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The Impact of Economic Globalization on the Structural Indicators of Production and Employment in Processing Industries

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Abstract
The relationship between economic globalization and structural indicators of output and employment is substantiated in a processing industry. It is proved that there is a high correlation between the economic globalization index (de facto) and the shares of production in the structure of output and employment of the processing industries of Poland, Italy, France, and Germany. With the help of regression equations, possible structural changes in output and employment in the processing industries of the analyzed countries were modelled with an increase in the economic globalization index by 5 points. To achieve the obtained results, an original methodological approach and classical methods of economic analysis were applied.

Keywords
Economic globalization, processing industry, structure, output, employment.

Introduction

Economic globalization today and during the last decades can be considered a factor of the most significant and broadest impact on the industry of both highly developed industrial economies and countries with transition economies. The issue of the impact of economic globalization on the industry of countries is debatable; today, there is no single sufficiently scientifically based position on what this impact is (negative or positive). There is also no single, empirically proven statement regarding the impact of economic globalization on the industry of different countries (with highly developed economies, developing countries, or other classifications). "It is difficult to draw certain conclusions regarding the impact of globalization on the country's economic and social indicators. A possible argument can be heterogeneity in the structure and politics of different countries" ([x]Naz, A. 7 2023).

Trade liberalization can have a negative impact on certain countries due to market imperfections, differences in technologies, and their availability ([x]Abdulkarim, 2023). Therefore, the consequences of economic globalization are interconnected with the structure of the country's economy and its policies and technologies. Consequently, for certain economies with one structure, economic globalization can be positive, and for others, it may not be. Significant fundamental problematic issues regarding the impact of economic globalization on the economic and industrial development of highly developed and transition economies are raised in the works of world-class scientists, in particular (Keynes, 1933; Stiglitz, 2002; Mazzucato, 2021). In this context, as well as according to the results of the author's previous research (Ishchuk et al., 2020; Ishchuk et al., 2021; Ishchuk et al. 2022), the necessity arises and the expediency of answering questions regarding the existence and modelling of the impact of economic globalization on the structure (share of production in output and employment) of a processing industry as one of the key sectors of the economy.

Literature review

Different perceptions of economic globalization are based on fundamental theories. Thus, according to Ricardo's theory of comparative advantage, countries can gain advantages in international trade when they focus on the production of goods that create the low-

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est opportunity costs compared to other countries. In other words, this theory advocates the specialization of countries in the world economy (Estevez, 2022). However, according to Keynes' idea of "National self-sufficiency," every country can and should strive to achieve economic self-sufficiency in order to ensure economic and social development; that is, to produce all the goods and services it needs as much as possible and not to ignore its economic security when conducting international trade. "I sympathize, therefore, with those who would minimize, rather than with those who would maximize, economic entanglement among nations. Ideas, knowledge, science, hospitality, travel these are the things which should by their nature be international. But let goods be homespun whenever it is reasonably and conveniently possible, and, above all, let finance be primarily national" (Keynes, 1933).

Joseph Stiglitz, winner of the Nobel Prize in Economics, emphasizes the fact that developed Western economies benefit economically from economic globalization. In contrast, in developing countries, economic globalization worsens poverty – "Western countries force poor countries to eliminate trade barriers, while they themselves maintain them, preventing developing countries from exporting their agricultural products..." (Stiglitz, 2002). Negative manifestations of economic globalization can also be corruption in the political sphere, polluted environment, mass unemployment, social tension and ethnic conflicts (Stiglitz, 2002).

In modern applied economic studies conducted in different countries of the world, the impact of economic globalization on different economies is also evaluated differently. Thus, the study (Lurweg et al., 2010) analytically substantiates the economic benefits for Germany from economic globalization. In particular, in 2005, thanks to the growth of net exports of the processing industry, the number of jobs in the country increased by 2.4 million people. Exports of high- and medium-high-tech industries, in particular engineering, had the greatest impact on employment growth. The results of the study were based on the data from the "input-output" tables for 2005 and were based on the calculated impact of the growth of net exports of each of the productions of the processing industry on the change in the number of people employed in the country's economy in general and in the sector whose products are exported. In addition, the study calculated the impact of foreign trade with Germany's main partners on changes in employment in the country. At the same time, it is appropriate to note that during the last 5-8 years in Germany, there has been a reduction in jobs and exports in the key productions of the country's processing industry, in particular machine building (Eurostat 2023).

This could be a consequence of global instability, the global semiconductor crisis, as well as unreasonably inflated strategic expectations from economic globalization and export promotion policies. As a result of the expansive export policy of Germany in the conditions of economic globalization, the dependence of the German economy on market conditions has increased significantly. It follows that the impact of economic globalization on the German economy is ambiguous.

