

**EXPLORING THE RELATIONSHIP BETWEEN BANK
PROFITABILITY AND STATE INTERVENTION POLICIES IN
EUROPEAN BANKING SECTOR**

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Abstract

Banking crisis, as well as the interventionist assistance of governments to stabilize their economies have generated controversies among the experts in the field. The purpose of this article is to determine the impact of rescue measures on bank profitability. For this purpose we developed a panel consisting of 81 european commercial banks that captures the relationship between bank profitability and state interventions policies. We explore a large set of bank-level, macroeconomic and market variables during q42008-q42013 period. As far as we know this topic isn't covered in commercial banking empirical standpoints. In order to highlight the evolution of profitability we use specific banking variables, market structure and macroeconomic factors. There are two theories about the interventions of governments in banking sector - the first one involves a positive effect of rescue measures due to improvement of banks' profitability ratios and charter value and the second which involves a negative effect as a result of increased risk-taking. We find a positive relationship between state intervention policies and profitability in European banking sector during q42008-q42013 period. Our results suggest that on short term (5 years) dominate the positive effects.

Keywords: *profitability, ROA, state interventions, banking crisis*

JEL classification: *C23, G18, G21*

1. Introduction

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The healthcare industry is different from other economic sectors because of its unique characteristics. First of all, this is one of the few areas that involve “life or death” matters. In such a context it becomes difficult to involve financial analysis or to pay attention at financial gains.

In order to maintain the financial stability governments implemented a series of rescue measures at the national level taking the form of loans, acquisitions of impaired assets and nationalizations, among others (Andries, Mutu and Ursu, (2014)). We provide a framework that assesses the relationship between these policies and bank profitability.

Our empirical setting focuses on 81 banking institutions that are analyzed during the q42008-q12013 period using bank-level and country level data. There is a large literature on the impact of government interventions on bank behavior, using a single policy mechanism ((Koetter (2012), Cordella and Yeyati (2003), Corsetti et al. (2006) and Martin (2006), Berger et al. (2011), Duchin and Sosyura (2013), Mehran and Thakor (2011), Black and Hazelwood (2012)), Harris et al. (2013), Philippon and Schnabl (2013)) and we found a single paper which empirically assesses the total impact of government rescue packages on bank behavior (Hryckiewicz A., (2014)). In the last article Hryckiewicz A. also suggests some evidence between bank profitability and government interventions in banking sector. The author uses as a dependent variable the standard deviation of ROA and found a positive relation between resolution policy and bank profitability.

Our paper contributes to the large strand of literature in several ways. First, we use a large and unique sample that consists of 81 banking institutions from 10 European countries. Second, we explore a large set of bank-level, regulatory framework and macroeconomic variables over the period 2008-2013. The bank-level data consists of quarterly balance sheet items. The policy intervention instruments used by supervisory authorities to limit the negative spillovers of recently financial crisis accounts for state loans, acquisition of impaired assets and nationalizations. Thirdly, we empirically assess if the state intervention policies are associated with higher profitability of European banks. As far as we know this topic isn't covered in commercial banking from both theoretical and empirical standpoints.

The remainder of paper is organized as follows. Section 2 describes the sample and financial data. Section 3 describes the methodology. Section 4 presents the empirical results. Finally, section 5 provides policy implications and conclusions.

2. Data analysis

In order to identify the determinants of banks' profitability level we have used a panel that includes 81 commercial banks from European banking sector analyzed for a period of 21 consecutive quarters, respectively Q4 2008 - Q4 2013. Commercial banks used in our analysis are from: Germany (4), Denmark (22), Estonia (5), Finland(14), Greece (8), Hungary (1), Italy (18), Poland (12), Portugal (4) and Sweden(4) .

In order to identify the factors that influence the banks' profitability level we have use an OLS Panel Regression model, with return on assets as a dependent variable. The profitability indicator is determined from data supplied by Bankscope database.

Return on assets (ROA) measures the efficiency and economic profitability of assets in terms of capital raised and is determined as the ratio between net interest profit and total assets of the bank.

We use bank level variables (Bank controls_{ij,t-1}), macroeconomic variables (Macro controls_{ij,t-1}) and banking market structure variables (Market controls_{ij,t-1}), . All explanatory variables are lagged one period in order to control for the speed of adjustment of the systemic risk indicators. $\epsilon_{ij,t}$ is an iid error term specific to bank i from country j in year t .

Table 1. Variables definition

Symbol	Variables	Definition and calculation method	Source
Dependent variables			
ROA	Rentability of assets	Net interest income to total assets	Own calculations using data from Bankscope.
Government interventions measures			
rescue measures	Rescue measures	Dummy variable that takes the value 1 for the entire period if the country provided state loans, acquisition of impair assets and nationalization after October 2008.	Own calculations using information from Petrovic and Tutsch(2009)
Balance sheet data (bank level)			
Lnta	Logarithm of Total Assets	log(Total Assets)	Own calculations using data from Bankscope.

