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# What explains changes in accounting divisional performance under liquidity shortage conditions? Evidence from the Greek Banking

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**Abstract**: This is the first study which tests empirically to which extent the quality and the spread of consumer and small business loans are responsible for the increases or decreases in branch accounting performance, measured by the Residual Income (RI) performance indicator, over time. Moreover, given extreme liquidity shortage conditions the paper investigates to which extent the above factors are responsible for changes in RI. Unique accounting information derived from the Management Information System (MIS) of a Greek systemic commercial bank is utilized. The study finds that lending spreads for both types of loans are positively and statistically significant related to RI. The crisis increases the positive value effect of consumer lending spreads while reduces the value premium of small business lending spreads. The latter indicates that the upward repricing of small business credit lines during crisis years seems to destroy value due to the side effects that the repricing loan policy activates (i.e. reduces the repayment ability of borrowers). Moreover, the enormous increase of loan loss impairments during crisis exercises an extra negative impact on RI thus further accelerating shareholder value destruction, for both loan portfolios. The study provides useful information about the thorough understanding of the quality of banking performance at the retail level in bank-driven crisis economies.

**Keywords**: Divisional performance, lending operations, retail branches, spread and credit risk, crisis

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# 1. Introduction

According to Deville (2009), "Retail banking has always erred on the side of caution. The result of such practise has been the creation of inertia in branch management and performance evaluation". Indeed, the literature review reveals a significant proliferation of research on bank performance and efficiency (Garcia-Herrero *et al.*, 2009; Fiordelisi & Molyneux, 2010), but only few on branch performance where the unit of analysis is an individual branch of the bank. The main reasons include the lack of easy access to branch level data and the condition to have practical knowledge on the way the bank branch operates. Given that commercial banking is based on the operation of a network of bank branches and these branches are involved in all the crucial steps of modern banking like cost and risk management, the branch performance analysis is expected to have important implications for the bank management, policymakers and academics. The main research question that the paper attempts to answer is as follows: To which extent the quality of the loan portfolio and the lending spreads - which are two crucial value factors with important trade-offs between them - are responsible for changes in shareholder value creation at the branch level and how this value effect is associated with the type of the loan portfolio and external environmental changes? In particular, the paper measures the impact of credit risk and lending spreads, related to the consumer and small business loan portfolio, on the value creation process over time taking into account changes in the external environment in terms of liquidity. The analysis focuses on consumer and small business loans where their volumes are large and they generate substantial income and risks (i.e. mortgage loans are not incorporated into the analysis since provisions for these collaterized loans were somewhat fixed over time).

Generally, measuring the divisional performance of banks such as the performance of bank branches is of great importance since this bottom level performance analysis ensures that changes on shareholder value can be measured directly at their sources by also capturing the direct crisis effects immediately. Two are the crucial conditions as regards the effective measurement of divisional performance: the structure of the analysis and the homogeneity of the data set. The employed data set satisfies adequately these two conditions. Specifically, regarding the structure of the paper, the study uses internal data of bank branches of a specific banking institution. As the literature reports (see Gross, 2006), a research design in retail banking performance should be based on internal data of bank branches of a specific banking institution and not be performed across competing banking institutions since the definition of the retail segment considerably varies across banks. Moreover, the paper examines a strict homogeneous data set of branches in terms of their activity and size. In particular, a novel data set, derived from the monthly Profit and Loss (P&L)

statements of homogeneous retail branches of one of the four largest commercial banks in Greece, is utilized over the period January 2006 to December 2010. Subsequently, this period is divided into the credit boom period (Period A: January 2006- August 2008) and the first phase of the crisis period (Period B: September 2008 - December 2010). In total, the data sample is a balanced panel with 27 homogeneous retail branches spread across Greece and 1,620 monthly observations over the period from January 2006 to December 2010. The data set is representative as the Greek banking industry is very oligopolistic (i.e. there are four systemic Greek commercial banks: The National Bank of Greece, Piraeus Bank, Eurobank and Alpha Bank) and quite homogeneous operating in commercial banking, mainly retail banking.