The positive impact of economic globalization on the economy of Western countries is substantiated in research (Erixon, 2018). It notes that the rapid growth of world trade over the past three decades before the global financial crisis of 2008 significantly improved the economies of Western countries and the standard of living of their citizens. Globalization spreads competition and increases the number of jobs as well as the level of remuneration for employees. New products produced as a result of increased competition become more technological and ecological. "Globalization has been a major force in spreading new technologies and providing new economic job opportunities in both advanced and developing economies." However, after the 2008 crisis, globalization came to a halt, and world trade fell victim to the rise of protectionism around the world. This caused a decline in macroeconomic indicators for all economies (Erixon, 2018). Before the global financial crisis, economic globalization was growing and could have had a short-term positive impact on certain socio-economic indicators of certain sectors or corporations, and adhered to the opinion that one of the reasons for the emergence or spread of the world financial crisis was precisely economic globalization in the form in which it existed until this period (2008). In particular, the financial and economic security of countries, financial markets, and the real sector of national economies was ignored. Therefore, the strengthening of protectionism after the financial crisis is perceived as a rational necessity, and the decline of macroeconomic indicators is still a consequence of the mistakes made during the unwinding of economic globalization while ignoring national and world economic security in general.

In the study (Shangquan, 2000), it is emphasized that economic globalization is based on the rapid development of science and technology, which, in turn, contributes to a significant reduction in transportation costs in international trade. It was also noted that economic globalization, to some extent, contributed to the integration of former planned economies into the world economy, although it was noted that the main carriers of economic globalization are transnational corporations.

At the same time, many studies conducted in different countries have focused on the prevailing negative aspects of economic globalization. In particular, the coun-

tries of Central and Eastern Europe suffered significant losses from their rapid integration into the world economy and the EU economy (Kuc-Czarnecka et al., 2021).

The initial impact of economic globalization on the business environment of the Baltic countries is gradually decreasing, and the process of globalization is turning into functional regionalization. In conditions of instability, such regionalization increases new challenges for the business environment, primarily in relation to maintaining competitiveness ((Masteikienė et al., 2015). Economic globalization is primarily beneficial to transnational corporations, but instead causes a decrease in the number of small and medium-sized national manufacturing enterprises, aggravates such global social problems as hunger, unemployment, poverty, monopolization, as well as environmental problems in developing countries. "The structure of economic globalization is itself corporate protectionism because it is set up to protect corporations from the regulations of democratic societies." (World Trade Observer 1999).

Thus, it can be stated that in modern economic science, there are two fundamental and clearly expressed trends in the perception of economic globalization: for and against economic globalization. Some scientists who adhere to Ricardo's theory of comparative advantages see only or mostly positive aspects of globalization and justify their position with individual indicators at the world or corporate level: the growth of scientific and technological progress, the increase in the number of jobs in developing countries, the acceleration of logistics, and the reduction of transport costs, as well as the economic growth of developed economies, etc. However, supporters of Keynes's theories and ideas see negative aspects in economic globalization and justify their claims by the substantial deterioration of national self-sufficiency, competitiveness of national production, and economies in general. Thus, these discussions can be conventionally outlined by "transnational corporations vs. national economies." To immediately quote the answer: "In the pursuit of narrow corporate objectives and strategies, a relatively small number of these enterprises have achieved such a command over global resources, and with it such an impact on the international economy, as to raise serious doubts about the long-term survival of the nation-state as a form of political organization." ((Panić, 1998). The following methodological and analytical features are common in the reviewed and other applied studies approving or criticizing economic globalization. The magnitude of economic globalization of a certain country is not identified by specific indicators. Instead, only superficial visual processes and changes that occurred in the country's economies in a certain period of time are considered. In most cases, the initial stage of counting time is the year of signing certain international agreements.

The use of this approach gives very conditional results for assessing the impact of economic globalization. It is an obvious fact that the level of liberalization of foreign trade, export and import duties, and quotas is different in different countries. Therefore, the impact of economic globalization is likely to be different. The results of the impact of economic globalization on the economy or industry of certain countries are determined by analyzing the trends of absolute indicators, for example, the dynamics of exports and imports, volumes of manufactured products, foreign investments, the number of employees, incomes, etc. Much less attention is paid to relative and structural indicators. In particular, the impact of economic globalization on the change in the structure of industries or economies of countries is not investigated. At the same time, it is logical that economic globalization, as one of the most long-lasting and large-scale factors, can eventually change the structure of the national, regional, and therefore the world economy. Based on the considered features, gaps, and contradictions in existing scientific research, as well as the results of previous authors' works Ishchuk, S., Sozanskyy, L., Pukała, R. (2020), Ishchuk, S., Sozanskyy, L., Pukała, R. (2021), Ishchuk, S., & Sozanskyy, L. (2022), the main idea, hypothesis, and purpose of this study were formed.

Research hypothesis. There is, for the most part, a high or very high direct or inverse correlation between economic globalization and the shares of production in the output and employment structures of the manufacturing industry.

The purpose of this study is to model the impact of economic globalization on the structure of output and employment in a processing industry.

