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# MACROECONOMIC FACTORS INFLUENCING ON THE REORGANIZATION OF BANKS IN THE CONDITIONS OF ECONOMIC IMBALANCES

## ABSTRACT

In the context of increasing economic imbalances, the goals of bank reorganization are being transformed and are acquiring new content, which increases the relevance of macroeconomic factors. The article is aimed at identifying the impact of macroeconomic factors on the choice of reorganization method by building a neural network like the Kohonen map. A cluster analysis method has been applied to build a neural network of the type of self-organization maps of Kohonen. As a result, has allowed four clusters. The first cluster includes developing countries. The most common methods are M&A agreements and buyback operations. Among the priority factors of influence are a high level of GDP per capita, a growing share of the urban population, and significant tax revenues. The second cluster includes developing countries, for which consolidation methods such as partial absorption, and acquisition of fixed assets are a priority. Among the main factors influencing, it is worth highlighting commodity trade, inflation, and the GDP deflator. The third cluster includes highly developed, developing countries, for which the dominance of share buyback agreements, which is primarily related to the share of foreign direct investments, the volume of GDP and the volume of tax revenues. The fourth cluster includes mainly developed countries, that are not included in the third cluster. Due to the determining influence of significant volumes of domestic crediting, foreign direct investments, GDP and a significant share of gross accumulation, practically all methods of reorganization are common in these countries (M&A, buybacks can be singled out among the most common transactions).

**Keywords:** methods of consolidation, mergers and acquisitions, liquidation, transformation, business model, crisis, neural network, cluster approach, Kohonen map

**JEL Classification:** G21, G33, G34, E44, C38

## INTRODUCTION

The current conditions of development of the Ukrainian economy are characterized by a large number of factors which are inherent in uncertainty and destabilizing the nature of action. As a result of the instability of the external environment, the business entities are faced with the task of gaining survival capacity and reflecting negative effects on them, as there may be an increase in the risk of reducing capacity to pay, financial sustainability, liquidity and profitability. The continuing transformation processes in the Ukrainian economy have proved that the existence of a powerful banking system is a key condition for achieving financial sustainability and sustainable economic development. The gradual integration of the banking sector into the world financial system strengthens the segmentation of the banking services market and the consolidation of banking capital. At the same time, the negative impact of military action, political and economic processes imbalances the financial system, which makes it impossible to develop the economy and responsible banking in Ukraine.

All banks are under constant influence of different risks and without withstanding the conditions of conducting market activities, can initiate (voluntarily or on the initiative of government regulators) market entry either through liquidation or through the sale of assets and/or the bank itself. The basis of these processes is imbalances between the need for financial support for economic development, the resource capabilities of banks

and the mechanisms for competition in the financial services market. In such circumstances, the reorganization of banks is seen as an effective way to consolidate banking business, resolve insolvency, increase profitability and efficiency, expand the scope of activities, save on expenditures and develop new market segments of banking products and services. In this context, the restructuring of the banking system and the restructuring of banks as a factor in preventing their bankruptcy and liquidation are being updated, thus contributing to the adaptation of banking institutions to constant changes and enhancing their market stability.

## LITERATURE REVIEW

First of all, it should be noted that most scientists consider the concept of "restructuring" as identical to the concept of "reorganization". In Ukrainian practice, these concepts are differentiated, and at the legislative level they adhere to the concept of "bank reorganization". In addition, most scholars study the impact of reorganization on the bank's activities, but there are no studies of factors influencing the choice of reorganization methods. Among the classic works, mention should be made of the opinion of Waxman, M. (1999), that reorganization, although it is a common practice in banking, in most cases refers to the process of bank liquidation. According to Bolzico, J., Mascaro, Y., & Granata, P. (2007), reorganization is an alternative to the liquidation process and can be radical. At the same time, Bolzico, J., Mascaro, Y., & Granata, P. (2007) and Seelig, SA (2006) mention reorganization only in the context of applying the "good bank – bad bank" method in the bank resolution process, namely, when using trust funds to transfer assets. However, the authors do not pay attention to the factors influencing the choice of the rehabilitation method, considering them *ex post facto*. Vo, X. V., Nguyen, H. H., & McMillan, D. (2018) equate the concepts of "reorganization" and "restructuring". At the same time, when evaluating the impact of various methods of reorganization (privatization, nationalization, M&A agreements) on the efficiency of banking activities in countries with economies in transition, the authors do not pay attention to the factors influencing the choice of methods for reorganizing banks. Similar views are described by Hsiao, H.-C., Chang, H., Cianci, A. M., & Huang, L.-H. (2010), however, the authors only assessed the impact of the reorganization on the operational efficiency of banks. The study by Iwanicz-Drozdowska, M., Smaga, P., & Witkowski, B. (2016) focuses on assessing the impact factors on the expenditure component of the resolution process but does not describe the prerequisites for choosing bank reorganization methods. Wang, C.-A. (2012) and Micu, A. (2020) describe many factors that can influence reorganization processes, measuring their impact by evaluating the values of various coefficients. Depending on the economic nature, each selected factor can be classified as either internal (microeconomic) or external (macroeconomic).