A fixed-effects model specification is applied to the panel of retail branches which produces efficient estimates. It is worth noting, that since the study explores the liquidity shortage effects on lending spreads and credit risk quality where there is an exogenous shock to the banking sector, the results are expected to not suffer from endogeneity problems. For measuring shareholder value, the performance indicator of Residual Income is used (thus RI is the dependent variable). RI is an effective measure of shareholder value creation at bottom level (Koller *et al.*, 2005). In the same spirit other SHV banking studies (Fiordelisi & Molyneux, 2010, 2007) use the Economic Value Added (EVA) model adjusting accounting net operating profits by adding back loan loss impairments (considering that they used to manage earnings and smooth earnings overtime) and subtracting net charge offs. However, Gross (2006) reports that such adjustments to provisions may potentially no longer be needed since the provisions requirements under International Accounting Standard 39 (IAS 39), which are based on observable data, lead to more realistic figures and so they can be considered as cash cost. Overall, the study proposes that RI model and other SHV models such as EVA and Economic Profit (EP) are often identical in practice (see also Bodmer, 2001).

The results overall indicate that both the lending spread earned on consumer and small business loans and the credit risk-taking on these loans, are significantly associated with the RI, but with a different statistical sign. In particular, the lending spreads for both types of loans are positively and statistically significant related to RI. The crisis increases the positive value effect of consumer lending spreads while reduces the value premium of small business lending spreads. The latter is due to the negative value effects of the upward repricing credit policy that the small business loans segment followed in the crisis period. As regards the credit risk value driver, the occurrence of liquidity shortage increases the generally negative value effect of credit risk for both loan categories. The results have important implications for policymakers and bank managers (see the discussion section below). Generally, the study provides useful information about the quality of banking performance at the retail level in the "bank-driven" crisis economy of Greece which is characterized by sovereign debt and a relatively weak local financial market, as well as other

Mediterranean economies of the European region (e.g. Italy, Portugal, and Spain). In this way, this might offer useful lessons for those specific countries as well.

The rest of this paper is organized as follows: Section two illustrates the recent developments in the Greek banking sector. Section three presents the theoretical framework of the study along with the related literature review. Section four presents the methodology employed to construct the model. Section five describes the data set, the definition of variables used in the study, and it illustrates the empirical results. The last section concludes the study and discusses its main findings.

## 2. A brief overview of the Greek banking industry – the passage of the expansion period to the crisis period

Until the end of the 1980's the domestic banking sector was heavily protected and regulated (protectionism period). Since then the Greek banking industry has faced structural changes caused by liberalization and deregulation (liberalization period). The liberalization period is of particular interest for this research since the new environment has positively affected the performance of banking institutions in the local economy, especially their retail banking activities, and enabled banks to better serve the interests of shareholders with similar strategies. Up to 2008 the domestic banking market was steadily expanding (expansion period). In particular, the liberalization of the capital account in the 1990's which allowed Greek enterprises and individuals to borrow in lower yielding foreign currencies, triggered credit growth. Moreover, the abolition of various regulatory credit ceilings, the adoption of the Euro in 2001 with the subsequent decline in interest rates and the increased competition amongst financial institutions, boosted the demand for credit further. The fast growth of the Greek banking sector relied heavily on a wide distribution network, thus branch performance had a significant performance effect on the bank as a whole, as the number of branches increased by 24% during 2003-2008 (Bank of Greece, 2009).

The systematic global crisis that started in August 2007 in conjunction with high public debt of the Greek economy discontinued in 2008 the expansion process of the banking industry and threw the domestic financial market in deep crisis and afterwards the real economy[i]. Consequently, the crisis caused the drying up of liquidity in the domestic interbank market, and led to a substantial increase in deposit and lending rates. However, this crisis transmitted to the local banking system with a greater time lag if compared with most of the EU. The reason is that Greek banks have been focused on retail banking and not on investment banking activities, as in the case of other EU banks that caused huge marked to market losses related to toxic assets.

Since the study takes into account the first phase of the crisis and for the needs of our empirical research, the starting point of the crisis that marks the economic alteration should be determined. Exogenously it is observed that the average interest rates of time deposits for Greek banks increased markedly in September 2008 (Bank of Greece, 2009). Specifically, in that month the interest rates of time deposits jumped from 4.99% (August 2008) to 5.11% with an increasing trend until the end of December 2008, where the month rate was 5.36%. So, the structural point at which the crisis started with the form of liquidity shortage, is positioned on September 2008.

# 3. Literature review and determinants of value creation

## 3.1 Literature on determinants of shareholder value

There is a large amount of literature exploring generally how European banks are able to increase their performance and profitability. Studies like Dietrich and Wanzenried (2011), Athanasoglou *et al.* (2008), Brissimis *et al.* (2008), Lepetit *et al.* (2008) or Salas and Saurina (2003) investigate bank-specific variables that may have an impact on banking profitability measured by ROE or other efficiency measures. Their results vary since there are differences in studied time periods and sample countries. Also, the examination of the impact of crisis on bank profitability drivers is scarce. More specifically, Dietrich and Wanzenried (2011) analyze profitability determinants of 372 commercial banks in Switzerland during the pre-crisis period (1999 – 2006) and the crisis years (2007-2009). They find that the profitability effect of credit risk taking is negative and significant, only in the crisis period.

