to deal with uncertainty. In some organisations, uncertainty evokes anxiety and organisation members tend to avoid it. In such cultures, people try to keep uncertainty away as far as possible. Conversely, in organisations with the low level of uncertainty avoidance, members readily accept uncertainty, approach risk and differences with curiosity, do not mind ambiguity and are flexible in terms of change and novelty (Küçükömürler, Özkan, 2022, p. 90). Uncertainty avoidance is seen as being in an ambiguous situation, in which an individual may feel threatened and consequently will prefer to have firm rules and order of things in place. In high uncertainty avoidance cultures, there will be more rules and regulations, which will result in less propensity for change and innovation. People tend to feel greater anxiety, and to occupy the positions in which there is less ambiguity (Escandon-Barbosa, Salas-Paramo & Rialp-Criado, 2021, p. 6, 7).

Long-term and short-term orientations relate to changes. A culture with long-term orientation focuses on the future and is pragmatic, whereas a culture with short-term orientation focuses on the past and present time, and is dominated by respecting tradition and maintaining social norms (Lee, Chernikov, Nagy & Degtereva, 2022, p. 3). In a short-term orientation culture, the world is basically the same as it was created, hence the past is a moral compass and preserving the past is morally good (Sienkiewicz, 2022, p. 531). Long-term orientation is connected with perseverance, ordering relationships according to their status and preserving this order, thriftiness, having a sense of shame, etc. (Alipour, 2021, p. 737).

An indulgent culture allows relatively free gratification of basic and natural human desires associated with life and play. Restraint, on the other hand, is associated with control, and gratification of needs regulated through strict social norms (Heydari, Laroche, Paulin & Richard, 2021, p. 2). Organisations displaying characteristics of indulgent culture are short-term oriented, relatively more spontaneous in terms of expenses, have less control over gratification and less self-control, and do not emphasise thriftiness. In turn, cultures distinguished by restraint display behaviours limited by strict social rules and norms, which

members of the society feel obliged to obey (Chudnovskaya & O'Hara, 2022, p. 45). Over this continuum, cultural orientations range from the 'preventive closure' mentality, associated with uniformity, discipline, hierarchy and authority, to the mentality of 'promoting openness', which emphasises the search for opportunities, diversity, creativity, autonomy and liberty (Alipour & Yaprak, 2022, p. 3).

Hofstede's Model Applied: Poland vs. Portugal

For making a diagnosis and analysis of the Polish and Portuguese business cultures, presented in this article, the authors applied a comparative tool available on the website Hofstede Insights (Country Comparison. 2022). According to Mihaş and Lungescu, results shown on the Hofstede Insights website are estimates and do not result from any field studies (Mihaş & Lungescu, 2006, p. 6). In 2005, the Gallup Organization Romania implemented the Hofstede methodology and instrument in order to detect meaningful differences in the diagnosis. The cited authors developed a new tool composed of 42 new items to analyse the five dimensions but with a different methodology. Their results verified the estimates made by Hofstede (Iliescu, 2019, p. 243). Likewise, studies carried out in Poland on micro, small and medium enterprises yielded similar results (Siemiński, 2020, p. 122-139).

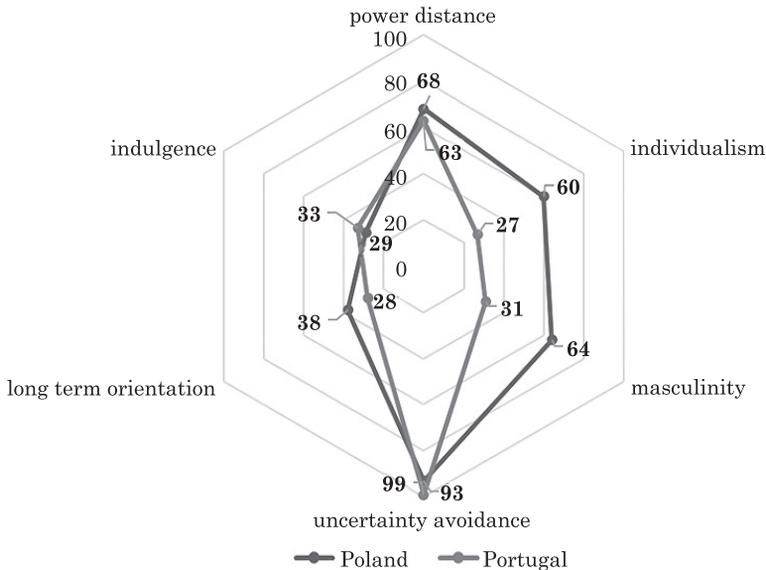


Fig. 1. Comparison culture profile Poland vs Portugal

Source: based on data from Country Comparison (2022).

Power distance reflects the attitude of a given culture to the fact that all individuals in the society are not equal. This dimension measures the extent to which less powerful members of a given community accept such inequality. The extent of acceptance of inequalities in the distribution of power is higher in the Polish society (68) than in the Portuguese one (63). Consequently, we can expect a higher degree of acceptance of solutions based on hierarchy in Polish organisations, and centralisation of power is likely to be more common. Managers tend to assume an autocratic style of management and to resist anything that might harm their managerial authority. Power is seen as the reflection of inherent inequalities and the ideal boss is a benevolent autocrat. It is expected in organisations that subordinates will report to their superiors their professional plans and will be subjected to control. In both cultures, power distance is underlined symbolically, and persons occupying key positions have access to privileges related to their position in the organisation.

Individualism is measured by the strength of independence of an individual, and it is reflected in organisations by the extent to which employees are willing to fight for the primacy of their own interests at the expense of the group. Individualism is sometimes presented as primary orientation towards oneself. Comparing the cultures diagnosed in Poland and in Portugal in terms of this dimension, distinct differences can be observed. The Polish society scores quite high on this dimension (68), which indicates that one cannot expect great loyalty of employees to their organisation or group. If an employee finds a better offer on the job market, they will take advantage of it. The employer-employee relationship is a contract based on mutual benefits, and management is the management of individuals. The dominant values in the system are first and foremost the personality of an individual, hence people have the right to criticise co-workers and the management. Managers in this culture, particularly in combination with high power distance, strive towards building a personal system of communication with subordinates, which enables them to create an impression that 'everybody is important in the organisation, although they are unequal'. The situation in Portuguese organisations is different. The low score on individualism (27) means that loyalty is paramount. Loyalty dominates the system of values, in which an individual is primarily a part of a group and secondly a personality. Employees are focused on attaining collective goals and collective success. The society supports strong relationships, where everyone feels responsible for other members of his or her group. The employer-employee relationships are seen in the light of moral categories, are long-term commitments, and decisions concerning an employee take into account his or her in-group performance. Relationships in companies are often like those in a family. The low individualism score means that people in Portugal may not accept changes very well.

The score on the masculinity dimension indicates to what extent the society is driven by competition, achievement and success. The diagnosis suggests that

there are large differences between the two analysed cultures in this area. The masculinity index for Poland was high (64). It can therefore be expected that the society will be driven by competition and success will be defined by the winner. Whatever is not permitted in the society is forbidden and illegal, yet breaching the law is common and legal nihilism is typical. In cultures with high scores on this dimension, people live to work and conflicts are solved by fighting. The low score on masculinity obtained by Portugal (31) means that the dominant value in that society is taking care of others and of the quality of life, while the key word is consensus. People in an organisation value equality, solidarity and quality in professional life. Free time and flexibility are favoured incentives. A successful manager is a supportive one, and decisions are made through involvement.

The dimension measuring uncertainty avoidance is connected to the way in which representatives of a given culture deal with anxiety and unknown situations in the future. Poland (93) and Portugal (99) both score very high on this dimension, which means that they both maintain rigid codes of beliefs and behaviour. Both value punctuality and security, and may resist innovation. In both countries, there is an emotional need for following rules, even if they do not work. The key element for individual motivation is security. Research has demonstrated that a fear of losing a job or the position in an organisation or going bankrupt are strong barriers for individuals to starting the process of implementation of changes (Esteves, Pastor & Carvalho, 2003, p. 151; Kozłowski, 2020, p. 210-212).

Long-term orientation describes the way in which the society maintains relations with the past while simultaneously facing challenges of the present and future time. The low value of this index for Poland (38) and Portugal (28) indicates that both societies are normative rather than pragmatic. It should be expected that behaviours will exhibit great respect to tradition, and a relatively little propensity to save for the future. The identified values of this index prove the preponderance of striving for quick results and strong inclination towards consumption rather than accumulation.

The extent to which people try to control their desires and impulses, according to the culture in which they grew up, is referred to as indulgence. Indulgent cultures are characterised by relatively weak control, whereas restraint ones will demonstrate strong control. Both Poland and Portugal are dominated by characteristics associated with restraint. The societies are therefore distinguished by restraining the needs and regulating them with strict social norms. It is possible to observe a tendency towards cynicism and pessimism. The society is dominated by the sense of their actions being limited by social norms, and it appears improper to indulge in one's desires.

Conclusions

Organisational culture determines the way individuals, groups and eventually organisations act. The knowledge of dominant features of a business culture allows one to achieve a better adjustment of the management solutions used, and in consequence to ensure the coherence with the requirements of the environment, thus enabling the attainment of the organisation's goals. This is particularly important whenever cultural differences emerge, as these are a challenge to managers. The programming of the mind, stereotypical behaviours, decodification of cultural templates and symbols contrary to their original meaning, can become a cause of organisational conflicts, characterised by great strength, intensity and dynamics of impact.

The analysis and comparison of the Polish and Portuguese business culture, based on the cultural dimensions contained in the Hofstede classification, led to the following conclusions. In terms of power distance, uncertainty avoidance, long-term orientation and the extent to which indulgence is controlled, the two cultures are similar. In both business cultures, similar behaviours, responses, and dominant values can be expected in these areas. The study shows that there are some intercultural differences between the Polish and Portuguese business cultures in the dimensions of individualism and masculinity.

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INFLUENCE OF A FINANCIAL CRISIS AND THE COVID-19 PANDEMIC ON PRICES OF CEREALS IN POLAND

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Key words: cereals, crisis, price.

Abstract

This article raises the question of the impact of global crises on the grain price market. Prices of wheat, rye, barley, oat and cereal mixture as well as maize were submitted to analysis. The aim of the study was to determine the influence of a financial crisis and the COVID-19 pandemic on prices of cereals in Poland. Two research hypotheses were put forth. The first one assumed that prices of cereals increased due to the 2007-2009 financial crisis. The second research hypothesis was that the COVID-19 pandemic caused fluctuations on the cereal price market. To verify these hypotheses, an analysis was completed using data from the GUS Central Statistical Office (Statistics Poland). In addition, relevant references from the fields of economics and agriculture were reviewed. Based on this study, it has been concluded that both the 2007-2009 financial crisis and the COVID-19 pandemic had significant effects on prices of cereals in Poland.

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WPLYW KRYZYSU FINANSOWEGO ORAZ PANDEMII COVID-19 NA CENY ZBÓŻ W POLSCE

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Słowa kluczowe: zboża, kryzys, cena.

Abstrakt

W opracowaniu przedstawiono rolę jaką odgrywają poważne kryzysy światowe na rynku cen zbóż. Badanie przeprowadzono na przykładzie cen pszenicy, żyta, jęczmienia, owsa i mieszanki zbożowej oraz kukurydzy. Celem badań była ocena wpływu kryzysu finansowego oraz pandemii COVID-19 na poziom cen zbóż w Polsce. W nawiązaniu do celu badania postawiono dwie hipotezy badawcze. Hipoteza pierwsza zakładała, że w wyniku pojawienia się kryzysu finansowego z lat 2007-2009 ceny zbóż wzrosły. W drugiej hipotezie badawczej założono, że pod wpływem pandemii COVID-19 doszło do wahań cen na rynku zbóż. W celu weryfikacji hipotez badawczych przeprowadzono analizę badawczą z wykorzystaniem danych Głównego Urzędu Statystycznego, przeanalizowano też literaturę fachową w dziedzinie ekonomii oraz rolnictwa. Na podstawie przeprowadzonych badań stwierdzono, że zarówno kryzys finansowy z lat 2007-2009, jak i pandemia COVID-19, wywarły istotny wpływ na ceny zbóż w Polsce.

Introduction

Cereals are among the most popular crops, grown in almost every country in the world. Cereal production has a fundamental meaning for the Polish and for global economies. Each year, the situation on the cereal markets, both international and national ones, is slightly different. This concerns for example prices of grains, which are affected by a variety of factors. Over the past several years, there have been two serious crises: a financial crisis in 2007-2009 and the COVID-19 pandemic in 2020-2021. Both of these recessions have had an impact on the socio-economic situation all over the world, and on many sectors of economy, including the agricultural sector and the cereal market. The aim of this study was to evaluate the effect of the mentioned financial crisis and

the COVID-19 pandemic on the level of prices for cereals in Poland. The study results are expected to provide a better insight into the mechanisms active on the cereal price markets, specific characteristics of crises, and their consequences in economy.

Research Methodology

Two research hypotheses were put forth in connection with the research objective. The first hypothesis H1 was that the financial crisis in 2007-2009 caused an increase in the prices of grains. The second hypothesis, H2, maintained that the COVID-19 pandemic led to fluctuations on the cereal market.

Statistical methods were employed to process the data. Analysis of the level of prices for particular cereals and an analysis of the dynamics of price changes (an index with the variable base) were conducted with the help of statistical inference methods. Data for analyses were obtained from the Local Data Bank of the GUS Central Statistical Office in Poland. The time scope of the study spanned the years 2004-2021. The analysis involved prices of the basic cereals such as wheat, rye, barley, oat and cereal mixture as well as maize.

The Role of the Financial Crisis and COVID-19 Pandemic in Shaping the Situation in Economy and Prices of Cereals

Szajner (2015, p. 9) reports that there have been many fluctuations in the production of cereals on the international market in the past decades. The second half of the 20th century was a time when there was an evident increase in the production of commodity grains, such as maize and wheat, which dominate the international trade. This was a consequence of the development of cultivation technologies, the emergence of new cultivars characterised by more abundant yields, expansion of the cultivated area and more intensive production. On the other hand, such fodder cereals as rye and oat recorded decreases in production. These were mainly due to unfavourable weather conditions. Since 2003, mainly in the European Union member countries, there has been a decline in the number of farms producing cereals. The main reason was that a large number of small farms (up to 1 ha) gradually ceased to grow cereal crops. Step by step, however, the number of farms with around 30 ha of farmland increased. And these are the farms that are economically the strongest. The EU countries with the highest number of farms with over 30 ha of farmland are France, Germany and Spain. Agriculture is a sector of the national economy which produces and provides bare necessities (Bak & Szalkowska, 2020, p. 240).

According to the forecasts made by the European Commission, the demand for cereals will grow continually in the following years. As suggested (Baer-Nawrocka

& Kiryluk-Dryjska, 2015, p. 617, 618), this will be a consequence of using some cereals as raw material for production of biofuels, which play an increasingly important role, and the growing demand for fodder cereals used mostly in animal production. In 2000-2015, the wheat harvest increased by about 8.5 million tons annually. The harvested yields of fodder cereals increased even more rapidly, by about 22 million tons each year.

Prices and especially differences in prices, have a substantial influence on trade and on consumers' behaviour. A change in the prices of agricultural products entails changes in prices of food products. According to (Zaród, 2017, p. 298), the factors that shape prices of agricultural and food products can be divided into cyclical and structural ones. The cyclical factors include currency exchange rates and weather conditions. The structural factors are, for example, sown area, yield, export, import and consumption. Prices in agriculture are characterised by high fluctuations because the agricultural sector is more sensitive to changes in the economic cycles than other sectors of the national economy. Causes of changes in the prices of agricultural and food products, including prices of cereals, should be primarily sought in demand-supply relationships. The quoted article (Zaród, 2017, p. 299) discusses also the so-called 'other factors'. They determine prices in agriculture, but some are difficult to describe in quantitative terms. Among these factors, the cyclic and structural (also referred to as 'short-term') ones are emphasised. The structural factors include:

- the growth in the global population of people; the human population reached 7.7 billion in 2021, and is estimated to increase to 8.5 billion in 2030 (Hertel, 2022);

- high economic growth rates in developing countries, as the people's income grows, in such countries as Brazil, China, Mexico and Indonesia for example, so does the demand for food, which results in increased prices for agricultural products;

- changes in nutrition models in developing countries;

- a small increase in food production in the past twenty years;

- emergence of new markets, above all the markets of biofuels; development of alternative sources of energy results in a greater demand for certain plant products, such as cereals, sugar, plant oils; according to forecasts, production of biofuels is going to increase continually;

- an inadequate system of food distribution.

