

## How does assets-liabilities management affects the profitability of banks?

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**Abstract:** The economic crisis has affected the stability of the financial institutions (banks) and the instability from the banking sector affected the real economy. Some banks were affected more than others and in this paper we analyze the stability and profitability of banks from the point of the asset-liability management. Assets-liabilities management (ALM) is the management of risk at bank level, the structure of the assets and liabilities of the banks may show which are the differences between the "good banks" and "bad banks". The main goal of this paper is to analyze the asset-liability management in banks for the 2004-2011 period, using a panel of over 30 banks. The analysis is carried using the canonical correlations (Hotelling, 1936), while in the case of the simple correlation we test for a linear dependency between two variables, canonical correlation test the interdependence between two sets of variables (the structure of assets and liabilities).

**Keywords:** canonical correlation; banks; financial crisis.

**JEL Classification:** G21

### 1. Introduction

The management of assets and liabilities is defined as the strategic management of the balance sheet for risk optimization of liabilities and assets banks taking into account all market risks (Rosen & Zenios, 2006) in other words the management of assets and liability's seek to maximizing earnings, adjusted for risk, given the long-term shareholders (Uyemura et al., 1993), while (Kusy & Ziemba, 1986) view the asset-liability management as a cost / profit function which takes into account the assumed risk, level of earnings and liquidity of the bank.

The management of assets and liability's objective is similar to the management of risk, it aims to help banks to achieve a balance between risks and profitability, this is realized using good planning of liquidity both on short-term and long term, through the process of intern transferred funds, the planning and allocation of capital, profitability measurement and risk management trading. In his seminal paper Markowitz (1952) analysis portfolio allocation between different types of assets, while Sharpe & Tint (1990) shows that the correlation between assets and liabilities is a utility function of the portfolio. Zenios & Ziemba (2007) present an extensive review of the evolution of assets-liabilities management and the models used.

Analysing the behavior of U.S. commercial banks on the 1990-2005 period DeYoung & Yom (2008) observed the evolution of correlation degree between assets versus liabilities, the degree of correlation is higher in large banks, with the observation that over time it improves for the small and medium-sized banks also, in the case of Germany the dependence between asset-liability for German banks Memmel & Schertler (2011) over the 1994-2007 period was also decreasing.

This paper analyses the relationship between assets and liabilities using the canonical correlation technique on a data panel set of 33 banks. The remaining of the article is organized as follows: Section 2 outlines the methodology; Section 3 describes the dataset and presents the results; Section 4 concludes.

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## 2. Methodology

The method we use is based on the canonical correlation analyses developed by Hotelling (1936) in his seminal paper „Relations between two sets of variables”, the canonical correlation analyses on the structure of banks assets and liabilities was also used on the structure of assets and liabilities by DeYoung & Yom (2008) for the United States. If the correlation analyses linear interdependence between two variables when using canonical correlation the analysis is generalized on the interdependence of a set of two variables. The canonical correlation analysis method has the following mathematical representation: for two groups of variables, X consisting of p variables and Y with q variables :

$$\begin{aligned} X &= [X_1, X_2, \dots, X_p] \\ Y &= [Y_1, Y_2, \dots, Y_q] \end{aligned}$$

we have the following linear combination:

$$U = a'X = \alpha_1 X_1 + \alpha_2 X_2 + \dots + \alpha_p X_p$$

$$V = b'Y = \beta_1 Y_1 + \beta_2 Y_2 + \dots + \beta_q Y_q$$

where

$$a' = [\alpha_1, \alpha_2, \dots, \alpha_p] \quad b' = [\beta_1, \beta_2, \dots, \beta_q]$$

are the vectors of canonical coefficients and the linear combination  $a'X$  și  $b'Y$  are the canonical variables.

The canonical loadings are defined as being the correlation between the canonical variables and the original variables group:

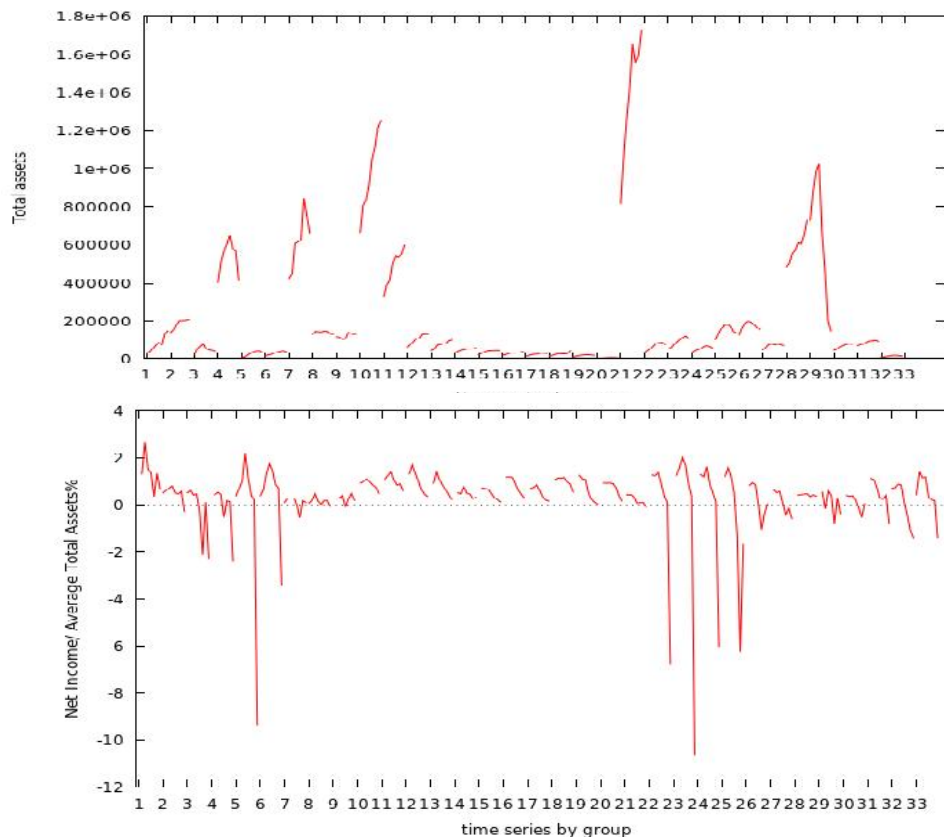
$$Corr(X_1, U_1) = Corr(X_1, \alpha_1 X_1 + \alpha_2 X_2 + \dots + \alpha_p X_p)$$

The interdependence between the canonical variables can be interpreted (DeYoung & Yom, 2008)• as: if there is a strong canonical correlation between the U and V variables, and also there is a strong correlation between the canonical loading  $X_i, Y_j$  with the linear combination U, V then there will be a dependency between the  $X_i, Y_j$  variables.

## 3. Data analyses

The dataset consists of annually financial information for the following banks: Raiffeisen(1), Erste Group(2), Volksbanken(3), Dexia(4), Cyprus Bank(5), Bank of Cyprus(6), Commerzbank(7), Landesbank(8), DekaBank(9), Banco Santander(10), Banco Bilbao(11), Banco Popular Espanol(12), Banco de Sabadell(13), Bankinter(14), Caja de Ahorros y Monte de Piedad de Zaragoza(15), Unicaja(16), Banco Pastor(17), Bilbao Bizkaia(18), Caja de Ahorros y Monte de Piedad de Gipuzkoa(19), Caja de Ahorros de Vitoria(20), Crédit Agricole(21), Eurobank(22), National Bank of Greece(23), Alpha Bank(24), Allied Irish(25), Bank of Ireland(26), Permanent(27), Rabobank(28), RBS(29), SNS Bank(30), Banco Millennium(31), Nova Ljubljanska Banka(32), Nova Kreditna(33), the data are obtained from the Bankscope database and covers the period between 2004 until 2011. (The number in parenthesis represents the indicators used in figures and estimations.)

Figure 1.Total assets and net income



The decrease in totals assets of the banking sector, Fig.1 was effected by the economic crises, in some cases large bail-out and debt restructuration programs were necessary (e.g. Cyprus) in order to keep the banks from bankruptcy. In the case of all of the analysed banks the level of profits and income has decreased, most of the banks suffering high losses. The mismatch in maturity between assets and liabilities, high leverage and over indebtedness in conjunction with deregulation made possible one of the biggest financial crises from the Great Depression.

#### 4. Conclusion

In order to be effective in banks the management of assets and liabilities must take into consideration the risk level, earnings, liquidity, profit, solvency, the level of loans and deposits, also an important factor for the evolution of the profitability in banks for the analysed period were the effects of the economic crisis. The impact of the economic crisis on the banking sector has shown that the present structure of assets and liabilities is not well suited for high variability in the assets price and borrowing cost. Given their systemic importance bank failure, regardless their size, amplify the risk associated on the national markets where banks operate, but can also have a deep impact on other markets due to the spillover effects.

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