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**Article**

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# Determinants of Credit Risk in the European Banking Sector

**Ioan Trenca[1], Daniela Bozga[2]**

**Abstract:** The purpose of this article is to determine the factors that influence the credit risk and the quality of the loan portfolio. Among them are the capital adequacy, GDP, unemployment rate, inflation rate, government debt and financial crisis. For this purpose we developed a panel consisting of 70 commercial banks from 13 European high income countries (Austria, Belgium, Cyprus, Germany, Greece, Italy, Norway, Poland, Portugal, Spain, Sweden, Denmark and Switzerland). The period analyzed in this study is Q12005: Q42011. The quality of the loan portfolio is determined as a ratio between: Loan reserves (allowance for loan losses) and Total loans.

**Keywords:** credit risk; the quality of the loan portfolio; OLS panel data.

**JEL Classification:** G21

## 1. Introduction

The recent financial crisis began in 2007 in the US and has as its main cause the loss of investor confidence in secured mortgage loans. In this context, the issued market shares no longer had a trading potential, which led to a liquidity deficit marked by tightening the conditions for obtaining a bank loan. In this context, we believe it is essential that before we look at the causes of the banking crises, we must focus on the credit risk and, in particular, on the quality of the bank loan portfolio. Numerous studies have analyzed the systematic and non-systemic credit risk and the factors that influence its levels. (Ahmad & Ariff, 2007)



## 2. The Purpose of the Research

The aim of this paper was to determine the factors that influence credit risk and the quality of the loan portfolio. The quality of the loan portfolio is determined as a ratio between: Loan reserves (allowance for loan losses) and Total loans. For this purpose we developed a unique panel consisting of 70 commercial banks from 13 European high income countries (Austria, Belgium, Cyprus, Germany, Greece, Italy, Norway, Poland, Portugal, Spain, Sweden, Denmark and Switzerland). The period analyzed in this study is Q12005: Q42011.

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## 3. Background and Estimation Technique

The factors influencing the systematic credit risk are: (i) macroeconomic factors such as employment rate, gross domestic product growth, inflation rate, foreign exchange rate, (ii) changes in economic policies such as: changes in monetary and fiscal policy, legislative economic changes, stimulating or restricting imports and exports, and (iii) political changes or changes in political guidelines.

All of these variables can have an important influence on the debtors' likelihood of paying off their debts. The factors that influence the non-systemic credit risk are the specific factors: (i) individuals/borrowers such as: their own personality, financial solvency and capital, the credit insurance concerned, (ii) banking companies/institutions such as management, financial position, or specific factors to the banking industry. Banking industry-specific factors may include industry's economic structure and success, industry stability and maturity. The period analyzed in this study is Q12005: Q42011.

### a. Determinats of Credit Risk

In order to identify the determinants of banks' credit risk we have used a panel that includes 70 commercial banks from 13 European high income countries (Austria, Belgium, Cyprus, Germany, Greece, Italy, Norway, Poland, Portugal, Spain, Sweden, Denmark and Switzerland). The estimates are run through OLS panel data method with robust standard errors, consistent with panel-specific autocorrelation and heteroskedasticity.

**Bank Credit Risk Indicator**

We proxy credit risk as a ratio between: Loan reserves (allowance for loan losses) and Total loans. Credit risk and loan portfolio quality are two extremely interdependent concepts. Credit risk is identified as the risk that promised cash flows from loans and securities might not be paid in full. (Saunders & Cornet, 2008) The ratio between: Loan reserves (allowance for loan losses) and Total loans reflects the quality of the loan portfolio due to the close link with provisions and losses from lending. (Gebhardt & Novotny-Farkas, 2013) For identifying the determinants of credit risk we have used a Worldscope panel approach that includes 70 European commercial banks analyzed for a period of 28 consecutive quarters, during Q1 2005 - Q4 2011. We explore a large set of bank-level, macroeconomic and market structure variables.



From the macroeconomic indicators set we want to test the significance of the following variables in explaining the credit risk:

- GDP – Gross Domestic Product growth rate; (unit of measure: GDP expressed as volume, 2005=100, estimated effect: -)
- Unemployment rate; (unit of measure: number of unemployed persons reported at the total workforce; estimated effect: +)
- Inflation rate; (unit of measure: Consumer Price Index, 2005=100; estimated effect: +)
- Government debt. (% GDP, estimated effect: +)

From the market indicators set we want to test the significance of the following variables in explaining the credit risk:

- Banking concentration (Percentage of assets held by the top five banks in total banking sector assets, estimated effect: +/-)

From the specific banking indicators set we want to test the significance of the following variables in explaining the credit risk:

- Capital adequacy - the ratio of equity to total assets; (estimated effect: +)
- Credit risk from the previous period. (Reserves for loans/Total loans, estimated effect: +)

In the regression model, a dummy variable for the financial crisis was introduced. (dummy variable that takes the value 1 for 2007q3-2009q2 and 0 for other cases)

These varables were determined using quarterly data extracted from the Worldscope, IMF and Eurostat databases.

