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Analysis of the Albanian banking system in a risk-performance framework

Irini kalluci

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Editorial

On 19-21 November 2009, the Bank of Greece co-organised with the Bank of Albania the 3rd Annual South-Eastern European Economic Research Workshop held at its premises in Athens. The 1st and 2nd workshops were organised by the Bank of Albania and took place in Tirana in 2007 and 2008, respectively. The main objectives of these workshops are to further economic research in South-Eastern Europe (SEE) and extend knowledge of the country-specific features of the economies in the region. Moreover, the workshops enhance regional cooperation through the sharing of scientific knowledge and the provision of opportunities for cooperative research.

The 2009 workshop placed a special emphasis on three important topics for central banking in transition and small open SEE economies: financial and economic stability; banking and finance; internal and external vulnerabilities. Researchers from central banks participated, presenting and discussing their work.

The 4th Annual SEE Economic Research Workshop was organised by the Bank of Albania and took place on 18-19 November 2010 in Tirana. An emphasis was placed upon the lessons drawn from the global crisis and its effects on the SEE macroeconomic and financial sectors; adjustment of internal and external imbalances; and the new anchors for economic policy.

The papers presented, with their discussions, at the 2009 SEE Workshop are being made available to a wider audience through the Special Conference Paper Series of the Bank of Greece.

Here we present the paper by Irini Kalluci (Bank of Albania).

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Altin Tanku (Bank of Albania)
Sophia Lazaretou (Bank of Greece)
(on behalf of the organisers)

ANALYSIS OF THE ALBANIAN BANKING SYSTEM IN A RISK-PERFORMANCE FRAMEWORK

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ABSTRACT

The banking industry is the most important element of the Albanian financial system and therefore it requires more attention when it comes to financial analysis. This paper handles theoretically and analytically some indicators of risk and performance, and for the first time ever, it presents a methodology for measuring a risk index for the Albanian banking system. Its aim is not simply to analyse some financial indicators or measures of risk and return, but, more importantly, to suggest some indicators and a risk index that may be helpful to supervisors during their work.

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1. Introduction

Recently, as a consequence of the difficulties financial markets have been experiencing since 2007, more attention has been dedicated to issues concerning the safety and stability of the financial system as a whole and notably the banking sector, as its cornerstone, in particular. The measures for tougher supervision and greater caution regarding banks' risk-performance analysis have increased. This analysis is helpful and of a great interest for all stakeholders, and not only for the regulators and supervisors. Differing from the traditional method of analysing banking indicators, as used in annual supervision reports, this paper provides additional elements, seen from a different perspective, for the Albanian banking system.

The paper is as follows. Section 2 decomposes the ROE ratio by using the modified DuPont model and identifies the factors affecting this indicator. In Section 3, a matrix of indicators useful for the financial analysis of the banking system is constructed. Section 4 presents the methodology applied and assess, for the first time ever, a Risk Index for the Albanian banking system, based on the model firstly developed by Hannan and Hanweck (1988) and then applied by several authors. Section 5 concludes.

2. Financial ratios analysis using the modified DuPont model

Measuring and analysing the ratios that provide a clear picture of a banks' financial position is becoming more and more important, most notably when efforts to preserve financial stability are at the fore. Furthermore, a preliminary analysis of the financial indicators gives a picture of the banking sector and can highlight weaknesses which could reveal themselves in the future.

2.1. The DuPont Model at a glance

The starting point for the measurement of a financial indicator and the analysis of an enterprise (or industry) is the rate of return on equity (ROE), which shows the profitability provided over a certain period from the shareholders' point of view.

The DuPont Model established since 1919, is broadly used nowadays by almost all industries and acts as the basic model whereby a detailed analysis of the return on equity and the factors that affect it, is made possible. The reason why this model has persisted over time relates to the fact that it serves two main purposes. First, it allows us to perform an analysis of the components that affect profitability and make a comparison between two businesses and/or with the industry aggregate. And, second, it facilitates trend analysis which is useful for detecting the source of a shift in profitability and taking corrective action before it is too late (Walker 2007). Or, as Jablonsky and Barsky (2001) succinctly put it, "The DuPont model is a way of visualizing the information so that everyone can see it."

The DuPont model breaks ROE down into several components by following three stages:

First stage

In this stage, the return on equity breaks down into two elements, i.e. the return on assets (ROA) and financial leverage (or the so called equity multiplier - EM):

$$ROE = ROA * EM \tag{1}$$

Second stage

The second stage of ROE decomposition consists of breaking down ROA into two other components, respectively profit margin (PM) and asset utilization (AU):

$$ROA = PM * AU \tag{2}$$

Third stage

At this stage some new ratios are created, starting from the components of the numerator or the denominator of the indicators generated in the previous stages and adapted to the specific characteristics of each industry.

2.2   The methodology of decomposing ROE

Cole (1972) was the first that adapted and applied the DuPont model for banks. The banking system operates like any other industry in a regulated, supervised and competitive market. It has its own products and services that distinguish it from other

industries. The financial statements of the banking sector also differ from those of other sectors, with regard to the peculiarities that characterize banking activity. As a consequence, the financial or economic ratios of efficiency and performance of banking operations take on another meaning when they are calculated for this sector.

Cole (1972) deemed that there are other more realistic ways for banks to measure performance than just net income growth or net income per share. He suggested another indicator that might be used, namely the ratio of the return on shareholders' equity, as the basic element where all financial analyses originate and expand. As may be seen in equation (3), this ratio shows the net income generated from the capital invested in the bank. A high value of ROE usually indicates a more stable and safe positon of the bank. But a higher value of this indicator may be caused by a lower level of shareholders' equity (which is not a preferable situation) or by a higher level of net income for that period. On the other hand, simultaneous negative values of shareholders' equity and net income would result in positive values of ROE, i.e.

$$ROE = \frac{\text{Earnings after taxes}}{\text{Book value of equity}} = \frac{EAT}{BVE} \qquad (3)$$

In these circumstances, in order to avoid the misleading picture that the return on equity may draw sometimes, the indicator that measures how efficiently the shareholders' equity is used, may be broken down into two components (EM and ROA)[1]. ROA is decomposed into two further elements (PM and AU), i.e.[2]

$$EM = \frac{\text{Total assets}}{\text{Book value of equity}} = \frac{TA}{BVE} \qquad (4)$$

The equity multiplier (EM) indicates the total assets the banks have available per unit of equity invested by the shareholders. It is the inverse of the book value of equity to total assets ratio which shows the level of banks' capitalization. In effect, EM provides the necessary information for the financial leverage of the bank, while the ratio (1-1/EM), i.e, debt/total assets, shows the level of the bank's liabilities. A higher value of the equity

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[1] See equation (1).
[2] See equation (2).

multiplier indicates that the bank is financed more by debt (which means that the banking sector is accepting more deposits but it has also more opportunities for generating income).

The return on assets (ROA) may be expressed as:

$$ROA = \frac{\text{Earnings after taxes}}{\text{Total assets}} = \frac{EAT}{TA} \tag{5}$$

ROA indicator shows how effectively the bank's assets are used to generate higher income. A higher value of ROA confirms that the bank has appropriately formed its assets portfolio, contributing to higher financial results.

It is better to look at both the financial ratios ROA and ROE. Even though they differ from each other and they express different things, they both remain two indicators of management efficiency towards generating income from the money invested by the shareholders and the total investments made in assets, as well. ROE does not provide an indication for the bank's financing through borrowing, whereas ROA does. This is why both indicators complement each other.

Several authors have decomposed ROA into two important elements in order to make financial analysis deeper and identify its determinant factors:

$$PM = \frac{\text{Earnings after taxes}}{\text{Total operating incomes}} = \frac{EAT}{TOI} \tag{6}$$

and

$$AU = \frac{\text{Total operating incomes}}{\text{Total assets}} = \frac{TOI}{TA} \tag{7}$$

Profit margin shows the relationship between the earnings after taxes and the total operating income of the banking system. Cole (1972) suggests breaking down the numerator of the ratio into income and expenses components and expressing it as a proportion of total operating income, in order to identify which of those items contributes more to profit margin.

While the second element, namely the asset utilization ratio (AU), shows the connection between total operating income and total (average) assets, it creates an indicator of gross return on average assets.

In this paper, we try to perform a more detailed analysis of the return on assets by using a combination of two models, i.e. the one suggested by Koch and MacDonald (2002), and the other suggested by Vensel *et al*. (2004). Both models can be considered extensions and modifications of the DuPont model. More indicators than those included in the DuPont model can now be assessed, presenting thus a more comprehensive framework for the analysis of the factors that affect the banking system's profitability.

Initially, Koch and MacDonald (2002) formulate ROE indicator as a combination of ROA and EM. Afterwards, they break it down into two indicators, one for the bank's ability to generate income and the other for the ability to control expenses, as the following equation shows:

$$ROA = AU - ER \qquad (8)$$

where *AU* is the above-mentioned asset utilization ratio and *ER* stands for the expense ratio. While the first indicator (AU) operates as an approximation of income management, the second one (ER) expresses the quality of expenses management.

