Relationship between the Financial Security of Bank Employees and the Efficiency of Bank's Activities: A Case Study on Banks of Ukraine

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Abstract: The banking system presents an open, multifaceted and meaningful set of different institutional units within a single monetary market. The effectiveness of such a system also largely determines the set of continuous mobilities of financial flows. At the same time the development of any economic entities, including banks, is impossible without the appropriate activities of its staff. Thus it is necessary to know the effectiveness of the action of the bank staff. Therefore in this paper we considered the feasibility of using the stochastic frontier analysis methodology to measure the effectiveness of financial security on bank employees. Also analyzed the relationship between different variables that determine the relative effectiveness of the model frontier. We also have shown that the significant influence on the formation efficiency of financial security of bank employees is by the number of personnel and the volume of deposits. This study was conducted on a group of local banks in Ukraine. It was noted that the number of staff and reduction in the volume of loans may adversely affect the efficiency of the formation of financial security of their personnel.
Keywords: bank, deposit, effectiveness, loan, staff, stochastic frontier analysis

INTRODUCTION

Banking is a sector of economy, that represents the whole range of different banking establishments which ensure the movement of financial flows between different economic entities and spheres of economic life, plays an important role in the development of any country. Therefore the problems of functioning of banking sector of economy attract great attention of various researchers in modern economic conditions.

We can highlight different areas of research:

Relying on the statistical analysis of data regarding the change of bank cash flow dynamics, A. Akhigbe, J. E McNulty and B. A. Stevenson [1], B. Casu, A. Ferrari and T. Zhao [2], J. Williams and N. Nguyen, studied the efficiency of the banking activity [3],

O. V. Vasyurenko, G. M. Azarenkova, N. J. Scannell conducted the research using the received financial results for the banking system of Ukraine with the help of statistical analysis methods depending on the change of bank cash flow dynamics [4],

I. Golodniuk [5], G. Smith [6], A. Stephan, Oleksandr Talavera and Andriy Tsapin [7], made analysis and comparison of opportunities for financial resources attraction for the needs of the real sector of Ukraine's economy.

However, in spite of such variety of different directions in the research of banks activity, the particular importance gets the consideration of various issues relating to the activity of bank staff. This is due to the fact that in the present conditions of increased competition in the banking services market, and constant problem aspects in the bank functioning in the field of crisis events in the financial and economic area between the different economic entities, a paramount importance has the role of bank staff in the ability to meet any new barriers, the crisis events in the banking based on the guiding principles of the main regulators of such activity [8].

In the work of J. W. Bos and C. J. Kool it is conducted an empirical analysis of efficiency changes in the bank functioning depending on the pay level of its personnel [9]. The influence of the personnel number on the building efficiency of its financial provision is considered in the study of L. Drake and B. Howcroft [10]. Thus, an important aspect is the study of the relationship between the efficiency of the bank staff and the results of such bank in the markets where the services are provided by it. However, the high pay level of certain categories of bank personnel does not always lead to an increase of the efficiency of bank functioning as a whole.

W. D. Cook, M. Hababou and H. J. Tuenter leads to the necessity to study the multicomponent effectiveness, where it should be distinguished two main banking directions: loans and deposits [11]. It is

accounted for by the fact that for the analysis of important is the dynamics of the incoming and outgoing cash flows of banks. The outgoing cash flow of banks is associated with bringing into effect active banking operations, where a significant role is allocated to banking transactions dealing with crediting, while the incoming cash flow embraces passive bank transactions, namely, bringing in resources, where a crucial importance is attributed to operations focusing on attracting the population funds to banks.

However it should be noted that the decision of some motivational aspects in the improving of labor productivity of bank employees depends on the capabilities of financial security of such work that in turn is correlated with the performance efficiency of the separate directions of bank activity. It gives an opportunity to suggest the reasonability of consideration the quantitative estimation of the effectiveness of financial security of bank staff, depending on the main directions of the bank as deposits and loans, where are directly involved the most of the bank employees.

Based on the need to consider the quantitative estimation of the effectiveness of financial security of bank employees we consider an analysis methodology with the help of stochastic frontiers.