At the same time, Ukrainian researchers Bilyk A. I. (2015), Volokhata V. E. (2014) and Pashchenko Y. P. (2015) treat reorganization as a change in the legal form of a bank as one of the types of corporate actions. Vyadrova I. (2015) specifies that a change in the legal form of a bank occurs through a merger, accession, separation, division or transformation, the result of which is the transfer, and acceptance of its property, money, rights and obligations by successors. We agree with Krasnova I., and Nikitin A. (2013) that the main goal of the reorganization is to find sources of business development based on internal and external factors. Despite the deep scientific controversy regarding the process and the feasibility/efficiency of reorganization methods, most scientists have not paid enough attention to the factors influencing the reorganization. In general, the authors note that in the context of increasing economic imbalances, the goals of bank reorganization are being transformed and are acquiring new content, in particular: achieving generativity and synergy; recovery of troubled banks; improving financial security and sustainability; ensuring continuous operation. At the same time, the systematization of scientific views on the methods of reorganization made it possible to include, in addition to mergers and acquisitions, also unification, acquisition and formation of groups. Most scientists are of the opinion that the dominance of one or another method of reorganization and its implementation is associated with various micro- and macroeconomic factors that characterize the financial market conditions, the business environment, the level of economic development and the phases of the economic cycle. In our opinion, microeconomic factors are highly dependent on business models and features of the banking business in a particular jurisdiction, which makes research difficult. In order to universalize the results, which can be extrapolated to any practice of reorganization in Ukraine and in the world, we propose to carry out the analysis based on macroeconomic factors. Therefore, an important task is to determine the influence of macroeconomic factors on the choice of a method for reorganizing banks, which will help in predicting the expected results of these processes both for the bank itself and for the banking system. Consequently, each method of reorganization is recognized through the influence of a certain number of factors, as a result of obvious causal relationships, affecting the final effectiveness of the reorganization processes and the efficiency of the bank.

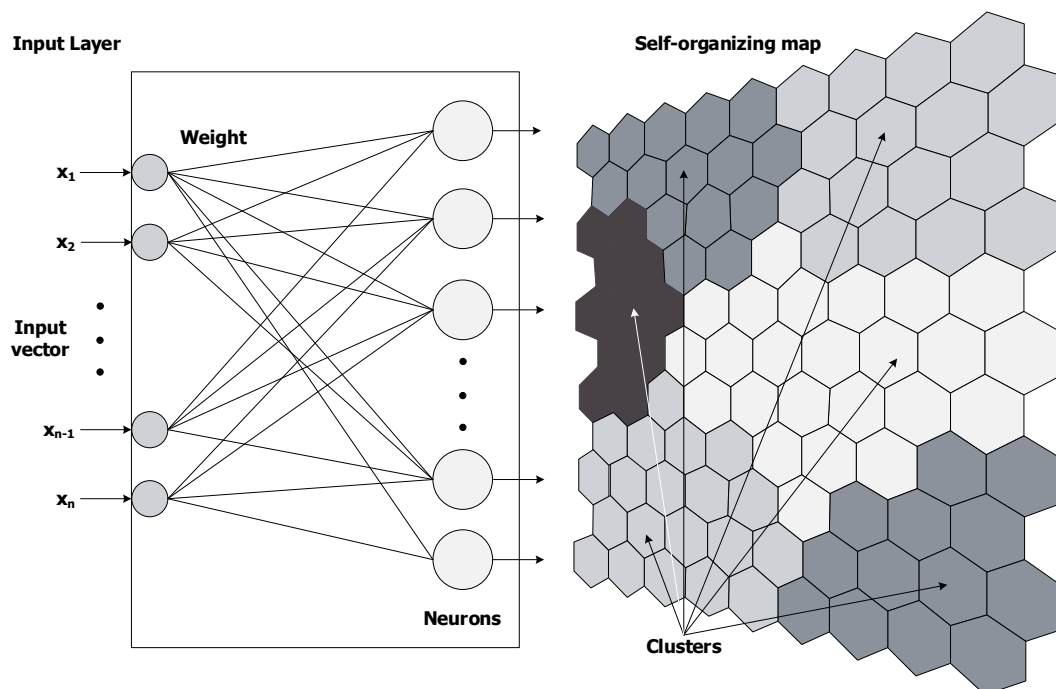
## AIMS AND OBJECTIVES

The article is aimed at identifying the impact of macroeconomic factors on the choice of reorganization method by building a neural network like the Kohonen map. The objectives of the study are to be achieved:

- identify the list of factors affecting the restructuring of banks and the choice of mode of reorganization;
- build a neural network of the type of self-organizing maps of Kohonen;
- conduct simulation and visualization of results that allow to make relevant conclusions.

## METHODS

Given the task of finding hidden patterns in the multitude of factors influencing the processes of reorganization of banks, the most appropriate analysis tool is the clustering approach. Clustering belongs to a descriptive group of data mining tasks. When solving it, it is necessary to find patterns in the data array, select a certain number of zones (clusters) and distribute data between them (Mints, O., Marhasova, V., Hlukha, H., Kurok, R., & Kolodizieva, T., 2019). The main feature of this approach is that with its application, objects belonging to one cluster are more similar to each other than to objects belonging to other clusters. As a result, it becomes possible to form fairly homogeneous groups of objects under study, characterized by similar properties. As part of our study, this will help form a group of macroeconomic factors that will have the same impact on the processes of bank reorganization. Due to the specifics of our study, for the clustering of macroeconomic factors influencing the processes of reorganization of banks, the tools of Kohonen's self-organization maps were used, which, in addition to forming homogeneous groups of objects under study, provide a convenient tool for visual analysis of clustering results. The basics of using Kohonen's self-organization map tools are described in the classic work *The Basic SOM* (Kohonen, T., 2001). Unlike other clustering methods, according to Miroshnichenko I. (2016), the location of an object on the Kohonen map immediately indicates to the analyst how developed the property under study is in comparison with others because the best and worst objects in terms of the considered indicator are located in opposite corners of the self-organization map. The result of constructing the Kohonen map is a visual representation of a two-dimensional neuron lattice that reflects the organizational structure of the influencing factors, forming clusters in which the influencing factors are similar to each other (Figure 1).



**Figure 1. Visual representation of clusters on the Kohonen map.** (Source: Kohonen, T., 2001; Miroshnychenko I. V., 2016)

As a result of factor clustering, we get a number of clusters, each of which will group factors with a close level of influence on the reorganization processes of banks (after all, they will be more or less similar values of the characteristics that determine this potential). Therefore, it is important to single out exactly those factors that really have a significant impact on the processes of reorganization of banks.