Among the cyclic (short-term) factors, there are:

- weather anomalies and extreme events, which have influence on the trade of agricultural and food products and reduce the agricultural production in the world; the most common are droughts and torrential rains;

- changes in currency exchange rates;

- economic fluctuations in prices of crude oil; according to a study completed by (Baffes & Dennis, 2013, p. 10), crude oil prices are among the most significant factors influencing changes in prices of agricultural products;

– short-term decisions made in the scope of trade and economic policies employing such instruments as export subsidies, duties and tariff quotas; examples of such restrictions in recent years, which were expected to control prices on internal markets, are a ban on export of cereals imposed by Russia, Serbia and Kazakhstan.

Apart from the factors mentioned above, there are also socio-cultural conditions, such as patterns developed in people's consumption expenses, and systems of preferences, likes or values, which influence the behaviour of potential consumers (Zaród, 2017, p. 300).

Agriculture is an important sector in any economy. In many European Union countries, agriculture receives support from public sources in order to improve its efficiency and stability (Popescu & Iscudor, 2017, p. 185). Crises can affect agriculture directly and indirectly. Direct effects are a consequence of changes which occur in the national economy of a given country, mainly due to a decrease in the country's GDP. The volume of agricultural production is closely associated with the population of a given country. A financial crisis, which is conducive to the general population's decreasing income, contributes to a decrease in prices of agricultural products.

According to Daszkowska (2008, p. 3, 4), incidents on financial markets also affected the markets of cereal grains. The depreciation of the US dollar, which began in the fourth quarter of 2007, took its toll on prices of agricultural crops. The markets connected directly with the agricultural sector became destabilised. Many countries that were food exporters reacted vehemently to the soaring prices and tightened their export policy. Some countries, such as China and India, imposed a ban on rice export.

Sapa (2017, p. 95) claims that the financial crisis was one of the most significant contributors to the sudden growth in prices of agricultural products, and therefore discussions were resumed on the necessity to liberalise the trade in agricultural products.

A considerable decrease in prices of agricultural products was observed all over the world in the second half of 2008. This concerned for example cereals, plant oils and dairy products. According to Parlińska and Wielechowski (2009, p. 152-163), it was the financial crisis and its consequences that caused the above situation. This was mainly because the financial crisis largely excluded cash flows on the markets of derivatives associated with the agricultural produce markets. As indicated by Pepliński (2010, p. 193), it can be concluded that prices of agricultural products, including cereals, responded to the financial crisis. According to Siche (2020, p. 4), the COVID-19 pandemic had a strong impact on the agricultural economy. The quoted author maintains that the pandemic threatened food security. Lal (2020, p. 1) claims that the COVID-19 pandemic disrupted the food supply chain. Also Szajner (2020, p. 73) concluded that the lockdowns and restrictions imposed due to the COVID-19 outbreak caused an economic recession, which affected all sectors, including the agricultural and food sector.

The agricultural sector makes a significant contribution to the GDP, and provides a large number of jobs, including ones in the food manufacturing sector, services and production of agricultural machinery and chemicals. It also generates a positive balance in foreign trade. However, the situation was different as regards retail prices of food products, which tended to increase in April 2020 relative to March that year. The increase in retail prices of food products meant that food became more expensive compared to other goods and services. The products whose prices grew the highest were potatoes, sugar, cereal products, meat and meat products. Only prices for butter and plant oils decreased (Szajner, 2020, p. 79). According to Elleby (2020, p. 12), it was the COVID-19 pandemic that caused the increase in prices of food products in many countries. Quoting the information provided by the Polish Economic Institute (2020, p. 5), it can be concluded that closing Poland's borders due to the coronavirus outbreak led to the shortage of seasonal workers, who until then used to come from other countries, and this together with the recent drought will most probably translate into higher prices for food in Poland.

The pandemic also had an evident effect on the consumption of cereals. The demand for cereal commodities increased because they are the products that are to a large extent relatively inexpensive and can be easily stored. Moreover, the demand for ethanol increased, as it is used for production of disinfectants (Brewin, 2021, p. 3). The increasing demand for flour and other cereal products resulted in the increasing prices of cereals. Some countries, for example Ukraine and Russia, responded to this development and lifted the restrictions on export in order to protect own market and citizens, which also stimulated the prices. In the spring 2020, due to the disruptions in supply chains induced by the COVID-19 pandemic, the supply of grain for purchase was limited. However, the situation improved as early as in May 2020 (Szajner, 2020, p. 80, 81).

The COVID-19 pandemic may greatly raise the number of people worldwide who will be struck by famine. A significant obstacle to international trade that arose during the pandemic was consisted of restriction on transport of cereals and plant oils (Polski Instytut Ekonomiczny, 2020, p. 4).

Changes in Prices of Cereals on the Polish Market in 2007-2009, 2020-2021

The average price of wheat in 2004-2006 was approximately PLN 43 per 1 decitonne (dt). The crisis on global markets that occurred in 2007 made the price of this cereal soar to PLN 70.7 in that year (Fig. 1).

In the following two years of the crisis, there was a gradual decrease in the price of this product, which may have been a result of the preventive measures taken on the global markets. Yet, the price of this cereal was still higher than

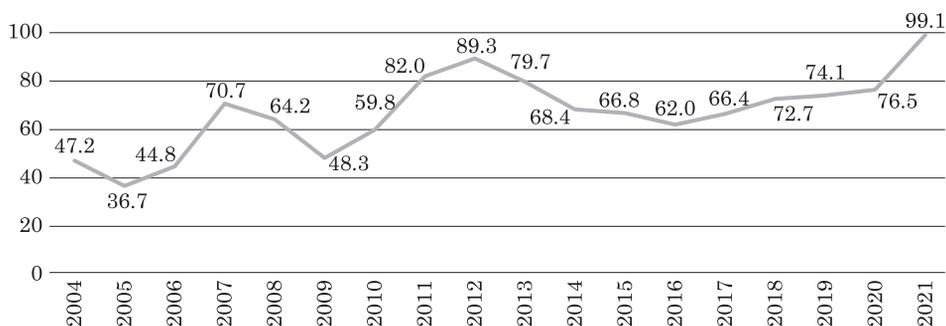


Fig. 1. Prices of wheat in PLN per 1 dt (2004-2021)

Source: the authors, based on the GUS data.

before the outbreak of the financial crisis. The COVID-19 pandemic also affected prices of cereals. The first year of the pandemic (2020) meant a small increase in the price of wheat, by just PLN 2.4 per dt, but the next year witnessed a sharp rise of PLN 22.6 per dt.

The diagram in Figure 2 illustrates changes in rye prices induced by the financial crisis and the COVID-19 pandemic as well as during these crises.

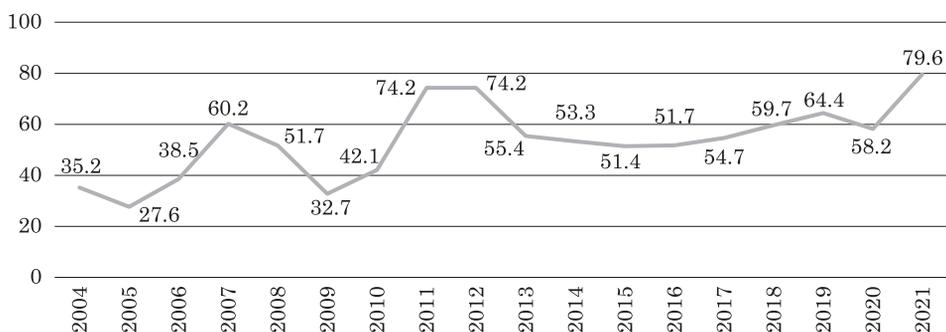


Fig. 2. Prices of rye in PLN per 1 dt (2004-2021)

Source: the authors, based on the GUS data.

The average price of rye in 2004-2006 was around PLN 34 per 1 dt. The crash on global markets in 2007 caused a drastic increase in the price of this cereal up to PLN 60.2 in that year. In the two consecutive years of the financial crisis, there was a gradual deceleration of the decrease in rye prices, which may have been a result of the preventive measures implemented on the global markets. The COVID-19 pandemic also had an impact on prices of rye. In 2020, prices of this cereal, unlike those of wheat, slightly decreased (by PLN 6.2 per 1 dt), but then increased rapidly in the following year (by PLN 21.4 per dt). As regards barley, its average price in 2004-2006 was approximately PLN 42 per 1 dt (Fig. 3).

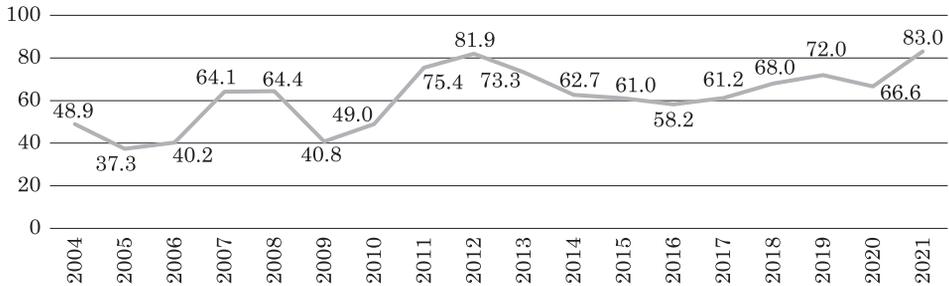


Fig. 3. Prices of barley in PLN per 1 dt (2004-2021)

Source: the authors, based on the GUS data.

The crash on the global markets in 2007 led to the prices of this cereal increase drastically to PLN 64.1 in the same year. Barley is the only cereal among the analysed species which in the second year of the financial crisis (2008) recorded higher rather than lower prices. The COVID-19 pandemic also affected the recorded prices of barley. The first year of the pandemic (2020) meant that the prices of barley, like those of rye, decreased slightly, by PLN 5.4 per 1 dt, while the second year witnessed a considerable rise in barley prices, which were by PLN 16.4 higher.

With respect to oat and cereal mixture, their average price in 2004-2006 ranged around PLN 33 per 1 dt. The crash on the global markets in 2007 resulted in the prices of these types of cereals increasing considerably, up to PLN 52.8 in that year (Fig. 4).

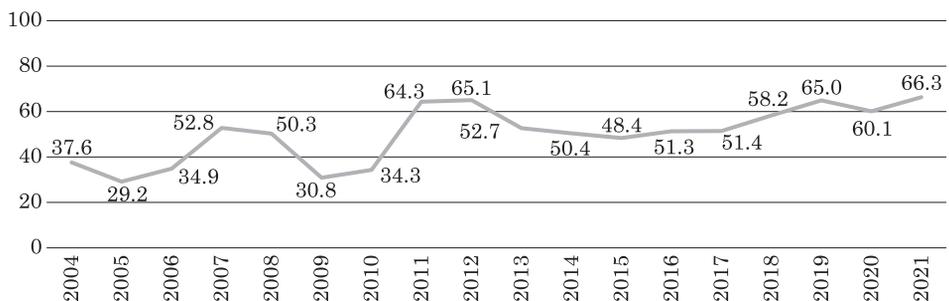


Fig. 4. Prices of oat and cereal mixture in PLN per 1 dt (2004-2021)

Source: the authors, based on the GUS data.

The prices were decreasing gradually in the two subsequent years of the crisis, which may have been a result of the preventive measures implemented on the world markets (Zielonka, Przybysz, Kobzhassarov & Witkowska-Dąbrowska, 2021, p. 298). The COVID-19 pandemic, same as in the case of rye and barley, induced a slight decrease in the prices of oat and cereal mixture by PLN 4.9.

In 2021, the price of these cereal products followed the same course of changes as the prices of the other analysed cereals. As for maize, its average price in 2004-2006 was PLN 41 per 1 dt. The year 2007 witnessed a rapid increase in prices of maize, up to PLN 64.4 (Fig. 5).

Considering the impact of the COVID-19 pandemic, it resulted in analogous fluctuations on the wheat market as described above. The first year of the pandemic (2020) marked a slight increase by just PLN 1.7 per 1 dt, but the following year meant a rapid rise, same as in maize prices, which in this case reached PLN 20.4.

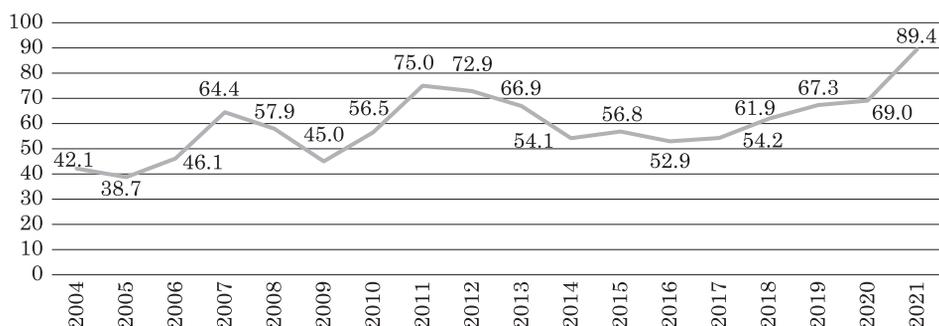


Fig. 5. Prices of maize in PLN per 1 dt (2004-2021)

Source: the authors, based on the GUS data.

Year-to-year per cent changes in prices for the five most popular cereals analysed in this study, i.e. wheat, rye, barley, oat and maize, as well as cereal mixture, were determined during the financial crisis and COVID-19 pandemic. For wheat, its price in the first year of the financial crisis (2007) increased by as much as 58% relative to the previous year. In the following two years (2008, 2009), there was a systematic decrease in wheat prices. The situation looked different during the crisis triggered by the COVID-19 pandemic. In the first year (2020), the price of wheat increased only minimally, by 3% in relations to the price in the previous year. However, in the next year (2021), wheat prices rose by an average of around 30%.

Prices of maize followed a very similar course of changes. In 2007, there was a rapid increase in maize prices, which reached 40%. In the subsequent years, recorded prices of maize decreased systematically. When the COVID-19 pandemic broke out, prices of maize responded the same as prices of wheat. There was only a small increase in prices of maize in year 2020 (just 2%), but this was followed by maize prices increasing by as much as 30% in year 2021. As regards the other four cereals (rye, barley, oat and cereal mixtures), their prices changed somewhat differently. For each of the four cereals mentioned above, their prices decreased in the first year of the pandemic (2020). However, in the

Table 1

Chain dynamics of changes in prices of cereals (index with the variable base)

Year	Wheat	Rye	Barley	Oat and cereal mixtures	Maize
2004	100	100	100	100	100
2005	78	79	76	78	92
2006	122	139	108	120	119
2007	158	156	159	152	140
2008	91	86	100	95	90
2009	75	63	63	61	78
2010	124	129	120	111	126
2011	137	176	154	188	133
2012	109	100	109	101	97
2013	89	75	90	81	92
2014	86	96	85	96	81
2015	98	96	97	96	105
2016	93	101	95	106	93
2017	107	106	105	100	102
2018	109	109	111	113	114
2019	102	108	106	112	109
2020	103	90	93	93	102
2021	130	137	125	110	130

Source: the authors.

second year of the pandemic and during the entire financial crisis before, the response of these four cereals resembled that of wheat and maize, namely their prices rose rapidly. Meanwhile, maize was the cereal crop which recorded the smallest increase in the average price among the six analysed cereals at the onset of the financial crisis in 2007. It reached 40% compared to the preceding year. The highest per cent increase in cereal prices during the COVID-19 pandemic was recorded for rye, at 37%, while the prices of oat and cereal mixture increased the least, by 10%.