Following equation (8), the indicators of AU and ER[3] may be broken down into:

$$AU = \frac{TOI}{TA} = \frac{IR + NIR}{TA} \qquad (9)$$

and

$$ER = \frac{TOE}{TA} = \frac{IE + NIE + LLP + T}{TA} \qquad (10)$$

The components of both total operating income and expenses as a proportion of average total assets, after some transformations, form some important indicators that should be further analysed. Thus, ROA may be written as:

$$ROA = AU - ER = \frac{(IR - IE) + (NIR - NIE) - LLP - T}{TA} = \frac{NII + NNII - LLP - T}{TA} \qquad (11)$$

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[3] For the meaning of the acronyms used, see the List of Abbreviations at the end of the paper.

The respective ratios may thus be transformed into:

$$\frac{NII}{TA} = \frac{NII}{EA} * \frac{EA}{TA} = NIM * EAR \qquad (12)$$

and

$$B = \frac{NNII}{TA} = \frac{NIR - NIE}{TA} \qquad (13)$$

EAR ratio is an important indicator of banks' efficiency and investment strategies as it shows the proportion of the total assets invested in income-generating assets. The bank's burden for not covering non-interest expenses by non-interest income (*B*) shows the degree to which operating expenses are managed. Usually, it takes negative values as non-interest income (income from commissions, operations with securities, foreign exchange operations, etc.) does not cover non-interest expenses (personnel costs, other administrative expenses, rents, etc.). Net interest margin (*NIM)* is another important factor that measures the efficiency of bank intermediation and expresses the net income generated by each unit of assets invested in income earning activities. Since this indicator measures the main source of a bank's returns, it should be analysed in more details, as follows:

$$NIM = \frac{IR}{EA} - \frac{IE}{PL} * \frac{PL}{EA} = REA - COL * LEA \qquad (14)$$

REA expresses the average returns on earning assets (in gross terms, before expenses' deduction) by giving an average rate for the interest earned on investments in loans, government securities or shares. *COL* may be considered as the average cost of the borrowed funds, as it shows the ratio of interest expenses to interest paid liabilities. The last indicator (*LEA*) measures the intensity of bank investment (i.e. the proportion of interest paid liabilities invested in earning assets).

Finally, ROA and ROE may be expressed as:

$$\text{ROA} = (\text{REA-COL*LEA}) * \text{EAR} + \text{B} - \frac{LLP}{TA} - \frac{T}{TA} \qquad (15)$$

$$\text{ROE} = [(\text{REA-COL*LEA}) * \text{EAR} + \text{B} - \frac{LLP}{TA} - \frac{T}{TA}] * \text{EM} \qquad (16)$$

2.3 Performance analysis of the Albanian banking system using the modified DuPont model

Table 1 presents the developments of ROE and ROA in Albania over the last four years, compared to some other regional countries, as of December of each year (if not otherwise specified).

As may be seen from the data, Albania ranks among the countries with the highest return on equity, which indicates high efficiency in the usage of equity capital. At the same time, it may be said that the rate of return on assets is satisfactory and comparable to other countries of the region – a finding that provides further support for the view that the Albanian banking system has achieved satisfactory financial results in the last years, as a consequence of investing in activities with high profitability. However, in 2008, both indicators have fallen significantly. If these figures are analysed at a diaggregated level (individual banks), the results show that the number of banks with a negative return on assets and on equity doubled at the end of 2008 (the number of banks with negative earnings after taxes increased from 4 at the end of 2007 to 8 at the end of 2008).[4]

The analysis of the trend behaviour as shown by the indicators over the last years presents a clear view of the domestic financial conditions. The changes that occurred in the Albanian banking system in recent years covering privatizations, acquisitions by foreign banks, mergers, important regulatory changes and supervisory strengthening by introducing stricter regulatory requirements, the widening of the variety of products and services provided and the increased competition in the market have undoubtedly affected the over time behaviour of the indicators.

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[4] See Figures 7 and 8.

Table 2 presents the decomposition of the return on equity and the return on assets ratios, according first to the DuPont model and then according to the models suggested by Koch and MacDonald (2002) and Vensel *et al.* (2004). The data used are taken from financial statements of the Albanian banking system.[5] The balance sheet items, i.e. total assets, shareholders' equity, earning assets, paying liabilities are averaged, while the profit and loss statement items are on a cumulative basis for the whole year.

ROE fluctuates over the period under review, but it has generally remained at the level of 19-23% during the years from 2001 to 2007. We may, however, note a sharp decline in 2008. This drop - if we simply look at equation (3) - is affected by the decrease in net income that characterized the banking system throughout 2008, compared to the previous year (in the period 2003-2007 net income exhibited an upward trend and an averaged growth of 21% per year). The banking system's earnings after taxes for 2008 were 7.3 billion leks, representing an annual decline of 26.5%. By contrast, the average shareholders' equity increased, but its pace of growth varied through the years, with an average of 19% in the period 2002-2008. The annual increase in shareholders' equity was 31.6% at the end of 2008. Apparently, these two phenomena affected ROE's decline.

However, let us have a look in more detail at the components that cause ROE to decline (see Figure 1). Profit margin (earnings after taxes/total operating income) increased continuously from 2003 suffering however an evident decline in 2008. This was one of the main factors that caused ROE to fall. Contributing factors were the annual fall in earning after taxes by 26.5% and the annual increase by the same rate (26.5%) in total income. A decline in profit margin implies that a smaller part of total income (after the deduction of expenses) remained at the shareholders' disposal (to be distributed in the form of dividends) or at the bank's disposal (to be re-invested).

Meanwhile, a slight increase in asset utilization from 8.24% in 2007 to 8.76% in 2008 is visible. Since this ratio shows small variability through the years (it fluctuated between 8% and 9% between 2002 and 2007), it is not expected to significantly affect the return on equity.

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[5] Table 5 presents a reduced form of the profit and loss statement of the Albanian banking system through the years 2001-2008, with some transformations for adapting it to the models of statements used by foreign authors in their analysis of the return on equity.

The equity multiplier[6] (EM) continues its downward trend in 2008 that started in 2005. This phenomenon has been induced by the faster annual increase in the shareholders' equity (averaging 28% over 2005-2008, compared to the average annual increase in assets by 19% over the same period). The value of the equity multiplier at the end of 2008 shows that assets cover more than 12 times the invested capital. The annual increase in shareholders' equity by about 32% for the year 2008 is a further proof of the measures taken by the banks to improve their capitalization and their management in times of difficulty. As mentioned in Section 2.2, the equity multiplier (EM) is used to calculate another important element, namely the debt ratio of the banking system (see Table 3). The debt ratio has generally been stable implying that the liabilities and total assets have increased by the same rate over the period in question. However, the indicator has experienced a slight decrease in 2007-2008. This may be explained by the fact that the banks preferred to rely more on the capital invested by the shareholders than on debt, as the latter has become more expensive and scarce during the current financial turmoil.

Summing up, we may conclude that the decrease of ROE in 2008 was mainly caused by the fall in profit margin and the equity multiplier.

Next, we proceed with the decomposition of the return on assets ratio to identify the components that determine it and, notably, its decline in 2008 (see Figure 2). The rate of return on assets (ROA) for the Albanian banking system was satisfactory in the last years. Generally, this indicator stood at the interval of 1.2-1.6% in 2001-2007; however, in 2008 it dropped rapidly to 0.9%. Looking at the trend behaviour of total revenues and expenditures as a percentage of total assets, both have moved in the same direction but not by the same degree. In 2008, there was an increase in both revenues and expenditures but apparently expenditure increased more than revenue, thus causing both net income and the return on assets to decline.

Furthermore, by performing another transformation of ROA (see Table 2), we obtain the results presented in Figure 3. Net interest margin (NIM) is an indicator of the bank's efficiency in the sense of an effective financial intermediation. During the period under study, this indicator has generally displayed a positive trend implying that the

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[6] In the Annual Report of Supervison, this concept is referred as "Financial Leverage".

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Albanian banking system has generated a higher net interest income as a proportion of earning assets. But, in 2008, it experienced a fall in net interest margins. While for the years 2005-2007, the annual increase of net interest income was higher than that of earning assets (which resulted in higher net interest margins), the trend was overturned in 2008, and net interest income increased by only 12%, whereas the annual change in earning assets was 18%, resulting in lower levels of the NIM rate. This development demands a more detailed analysis in order to identify, from an accounting perspective, the elements that affected it (see later in this paper).

The Albanian banking system has seen to be efficient as far it concerns assets' investment. On average, its earning assets comprise more than 90% of its total assets in the years 2001-2008. EAR indicator decreased slightly during 2008. The later is evidence of the decline in ROE and ROA.

As expected, the banking system burden is negative. The banks have not been able to generate enough non-interest revenues to cover non-interest expenses. Furthermore, net non-interest income[7], which has been negative, continuously worsened due to several factors. First, net income from other activities increased continuously, while the principal items of revenues and expenses from this category were the revenues and expenses from commissions and foreign exchange activities. Thus, it may be said that this item positively affected net non-interest income. On the other hand, operating expenses also increased and contributed to a worsening of the already negative net income from non-interest activities. It should be mentioned that operating expenses in 2008 continued to increase as they had done in the previous years (by 23.5%) due to the continuous widening of the range of activities and the geographical expansion of the banking system, where personnel expenses comprise about 40% of the operating expenses.