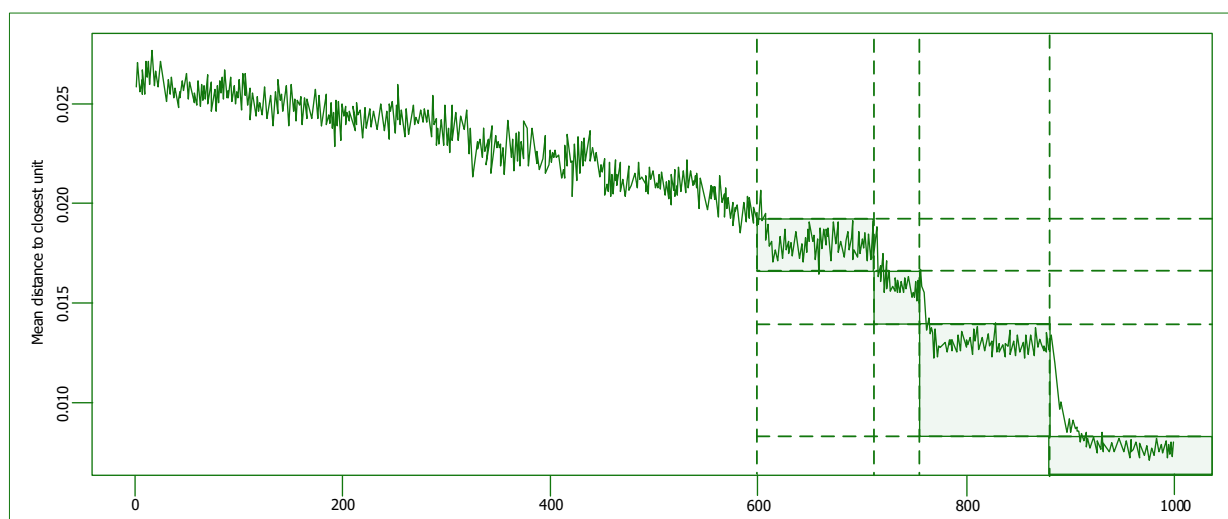
The results of assessing the impact of reorganization on the growth of the bank's market value can be found in Prymostka L. & etc (2021). For the purposes of our study, an updated dataset was formed, similar to that used in the work of Prymostka L. & etc. (2021). The data source is Refinitiv Eikon, one of the world's largest providers of data and infrastructure solutions for financial markets, and the World Bank database. 12 macroeconomic factors are identified, which are described by the corresponding quantitative indicators (Table 1), the sample includes 823 observations. The incoming dataset contains panel data on bank restructuring agreements by country and identified influence factors since 1981.

**Table 1. Macroeconomic indicators of the impact on the reorganization. Notes: \*Classification of indicators according to the approach of the European Bank for Reconstruction and Development. (Source: Refinitiv Eikon, The World Bank)**

Classifier*	Indicators
FS.AST.DOMS.GD.ZS	Domestic credit granted to the financial sector (% of GDP)
BX.KLT.DINV.CD.WD	Foreign direct investment, net inflow (US \$)
NY.GDP.MKTP.CD	GDP (at current prices)
NY.GDP.MKTP.KD.ZG	GDP growth (annual %)
NY.GNP.PCAP.PP.CD	GNI per capita, PPP (current international \$)
NE.GDI.TOTL.ZS	Gross accumulation (% of GDP)
NY.GDP.DEFL.KD.ZG	Inflation, GDP deflator (annual%)
TG.VAL.TOTL.GD.ZS	Commodity trade (% of GDP)
GC.TAX.TOTL.GD.ZS	Tax revenues (% of GDP)
IC.REG.DURS	Time period necessary to start a business (days)
DT.TDS.DECT.EX.ZS	Total amount of debt service (%of export of goods, settlement)
SP.URB.GROW	Urban population growth (annual%)

## RESULTS

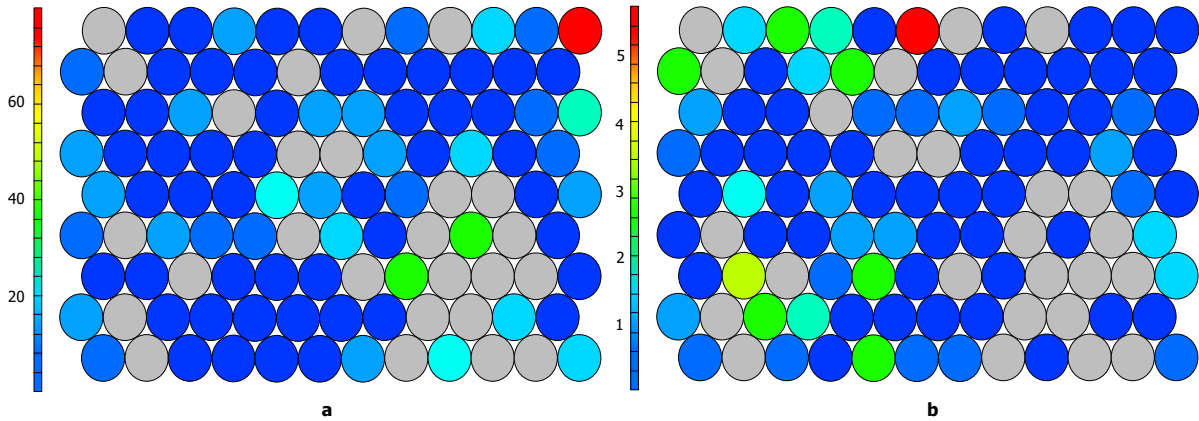
To build Kohonen maps, the Deductor Studio Academic and R Studio software package (Kohonen library) was used (Shitikov V. K., Mostitsky S. E., 2017; The Digital Projects Studio; Shane Lynn's HomePage). To reduce the excessive influence of variables with large absolute values of indicators, z-score standardization was carried out. According to the results of the analysis of two software products, similar results were obtained. You should start with the results obtained in R Studio. Reducing the average distance to the nearest neurons during 1 000 iterations of training the SOM network with the given values of the hyperparameter  $\alpha=0.05$ , 0.01 demonstrated a slowdown and low variability at 600 iterations. This indicates the sufficiency of the number of iterations and the elimination of the assumption that it is necessary to increase them. Note that with a smaller number of iterations ( $>1\ 000$ ), the evolution of the average distance to the nearest cells on the map continues to decrease (Figure 2).