Summary

The aim of this study was to determine whether prices of cereals changed under the impact of a financial crisis and the COVID-19 pandemic. The first research hypothesis stating that the financial crisis in 2007-2009 caused an increase in the prices of cereals was confirmed by the determined changes in prices of all the six cereals submitted to our analysis. In each case, the same

pattern of changes repeated, namely there was a rapid increase in the price of every cereal crop in 2007, which marked the onset of the financial crisis. According to the second research hypothesis, the COVID-19 pandemic resulted in fluctuations in the prices recorded on the market of cereals. In this case, not all the analysed cereals supported this presumption. The increasing trend that had continued systematically since 2015/16 was halted for prices of four of the six analysed cereals in the first year of the pandemic (2020), but a rapid increase in cereal prices was noted in the next year (2021). This pattern was determined for prices of rye, barley, oat and cereal mixture. As for the other two cereals, that is wheat and maize, their prices continued to increase in both years of the pandemic. However, attention should be drawn to the fact that prices of wheat and maize rose considerably in the second year, same as prices of the other four cereals.

Recapitulating, the impact of global crises, such as the financial crisis in 2007-2009 or the COVID-19 pandemic, influence prices of cereals on the Polish market.

Translated by Jolanta Idźkowska

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PROSPECTS FOR THE DEVELOPMENT OF INTERMODAL TRANSPORT IN THE VISEGRAD COUNTRIES, GERMANY AND ITALY – SELECTED ASPECTS

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Abstract

The article presents the results of research on the possibilities of developing intermodal rail transport in the Visegrad Group countries, Italy and Germany. The research was conducted based on statistical data regarding demand for transport in intermodal cargo units and rail transport. Selected elements of transport infrastructure were taken into account as well, i.e. the length of railway tracks and railway lines (including electrified ones), the railway line density indicator, and the number of terminals. The study results proved that there was a noticeable development of infrastructure in Hungary which makes it a prospective market, affording the possibility for development of domestic and international transport. The biggest decrease for railway transport was observed in Germany and Poland. In the same time, in Poland there was observed the biggest increase in demand for intermodal container units (ICUs). The inverse relationship between demand for railway transport and ICUs is observed in most countries. Only in Czechia there was a parallel increase observed. It has been observed that linear and point infrastructure requires investment in electrification in most countries surveyed. These investments are important due to handling the needs of foreign trade. With the growing demand for transport and developed infrastructure, the intermodal rail transport will be able to compete with road transport. This process is consistent with the need to ensure green transport and modify transport structure into the environmental friendly one.

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**PERSPEKTYWY ROZWOJU PRZWOZÓW INTERMODALNYCH
W KRAJACH GRUPY WYSZEHRADZKIEJ, NIEMCZECH I WŁOSZECH –
WYBRANE ASPEKTY**

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Kody JEL: F15, R4.

Słowa kluczowe: V4, transport intermodalny, infrastruktura, zrównoważony transport, UE.

A b s t r a k t

W artykule zaprezentowano wyniki badań dotyczących możliwości rozwoju kolejowych przewozów intermodalnych w krajach Grupy Wyszehradzkiej, Włoszech i Niemczech. Badania przeprowadzono na podstawie danych statystycznych: popytu na przewozy w intermodalnych jednostkach ładunkowych i przewozy kolejowe. Ponadto uwzględniono wybrane elementy infrastruktury transportowej, tj. długość torów i linii kolejowych (w tym zelektryfikowanych), wskaźnik gęstości linii kolejowych i liczbę terminali. W wyniku badań wykazano, że na Węgrzech nastąpił znaczący rozwój infrastruktury kolejowej, co sprawia, że jest to rynek perspektywiczny, dający możliwość rozwoju transportu krajowego i międzynarodowego. Największy spadek popytu na transport kolejowy odnotowano w Niemczech i Polsce. Jednocześnie w Polsce zaobserwowano największy wzrost zapotrzebowania na przewozy intermodalnych jednostek ładunkowych (IJŁ). W większości krajów występuje odwrotna zależność między popytem na transport kolejowy a popytem na IJŁ. Jedynie w Czechach widoczny jest wzrost popytu w obydwu przypadkach. Zaobserwowano, że infrastruktura liniowa i punktowa wymagają inwestycji w elektryfikację w większości krajów. Inwestycje te są istotne z uwagi na obsługę potrzeb handlu zagranicznego. Przy rosnącym popycie na przewozy i rozwiniętej infrastrukturze możliwe będzie konkutowanie z transportem samochodowym. Proces ten wpisuje się w potrzebę ekologizacji transportu i zmianę struktury przewozów sprzyjającej środowisku naturalnemu.

Introduction and Research Background

Intermodal transport is most often defined as the conveyance of cargo units (package, pallet, container) using at least two means of carriage (Neider, 2015, p. 110; Mindur, 2008, p. 229; Bril & Łukasik, 2012, p. 77, 78). This technology is recommended in international transport to handle the needs of foreign trade (Crainic & Kim, 2007, p. 470, 471). The relatively most frequently used technology is a combination of rail transport (on the longest distance) and car transport (to ensure delivery and pickup services) (Daramola, 2022, p. 61).

There is no full agreement in the literature as to the definition of intermodal transport. However, its importance in international trade and in the process of globalization of economies is clearly indicated (Crainic, Perboli & Rosano, 2018, p. 401), and its efficiency is deemed dependent on an efficient and sustainable transport network (Liu, Deng, Sun, Wang & Wang, 2019, p. 1, 2). In addition, as concluded by Garcia-Menendez *et al.* (2014), Zhang, Heinold, Meisel, Negenborn and Atasoy (2022), Gharehgozli, de Vries and Decrauw (2019), and Mindur (2021), intermodal transport is an ecological mean for cargo movement. It may compete with road transport, which performs 50-70% of the cargo transport in the EU (depending on the adopted measure). This argument prompts research aimed to investigate the conditions for the functioning and development of intermodal transport.

Pursuant to the assumptions of the EU transport policy, 60% reduction in greenhouse gas emissions is expected by 2050 (compared to 1990). Given the thus-far ineffective attempts to implement these assumptions, the importance of intermodal transport as a competitor of road transport as well as the opportunity to push the transport into more ecological modes of operation are observed to grow (Bergqvist & Flodén, 2010, p. 4, 5; Rotaris, Tonelli & Capoani, 2022, p. 5; Szymanowski, 2014, p. 326). The development of world trade affects the development of container transport (sea and rail), which is another premise for the development of intermodal transport. In a situation where the importance of road transport diminishes in favor of an increasing demand for intermodal transport, it is possible to decarbonize the transport sector (Lebedevas, Dailydka, Jastremskas & Rapalis, 2017, p. 292) in line with the objectives of the transport development policy. At the same time, there is a positive relationship between economic development and the development of intermodal transport in some countries of Central and Eastern Europe (Silborn, 2008, p. 60; de Miranda Pinto, Mistage, Bilotta & Helmers, 2018, p. 104). It should be borne in mind, however, that organizing and monitoring intermodal supply chains requires greater organizational effort and high coordination skills (Zhao, Zhu & Wang, 2020, p. 5). The success of these activities is determined by the efficiency (including the timeliness of deliveries) and the effectiveness of intermodal transport (Demir, Hrusovsky, Jammernegg & van Woensel, 2019, p. 6162, 6163) under conditions of safe transport infrastructure tailored to needs.

On a global scale, there is a large quantitative and qualitative diversity of infrastructure. The largest number of railway lines is found in the region of Asia and Oceania (33%) and Europe (30%), followed by America (20%), the Russian Federation (10%) and Africa (7%) (*Union Internationale des...*, 2020). An important qualitative element of the railway infrastructure is the degree of its electrification. When screened across continents, it has a high variability, ranging from 50% in Europe, 33% in Asia and Oceania, 26% in Africa and only 0.1% in America (where electric traction is only found in subway lines) (Licciardello & Ricci, 2022).

The aim of the presented research was to indicate the possibilities for the development of intermodal rail transport (IRT) in selected EU countries. The analysis includes countries with a similar level of economic development, additionally associated in the Visegrad Group (V4: Czech Republic, Slovakia, Hungary, Poland) and highly industrialized countries belonging to the G7 countries (Germany and Italy). Development opportunities were made based on the analysis of infrastructure and demand for transport. The choice of the IRT technology was driven by two reasons. The first is its importance in the process of making transport green in accordance with the guidelines of the EU transport policy. The pursuit of decarbonizing the transport sector creates a real opportunity for intermodal transport development. The safety of transport and long distance are elements inscribing into the needs of international trade, which was the second reason for choosing the IRT technology for analysis.

Methodology

The study included the V4 countries due to the similar level of GDP per capita. Moreover, these countries share common foreign policy goals and cooperation in the field of developing safe and efficient transport infrastructure. The European G7 countries were also included in the comparative analysis. Extending the analysis to industrialized countries allows for a broader look at the development possibilities of intermodal transport. Germany and Italy are important trade partners with the V4 countries, characterized by a large market potential. The European G7 countries include also France, however, it was excluded from the study due to the lack of access to analogous statistical data. Great Britain was not considered for infrastructural and geographical reasons.

Including the European G7 and V4 countries in the analysis was expected to enable the comparison of intermodal transport in countries with different levels of economic development and transport potential. All the indicated countries are partners in international trade, the needs of which can be handled by intermodal transport.

Secondary data from the Eurostat database was used to assess the development of IRT. The research extends into the years 2010-2020 and takes account of the following data:

- length of railway tracks [km] – railway tracks are a set of two rails set parallel to each other; the variable quantifies the state of the infrastructure necessary to provide the IRT;

- length of railway lines [km] – these are railway roads that may consist of one or more railway tracks; multi-track railway lines affect the capacity and speed of transport means;

- demand for rail transport – expressed in thousand tonnes;
- demand for transport in intermodal cargo units (ICUs) (in thousands tonnes);
- number of intermodal terminals – reloading and storage points for goods transported in intermodal units; the higher the number of terminals, the greater the reloading and storage capacity, which determines the possibilities for intermodal transport development and the efficiency of international supply chains.

General statistical data lacks publicly available information on intermodal rail transport at the international level. Sometimes, access to this data is paid and made available by national railway carriers. Therefore, an attempt was made to compare the possibility of IRT development under the conditions of the demand for rail transport and transport in ICUs. The ICUs can also be used in intermodal transport by sea and inland waterways.

The assessment of the possibility of IRT development was carried out deploying descriptive statistics tools based on indicators of dynamics of railway electrification and density of railway lines.

Research Results

The larger the country's area and population, the greater the potential transport needs and capacity. Moreover, the country's area determines the railway network (measured by the length of railway tracks and lines), assuming a favorable topography. Poland, which is second in terms of area among the surveyed countries, also has one of the most extensive railway networks (expressed in track length). Similarly, Germany is characterized by the largest area of the country and, at the same time, the largest railway network. Table 1 presents detailed data on the length of railway tracks in the analyzed countries (total and electrified). Information on changes in the railway network is important in determining the possibilities of providing services in individual countries. In turn, the figures regarding the electrification of the railway network are essential to the development of the quality of services, especially in the international perspective.

In 2010-2019, a decrease was observed in the total length of railway tracks in Germany (by 3% – compared to 2016), Czechia (2%), and Poland (1%). In Italy, the length of tracks increased by 1% and so did the length of electrified tracks (2%). The highest dynamics of qualitative changes was observed in Hungary, showing a 23% increase in the total length of tracks and a 40% increase in the length of electrified tracks. The Hungarian IRT market opens the possibility of meeting larger transport needs in the domestic, and what is equally important, in the international dimension. Rail electrification is a key determinant of handling international supply chains. In the other analyzed countries, the dynamics

Table 1

Length of railway tracks in selected EU countries (in thousands of km)

Years	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Germany										
Total	69.3	69.2	69.4	69.2	69.1	67.4	67.4	n.d.	n.d.	n.d.
Electrified	44.2	n.d.	n.d.	n.d.	n.d.	42.3	42.3	n.d.	n.d.	n.d.
Italy										
Total	24.2	24.2	24.3	24.3	24.3	24.3	24.4	24.5	24.5	24.5
Electrified	19.3	19.4	19.4	n.d.	n.d.	n.d.	12.0	19.6	19.7	19.7
Czechia										
Total	15.7	15.6	15.6	15.6	15.6	15.6	15.5	15.5	15.5	15.4
Electrified	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Slovakia										
Total	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Electrified	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Poland										
Total	37.8	38.1	37.6	36.9	37.5	37.6	37.4	37.2	37.1	37.3
Electrified	25.2	25.2	25.1	25.0	25.0	24.9	24.9	24.9	25.0	25.2
Hungary										
Total	9.2	9.4	9.4	9.5	9.4	9.4	11.4	11.5	11.3	11.3
Electrified	4.0	4.1	4.1	4.1	4.0	4.1	5.4	5.5	5.5	5.6

n.d. – no data available

Source: own elaboration based on the Eurostat database.

of changes in the length of electrified tracks was much lower (Germany – 1%, Czech Republic – 1%). In contrast, in Poland and Slovakia, the length of electrified tracks was relatively constant.

Railway lines differ from railway tracks by the fact that lines can consist of one or more tracks at different sections (distances). This underlies the difference in their length. Table 2 presents the length of railway lines (total and electrified). Multi-track lines enable an increase in train traffic (possibility to handle more orders), free passing, and the possibility of separating freight and passenger traffic, which enables IRT optimization. Therefore, they set a higher level of service provision, e.g. minimizing delays and offering greater flexibility in redirecting trains in the event of adverse events.

In 2010-2019, no changes were observed in the length of railway lines (total and electrified) in Czechia and Slovakia. Slight upward dynamics (less than 1%) in the electrified network development was visible in Germany and Italy. A decrease in the length of the electrified railway lines was observed only in Poland (by 6%). The greatest positive changes were noticed in Hungary – an increase in the length of electrified lines by almost 90%. Undoubtedly, Hungary

has experienced the greatest qualitative change in the railway network. The extent of railway electrification in this country is also noteworthy as it reaches 71%, which should be assessed positively. This is a level comparable to the railway network in Italy (71%). In the other analyzed countries, the degree of railway electrification was lower and amounted to 54% in Germany, 33% in Czechia, 44% in Slovakia, and 58% in Poland.

Table 2

Length of railway lines in selected EU countries (thousand km)

Years	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Germany										
Total	37.9	37.8	37.9	37.9	37.8	38.5	38.6	38.6	38.4	38.4
Electrified	20.6	n.d.	n.d.	n.d.	n.d.	20.7	20.7	n.d.	n.d.	n.d.
Italy										
Total	16.7	16.7	16.7	16.7	n.d.	n.d.	16.8	16, 8	16.8	16.8
Electrified	11.9	1.9	11.9	11.9	n.d.	n.d.	12.0	12.0	12.0	12.0
Czechia										
Total	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
Electrified	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Slovakia										
Total	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Electrified	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Poland										
Total	20.2	20.2	20.1	19.3	19.2	19.2	19.1	19.2	91.2	19.4
Electrified	11.9	11.9	11.9	11.9	11.8	11.9	11.9	11.8	11.9	11.2
Hungary										
Total	7.4	7.5	7.5	7.4	7.2	7.2	7.8	7.9	7.7	7.7
Electrified	2.9	2.9	3.0	3.0	3.0	3.0	3.0	5.5	5.5	5.5

n.d. – no data available

Source: own elaboration based on the Eurostat database.

The analysis of the railway infrastructure was extended by the total railway line density index (TRLDI) and the electrified railway line density index (ERLDI), calculated using the following formulas:

$$\text{TRLDI} = \frac{\text{total length of railway lines [km]}}{\text{country's area [km}^2\text{]}} \cdot 100$$

$$\text{ERLDI} = \frac{\text{length of electrified railway lines [km]}}{\text{country's area [km}^2\text{]}} \cdot 100$$

The calculations provided interesting information, and their graphical presentation is shown in Figure 1. Czechia, which is one of the smallest compared countries (in terms of area), is characterized by the highest density of railway lines (12.2 km of railway lines per 100 km² of the country area); however, it performs slightly worse considering the density of electrified lines. Undoubtedly, the most favorable situation is observed in Germany and Hungary, where the density of the electrified railway network is the highest.

