УДК *303.725:330.131.5:336.71*
JEL Code *G21*

О.В. ЛИСЕНОК
(Український державний університет фінансів та міжнародної торгівлі, м. Київ, Україна)

Нормативно-індексна модель оцінки соціально-економічної ефективності банківської діяльності

Стаття присвячена удосконаленню методики оцінки соціально-економічної ефективності банківської діяльності на основі обґрунтування нормативно-індексної моделі, яка дає можливість об'єднати декілька показників та отримати один, узагальнюючий результат. Розглянуто і проаналізовано показники оцінки соціально-економічної ефективності банківської діяльності. Доведено, що здійснення оцінки соціально-економічної ефективності банківської діяльності полегшується завдяки побудові динамічного нормативу, який формується за допомогою ранжованого ряду відібраних економічно-обґрунтованих показників. Упорядкування таких показників за темпами їх росту забезпечує врахування їхнього взаємовідношення та взаємовпливу, що дає можливість оцінити всі необхідні сторони об'єкта дослідження, які неможливо охарактеризувати окремим показником. Дослідження можливостей, що надає процес побудови та реалізації динамічного нормативу, дозволило дійти висновку, що даний підхід є універсальним інструментарієм комплексної оцінки соціально-економічної ефективності банківської діяльності. На основі обґрунтованої у статті методики здійснено оцінку соціально-економічної ефективності банківської системи України.

Ключові слова: *банк, банківська система, нормативно-індексна модель, динамічний норматив, соціально-економічна ефективність.*

А.В. ЛЫСЕНОК
(Украинский государственный университет финансов и международной торговли, г. Киев, Украина)

Нормативно-индексная модель оценки социально-экономической эффективности банковской деятельности

Статья посвящена усовершенствованию методики оценки социально-экономической эффективности банковской деятельности на основе обоснования нормативно-индексной модели, которая дает возможность объединить несколько показателей и получить обобщающий результат. Рассмотрены и проанализированы показатели оценки социально-экономической эффективности банковской деятельности. Доказано, что осуществление оценки социально-экономической эффективности банковской деятельности облегчается благодаря построению динамического норматива, который формируется с помощью ранжированного ряда отобранных и экономически обоснованных показателей. Упорядочение таких показателей по темпам их роста обеспечивает учет их взаимоотношения и взаимовлияния, что дает возможность оценить все необходимые стороны объекта исследования, которые невозможно охарактеризовать отдельным показателем. Исследование возможностей, которые предоставляет процесс построения и реализации динамического норматива, позволило сделать вывод, что данный подход является универсальным инструментарием комплексной оценки социально-экономической эффективности банковской деятельности. На основе обоснованной в статье методики осуществлена оценка социально- экономической эффективности банковской системы Украины.

Ключевые слова: *банк, банковская система, нормативно-индексная модель, динамический норматив, социально-экономическая эффективность.*

O.V. LYSENOK
(Ukrainian State University of Finance and International Trade, Kyiv, Ukraine)

Regulatory-Index Model for Evaluation of Banking Socioeconomic Efficiency

The article is devoted to improvement of evaluation methods for socioeconomic efficiency of banking on the basis of substantiation of the regulatory-index model which gives possibility to combine several parameters and obtain one summarizing result. Discussed and analyzed are the parameters of banking socioeconomic efficiency evaluation. It is shown that the evaluation of banking socioeconomic efficiency is facilitated due to build-up of a dynamic regulation which is formed with the help of the ranged series of selected economically grounded parameters. Arrangement of such parameters depending on their growth ensures taking into consideration their interrelation and mutual influence, which makes it possible to evaluate all the necessary aspects of the study object which are impossible to characterize by a single parameter. The study of the possibilities given by the process of dynamic regulation build-up and implementation allowed us to conclude that this approach is a universal toolkit for comprehensive evaluation of banking socioeconomic efficiency. On the basis of the methods grounded in the article, evaluation of the socioeconomic efficiency of the banking system of Ukraine is made.