The ratio of loan loss provisions to total assets remained low (less than 0.5%) between 2001 and 2007, but in 2008 it sharply increased to 1.05%, as a consequence of deterioration in the quality of the loan portfolio. The high growth of loan loss provisions over 2008 (more than 1.4 times than that of 2007), as a result of the loan portfolio

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[7] It is calculated as follows: net income from other activities + net extraordinary income – operating expenses. Another way of calculation is: Non-interest income – Non-interest expenses (refer toTable 5).

deterioration and the measures taken by the banking system to put aside reserves under circumstances of increasing uncertainty, exceeded the increase in the average total assets (19%), thus negatively affecting the return on assets.

Tax paid by banks comprised on average only 0.5% of the total assets, and fell to 0.2% in 2008, positively affecting the return on assets. The drop in the absolute value was caused by the fall in earnings before taxes.

In conclusion, net interest margin generally shows a positive trend over the sample period, with a slight reversal in 2008. In order to explain its trend behaviour, it is necessary to analyse the components of net interest margin (see equation 14 and Figure 4).

The return on earning assets (REA) is a way of measuring the average interest earned on profitable assets by the banking system. This indicator increased in the recent years, signalling that domestic banks started to invest in higher return (but also more risky) activities. Despite this increase, the return on invested funds has remained almost at the same levels as at the beginning of the sample period.

The cost of borrowed funds (COL) also increased in the last three years of the sample, but, compared to the starting point, i.e. 2001, it declined by 1 percentage point. The major share of interest expenses went to interest paid to customers (for time deposits). These expenses increased not only as a consequence of the rise in the absolute value of liabilities, but also because interest rates increased notably in the later years (either because of a gradual rise of the policy rate since 2005 or of the policy of banks to call the attention of their depositors to seasonal offers).

The ratio of paying liabilities to earning assets (LEA) was not so volatile. In 2008, a slight increase took place, but generally, over the whole sample period more than 90% of interest bearing assets was financed by interest paying liabilities.

Finally, it should be noted that the decrease in net interest margin during 2008 results from the fact that the higher return on earning assets (REA) has not successfully managed to cover the negative effect of the increase in the cost of liabilities (COL) and in the ratio of earning assets financed by the paying liabilities (LEA).

3. Matrix analysis of banking system performance

An alternative way of analysing financial ratios is through the matrix approach presented by Vensel *et al.* (2004). These authors introduce a different treatment of financial indicators of the Estonian banking system, by creating a matrix for the analysis of these indicators. In this section, we present the structure of the financial ratios' matrix based on the work by Vensel *et al.* with some differences as the matrix is adapted to the Albanian case.

3.1   Methodology

Vensel *et al.* (2004) note that starting from *n* quantitative indicators Y_i (*i=1,2,....n*), it is possible to define n^2-n qualitative indicators x_i (financial ratios),

$$x_i = \frac{Yi}{Yj} \quad (i, j = 1,2,...n; i \neq j) \tag{17}$$

By the combination of these *n* quantitative indicators, we form a (*n x n*) matrix which is also called the *matrix model*, i.e.

$$X = \begin{vmatrix} x_{11} & x_{12} & .... & x_{1n} \\ x_{21} & x_{22} & .... & x_{2n} \\ .... & .... & .... & .... \\ x_{n1} & x_{n2} & .... & x_{nn} \end{vmatrix} = \{x_{ij}\} \tag{18}$$

This is a symmetric matrix where the symmetric elements with respect to the main diagonal are reciprocal to each other (x_{ij} ratios are reciprocal to x_{ji} ratios) and it comprises of two triangular symmetric matrices: the matrix of effectiveness and the inverse matrix of effectiveness. The financial information needed for the analysis is presented in the matrix of effectiveness (the elements down the diagonal), without thus needing to calculate all financial ratios. The main idea of presenting this matrix is the introduction and the analysis of the interrelations among different financial indicators.

All the quantitative indicators that are analyzed and used for defining other financial ratios so far may be divided into two groups according to their economic meaning, namely:

1. *the input indicators* of banking activity, obtained from the bank balance sheets. The reason why these indicators are called "inputs" is that they generate and improve financial results. The indicators included in this group are: total assets (TA), the book value of equity (BVE), earning assets (EA), paying liabilities (PL), etc.

2. *the output indicators* of banking activity, obtained from the bank's income statement. The reason why these indicators are called "outputs" is that they are results of the inputs' usage. The indicators included in this group are: earning after taxes (EAT), total operating income (TOI), net interest income (NII), interest revenues (IR), non-interest revenues (NIR), etc.

The combination of these two initial groups of indicators forms the effectiveness matrix of financial indicators for the banking system, which comprises three partial matrices:

(i) a triangular matrix called *"output matrix",* whose elements present proportions between two *output indicators;*

(ii) a triangular matrix called *"input matrix",* whose elements present proportions between two *input indicators;* and

(iii) a quadrate matrix called *"output-input matrix",* whose elements present proportions between *an output* and *an input indicator.*

3.2 Some explanations of the meaning of financial ratios in the "Output" Matrix

As discussed above, the partial "output matrix" presents proportions among items of the income statement. A lower value of NENII shows that earnings after taxes comprise a smaller part of net interest income, an undesirable situation that indicates higher operating expenses or loan loss provisions which reduce earnings after taxes. A higher NIIR ratio signifies that a higher proportion of interest revenues remain at the bank's disposal, after interest expenses are deduced. INIR, ITIR and NIRTIR tell us the way total operating income is allocated between interest and non-interest revenues. Generally speaking, a higher value of profit margin (PM) is preferable, as it shows that

after the deduction of all expenses, the net results (earning after taxes) comprise a considerable proportion of total operating income.

In the partial "input matrix", a higher EAR indicator is preferred, since this implies that a larger part of assets are invested in profitable activities. As concerns the equity multiplier (EM), the higher is, the more banks depend on borrowing for financing their activities.

The partial "output-input matrix" presents proportions among items of the income statement and the balance sheet, and, in general, higher values for the qualitative indicators are preferred. In this case, we can support that the utilization of input indicators has been effective and has generated high results.

3.3 Matrix analysis of the Albanian banking system performance

Once the matrix has been created and a range of financial ratios have been calculated, we are now able to assess the performance of the banking system. Unlike the modified DuPont model, we can create more financial ratios and present them in a summary making comparison simpler. In matrix no.2, 28 financial indicators are presented for the years 2001, 2005 and 2008. Thus, a range of matrices may be formed, with indicators for different years that may be compared with each other.

In the "output matrix", x_{15} – PM (profit margin) is the leading element which may be written as a combination of some other ratios:

$$x_{15} = x_{12} * x_{23} * x_{34} * x_{45} \qquad (19)$$

or,

$$PM = NENII*NIIR*INIR*NIRTIR = \frac{EAT}{NII} * \frac{NII}{IR} * \frac{IR}{NIR} * \frac{NIR}{TOI} = \frac{EAT}{TOI} \qquad (20)$$

Based on the above interrelations, we may establish diverse combinations that may be used to identify the factors that affect a certain element of the matrix (or affect its increase or decrease compared to a given period).

For instance, if $PM_{08} / PM_{01} = 0.652$, this may be expressed as a combination of the growth rates of each PM component during the period 2001-2008 (refer to equation 19 and matrix no.2), respectively:

$$\frac{PM_{08}}{PM_{01}} = \frac{NENII_{08}}{NENII_{01}} * \frac{NIIR_{08}}{NIIR_{01}} * \frac{INIR_{08}}{INIR_{01}} * \frac{NIRTIR_{08}}{NIRTIR_{01}} = 0.459*1.281*1.757*0.631 = 0.652 \quad (21)$$

Here, we note that the element which accounts for most of the decline in PM over 2001-2008 is NENII indicator. Subsequently, we may proceed with the decomposition of the latter into its components in an attempt to analyse in more detail the situation and the motives that may have caused it.

In the "input matrix", x_{68} – EAER (earning asset to equity ratio) is the leading element which may be written as a combination of two input indicators:

$$x_{68} = x_{67} * x_{78} \quad (22)$$

or,

$$EAER = EAR*EM = \frac{EA}{TA} * \frac{TA}{BVE} = \frac{EA}{BVE} \quad (23)$$

Similarly, we can analyse the factors that affect the decrease in EAER (over 2001-2008) to discover that the leading cause of this drop is the equity multiplier (EM).