Materials & Methods

At the first stage of this study, to identify the magnitude of economic globalization, an analysis of the level and dynamics of Economic Globalization, de facto index (KOFEcGIdf), described in detail and calculated in the (KOF Globalization Index (2022), was carried out. This indicator most objectively reflects the actual state of foreign economic activity of countries. The higher the KOFEcGIdf value, the more open the country's economy is to economic globalization and foreign trade, and vice versa. The range of this indicator is from 1 to 100. KOFEcGIdf is based on many indicators, in particular those that reflect foreign trade in goods and services, foreign investments, and economic restrictions.

At the second stage of this study, the current state and

changes in the production and employment structures of the processing industry of the countries under study were analyzed. The structural and dynamic analysis of the processing industry of the countries studied, in terms of output and employment, was carried out to identify the level of technology, and therefore the key sectors that can potentially ensure innovative development and economic self-sufficiency of the countries. In other words, these two structures (output and employment) show the specialization of the country's processing industry. The key task of this stage of the research was also to identify the closeness and type of correlation between economic globalization and the share of each of the productions in the output and employment structures of the processing industry of the country. To identify these relationships, the pairwise correlation coefficient was calculated between KOFEcGIdf and each of the mentioned structural indicators. Calculations were carried out in the Statistica software package. At the third stage, in order to determine the magnitude of the impact of economic globalization on the change in the structure of output and employment in the processing industry, regression analysis methods were used. As a result of the calculations, one-factor regression models of the influence of KOFEcGIdf on the change were built: shares of each of the productions in the output and employment of the processing industry of the country. Calculations were made in the Statistica software package. The statistical significance of the constructed univariate regression models was checked using the appropriate statistical indicators (Multiple R, R Square, Adjusted R Square, Standard Error, t Stat, P-value). The final conclusion about the statistical significance of the regression equation was made after the results of its interpretation (substitution of the actual values of KOFEcGIdf into the obtained regression equations). The processing industries of Poland, Italy, France, and Germany were chosen as the object of this study. The choice of these countries as the object of research of the processing industry is because they are all large EU countries. However, the industry of each of these countries has its own characteristics, branch specialization, and is at different levels of industrial and innovative development. An important argument in favor of choosing the economies of these countries was the significant differences in the magnitude of economic globalization according to the indicator (KOFEcGIdf). Therefore, the author of this study was interested in tracking whether the degree of economic globalization (openness or closedness to foreign trade) has an impact on the structural and qualitative indicators of the processing industry. 2000-2019 was chosen as the research period. During this period, the economies of Eastern Europe were integrated into the EU, which strengthened economic globalization.

The research used statistical data: (KOF Globalization Index 2023, Eurostat 2023 and (OECD.Stat 2023).

Results

Results of the first stage of this study – Trends and level of globalization of the economy of European countries

As a result of the first stage of the conducted research, the following data were generated and processed. According to the rating of the index of globalization of the economy, de facto, the most open to the liberalization of foreign trade are small countries with a low level of economic self-sufficiency, oriented to the export of several items of goods or services and, at the same time, highly dependent on imports. On the contrary, industrialized economies are mostly more closed to the liberalization of foreign trade. As of 2019 (latest data), in the ranking of the index of actual globalization of the economy, out of 204 countries in the world, the European countries the Netherlands, Belgium, Ireland, Malta, Switzerland, and Cyprus take the first place. The most closed to economic globalization are Romania, Italy, Poland, and France. At the same time, decisions regarding the level of openness of the country's economy are made individually. Such decisions may be determined by state strategies, the country's economic potential, and the terms of relevant international agreements. For example, the Czech Republic, despite the well-known significant dependence of its economy on foreign trade, maintains a moderate level of economic openness (40th place in the rating). Ukraine, which has significant but unrealized industrial potential and human capital, almost equalled Germany (36th and 34th place, respectively) in the ranking according to the value of the index of the actual globalization of the economy. The trends of economic globalization in different countries are also different. This is clearly illustrated by the dynamics of the economic globalization index, de facto selected for this study of four EU countries for the years 2000-2019. In Germany, this indicator began to grow (with the exception of 2009). In Poland, economic globalization is characterized by two periods: rapid growth (2002-2008) and stable growth (2010-2019). In France and Italy, economic globalization maintained a trend similar to that of Germany – relatively constant growth, with the exception of 2009. From the considered trends, it follows that global challenges, in particular the global financial crisis of 2008, lead to a certain decrease in the level of foreign trade liberalization.

Results of the second stage of this study – The relationship between economic globalization and structural changes in the processing industry of the countries

According to the results of the second stage of the research, in particular the analysis of structural changes in the production of the processing industry of the studied countries, it was established that the structure and structural shifts in the production of the processing industries of Poland, Germany, France, and Italy are not the same and have significant differences, with different directions in terms of technology. In addition, as already noted, the level of economic globalization (KOFEcGIdf indicator) in all four countries is also different. However, despite this, there is actually a high or very high direct (an increase in one indicator leads to an increase in another) or an inverse (increase in one – decrease in another) correlation.