**Figure 2. The process of training neurons.**

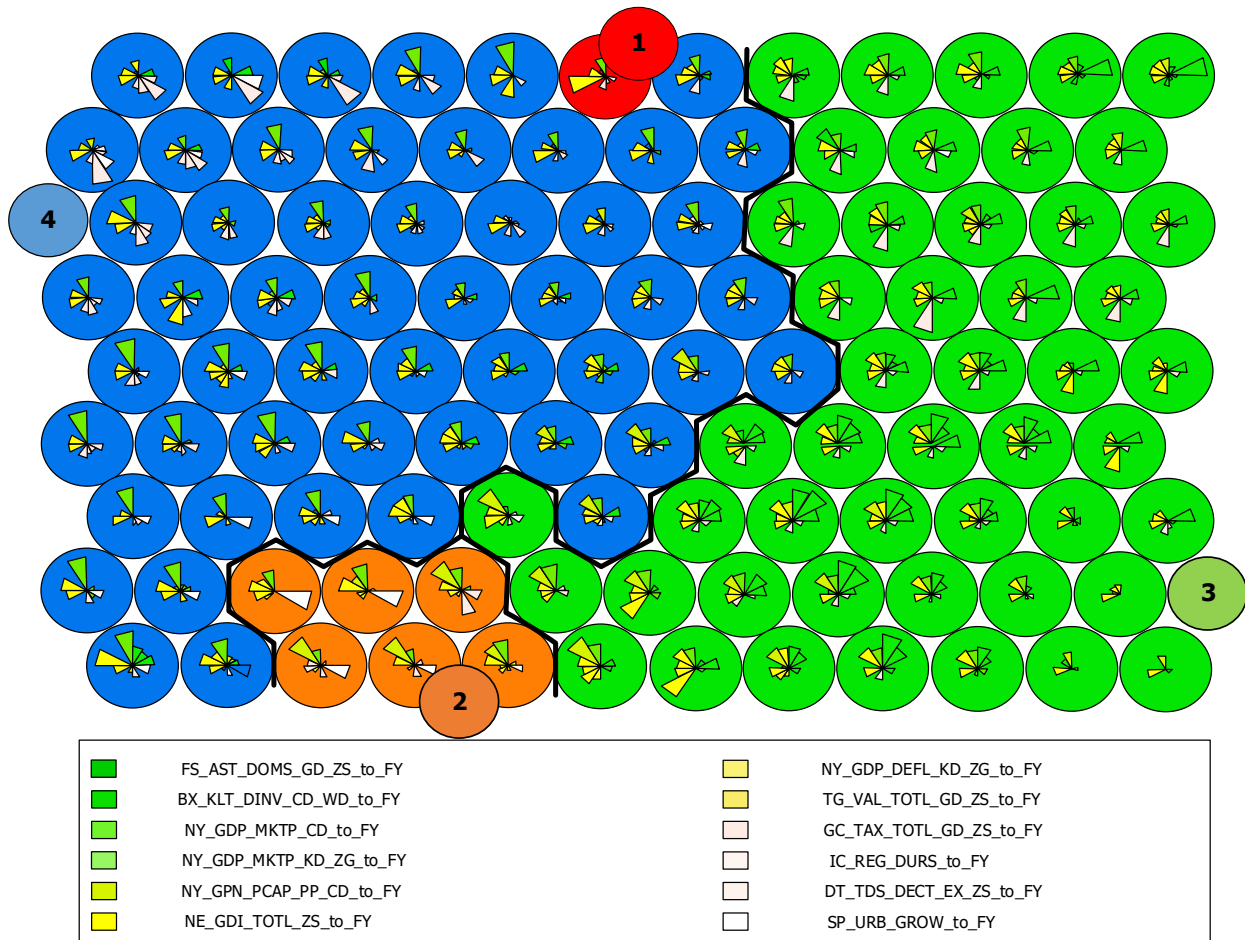
Visualization of a set of Kohonen maps with various control parameters of functions showed:

1. The number of objects associated with each node (Figure 3, a). The density of factors for neurons is acceptable, a high value is observed for only one neuron (red colour);
2. Average distance of node objects to their prototypes (Figure 3, b). A high distance of neuron nodes is also observed for only one neuron (red colour).



**Figure 3. Visualization of the number and quality of Kohonen map objects.**

The results of the construction of the Kohonen map showed the selection of 4 clusters by the SOM algorithm. For clarity of visualization, an approach was used to reflect the contribution of each of the selected factors to the neural network (Figure 4).