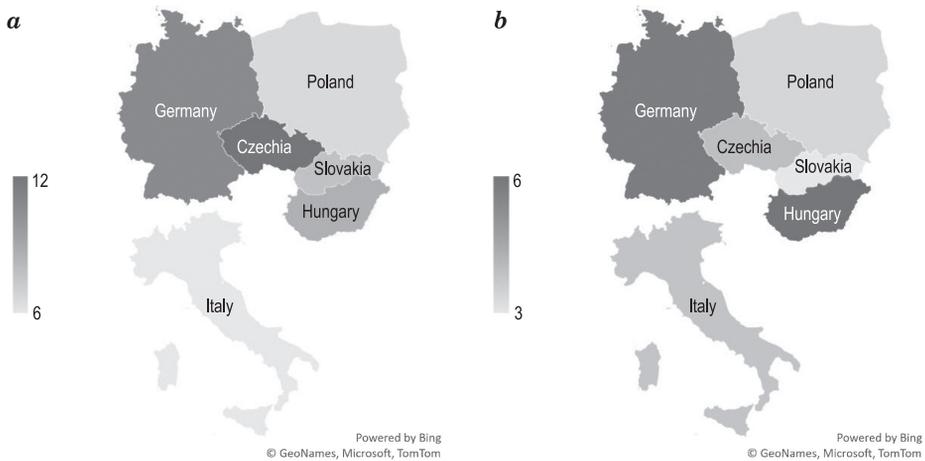


Fig. 1. Density indicators of total and electrified railway lines in selected EU countries:

a – TRLDI, b – ERLDI

Source: own calculations based on EUROSTAT data.

Untapped potential can be observed in Poland, whose geographical location is advantageous due to the fact that it shares 3 European transport corridors (No. 5 – Baltic Sea – Adriatic Sea, No. 8 – North Sea – Baltic Sea, and No. 11 – Amber Rail Freight Corridor). Poland is also important in reactivating the New Silk Road and providing IRT services on it. However, a low degree of electrification of its railway network diminishes its potential to provide international IRTs. This is where an opportunity opens up for Hungary, which has a qualitatively better railway infrastructure. Countries with high railway network density (especially of the electrified one) represent an attractive IRT market, which provides a high level of services, especially in international transport.

The development of IRT is enabled by a well-developed point infrastructure, including e.g. intermodal terminals adapted to reloading and storing intermodal cargo units. In addition to reloading, terminals merge logistics and distribution services and determine the possibilities for the efficient functioning of international supply chains. The higher the number of terminals, the greater the negotiation possibilities in the context of import-export operations and

competitiveness compared to road transport. Depending on the location, terminals can handle several modes of transport (rail, road, air, sea and inland waterways). The only (known to the authors of this manuscript) statistics related to intermodal terminals in the analyzed countries are presented on the website of the intermodal transport operators consortium (AGORA Intermodal terminals). However, an interactive map available therein and showing the number of terminals prevents historical data collection. Table 3 summarizes the number of terminals in the analyzed countries and provides the characteristics of the cities with the largest number of terminals. It should be emphasized that the location of the terminals takes into account the profile of transport and logistics activities of a given region. These are places that require a lot of logistical support in the strategies of operation.

Table 3

Intermodal terminals in selected EU countries in 2020

Country	Number of intermodal terminals	The city with the highest number of terminals
Germany	140	Duisburg – inland waterway port
Italy	19	Trieste – seaport
Czechia	16	Lovosice – inland waterway port, high-speed railways to Czechia and Germany
Slovakia	10	Bratislava – the capital city
Poland	40	Małaszewicze – terminals with broad-gauge infrastructure, end station for 90% of transports from Asian markets
Hungary	6	Budapest – the capital city

Source: own study based on Intermodal Terminals in Europe. (2022); Duisport: Facts and figures. (2022); The Free Port of Trieste. (2022); Město Lovosice. (2022).

Noteworthy is the significant difference in the number of terminals in Germany, being over 3 times higher than the number of terminals in Poland. Another important observation is the comparable number of terminals in Czechia and Italy, despite four times larger area of Italy. In turn, the number of terminals in Slovakia is greater than in Hungary, whose area is almost twice as large. The construction of intermodal terminals paves the way for the development of transport activities. Most often, they are located in the vicinity of ports (Duisburg, Lovosice, Trieste) and capitals of countries (Bratislava, Budapest), have features that allow them to handle specific transport requirements (Małaszewicze) and are well connected to road infrastructure.

Another important piece of information in identifying IRT development opportunities is demand for railway transport. One of the measures of demand in transport is transport performance [ton-kilometers – tkm]. The analysis also takes into account the demand for transport in intermodal cargo units (ICUs).

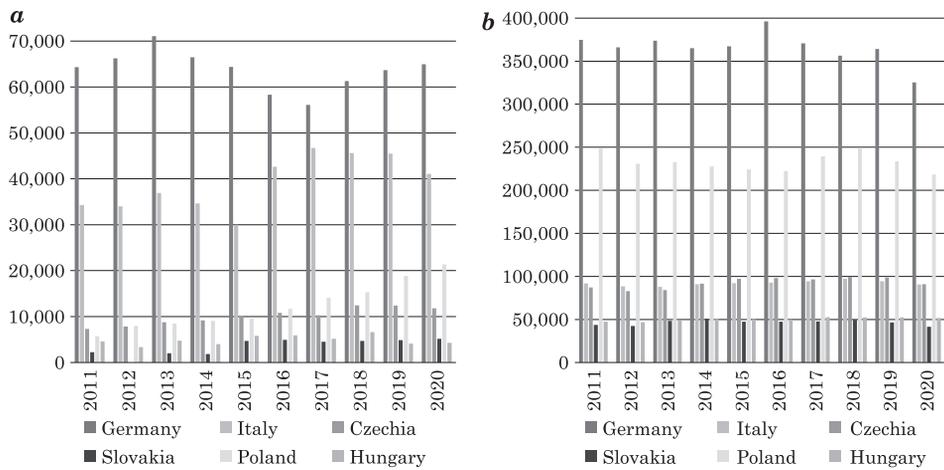


Fig. 2. Demand for railway transport and intermodal cargo units in 2011-2020 (thousand tonnes):
a – intermodal transport, *b* – railway transport

Source: own calculations based on EUROSTAT data.

Comparing this information will allow for an in-depth analysis of the possibility of IRT development. The time range covers the years for which similar statistical reporting was carried out, i.e. from 2011.

The biggest decrease for railway transport was observed in Germany (13%) and Poland (12%). The worth noting thing is that in Poland there was the biggest increase in demand for ICUs (271%) while in Germany the demand was rather stable (1% increase). The increase in demand for ICUs was also relatively high in Slovakia (129%) while there was observed a 5% decrease in the demand for railway transport. What is important the inverse relationship between demand for railway transport and ICUs is observed in most countries. Except for Poland and Slovakia, also in Italy (a 1% decrease for railway transport and a 20% increase for ICUs), and Hungary (a 9% increase and 5% decrease). Only in Czechia there was increase in both cases: a 4% for demand for railway transport and 61% for ICUs. The increase in the demand for ICUs is needed and may indicate an opportunity for IRT development because this technology needs to be implemented in and can be exchanged between the analyzed countries due to both the need to ensure environment-friendly transport and to optimize supply chains. The use of ICUs in maritime transport is questionable, as is inland waterway transport, which is of marginal importance in intra-EU trade.

Conclusions and Discussion

The denser the railway network and the higher the degree of its electrification are, the greater the chances are for providing IRT in individual countries, but also in international trade. The railway infrastructure is an important element of IRT development. It has to be mentioned that in future analysis of cost per tkm should be calculated as a one of crucial factors of development. Undoubtedly, qualitative changes in the railway network afford opportunities for IRT development. It also opens the possibilities for foreign carriers to enter into the market. Considering the V4 countries, the noticeable development of infrastructure in Hungary may contribute to the development of foreign competition and transit services. It is also important to develop point infrastructure – intermodal terminals, the scarcity of which does not allow to sufficiently exploit the IRT potential. Given the fully liberalized railway transport markets, foreign competition will also contribute to the qualitative development of the offer, and with a developed infrastructure, it will allow, among others, to compete in the promptness of deliveries with road carriers. This approach is part of the process of making transport green and modifying transport structure into the environment-friendly one.

The prerequisite for the development of IRT is also the extension of the logistic base in the form of terminals adapted to handle ICUs. It is important that the intermodal terminals have the potential to handle rail transport, regardless of its location.

Observing changes in demand allows assessing the attractiveness of a given market in terms of potential expansion. The German and Italian markets will always be attractive due to trade exchange. The extensive German infrastructure and investments in Italy are additional factors supporting the development of IRT in relations to/from these countries. In addition, they are an element encouraging the expansion of private carriers. The potential of these markets should be described as very competitive.

An increase in the interest in IRT within the framework of the New Silk Road can be expected after the end of the war in Ukraine. This is another chance for IRT development. Consideration of the structure of exports and imports indicates avenues for further research on IRT and for determining the transport offer. The construction and modernization of the railway network may contribute to the increase in the quality of services, and thus to the development of intermodal transport. Determination of the technical possibilities of providing services and analysis of the demand make it possible to identify markets that are potentially attractive to foreign carriers. It seems that geographical potential is essential as well, which in the case of the V4 countries could be exploited both in intra-EU and intercontinental trade.

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IMPLEMENTATION OF THE STABILIZING FUNCTION OF A FISCAL POLICY IN THE EUROZONE COUNTRIES

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Abstract

The implementation of a stabilizing fiscal policy is of particular importance to the eurozone countries, which do not have the ability to make autonomous decisions in the scope of their monetary policy in order to ease fluctuations of an economic cycle. The aim of this research was to evaluate the implementation of a discretionary fiscal policy in selected countries of this bloc. The *ex post* analysis of the approaches to national fiscal policies, with a division into two research sub-periods, was conducted with statistical methods. Based on the official forecasts by the European Commission, a “real time analysis” was also made, which to some extent enables gaining an insight into plans and intentions of the governments at the moment of making budgetary decisions. The results call into question the use of discretionary fiscal policies in stabilizing the economic cycle at the national level in the studied Eurozone countries. It can be said that the reforms implemented after the financial and economic crisis had a limited impact on the intentions and the actual implementation of the fiscal policies in an anti-cyclical manner. It is then sensible to consider alternative mechanisms, which could successfully lessen the asynchronous fluctuations in production within the European monetary union.

REALIZACJA STABILIZACYJNEJ FUNKCJI POLITYKI FISKALNEJ W KRAJACH STREFY EURO

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Kody JEL: E62, F45, E32.

Słowa kluczowe: polityka fiskalna, strefa euro, luka produktowa.

Abstrakt

Realizacja funkcji stabilizacyjnej polityki fiskalnej ma szczególne znaczenie w krajach strefy euro, które nie mają możliwości podejmowania autonomicznych decyzji w zakresie polityki monetarnej w celu łagodzenia fluktuacji koniunktury. Celem badań była ocena realizacji dyskrecjonalnej polityki fiskalnej w wybranych krajach tego ugrupowania. Analizę *ex post* nastawienia krajowych polityk fiskalnych z podziałem na dwa podokresy badawcze przeprowadzono z wykorzystaniem metod statystycznych. Na podstawie oficjalnych prognoz Komisji Europejskiej przeprowadzono również „analizę w czasie rzeczywistym”, która w pewnym stopniu pozwala na uchwycenie zamierzeń i intencji rządów w momencie podejmowania decyzji budżetowych. Uzyskane wyniki badań podają w wątpliwość stosowanie uznaniowych polityk fiskalnych w stabilizacji koniunktury gospodarczej na szczeblu krajowym w badanych krajach strefy euro. Można również stwierdzić, że wdrożone reformy po kryzysie ekonomiczno-finansowym miały ograniczony wpływ na zamiar i faktyczną realizację polityki fiskalnej w sposób antycykliczny. Wobec tego zasadne jest zastanowienie się nad alternatywnymi mechanizmami, które z większym powodzeniem mogłyby niwelować asynchroniczne wahania produkcji w europejskiej unii monetarnej.

Introduction

The implementation of the stabilizing function of a fiscal policy is determined by a range of conditions: systemic, internal and external ones. At present, a particular weight is attributed to the last group, as it refers to countries' allegiance to international blocs and, in consequence, the need to adapt to the specific conditions and rules which shape the form and extent of the state's intervention in economy. Particular attention should be paid to the implementation of an anti-cyclical policy in the context of the European economic integration, in which countries transfer their competencies with regard to monetary policy to the European Union organs, and national fiscal policies are subject to transnational rules. The ability to counteract excessive, asynchronous economic fluctuations and asymmetric output gaps is considered a fundamental criterion which creates prospects for further integration and maintenance of the previous accomplishments, as the economic theory considers effectiveness to be the most significant criterion in integration processes. This phenomenon must be then empirically verifiable at various levels of the integration process in order

to assure that a stabilizing policy satisfies its objectives and does not aggravate the situation, i.e. it does not act in a pro-cyclical manner.

The aim of the present paper is to evaluate the implementation of discretionary fiscal policies in selected eurozone countries. Until the economic crisis following the pandemic of 2020, we could have argued for a certain closed phase in the functioning of the economic and monetary union in Europe. This phase, in turn, can be divided into two sub-periods whose dividing line was the economic and financial crisis and the “restructuring” of the eurozone based on a range of reforms implemented in response to that event. The time that has passed since the formation of the monetary union in Europe, and the fact that it can be broken down into two time series similar in the number of observations, facilitates such an evaluation.

Conditions for the Implementation of an Anti-cyclical Policy in the Eurozone in 1997-2019

The stabilizing function of a fiscal policy can be realized in two ways. One approach includes the so-called automatic stabilizers of the cycle, which are autonomous changes in the balance of the state budget that respond to cyclical fluctuations. The other one is referred to as a discretionary policy, which consists in taking active measures by the government to adjust expenditure or taxes to fluctuations in the economic activity (Kotliński & Warżała, 2018, p. 58). This way of implementing the stabilizing function of a fiscal policy raises much more controversy than the former one, in particular with regard to countries which belong to the monetary union. The use of fiscal instruments in order to stabilize excessive cyclical fluctuations is also determined by which current of the economic theory prevails in the economic practice. The construction of the eurozone was based on the assumptions of monetarism and the neo-classical school, which were skeptical about the use of fiscal instruments to ease the fluctuations of production in economy (Hnatyszyn-Dzikowska, 2009, p. 21, 47, 48; Heller & Kotliński, 2012, p. 230). It was then decided that one of the most important conditions for the effective operation of the union was the stability of public finances, which were a determinant of the macroeconomic stability. This approach stood in opposition to the realization of fiscal policies of the 1970s and, as emphasized by A.J. Auerbach (2012, p. 2), it followed from the negation of the effectiveness of its instruments, which was present in the Lucas critique. A solution which was to address the problem of the loss of autonomy with regard to fiscal policies was their coordination (Molle, 2000, p. 412), but only within the scope of maintaining the fiscal discipline guaranteed by the imposition of rules and restrictions in order to avoid the fare-dodging effect and the temptation of abuse. However, the competences to realize the fiscal policies have remained

at the national level. This was justified by the claim that the execution of a fiscal policy and a given country's internal context and specificity are interdependent (Skrzypczyńska, 2012, p. 289).

The autonomy of the state government, which was initially restricted by the provisions in the Treaty of Maastricht, was also subject to rules introduced in 1997 by the Stability and Growth Pact (SGP). This agreement completed and tightened the fiscal rules by obliging the eurozone member states to realize budgetary objectives, understood as the accomplishment of the surplus or balance in the mid-term (Skrzypczyńska, 2012, p. 289, 294). The basis of the corrective part of the SGP was the Excessive Deficit Procedure (EDP), which stipulates the means and timetable to deal with a country that has violated the criteria. The main objective of the SGP was to prevent negative consequences of excessive public debt and deficit. The fiscal space for the stabilization of the cycle (along with the fiscal discipline) was to be secured with the *no bailout* clause, which stipulated that the union and the particular member states do not bear responsibility for the liabilities of other countries, and with the prohibition to finance such liabilities from the funds of the central bank (*Ekonomiczne wyzwania integracji...*, 2014, p. 7).