Keywords: *bank, banking system, regulatory-index model, dynamic regulation, socioeconomic efficiency.*

Research Urgency. Various analytical ratios can be used to assess banking socio-economic efficiency. But whereas the coefficients method is rather simple and easily implemented in banking practice, it may not always be recognized as an adequate methodological approach to the integrated assessment of banking socio-economic efficiency. The reason being – lack of direct relationship between groups of factors, their relative independence and differences in boundary values, which stipulate almost complete lack of interdependence between various indices and, consequently, impossibility of integrated estimation formation, that is the result of a synthesis of all the design coefficients.

Literature Review. Many native and foreign scholars worked on the problems of the banking and its role in the socio-economic development of the country, including Z.V. Gerasymchuk, N.I. Koretskaya, N.S. Riznyk, S.M. Ilyasov, O.D. Vovchak, A.A. Prymostka, S.B. Yehorycheva, I.P. Senysch and others. But in the domestic banking practice a single universally accepted methodology that would allow quick and efficient assessment of the banking socio-economic efficiency has not formed yet.

Objective of the Study. Drawing on the above mentioned basic flaws of the coefficients method one ought to pay heed to the necessity of the improvement of methods that will be instrumental in building-up of generic output data, resulting in producing a single number or integrated evaluation.

With regard to this it should be noted that the process of formation of a universal comprehensive methodology for assessing banking socio-economic efficiency today is not explored in full, and some methodological approaches, based on the application of a certain number of design factors, contribute to the complication of formation of obtained results comprehensive assessment.

Research results. The process of building-up of the normative index-linked model to assess banking socio-economic efficiency starts with the choice of economic indices (table 1).

Table 1

List of indices for banking socio-economic efficiency assessment

№	Index	Design procedure	Symbol
1	Capital	Total fixed and supplementary bank stock	C
2	Funds held for customers	Total funds held for customers on current and saving accounts	FC
3	Bank liabilities	Bank liabilities on the books	BL
4	Bank assets	Bank assets on the books	BA
5	Interest expenses	Bank interest expenses on income statement	IE
6	Provision for credit risk	Provision for credit risk estimated value	PCR
7	Credit portfolio	Total all loans originated by the bank	CP
8	Interest yield	Bank interest yield on income statement	IY
9	Net income	Net income of the bank less all fiscal charges	NI

Source: build-up by the author based on [9].

Founded on the analysis of correlations between the growth rates of stand-alone indices and ratios built on the ground of them (table 2), a dynamic ratio is being formed (table 4), which is defined as a certain aggregate of parameters, arranged by rates of growth so that compliance with this order in practice of the bank will provide the best compared to previous periods results [1; 4; 5; 6; 7].

Table 2

Analytical ratios to assess banking socio-economic efficiency and regulatory correlation between the rates of their growth

№	Ratio	Design procedure	Normative changes of correlations	Normative correlations between the rates of their growth
1	Share of customers' deposits in bank liabilities	$Q_{cd} = \frac{FC}{BL}$	Increase	FC(i) > BL(j)
2	Average cost of raised funds	$C_{cd} = \frac{IE}{FC}$	Decrease	IE(i) < FC(j)
3	Share of credit portfolio in bank assets	$Q_{CP} = \frac{CP}{BA}$	Increase	CP(i) > BA(j)
4	Average yield of credit portfolio	$YCP = \frac{IY}{CP}$	Increase	IY(i) > CP(j)
5	Return on assets	$ROA = \frac{NI}{BA}$	Increase	NI(i) > BA(j)
6	Return on capital	$ROE = \frac{NI}{C}$	Increase	NI(i) > C(j)
7	Capital multiplier	$CM = \frac{BA}{C}$	Decrease	BA(i) < C(j)
8	Ratio of portfolio credit risk	$CR = \frac{PCR}{CP}$	Decrease	PCR(i) < CP(j)
9	Safety factor	$SF = \frac{C}{BL}$	Increase	C(i) > BL(j)

Source: [2, p.348].