A high or very high direct relationship means that for some manufacturing industries, this relationship is high, and for others it is very high. For the most part, a high or very high direct relationship is present for the productions in which the country specializes, or which occupy a significant share in the structure of its processing industry. The reverse relationship is characteristic of productions that are not among those in which the country specializes and has high advantages.

The relationship between the de facto economic globalization index and the output structure of the processing industry is evidenced by the data of the calculated pair correlation coefficient (Table 1). A positive value of the pairwise correlation coefficient, close to 1, indicates a very high direct relationship between the indicators. A negative value of this indicator, close to (–1), indicates the presence of a very high inverse correlation.

From those listed in Table 1, values of the pair correlation coefficient led to the following analytical conclusions:

1. The grounds for the author's hypothesis that there is usually a high or very high direct or inverse correlation between economic globalization and the output structure of the processing industry are confirmed. For some industries, this correlation is high; for others, it is very high or vice versa. A good example and justification for this are the high values of the pairwise correlation coefficient for the majority of the productions of the processing industry of the studied countries.
2. Under the influence of economic globalization, structural transformations of the processing industry in the considered countries are taking place in different directions. This may be due to the different priorities of the customs policies of countries and special international agreements that establish and regulate tariff and non-tariff barriers in world trade, as well as the effectiveness of strategies to increase the competitiveness of nationally produced products in the domestic and foreign markets. Thus, in Poland, with the growth of economic globalization, the share of low-tech industries in the products of the processing industry is decreasing, while the share of industries with a higher technological level is increasing, in particular C27, C29, and C25. At the same time, it should be noted that with the growth of foreign trade liberalization, the share of C21 high-tech products is decreasing. It is also worth paying attention to the fact that, in Poland, unlike the rest of the three analyzed countries, there is a very low correlation between economic globalization and the share of C26 production in the output of the processing industry. This can be explained by the fact that the mentioned production in Poland during the last decades showed a low level of development, and therefore, the changes caused by the globalization of the economy almost did not affect the size of its share in the production of the country's processing industry. In the products of the processing industry of Italy, with the growth of economic globalization, structural changes are taking place, mostly in the direction of a decrease in the structure of the output of the processing industry in the share of low-tech products (C10-C12; C13-C15; C16-C18; C30-C33) and high-tech production (C26), while there is an increase in the share of medium-high-tech production (C28-C30) and high-tech production (C21).

Such structural transformations are signs of the rationality of the state policy of this country regarding the improvement of specialization and innovative development of industry. In France and Germany, the result of the growth of globalization of the economy was an increase in the technological level of the processing industry, that is, an increase in the share of industries whose products have high competitive advantages in the world market. In particular, in France, this applies to the production of C30; C10-C12; C25; C20, and in Germany – almost the entire engineering sector (primarily C29), as well as pharmaceuticals (C21).

The results of the conducted correlation analysis between the index of economic globalization de facto and the structure of employment in the processing industry of Poland, Italy, France, and Germany allow us to assert the existence of a correlation between the index of economic globalization de facto and employment in the vast majority of industries in the processing industry of the studied countries (Table 2). In particular, there is a high inverse correlation between KOFEcGIdf and textile employment in all four countries (C13-C15).

It can be noted that employment in the woodworking industry (which has significant potential for de-

Table 1
Coefficient of pairwise correlation between the index of de facto economic globalization and shares of production in the output of the manufacturing industry

The group	The manufacturing	Code classification of economic activities NACE Rev.2	Poland	Italy	France	Germany
High tech	Manufacture of basic pharmaceutical products and pharmaceuticals	C21	–0.61	0.62	0.30	0.56
	Manufacture of computers, electronic and optical products	C26	0.19	–0.90	–0.77	–0.68
The medium-high-tech	Manufacture of chemicals and chemical products	C20	–0.48	0.33	0.65	–0.59
	Manufacture of electrical equipment	C27	0.77	–0.77	–0.78	–0.93
	Manufacture of machinery and equipment not elsewhere classified	C28	–0.28	0.87	–0.67	0.93
	Manufacture of motor vehicles, trailers and semi-trailers	C29	0.93	0.57	–0.66	0.70
	Manufacture of other transport equipment	C30	0.17	0.64	0.94	0.71
The moderately-low-tech	Manufacture of coke and refined petroleum products	C19	0.35	0.40	0.01	0.08
	Manufacture of rubber and plastic products	C22	0.77	–0.23	–0.76	0.41
	Manufacture of other non-metallic mineral products	C23	–0.86	–0.85	–0.58	–0.88
	Manufacture of basic metals	C24	–0.03	0.77	–0.17	0.48
	Manufacture of fabricated metal products, except machinery and equipment	C25	0.88	0.07	0.47	0.58
The low-tech	Manufacture of food products; beverages and tobacco products	C10-12	–0.93	0.36	0.67	–0.70
	Manufacture of textiles, wearing apparel, leather and related products	C13-15	–0.96	–0.86	–0.84	–0.97
	Manufacture of wood, paper, printing and reproduction	C16-18	–0.74	–0.94	–0.96	–0.94
	Manufacture of furniture; jewellery, musical instruments, toys; repair and installation of machinery and equipment	C31-33	–0.31	–0.63	0.76	–0.10