A gap is located on the empirical literature on measuring shareholder value creation as a proxy for bank performance and identify relevant value drivers. In particular, Fiordelisi and Molyneux (2010), examining several bank- and industry- and macroeconomic-specific determinants of SHV creation (measured by the EVA performance indicator which is identical in practise with the RI approach, see the introduction section) for a large sample of European banks between 1998 and 2005 (including Southern European Countries such as Spain, Portugal, Italy, Greece etc.) emphasize that such value factors often have both positive and negative effects on SHV creation. Their most important finding related to this study is the identification of a positive relationship between credit risk taking and SHV – as banks take on more credit risk they also boost their interest revenues. On the contrary, Gross (2006) examines determinants of SHV creation for the German banking sector during the period 1998-2003. The findings suggest that an increase in credit risk taking destroys value while an increase in cost efficiency creates it. The above limited SHV literature is applied at the bank level. To the best of my knowledge, no previous SHV study

has been applied to the branch level and thus on retail banking, focusing at the same time on the simultaneous examination of the impact of credit risk and lending spreads on RI and taking also into account the effects of crisis and loan portfolio characteristics.

### 3.2 The effect of credit risk and lending spreads on value creation process

A bank branch creates value for its shareholders when the return on invested capital is greater than its opportunity cost (Feltham & Ohlson; 1995). A reliable accounting performance indicator is Residual Income (i.e. the difference between the allocated net operating income after taxes and the cost of allocated equity - the product of allocated equity and cost of equity-). According to Dermine (2009), equity allocation at branch level should be based on the risk taken at the branch level (that is essentially credit and operational risk) and to bank regulations on capital. Specifically, the equity employed to each branch is the sum of capital requirements for credit and operational risk according to Basel II capital rules (Gross, 2006; Uyemura *et al.*, 1996). The allocation of income to the branches is implemented through the concept of fund transfer pricing that allows interest income from lending and deposit transactions to be calculated in isolation for each branch (Gross, 2006)

Based on earlier shareholder value literature (Fiordelisi & Molyneux, 2010; Gross, 2006), this paper suggests that the credit risk taking activity is expected to have an interesting impact on RI. Also, granting loans with a high spread is considered a valuable driver (Dermine, 2009) for the income structure of the branch. In addition, the study recognizes the impact of crisis on the value effects of the above drivers. Thus, it is realistic to assume that when compared to the growth period that stimulates the influence of positive value factors the crisis hampers the SHV creation process, reducing the dynamic of the specific factors. The net effect (value creation in the growth period vs. value destruction in the crisis period) will finally show the overall contribution of the value determinants.

The following arguments shed some insights in this proposition discussing the uncertain impact of our independent variables on RI in a dynamic environment. The effect of higher credit risk on performance appears to be negative because of the relative rise of loan impairments (Athanasoglou *et al.* 2008; Brissimis *et al.*, 2008; Gross, 2006). Especially in the crisis period, a very high level of loan impairments, and consequently a bad quality of loan portfolio, may seriously threaten the survival of banking institutions. On the contrary, credit risk taking which lends to doubtful customers in terms of creditworthiness at high rates of interest may increase the loan volumes and thus the ability of the institution to generate interest income through market share expansion (Fiordelisi *et al.* 2011; Salas & Saurina, 2003). In the crisis period, a negative impact of credit risk taking on RI is expected due to the unfavorable economic environment.

In addition, profitability derived from lending taking business may be considered as potential value determinant (Dermine, 2010). From this point of view, it is expected that retail branches which charge higher lending spreads (i.e. difference between interest earned on loans before provisions and cost of funding –transfer price-) to their lending customers naturally present a higher value. However, high interest margins maybe hiding a relatively low quality loan portfolio. Such loan portfolios are usually related with higher credit risk in the period of crisis, with negative impact on SHV creation. Moreover, in the crisis period the chances of implementing a successful policy of higher spread seems to decrease due to reducing credit demand. This may be implemented through repricing the existing loan portfolio, especially the credit lines of the small business loan portfolio. In that case, a possible repricing policy might have side effects since the repayment ability of the borrower is decreased while at the same time the loan delays are increased given the negative economic environment.