It should also be mentioned that the first SGP reform of 2005 *de facto* consisted in easing its rules. The deficit was not considered excessive if followed from an emergency which had a negative impact on the economy. More weight was given to the rule of medium-term objectives (MTO), which was to support the stability of public finances, but also provide space for active policies. However, no mechanisms of control were established to execute the MTO (Baran, 2013, p. 26). The founders of the European economic and monetary union assumed then that the free space for an anti-cyclical fiscal policy, supported by transfers from the cohesions funds and the dominance of the stabilizing real foreign exchange channel and the destabilizing channel of the real interest rate, would suffice to successfully stabilize the economic cycles (*Ekonomiczne wyzwania integracji...*, 2014, p. 19).

However, the financial crisis and then the debt crisis made it evident that the existing solutions were inadequate, and the mere membership in the monetary union and control by the SGP rules were not disciplining the member states in a sufficient manner (Kotliński, 2013, p. 13). This ineffectiveness was manifested, among other things, by the increase in debt and deficit in the eurozone member states¹. Recession was in some sense a turning point in the approach

¹ Doubts as to institutional solutions and fiscal mechanisms were in fact expressed even before the creation of the eurozone. Reservations were raised especially about the Stability and Growth Pact. This skepticism followed mostly from the lack of direct relation to the OCA. Moreover, the critics of the solutions proposed by the SGP emphasized the restriction of the flexibility of fiscal policy, doubling of regulations, negative impact on the synchronicity of economic fluctuations, weakening of automatic stabilizers, oversimplification of the adopted rules and lack of clarity in the rules of budget discipline (Lubiński, 2009, p. 236-248). Many economists claimed that

to the economic policy. When the most acute recessionary effects had eased off, the most important priority for the EU was to achieve tight fiscal discipline, as the growing imbalance in budget and public debt (crisis of debt) was seen as a threat to the competitiveness and economic growth of the entire bloc. What is more, it was pointed out that the economic and monetary union in Europe would not survive without a reduction in debt. Given all this, a new system of economic management was launched in 2011, based on a new fiscal control over the national level. Reforms such as the Fiscal Compact, the so-called six-pack and two-pack and the European Semester, mainly emphasized the discipline and fiscal consolidation in the eurozone, introduction of structural reforms and monitoring of the economic situation together with an ongoing analysis of the *ex ante* character.

Detailed principles with respect to the character of the budgetary framework in member states were regulated by the Council Directive of 8 November 2011. The framework was precisely defined as a set of agreements, procedures and institutions constituting the basis for a fiscal policy managed by the government and self-government agencies (Moździerz, 2018, p. 81). One of the essential principles which were formulated therein was: “Member States should avoid pro-cyclical fiscal policies, and fiscal consolidation efforts should be greater in economic good times. Well-specified numerical fiscal rules are conducive to these objectives and should be reflected in the annual budget legislation of the Member States” (Council Directive 2011/85/EU, 2011, point 18). In the context of this research, it is worth emphasizing that the introduced system of economic management was to support the anti-cyclical approach in fiscal policies (*Ekonomiczne wyzwania integracji...*, 2014, p. 9; Bénassy-Quéré & Ragot, 2016, p. 11; Markowski, 2018, p. 80). This was to be implemented with the use of several instruments.

Firstly, the European economic and monetary union placed more emphasis on the sustainability of the budgets of governmental institutions, which should be balanced or show some surplus. The EDP was then tightened and the catalogue of financial sanctions was expanded. The new system of economic management gave even more priority to the MTO, aiming at the increase in the stability of public finances (Moździerz, 2018, p. 83). Attaining the medium-term objective was to provide a safety margin to countries against the reference value of 3% GDP in the time of economic contraction. The obligation to maintain the structural balance in the amount of the individual medium-term objective (which was implemented by the modified SGP in 2005) was sustained, but the annual lower boundary

the stabilization of the economic cycle in the member states would be limited by the Maastricht criteria. Lack of fiscal coordination was supposed to lead to a situation where independent stabilization of common shocks (taken without consultation with other countries) would result in too small fiscal activity (Allsopp & Vines, 1996, p. 91).

of the structural deficit was set at 0.5% of the GDP in market prices. For countries where public debt was below 60% of the GDP, the maximum structural deficit was set at 1% of the GDP (Kotliński, 2013, p. 15; Moździerz, 2018, p. 84).

At the same time, more flexibility was given to the regulations emphasizing structural variables, which allows one to take into account various economic situations in member states, including the contraction of the economic activity. It was determined that a deviation is not significant when the country has realized the MTO with a surplus or when the country is in an emergency beyond its control (Kotliński, 2013, p. 18; *Ekonomiczne wyzwania integracji...*, 2014, p. 9-11; Moździerz, 2018, p. 84).

Theoretically then, the above modifications based on the tightening of fiscal rules should alleviate the risk following from inadequate space for an anti-cyclical approach at the national level in the time of an economic slowdown, at least in the countries which have not generated an excessive debt (*Ekonomiczne wyzwania integracji...*, 2014, p. 9, 23). This approach reflects the fact that the European Commission, while giving priority to fiscal consolidation, paid more attention to the macroeconomic stability. In order to conduct precise evaluation of the fiscal situation in member states, the list of determinants taken into account was expanded to include such aspects as the medium-term economic growth, cyclical changes in the economy, realization of policies counteracting macroeconomic imbalances, ability to serve the long-term debt, or hidden liabilities, like those following from the ageing of the population (Moździerz, 2018, p. 78, 114).

Another important change in the system of budget management adopted after the crisis, which was important from the point of view of an anti-cyclical strategy, was placing more emphasis on the process of limiting the public debt. This was supported by a new spending rule which stipulated that the public expenditure should not increase faster than the growth of the potential GDP (in countries which has not attained the MTO, the public spending must increase more slowly than the potential GDP). This aims at securing surplus revenues, coming into the budget at the time of economic expansion, for limiting debt and not for further increase in spending (*Ekonomiczne wyzwania integracji...*, 2014, p. 9; Moździerz, 2018, p. 87). Ultimately it was supposed to counteract the pro-cyclical, expansionary fiscal policy.

In the recapitulation, owing to the implemented changes, the fiscal discipline was to be maintained throughout the entire economic cycle, and not only in the event of exceeding 3% of the DGP in the current deficit. Thus, the efforts towards satisfying this criterion were to be free of the risk that they would lead to a pro-cyclical fiscal policy in the time of weak economic growth or excessively intensive expansion. Overall, the introduced solutions in the economic and monetary union theoretically should limit the pro-cyclical character of fiscal policies and promote an anti-cyclical approach (*Ekonomiczne wyzwania integracji...*, 2014, p. 9, 10).

The manner of response to any disturbances of economic activity is important from the perspective of the theory of the optimum currency area (Warżała,

2015, p. 159). This is why the fiscal policy will always be of particular importance in the process of economic integration, regardless of the dominant paradigm in economics. Alternative adaptive mechanisms (mobility of the workforce, flexibility of prices and wages, financial integration) are not yet adequately developed². For this reason, the research on the fiscal approach seems even more expedient, if only in the context of the accession of new countries into the eurozone.

Analysis of the stabilizing function of the fiscal policy in the countries sharing the same currency is particularly interesting also because the European Commission is shifting its approach towards the realization of intervention policies following from the pandemic crisis. After the lockdown crisis the strategy that had been evident since the financial crisis, namely keeping the unconditional fiscal regime, gave way to the view that the consolidation of public finances cannot be an objective of only an exogenous character. It is highly probable that this approach, when the current pandemic turbulences and the war in Ukraine are over, will remain as a supplement to the existing concept which the eurozone is based on. It is then rational to conduct a synthetic evaluation and a summary of the stabilizing function of the fiscal policies in a certain closed period of this bloc's existence.

Methodology

The research covered 12 eurozone states: 11 countries which formed it in 1999 and Greece (which joined in 2001). The selection of these countries followed from their long performance under the umbrella of the economic and monetary union. The analysis spans the period from the 1999 to the 2019, in the quarterly frequency. The empirical analysis does not cover the period of the financial crisis because the aim of the study is to analyze the implementation of stabilizing policies, not anti-crisis solutions. The former can be used in the more favorable economic times. On the other hand, the time of the recession resulted in strict anti-crisis measures. The period of the financial crisis was a unique time in the functioning of the eurozone. The recession was very deep, and varied in duration between countries (from one to three years). Such crises very seldom come together with cyclical fluctuations in relatively stable times (Borowiec, 2017a, p. 14), which the author of the present article has researched. In the light of the above, taking account of the mentioned years in the study (inclusion into one of the researched periods) would have had a great impact on the results obtained. The period of the study was thus divided into two sub-periods: 1999-2007 and 2011-2019. Such a division made it possible to conduct a comparative analysis of two sub-periods,

² Even in the USA, where flexibility of wages is much higher than in Europe, fiscal and monetary interventions remain the main instrument of macro-economic stabilization (*Ekonomiczne wyzwania integracji...*, 2014, s. 21, 29).

relatively stable from the perspective of economic fluctuations, in the functioning of the eurozone. The first one ends before the outbreak of the crisis³, and the second one begins when the situation had relatively stabilized and the reforms were being implemented⁴. The division makes it possible to compare two stages in the functioning of the economic and monetary union, separated by the most important reforms at the transnational level⁵.

Statistical data were retrieved from the Eurostat, (*ECB Statistical Data Warehouse*) and reports by the European Commission (EC).

The output gap was used as a measure of the cyclicity of economies. The output gap is the most popular indicator in an evaluation of a stabilizing policy. It is interpreted as a deviation of the level of the real GDP away from the level of potential production or its trend, expressed in % (Mourre, Isbasoiu, Paternoster & Salto, 2013, p. 9, 11). In order to calculate this variable, I used quarterly sequences of the GDP in nominal values (current prices), which were then made real with the GDP deflator and cleaned of seasonal fluctuations with the TRAMO/SEATS method, recommended by the Eurostat⁶. Such time sequences were ready to extract the cyclical component and express it as % of the potential production or its trend. To this end, I used the Hodrick-Prescott (HP) filter, which was proposed by R. Hodrick and E. Prescott (1997). It is a high-throughput filter, which means that it 'passes through' fluctuations of the higher frequencies than those selected by the researcher (Adamowicz, Dudek, Pachucki & Walczyk, 2008, p. 18). The starting point in the use of the HP filter is the assumption that the time sequence is made of two components: the trend and the cyclical component. The trend estimation is done by solving the following function (Kufel, Osińska, Błażejowski & Kufel, 2014, p. 42; Beck, 2017, p. 7):

³ In economics, 2008 is commonly seen as the beginning of the global crisis (Arestis & Karakitsos, 2011, p. 15; Engelen *et al.*, 2011, p. 22).

⁴ In the second sub-period under research the eurozone went through the debt crisis, however. It also experienced recession in 2012-2013. This one did not follow from an external, unexpected shock like the one caused by the financial crisis. It was also decisively "more shallow" which, albeit not often, accompanies contemporary economic fluctuations.

⁵ It should also be emphasized that making an unambiguous and uncontroversial division is practically difficult, as the reforms towards the improvement in fiscal and economic management were introduced in different years (e.g. the European Semester was launched in 2011, and the two-pack in 2013). Besides, their results can only be observed in the following periods. It was decided however, that the beginning of the second research sub-period will be convergent with the year when the first reform took effect.

⁶ This procedure was elaborated by V. Gomez and A. Maravall (2001) and has a two-stage course. In the first TRAMO stage (*Time Series Regression with ARIMA Noise, Missing Values, and Outliers*) there is a preliminary elimination, where the selection is made of the auto-regression scope, differentiation scope, as well as delay values of the moving average for the combination of seasonal and non-seasonal factors. Next, with the use of highest credibility, outlier observations are detected together with the estimation of independent variables. Outliers are eliminated. Next, during the SEATS procedure (*Signal Extraction in ARIMA Time Series*), the series is decomposed and each of the non-observable factors is estimated. The procedure was carried out with the GRETTL package.

$$\min. \left[\sum_{t=1}^T (y_t - g_t)^2 + \lambda \sum_{t=3}^T (\Delta^2 g_t)^2 \right] \quad (1)$$

where:

g_t – the trend,

λ – the so called smoothing parameter.

The component of this formula which must be determined by the researcher is the parameter. The value of the smoothing parameter was set in line with the suggestion by Ravn and Uhlig (2001, p. 1), who proposed that that value for quarterly data is 1,600. The values of the cyclical component obtained with the HP filter (interpreted as the output gap) were divided by the value of HP trends and multiplied by 100, which is how I arrived at the value of the product gap expressed as % of the trend.

I used the cyclically adjusted primary balance, the CAPB, as an indicator of the approach to the discretionary fiscal policy. The CAPB is a hypothetical value of the budget balance after adjusting for the impact of cyclical fluctuations and cost of debt service. Its values were calculated in quarterly frequency, based on the following formula:

$$\text{CAPB}_t = \text{PB}_t - \varepsilon \cdot \text{OG}_t \quad (2)$$

where:

PB_t – the primary balance of the general government sector in relation to the GDP in period t ,

ε – the semi-elasticity parameter⁷ indicating by how many percentage points the budget balance will change with the increase in production in the economy by 1%,

OG_t – the output gap in the period t .

Another aim of this article was to assess the plans and intentions of the governments as to the direction of the fiscal policy, with the use of official data of the European Commission, which were known to the policy makers at the time of making budget decisions. To this end, I conducted the so-called real time analysis. The basis for the evaluation of the fiscal approach was the Fiscal Condition Index (the FCI). The FCI is the difference between the value of the cyclically adjusted primary balance in the current period and in the base period. A positive change is interpreted as fiscal tightening in a given period, a negative change – as easing the fiscal policy. It can be expressed as a following formula:

⁷The „semi-elasticity” parameter was assumed to be the values of this indicator published by the European Commission for each member state (*Report on Public...*, 2014, p. 45).

$$FCI_t = CAPB_t - CAPB_{t-1} \quad (3)$$

where:

- $CAPB_t$ – the cyclically adjusted primary balance in year t ,
- $CAPB_{t-1}$ – the cyclically adjusted primary balance in year $t-1$.

Most of the research on the implementation of a fiscal policy in real time is based on the use of forecasts of the cyclically adjusted primary balance as the indicator of the next-year discretionary measures (Cimadomo, 2012; Świącicki & Michałek, 2014; Paloviita & Ikonen, 2016). In this research, I also used official forecasts by the European Commission concerning both the CAPB and the output gap⁸. As the most important part of the European Semester (the guidelines of which are used by the eurozone countries to construct and submit their budget plans) falls into the first six months of the year, the autumn forecasts for the output gap from year $t-1$ were used for year t , which are usually published in October and are therefore the most recent and accessible data at the time when the budget construction for the next year is still under way⁹. Given all this, in the formula (3) for the fiscal condition index, the values of the CAPB in period t have been construed as the autumn CAPB forecast from year $t-1$ for year t (as the budget for year t is constructed in year $t-1$). This choice seems natural because, compared to the previous, spring forecasts, these values reflect a wide set of planned, discretionary measures by the governments in the following year, and are published upon an analysis of preliminary budget strategies of the member states by the EC, with the account of the recommendations issued by the EU organs.

To determine if the values mean the tightening or easing of the fiscal conditions, the data must be referred to the previous period (subtract the “actual” CAPB from the previous period). The “base” value in the formula was taken to be the autumn CAPB forecast from year $t-1$ for the same year ($t-1$). These data include the most recent information which are at the disposal of politicians who make the decisions concerning the revenue and expenditure for the following year, and who know the forecasts of the cyclically adjusted primary balance in the current year. On these grounds, it can be deduced whether their intention was to tighten or ease the fiscal discipline. In consequence, the modified formula for the FCI index in “real time” was obtained:

$$FCI_t = \text{forecast}_{t-1} CAPB_t - \text{forecast}_{t-1} CAPB_{t-1} \quad (4)$$

⁸ Subsequent issues of *Statistical Annex to European Economy* and *European Economic Forecast*.

⁹ In order to maintain methodological consistency with own estimates of the output gap in the quarterly frequency, forecasts of the output gap were selected with the HP filter. The European Commission also uses the output function by Cobb-Douglas to estimate these values.

where:

forecast $_{t-1}$ CAPB $_t$ – the forecast for year t of the cyclically adjusted primary balance released in autumn of year $t-1$,

forecast $_{t-1}$ CAPB $_{t-1}$ – the forecast for year $t-1$ of the cyclically adjusted primary balance released in autumn of year $t-1$.