*Calculations were made for the period 2000-2019. Source: elaborated by the authors based on Eurostat 2023 and KOF Globalization Index 2023

velopment in all four countries) has decreased with increased economic globalization. In France and Germany, which are among the leaders in Europe in terms of forest area, a very high (>-0.91) inverse relationship between KOFEcGIdf and employment in the sector was found (C16-C18). At the same time, in Poland and Italy, this dependence was also reversed, but low. This indicates that economic globalization has facilitated the import of raw materials, particularly wood, from industrially less developed countries with economies in transition to industrialized countries. On the one hand, this situation is beneficial both to countries that export and receive foreign exchange earnings, and to importing countries that preserve their own natural resources and receive added value from the processing of raw materials. But, on the other hand, in natural

Table 2
Coefficient of paired correlation between the index of globalization of the de facto economy and the share of employees in the processing industry, %

The manufacturing	Code classification of economic activities NACE Rev.2	Poland	Italy	France	Germany
Manufacture of food products; beverages and tobacco products	C10-12	0.41	0.03	0.93	0.24
Manufacture of textiles, wearing apparel, leather and related products	C13-15	–0.91	–0.52	–0.85	–0.95
Manufacture of wood, paper, printing and reproduction	C16-18	–0.41	–0.48	–0.94	–0.91
Manufacture of coke and refined petroleum products	C19	0.73	–0.43	0.37	–0.65
Manufacture of chemicals and chemical products	C20	0.81	–0.19	0.55	–0.71
Manufacture of basic pharmaceutical products and pharmaceutical preparations	C21	0.86	–0.33	0.67	0.92
Manufacture of rubber and plastic products	×22	0.79	–0.37	–0.72	0.86
Manufacture of other non-metallic mineral products	×23	–0.75	–0.54	–0.75	–0.94
Manufacture of basic metals	×24	0.77	–0.26	–0.88	–0.45
Manufacture of fabricated metal products, except machinery and equipment	×25	0.87	–0.19	0.73	0.90
Manufacture of computer, electronic and optical products	×26	–0.57	–0.35	–0.79	0.58
Manufacture of electrical equipment	×27	0.79	–0.30	–0.77	–0.72
Manufacture of machinery and equipment n.e.c.	×28	–0.60	–0.02	–0.75	0.89
Manufacture of motor vehicles, trailers and semi-trailers	×29	0.30	–0.25	–0.91	0.00
Manufacture of other transport equipment	×30	–0.85	–0.16	0.96	0.88
Manufacture of furniture; jewellery, musical instruments, toys; repair and installation of machinery and equipment	×31-×33	0.88	–0.26	0.77	0.39

Source: elaborated by the authors based on Eurostat 2023 and KOF Globalisation Index 2023

resource-exporting countries, ecology is deteriorating, innovative and socio-economic development is slowing down, labor migration is increasing, and in importing countries, employment is decreasing, and economic dependence on the import of raw materials is increasing.

An interesting result of the conducted correlation analysis is the correlation between employment and economic globalization in one of the main modern high-tech industries, namely in the production of computer, electronic, and optical products (C26). In Poland and France, such a connection was high and inverse, while in Germany, it was high but direct. This is another sign of deepening specialization in the world economy, which is most noticeable in the field of mechanical engineering. On the other hand, in Poland, a significant positive (direct) relationship was found between the de facto economic globalization index and employment in electrical equipment manufacturing (C27), while in France and Germany, on the contrary, it was inverse.

This feature is explained by the fact that the production processes of C27 products, which include wiring, electrical equipment, batteries and accumulators, electric lighting equipment, and household appliances, have been clearly divided between countries in recent decades. In countries with higher wages (Germany, France), the design and production of basic parts take

place, while in countries with lower wages, particularly in Poland, assembly processes occur. It is important to pay attention to the revealed connections between the index of globalization of the economy and employment in one of the most strategic machine-building industries – the production of machines and equipment not included in other categories (C28). This is the production of fixed assets, machines, and equipment for all branches of the economy.