Finally, in the "output-input matrix", x_{18} – ROE (return on equity) is the leading element which may be written as a combination of:

$$x_{18} = x_{12} * x_{23} * x_{34} * x_{45} * x_{56} * x_{67} * x_{78} \quad (24)$$

or,

$$ROE = NENII*NIIR*INIR*NIRTIR*TIEA*EAR*EM=$$
$$= \frac{EAT}{NII} * \frac{NII}{IR} * \frac{IR}{NIR} * \frac{NIR}{TOI} * \frac{TOI}{EA} * \frac{EA}{TA} * \frac{TA}{BVE} = \frac{EAT}{BVE} \quad (25)$$

Again, the elements that explain ROE's fall may be identified as follows:

$$\frac{ROE_{08}}{ROE_{01}} = \frac{NENII_{08}}{NENII_{01}} * \frac{NIIR_{08}}{NIIR_{01}} * \frac{INIR_{08}}{INIR_{01}} * \frac{NIRTIR_{08}}{NIRTIR_{01}} * \frac{TIEA_{08}}{TIEA_{01}} * \frac{EAR_{08}}{EAR_{01}} * \frac{EM_{08}}{EM_{01}} =$$

$$=0.459*1.281*1.757*0.631*0.866*1.021*0.839= 0.484 \qquad (26)$$

As noted above, the decrease in NENII has been the most important factor causing ROE to decline in 2008, compared to 2001. Other factors that have also affected negatively ROE are NIRTIR, TIEA and EM.

4. The risk index

Generall speaking, financial theory views returns as being related to risk, as higher risk needs to be compensated by higher returns in order to be undertaken by risk-averse shareholders. In the previous section we analyse the performance of the Albanian banking system. Now, we move to compute the risk that this system encounters while performing its intermediary activity. Banks face risks, such as credit risk, interest rate risk, liquidity risk, exchange rate risk, operational risk, etc. Aside from developing specific indicators to measure each of the above risks, a "Risk Index" can also be created that encompasses all types of risk in a single index.

4.1 Methodology

The Risk Index, also known in the literature as Z-statistic, Z-index or Z-score, is an indicator of the overall level of risk that banks face. Recently, this index, which is a measure of the soundness and stability of the financial institutions, has become more important. The risk index is inversely related to the probability of the book value of insolvency of these institutions. Different versions of calculation are found in the literature for individual banks or groups of banks (grouped by ownership or by their activities) or for a country's banking system. The index was first performed by Hannan and Hanweck (1988)[8], who derived the probability of the book value insolvency[9] (i.e. the probability that the bank's losses in a certain period exceed the book value of the bank's equity, or the probability that the assets value of the bank becomes lower than the value of its liabilities).

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[8] The index was then applied by Liang and Savage (1990), Eisenberg and Kwast (1991), Sinkey and Nash (1993), Nash and Sinkey (1997), Naïmy (2005), among others.
[9] In terms of book and not market value.

The Risk Index is provided by a combination of the return on assets ratio (ROA), the equity multiplier (EM) and the standard deviation of ROA. Its empirical form is given by:

$$RI = \frac{E(ROA) + CAP}{\sigma_{ROA}}$$ (27)

where

RI is the Risk Index (also called Z-statistic, Z-index or Z-score);

E(ROA) is the average (expected) return on assets;

$CAP = EM^{-1}$ is the equity to asset ratio and

σ_{ROA} is the ROA's standard deviation.

The probability of the book value insolvency (Π) is measured by:

$$\Pi = \frac{1}{2 * RI^2}$$ (28)

The risk index (Z-score) is the number of standard deviations below the mean by which the bank's (or the banking system's) profit would have to decline in order to eliminate equity (see Eisenberg and Kwast 1991). Thus, it expresses the ability of the bank to absorb losses.

It should be noted that a value or interval that serves as benchmark for the risk index (i.e. for detecting whether a banking system or a bank is in a safe or a risky position) does not exist. Instead, its trend behaviour is analysed. Specifically, an upward trend indicates a favourable development whereas a downward trend signals a negative development. For example, Jordan (1998) distinguishes the Z-scores between surviving and failed banks in New England over the period 1989-1992 which was a period of excess difficulty for the country's banking industry. He reached the conclusion that the group of banks which survived had a higher average value of the Z-index (13.33) and consequently a lower probability of the book value insolvency, compared to the banks that failed (Z=8.71). Beck and Leaven (2006) also measured the Z-scores for 57 countries and found differences among them. They calculated an average Z-score for the period 1997-2003 of nearly 50 for the United States, but only of 2 for Korea and 11.6 for

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Albania, while the average Z-score of all 57 countries was 24. More recently, Hesse and Čihák (2007) calculated the risk index for individual banks of 29 advanced and emerging OECD countries in the 1994-2004 period, and concluded that cooperative banks had higher index values (the group average score for these banks was 59.6) than savings banks (55.4) and commercial ones (46.5), implying that the first type of banks are more stable. Finally, Čihák (2007), using a group of 29 countries, 12 of which have experienced systemic banking crises, found that banks in difficulty were characterized by significantly lower Z-scores (Z=32) than other banks (Z=89).

The international evidence shows that risk index values vary by countries and/or bank type. Therefore, when the risk index is calculated for the Albanian banking system, it will be discussed on the basis of its trend behaviour without taking into account its absolute value. A lower value implies a riskier bank, and a high value signals a safe one. Since the index value is inversely related to the probability of book value insolvency, a higher value means a lower probability to face a bank solvency difficulty.

If a bank or a banking system is characterized by a high return on assets, a high level of capitalization and a low volatility of ROA, then the bank or the banking system is considered safe, that is it has a higher risk index. It is interesting to note that the index includes all these components, because each of them has a special connotation: ROA indicator is regarded as the best measure of bank's performance (as it is discussed in the previous section); its volatility is seen a standard measure of risk in finance; and the capitalization level represents a standard for the banks' stability and safety.

4.2 Computation of the risk index for the Albanian banking system

To the best of our knowledge, the risk index for the Albanian banking system has been calculated in very few papers[10] and only within the context of a cross-country comparison. It should be emphasized that differences may be found between the approach we present here and the ones that applied by other authors. This is chiefly due to the different time periods selected. Moreover, the data used by other authors in their studies covers only a limited sample of Albanian banks, namely only those whose financial statements are available in Bankscope. For the first time ever, in this paper, a risk index is

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[10] See, Beck and Leaven (2006), Ariss (2009) and Agoraki *et al.* (2009).

calculated for the whole Albanian banking system and a complete time series of its values is obtained for the period from December 2001 to June 2009. The data used are on a quarterly basis and they were collected separately for each individual bank. Then, in order to calculate the required indicators which are components of the index, they were aggregated for the whole system using the weighted averages of the individual data (the weighting factor is the share of each bank's assets to total banks assets).

Two methods of calculating average ROA and its standard deviation – which are used in the index's measurement – are found in the literature. The first one calculates the expected (average) value as the average value of ROA during a given time period, from which the standard deviation of the values during the same period can be derived. This method is appropriate in the case when the risk index is calculated over a time period for a particular bank or a banking system.

The second method is to calculate the average value of ROA at a specific point of time using the weighted average of individual bank ROAs; the standard deviation is then the standard deviation across banks. This method is more appropriate when we need to create a time series of the risk index and view the banking system as a whole, made up of individual banks, whose asset shares act as weighting elements in computing average ROA and its standard deviation at this certain point.

Since our main purpose is to calculate the risk index and to create a series of data points in order to identify its trend behaviour, we apply the second method. However, future users of this risk measure may try to calculate the index value for a time period, following the explanations of the first method mentioned above.

The expected value of the system's ROA for each quarter is calculated as a weighted average of each bank's ROA[11] at the end of the quarter, weighted by the share of each bank's assets to the total banks' assets at the end of the respective period, i.e.

$$E(ROA)_t = \Sigma(ROA_{it} * w_{it}) \tag{29}$$

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[11] Usually, in calculating the expected value, the probabilities of a specific situation occuring are used as weighting factors. Since the probability distribution of future (predicted) values is missing, it is supposed that the expected value of the system's ROA may be approximated by the weighted average of all current ROAs for each bank.

where

$E(ROA)_t$ is the banking system's average (expected) return on assets at quarter t;

ROA_{it} is the return on assets of the bank i at the t-th quarter on an annual basis;

w_{it} is the share of bank i assets to the banking system's total assets at quarter t;

i stands for the i-th bank and t for the t-th quarter.

The standard deviation is calculated according to

$$\sigma_{(ROA)\,t} = \sqrt{\Sigma[ROA_{it} - E(ROA)_t]^2 * w_{it}} \qquad\qquad (30)$$

Table 4 displays the risk index obtained and the probability of the book value insolvency for the Albanian banking system during the years 2001-2008. As is evident, the risk index fluctuated over time, but its average level during 2001-2008 reached 8.3 if we take into account the December values. At the end of 2008, the index's value was lower than the average of the last eight years. In the first quarter of 2009, the value of the risk index declined to 5.1 reflecting the problems that financial markets worldwide encountered. Thus, the riskiness of the Albanian banking system increased. However, in the second quarter of 2009, we notice an improvement of the index, thus signalling a more optimistic situation. This is in line with the forecast for an upturn in banking activity and a reversion of the public confidence in the banking system.

Generally speaking, the equity/asset ratio has been increasing over time, positively affected the value of the risk index. The element that caused the index to decrease was the weighted average ROA of the system, which fell rapidly, notably in the three quarters prior to the second quarter of 2009. There is an improvement in average ROA of the system causing the index to increase. In addition, the higher volatility of ROA contributed to the deterioration of the risk index at the end of 2008 and in the first quarter of 2009. As for the second quarter, the standard deviation decreased, which is reflected in the risk index's improvement (see Figure 5).