The above formula can be interpreted as follows: an indicator of the evaluation whether politicians who are aware of the possible value of the CAPB in a given year (based on the forecast) have planned the tightening or easing of the fiscal policy for the following year. In order to determine if such plans were of an anti-cyclical or pro-cyclical character, the following assumption was made: the policy was defined as anti-cyclical when the change in the CAPB (FCI) in period t was positive (negative) and the forecast of the output gap made in period $t-1$ for period t was also positive (negative). In this approach, the phase of favorable economic conditions should be accompanied by fiscal tightening, and easing the fiscal discipline should take place in the phase of the economic contraction. By analogy, a reverse situation (fiscal easing in the periods of the positive output gap or tightening in the case of the negative gap) was interpreted as pro-cyclical. Following Borowiec (2017b, p. 13), it was also assumed that the annual absolute change of the cyclically adjusted primary balance must be at least 0.2% of the GDP to define the policy as either anti-cyclical or pro-cyclical. In other cases, the fiscal approach was deemed neutral.

Research Results

In order to evaluate and compare the bias of the fiscal policy, indicators of correlation between the CAPB and the output gap were estimated for the two research sub-periods defined previously¹⁰ (Tab. 1). A positive correlation means that the balance grows in the periods of increase in the output gap and drops when the gap decreases. This indicates the anti-cyclical function of the discretionary fiscal policy. A negative correlation means that the balance has a pro-cyclical character.

In accordance with the interpretation of the value of the correlation indicator presented above, one can conclude that the CAPB in the first research sub-period was mainly anti-cyclical (correlation above 0.1). This was the case in 8 of the studied countries. In the second sub-period, however, as many as 7 countries had a balance that could be interpreted as pro-cyclical. In most cases, the estimated correlations must be considered as weak or moderate.

¹⁰ Because of the statistical data accessibility, the analysis of Germany and Ireland begins in Q1 2002, and Austria in Q1 2001.

Table 1

Correlation between the CAPB and output gap in eurozone countries

Country/period	1999 – 2007	2011 – 2019
Austria	0.28	-0.20
Belgium	0.16	0.02
Finland	0.71***	0.15
France	0.43***	-0.40**
Germany	0.28	-0.45***
Greece	-0.64***	0.40**
Ireland	0.19	-0.56***
Italy	-0.12	-0.80***
Luxemburg	0.63***	-0.12
Netherlands	0.19	0.01
Portugal	0.06	-0.19
Spain	0.07	-0.08

*** statistically significant correlations at 1% significance ** statistically significant correlations at 5% significance 5%; * statistically significant correlations at 10% significance

Source: the author, based on the Eurostat and EBC data.

The research results are to a large extent consistent with other elaborations in the subject literature on the stabilizing function of fiscal policies in the eurozone countries (Krajewski & Pilat, 2012; Arsic, Nojkovic & Randjelovic, 2017; Borowiec, 2017b; Carnazza, Liberati & Sacchi, 2020; Dallari & Ribba, 2020). These studies, however, focused on the first decade in the history of the monetary and economic union, the crisis years, and a few years following the recession.

It should be noted that the *ex post* evaluation of the fiscal policy character is not free of shortcomings. For example, it does not contribute to the investigation whether the implemented reforms support the planning of an anti-cyclical approach. Therefore, it is worth considering the “real time analysis”, which may, to some degree, reflect the intentions of politicians regarding their activities in the domain of fiscal policy.

Table 2 contains the results of the study conducted in accordance with the procedure presented in the methodological part of this article. The lighter shade of grey color indicates anti-cyclical policies, while the darker shade of grey color stands for pro-cyclical policies. In addition, the bolder framework indicates the periods in which a given country was subject to the Excessive Deficit Procedure (including the years when the EDP was imposed and lifted).

In the first sub-period under research, the policy decisions of the governments in the fiscal domain were mainly pro-cyclical. The concordance indicator, understood as the percentage share of the number of years characterized by a bias

Table 2
Character of decisions regarding discretionary realization of fiscal policies in the eurozone countries

Country/ year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	AE	AR	PR	PR	PR	AE	N	N	-	-	-	PR	PR	PR	PR	PR	AE	N	PE	AR
Belgium	N	N	PR	AE	AE	AE	AE	AE	-	-	-	N	AE	AE	N	N	N	PR	AE	PE
Finland	AR	N	AR	AE	X	PE	AE	N	-	-	-	PR	PR	PR	N	N	PR	AE	AE	AR
France	PR	N	PR	N	PR	PR	N	N	-	-	-	PR	PR	PR	PR	N	PR	PR	N	PE
Germany	PR	AE	PR	PR	PR	PR	N	PR	-	-	-	PR	PR	PR	AE	N	AE	PE	N	PE
Greece	PE	PE	AR	PE	PE	AR	PE	PE	-	-	-	PR	PR	PR	PR	AE	PR	N	PR	AE
Ireland	PE	N	AR	X	PR	N	PR	N	-	-	-	PR	PR	PR	PR	N	AR	AR	AR	PE
Italy	AE	AE	PR	N	AE	N	AE	PR	-	-	-	PR	PR	PR	N	AE	AE	AE	PE	PE
Luxembourg	n.d.	PE	N	n.d.	n.d.	PE	N	AR	-	-	-	PR	AE	PR	AE	AE	AR	PE	PE	PE
Netherlands	PE	PE	PR	PR	PR	PR	AE	AE	-	-	-	PR	PR	PR	AE	AE	AE	PR	PE	PE
Portugal	N	AR	AR	PR	AE	AE	PR	PR	-	-	-	PR	PR	PR	PR	PR	AE	N	PE	N
Spain	AR	AR	AR	AE	N	PR	N	AE	-	-	-	PR	PR	PR	PR	N	AE	AE	PE	N

AE – anti-cyclical expansive (fiscal easing in the environment of negative output gap); AR – anti-cyclical restrictive (fiscal tightening in the time of positive output gap); PE – pro-cyclical expansive (fiscal easing in the environment of positive output gap); PR – pro-cyclical restrictive (fiscal tightening in the time of negative output gap); „n.d.“ no data; N – neutral, X – forecast of production gap was 0 which indicates that the economy was in the state of long-term and short-term balance. Hence, the intentions to realize the fiscal policy for the given period were not interpreted. Source: the author, based on the Eurostat and EBC data.

that deepens economic fluctuations in this sub-period (for all countries), amounted to 42%. Anti-cyclical intentions were noted for 33% of all periods, and neutral ones – for 23%. These values do not add up to 100% as there were also years when the policies had a neutral character, or their approach was not interpreted because of the “closing of the output gap” (e.g. Finland in 2004).

Upon the analysis of the character of the implemented fiscal measures, we notice that in the second sub-period under research (2011-2019), the indicator of concordance for the periods where the pro-cyclical intentions were prevalent rose to 57% for all of the countries. Moreover, the indicator of concordance for the anti-cyclical policy dropped to 26% and for the neutral policy – to 17%. This pro-cyclicality was mainly restrictive in nature, most of all because of the target for the fiscal conditions to be met under the Excessive Deficit Procedure (this was particularly evident in 2011-2014). This pro-cyclical tightening refers also to the countries where the situation of public finances was relatively stable, which may attest to the fact that these countries exercise special caution against fiscal stimulation in the face of the debt crisis in the eurozone. Nevertheless, the pro-cyclical expansion was increasingly evident in the last three of the studied years. This may follow from the need to compensate for the period of fiscal consolidation and economic slowdown, which was foreseen then. However, in line with the research methodology presented above, these were still measures which enhanced the economic fluctuations, as the output gap was positive.

Because the period when the EDP was in place was unusual, it is worth investigating the periods in which countries had more leeway in setting their budgets. In order to verify what intentions were really dominant in those years, the anti-cyclical or pro-cyclical ones, I estimated the concordance indicator excluding all of the years in which the EDP was in force. In the first sub-period, the indicator reached 40% for “anti-cyclical years” and 34% for the “pro-cyclical years.” In the second sub-period, these values stood at 38% and 45%, respectively.

The above research results cannot substantiate unambiguous conclusions, as the future fiscal decisions may not fully materialize, for example when a discrepancy appears between the production forecast at the moment of budget construction and the actual performance. Therefore, what we observe *ex post* may be considerably different from what was planned in the past and was taken account in the register of legislative instruments (Cimadomo, 2012, p. 447-451). Moreover, the closing of the Excessive Deficit Procedure did not mean that the country reached its medium-term objectives. Nevertheless, the above analysis may indicate the actual intentions of politicians at the moment of constructing the revenue and expenditure of the state, based on the existing and accessible data. The research warrants a conclusion that the reforms implemented after the economic and financial crisis had a limited impact on the intentions and factual realization of fiscal policies in an anti-cyclical manner.

Conclusions

The research results, both obtained *ex post* and from the “real time” analysis, question the use of discretionary fiscal policies in the stabilization of an economic cycle at the national level in the selected eurozone countries. Taking into account the fact that the completion of subsequent stages in the economic integration does not alter the expected outcomes of policy interventions into the economic cycle, it is worth considering alternative mechanisms, which could be more successful in alleviating the asynchronous fluctuations in production in the countries of the European monetary union. This is particularly important in the context of the new situation which the EU countries need to face after the crisis following from the pandemic and Russia’s invasion of Ukraine. Public finances will eventually need to undergo gradual consolidation, which may again render national fiscal policies “inadequate” in counteracting short-term asymmetric output gaps.

In the author’s view, national fiscal policies should first and foremost secure the credibility and stability of public finances in particular countries, and the potential stabilizing function should be supported by a central mechanism. The most likely scenario are fiscal transfers based on the inter-regional distribution in the short term, implemented on the *ex ante* basis as an automatic stabilizer. Needless to say, every initiative limiting the sovereignty and autonomy in the realization of a country’s fiscal policy will require a significant political willpower, determination and a long-term outlook. This is why further research and discussion in this field seem necessary.

Translated by Jolanta Idźkowska

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ANALYSIS OF THE SIMILARITY OF THE MACROECONOMIC SITUATION AND THE LEVEL OF INVESTMENT IN THE EUROPEAN UNION IN 2018-2020 IN THE CONTEXT OF THE COVID-19

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Key words: the European Union, the COVID pandemic, macroeconomic situation, investment.

Abstract

The purpose of this article was to determine the macroeconomic and investment situation in 2018-2020 in the Member States of the European Union. The work also deals with the division of the European Union into three parts: the core, the periphery, and Central and Eastern Europe. A critical analysis of the scientific literature was used to present the economic consequences of the pandemic. Ward's method was used to create a few clusters of European Union Member States that are most similar to each other in terms of macroeconomic situation and investments. During the pandemic, the macroeconomic and investment situation worsened. Moreover, there are three groups of member states in the European Union, which indicates that there are still significant development and economic disproportions between the groups in the EU.

**ANALIZA PODOBIEŃSTWA SYTUACJI MAKROEKONOMICZNEJ
I POZIOMU INWESTYCJI W UNII EUROPEJSKIEJ W LATACH 2018-2020
W KONTEKŚCIE PANDEMII COVID-19**

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Słowa kluczowe: Unia Europejska, pandemia COVID, sytuacja makroekonomiczna, inwestycje.

Abstrakt

Celem artykułu było określenie sytuacji makroekonomicznej i inwestycyjnej w latach 2018-2020 w państwach członkowskich Unii Europejskiej. Praca dotyczy również podziału Unii Europejskiej na trzy części: rdzeń, peryferia oraz Europę Środkowo-Wschodnią. Do przedstawienia ekonomicznych skutków pandemii wykorzystano krytyczną analizę literatury naukowej. Metodę Warda wykorzystano do utworzenia kilku klastrów państw członkowskich Unii Europejskiej najbardziej do siebie podobnych pod względem sytuacji makroekonomicznej i inwestycji. W czasie pandemii pogorszyła się sytuacja makroekonomiczna i inwestycyjna. Ponadto w Unii Europejskiej istnieją trzy grupy państw członkowskich, co wskazuje, że nadal istnieją znaczne dysproporcje rozwojowe i gospodarcze między grupami w UE.

Introduction

The COVID-19 pandemic is not only treated as a health threat, but also as a global economic challenge. In countries that decided to introduce restrictions, an economic slowdown and even deterioration of the micro-and macroeconomic situation, as well as in the investment market, could be noticed very quickly (Wielen & Barrios, 2021, p. 1). Economists introduced the phrase LONG COVID to describe the long-term effects of the COVID-19 pandemic, which is a significant threat to society and the global economy (Rabiej & Kaliszczak, 2022, p. 356). It can be assumed that the impact of COVID-19 in individual sectors of the economy and the Member States of the European Union is diversified, even though the competitiveness of a significant part of the EU economy has decreased (Lakhani & Puranam, 2020, p. 1757).

In addition to the impact of COVID-19 on the economy, the article also addresses the issues of the diversification of the macroeconomic situation and

investments in the Member States, taking into account the two divisions of the European Union Member States. The first takes into account participation in the euro area, while the second takes into account the socio-economic conditions, which made it possible to create three groups of countries with a similar macroeconomic situation and level of investment: highly developed countries, peripheral (southern) countries, and Central and Eastern Europe.

Research Methodology

The purpose of this article was to determine the macroeconomic and investment situation in 2018-2020 in the Member States of the European Union. Additionally, the study partially covered the European Commission's forecast for 2021. The work also deals with the issue of the division of the European Union into euro area countries and countries outside the monetary union and the division into the following three parts: the core (highly developed countries), the periphery (southern countries), and the countries of Central and Eastern Europe. In line with the above, the scientific hypothesis is: In the analyzed period three groups could be distinguished, characterized by a different macroeconomic situation and the level of investments in the European Union. In this analysis were used 4 variables: the percentage change in GDP per capita, inflation rate, unemployment rate, and percentage change in investment level.

Several research methods were used in the work: a critical analysis of the literature on the subject, which made it possible to present an outline of the historical division of the European Union into several groups, and quantitative methods – multidimensional statistical analysis. In the case of multivariate studies, in addition to the correlation analysis, Ward's method was used as one of the most generalized hierarchical cluster analyses, especially for relatively small sets of objects. This method is also one of the most effective ways of extracting the hierarchical structure of a set of objects with decreasing similarity between them (Gatnar & Walesiak, 2004). The highlighted clusters confirm the heterogeneity of the data used in the study. Ward's method is an agglomeration procedure consisting in combining clusters that minimize the sum of squares of distances from the center of gravity of the resulting cluster. Using the so-called dendrogram, this method made it possible to present the created clusters of European Union Member States, which are the most similar in the given clusters in terms of the macroeconomic situation and the level of investments. In addition, cluster analyses make it possible to create recommendations for politicians based on a comparison of the examined features and indicate in which areas actions should be taken to improve the economic situation (Janulewicz, Kamińska & Białoskurski, 2017, p. 92). It should be noted that the study carried out a variable normalization procedure using standardization. The correlation analysis was used, *inter alia*,

to determine the degree of collinearity of the proposed variables. A high correlation of diagnostic features can build an unbelievable cluster structure about the macroeconomic situation and the level of investment in the analyzed period 2018-2020.

Economic and Financial Consequences of the COVID-19 Pandemic

The first case of COVID-19 was recorded in Wuhan (China) in November 2019 (Platto, Xue & Carafoli, 2020, s. 9). Over the next month, more cases of COVID-19 were discovered in Europe and the United States, while the WHO decided in March 2020 to officially call COVID-19 a global pandemic (Pappas, 2021, p. 1).

The pandemic is not only a health threat but also undoubtedly has a significant impact on the economy, politics, education as well as society, and the psyche of individual people (Ayipey, 2020, p. 26). An increasingly widespread thesis indicates that the COVID-19 pandemic is a period of another economic crisis, because it has such features as increased risk and uncertainty in running a business, and is an economic challenge that cannot be solved with existing solutions (Ignacio & Novoa, 2021, p. 334). One of the solutions was to introduce restrictions. The restrictions had an ambivalent impact on the economy (Ancyparowicz, 2022, p. 41).