METHODOLOGY

One of the most recently considered directions, allowing to disclose and investigate efficiency of economic processes, occurrences, aspects of activity of various subjects of managing is the analysis with use of methods of econometric analysis, among them it is necessary to select stochastic frontier analysis (SFA). According to M. J. Farrell this efficiency allows to define an ability estimation to receive a maximum outcome (certain outcome), using a lot of inputs that uncover an aggregate of various factors of possibility to reach a certain outcome (a maximum input) [12].

The essence of the method SFA is the construction of the efficiency frontier by statistical analysis methods, the positioning of researched economic process or object relatively resulting the efficiency frontier, the efficiency determining of researched economic process or object as a function characterizing the reachability of constructed efficiency frontier [13-15].

Function characterizing an accessibility of constructed boundary of efficiency can be written as [16]:

$$TE = e^{-M(u|\hat{\varepsilon})} , \qquad (1)$$

Where,

TE – effectiveness of the researched process or effect, that can be expressed either as a fraction of the whole or as a percentage;

$M(u|\hat{\varepsilon})$ – the conditional expectation u by estimated values $\hat{\varepsilon}$, which are complicated composite casual members of model for the obtained boundary of efficiency of investigated process, occurrence or object by means of statistical analysis methods [13, 16]:

$$y = f(x, \beta) + \varepsilon , \qquad (2)$$
$$\varepsilon = v - u , \qquad (3)$$

Where,
y – vector of the results of researched object or process;
x – vector of used resources for receiving the certain results of researched object or process;
f – function of the efficiency frontier of researched object or process;
β – vector of parameters of the function f ;
ε – composite random member of the model;
v – vector of random vibration of the model;
u – vector describing the technical inefficiency of researched object or process.

Then an evaluation measure of the researched effectiveness can be represented as the ratio of corresponding model of efficiency frontier with the actual parameters to the efficiency frontier model for which is assumed the absence of parameters reflecting the model inefficiency [13, 16]:

$$TE = \frac{P}{P^{opt}} , \qquad (4)$$

where P – model of the researched process or effect which is characterized by its actual parameters;
P^{opt} – stochastic model of the researched process or effect which is characterized by its optimal parameters (by exception of inefficiencies factors).

Based on a necessary condition of positive values of all component vectors v and u it is conjectured that these casual components of formalization of model of boundary of efficiency can have the form of seminormal distribution $v \approx N(0, \sigma_v^2)$ and $u \approx N_+(0, \sigma_u^2)$ but by their values σ_v^2 and σ_u^2 . Thus, considering unusual structure of errors of model of boundary of efficiency

which has dissymetric distribution and consists of two components, regression residuals are estimated by a method of a maximum probability. Also it is necessary to notice that as a whole the model of function of boundary of efficiency of investigated processes, occurrences or objects for derivation of estimations of efficiency, can be defined in functional form of a transyllable or its simplified representation in Kobba-Duglasa functional form. It is important to note that such model should include the multiplicative connections of the independent variables [17].

As a dependent variable of the researched model of the efficiency frontier it should be considered not so much pay fund of bank personnel as the total cost of bank personnel that generally reflect a corresponding eventual financial security.

As the independent variables, we consider [8]: the weighted average number of bank employees, the volume of loans and the volume of deposits.

Then the model of efficiency frontier for the analysis of evaluation measure of financial security of bank personnel can be represented by the following multiplicative model:

$$ZP = \exp(\beta_0) \cdot KP^{\beta_1} \cdot VK^{\beta_2} \cdot VD^{\beta_3} \cdot \exp(\varepsilon) \quad , \tag{5}$$

where ZP – the total cost for bank personnel;

KP – weighted average number of bank employees;

VK – volume of issued loans by particular bank;

VD – volume of deposits of particular bank.

ε – composite random member of the model, where $\varepsilon = v - u$;

$\beta_0, \beta_1, \beta_2, \beta_3$ – model coefficients.

Taking into account the linearization function (5), the formalization of the additive frontier model for the efficiency analysis of financial security of bank personnel take the following form:

$$Ln(ZP) = \beta_0 + \beta_1 \cdot Ln(KP) + \beta_2 \cdot Ln(VK) + \beta_3 \cdot Ln(VD) + v - u \tag{6}$$

All the variables models of the efficiency frontier for the formula (6) are represented by vectors of corresponding data for various banks. Then we can write:

$$Ln(ZP_i) = \beta_0^i + \beta_1^i \cdot Ln(KP_i) + \beta_2^i \cdot Ln(VK_i) + \beta_3^i \cdot Ln(VD_i) + v_i - u_i \tag{7}$$

$$TE_i = e^{-M(u_i|\hat{\varepsilon}_i)}, \tag{8}$$

where i – the number of researched banks.