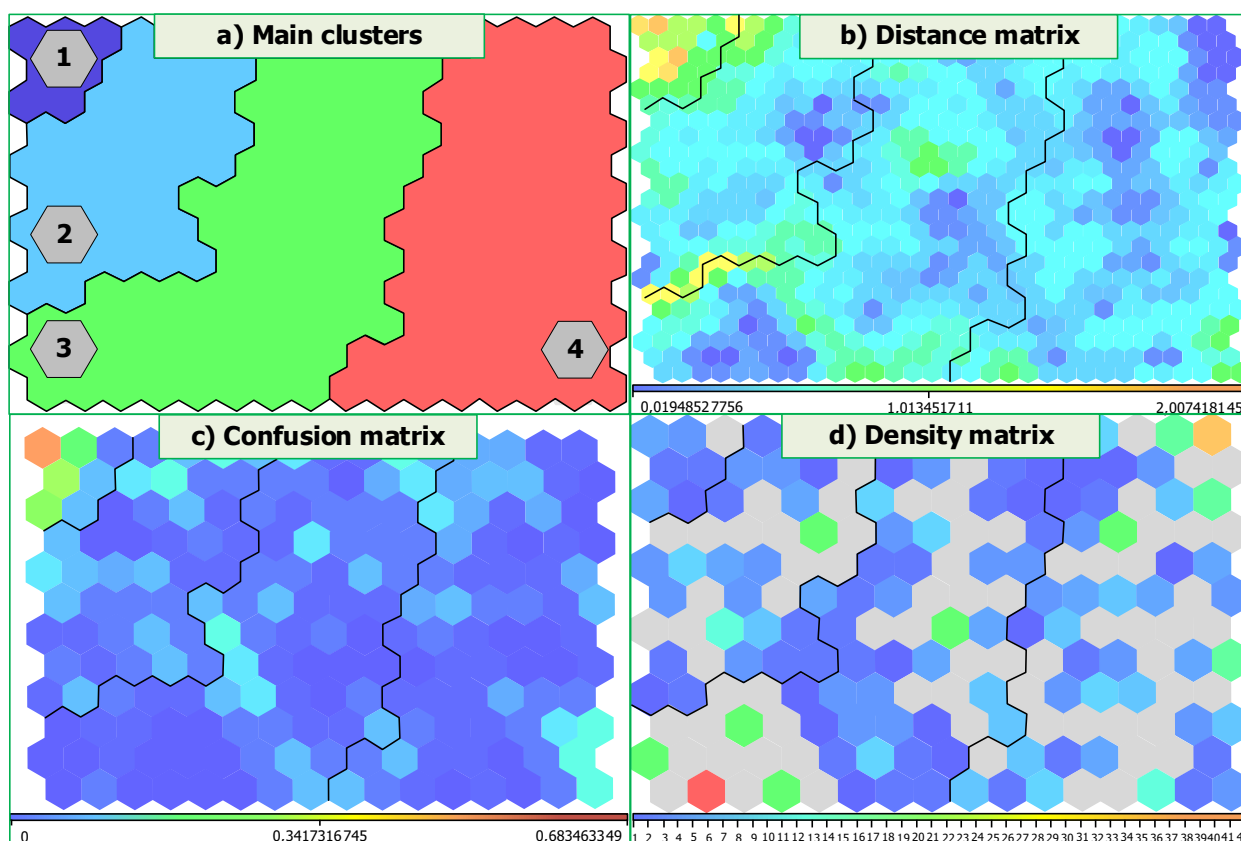
**Figure 4. Visualization of clusters and the contribution of each factor.**

The next step is to build Kohonen maps using the Deductor Studio Academic software package to obtain an alternative simulation result. According to the input parameters of the simulation (Table 2), Kohonen maps were obtained with 4 clusters selected, which coincides with the results obtained in R Studio (Figures 5, 6).

**Table 2. Learning parameters of the SOM algorithm.**

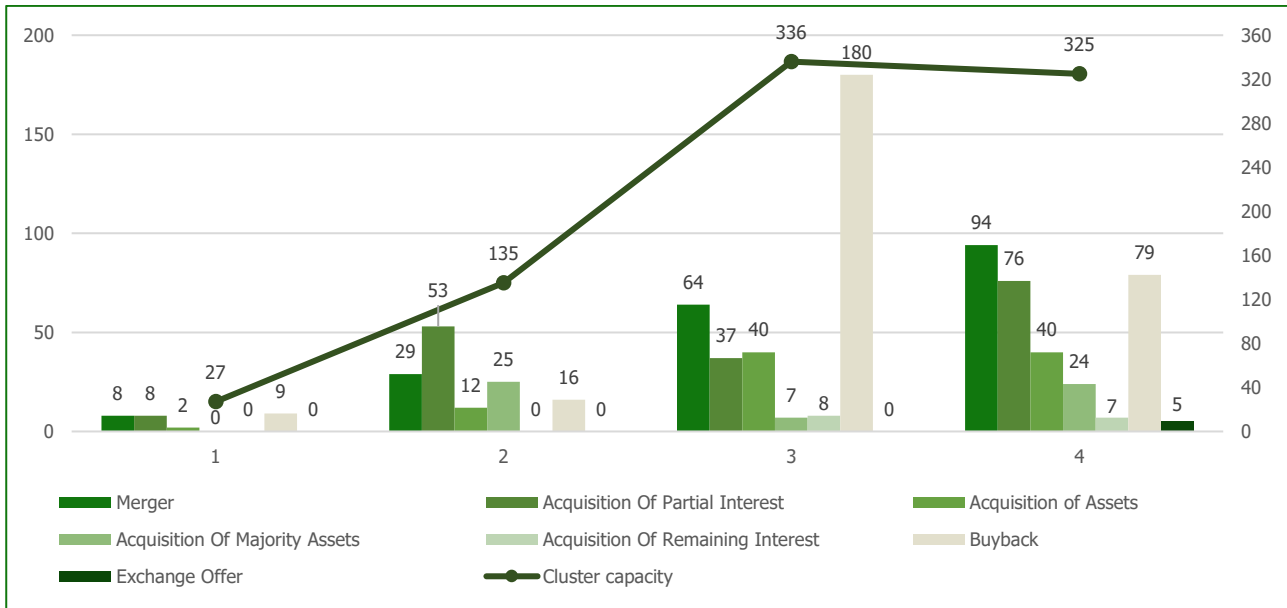
Nº	Option	Value
1	Ages	1500
2	The number of ages through which it is necessary to mix dates	20
3	Method of initial card initialization	Random values
4	Neighbourhood function	Gaussian
5	Learning speed	At the beginning - 0.3; at the end - 0.005
6	Learning radius	At the beginning - 4; at the end - 0,1
7	level of significance	1%
8	Determining the number of clusters	Automatic

Since any clustering method, including Kohonen's algorithm, is subjective, there is usually no point in selecting a separate test set. 100% samples were used for training selecting a separate test set.