The pandemic undoubtedly has a significant impact on the situation of the private sector – both households and enterprises – and the public sector. Much of the impact of COVID-19 on this sector includes negative consequences, such as supply disruptions, limited demand, and reduction of corporate revenues from operating activities, which may increase unemployment and impoverishment of some households (Pukin-Sowul & Ostrowska, 2021, p. 49). COVID-19 also contributed to the organizational and financial challenges of local governments. In addition, during the pandemic, the revenues of local government units decreased and their expenses increased, as a result of which the situation of public finances deteriorated. The above-mentioned division has micro, meso, and macroeconomic consequences. Microeconomic effects include the previously mentioned reduction in household and corporate incomes due to government restrictions, while mesoeconomic effects focus on the impact of COVID-19 on individual industries (Kostyk-Siekierska, 2021, p. 43).

The macroeconomic consequences of the pandemic are related to, *inter alia*, the most important macroeconomic indicators, such as GDP (decrease), GDP per capita (decrease), unemployment rate (increase), and inflation rate (increase). The reduction in production contributed to a reduction in production, a reduction in the sale of goods and services, and the dismissal of workers. The pandemic also saw significant increases in prices in many countries around the world (Ataguba, 2020, p. 327).

The COVID-19 pandemic is also having an impact on the financial market (both domestic, international, and global). The increase in risk and uncertainty contributes to negative consequences making it difficult to run a business (Mishra, Rath & Dash, 2020, p. 2162). As the incidence increases, the profitability of a significant proportion of investments and securities decreases. Moreover, investors are less prone to risk, often increasing sales of financial assets, and therefore financial markets become more unpredictable than before the spread of the virus. However, the diversified impact of the COVID-19 pandemic on the financial market can be noticed, both due to the epidemiological situation, monetary and fiscal policy, and the economic situation of individual countries in the world (Halder & Sethi, 2021, p. 34).

The COVID-19 pandemic has highlighted important links between economic and financial performance, the private and public sectors, the micro and macroeconomic situation, and the national, international, and global economy. It is not possible to improve the economic situation if decision-makers focus on only one economic aspect. Restoring economic equilibrium requires both interdisciplinary research and multi-faceted solutions.

Analysis of the Clusters of the European Union in Terms of the Macroeconomic Situation and the Level of Investments

The European Union member states' grouping, in terms of the macroeconomic situation, was carried out by Ward's method. The grouping results were supported by classification trees for each year, presented in Figures 1-3.

According to the dendrograms, 3 key groups of countries can be distinguished: core (highly developed countries), peripheral countries (southern countries), and Central and Eastern Europe (Tab. 1).

It should be noted that some European Union Member States can be classified, based on selected variables, into three groups, i.e. the core (highly developed countries), the periphery (less developed countries, mostly southern countries), and the countries of Central and Eastern Europe. Nevertheless, a few countries have different macroeconomic and investment situations. An example of such a country is Ireland, which is characterized by high amplitudes of macroeconomic indicators and the level of investments. In the selected period, it was also noticeable that there is a variation in the distance of links, therefore it is possible to create several additional groups or subgroups. Examples of a very high level of similarity in the macroeconomic situation and investments are Greece and Spain, while in Central and Eastern Europe one could distinguish Poland, the Czech Republic, and Hungary, which are characterized by a slightly different situation than the Baltic countries.

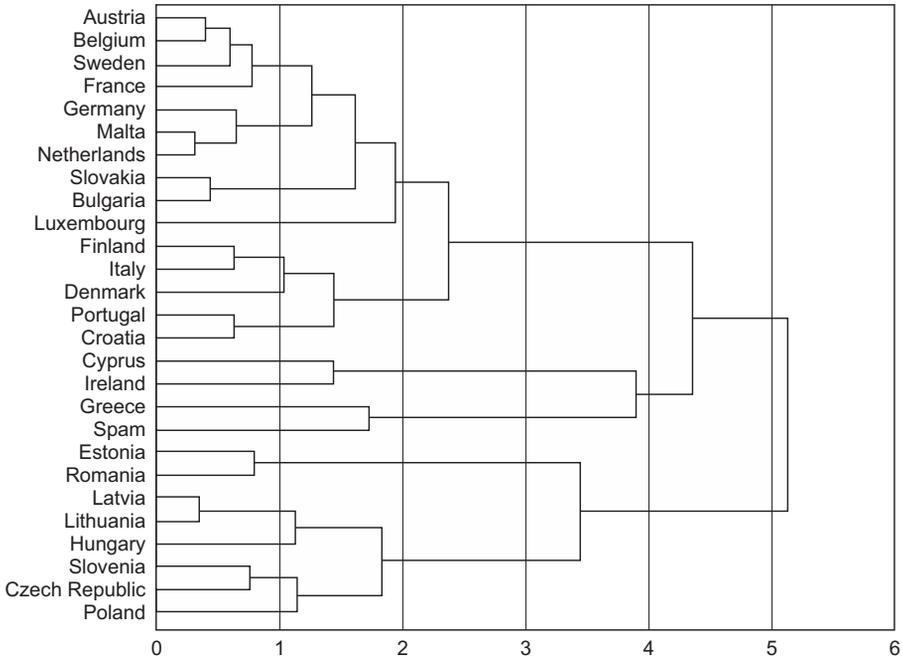


Fig. 1. Classification tree (dendrogram) for 2018 obtained using the Ward method
 Source: own study based on: *Autumn 2021 Economic Forecast...* (2021).

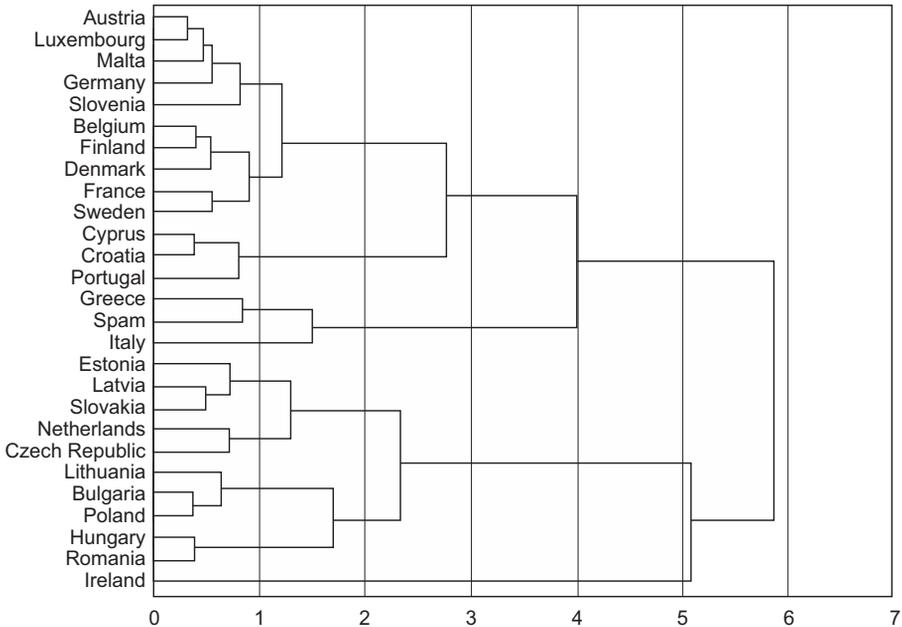


Fig. 2. Classification tree (dendrogram) for 2019 obtained using the Ward method
 Source: own study based on: *Autumn 2021 Economic Forecast...* (2021).

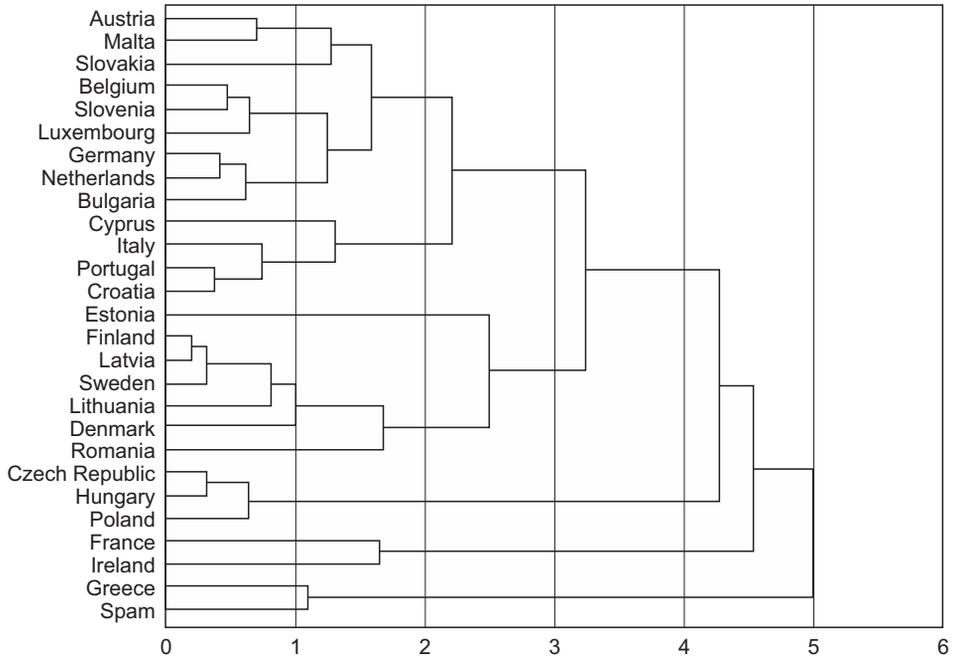


Fig. 3. Classification tree (dendrogram) for 2020 obtained using the Ward method
 Source: own study based on: *Autumn 2021 Economic Forecast...* (2021).

Table 1

The division of the European Union into groups according to the Ward method

Groups	2018	2019	2020	Established groups
1	2	3	4	5
Group 1 – highly developed countries	Belgium, Austria, Sweden, France, Germany, Malta, the Netherlands, Slovakia Luxembourg + Bulgaria	Belgium, Finland, Denmark, France, Sweden, Germany, Luxembourg, Austria, Malta, Slovenia	Belgium, Slovenia, Luxembourg, Germany, the Netherlands, Bulgaria, Malta, Austria, Slovakia	Belgium, Luxembourg, Austria, Germany, Malta
Group 2 – peripheral countries	Italy, Finland, Denmark, Croatia, Portugal + Greece, Spain	Greece, Spain, Italy	Italy, Portugal, Croatia +Greece, Spain	Greece, Spain, Italy

cont. Table 1

1	2	3	4	5
Group 3 – Central and Eastern Europe	Estonia Latvia, Lithuania, Hungary, Slovenia, Czech Republic, Poland, Romania	Estonia, Latvia, Slovakia, Czech Republic + the Netherlands; Lithuania, Bulgaria, Poland, Hungary, Romania	Estonia, Latvia, Finland, Sweden, Lithuania, Romania + Czech Republic, Poland, Hungary	Estonia, Lithuania, Latvia, Hungary, Poland, Czech Republic, Romania
Countries for which no groups have been selected	Cyprus, Ireland	Cyprus, Croatia, Ireland	Cyprus, Ireland	

Source: own study based on: *Autumn 2021 Economic Forecast...* (2021).

The final division of the Member States indicates a partial invariability of individual groups (the choice of countries was determined by the fact that a given country was classified to a given group throughout the period), which may indicate club convergence in the European Union. It is worth noting that the EU-12 countries belong to two groups, while the current composition of the euro area belongs to three groups, which may make it difficult to conduct a common monetary policy (the so-called problem one size does not fit for all) and to counteract macroeconomic shocks in the monetary union.

The COVID-19 pandemic could have had a negative impact on the macroeconomic situation and investments, and contributed to minor changes in the division of European Union Member States. For example, France lost its high level of connection with the most developed countries, and the macroeconomic situation and the level of investments of Finland and Sweden, countries also considered highly developed, were similar to the results of Central and Eastern European countries. The increase in macroeconomic similarity and investments of the Scandinavian countries with the Baltic countries indicates an increase in economic convergence and strong economic ties.

Macroeconomic Results and the Level of Investments in Three Groups of European Union Countries

The macroeconomic situation and the level of investments differ in the three groups of the European Union. The results of the average values of the analyzed variables in the selected groups of EU countries are presented in Table 2.

Table 2

Average levels of macroeconomic performance and investments

Group	Variable	2018	2019	2020	2021
Core	percentage change in GDP per capita	1.27	1.24	-3.80	4.04
	inflation rate	2.01	1.46	0.60	2.44
	unemployment rate	5.57	5.33	6.03	5.73
	percentage change in investment level	2.00	4.67	-4.81	8.17
Periphery	percentage change in GDP per capita	1.63	1.30	-9.60	5.90
	inflation rate	1.23	0.63	-0.57	1.57
	unemployment rate	15.07	13.8	13.67	13.43
	percentage change in investment level	1.70	0.63	-6.33	11.60
Central and Eastern Europe	percentage change in GDP per capita	4.77	4.13	-3.30	5.62
	inflation rate	2.55	2.82	2.32	4.05
	unemployment rate	4.60	4.20	5.10	4.92
	percentage change in investment level	9.40	8.53	-2.98	8.30

Source: own study based on: *Autumn 2021 Economic Forecast...* (2021).

The highest average investment growth in 2018-2019 took place in Central and Eastern Europe (in 2018 -9.4%, and 2019 – 8.53%), while the lowest was in peripheral countries (1.7% in 2018, and 0.63% in 2019). In 2020, it was noticed that in the group with the lowest level of economic growth, the highest decrease in investment was recorded (6.33%), then in the core countries of the European Union (4.81%), while in Central and Eastern Europe the decrease in investment was 2, 93%. However, representatives of the European Commission point to a major increase in investment in 2021: in the peripheral countries it should amount to 11.6%, and in the other two groups it should be slightly above 8.15%.

Similar trends can be seen in the case of another variable, the unemployment rate. In the CEE countries, it was the lowest (4.6% in 2018, and 4.2% in 2019). The highest unemployment rate was recorded in the group of peripheral countries (in 2018, 15.07%, compared to 13.8%). Moreover, in the indigenous countries also in 2019, the selected variable was lower in 2018. In this group and in Central and Eastern Europe in 2020 unemployment increased (in highly developed countries to 6.03%, and in CEE to 5.10%, which means that in the second group, the increase was greater, both in terms of percentage and quantity. In peripheral countries, the unemployment rate fell slightly (to 13.67%). All countries should

decline in 2021, with minor changes, and unemployment in the peripheral countries, unemployment will remain a significant problem.

According to the data, inflation in all groups is similar, with the highest in Central and Eastern European countries and the lowest in peripheral countries. The representatives of the European Commission emphasized that inflation in all groups should be higher in 2021 than in 2020

Central and Eastern Europe is characterized by the highest GDP growth per capita. It is more than twice as high as in “the core” countries and about three times as high as in the peripheral countries (it was 4.77% in 2018 and 4.13% in 2019). In 2019, GDP per capita decreased in all groups (in the core countries from 1.27% to 1.24%, and in the peripheral countries (from 1.63 to 1.3%). The value of GDP per capita declined in indigenous countries (by 3.8%), and in the countries of Central and Eastern Europe by 3.3%. A three-fold higher percentage decrease was recorded in peripheral countries (9.6%) that GDP per capita growth in all groups will be relatively similar – the lowest in “the core” countries (4.04%), and the highest in the peripheral countries (5.9%).

Central and Eastern European countries are relatively less vulnerable to economic shocks. This may be due to the possibility of using autonomous monetary policy and less dependence on other economies of European countries.

Conclusions

A significant part of the analysis by representatives of EU institutions divides the EU Member States into two groups in terms of their participation in the euro area. According to the research, the EU Member States can be divided into three groups: highly developed countries (the core), southern countries (the periphery), and Central and Eastern Europe, which may mean that there are still significant development and economic disproportions between the above-mentioned groups. This is in line with the research of other economists. Economists in the 1990s emphasized that there are two groups of countries in the European Union: the core (highly developed countries) and the periphery (less developed countries) (Oman 2019, s. 330). The European Union is a union of 27 countries characterized by a different social and economic situation (Pukin, 2020, p. 166). Each successive enlargement of the EU increased doubts as to the integration of diversified European countries. Therefore, since the group’s inception, the coexistence of at least two groups of countries has been mentioned many times: the core (Germany, France, Belgium, the Netherlands, and Denmark) and the periphery (Greece, Ireland, Italy, Portugal, Spain). On the other hand, the participation of Central and Eastern European (CEE) countries forced the updating of the division of the European Union into three parts: the two previously mentioned and the new EU countries (Beck & Grodzicki, 2014, p. 152).