Generally speaking, in a changing environment the uncertain impact of the aforementioned determinants requires that shareholder value creation can only be effectively investigated ex-post by empirical research.

# 4. Methodology

The divisional performance in retail branches, measured by RI (dependent variable), is linked to four independent variables related to interest income earnings and risk taking characteristics for each type of loan (consumer and small business loans). The RI is standardized by equity (RIOE) so that this ratio expresses the shareholder value created for any euro of capital invested by shareholders in the bank branch.

A linear panel model is specified to examine the determinants of shareholder value creation. As independent variables, the credit risk (CR) of consumer and small business loans relatively and the net interest spread on consumer and small business loans before provisions (S), are selected. For capturing the effect of value drivers on RI, given that liquidity shortage, a dummy variable d is introduced taking on the value of 1 in the period of the crisis and 0 otherwise. This dummy variable is multiplied separately with each of our four independent variables and thus four more variables included in our model, the coefficients of which show the supplementary impact of each independent variable on the performance in periods of credit crunch.

Below is illustrated the fixed-effects model specification assuming constant slope coefficients but intercepts that vary over time or individual branches (Baltagi, 2005).

$$RIOE_{it} = a + \mu_t + \lambda_t + b_1 Scon_{it} + b_2 CRcon_{it} + b_3 Ssbl_{it} + b_4 CRsbl_{it} + b_5 d * Scon_{it} + b_6 d * CRcon_{it} + b_7 Ssbl_{it} + b_8 CRsbl_{it} + u_{it} \quad (1)$$

Where, RIOE = Residual income on equity
$\alpha$ = Intercept.
i = 1,….. 27 , denoting retail branches.
t = 1, …..60 , corresponding months.
$b_1..b_{11}$ = constant slope coefficients for independent variables.
$\mu_i$ = dummy variable coefficient for each branch i.
$\lambda_t$ = dummy variable coefficient for each month t.
$u_{it}$ = disturbance term varies with branches and time.
CRcons= Credit Risk on consumer loans
CRsbl= Credit Risk on small business loans
Scons = Net interest spread on consumer loans
Ssbl = Net interest spread on small business loans
d = Indicator dummy variable, 1 for the crisis and 0 otherwise.

In the above fixed effects model differences across branches are captured in differences in the constant term $\mu_i$ and differences over time in the constant term of $\lambda_t$. The branch specific effects and period specific effects are assumed fixed parameters to be estimated as coefficients of branch dummies and period dummies for each retail branch and for each period in the sample respectively. The estimations of the above two-way fixed effects specification are corrected for serial correlation and time varying variances in the disturbances by using the White (period) robust coefficient variance method (White, 1980). It is worth noting, that since the study explores the liquidity shortage effects on lending spreads and credit risk quality where there is an exogenous shock to the banking sector, the results are expected to not suffer from endogeneity problems. A possible limitation of the methodology is related with the risk of omitting other significant value drivers such as branch manager's skills, product diversification etc. However, the use of a panel data model with the incorporation of branch specific fixed effects captures adequately these omitted variables and thus reduces the omitted variable bias.

To test the fit of the above fixed-effects model to the data set, several tests are performed. It is worth pointing out that since the paper deals with fixed effects at the branch and year level, the omitted variables bias is reduced. Also, there are no endogeneity issues related to the results given that the paper investigates exogenous shock value effects to the banking industry. As regards the statistical tests (see below

Table 2, Panel B), initially a basic F-test is run for joint parameter insignificance. With an F-statistic of 284.1, the Ho at the 1% level is rejected and thus the model does not show a misspecification. The next step is to test that branch specific effects exist. An F-test is employed with the Ho that all the coefficients of branch dummies are redundant and equal to zero. With an F- statistic of 7.63 the Ho is rejected at the 1% level. Also, the null that all the coefficients of time-dummies are jointly equal to zero is rejected (F-statistic of 18.52), as well as all the coefficients of branch dummies and time dummies are jointly equal to zero (F - statistic of 15.28). Results therefore suggest that individual branch specific effects and time period effects exist and the appropriate model is the proposed fixed-effects model. The final test is to examine that the effects are fixed and not random. The Hausman test statistic (Hausman, 1978) with a value of 29.33 rejects the null hypothesis that independent variables are not correlated with the branch specific effect. In summary, the results of the above tests conducted suggest that the fixed effects model produces efficient coefficient estimates.