Lntd	Maturity mismatch	Loans net to Total Deposits	Own calculations using data from Bankscope.
Lvg	Leverage	Total Shareholder Equity on Total assets	Own calculations using data from Bankscope.
lr1	Liquidity ratio	Liquid assets to total assets	Own calculations using data from Bankscope.
lr2	Liquidity ratio	Cash and due from banks to Total Assets	Own calculations using data from Bankscope.
Rnl	Credit risk ratio	Reserve For Loan Losses on Net Loans	Own calculations using data from Bankscope.
Npl	Credit risk ratio	Provision For Loan Losses on Net Loans	Own calculations using data from Bankscope.
Macroeconomic variables (country level)			
Infl	Inflation rate	Volatility for inflation annual rate of change (2005=100)	World Bank
Une	Unemployment rate	Unemployment rates by sex, age and nationality, total (%).	Eurostat
Gov	Government lending	Net government lending minus net borrowing as a percentage of GDP. Figures are at general government level.	Eurostat
Gdp	Gross domestic product	Gross domestic product at market prices, price index - percentage change on previous period, based on 2005=100	Eurostat
Banking market structure variables (country level)			
herd_year	Herding measure	This is a measure of banking industry heterogeneity obtained as the within country standard deviation of the percentage non-interest income (with respect to total assets) as in Beck et al. (2013), per year (t).	Own calculations using data from Bankscope.
herd_country	Herding measure	This is a measure of banking industry heterogeneity obtained as the within country standard deviation of the percentage non-interest income (with respect to total assets) as in Beck et al. (2013), per country (i).	Own calculations using data from Bankscope.
Conc	Concentration	Percent of total assets held by the five largest banks at the end of 2008.	WorldBank
conc_lerner	Concentration Lerner	Mixed measure that combines banks' concentration index in the loan market with market monopoly power at the end of 2008. A measure of market power in the banking market. An increase in the Lerner index indicates a deterioration of the competitive conduct of financial intermediaries. Higher values of the Lerner index indicate less bank competition.	WorldBank

o_freedom	Overall Freedom	Overall measure of financial freedom.	The Heritage Foundation.
bf_freedom	Business freedom		The Heritage Foundation.

Source: authors' calculation

3. Methodology

For identifying the impact of state intervention on profitability level of banks we have used a panel approach that includes 81 European commercial banks for a period of 21 consecutive quarters, during Q4 2008 - Q4 2013 period.

The first step in methodology was to check the stationarity of the variables in the Panel Regression Model with Fisher Test. Next we apply the Lagrange-Multiplier test for serial correlation. Serial correlation causes the standard errors of the coefficients to be smaller than they actually are and higher R-squared. The null hypothesis is no serial correlation. Above we fail to reject the null and conclude the data does not have first-order. Also we have applied Wald Test to detect the presence of heteroskedasticity. The null hypothesis is homoskedasticity or constant variance. Above we reject the null and conclude that heteroskedasticity is present in our data. In order to control heteroskedasticity we use "robust" option proposed by Oscar Torres-Reyna (Oscar Torres-Reyna: 2011).

The relationship between the macroeconomic variables and the return, in Pooled OLS model is the following:

$$ROA = \beta_0 + \beta_1 \times \text{Rescue measures}_{j,t-1} + \Phi \times \text{Bank controls}_{i,t-1} + \Theta \times \text{Macro controls}_{j,t-1} + \delta \times \text{Market controls}_{j,t-1} + \epsilon_{i,t}$$

ROA is the profitability ratio calculated for bank i at the moment t , Bank controls $_{i,t-1}$ are banking level variables, Macro controls $_{j,t-1}$ represent macroeconomic variables, Market controls $_{j,t-1}$ represent banking market structure variables and $\epsilon_{i,t}$ represents the error term.

4. Results

There are two theories about the interventions of governments in banking sector - the first one involves a positive effect of rescue measures due to improvement of banks' profitability ratios and charter value and the second which involves a negative effect as a result of increased risk-taking. We find a positive relationship between state intervention policies and profitability in European banking sector during q42008-q42013 period, the state intervention

policies are associated with higher profitability of european banks. Our results suggest that on short term (5 years) dominate the positive effects.