Therefore, the competitiveness, efficiency, and innovativeness, respectively, of all those sectors that consume these products depend on the innovativeness of the products of this production. According to the results of the correlation analysis, a high direct (positive) relationship was found between economic globalization and employment in the production of machinery and equipment not included in other categories in Germany. At the same time in Poland and France, such a relationship was highly inverse, and in Italy, it was absent. The results of the mentioned relationships in the production of cars, trailers, and semi-trailers (C29) turned out to be somewhat unexpected, primarily due to the lack of a relationship between economic globalization and employment in this industry in Germany. According to a 2005 study, this effect was high (Lurweg et al., 2010). However, since 2009 until now, the German automobile industry has been undergoing reorganization and structural changes triggered by the intensifying competition in the global automobile markets, the instability of the economic situation and demand, and other interrelated challenges. According to 2019, the positive effects of the spread of foreign trade liberalization observed since 2000 have been completely eliminated. It is also worth paying attention to the fact that employment in the production of cars, trailers, and semi-trailers (C29) in France has decreased with the growth of globalization of the economy (the correlation between the indicators is very high and inverse). Summarizing the results of the analysis, it is possible to state strong connections between economic globalization and structural indicators of the processing industry.

This gives reason to consider the author's hypothesis as justified – that between the index of economic globalization (de facto) and the shares of productions in the structures of output and employment of the processing industry, there is mostly a high or very high direct (for dominant productions) or inverse (for other productions) correlation relationship. Thus, summarizing the results of the second stage of the conducted research, it can be stated that during the years 2000-2019, under the influence of the globalization of the economy, there were changes in the structure of output and employment of the processing industries of Poland, Italy, France, and Germany in the direction of a decrease in the share of low-tech industries and, instead, a growth in shares of medium-low-tech and medium-high-tech industries. The considered changes also increased the specialization of the structure of the processing industry of these countries.

Results of the third stage of this study – Determination of changes in the structure of output and employment under the influence of economic globalization.

According to the results obtained at the second stage of the research, in particular, the correlation analysis between KOFEcGIdf and the structures of output and employment in the processing industry of Poland, Italy, France, and Germany, an information and analytical base was formed for the quantitative determination of the interactions between these indicators. For this, one-factor regression models were built for the quantitative expression of the impact of the index of economic globalization de facto (KOFEcGIdf) on the change in the structure of output and employment of the products of the processing industry.

With the help of constructed regression equations, the change in the mentioned indicators was simulated under the condition that KOFEcGIdf increases by 5 points (compared to the current value of 2019). Five points are selected for better clarity. According to the obtained calculation results, in the structure of output and employment of the processing industry (Tables 3 and 4) of the studied countries, with an increase in economic globalization by 5 points and further, the trends towards an increase in the share of individual medium and high-tech productions will continue, while the share of them will decrease for individual low- and low-medium technological productions. For individual productions, such changes will be quite noticeable for structural indicators, which in developed market economies are relatively stable; that is, they change insignificantly over a long period of time.

The practical value of the calculation results lies in the possibility of using the calculated values of the impact of economic globalization on structural indicators of the products of the processing industry when developing appropriate strategies for economic and social development and foreign economic activity. In order to determine how the considered indicators will change when the KOFEcGIdf increases by 1 point, it is enough to divide the values obtained as a result of the simulation by 5. Therefore, it will be easy to predict changes in the considered indicators when KOFEcGIdf is changed by any value. To summarize, the calculation results can be explained by the fact that, on the one hand, economic

Table 3
One-factor regression models of the impact of KOFEcGIdf on the change in the output structure of the processing industry and their interpretation when KOFEcGIdf increases by 5 points

Processing industry	Code NACE Rev.2	Univariate regression equations				The magnitude of the influence of x on Y (Y simulated – Y actual), percentage points			
		Poland	Italy	France	Germany	Poland	Italy	France	Germany
Manufacturing	C	×	×	×	×	×	×	×	×
Manufacture of food products; beverages and tobacco products	C10-12	Y=30.23+(-0.17x)	Y=8.14+0.10x	Y=3.96+0.24x	Y=15.32+(-0.0726x)	–0.82	0.48	1.19	–0.36
Manufacture of textiles, wearing apparel, leather and related products	C13-15	Y=8.26+(-0.091x)	Y=25.96+(-0.283x)	Y=15.01+(-0.185x)	Y=7.139+(-0.0787x)	–0.46	–1.41	–0.93	–0.39
Manufacture of wood, paper, printing and reproduction	C16-18	Y=10.63+(-0.049x)	Y=15.77+(-0.17x)	Y=15.74+(-0.157x)	Y=13.776+(-0.123x)	–0.24	–0.86	–0.79	–0.62
Manufacture of coke and refined petroleum products	C19	**	Y=-2.52+0.133x	**	**	**	0.93	**	**
Manufacture of chemicals and chemical products	C20	Y=6.22+(0.015x)	Y=4.44+0.017x	Y=2.28+0.0896x	Y=10.53+(-0.042x)	–0.07	0.09	0.45	–0.21
Manufacture of basic pharmaceutical products and pharmaceutical preparations	C21	Y=1.92+(-0.01x)	Y=-0.033+(0.044x)	Y=2.19+0.02	Y=0.389+(0.029x)	–0.05	0.22	0.09	0.15
Manufacture of rubber and plastic products	C22	Y=3.54+0.06x	Y=5.33+(-0.015x)	Y=8.40+(-0.0639x)	Y=3.54+0.0094x	0.25	–0.07	–0.32	0.05
Manufacture of other non-metallic mineral products	C23	Y=7.59+(-0.05x)	Y=14.25+(-0.18x)	Y=4.882+(0.025x)	Y=5.479+(-0.040x)	–0.23	–0.66	–0.13	–0.20
Manufacture of basic metals	C24	**	Y=-4.683+(0.182x)	Y=5.71+(-0.02x)	Y=0.794+0.0663x	**	0.91	–0.10	0.33