**Figure 5. Visualization of Kohonen maps in Deductor Studio Academic.**

According to the results of the SOM algorithm in the Deductor Studio Academic software complex, 4 clusters were also obtained, similar in characteristics to the clusters obtained in R Studio. The corresponding model quality metrics show a low level of errors and distances between neurons (Figure 5, confusion matrix, distance matrix).



**Figure 6. Distribution of methods of reorganization by clusters, pcs.**

Note that the allocation of deals was carried out depending on the marginal share of such deals in the cluster ( $\geq 10\%$ ). The choice of reorganization method is influenced by economic conditions, the level of development of the money market and the bank's business model. To implement the development model, the bank develops a strategy for its activities: the market situation is assessed; strengths and weaknesses; search for new, innovative activities, etc. The management may choose one or another strategy: development of new innovative activities; strengthening of traditional channels; diversification; sale of non-core assets. Achieving the chosen direction of development presupposes the choice of a method of reorganization in accordance with the conditions. The most common methods of reorganization are mergers, partial acquisitions (acquisition of real interest), which have different consequences for the subjects of such transactions, and repurchase agreements. In almost all clusters, with the exception of the third one, the total share of mergers and acquisitions (M&A) deals is more than 50% of the total number and value of deals. Such agreements are concluded quite often, are widespread in economically developed countries of the world and are actively used as a method of selecting the most effective and adapted to competitive conditions of banking institutions.

In international practice, such methods as exchange and acquisition of the final share are practically not used. The acquisition of the remaining interest as a method of reorganization is quite confusing from the point of view of conducting business, however, it allows bypassing most of the legal obstacles of regulatory bodies, the antimonopoly committee, etc. An Exchange Offer assumes that the minority shares of the shares are exchanged between the shareholders - the owners of both sides of the transaction. Thus, we come to the conclusion that in international practice, the main goal of the reorganization is not so much capitalization as penetration into new markets, expansion of the bank's market share, as well as elimination of competitors through takeover.

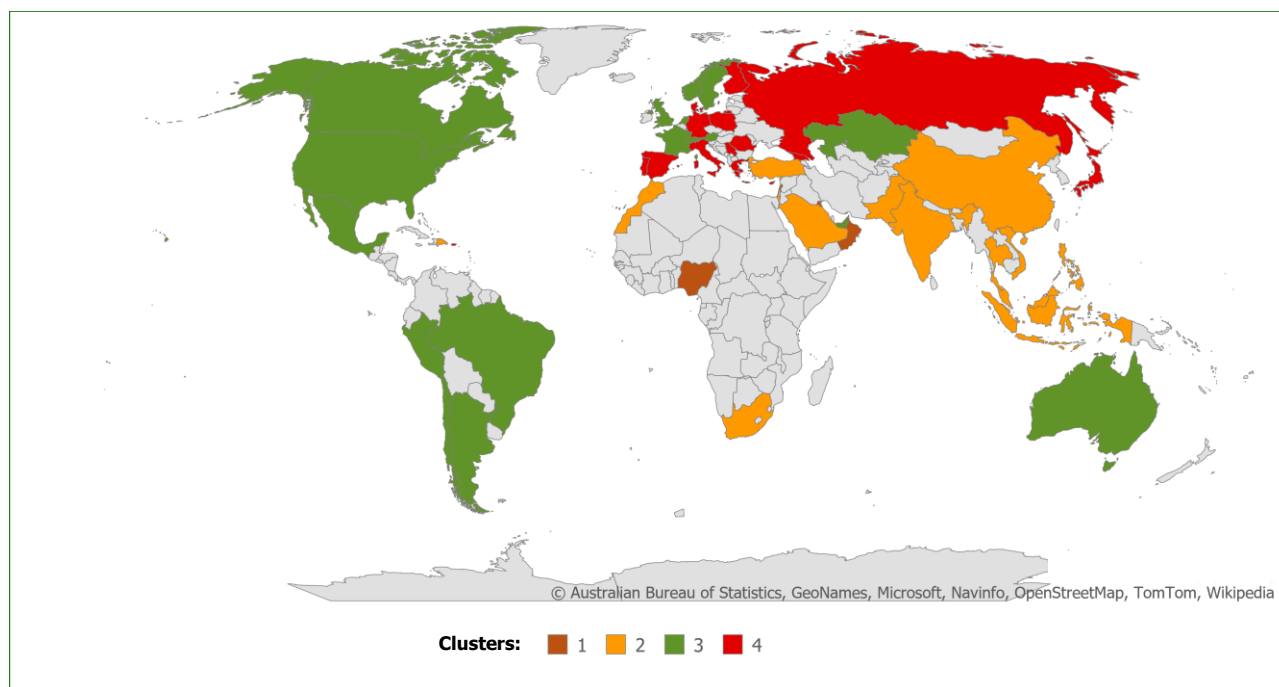
The algorithm determines significance at a high level ( $\geq 90\%$ ) for almost all indicators included in the model (Table 3) and shows similar results obtained in R Studio (Figure 4), however, there are certain exceptions. According to the results of the analysis of the clustering of macroeconomic indicators, which, according to the authors, are structural indicators, which are capable of provoking economic imbalances, it was established:

- The first cluster is characterized by a heterogeneous degree of influence of factors. Dominant inflation, tax revenues, and growth of urban population. However, this is the only cluster where gross accumulation does not affect the choice of the reorganization method.
- The second cluster, on the contrary, is influenced by almost all indicators. Unlike the other clusters, it is characterized by the influence of commodity trade.
- The third cluster, as well as the two previous ones, is characterized by a significant influence of tax revenues as a percentage of GDP, and less significant, compared to the other clusters, is the influence of domestic credit.
- The fourth cluster differs from the previous three in that tax revenues do not affect the choice of reorganization method. Commodity trade and inflation have a moderate effect on the reorganization method.

