PORTFOLIO DIVERSIFICATION POTENTIAL ON CAPITAL RETURNS OF ALBANIAN BANKS, BEFORE AND AFTER THE 2008 FINANCIAL CRISIS

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Abstract
This paper presents a profile of the Albanian banking sector, through the financial indicator Return on Equity (ROE) taking in consideration the interval of time 2006-2015 considering also data frequency of 3 months. The focus of this paper is the investor who wants to invest in bonds to build an optimal portfolio. The investor is supposed to take the same investment decision in 2008 and 2015. This assumption is used to see the effect of the financial crisis' on the returns of the invested capital of commercial banks. To achieve this goal, is built a vehicle capital pricing model (CAPM) and is used the Jensen techniques of overestimation or underestimation of financial securities. Efficient front investment is realized through Lagrange multipliers and with the help of capital distribution line (CAL) have been identified optimal investment portfolios in equity. Although the negative effects of the 2008 financial crisis have accompanied decreasing returns and increasing risk, in this paper, considering even the absence of stock exchange securities in Albania, the goal to determine the value at risk, the value of the returns and the bank premium is achieved.

Keywords: investment position, optimal portfolio, banking system, ROE

JEL Classification: C61, G11, G14.

Introduction

In this paper there is analyzed the importance and the level of diversification of the invested capital in the banking system in Albania, showing the impact of the financial crisis in the return on this capital. The focus of the study is the investor who wants to invest in bonds to build an optimal portfolio. The investor is supposed to take a decision in 2008 and then take the same decision in 2015. This is used in order to observe the effect of the financial crisis on the return of banking capital and the risk premium on investment. This assessment of the Albanian reality is difficult to achieve in a high degree of reliability, whereas Albania does not have a liquid secondary market of financial securities. This paper aims to analyze the potential of diversification of portfolio return of capital invested in the Albanian banking sector before the 2008 financial crisis and after the crisis. There are several reasons that motivate us to do this paper:

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- *first*, there is no previous quantitative study that quantified on this financial aspect, because the effects of the financial crisis in the banking system are only seen in terms of liquidity management and non-performing loans, non-refundable capital;
- *secondly*, this assessment would represent a measurable "start-up" of these banks, if they were listed on the securities exchange, such as the return of shares in the first days in stock market;
- *thirdly*, researchers and academics can make a measure of return on equity of banks in Albania even in the absence of stock of securities, for various research purposes.

The following analysis of paper includes all commercial banks in the Albanian banking sector (16 banks). The results of return on capital invested by all banks represent a time series with 3-monthly frequency for the years 2006-2015. In this paper there are not included companies with other activities, due to a change of the nature of the activity, capital adequacy regulations and supervision, etc.

1. Literature review

Return on invested capital in each company, which aims to profit, is affected by its performance (Gitman, 2010). The performance and risk of banks is analyzed by several financial indicators with accounting nature that make this possible, such as: return on equity (ROE), earning per share (EPS), operating profit margin, etc. ROE is a good indicator measuring the discount rate the shares of banks (Velez-Pareja, 2000). It is also observed that there is a stable and important statistical connection between the indicator ROE and the discount rate of companies stock listed on stock exchange (Hevert, 2014). This conclusion is supported by Ketchum and Kim (2013).Banks capital structure is guided by regulations and not from the free hand of the market, so that the main variable is equity financing and its component elements (Sironi, 1999 and Antonio, 2002). Using ROE as the return rate of stock has some drawbacks, because the investor does not understand the creating value process and time value movement (Malkelainen, 1998).

Assessing the profitability of shares listed on stock market is measured by capital asset pricing model (CAPM) which describes the relationship between risk and expected return and that is used in the pricing of risky securities (Traynor, 1961; Sharpe, 1964 and Lintner, 1965). Using the CAPM model in countries that do not have capital markets or their capital markets are illiquid (as the case of Albania) is difficult to apply because this method has is a high error margin. However, certainly CAPM model represents the best estimate model of the return rate on the stock, even for banks. Nowadays, many financial consultants make estimates derived from CAPM model, based on ROE (Graham and Harvey, 2001).

Besides the lack of securities stock in Albania, another limitation of this paper is the exclusion of all other economy sectors. The reasons why companies in other sectors are not taken into this study are: *first*, companies (also big businesses) in Albania have significant problems of diversification their capital structure; and *secondly*, the companies data in Albania are part of the financial statements and the profit level has been and continues to be under the influence of tax evasion or economic informality (Ministry of Finance of Albania, 2015).