At the next point, given the established relationship between growth rate of indices, the preferences matrix is being formed (table 3), each element of which (a_{ij}) is determined as follows:

a_{ij} = 1 if the i-th determinant should grow faster than the j-th;

a_{ij} = -1, if the i-th determinant should grow slower than the j-th;

a_{ij} = 0 if the normative relationship between i-th and j-th determinants is not ascertained.

Table 3

Growth rates of socio-economic efficiency of banking indices assessment preferences matrix

	FC	BL	IE	CP	BA	IY	NI	C	PCR
FC	0	1	1	0	0	0	0	0	0
BL	-1	0	0	0	0	0	0	-1	0
IE	-1	0	0	0	0	0	0	0	0
CP	0	0	0	0	1	-1	0	0	1
BA	0	0	0	-1	0	0	-1	-1	0
IY	0	0	0	1	0	0	0	0	0
NI	0	0	0	0	1	0	0	1	0
C	0	1	0	0	1	0	-1	0	0
PCR	0	0	0	-1	0	0	0	0	0

Source: build-up by the author based on Table 2.

Thus, the preferences matrix demonstrates normative preferences (standard) correlation of ratios, included in the model of the banking socio-economic efficiency assessment. That is to say, for example, in order to enhance socio-economic efficiency, bank credit portfolio should grow faster than assets (CP > BA) that is why the intersection of row 4 and column 5 of preferences matrix should be marked '1', and vice versa, at the intersection of column 4 and line 5 one should put '-1', indicating that in this matrix the assets are growing at a slower pace than the credit portfolio. This procedure is carried out for all nine factors (table 2), and if the normative correlation between indices growth rates is not detected, then the appropriate preferences matrix row and column should be marked as '0'.

Based on the banking socio-economic efficiency assessment preferences matrix the matrix of normative correlations (dynamic ratio) is designed to depict the rates of parameters growth (table 4), on the assumption of the principle of transitivity. For example, if IY > CP > BA, then IY > BA, so at the intersection of row 6 and column 5 we have '1' and, respectively, at the intersection of row 5 and column 6 – '-1'.

Table 4

Matrix of normative correlations between growth rates of the socio-economic efficiency of banking assessment indices (dynamic ratio)

	FC	BL	IE	CP	BA	IY	NI	C	PCR
FC	0	1	1	0	0	0	0	0	0
BL	-1	0	0	0	0	0	-1	-1	0
IE	-1	0	0	0	0	0	0	0	0
CP	0	0	0	0	1	-1	0	0	1
BA	0	0	0	-1	0	-1	-1	-1	0
IY	0	0	0	1	1	0	0	0	1
NI	0	1	0	0	1	0	0	1	0
C	0	1	0	0	1	0	-1	0	0
PCR	0	0	0	-1	0	-1	0	0	0

Source: build-up by the author based on Table 2 and Table 3.

For applied appraisal of dynamic regulatory-index-linked model of the socio-economic efficiency of banks assessment there were chosen absolute values of respective indices and their growth rates were calculated (table 5).

Based on Table 5 data the matrixes of actual correlations of growth rate indices for the reference (2013) and reporting (2014) periods are being built (table 6, 7); for this purpose data of the Table 5 should be ranked by the actual pace of growth. For example, in 2013 the growth rate FC = 1,15 and BL = 1,07, while in fact BL < FC, that is the liabilities growth rate is lower than the growth rate of customer deposits, that should be the case, reasoning from the regulatory ratios (table 4). Therefore, at the intersection of row 1 and column 2 of the Table 6 should be '1' and, respectively, at the intersection of row 2 and column 1 – '-1' and so on.

Table 5

Absolute values and growth rates of fundamental indices of Ukrainian banking system

Index	Absolute values, thousands of UAH			Growth rates compared with previous year	
	2012	2013	2014	2013	2014
FC	492418	566553	668674	1,15	1,18
BL	1054280	1127192	1278095	1,07	1,13
IE	59506	68239	80 881	1,15	1,19
CP	825320	815327	911402	0,99	1,12
BA	1054280	1127192	1278095	1,07	1,13
IY	113352	117 547	129 932	1,04	1,11
NI	-7708	4899	1436	-0,64	0,29
C	155487	169320	192599	1,09	1,14
PCR	118941	111995	122402	0,94	1,09

Source: calculated by the author based on [3; 8].