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Processing industry	Code NACE Rev.2	Univariate regression equations				The magnitude of the influence of x on Y (Y simulated – Y actual), percentage points			
		Poland	Italy	France	Germany	Poland	Italy	France	Germany
Manufacture of fabricated metal products, except machinery and equipment	C25	Y=2.45+0.091x	**	Y=4.66+0.0303x	Y=5.59+0.0196X	0.46	**	0.15	0.10
Manufacture of computer, electronic and optical products	C26	**	Y=6.49+(-0.067x)	Y=19.65+(-0.236x)	Y=11.151+(-0.089x)	**	–4.0	–1.18	–0.44
Manufacture of electrical equipment	C27	Y=1.57+0.046x	Y=7.00+(-0.045x)	Y=5.57+(-0.041x)	Y=12.55+(-0.091x)	0.23	–0.23	–0.20	–0.46
Manufacture of machinery and equipment n.e.c.	C28	**	Y=1.82+(0.175x)	Y=8.83+(-0.0556x)	Y=2.72+0.145x	**	0.88	–0.28	0.72
Manufacture of motor vehicles, trailers and semi-trailers	C29	Y=1.44+0.154x	Y=-0.218+(0.106x)	Y=27.42+(-0.279x)	Y=4.96+0.200x	0.77	0.53	–1.39	1.00
Manufacture of other transport equipment	C30	**	Y=0.104+(0.043x)	Y=-29.88+(0.552x)	Y=-2.066+0.0584x	**	0.22	2.76	0.29
Manufacture of furniture; jewellery, musical instruments, toys; repair and installation of machinery and equipment	C31–C33	Y=8.55+(-0.02x)	Y=9.20+(-0.043x)	Y=0.0616+0.130x	Y=5.39+(-0.004x)	–0.08	–0.22	0.65	–0.02

Source: author's calculations

Y – the share of production in the output of the processing industry; × – KOFEcGIdf

** – the influence of KOFEcGIdf on the share is absent, very low, or the results of statistical testing and interpretation of the regression equation are unsatisfactory.

Table 4
One-factor regression models of the influence of KOFEcGIdf on the change in the structure of employment in the processing industry and their interpretation when KOFEcGIdf increases by 5 points

Processing industry	Code NACE Rev.2	Univariate regression equations				The magnitude of the influence of x on E (E simulated – E actual), percentage points			
		Poland	Italy	France	Germany	Poland	Italy	France	Germany
Manufacturing	×	×	×	×	×	×	×	×	×
Manufacture of food products; beverages and tobacco products	C10-12	E=14.09+0.04x	**	E=-19.28+0.616x	E=11.20+0.016x	0.20	**	3.08	0.08
Manufacture of textiles, wearing apparel, leather and related products	C13-15	E=30.316+(-0.347x)	E=61.21+(-0.80x)	E=22.68+(-0.271x)	E=10.32+(-0.111x)	–1.73	–3.98	–1.35	–0.56
Manufacture of wood, paper, printing and reproduction	C16-18	E=10.86+(-0.016x)	E=29.67+(-0.368x)	E=18.32+(-0.158x)	E=17.15+(-0.147x)	–0.08	–1.84	–0.79	–0.73
Manufacture of coke and refined petroleum products	C19	E=0.0125+0.0105x	E=1.48+(-0.017x)	E=0.289+0.0009x	E=0.44+(-0.0027x)	0.05	–0.09	0.005	–0.01
Manufacture of chemicals and chemical products	C20	E=1.47+0.0286x	**	E=3.037+0.0175x	E=5.78+(-0.0156x)	0.14	**	0.09	–0.08
Manufacture of basic pharmaceutical products and pharmaceutical preparations	C21	E=-0.95+.034x	E=4.48+(-0.048x)	E=-0.127+0.028x	E=-0.32+0.0271x	0.17	1.42	0.14	0.14
Manufacture of rubber and plastic products	C22	E=1.89+0.064x	E=14.27+(-0.159x)	E=11.94+(-0.0863x)	E=3.49+0.0297x	0.32	–0.80	–0.43	0.15
Manufacture of other non-metallic mineral products	C23	E=7.35+(-0.0278x)	E=22.16+(-0.288x)	E=5.19+(-0.0195x)	E=6.48+(-0.043x)	–0.14	–1.44	–0.10	–0.22