# 5. Data and empirical results

## 5.1 Data

As mentioned above the study's original data set is derived from a branch network of a systemic commercial bank spread across Greece for the period January 2006 to December 2010. The stepwise sampling process in order to form the observation set of homogeneous branches for this study is presented below: First, within the bank's entire branch network consisting of over 300 branches with different structure of their business, the paper focuses on almost 250 branches providing similar services to individuals and small sized enterprises (pure retail banking). Second, mature branches with an operation of more than six years, are selected. The intuition is that the age of branch substantially influences the calculation of loan loss impairments and, by extension, the quality of branch loans portfolio. After this adjustment, the data set is ended up with 130 branches. In addition, a sample restriction is introduced with respect to the usage of similar services (e.g. number of employees) from the selected branches. Small-sized branches (number of employees less than six according to the bank's definition) are excluded since they considered being less developed, thus 80 branches are remained. Since the aim of the paper is to conduct an extensive analysis of value drivers by manually gathering a series of monthly P&L statements in their original format, more than 30% of the bank's purely branch network by selecting through a random sampling technique 27 branches symmetrically spread across Greece (criterion of geographic dispersion), is decided to be analyzed. In total, the study's data sample is a balanced panel with 27 retail branches.

### 5.2 Definition of variables

As described above, the RI as a proxy for the shareholder value creation of the sample retail branches. Thus,

$$RI_{it} = (ROE_{it} - c_{et}) x E_{i,t/t-1} \qquad (2)$$

Where:

$RI_{it}$ = Residual income of bank branch i in month t.
$ROE_{it}$ = Return on equity of branch i in month t.
$c_{et}$ = Cost of equity of bank in month t.
$E_{i,t/t-1}$ = Average equity of bank branch i in month t and t-1.

The return on equity of bank branch i in month t, is defined as net operating income stemming from lending operations divided by the average allocated equity of bank branch i in month t and t-1. The equity employed by each branch is obtained by applying the capital requirements for retail exposures, against credit and operational risk (Basel II via Bank of Greece Governor's Act: No 2588 & No 2590, 20/08/2007). In particular, the capital requirement for credit risk is calculated by the sum of the risk weighted loans of each branch (weight 75% for mortgages, consumer, small business loans and credit cards) multiplied by the Basle capital ratio 8%. For the operational risk, the required capital is calculated by multiplying the three-year average operating income before taxes and loan provisions, by 12%.

Operating income from lending operations is derived if from income from consumer and small business loans we subtract costs and loan loss impairments for these types of loans. Loan's income is calculated as the sum of net interest income (interest revenue less interest expense) as reported in branches P&L statements. Net interest income from loans is defined as the difference between interest earned on loans and cost of funding (market price), multiplied by the loans balance. Total costs are comprised of staff costs and non-staff costs. To allocate costs to lending operation, the portion of loan's income to total branch income is considered. Loan loss impairments are the sum of loss impairments for consumer (include and credit cards) and small business loans. Impairment loss is an amount which has been created against identified credit losses and is calculated on a monthly basis. The bank of our study creates a loan loss provision on a portfolio basis using as observable data the day's payments loans and credit cards are overdue (IAS 39). Regarding the cost of equity at the retail branch, it is approximated it with the overall cost of equity of the bank (Gross, 2006; Dermine, 2009). The bank's cost of equity capital is calculated looking at the shareholders expected rate of return that is estimated by using the Capital Asset Pricing Model (CAPM) framework.

The descriptive statistics of the estimated dependent and independent variables are presented in Table 1 for both the total period, the expansion period and the crisis period respectively. The average monthly value created for any Euro of capital invested by shareholders in the bank branch for the total period is Euro 0.013 (i.e.

the average RIOE decreased substantially from 0.031 in the expansion period to a negative value -0.009 in the crisis period). Looking at the mean values for credit risk and lending spreads for both loan portfolios, it is observed generally for the total period that the spread of consumer loans (0.079) was almost twice than the corresponding spread of small business loans (0.043). The spread of consumer loans presented a marginal decrease during the crisis period (i.e. from 0.080 to 0.078) while the spread of business loans increased during the crisis period (i.e. from 0.040 to 0.048) because of the repricing policy that the business unit of small business loans adopted. As regards the risk structure of the studied branch network, the risk of consumer loans (0.458) in the expansion period was higher than the risk of small business loans (0.0271). This is logical since consumer loans are unsecured and this is reflected to their higher rates. The coming of the crisis increased substantially both the credit risk of consumer and small business loans portfolio thus covering totally the monthly generated interest income. Finally, the model was checked for multicollinearity problems through estimating correlation coefficients between the independent variables (i.e. they found less than 15%)