DATA FOR THE ANALYSIS
At this point, we have to talk about the complexity of the relevant analysis which is associated with significant changes in the banking sector of Ukraine.

For further realization of the model of the stochastic boundary efficiency for the purpose of obtaining the corresponding ratings of efficiency were studied the indicators the Ukraine's banks activity that were taken from the official site of the National Bank of Ukraine – bank.gov.ua. We are considering 28 banks and their activities in 2014 year. Its different banks: big banks, small banks, middle banks, public banks, commercial banks, foreign banks.

Table 1 shows the particular stochastic characteristics of the investigated data series for the parameters of the model of efficiency stochastic boundary (the calculations were made at a significance level of 0.05).

Table 1: A descriptive statistics of the variables under study in the model (7-8)

Variables	a descriptive statistics		
	average	min	max
Total cost for bank personnel (thous. UAH.)	474957.464	22052.000	3768000.000
Weighted average number of bank employees (people)	4456	144	32274
Volume of issued loans by particular bank (thous. UAH.)	20623471.927	1320902.604	161338725.506
Volume of deposits of particular bank (thous. UAH.)	17186717.178	1215339.112	141338369.213

The total cost for banks personnel presented in the Figure 1.

Figure 1. The total cost for banks personnel
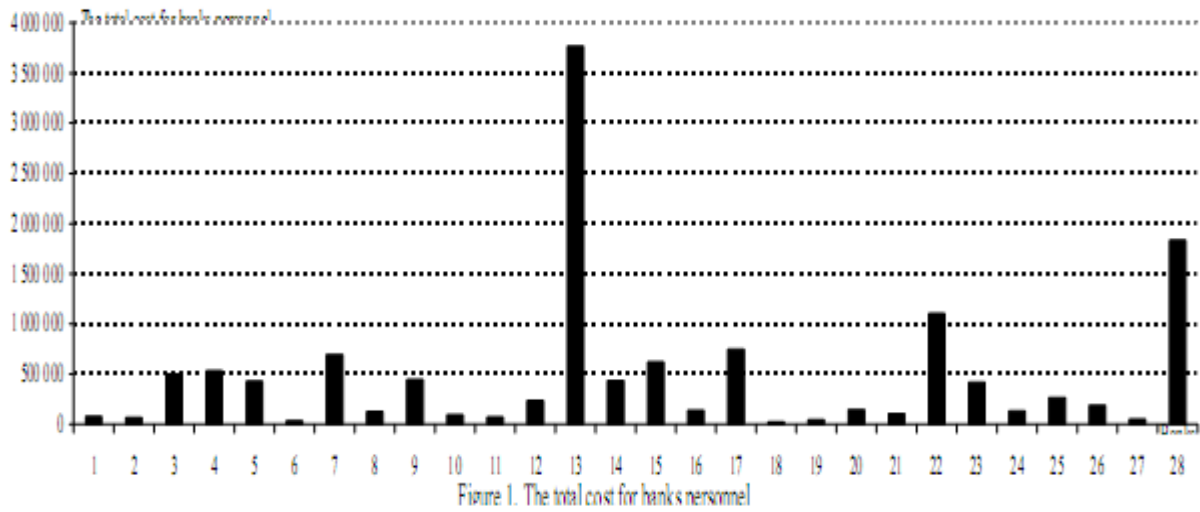
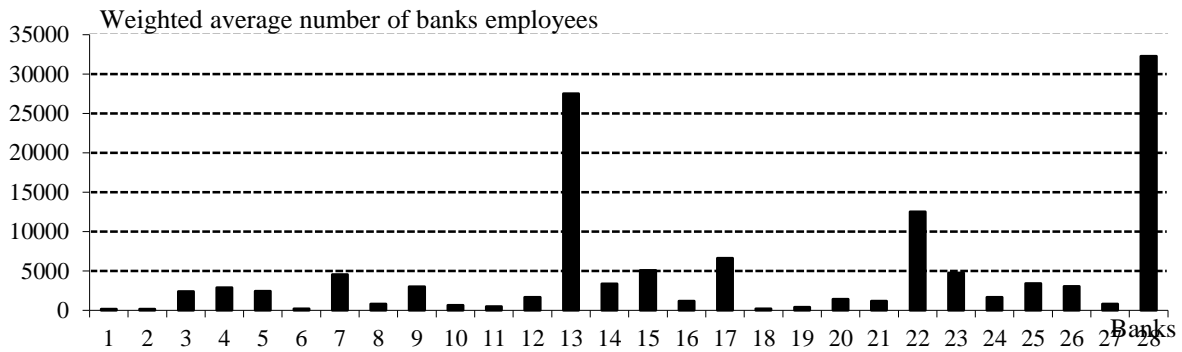Weighted average number of banks employees presented in the Figure 2.