**Table 3. Significance of indicators by clusters, %.**

Indicators	Clusters			
	1	2	3	4
<b>Gross significance by clusters</b>	<b>3.3</b>	<b>16.4</b>	<b>39.5</b>	<b>40.8</b>
Domestic credit granted to the financial sector (% of GDP)	99.9	100	67.4	100
Foreign direct investment. net inflow (USD)	99.4	100	100	100
GDP (at current prices)	99.9	100	100	100
GDP growth (annual %)	46.7	100	99.9	100
GNI per capita. PPP (current international USD)	85.5	100	100	99.3
Gross accumulation (% of GDP)	19.8	100	96.2	100
Inflation. GDP deflator (annual%)	100	91.8	69	64.4
Commodity trade (% of GDP)	41.9	99.1	42.2	59.7
Tax revenues (% of GDP)	100	100	100	10.9
Time period necessary to start a business (days)	99.1	100	99	100
Total amount of debt service (% of the export of goods. settlement)	99.9	100	81.3	100
Urban population growth (annual. %)	100	100	89.9	100

The ranking of clusters by country and their mapping using MS Word shows the presence of a clearly defined geographical distribution, which emphasizes the opinion of many researchers about the presence of regional features in the choice of the method of reorganization (Figure 7).



**Figure 7. Mapping countries by clusters.** (Source: compiled by the authors based on Australian Bureau of Statistic, GeoNames, Microsoft, Navinfo, OpenStreetMap, TomTom, Wikipedia)

## DISCUSSION

The majority of scientists and researchers study the impact of reorganization on the bank's activities, but little attention has been paid to the studies of factors influencing the choice of reorganization methods. In particular, Wang, C. A. (2012) and Micu, A. (2020) identify a significant number of various factors that can influence reorganization processes, but their impact is only measured by evaluating the values of various coefficients. For this reason, the discussion of the results in

this paper is very relevant. Summarizing the results of the study, we will determine the relationships between the above-mentioned separate characteristics of the formed clusters:

1. The first cluster was formed from 27 consolidation agreements that took place in five countries. The cluster includes mainly developing countries, and more specifically, individual Arab countries of the Persian Gulf and Nigeria. These countries have large revenues from the production, processing and export of oil and gas. This can explain the predominance in the structure of share buyback transactions, which are an attractive way of financial reorganization for institutions with significant cash balances. In addition, buyback operations are an effective method of implementing various options for financial restructuring, using purchased shares as an internal financial resource for corporate mergers/acquisitions (M&A) and influencing the growth of the issuer's value indicators. Due to the low population density, the countries have a high level of GDP per capita, at the same time, an unbalanced structure of the economy, which determined the low level of influence of gross accumulation on the choice of consolidation method. Understanding the economic essence of gross accumulation, it is worth noting that this factor really affects the choice of consolidation method. The growth of non-financial assets, which have been used in the production process for a long time, is less than 15% of GDP, indicating that the country is in the mode of "eating out" and limited foreign direct investment. Such characteristics are characteristic, first of all, of Nigeria, which is included in this cluster. Critical dependence on the export of energy resources determines the vector for the development and diversification of the industrial sector. This requires the concentration of financial resources, which affects the development of mergers and acquisitions along with buybacks.
2. The second cluster includes developing countries, namely newly industrialized countries, mainly from the Asian region (primarily China, and India), in addition to Saudi Arabia, Malaysia, Israel, etc. Banks in Asia have reduced their profitability in recent years, so they see reorganization as an opportunity to increase profits. The focus on economic growth is reflected in the comprehensive impact of various economic indicators and the availability of various methods of reorganization. In the Asian region, these processes have a slower and local (regional) character. In order to implement the strategy of taking over a competitor, banks seek to increase their market share, consolidate their resource base, create additional value through synergistic effects, increase their competitiveness by expanding the range of services provided, and improve the management structure of the institution. This can explain the dominance of partial takeover agreements over others and the popularity of the acquisition of fixed assets (Acquisition Of Majority Assets), or majority acquisition, which means any acquisition of own shares of a state gift entity, in which the company is prohibited from owning 100% of its own shares of capital due to restrictions established by the relevant contract with the parent company.
3. The third cluster includes mainly highly developed and developing countries of the North and South American continent, Australia, Great Britain, UAE, Scandinavian countries, France and a number of other European countries. A characteristic feature of these countries is, in addition to a turbulent economy, also a developed, highly capitalized financial market, which determined the dominance of share buyback agreements (54%) over other methods of consolidation. The essence of such agreements is the consolidation of assets through the sale of a controlling stake by the party - the object of the agreement, with the possibility of buying this stake in the future. Note that in 2017-2018 in the USA there was uncertainty surrounding the tax reform, which contributed to the development of exactly this type of agreements. The buyback program is a fairly convenient method of cash payments to investors without a permanent increase in the amount of dividends; is also a method of obtaining benefits in the taxation of dividends.
4. The fourth cluster includes the developed countries of Europe that are not included in the third cluster (Germany, Italy, Spain, Denmark, Finland, etc.) and Asia (the eastern part, in particular, Japan, Hong Kong, and Korea). It is worth noting that recently the average return on capital of European banks has been decreasing and is about 4%. The cluster is characterized by the absence of a dominant method of reorganization. In addition, imbalances have formed in these countries between a long period of low-interest rates, burdensome regulatory requirements, the need for constant modernization of technologies, depopulation in rural areas and the intensification of banking activities, especially on the part of small banks. Classic forms of transformational changes of mergers and acquisitions are supplemented by asset sale and buyback agreements with certain features. An agreement to purchase net assets (or part thereof) acts as an investment mechanism and results in the establishment of control over the target company. In this case, it is not the unification of bank capitals as a consequence of property consolidation that becomes more important, but the consolidation of management decision-making in one centre. The prevalence of these agreements is a sign of implicit transformational changes in the banking segment, without reducing the number of banks. The main macroeconomic prerequisites for the spread of repurchase operations on these local financial markets are the slow growth of the sovereign economy, accompanied by a relatively low level of the discount rate and certain regulatory restrictions on this type of transaction, which are different from the previous cluster. The

peculiarity of this cluster is that the tax revenue factor does not have a clear influence on the reorganization processes.