Table 6

Matrix of actual correlations between growth rates of the socio-economic efficiency assessment indices of banking system of Ukraine in 2013

	FC	BL	IE	CP	BA	IY	NI	C	PCR
FC	0	1	1	1	1	1	1	1	1
BL	-1	0	-1	1	-1	1	1	-1	1
IE	-1	1	0	1	1	1	1	1	1
CP	-1	-1	-1	0	-1	-1	1	-1	1
BA	-1	-1	-1	1	0	1	1	-1	1
IY	-1	-1	-1	1	-1	0	1	-1	1
NI	-1	-1	-1	-1	-1	-1	0	-1	-1
C	-1	1	-1	1	1	1	1	0	1
PCR	-1	-1	-1	-1	-1	-1	1	-1	0

Source: build-up by the author based on Table 2 and Table 5.

Table 7

Matrix of actual correlations between growth rates of the socio-economic efficiency assessment indices of banking system of Ukraine in 2014

	FC	BL	IE	CP	BA	IY	NI	C	PCR
FC	0	1	-1	1	1	1	1	1	1
BL	-1	0	-1	1	-1	1	1	-1	1
IE	1	1	0	1	1	1	1	1	1
CP	-1	-1	-1	0	-1	1	1	-1	1
BA	-1	-1	-1	1	0	1	1	-1	1
IY	-1	-1	-1	-1	-1	0	1	-1	1
NI	-1	-1	-1	-1	-1	-1	0	-1	-1
C	-1	1	-1	1	1	1	1	0	1
PCR	-1	-1	-1	-1	-1	-1	1	-1	0

Source: build-up by the author based on Table 2 and Table 5.

In the general case, the actual correlation between indices growth rate ought to meet the ratio, formed in the reference (dynamic) standards, but it is difficult to secure this in practice, that is why in the process of comparing actual correlation between the growth rates of socio-economic efficiency of the banking indices and regulatory ratios the number of matches is detected (tables 8, 9) and on the basis of the following formula [2, p. 352] synthesis ratio of banking socio-economic efficiency is calculated:

$$Z = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} d_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{n} \left| e_{ij} \right|}, \qquad (1)$$

where i, j – sequence numbers of indices in a dynamic normal (i = 1, n); d_{ij} – compliance matrix elements of actual and normative correlations between growth rate of indices; e_{ij} – elements of the matrix of regulatory correlations (dynamic normal) between the indices rates of growth.

Thus, let us analyze an example of filling the compliance matrix of actual and normative correlations between the indices growth rates in 2013 (table 8):

1) Table 4 at the intersection of row 4 and column 5 gives ‘1’, and Table 6 at the same place gives ‘-1’ (discrepancy), that is why in Table 8 at the same place should be put ‘0’;

2) Table 4 at the intersection of row 4 and column 6 gives ‘1’, and Table 6 in the same place also gives ‘-1’ (match), that is why in Table 8 at the same place should be put ‘1’;

3) Table 4 at the intersection of row 4 and column 9 gives ‘1’, and Table 6 at the same place gives ‘1’ (coincidence), so in Table 8 in the same place should be put ‘1’;

4) where Table 4 gives ‘0’, Table 8 at the same place should also give ‘0’.

Table 8

Compliance matrix of actual and standard correlations between growth rates of the Ukrainian banking system socio-economic efficiency assessment indices in 2013

	FC	BL	IE	CP	BA	IY	NI	C	PCR
FC	0	1	1	0	0	0	0	0	0
BL	1	0	0	0	0	0	0	1	0
IE	1	0	0	0	0	0	0	0	0
CP	0	0	0	0	0	1	0	0	1
BA	0	0	0	0	0	0	0	1	0
IY	0	0	0	1	0	0	0	0	1
NI	0	0	0	0	0	0	0	0	0
C	0	1	0	0	1	0	0	0	0
PCR	0	0	0	1	0	1	0	0	0

Source: build-up by the author based on Table 4 and Table 6.