**Table 1. Descriptive statistics of the dependent and independent variables (monthly average data for the total period, the expansion period and the crisis period)**

| **Entire period (January 2006 – December 2010)** | | | | | |
|---|---|---|---|---|---|
| | **RIOE** | **SPREAD CONC** | **RISK CONS** | **SPREAD SB** | **RISK SB** |
| **mean** | 0.013 | 0.079 | 1.111 | 0.043 | 0.926 |
| **max** | 0.130 | 0.126 | 12.682 | 0.105 | 26.061 |
| **min** | -0.130 | 0.027 | 0.000 | 0.005 | 0.000 |
| **std dev** | 0.032 | 0.010 | 1.589 | 0.009 | 1.980 |
| **Expansion period (January 2006 – August 2008)** | | | | | |
| | **RIOE** | **SPREAD CONC** | **RISK CONS** | **SPREAD SB** | **RISK SB** |
| **mean** | 0.031 | 0.080 | 0.458 | 0.040 | 0.271 |
| **max** | 0.072 | 0.126 | 1.608 | 0.105 | 3.562 |
| **min** | -0.048 | 0.027 | 0.000 | 0.005 | 0.000 |
| **std dev** | 0.013 | 0.007 | 0.251 | 0.007 | 0.327 |
| **Crisis period (September 2008 – December 2010)** | | | | | |
| | **RIOE** | **SPREAD CONC** | **RISK CONS** | **SPREAD SB** | **RISK SB** |
| **mean** | -0.009 | 0.078 | 1.856 | 0.048 | 1.674 |
| **max** | 0.130 | 0.107 | 12.682 | 0.074 | 26.061 |
| **min** | -0.130 | 0.041 | 0.006 | 0.026 | 0.003 |
| **std dev** | 0.033 | 0.013 | 2.074 | 0.008 | 2.690 |

**Notes:** RIOE: residual income on equity employed, as an indicator of shareholder value created for any euro of capital invested by shareholders in the bank; Risk CONS: Credit Risk on consumer loans; Risk SB: Credit Risk on small business loans; Spread CONS: Net interest spread on consumer loans; Spread SB: Net interest spread on small business loans

### 5.3 Econometric results

In Table 2 are presented the efficient coefficient estimates of the fixed-effects model (Panel A) and the redundant fixed effects tests (Panel B).

**Table 2. The association of RIOE with the independent drivers of Greek retail branches estimated with a fixed effects model and the results of the redundant fixed effects tests.**

| ***Panel A**: regression results* | | |
|---|---|---|
| **Variable** | **Coefficient** | **t-statistic** |
| Constant | -0.0170 | 2.010** |
| Spread on Consumer Loans (Scon) | 0.1445 | 2.879 *** |
| Credit risk on Consumer Loans (CRcon) | -0.0049 | -4.413*** |
| Spread on Small Business Loans (Ssbl) | 0.5258 | 4.202 *** |
| Credit risk on small business loans (CRsbl) | -0.0010 | 1.667* |
| d*Scon | 0.3548 | 2.973*** |
| d*CRcon | -0.0042 | -2.105** |
| d*Ssbl | -0.3439 | -2.170** |
| d*CRsbl | -0.0023 | -2.010 ** |
| $R^2$ | 0.7378 | |
| $\chi^2$ statistic (Hausman test) | 29.33 | |
| Probability (Hausman test) | 0.0000 | |

| ***Panel B** : redundant FEs tests* | | |
|---|---|---|
| **Effects test** | **Statistic** | **Probability** |
| Cross – section F | 7.632 | 0.000 |
| Cross – section $\chi^2$ | 198.041 | 0.000 |
| Period F | 18.526 | 0.000 |
| Period $\chi^2$ | 875.070 | 0.000 |
| Cross- section/period F | 15.288 | 0.000 |
| Cross-section/period $\chi^2$ | 998.013 | 0.000 |

***Notes**: Dependent variable: RIOE*
*Number of cross-sections used: 27*
*Number of time- periods: 60*
*Total panel (balanced observations): 1,620.*
*RIOE: residual income on equity employed, as an indicator of shareholder value created for any euro of capital invested by shareholders in the bank; CRcons: Credit Risk on consumer loans; CRsbl: Credit Risk on small business loans; Scons: Net interest spread on consumer loans; Ssbl: Net interest spread on small business loans; d :dummy variable, 1 for the crisis and 0 otherwise d*CRcon, d*CRsbl, d*Ssbl, ,d*Scon: the coefficients of these variables*