2. Methodology and data

CAPM model for the Albanian banking system: The model of price of a capital asset (CAPM) is a model that links the required rate of return of an asset, with his risk as measured by the coefficient β (systemic risk). According to this model, the expected return of a financial title *"k_i"* is given by the formula: $k_i = r_F + \beta[r_M - r_F]$. Where, "$r_F$" is risk-free rate, in Albania taken interest rates on Treasury bills with a maturity of 12 months. "r_M" is the market rate of return. Rate market we take the average ROE level before the financial crisis period (2006-2008) and after the financial crisis (2009-2015). β indicator for each share of banks counted by the formula: $\beta_i = \rho_{iM}\frac{\sigma_i}{\sigma_M}$. Where: "$\beta_i$" is systematic risk for each bank; "σ_i" is the standard deviation of ROE for each bank; "σ_M" is the standard deviation of the returns of the market; "ρ_{iM}" stated ROE correlation coefficient of the bank "i" with banking market. The data in this study are the financial results of the level of return on equity (ROE) for each bank in the banking system in Albania for 2006-2015 time series, 3-monthly frequency. This indicator is computed by the formula:

$$ROE = \left(\frac{3-\text{month profit}}{\frac{(\text{the equity at end of period}) - (3-\text{month profit}) + (\text{the equity at beginning of period})}{2}} \right) * \frac{12}{3}$$

Remark with Δ = {ki (according to CAPM) - ROE (average of each bank)}, this technique is called Jensen, from which we analyze the position of investors, of the shares of banks. According to the ROE-s of the Albanian banking system, denote $X = (x_1, x_2, ..., x_{16})$ vector weights investment in banks' capital, k^* remark the desired rate of the investor's ROE, in order to minimize the portfolio variance, *Var(x)* efficient portfolio will be:

$$\begin{cases} x_1 + x_2 + \cdots + x_{16} = 1 \\ x_j \geq 0 \text{ për } j = 1,2,\ldots,16 \\ k_1x_1 + k_2x_2 + \cdots + k_{16}x_{16} = k^* \end{cases} \quad \text{and} \quad Var(x) = \sum_{i=1}^{16}\sum_{j=1}^{16} x_i x_j cov_{ij}$$

Where: cov_{ij} is covariance of the shares *i* with the *j*. With the method of Lagrange multipliers, we have:

$$F(min) = \sum_{i=1}^{16}\sum_{j=1}^{16} x_i x_j cov_{ij} + \lambda_1\left[\sum_{i=1}^{16} x_i k_i - k^*\right] + \lambda_2\left[\sum_{i=1}^{16} x_i - 1\right]$$

We find minimum values of partial derivatives equated to zero and, so we found the front efficient for different k^*. $K = (k_1, k_2, ..., k_{16})$ is the vector of returns (ROE average of 3 months before the financial crisis after financial crisis). While the optimal portfolio will be calculated by the model of capital distribution line (CAL). The equation of the line CAL is tangent with efficient front, and is calculated by straight line CAL: $return = r_F + m*risk$, where "*m*" is the slope of the line, and it is calculated from the equation of derivatives respective functions.

3. Analysis of results

Investment Position: Simulated results of CAPM model (through ROE) indicate change of position evaluation of banks shares individually to the market. This change comes as a result of the financial crisis of 2008. In Table 1, there is the shown the investment position before the financial crisis (where the risk-free rate is obtained average rate of Treasury bills with a maturity of 12 months of 2008 which was 8.14%). Also, there is shown there investment position after the financial crisis (where the risk-free rate is obtained average rate of Treasury bills with a maturity of 12 months of 2015 which was 3.26%).