However, the probability the banking system's equity would turn negative is low, fluctuating between 1 and 2% over the period under study. Despite the increase in the probability of the book value insolvency during the global financial crisis (as a

consequence of the decline in the risk index), its modest value may not be considered a disturbing element for the Albanian banking system (see Figure 6).

5. Conclusions

During the recent years, the Albanian banking system has been characterized by a fast expansion of its activity, as is evident by the increase in total assets, the expansion of the loan portfolio, deposit collection, the variety of products and services provided, the increased competition, the earnings after taxes and by other quantitative and qualitative indicators. During the period 2001-2007, the domestic banking system mostly generated high rates of return on equity and on assets, ranking among the first countries in the region. This testifies once more to the fact that Albanian banks engaged in risky activities, thus generating higher returns. However, in 2008, when the global economy was overcome by the financial crisis, the Albanian banking system started to show signs of a slowdown and deterioration in financial indicators. The return on equity declined significantly owing to a decline in its two main components, namely the equity multiplier and the return on assets ratio. The latter fell as a consequence of the fall in net interest margin and in the earning assets ratio, as well as a consequence of the banks being unable to cover non-interest expenses by non-interest income and the rise in the loan loss provisions to total assets ratio. Net interest margin fell during 2008 as a result of the increase in the cost of borrowed funds and earning assets financed by paying liabilities.

This paper also presents, for the first time ever, a quarterly time series of the risk index calculated for the whole Albanian banking system over the period December 2001 to June 2009. This index exhibits high values over the period under review, largely supported by the high returns on assets and a well capitalized banking system, as well as by low ROA volatility. Nevertheless, as the global financial crisis culminated, the risk index for the Albanian banking system deteriorated too.

This paper, being more than a simple technical exercise, aims at bringing to the scene some new financial indicators for the Albanian banking system that measure risk and performance. This will facilitate the periodic analyses of the banking system that supervisors perform.

Future research may focus on the enrichment of these new indicators' series and on the identification of the factors that affect ROE and ROA by using more sophisticated econometric models. Furthermore, as far as it concerns the risk index, tests on the quality of this index should be employed. Finally, the extension of the index's time series may enable its assessment over a certain time period rather than at specific quarters.

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Figure 1. Graphical display of the components of return on equity
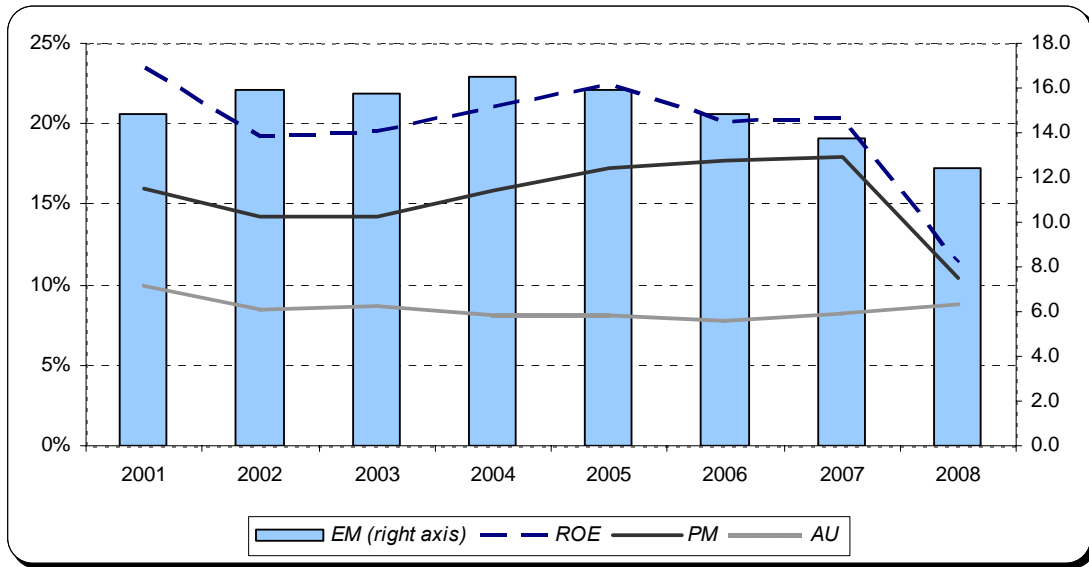
Source: Bank of Albania, author's calculations.

Figure 2. Graphical display of the components of return on assets
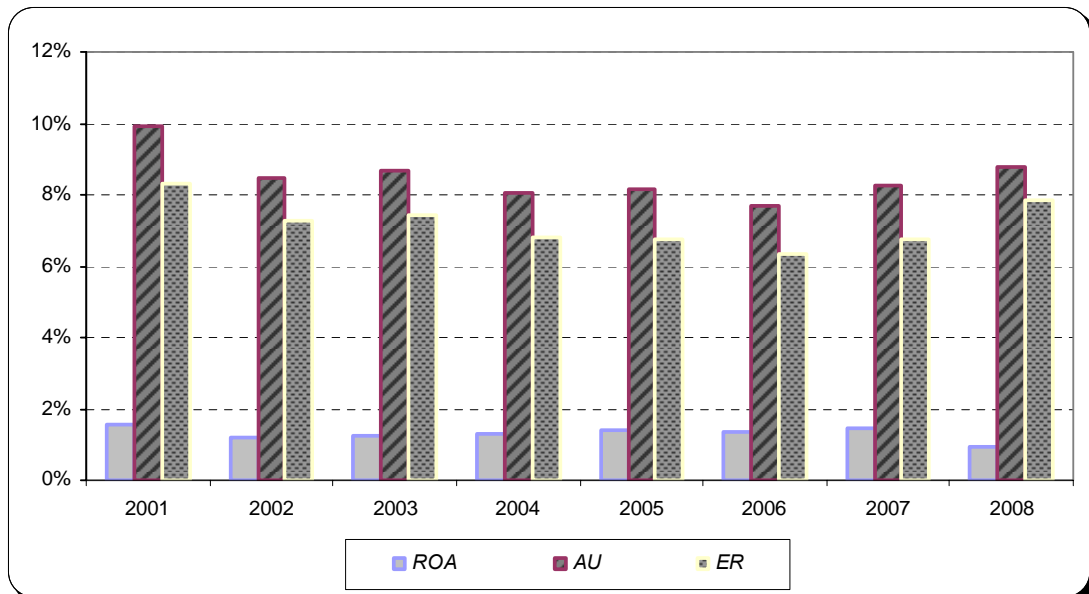
Source: Bank of Albania, author's calculations.

Figure 3. Graphical display of the components of return on assets
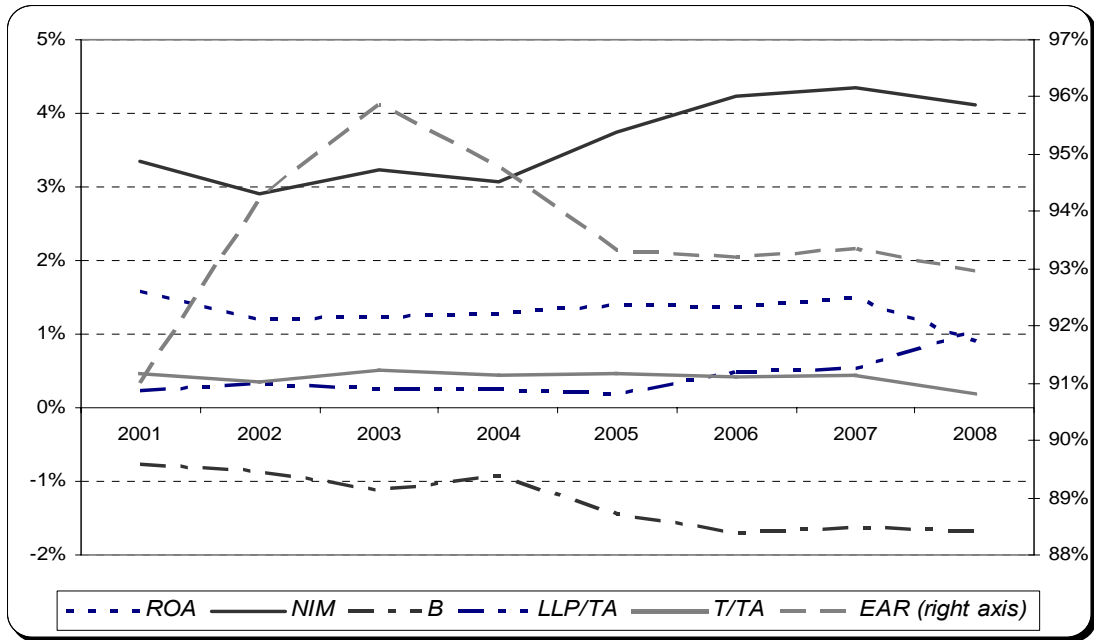
Source: Bank of Albania, author's calculations.