Figure 2. Weighted average number of banks employees

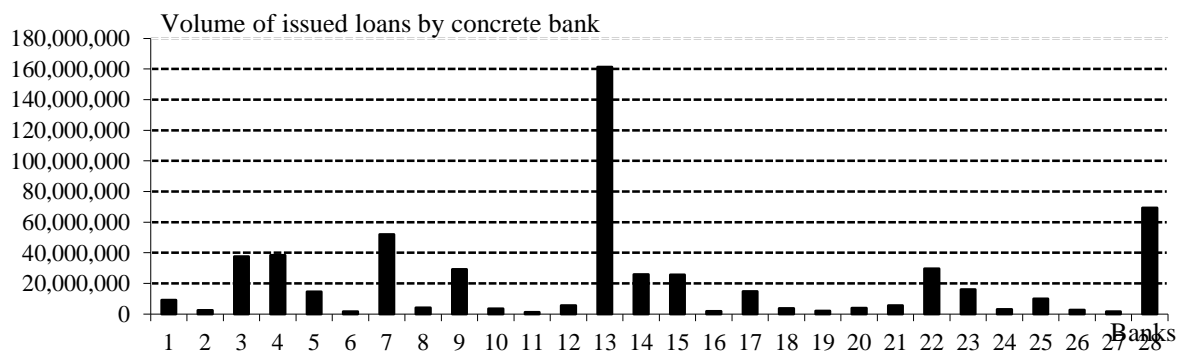Volume of issued loans by particular bank presented in the Figure 3.

Figure 3. Volume of issued loans by concrete bank

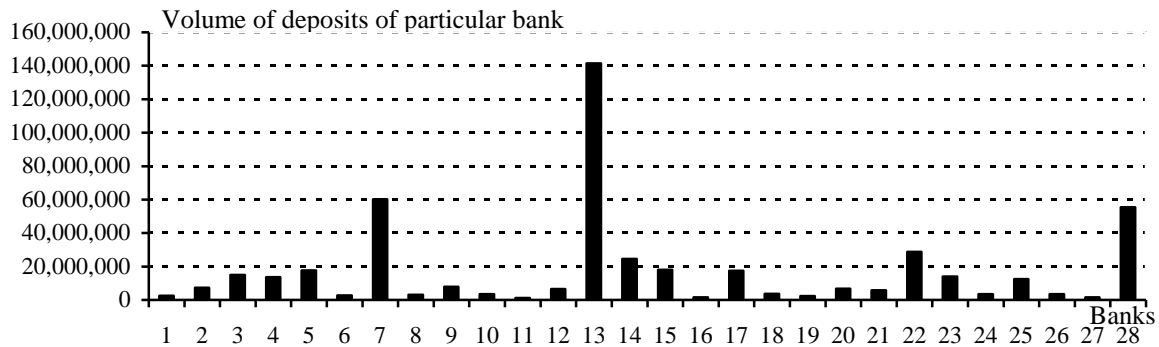Volume of deposits of particular bank presented in the Figure 4.

Figure 4. Volume of deposits of paricular bank

RESULTS AND DISCUSSION

To analyze the quantitative evaluation of the efficiency measure of financial security of bank personnel the program FRONTIER4.1 was used which is in the free access [18].