Therefore, the adopted research hypothesis was positively verified. The CEE countries are still developing the fastest, peripheral countries struggle with economic and financial problems, while the core of the EU is characterized by relatively stable economic development. Such tendencies can be observed using both simple statistical analysis and Ward's method. However, the analysis of clusters showed that some countries are characterized by different macroeconomic and investment situations. Therefore, actions are needed to reduce disparities and increase the convergence of the European Union Member States.

In addition, the deterioration of the macroeconomic situation and the level of investment during the COVID-19 pandemic should, as mentioned before, be seen as a stimulus for joint action to restore the economic balance of the European Union and its members as soon as possible.

Translated by Authors

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MODELS OF COMMERCIALIZATION OF INNOVATIONS IN AN OPEN INNOVATION PROCESS

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JEL Classification: O31, O32, O33.

Key words: open innovations, commercialization of innovations, transfer of technologies.

Abstract

At present, innovations constitute a key determinant of a competitive position among market entities. Recent years have seen a change in the approach towards innovations and a gradual shift from a closed to an open model of innovation. The changing paradigm of innovation is accompanied by the question how to commercialize about outcomes of open innovation processes. The aim of the present article is to review models of the commercialization of innovations which are applied in innovation processes based on principles typical of the open innovation model.

MODELE KOMERCJALIZACJI INNOWACJI W OTWARTYM PROCESIE INNOWACYJNYM

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Kody JEL: O31, O32, O33.

Słowa kluczowe: innowacje otwarte, komercjalizacja innowacji, transfer technologii.

Abstrakt

Innowacje stanowią obecnie najważniejszy czynnik determinujący pozycję konkurencyjną podmiotów rynkowych. W ostatnich latach jest dostrzegalna zmiana filozofii postrzegania innowacji i stopniowe przejście od zamkniętego do otwartego modelu innowacji. Zmieniającemu się paradygmatowi innowacji towarzyszy także pytanie o to, w jaki sposób komercjalizować wyniki otwartych procesów innowacyjnych. Celem artykułu jest przegląd modeli komercjalizacji innowacji, które mają zastosowanie w procesach innowacyjnych prowadzonych na podstawie zasad typowych dla otwartego modelu innowacji.

Introduction

Dynamically changing conditions force businesses to seek new ways of gaining an actual competitive edge. One such pathway is to implement innovations. However, developing and launching novel or significantly improved solutions alone may not suffice.

There has been a change in the approach to understanding innovation in recent years, namely a gradual move from a closed to an open innovation model, in which enterprises employ both external and internal ideas in innovation processes they are conducting. The shifting paradigm of innovation is accompanied by the question of how to commercialize the outcomes of open innovation processes. The relevant literature describes many models of commercialization, but their scopes differ to a large extent. The present article aims to review and categorize models of commercialization of innovations.

Open Innovations and Innovation Process

Innovations are now a key factor which determines a competitive position of market entities. Dynamically changing conditions of operating business force the entities engaged in this process to re-orient their innovation policies. Such changes are especially evident in developed economies, where economy of a novel type emerges and morphs into the network economy or knowledge-based economy. It can be characterized by three basic properties: a high share of the service sector in employment and generation of the GDP, a significant share of knowledge and innovation in the growth stimulation, and an increase in the role of formal and informal relations between economic entities (Limański, 2011, p. 136).

The emergence of this new type of economy is accompanied by modifications in the innovation activities. We witness a move away from the traditional (closed) models to open models of innovation, which follows from the increasing role of the body of knowledge (Oberg & Alexander, 2018, p. 1). The open model of innovation describes how entities creating innovations use internal and external sources

of market information to share the knowledge. This process often takes the form of a network of relations and systems of relations and interactions (Ollila & Elmquist, 2011, p. 276).

Within this space in the subject literature, a new paradigm of innovation processes has been formed. It assumes rejecting the previous philosophy and placing more emphasis on the fact that innovations should result from numerous interactions and relations between businesses and surrounding entities. This approach has led to a new model, an alternative to the traditional (closed) model of innovation, laying the foundation for a more contemporary approach to managing innovations, such as the open innovation paradigm (Rojek, 2014, p. 210).

The open innovation model reevaluates the guidance set by traditional models, for instance it abolishes the assumption that any entity is in full control of all elements of an innovation process. The new model adopts valuable ideas generated not only in laboratories or R&D departments, but also in the environment of the entity engaged in innovation activities. Thus, market success of an enterprise does not depend solely on the resources of the company; it requires seeking ideas and modern technologies outside the boundaries of the company (Chesbrough, Vanhaverbeke & West, 2008, p. 3). This assumption also involves forms of market access, seeking innovation as well as the commercialization and sale of a developed solution (Pohulak-Żołędowska & Żabiński, 2016, p. 490, 491).

Open innovations represent a holistic concept of the sustainable use of both internal and external information for the sake of potential innovations. This approach involves seeking, testing and exploiting various sources of information simultaneously in order to identify innovations which show commercial potential (Inauen & Schenker-Wicki, 2011, p. 496-520). As pointed out by Spoińska (2013, p. 288), the use of external participants in innovation processes has a positive effect on the reduction of cost and risk of the research activities, and leads to effects of scale in production. It is also significant that the potential of technological convergence and synergy of resources is noticed in this process. Bearing the above in mind, suppliers, clients, competitors, research institutes and higher schools become natural partners in the open innovation model (Buganza & Verganti, 2009, p. 309).

The opening of an innovation process concerns all of its phases. Both in the internal stage and the development of an innovation and then during the marketing stage, external resources are engaged in order to elaborate an innovative solution. In the research phase, it is possible to transfer the activity outside the company and its R&D department to specialized research units; in the implementation phase, the company may attempt to acquire licenses and other technological solutions from external entities which exercise intellectual property rights. Sometimes this process runs in reverse and takes a form of sale of own patents, rights and technologies to other companies (Pohulak-Żołędowska & Żabiński, 2016, p. 492).

Defining the categories of an innovation process in the context of the open innovation paradigm is extremely difficult, as its course depends to a large extent on specific characteristic of an entity which engages in it. The extent of the complexity of an innovation process depends on the assumed objectives and results, understood as effects of the innovation process. Practically every innovation process is characterized by occurring in a stepwise, cyclic and simplified manner. It usually involves seven stages (Baruk, 2010, p. 4):

- seeking and collecting ideas;
- selection of the ideas for viability, profitability and potential demand;
- elaborating and testing the concept of a new product among potential buyers;
- economical and financial analysis including the forecast of sales, cost, and profit;
- converting the concept of a new product into a technical design and prototypes;
- marketing test;
- commercialization of the product.

An innovation process, regardless of the character of an innovation, is realized in a specific, often different organizational context, which to a large extent determines its course. Proper management of an innovation process leads to the transition of an organization previously understood as a traditional into an innovative one, by means of a model of steering the innovation process.

The model of steering the innovation process may take a form defined in the relevant literature as traditional or modern. The former one treats innovation as an element of a separate whole, which in some way closes the innovation cycle. Innovation perceived in this way influences the corporate management, which – using a wide array of negotiation instruments or direct pressure (possibly evoking resistance and rejection) – influences the behavior of the internal clients of the process taking place in the culture specific to that organization. On principle, this culture is part of the status quo and does not change easily, which means that the innovation formed this way seems excessive, as it only determines the existing factual state. A significant problem observed on the grounds of the traditional model is the barrier of routine perception, arising from the long-term participation in the organization's life and the following routine, which endows the traditional model with a static character and stands in contradiction to the dynamics of change (Francik & Kosała, 2011, p. 16, 17).

Unlike in the traditional model, the modern model of managing the innovation process places less emphasis on the result (effect). More attention is paid to the relations created inside the organization, which take the form of a change in the culture, a new shape of the organization, in which knowledge, tradition, intuition and experience become an entire range of benefits. Knowledge is a starting point in shaping the ideas and harmonious realization of internal and external innovations. In the modern model,

innovation becomes an opportunity for an organization, a way to strengthen its level of creativity. Changes involving the search for the most effective and best evaluated reinforcements turn the clients of internal innovation into approving employees, who sometimes initiate changes, which means that the effect of innovation does not close the stream of creativity, but begins another innovation process (Francik & Kosala, 2011, p. 16, 17).

The context described above builds a clear image of the phased character of innovation activities. It is then warranted to ask the question what the mentioned change is and should be. Is every change an innovation? Should a designed and implemented change satisfy specific criteria? What should it result in? What should it involve? (Baruk, 2009, p. 13). The answers to these questions should be found in conceptual models of the commercialization of an innovation process.

Models of Commercialization of Innovation Process

The essence of a properly implemented innovation process is not only the elaboration of a novel or greatly improved (modified) product, but also, and more importantly, its successful commercialization. This phase usually begins at the preliminary stage of designing a new solution, by defining the functional properties of the product or technology being developed. This activity is therefore a starting point for the determination of the market potential of a given innovative product or service. This process entails numerous, interconnected variables, which often makes it assume a complex form, which necessitates the participation of specialized stakeholders in the commercialization process. They assume the role of the so-called brokers of technology, who are intermediaries between the research sector and economic practice, engaging in a range of operations, including (Kalinowski, 2010, p. 11): presentation of new, innovative ideas, products or processes; conducting developmental activities and identifying potential applications of the innovation; generating prototypes of innovative products, seeking market applications of technologies and conducting technological audits; analyzing markets, designing and launching marketing strategies, as well as launching the product on the market and its sale.

In the traditional understanding, the transfer of technology is defined as a network of relations and dependencies between the world of science, research and development, and economic enterprises. It occurs both inside market entities and at the point of contact between individual inventors and entrepreneurs. Technology transfers include two elements: transmission and absorption. The former involves the acquisition of knowledge and technology and passing them on to a potential recipient, while the latter is the acquisition of knowledge and technology and their acceptance (Wiatrak, 2018, p. 247). Moreover, it should be noted that the transmission and absorption of knowledge may occur in two dimensions: horizontal and vertical. The horizontal transfer takes place between

economic entities engaged in similar business, while the vertical transfer refers to the cooperation between universities and research institutes and enterprises, public and social organizations in order to sell licenses or realize the projects (Klimczuk, 2010, p. 151). The horizontal transfer entails precise determination of priorities in the cooperation and their connection to the objectives inside both the research entity and the economic enterprise. It makes it possible to expand the educational offer by programs preparing for the practical application of knowledge and technology; to develop the directions of research which are commissioned by economic, public and social organizations; to consult on preparation and implementation of local strategies for particular areas (on macro-, mid-, and micro-levels); to set up clusters, especially those based on knowledge, which rely on the access to research results (Wiatrak, 2015, p. 82).

The subject literature identifies several models of the commercialization of innovation. One of the most characteristic is the so-called Jolly model, which was developed on the basis of an analysis of technological cycles proposed by Schumpeter, Wright and Cooper. V.J. Jolly proposed the so-called segmentation understanding of the commercialization process, involving the setting of phases of development as well as the stages referring to the readiness of a market launch in order to develop and maintain the innovation on the market. The Jolly model consists of five subsequent stages and four intermediary elements, which mark the so-called reinforcement, a specific bridge in the process of the commercialization of innovation (Kaczmarek, Bochnia & Gierulski, 2015, p. 106):

- awareness – an idea and vision of a product, determination of technical parameters and viability;
- reinforcement – interest and acceptance;
- incubation – determination of commercial potential, preparation of a business plan, securing the funding, selection of the production location;
- reinforcement – collection of resources;
- introduction – design of the final version of the product to be launched on the market, organization of the production process;
- reinforcement – shaping of the market;
- promotion – presentation of the product to potential buyers, collection of consumer surveys, organization of the distribution network;
- reinforcement – seeking of complementary resources;
- maintenance – expansion and development of the product securing a stable market position.

A particular approach to commercializing innovation is found in what is referred to as the R. Cooper model. It introduces the stages of control and evaluation of the commercialization potential into the process, which enable its ongoing verification against the previously assumed plan. The Cooper model defines the set of operations and activities which are to be realized in particular stages. They correspond with the particular stages of the enterprise development and condition a possible move from one stage to another. Hence, the point

of making a decision becomes the moment when the whole process is subject to control and evaluation; this is when the decision to continue or abandon the work is made. This system aims at minimizing the risk and raising the effectiveness of the conducted work over the commercialization of the innovation (Bolek & Bolek, 2014, p. 48)

Another approach to the process of commercialization is an objective-based model, which includes five phases (Kaczmarek, Bochnia & Gierulski, 2015, p. 107):

- finding out what to produce. This stage requires particular commitment and creativity;

- defining the technical practicality of manufacturing the product with a simultaneous review of the expectations, needs and desires of potential customers. This phase requires the engagement of designers, constructors, and technologists. It is also recommended that these experts closely cooperate with specialists in marketing and promotion;

- seeking the sources of business success and making decisions as to the further direction of the project (continuation or abandonment);

- answering the question how to manufacture the product requires a combination of engineering expertise and business activities;

- engaging into marketing and promotional activities, pointing the potential markets for the new product and its distribution channels.

The subject literature describes other models of commercialization of innovation that give special priority to the protection of intellectual property. An example of such an approach is the model of commercialization generated in 2008, called SEKT (Network of Effective Commercialization of Technologies). The aim of the model is to generate knowledge with the largest possible added value, through the wide engagement of companies at the stage of identifying the priority research areas. The SEKT model foresees support for those scientists who stand out with excellent body of research and a high number of implementations in economic practice. An important component of the presented model of commercialization of innovation consists of attempts to protect intellectual property internationally. Such activities are realized through the cooperation with scientists who will participate in the future revenue from the commercialization of technologies and innovation, creating a possibility of participation (e.g. for a definite period) of the R&D staff in private companies, elaboration of new forms of financing research (patent fund, incubation fund), and attempts to integrate research teams in the network of cooperation with private companies (Kalinowski, 2010, p. 18).

Models of commercialization of innovation which allow for the process of intellectual property management show the innovation process from the perspective of two important elements: the unit of research and development and the intermediary institution in the transfer of technology and innovation. The transfer of knowledge, technology and innovation in these models is determined by the phases of commercialization. It may occur at each step

of this process or span a few phases at the same time. This is characteristic for the process of knowledge transfer from a research institute to economic practice, as during such a transfer of technology between the academia and business several assignments are realized, such as: basic research (acquiring new knowledge which is not expected to be applied in practice), applied research (new knowledge to be applied in practice), industrial research (acquiring knowledge in order to modify or optimize the existing products, processes, or services), pre-competition research (transformation of industrial research results into projects of new products, processes, or services), prototype building, and implementation activities (introduction of the new solution to industrial practice) (Kalinowski, 2010, p. 22, 23).

The process of generating innovation in the institute-business model is based on the constant monitoring of implementation effects in order to minimize the risk of failure of the process of generating and commercializing the innovation. This evaluation usually assumes the form of the TRL (Technology Readiness Levels) model and takes into account, among others, the state of development of a new product or technology, prospects for future elaboration, the amount of investment necessary to implement the elaborated solution, and the risk of the innovation. The methodology within the TRL model does not translate into the process of commercialization as such; hence, it does not answer the question whether there is demand for the evaluated product or technology. It constitutes the background for the other models of commercialization described above (Kaczmarek, Bochnia & Gierulski, 2015, p. 108).

Conclusions

The process of commercialization should yield economic, technological, social and environmental benefits to every participant. A properly managed process of the commercialization of innovation enables reinforcement of the potential of both the entity conducting the innovative activity and the ones at the receiving end of the innovation, which leads to an effective conversion of research results into a real product or service. This is particularly evident when the knowledge acquired in the process of innovation is personalized and adapted to the ability of the recipient (Wiatrak, 2018, p. 248). The effectiveness of the commercialization of innovation in this approach is determined by a few factors. The entity which offers knowledge or technology should engage in constant efforts towards the effective adaptation of the offered product to the market expectations and needs expressed by the final customers. Moreover, the entity which purchases the product should possess an adequate level of technological absorption, which conditions the scope and manner of adoption of the specialized solutions.

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