Table 9

Compliance matrix of actual and standard correlations between growth rates of the Ukrainian banking system socio-economic efficiency assessment indices in 2014

	FC	BL	IE	CP	BA	IY	NI	C	PCR
FC	0	1	0	0	0	0	0	0	0
BL	1	0	0	0	0	0	0	1	0
IE	0	0	0	0	0	0	0	0	0
CP	0	0	0	0	0	0	0	0	1
BA	0	0	0	0	0	0	0	1	0
IY	0	0	0	0	0	0	0	0	1
NI	0	0	0	0	0	0	0	0	0
C	0	1	0	0	1	0	0	0	0
PCR	0	0	0	1	0	1	0	0	0

Source: build-up by the author based on Table 4 and Table 7.

Based on the Table 4, 8 and 9 data, synthesis ratio of banking system socio-economic efficiency is calculated (coefficient Z) by means of division of the sum total of the elements of compliance matrix of actual and standard correlations between indices growth rates by the sum total (modulo) of the elements of the dynamic standard matrix:

$$Z_{2013} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} d_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{n} |e_{ij}|} = \frac{14}{24} = 0,58 \ ;$$

$$Z_{2014} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} d_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{n} |e_{ij}|} = \frac{10}{24} = 0,42 \ .$$

Approximation of coefficient Z to unity in the model of dynamic standard is indicative of the fact that actual situation meets the standard, in other words – that actual indices growth rate is approaching the standard. In 2013 the indices of Ukrainian banking system growth rate for the bigger part were more consistent to dynamic standard (Z = 0,58), than in 2014 (Z = 0,42). Therefore calculated comprehensive assessment of the domestic banking system indicates a worsening of its socio-economic efficiency.

As the research and real-world computations have shown [2, p. 413-421], the average value of coefficient Z in the domestic banking system in the period of 2005 - 2014 is 0,5 (fig. 1); that is why on the basis of analyses of its socio-economic efficiency, we can conclude that it was the highest in 2005 (the coefficient Z = 0,75). Afterwards we saw a gradual decrease to 2008 when it had the lowest value – 0,25. During 2008-2012 synthesis ratio of socio-economic efficiency of the domestic banking system remained below the average value, and in 2013 coefficient Z exceeded its own average value and was equal to 0,58, but in 2014 fell back to 0,42.

Thus, as the undertaken study of the Ukrainian banking system socio-economic efficiency and dynamic of coefficient Z, the activities of domestic banks can be considered socio-economically effective in case when the calculated value of the integral coefficient Z is in the range of 0,5 to 1.

Conclusions. Thereby, construction and practical implementation of normative index-linked model to assess socio-economic efficiency of banking gives grounds to drawing appropriate conclusions and generalizations on the subject of the possibilities of this approach practical use in the domestic banking institutions.

1. The model of dynamic standard can be used for integrated assessment of the socio-economic efficiency of the banking activity on the various structural levels:

– to assess the socio-economic efficiency of the banking system as a whole;

– in the process of evaluating the socio-economic efficiency of individual banks.

2. Examined dynamic model allows for a comparative analysis of the socio-economic efficiency of individual banking institutions, regardless of their equity capital value, liabilities and assets.