Figure 4. Graphical display of the components of net interest margin
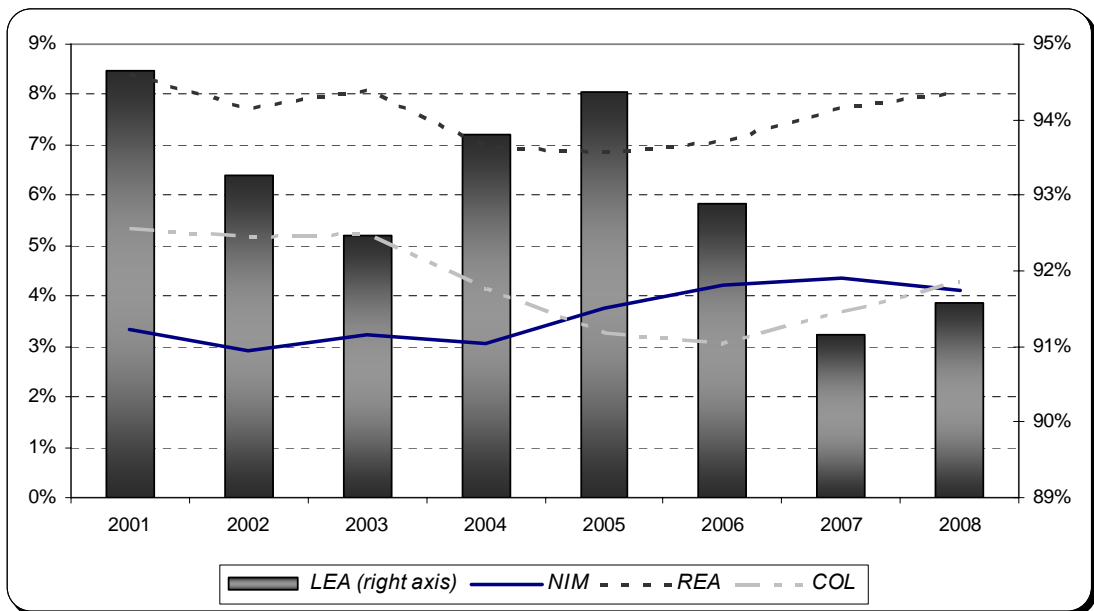
Source: Bank of Albania, author's calculations.

Figure 5. The components of Risk Index for the Albanian banking system
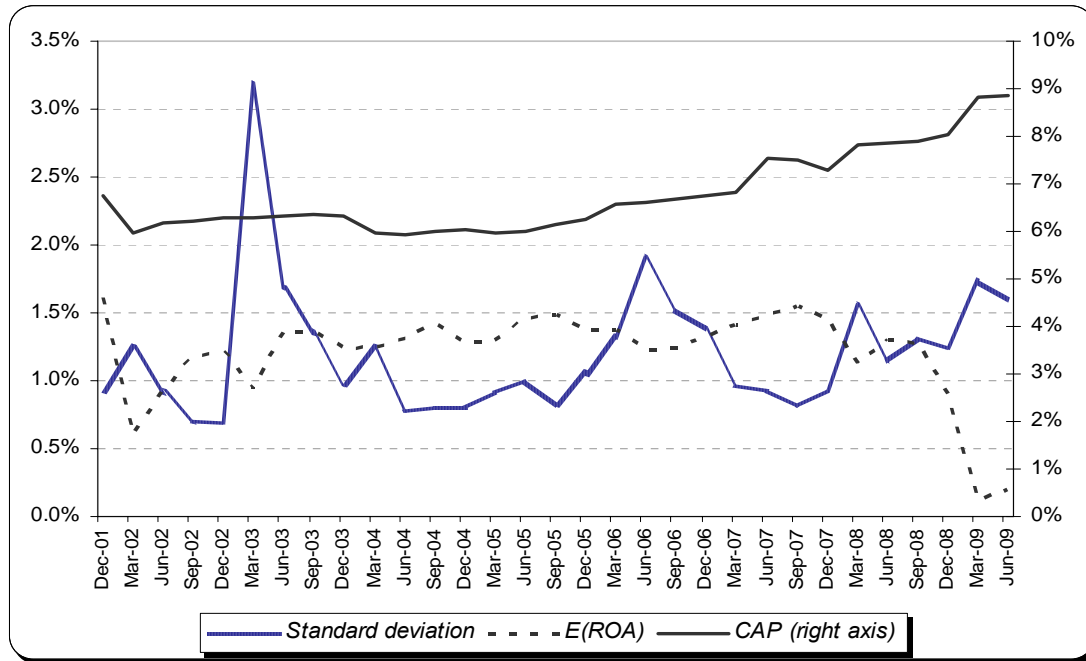
Figure 6. The Albanian banking system's Risk Index and the Probability of book value insolvency
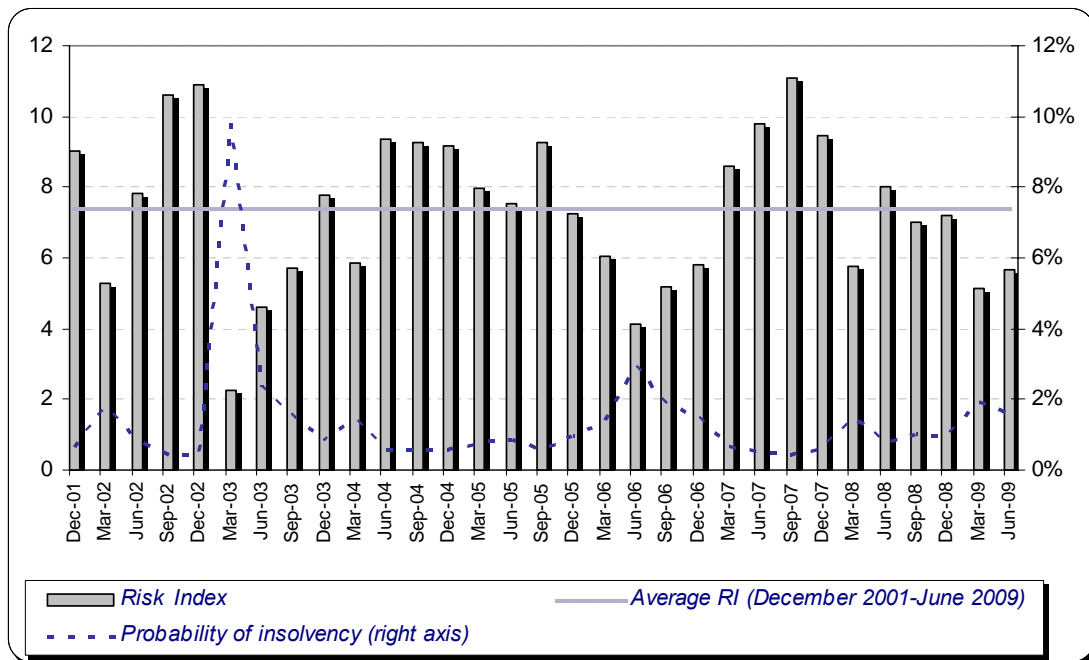
Figure 7. The distribution of ROE by the number of banks
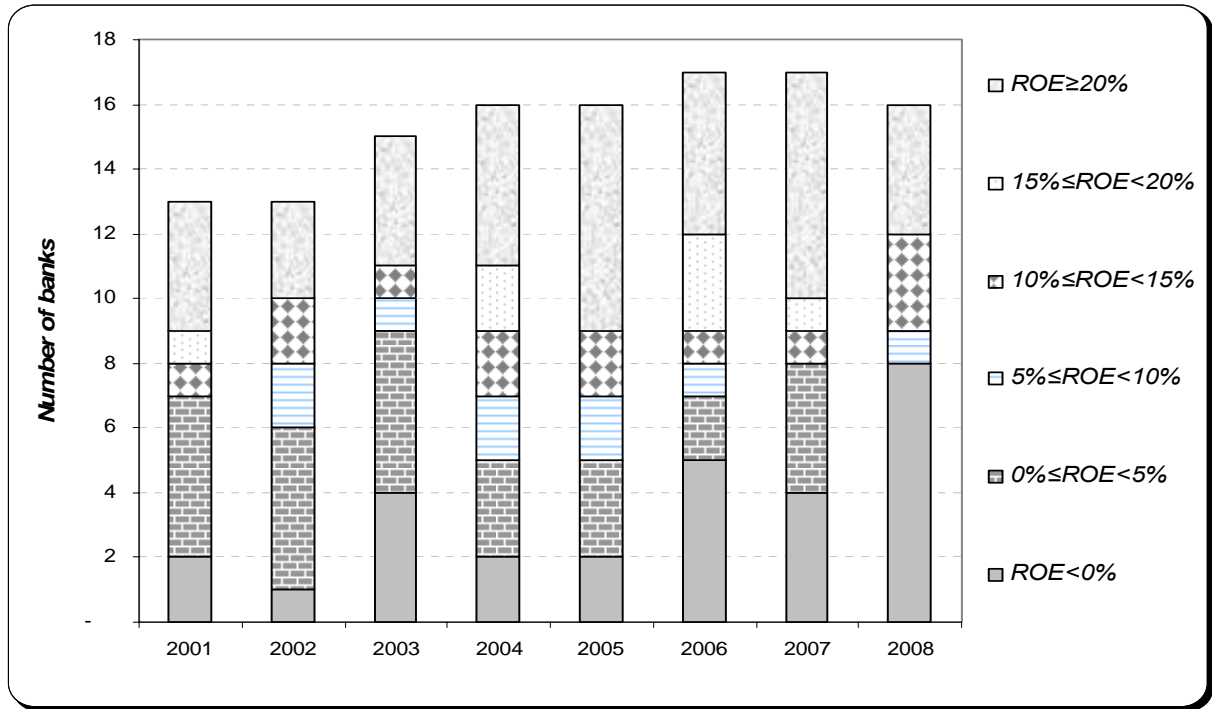
Source: Bank of Albania, author's calculations.