In the Table 2 (the calculations were made at a significance level of 0,05) there are represented the parameters and statistical values for the efficiency frontier model of researched quantitative evaluations of the efficiency measure of financial security of bank personnel for various time periods.

Particularly, in the Table 1 are represented:

values of model coefficients – $\beta_0, \beta_1, \beta_2, \beta_3$;

value of total error variance – $\sigma^2 = \sigma_\nu^2 + \sigma_u^2$, which defines the key parameters of the distribution of random model values ν and u ;

value share of inefficient component in the total error variance – $\gamma = \sigma_u^2 \big/ \sigma^2$;

t-ratio of researched parameters.

Table 2: Parameters and statistical values for the efficiency frontier model of the researched quantitative evaluations of the efficiency measure of financial maintenance the bank employees

Parameters	Features		
	parameters evaluation	standard-error	t-ratio
β_0	2.800	0.234	11.962
β_1	0.489	0.029	16.349
β_2	0.336	0.073	4.592
β_3	0.053	0.007	0.689
σ^2	0.199	0.031	5.067
γ	0.999	0.002	519.468

First of all, we should note a significant part of ineffective component that, in particular, is a confirmation of the reasonability of methodology use of analysis of stochastic frontiers for determining the efficiency of financial maintenance the bank employees (see Table 2, parameter γ).

The presented data in Table 2 also indicate the reliability and statistical significance of the researched efficiency frontier model for quantitative evaluations of the efficiency measure of financial maintenance the bank employees.

Considering the influence of independent variables on dependent variable of the researched efficiency frontier model it should be noted: a significant effect on the total costs for bank personnel by the weight average number of bank employees and by the loans volume; a slight effect on the total costs for bank personnel by the deposits volume.

But the volume of deposits generates the necessary volume of loans. Therefore, it is important to

have a balanced deposits-loans system. Figure 5 shows the value of quantitative evaluation of the efficiency measure of financial maintenance the banks employees that are analyzed. The average value of quantitative evaluation of the efficiency measure of financial maintenance the banks employees – 0.72.
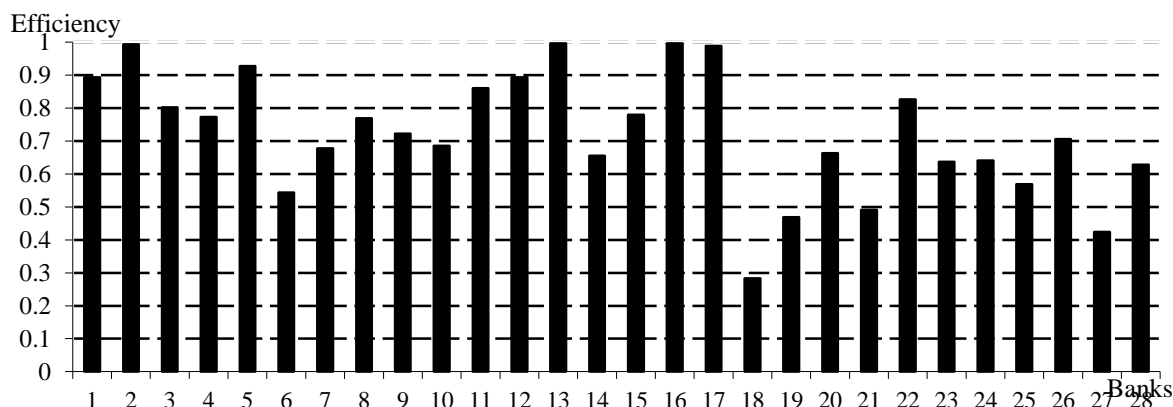

Figure 5. Value of quantitative evaluation of the efficiency measure of financial maintenance the banks employees that are analyzed

It is clear that some of banks have an effectiveness evaluation value which is considerably higher than the average value (1, 2, 5, 11, 12, 13, 16, 17, 22), while some of them have an effectiveness evaluation value which is considerably less than the average value (6, 18, 19, 21, 25, 27).