*measure the supplementary impact of each independent variable on the inefficiency score given the crisis occurred.*
*Statistical Significance Index: *** at 1%, **at 5%, * at 10%; The model is estimated on the basis of a two-way Fixed Effects specification and the estimates are corrected for serial correlation and time varying variances in the disturbances by using the White (period) robust coefficient variance method. The reported R-squared (estimated by e-views which is based on the difference between the residual sums of squares form the estimated model and the sums of squares from a single constant only specification, not from a fixed effects only specification) describes the explanatory power of the entire specification including the estimated fixed effects.*

Looking at the results, firstly the impact of spread on Consumer Loans on RI is analyzed. This specific earning factor related to the consumer loan portfolio creates value as shown by the positive and statistically significant coefficient (+ 0.1445) at the 1% level. The crisis causes an increase of the value of the coefficient by 0.354, bringing the total effect to + 0.4985 (0.1445 + 0.354).

Regarding the impact of credit risk of consumer loans on value creation is found that higher credit risk destroys value as shown by the negative and statistically significant coefficient (- 0.0049) at the 1% level. The crisis period destroys value more, increasing the value of that specific coefficient by – 0.0042 (statistically significant at the 5%), bringing the total effect to – 0.0091 ((-0.0049 + (- 0.0042)).

Moreover, an increase in spread of small business loans creates shareholder value as shown by the positive and statistically significant coefficient (+ 0.5258) at the 1% level. The crisis period decreases the effect of that factor by – 0.3439, bringing the total effect to + 0.1819 (0.5258-0.3439).

Finally, an increase in credit risk from granting small business loans destroys shareholder value as shown by the negative and statistically significant coefficient (- 0.0010) at the 10% level. The crisis period destroys value more, increasing the value of that specific coefficient by – 0.0023 (statistically significant at the 5%), bringing the total effect to – 0.0033 ((-0.0010 + (- 0.0023)). Table 3 summarizes the above relationships.

**Table 3. Summary of the results (impact on value determinants on RIOE, taking into account the financial crisis)**

| | Variable | Policy field | Total period | | Crisis period | | Incremental impact of each factor in the crisis period (2) | |
|---|---|---|---|---|---|---|---|---|
| | | | sign | St. sign. (1) | sign | St. sign. (1). | Non Statistical significant | Statistical significant |
| 1 | Consumer loans income/Consumer loans balance | Spread of Consumer loans (earnings) | + | *** | + | *** | | ↑*** |

| | Variable | Policy field | Total period | | Crisis period | | Incremental impact of each factor in the crisis period (2) | |
|---|---|---|---|---|---|---|---|---|
| | | | sign | St. sign. (1) | sign | St. sign. (1). | Non Statistical significant | Statistical significant |
| 2 | Consumer loan loss impairments/Consumer loans income | Credit risk (Quality) of Consumer loans | - | *** | - | * | | ↑* |
| 3 | Small business loans income/Small business loans balance | Spread of Small Business Loans (earnings) | + | *** | - | ** | | ↓*** |
| 4 | Small business loans impairments/Small business loans income | Credit risk (Quality) of Small business loans | - | *** | - | *** | | ↑*** |

**Notes:** (1) Statistical Significance Index: *** at 1%, **at 5%, * at 10%.

(2) Denotes the incremental impact (increase or decrease) of each factor on RIOE - given that the crisis occurs- along with its statistically significance.

## 6. Discussion and conclusions

The main research objective of the paper was to investigate what explains changes on performance of banks over time exploiting the advantages of a unique monthly data set. In particular, the paper analyzed for the first time to which extent is the quality and the spread on consumer and small business loans, responsible for the increases or decreases in branch performance ((measured by the reliable RI approach (Fiordelisi & Molyneux, 2010; Gross, 2006)), over time. Also, it is tested under liquidity shortage conditions, where it is expected the loans spread to be increased and the quality of loans to be decreased, to which extent the above drivers were responsible for the decrease or increase in RI. Due to the non-existence of higher quality secondary data, the non-published monthly P&L statements of 27 retail branches of one of the four systemic commercial banks in Greece were utilized. Generally, a research design in retail banking performance should be based on

internal data of bank branches of a specific banking institution and not be performed across competing banking institutions since the definition of the retail segment considerably varies across banks (Gross, 2006). Obviously, to conduct a comparative study is unrealistic because of the difficulty to get access to more than one bank. Nevertheless, this limitation does not necessarily prevent generalization of findings from a certain case study since strategic players within retail banking industry are basically similar thus their branches are very comparable. Thus, the data set is representative as the Greek banking industry is very oligopolistic and quite homogeneous operating in commercial banking, mainly retail banking.