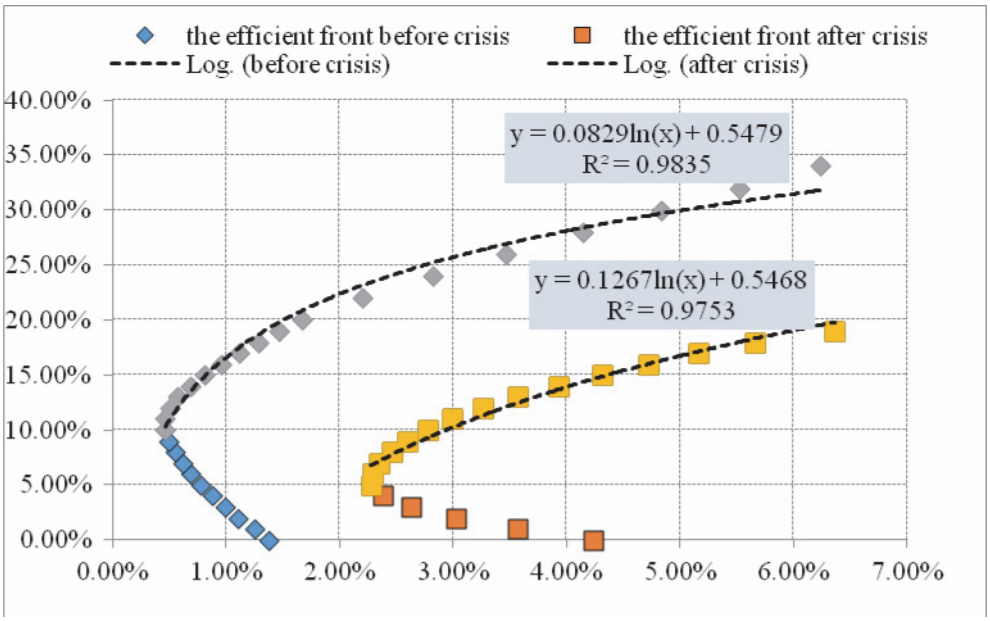
Table no.1: Investment position before the 2008 financial crisis, Jensen techniques

Banks Name	*Before the crisis 2008*		*After the crisis 2008*	
	β	*Investment position*	*β*	*Investment position*
Alpha Bank Albania	1.2	NV	0.2	MV
Commercial Bank Albania	-0.5	NV	0.4	NV
Credins Bank	2.3	NV	0.8	NV
Credit Bank of Albania	0.2	MV	0.6	MV
Emporiki Bank Albania	1.6	MV	5.2	MV
First Investment Bank Albania	1.8	MV	0.2	EF
International Commercial Bank	-1.1	NV	0.6	NV
Intesa SanPaolo Bank Albania	1.7	NV	0.7	NV
National Bank of Greece Albania	3.9	MV	0.5	MV
ProCredit Bank	2.9	NV	0.2	EF
Raiffeisen Bank Albania	0.9	NV	1.4	NV
Societe Generale Albania	0.3	MV	0.1	MV
Tirana Bank	0.4	NV	2.1	MV
Union Bank	-1	MV	-0.3	NV
United Bank of Albania	0.9	MV	0.8	MV
Veneto Banka	0.5	MV	2.8	MV

Source: Calculations by the authors in Excel. Note: NV = undervalued, MV = overvalued and EF = efficiency.

Before the financial crisis, none of the banks did have efficient evaluation, as market. However, based on the end of that period (fourth 3-quarter of 2008) there is detected an overestimation trend of the bank shares. Whereas after the financial crisis, two banks have efficient assessment, namely as market, and there is an unequal division of evaluation and undervaluation, 8 banks are overvalued and 6 banks are undervalued.

Albanian banking system and their efficient investment front: Using Microsoft Office Excel 2010 program, Add Ins - Solver, for each bank we will take in consideration the weight that their share should have on efficient portfolio. Portfolio return"k^*" has fixed values starting from 0% up to a maximum value (corresponding to the extreme values of potential return of the portfolio of securities mentioned above, excluding short sale) with constant progressivity1%, in order to have a high precision model and a sufficient number of values. Results obtained are as in the following *chart*:



Source: Calculations by the authors in Excel

From the chart, we can observe a pronounced disconnect of efficient investment front, due to the financial crisis of 2008. So this crisis has had a significant negative impact on portfolio diversification potential of invested capital in the banking system. Based on the interpolated equation in logarithmic form for both efficient fronts (before and after the crisis) we see a big difference in deteriorated displacement after the financial crisis. Since logarithmic functions of the two efficient fronts have a coefficient of determination (R2) greater than 95%, we will accept these functions for analysis of finding the optimal portfolios.

Optimal portfolio by line CAL: On investment theory, the optimal portfolio is located where the curved line of efficient front of risk free securities is tangent to the capital allocation line (CAL) which starts form the risk free rate (r_F). Let us find the optimal portfolio of 16 banks in the survey. So CAL is a line that begins at the point (risk; return) = (0; 0.0814) in Albania case, before financial crisis. The value 8.14% is the Treasury Bond rate with maturities of 12 months, the average in 2008.CAL equation of the line tangent to the efficient front has the slope "m". Defining *x = risk* and *y = return*, from the interpolation model of the efficient front function in banking system equity before financial crisis in 2008, we get the function: *return = 0.547 + 0.082*ln(risk)*", from which:

$$m = \frac{\partial return}{\partial risk} = \frac{0.082}{x_0}$$

Tangential points, which represents the optimal portfolio before the financial crisis is (x_0; y_0) and it is taken out of the equation of straight CAL: $y - y_0 = m^*(x_0 - x)$ which passes through the points (0; 0.0814) and (x_0; y_0). Since we know the slope of the straight-and we