Therefore, we will look at the link between the specific volume of marriageable age credits (SKR), specific volume of the deposit (SVD), specific volume of financial maintenance the bank employees (SZP) and the value of quantitative evaluation of the efficiency:

$$SVK_i = \frac{VK_i}{KP_i}, \qquad (9)$$

$$SVD_i = \frac{VD_i}{KP_i}, \qquad (10)$$

$$SZP_i = \frac{ZP_i}{KP_i}. \qquad (11)$$

The relationship between the specific volume of marriageable age credits and specific volume of financial maintenance the bank employees presented in the Figure 6 (sphere size indicates the level of evaluating the effectiveness).
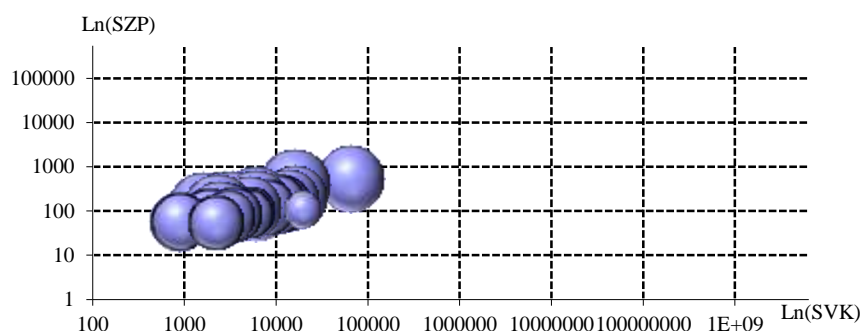

Figure 6. The relationship between the specific volume of marriageable age credits and specific volume of financial maintenance the bank employees

The relationship between the specific volume of the deposit and specific volume of financial maintenance the bank employees presented in the Figure 7 (sphere size indicates the level of evaluating the effectiveness).
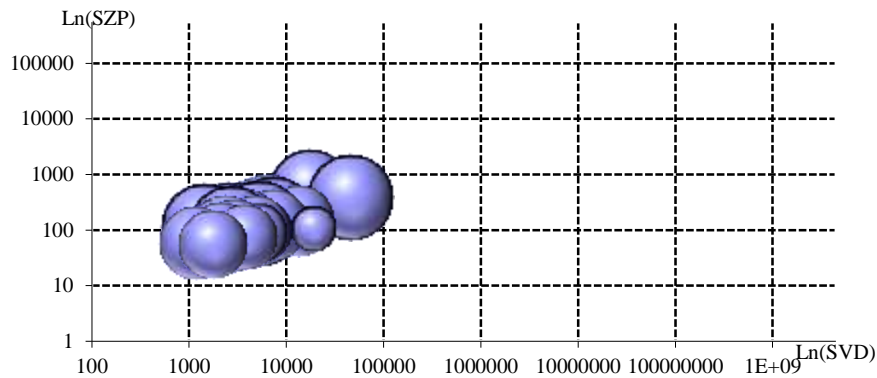

Figure 7. The relationship between the specific volume of the deposit and specific volume
of financial maintenance the bank employees