Figure 8. The distribution of ROA by the number of banks
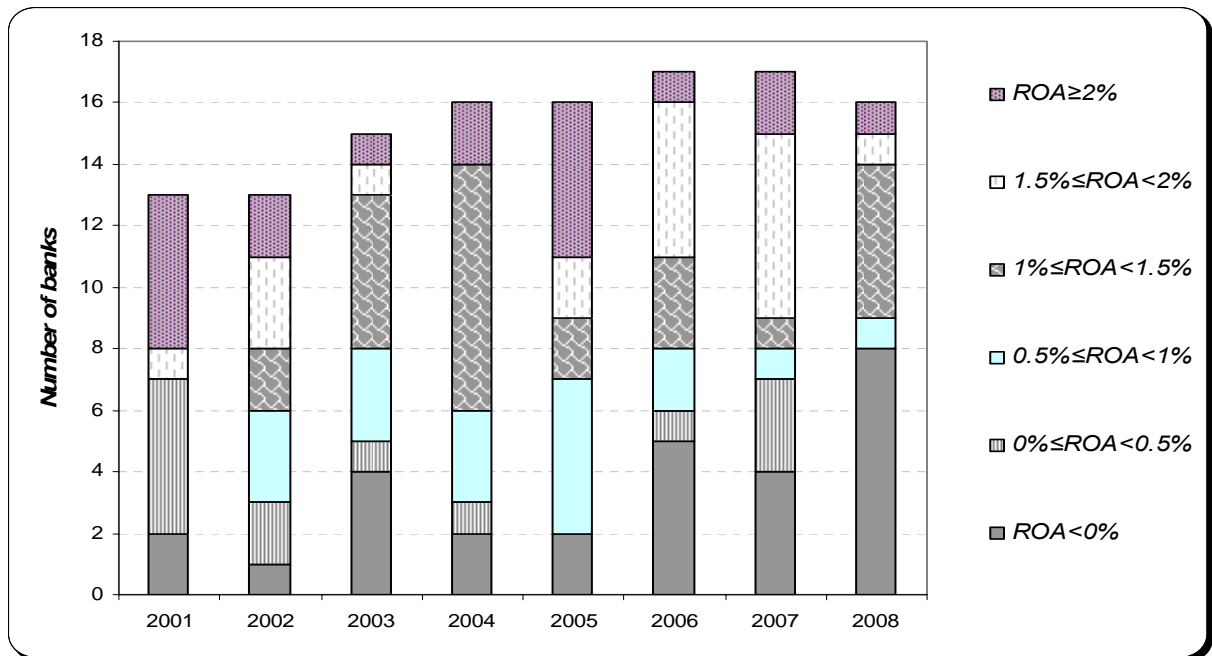
Source: Bank of Albania, author's calculations

Table 1. ROE and ROA: cross country comparisons

Country	Return on equity, in % (ROE)				Return on assets, in % (ROA)			
	2005	2006	2007	2008	2005	2006	2007	2008
Albania	22.4	20.2	20.3	11.4	1.4	1.4	1.6	0.9
Bosnia and Herzegovina	6.2	8.5	8.9	4.8	0.7	0.9	0.9	0.5
Bulgaria	21.4	25.0	24.8	23.1	2.1	2.2	2.4	2.1
Croatia	15.1	13.0	11.1	10.9 [12]	1.6	1.5	1.6	1.8 [12]
Czech Republic	25.2	22.5	24.5	23.7 [12]	1.4	1.2	1.3	1.3 [12]
Macedonia	7.5	12.3	15.8	16.5 [12]	1.2	1.8	2.0	1.9 [12]
Montenegro	5.3	6.8	6.2	3.5 [12]	0.8	1.1	0.7	0.3 [12]
Romania	15.4	13.6	11.5	15.9 [13]	1.9	1.7	1.3	1.4 [13]
Serbia	6.7	10	10.2	10.6	1.1	1.7	1.7	2.1
Greece	15.9	12.8	14.8	11.2 [14]	0.9	0.8	1.0	0.7 [14]
Italy	9.7	11.4	9.7	N/A	0.7	0.8	0.7	N/A

Source: IMF, *Global Financial Stability Report* (April 2009) and Bank of Albania.

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[12] The latest figures as of September 2008
[13] The latest figures as of June 2008
[14] The latest figures as of March 2008

Table 2. ROE's components: Albania, 2001-2008

Financial ratios	2001	2002	2003	2004	2005	2006	2007	2008
Return on Equity (in %), ROE= EAT/BVE	23.45	19.20	19.53	21.10	22.43	20.17	20.32	11.35
Return on Assets (in %), ROA= EAT/TA	1.58	1.20	1.24	1.28	1.41	1.36	1.48	0.91
The components of ROE, ROE=PM*AU*EM								
Profit Margin (in %), PM=EAT/TOI	15.99	14.23	14.29	15.80	17.24	17.67	17.95	10.43
Asset Utilization (in %), AU=TOI/TA	9.90	8.46	8.66	8.08	8.15	7.70	8.24	8.76
Equity Multiplier (in times), EM=TA/BVE	14.81	15.94	15.78	16.54	15.96	14.82	13.74	12.42
The components of ROA, ROA=AU-ER								
Asset Utilization (in %), AU=TOI/TA	9.90	8.46	8.66	8.08	8.15	7.70	8.24	8.76
Expenses Ratio (in %), ER=TOE/TA	8.32	7.26	7.42	6.80	6.75	6.34	6.76	7.85
The components of ROA, ROA=NIM*EAR+B-LLP/TA-T/TA								
Net Interest Margin (in %), NIM=NII/EA	3.35	2.91	3.23	3.08	3.75	4.22	4.35	4.13
Earning Assets Ratio (in %), EAR=EA/TA	91.00	94.21	95.85	94.80	93.33	93.19	93.34	92.95
Banks Burden (in %), B=NNII/TA	-0.77	-0.85	-1.11	-0.93	-1.45	-1.69	-1.62	-1.68
Loan Loss Provisions to Total Assets ratio (in %), LLP/TA	0.23	0.33	0.25	0.26	0.19	0.48	0.53	1.05
Taxes to Total Assets ratio (in %), T/TA	0.47	0.35	0.50	0.45	0.46	0.41	0.44	0.18
The components of NIM, NIM=REA-COL*LEA								
Return on Earning Assets (in %), REA=IR/EA	8.39	7.73	8.07	6.96	6.84	7.05	7.72	8.06
Cost of Liabilities (in %), COL=IE/PL	5.33	5.17	5.23	4.14	3.28	3.05	3.70	4.30
Liabilities to Earning Assets ratio (in %), LEA=PL/EA	94.65	93.26	92.47	93.80	94.36	92.90	91.15	91.59

Source: Bank of Albania, author's calculations.

Table 3. The debt ratio of the Albanian banking system

	2001	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
Debt ratio (in %) *1-1/EM = Debt / Total Assets*	93.25	93.73	93.66	93.95	93.73	93.25	92.72	91.95

Source: Bank of Albania, author's calculations.

**Table 4. The Albanian banking system's Risk Index and the Probability of book value insolvency**

	Dec 2001	*Dec 2002*	*Dec 2003*	*Dec 2004*	*Dec 2005*	*Dec 2006*	*Dec 2007*	*Dec 2008*
Risk Index (RI)	9.0	10.9	7.8	9.2	7.3	5.8	9.4	7.2
Average RI as of December values over '01-'08	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Probability of book value insolvency (Π, %)	0.61	0.42	0.83	0.59	0.95	1.48	0.56	0.96

Source: Bank of Albania, author's calculations.