3. Dynamic standard is a universal toolset for the comprehensive assessment of the banking socio-economic efficiency.

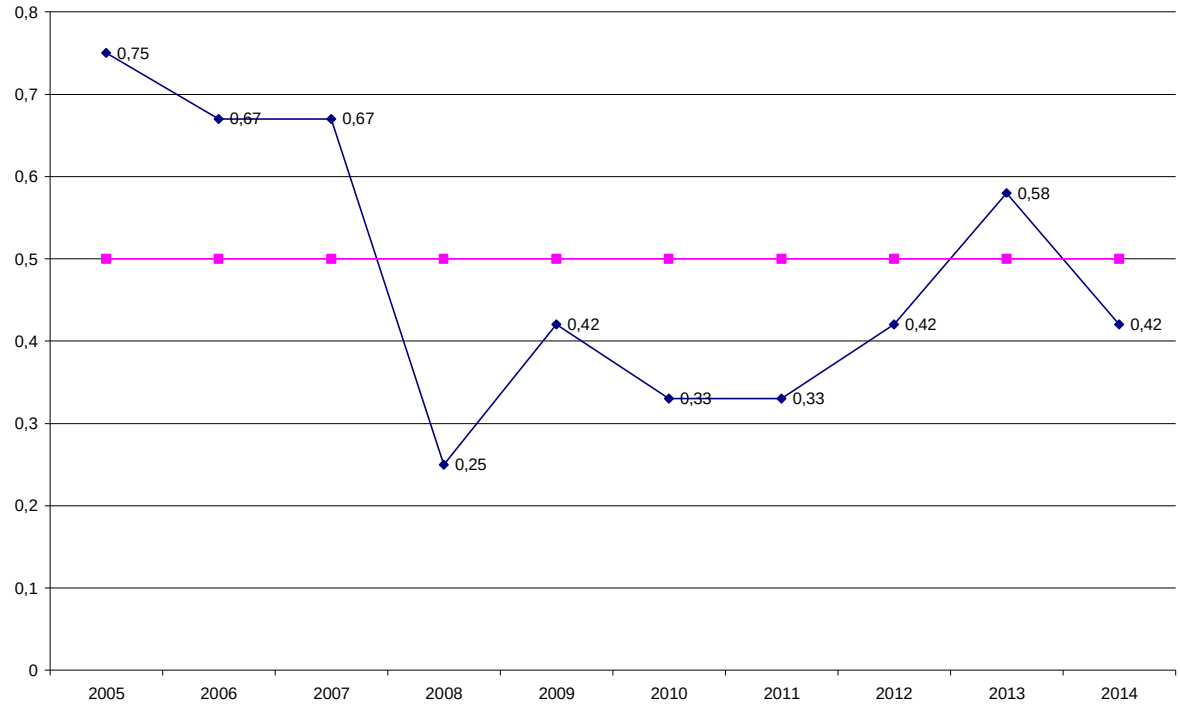

Fig. 1. **Dynamics of the integral coefficient of the domestic banking system socio-economic efficiency assessment**

Source: build-up and calculated by the author based on [2; 3; 8].

4 References

1. *Karcheva G.T.* Use of nonparametric statistics to assess bank liquidity risk / G.T. Karcheva // Bulletin of the National Bank of Ukraine. – 2007. – № 7. – pp. 31-39.
2. *Lysenok A.V.* Banks financial and economic activity management: the theory, methodology and practice: [monograph] / A.V. Lysenok. – Zhytomyr: Zhytomyr State Technological University, 2014. – 424 p.
3. Main performance indicators of banks in Ukraine [Electronic resource]. – Mode of Access: http://bank.gov.ua.
4. *Neradovskyy V.A.* Liquidity and solvency of a credit institution in ordinal dimension / V.A. Neradovskyy // Banking technologies. – 2001. – № 6. – P. 29-37.
5. *Pohostynskaya N.N.* System-oriented analysis of financial statements / N.N. Pohostynskaya, Y.A. Pohostynskyy. – St. Petersburg: Publishing house of Mikhailov V.A., 1999. – 96 p.
6. *Prymostka L.O.* Aggregate bank risk: methods of evaluation based on the regulatory index-linked model / L.O. Prymostka, A.V. Lysenok // Bulletin of the National Bank of Ukraine. – 2008. – № 5. – pp. 34-38.
7. *Prymostka L.O.* Analysis procedure of the bank financial stability by means of dynamic standard / L.O. Prymostka // Bulletin of the National Bank of Ukraine. – 2002. – № 2. – pp. 40-44.
8. Ukrainian banks financial statements data [Electronic resource]. – Mode of Access: http://bank.gov.ua.
9. *Onysko S.M.* Credit Risk Monitoring of Creditor Banks of Agro-Industrial Complex / S.M. Onysko, O.V. Sholudko, R.I. Sodoma // Accounting and Finance. – 2015. – № 3(69). – pp 108-115.