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Processing industry	Code NACE Rev.2	Univariate regression equations				The magnitude of the influence of x on E (E simulated – E actual), percentage points			
		Poland	Italy	France	Germany	Poland	Italy	France	Germany
Manufacture of basic metals	C24	E=1.32+0.032x	E=7.49+(-0.07x)	E=6.35+(-0.0469x)	E=4.15+(-0.0073x)	0.16	–0.34	–0.23	–0.04
Manufacture of fabricated metal products, except machinery and equipment	C25	E=3.82+0.10x	E=26.33+(-0.20x)	E=6.90+0.0697x	E=6.53+0.0741x	0.48	–1.02	0.35	0.37
Manufacture of computer, electronic and optical products	C26	E=3.47+(-0.011x)	E=7.79+(-0.084x)	E=8.99+(-0.0816x)	E=3.27+0.0182x	–0.06	–0.42	–0.41	0.09
Manufacture of electrical equipment	C27	E=2.28+0.029x	E=10.81+(-0.109x)	E=6.20+(-0.044x)	E=8.91+(-0.0295x)	0.15	–0.55	–0.22	–0.15
Manufacture of machinery and equipment n.e.c.	C28	E=6.47+(-0.028x)	**	E=10.135+(-0.0632x)	E=3.47+0.154x	–0.14	**	–0.32	0.77
Manufacture of motor vehicles, trailers and semi-trailers	C29	E=6.83+0.02x	E=9.61+(-0.087x)	E=15.58+(-0.161x)	**	0.11	–0.43	–0.81	**
Manufacture of other transport equipment	C30	E=6.81+(-0.068x)	E=3.89+(-0.03x)	E=-2.94+0.085x	E=0.166+0.0213x	–0.34	–0.13	0.43	0.11
Manufacture of furniture; jewellery, musical instruments, toys; repair and installation of machinery and equipment	C31–C33	E=3.97+0.14x	E=25.55+(-0.24x)	E=6.58+0.117x	E=7.49+0.02x	0.71	–1.18	0.58	0.08

Source: author's calculations

E – the share of production in the employment of the processing industry; × – KOFEcGIdf

** – the influence of KOFEcGIdf on the share is absent, very low, or the results of statistical testing and interpretation of the regression equation are unsatisfactory.

globalization has contributed to the growing influence of transnational corporations on the specialization and activities of national economies, and on the other hand, governments have not taken sufficient measures to preserve and enhance economic self-sufficiency, innovation, and socio-economic development.

Discussion

The research was carried out from 2000–2019. This was due to the availability of data at the time of this study. At the same time, it would be interesting for further research to consider whether the crises caused by COVID-19 and the military invasion of Russia in Ukraine affected the relationship between economic globalization and the structural indicators of the processing industry. The results of the research are confirmed for the analyzed countries, but it is not known for certain whether the well-founded author's hypothesis will be confirmed in other countries. It can be assumed that the proposed results in this study are relevant for the vast majority of EU countries and Eastern Europe. The article reflects the main results of this study but does not provide primary data and statistical characteristics. This is done in order not to overburden the article with countless appendices, tables of figures, etc.

Conclusions

The first fundamental result of the conducted research is the theoretical and analytical substantiation of the presence of a high correlation between economic globalization, expressed by KOFEcGIdf, and the structure of outputs and employment of the processing industries of Poland, Italy, France, and Germany. The importance of this result is due to a number of reasons. In developed market economies, the structures of output and employment are relatively stable; that is, they change insignificantly (1-3 percentage points) over long periods of time (decades). At the same time, structural changes in a processing industry take place under the influence of many direct, indirect, external, macroeconomic, and conjunctural factors.

Therefore, the identification and substantiation of a factor that has a high impact on these structural changes can be considered a research success. At the same time, it is also necessary to consider the fact that the revealed relationship is not obvious, but rather indirect. The economic processes that determine this relationship are related to the fact that: a) a certain, mostly insignificant part of the manufactured products of the industry is exported; b) part of the products (raw materials, materials, etc.) used in production is imported; c) economic globalization has influenced a greater strengthening of specialization in the world economy across countries; d) during the period of economic globalization, the role of transnational corporations in the world economy has significantly increased, which has led to an increase in offshoring, tolling, and outsourcing operations.

The second fundamental and, at the same time, applied result of this study, was the quantitative determination of the impact of economic globalization on the share of production in the output and employment of the processing industry in the studied countries. Achieving the above research results was carried out according to an original methodical approach using well-known methods of economic analysis. Prospects for further research in this direction include the identification of other macroeconomic factors influencing the structural indicators of a processing industry and determining the strength of their influence in the context of global changes.

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