The balance sheet structure of a bank is bound to affect profitability. We find a positive relationship between bank size and profitability, significant in all cases, suggesting that larger banks tend to earn bigger profits. We measure maturity mismatch using the ratio of loans net to total deposits (Intd) since this provide a forward-looking measure of bank exposure to default. We find a negative and significant relationship between ROA and loans net to total deposits. Based on economic theory, there should be a positive relationship between profits and bank risk, but during the banking crisis the risk increased as a consequence of the deterioration of loans' quality and therefore, the profitability of banks decreased. The ratio of shareholder equity to total assets (lvg) is considered one of the basic ratios for capital strength. It is expected that the higher this ratio, the lower the need for external funding and therefore the higher the profitability of the bank. Capital strength (lvg) has a significant and positive contribution to the profitability of the european banks. This finding is consistent with previous studies (Berger, 1995; Demirguc-Kunt and Huizinga, 1999; Ben Nacuer, 2003; Pasiouras et al., 2006). The results show a positive effect of liquidity (r11 and r12) on european bank profitability which is consistent with Bourke (1989). Generally, a higher value of the liquidity ratio (r11, r12) makes the bank more liquid and less vulnerable to failure. However, liquid assets are usually associated with lower rates of return, and so generally a negative relationship is expected between this variable and profitability. However, during financial and banking crisis banking institutions which holds cash were able to make profitable investments. The impact of provision for loan losses to net loans (npl and rnl) on ROA is positive and significant, suggesting that higher risks result in higher profitability for european banks. The credit risk ratio is a measure of bank asset quality. A high ratio could signal a poor quality of loans and therefore a higher risk of the loan portfolio. Therefore, a high ratio could imply a positive relationship between risk and profitability, according to the risk-return hypothesis.

Bank profitability is expected to be sensitive to macroeconomic control variables. We find a positive relation between inflation and ROA . This association supports the theory that inflation was anticipated giving banks the opportunity to adjust interest rates accordingly. We find a significant and negative relationship (See Table 3, equation 2) between

unemployment rate and ROA. A deterioration of macroeconomic condition determined a deterioration of bank profits. The impact of GDP growth and government debt to profitability is insignificant.

Bank profitability is expected to be sensitive to market structure variables. We compute the Herding Measure (*herd_year* and *herd_country*) as in Beck et al. (2013). We find a positive and significant relationship between ROA and these two herding measures. These measures takes into consideration the possible incentives for banks to increase their risk-taking following an increase in competition. The higher the value of these variables, the more heterogeneous are the sources of revenues of european banks (i.e., less herding). The relationship between bank concentration and bank profitability has been examined in many published studies using European and U.S. data. Concentration (*conc*) may have a positive effect on profitability according to the Structure Conduct Performance (SCP) hypothesis, therefore banks in highly concentrated markets tend to earn monopoly profits. However, not all studies have found evidence to support the SCP hypothesis. Corvoisier and Gropp (2002) employ a Cournot model of loan pricing, where banks are assumed to be price makers in the loan markets, but are price takers in the deposit markets. They also empirically show that for demand deposits and loans increasing bank concentration in Euro area countries during the years 1993-1999 has resulted in less competitive pricing by banks. Our results (See table 2 and table 4) claims the last theory and suggests a negative relationship between concentration and ROA. We find a significant and negative relationship between ROA and Lerner Concentration (*conc_lerner*). Higher values of the Lerner index indicate less bank competition and profitability. As we expected we also found a positive and significant relationship between overall freedom respectively business freedom and profitability

Table 2. Results of the econometric estimation of the baseline OLS model

VARIABLES	(1)	(2)
Rescue measures	0.121** (0.0488)	0.308*** (0.0686)
l.loglnta	0.188*** (0.0380)	0.207*** (0.0398)
l.lnr2	0.0128*** (0.00208)	0.0131*** (0.00219)
l.npl	0.129*** (0.0397)	0.0907** (0.0416)
l.loglntd	-0.226***	-0.256***

	(0.0315)	(0.0351)
l.loglvg	0.254***	0.231***
	(0.0270)	(0.0309)
l.infl	0.0388	0.0765**
	(0.0322)	(0.0323)
l.logune	-0.0138	0.0444
	(0.0228)	(0.0304)
herd_year	0.207*	0.259**
	(0.121)	(0.119)
Conc		-0.00283**
		(0.00125)
conc_lerner		-1.672***
		(0.344)
o_freedom	0.00743***	
	(0.00131)	
constant	-1.364***	-0.736***
	(0.193)	(0.188)
Observations	1,400	1,400
r-squared	0.335	0.350

Source: authors' calculation

Table 3. Robustness checks for equations containing overall and business freedom variables