The paper finds that the lending spread earned on consumer and small business loans and credit risk-taking on these loans, are all significantly associated with the RI, but with a different statistical sign. In particular, it is found that the value driver of spread of consumer and small business loans increased RI significantly, confirming the findings of Gross (2006), Fiordelisi and Molyneux (2010) and Dermine (2010). This finding reveals that the effect of higher interest income related to higher spreads for both the small business loan and consumer portfolio seems to over compensate the risk that high interest margins may lead to a decrease on credit quality. Also, the positive effect of the spread of small business loans on RI, was found to be higher than the spread of consumer loans. Regarding the external environmental change effects, the crisis increases even more the positive value effect of the spread of consumer's loans. However, lending spreads on small business loans lose their dynamic during the crisis period causing a statistical significant reduction in RI. This destructive value effect of lending spreads during the crisis indicates that the adoption of a repricing policy to the small business loans portfolio (i.e. as it explained analytically in the theoretical framework section above) seems to not be the appropriate due to the side effects that repricing loan policy activates. In particular, the credit policy to increase contractual loan rates of credit lines seems to reduce the repayment ability of small business loan borrowers thus exacerbating even more the accumulation of loan loss impairments, given and the unfavorable external environment under which loan delays -by definition- increase substantially.

Regarding the impact of credit risk taking on value creation, it is observed that higher credit risk destroys value for both loan portfolios. This result stands in line with the results of Fiordelisi and Molyneux (2010) and Gross (2006). Moreover, (in the crisis period) the enormous increase of loan loss impairments relative to the income of loans (credit risk) exercises an extra negative impact on RI thus further accelerating shareholder value destruction, for both loan portfolios. Combining the empirical results for both value drivers as regards the consumer loan portfolio, the paper concludes that the crisis increases the positive value effect of the spread factor while increases even more the negative value effect of credit risk due to the unstable economic environment. On the contrary, for the small business loan portfolio, the crisis decreases the generally positive value effect of the spread factor while increases even more the negative value effect of credit risk. On average, the negative

value effect of credit risk for small business loans was higher than consumer loans, (almost doubled), relative to their pre-crisis value effects levels. These differences in the empirical results can be explained by the different strategic policies that two bank business units (i.e. consumer loans business unit and small business loans business unit) followed during crisis in their attempt to minimize the negative consequences of the unfavorable environment. The business unit of consumer loans followed a strategic policy of restructuring immediately its portfolio through securing loans with collateral (reducing in some cases the loan rates), while the small business banking segment followed a different policy through proceeding to an upward repricing of small business loans with low rates, reflecting in this way the higher banks cost funding. Therefore, it is demonstrated that the policy of restructuring directly the loan portfolio held back the expected increase in loan loss provisions for consumer loans (due to loan delays), while at the same time the repricing policy on small business loans resulted in multiple shareholder value destruction through the negative effect of credit risk and lending spread.

The study findings have important strategic implications: Firstly, in the crisis period, it appears that the strategic priority for the bank management should be the reorganization of loan portfolios given the negative value impact of credit risk. This finding stresses the importance of setting rules to manage credit risk, hence supporting the post-crisis initiatives taken by policymakers in the EU (European Banking Authority -EBA-, 2014) for the effective management of NPL and arrears, attempting to achieve a single evaluation approach of credit portfolios by European banks. Secondly, the destructive value effect of lending spreads during the crisis indicates that the adoption of a repricing policy to the small business loan's portfolio is not appropriate and seems to reduce the repayment ability of borrowers. Overall, the empirical findings can have important implications for the assessment of the quality of bank performance and the change of its dynamic in the turbulent crisis environment, for both the bank managers and the policymakers. Given the similarities of the Greek Economy with other bank-driven European economies, the empirical results offer useful lessons to other EU peripheral crisis economies such as Italy, Spain, and Portugal with contiguous banking operations (e.g. pure retail banking) revealing the important role of crisis in the total value creation process. Future research in branch networks of these countries would be of interest in order to check for any possible similarities and differences in the factors that influence shareholder value.

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[i] This adverse environment negatively affected the performance of the Greek banking system. The number of non-performing loans increased gradually from 2008 onwards. In particular, the overall NPL ratio of Greek banks rose to 7.7% in 2009, from 5.0% in 2008 and more than doubled in 2010 from its 2008 levels (Bank of Greece, 2010).