We see that with the increase of the specific volume of marriageable age credits (SKR) and specific volume of the deposit (SVD) and increasing the value of specific volume of financial maintenance the bank employees (SZP). However, this increase is different, it may be an indication of inconsistency between the volumes of deposits and loan volumes. This in turn affects the assessment of the effectiveness of financial security of bank employees. Most clearly this dependence and lack of coordination between the volumes of deposits and loans volumes (in terms of a bank employee) can be seen in Figure 8 and Figure 9, which shows the first five banks.
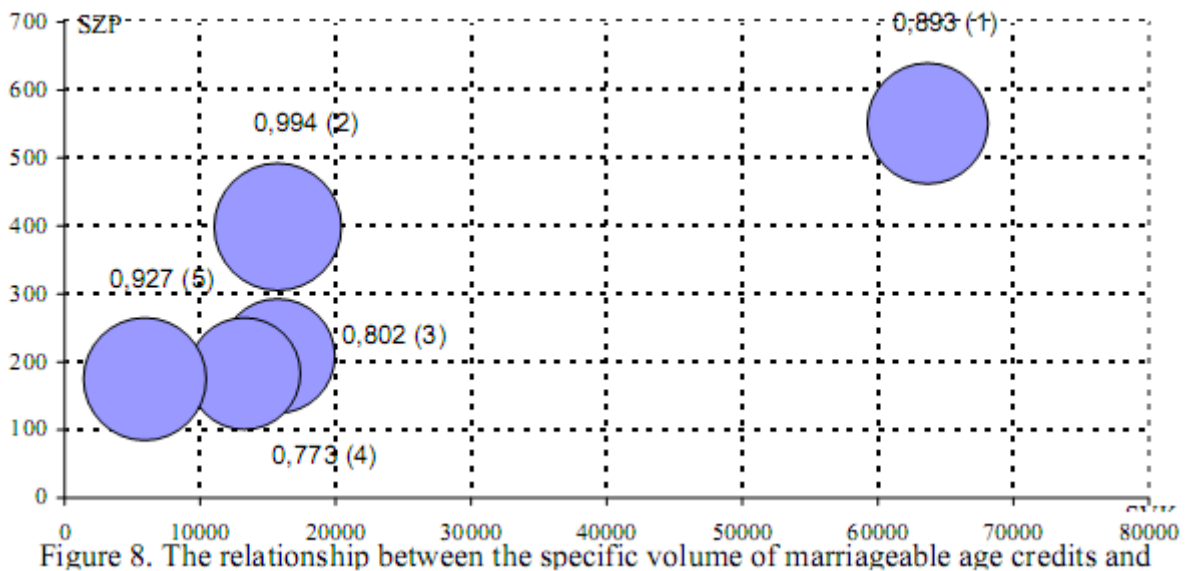

Figure 8. The relationship between the specific volume of marriageable age credits and
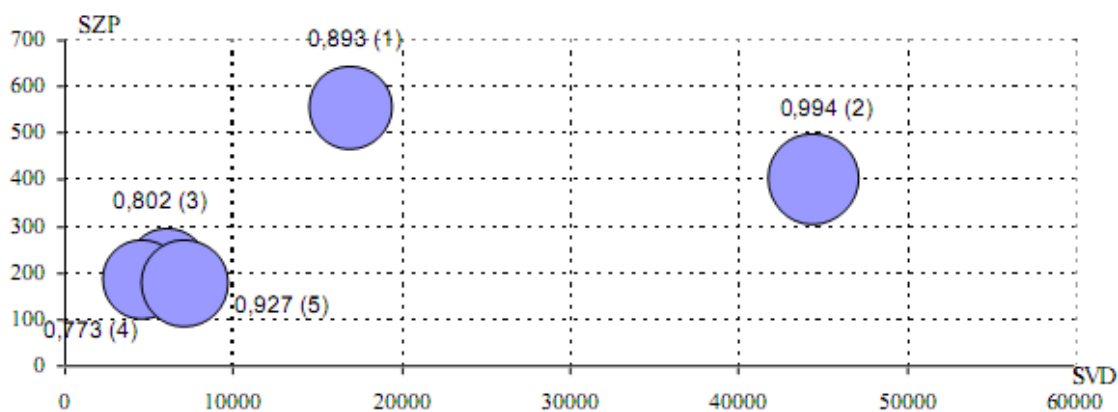
Figure 9. The relationship between the specific volume of the deposit and specific volume of financial maintenance the bank employees (first five banks)

The explanation of this fact is the current dynamic of economic processes occurring in banking services area in Ukraine, which is characterized by a reduction of loans and a decrease in the volume of deposits. This can negatively affect the evaluation of the efficiency measure of financial maintenance the bank employees in the future.

CONCLUSION

Thus, according to our research we can indicate the reasonability of using the methodology of the stochastic frontier analysis for the disclosure of quantitative evaluations of the efficiency measure of financial maintenance the bank employees.

The use of method of stochastic frontier analysis has allowed to analyze the relationship between the parameters which allow to calculate the corresponding efficiency evaluations.

We have shown that it is the significant influence on the formation efficiency of financial maintenance the bank employees by the number of personnel and the volume of deposits. At the same time, we note that there is no consistency between the volumes of deposits and volumes of loans.

Also it is shown that in the current circumstances of banking activity in Ukraine is the number of bank employees and reducing of loans volume can negatively affect the formation efficiency of financial maintenance the bank employees. Thus, on the basis of the presented data for the explored group of banks we can say that it is the number of bank employees and a reduction of loans volume potentially affects most strongly the formation of the total costs for bank personnel.

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