VARIABLES	(1)	(2)	(3)	(4)	(5)
Rescue measures	0.128*** (0.0493)	0.0241 (0.0494)	0.113** (0.0463)	0.133*** (0.0510)	0.112** (0.0499)
l.loglnta	0.187*** (0.0392)	0.220*** (0.0374)	0.407*** (0.0984)	0.193*** (0.0381)	0.180*** (0.0379)
l.lr2	0.0125*** (0.00212)	0.0159*** (0.00270)		0.0123*** (0.00221)	0.0146*** (0.00210)
l.npl	0.128*** (0.0399)		0.147*** (0.0381)	0.127*** (0.0393)	0.124*** (0.0416)
l.loglntd	-0.224*** (0.0332)	-0.192*** (0.0326)	-0.245*** (0.0321)	-0.225*** (0.0318)	-0.243*** (0.0339)
l.loglvg	0.255*** (0.0278)	0.177*** (0.0335)	0.262*** (0.0269)	0.251*** (0.0268)	0.267*** (0.0273)
l.infl	0.0336 (0.0350)	0.0564 (0.0381)	0.0516 (0.0322)	0.0510 (0.0326)	0.0490 (0.0311)
l.logune	-0.0200 (0.0318)	-0.0492** (0.0238)	-0.0149 (0.0235)	-0.0113 (0.0297)	-0.0262 (0.0260)
l.gov	-0.00122 (0.00307)				
l.gdp	-0.000200 (0.00204)				
herd_year	0.187 (0.121)	0.393*** (0.141)	0.176 (0.125)		0.224* (0.123)
o_freedom	0.00762***	0.00552***	0.00809***	0.00783***	

	(0.00133)	(0.00127)	(0.00131)	(0.00161)	
l.logrnl		0.0885*** (0.0127)			
l.lrl			0.00470*** (0.00162)		
herd_country				0.0861 (0.132)	
bf_freedom					0.00311*** (0.000731)
Constant	-1.363*** (0.209)	-1.205*** (0.141)	-2.406*** (0.475)	-1.378*** (0.244)	-1.077*** (0.199)
Observations	1,361	1,076	1,408	1,400	1,400
R-squared	0.331	0.369	0.329	0.334	0.329

Source: authors' calculation

Table 4. Robustness checks for equations containing banking concentration variables

VARIABLES	(1)	(2)	(3)	(4)
Rescue measures	0.322*** (0.0705)	0.200*** (0.0579)	0.305*** (0.0668)	0.362*** (0.0833)
l.loglnta	0.206*** (0.0410)	0.226*** (0.0376)	0.472*** (0.114)	0.214*** (0.0399)
l.lrl2	0.0128*** (0.00223)	0.0158*** (0.00287)		0.0116*** (0.00222)
l.npl	0.0895** (0.0420)		0.111*** (0.0401)	0.0850** (0.0410)
l.loglntd	-0.253*** (0.0367)	-0.210*** (0.0339)	-0.272*** (0.0355)	-0.254*** (0.0350)
l.loglvg	0.231*** (0.0317)	0.175*** (0.0345)	0.246*** (0.0308)	0.223*** (0.0311)
l.infl	0.0747** (0.0346)	0.0810** (0.0387)	0.0862*** (0.0322)	0.101*** (0.0337)
l.logune	0.0354 (0.0382)	0.0103 (0.0293)	0.0359 (0.0302)	0.0676 (0.0428)
l.gov	-0.00163 (0.00289)			
l.gdp	-0.000324 (0.00194)			
herd_year	0.248** (0.119)	0.430*** (0.138)	0.228* (0.123)	
conc	-0.00289** (0.00122)	-0.00199 (0.00125)	-0.00176 (0.00117)	-0.00277** (0.00130)
conc_lerner	-1.719*** (0.344)	-1.350*** (0.273)	-1.598*** (0.336)	-1.822*** (0.411)
l.logrnl		0.0725*** (0.0117)		
l.lrl			0.00571*** (0.00188)	

herd_country				0.276* (0.151)
Constant	-0.716*** (0.196)	-0.786*** (0.192)	-2.047*** (0.524)	-0.836*** (0.190)
Observations	1,361	1,076	1,408	1,400
R-squared	0.347	0.388	0.345	0.350

Source: authors' calculation

5. Conclusions

The bank profitability nexus rescue measures is an unsettled topic in the banking literature. The purpose of this paper is to determine the relationship between profitability and state intervention policies in European banking system. We estimate at individual level bank's concentration (Lerner Index Concentration and the percent of total assets held by the five largest banks at the end of 2008) and the degree of freedom (overall and business freedom). We also control for bank-level fundamentals and macroeconomic factors. In addition, we introduce a herding measure for market structure. There are two theories about the interventions of governments in banking sector - the first one involves a positive effect of rescue measures due to improvement of banks' profitability ratios and charter value and the second which involves a negative effect as a result of increased risk-taking. We find a positive relationship between state intervention policies and profitability in European banking sector. Our results suggest that on short term (5 years) dominate the positive effects.

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