Table 5. Income statement of the Albanian banking system (in million leks)

	2001	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
Interest revenues(1)	22,445.59	23,538.08	27,837.99	26,394.47	29,960.53	35,988.82	48,635.63	60,159.25
Interest Expenses (2)	13,483.97	14,690.76	16,687.77	14,731.21	13,548.60	14,452.06	21,222.42	29,380.91
Net interest income (3)=(1)-(2)	*8,961.62*	*8,847.33*	*11,150.22*	*11,663.26*	*16,411.93*	*21,536.77*	*27,413.20*	*30,778.34*
Non-interest revenues (Operating income from other activities + Extraordinary income) (4)	6,661.75	3,819.92	3,341.30	5,915.35	8,309.83	6,186.52	6,962.45	10,163.72
Non-interest expenses (Expenses for other activities + Operating expenses + Extraordinary expenses) (5)	8,929.81	6,568.08	7,326.24	9,621.60	15,091.69	15,427.66	17,892.28	23,684.12
Net non-interest income (6)=(4)-(5)	*(2,268.06)*	*(2,748.16)*	*(3,984.94)*	*(3,706.25)*	*(6,781.86)*	*(9,241.15)*	*(10,929.83)*	*(13,520.40)*
Loan loss provisions (7)	667.75	1,062.93	907.90	1,039.47	869.33	2,615.18	3,543.70	8,454.13
Taxes (taxes exluding income taxex + income taxes) (8)	1,371.67	1,142.26	1,802.44	1,811.44	2,162.85	2,229.85	2,961.87	1,468.14
Earning after taxes (9)=(3)+(6)-(7)-(8)	**4,654.13**	**3,893.98**	**4,454.94**	**5,106.11**	**6,597.89**	**7,450.58**	**9,977.81**	**7,335.68**

Source: Bank of Albania, author's calculations.

LIST OF ABBREVIATIONS

Abbreviation	Meaning
AU	Asset Utilization
B	Burden
BVE	Book Value of Equity
COL	Cost of Liabilities
EA	Earning Assets
EAER	Earning Assets to Equity Ratio
EAR	Earning Assets Ratio
EAT	Earnings After Taxes
EM	Equity Multiplier
ER	Expenses Ratio
IE	Interest Expenses
INIR	Interest to Non-Interest Ratio
IOA	Interest on Assets
IOE	Interest on Equity
IR	Interest Revenues
ITIR	Interest to Total Income Ratio
LEA	Liabilities to Earning Assets
LLP	Loan Loss Provisions
NEIR	Net Earnings to Interest Ratio
NENII	Net Earnings to Net Interest Income
NENIR	Net Earnings to Non-Interest Ratio
NIE	Non Interest Expenses
NIEA	Non-Interest on Earning Assets

NII	Net Interest Income
NIIOE	Net Interest Income on Equity
NIIR	Net Interest to Interest Ratio
NIRTIR	Non-Interest Revenues to Total Income Ratio
NIM	Net Interest Margin
NINIR	Net Interest to Non-Interest Ratio
NIOA	Non-Interest on Assets
NIOE	Non-Interest on Equity
NIR	Non-Interest Revenues
NITIR	Net Interest to Total Income Ratio
NNII	Net Non-Interest Income
NOI	Net Operating Income
NREA	Net Return on Earning Assets
PL	Paying Liabilities
PM	Profit Margin
REA	Return on Earning Assets
ROA	Return on Assets
ROE	Return on Equity
T	Taxes
TA	Total Assets
TIEA	Total Income on Earning Assets
TIOE	Total Income on Equity
TOE	Total Operating Expenses
TOI	Total Operating Income

MATRIX 1	Earning after taxes (EAT) Y_1	Net interest income (NII) Y_2	Interest revenues (IR) Y_3	Non-interest revenues (NIR) Y_4	Total operating income (TOI) Y_5	Earning assets (EA) Y_6	Total assets (TA) Y_7
Net interest income (NII) Y_2	$x_{12}= Y_1 / Y_2$ Net Earnings to Net Interest Income (NENII)						
Interest revenues (IR) Y_3	$x_{13}= Y_1 / Y_3$ Net Earnings to Interest Ratio (NEIR)	$x_{23}= Y_2 / Y_3$ Net Interest to Interest Ratio (NIIR)					
Non-interest revenues (NIR) Y_4	$x_{14}= Y_1 / Y_4$ Net Earnings to Non-Interest Ratio (NENIR)	$x_{24}= Y_2 / Y_4$ Net Interest to Non-Interest Ratio (NINIR)	$x_{34}= Y_3 / Y_4$ Interest to Non-Interest Ratio (INIR)				
Total operating income (TOI) Y_5	$x_{15}= Y_1 / Y_5$ Profit Margin (PM)	$x_{25}= Y_2 / Y_5$ Net Interest to Total Income Ratio (NITIR)	$x_{35}= Y_3 / Y_5$ Interest to Total Income Ratio (ITIR)	$x_{45}= Y_4 / Y_5$ Non - Interest Revenues to Total Income Ratio (NIRTIR)			
Earning assets (EA) Y_6	$x_{16}= Y_1 / Y_6$ Net Return on Earning Assets (NREA)	$x_{26}= Y_2 / Y_6$ Net Interest Margin[15] (NIM_1)	$x_{36}= Y_3 / Y_6$ Return on Earning Assets (REA)	$x_{46}= Y_4 / Y_6$ Non - Interest on Earning Assets (NIEA)	$x_{56}= Y_5 / Y_6$ Total Income on Earning Assets (TIEA)		
Total assets (TA) Y_7	$x_{17}= Y_1 / Y_7$ Return on Assets (ROA)	$x_{27}= Y_2 / Y_7$ Net Interest Margin[15] (NIM_2)	$x_{37}= Y_3 / Y_7$ Interest on Assets (IOA)	$x_{47}= Y_4 / Y_7$ Non - Interest on Assets (NIOA)	$x_{57}= Y_5 / Y_7$ Asset Utilization (AU)	$x_{67}= Y_6 / Y_7$ Earning Assets Ratio (EAR)	
Book value of equity (BVE) Y_8	$x_{18}= Y_1 / Y_8$ Return on Equity (ROE)	$x_{28}= Y_2 / Y_8$ Net Interest Income on Equity (NIIOE)	$x_{38}= Y_3 / Y_8$ Interest on Equity (IOE)	$x_{48}= Y_4 / Y_8$ Non - Interest on Equity (NIOE)	$x_{58}= Y_5 / Y_8$ Total Income on Equity (TIOE)	$x_{68}= Y_6 / Y_8$ Earning Assets to Equity Ratio (EAER)	$x_{78}= Y_7 / Y_8$ Equity Multiplier (EM)

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[15] The net interest margin may be measured in two ways: Net interest income to Earning assets (x_{26}) or Net interest income to Total assets (x_{27}), (Kalluci, 2008).

MATRIX 2	Earning after taxes (EAT) Y_1	Net interest income (NII) Y_2	Interest revenues (IR) Y_3	Non-Interest revenues (NIR) Y_4	Total operating income (TOI) Y_5	Earning assets (EA) Y_6	Total assets (TA) Y_7
Net interest income (NII) Y_2	**NENII** 51.9% (2001) 40.2% (2005) 23.8% (2008)						
Interest revenues (IR) Y_3	**NEIR** 20.7% (2001) 22.0% (2005) 12.2% (2008)	**NIIR** 39.9% (2001) 54.8% (2005) 51.2% (2008)					
Non-Interest revenues (NIR) Y_4	**NENIR** 69.9% (2001) 79.4% (2005) 72.2% (2008)	**NINIR** 134.5% (2001) 197.5% (2005) 302.8% (2008)	**INIR** 336.9% (2001) 360.5% (2005) 591.9% (2008)				
Total operating income (TOI) Y_5	**PM** 16% (2001) 17.2% (2005) 10.4% (2008)	**NITIR** 30.8% (2001) 42.9% (2005) 43.8% (2008)	**ITIR** 77.1% (2001) 78.3% (2005) 85.5% (2008)	**NIRTIR** 22.9% (2001) 21.7% (2005) 14.5% (2008)			
Earning assets (EA) Y_6	**NREA** 1.7% (2001) 1.5% (2005) 1.0% (2008)	**NIM$_1$** 3.4% (2001) 3.7% (2005) 4.1% (2008)	**REA** 8.4% (2001) 6.8% (2005) 8.1% (2008)	**NIEA** 2.5% (2001) 1.9% (2005) 1.4% (2008)	**TIEA** 10.9% (2001) 8.7% (2005) 9.4% (2008)		
Total assets (TA) Y_7	**ROA** 1.6% (2001) 1.4% (2005) 0.9% (2008)	**NIM$_2$** 3.0% (2001) 3.5% (2005) 3.8% (2008)	**IOA** 7.6% (2001) 6.4% (2005) 7.5% (2008)	**NIOA** 2.3% (2001) 1.8% (2005) 1.3% (2008)	**AU** 9.9% (2001) 8.2% (2005) 8.8% (2008)	**EAR** 91.0% (2001) 93.3% (2005) 93.0% (2008)	
Book value of equity (BVE) Y_8	**ROE** 23.4% (2001) 22.4% (2005) 11.4% (2008)	**NIIOE** 45.1% (2001) 55.8% (2005) 47.6% (2008)	**IOE** 113.1% (2001) 101.9% (2005) 93.1% (2008)	**NIOE** 33.6% (2001) 28.3% (2005) 15.7% (2008)	**TIOE** 146.6% (2001) 130.1% (2005) 108.8% (2008)	**EAER** 13.47 (2001) 14.89 (2005) 11.55 (2008)	**EM** 14.81 (2001) 15.96 (2005) 12.42 (2008)

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