### b. Estimation Technique

For identifying the determinants of credit risk we have used a panel approach that includes 70 European commercial banks analyzed for a period of 28 consecutive quarters, during Q1 2005 - Q4 2011. The estimates are run through OLS panel data method with robust standard errors, consistent with panel-specific autocorrelation and heteroskedasticity.

The impact of these factors on credit risk is examined on a quarterly basis through the following baseline model specification.

$$Credit\ risk_{i,t-1} = \beta_0 + \Phi\times Bank\ controls_{i,t-1} + \Theta\times Macro\ controls_{j,t-1..} + \Theta\times Market\ controls_{j,t-1} + .+\eth\times Other\ control\ variables_{j,t-1} + \varepsilon_{i,t}$$

All explanatory variables are lagged one period in order to control for the speed of adjustment of the credit risk indicators. $\varepsilon_{ij,t}$ is an *iid* error term specific to bank i from country j in year t. There aren't correlations bigger than 0.5 between regressors and all variables used in our analysis are stationary.



## 3. Empirical Results and Discussions

We proxy credit risk as a ratio between: Loan reserves (allowance for loan losses) and Total loans. Among the explanatory variables, the results suggest that capital adequacy, GDP, unemployment rate, inflation rate, government debt and financial crisis are key drivers of the bank's credit risk (Tabel 1).
The determination coefficient shows that 26.2% of the variability of credit risk is explained by explanatory variables. The bank-level variables ($Bank\ controls_{ij,t-1}$) include accumulated credit risk and capital adequacy ratio. As macroeconomic ($Macro\ controls_{j,t-1}$) controls, we use GDP growth, inflation rate, government debt ratio and unemployment rate. As market structure variables ($Market\ controls_{j,t-1}$), we use banking concentration. We also use a dummy for the financial crisis.

The accumulation of reserves in the total loans compared to the previous period has a positive impact on the dependent variable. Therefore, loan decisions from the previous period define changes in the current level of bank loan portfolio quality.

The capital adequacy indicator determined as a ratio between Capital and Total assets has a positive impact on bank lending. This indicator promotes stability and protects depositors of the bank. Thus, the

hypothesis that higher levels of this indicator leads to a decrease in the likelihood of increased bank credit risk is confirmed. (Berger & De Young, 1997)

The results show that GDP growth has a negative impact on bank lending. Salas and Saurina (2002) obtained the same results. The expansion phase of the economy is usually characterized by a low credit risk and then when the recession phase is established, the credit risk tends to increase. The unemployment rate has a positive impact on bank credit risk. (Brookes, Dicks & Pradhan, 1994) An increase in the unemployed should have a negative effect on the cash flows of the population and companies. This can lead to a fall in jobs and a fragile debt situation. The results show that the inflation rate has a positive impact on bank lending. Therefore, repayment of loans can be difficult when there is high inflation, as the real income of borrowers decreases (when wages and salaries remain stable). Also, government debt has a positive impact on bank lending. As investors' confidence in the country declines when public debt increases, interest rates tend to increase, which will positively affect credit risk. (Castro, 2013)

The results highlight the positive link between bank concentration and credit risk. (Jimenez, et al., 2007) Banking may lead to higher interest rates on loans, which may lead to increased credit risk, ie debtors will not pay off their debts. The results highlight the positive relationship between the Financial Crisis dummy variable and the bank credit risk. Due to the economic downturn, borrowers face more difficulties in paying off debts to banks, thus lowering the quality of their credit portfolio and increasing credit risk.

**Tabel 1. Determinats of credit risk in the European banking system**

| Variabiles | Econometric model |
|---|---|
| **Balance sheet data (bank level)** | |
| Credit risk | 0.287*** |
| | (0.150) |
| Capital adequacy | 0.0123*** |
| | (0.00332) |
| **Macoeconomic variables** | |
| GDP | -0.00128*** |
| | (0.0117) |
| Unemployment rate | 0.0205*** |
| | (0.00020) |
| Inflation rate | 0.0247** |
| | (0.00915) |
| Government debt | 0.001*** |
| | (0.02223) |
| **Market structure variables** | |
| Banking concentration | 0.00353*** |
| | (0.000946) |
| **Others variables** | |
| Financial crisis | 0.009** |
| | (0.0125) |
| Constant | -0.238*** |
| | (0.119) |
| Observations | 1,296 |
| R-squared | 0.262 |

*Source: Own calculations*

Note: Explanatory variables are one quarter lagged. Robust standard error in brackets.*, ** and *** denote significance levels of 10%, 5% and 1%.

## 3. Conclusions

The aim of this paper was to determine the factors that influence the quality of the loan portfolio. We developed a unique panel consisting of 70 commercial banks from 13 European high income countries. The period analyzed in this study is Q12005: Q42011. Among them are the capital adequacy, GDP, unemployment rate, inflation rate, government debt and financial crisis.

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