In Latin America and Southeast Asia, the reorganization of the banking sector was forced and to a large extent became an attempt to overcome the financial crises faced by the states of the regions at the end of the 20th century. In the countries of Central and Eastern Europe, as well as in the CIS countries, the first peak of banking consolidation activity began with the entry of foreign capital into the banking sector. The situation in the European markets is heterogeneous: in some countries, banks have actually completed the reorganization processes, and in other countries the processes are ongoing. At the same time, regardless of the stage of transformation of the banking business, banks are forced to continue to work in turbulent market conditions and economic imbalances. The main features of the European market are: focus on intra-group agreements aimed at optimizing capital, managing operational and tax efficiency through the centralization of regulatory approvals; use of existing relationships between legal entities, and business units; arrangement of intragroup services. At the same time, banks are forced to move from restructuring activities to changing the business model of banking services if they focus on a growth strategy.

### ***Prospects for further research***

Information about the bankruptcy of the bank causes panic among customers. That is why, for the sake of preserving trust in the financial market, in global practice, regulators prefer bank reorganization processes in one way or another before liquidation. Tsyganova N. V. (2020) claims that in Ukraine, reorganization as a way of resolving the insolvency of banks is not used enough, which deforms the relationship between owners of funds and banks. The liquidation of banks is tantamount to the bankruptcy of the bank's customers and increases public distrust in the banking system. In the conditions of crisis, strengthening of economic imbalances, and transformational changes, there is a need to develop macroeconomic prerequisites and managed reorganization in various ways. Such reorganization involves the creation of uniform, understandable rules for the implementation of transactions with assets and increasing the effectiveness of the sale of assets of bankrupt banks, which is the subject of further research. Buyback operations are an underdeveloped method of bank reorganization in Ukraine that requires further research.

## **CONCLUSIONS**

The purpose of the study was to investigate the influence of macroeconomic factors on the choice of the method of reorganization, which was completely achieved. In addition, the additional results of the study investigate the dependence between the level of economic development of the country of the base of the reorganized bank and the prevalence of certain methods of consolidation in this jurisdiction.

In general, according to the results of the study, it was found that the first cluster (the smallest) includes developing countries (energy exporters), in which the most common methods of reorganization are M&A agreements and buyback operations. Among the priority factors of influence are a high level of GDP per capita, a growing share of the urban population and significant tax revenues. At the same time, a low level of influence of gross accumulation on the choice of reorganization methods was revealed. The second cluster also includes developing countries (newly industrialized countries, Asia), for which consolidation methods such as partial absorption and acquisition of fixed assets are a priority. Among the main factors influencing the choice of reorganization methods, it is worth highlighting commodity trade, inflation, and the GDP deflator. The third cluster includes highly developed and developing countries of North and South America, Australia, Great Britain, UAE, Scandinavian countries, and France. They are characterized by the dominance of share buyback agreements, which is primarily related to the share of foreign direct investments, the volume of GDP and the volume of tax revenues. The fourth cluster includes mainly developed European countries that are not included in the third cluster (Germany, Italy, Spain, Denmark, Finland, etc.) and the countries of the eastern part of the Asia-Pacific region. Due to the determining influence of significant volumes of domestic crediting, foreign direct investments, GDP and a significant share of gross accumulation, practically all methods of reorganization are common in these countries. At the same time, M&A and buybacks can be singled out among the most common transactions.

Data on the reorganization of banks in Ukraine is not available in the necessary volume, therefore it was not included in the study. However, in terms of its potential, the fourth cluster is considered more appropriate, which is characterized by a plurality of ways of reorganizing the banking business, and choosing a business model. It is advisable to supplement the study with a similar one on the example of Ukraine, but already taking into account microeconomic factors. Currently, due to the state of war and the insufficient representativeness of the sample for the necessary data, the possibilities for such an analysis are limited, but it may become a promising direction of research in the future.

## ADDITIONAL INFORMATION

### AUTHOR CONTRIBUTIONS

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## МАКРОЕКОНОМІЧНІ ФАКТОРИ ВПЛИВУ НА РЕОРГАНІЗАЦІЮ БАНКІВ В УМОВАХ ЕКОНОМІЧНИХ ДИСБАЛАНСІВ

В умовах посилення економічних дисбалансів цілі реорганізації банків трансформуються та набувають нового наповнення, що посилює актуальність впливу саме макроекономічних факторів. Метою дослідження є виявлення впливу макроекономічних факторів на вибір методу реорганізації шляхом побудови нейронної мережі на зразок карти Кохонена. Застосовано кластерний підхід для побудови нейронної мережі типу самоорганізаційних карт Кохонена. У результаті було виділено чотири кластери. До першого кластера ввійшли країни, що розвиваються. Найпоширенішими методами є угоди M&A та операції зворотного викупу. Серед пріоритетних макроекономічних факторів впливу – високий рівень ВВП на душу населення, зростаюча частка міського населення, значні податкові надходження. До другого кластера ввійшли нові індустріальні країни, для яких пріоритетними є такі методи консолідації, як часткове поглинання, придбання основних засобів. Серед основних макроекономічних факторів впливу варто виділити товарну торгівлю, інфляцію та дефлятор ВВП. Третій кластер включає високорозвинені країни та країни, що розвиваються, для яких характерне домінування угод зворотного викупу акцій, що пов'язано насамперед із часткою прямих іноземних інвестицій, обсягом ВВП та обсягом податкових надходжень. До четвертого кластера

ввійшли переважно розвинуті країни, які не ввійшли до третього кластера. Визначальний вплив чинять обсяги внутрішнього кредитування, прямі іноземні інвестиції, ВВП та валові нагромадження, що сприяє розвитку майже всіх способів реорганізації (серед найпоширеніших угод можна виокремити M&A та зворотний викуп).

**Ключові слова:** методи консолідації, злиття та поглинання, ліквідація, трансформація, бізнес-модель, криза, нейронна мережа, кластерний підхід, карта Кохонена

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