know its point, it follows that: $y - y_0 = \frac{0.082}{x_0} \cdot (x - x_0)$. If ($x_1$; y_1) = (0; 0.0814) is the risk free coordinate, than tangential point (x_0; y_0) is y = 16.34%. As seen, optimal portfolio before the 2008 financial crisis has the return16.34% and the risk premium of this optimal portfolio is: $k_i - r_F$ = 16.34% – 8.14% = 8.2%, while this portfolio risk is 1.01%. We will use the same technique for the computation of the line that begins at the CAL point CAL (risk; return) = (0; 0.0326) in Albania case, before financial crisis. The value 3.26% is the Treasury Bills rate with the maturities of 12 months, the average in 2015. The optimal portfolio after financial crisis has the return rate 15.86% and the risk premium of this optimal portfolio is: $k_i - r_F$ = 15.86% – 3.26% = 12.6%, while this portfolio risk is 4.67%.
From the values of optimal portfolios in 2008 and 2015, we can see that the return rate without risk was too high before the financial crisis while later there was a pronounced decrease of this rate, reaching the lowest values in the free economy days in Albania. Meanwhile, it is noticed deterioration of portfolio return and risk of optimal portfolio (optimal portfolio significantly dominates before the financial crisis). This brings another worsened phenomenon in recent years in the capital share of the Albanian banking system, which is the risk premium increasing by 4.4% (which shows a rising trend in the capital market risk). However, the financial crisis of 2008 has had a different impact from one bank to another. This phenomenon can easily be seen from the distribution of investment rates in the optimal portfolios, summarized in Table 2. Let us analyze the optimal portfolio that our banking system had before the 2008 crisis (RF-2008) and after financial crisis (with r_F of 2015):

Table no. 2: Percent distribution of investment in optimal portfolios

Investment before crisis		***Investment after crisis***	
Bank	***Weight***	***Bank***	***Weight***
Alpha Bank – Albania	10%	Commercial Bank Albania	57%
Commercial Bank Albania	41%	First Investment Bank– Albania	5%
First Investment Bank– Albania	14%	Intesa SanPaolo Bank Albania	21%
International Commercial Bank	3%	ProCredit Bank	4%
National Bank of Greece – Albania	0%	Raiffeisen Bank – Albania	10%
Societe Generale Albania	23%	Union Bank	3%
Union Bank	8%	***Total***	***100%***
Total	***100%***		

Source: Authors' Calculations in Excel

According to *Table 2*, we see that from16 commercial banks in the banking system, 6 of them are not part of the optimal investment portfolio both before and after the financial crisis of 2008. While from 10 banks represented in the allocation of optimal portfolios, only 3 of them are present in both the optimal portfolios (before and after the crisis), this shows that the financial crisis has fundamentally influenced the Albanian banking system in their position of risk and return.

Conclusions

In this study we analyzed several aspects that relate to the efficiency of the banking sector in the absence of a secondary capital market. The study was based on 3-month financial

data of 16 commercial banks operating in Albania for 2006-2008 and 2009-2015 in order to identify the impact of the financial crisis in this sector. As a return of bank stocks is considered the financial index return on equity, ROE. According to the model simulation CAPM and the analysis of Jensen technique, we conclude that before the 2008 financial crisis, none of the banks has not efficient assessment, namely division in overvaluation and undervaluation is equal. But after 2008 there is seen a trend appreciation of the shares of banks, both in number and in value bank return.

The analysis of efficient investment frontier from 2006-2008 compared to 2009-2015 has a pronounced break as a result of the financial crisis of 2008. The financial crisis in Albania has had a greater negative impact on portfolio diversification potential capital investing in the banking system. Before the crisis, the optimal portfolio has the return 16.34%, the risk 1.01 % and the risk premium 8.2%. After the crisis, the optimal portfolio has the return 15.86%, risk premium 4.67% and 12.6% risk. After 2008, the capital share of the Albanian banking system has a growing trend of risk capital. On the other hand, from all 16 commercial banks in the banking system, 6 of them are not part of the optimal portfolio investment both before and after the financial crisis of 2008. While from 10 banks represented in the optimal allocation of portfolios, only 3 of them are present in both the optimal portfolios (before and after the crisis), a fact that shows that financial crisis has fundamentally influenced the Albanian banking system in their position to risk and return.

Risk assessment of activity and operations of the banks in Albania should be deeper, occupying their main policies. Also, the Central Bank should increase monitoring in banking risk assessment.

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