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Abstract

Following a common wisdom in banking, revenue diversification is likely to produce a "portfolio-effect" in bank income statement, enhancing the creation of greater and more stable profits. We test this hypothesis on a sample of 110 large commercial, saving and cooperative banks headquartered in 8 EMU countries for the period 2005-2013. Results indicate that diversification strategies have had a role in determining banks profitability only for selected subsamples (and in particular for commercial and saving banks); on the contrary, efficiency and credit portfolio quality have been the main drivers of profits in the period under examination. We contribute to previous literature using a cross-country balanced dataset that covers both the pre-crisis and the following economically troubled periods. Topics underlying this work – and empirical results – have relevant policy implications from a managerial and regulatory point of view.

Keywords: *Bank performance*

Revenue Diversification

JEL Codes: *G21*

L25

1. *Introduction and brief literature review*

The recent financial crisis led to a severe reduction in bank profitability, after a long extended period of prosperity. This effect was caused mainly by a decrease in the quality of credit portfolio and lower level of interest rates, in a context of steady operational costs. The concurrence of these elements created great concerns in the European Monetary Union (EMU), where the traditional business of borrowing and lending is still the core activity of commercial banks. In this context, other sources of revenue could have played a smoothing effect on bank profitability, counterbalancing the worsening of credit portfolio quality.

This expected "portfolio-effect" due to revenue diversification has been a common wisdom in banking management. Goddard et al. (2007), concerning the developments observed in the European banking system since the mid-eighties, underline that banks' answers to the changing competitive environment have usually included several key strategies: diversification, product differentiation and consolidation. However, the empirical literature has found mixed results about the effect of revenue diversification on banks' risks and profitability.

Adverse relationship between diversification and risk is found in Boyd and Graham (1986), Demsetz and Strahan (1997), De Young and Roland (2001) and Lepetit et al. (2008). Numerous papers (De Young and Rice 2004a, Stiroh 2004, Acharya et al. 2006, Hayden et

al. 2007, Mercieca et al. 2007, Berger et al. 2010a, Berger et al. 2010b) find that diversification fails to produce a greater performance. On the contrary, reduced insolvency risk and improved profitability are found to be the outcome of diversification strategies by Al-Obaidan (2010) and Sanya and Wolfe (2011). Similar results are found by Nguyen et al. (2012) and Mergaerts and Vander Vennet (2016). Other empirical works find an ambiguous effect of revenue diversification on banking profits and risks. De Young and Rice (2004b), analysing U.S. banks during the period 1986-2003, state that diversification gains from fee-based activities appear to be scarce; fee-income contributes to boosting bank earnings but also increases earnings volatility. Baele et al. (2007), analysing a panel data of banks over the period 1989-2004, find that a higher share of non-interest income positively affects bank' franchise values, but increases their systematic risk. Busch and Kick (2009) show that risk-adjusted returns on equity and total assets are positively associated with higher fee-income activities, using a panel of German banks during the period 1995-2007; however, a strong engagement in fee-generating activities goes along with higher risk. On the same line Calmes and Liu (2009) find that non-interest income has driven the variance of Canadian banks' aggregate operating income growth: the authors conclude that, by contributing to banking income volatility, market-oriented activities do not necessarily yield diversification benefits to banks.

Some papers underline that the effect of revenue diversification on banks' profits and risks may be influenced by the size of the bank. Chiorazzo et al. (2008), analysing Italian banks during the period 1993-2003, find that income diversification increases risk-adjusted returns. This relation is stronger at large banks; moreover the authors underline that there are limits to diversification gains as banks get larger. Studying U.S. credit unions for the period 1993-2004, Goddard et al. (2008) find that similar diversification strategies are not appropriate for large and small credit unions.

These ambiguous results in literature references suggest that revenue diversification seems to have a "dark side" and that its smoothing effect on profits and risk is not guaranteed. Stiroh and Rumble (2006) elegantly introduce this point arguing that the volatile pattern of non-interest income can offset the benefits linked to a "diversified-portfolio effect". In brief, the (adverse) variance effect may counterbalance the (positive) correlation effect. Under this assumption, the net influence of revenue diversification on bank performances is ambiguous and needs to be empirically determined.

To this extent, our work explores the relationship between the degree of revenue diversification and the risk-return profile of a sample of commercial, saving and cooperative banks headquartered in 8 EMU countries for the period 2005-2013. In particular, we aim to test the attitude of revenue diversification in enhancing bank profits level and reducing their volatility. We contribute to previous literature using a

cross-country balanced dataset that covers both the pre-crisis and the following economically troubled periods. The presence of a common regulatory framework in EMU limits the heterogeneity that is typical of this kind of approach. The wide time-span under investigation allows us to explore the relationship between revenue diversification and bank profitability over the whole recession and under specific macroeconomic conditions (huge falls in GDP, very low-interest rates and inflation, etc.). Topics underlying this work have relevant policy implications from a managerial and regulatory point of view. In effect, revenue diversification largely depends on the bank business model, which is also one of the five high-level priorities of the Single Supervisory Mechanism.

2. *Hypotheses and data*

We use a cross-country dataset that includes firm specific (source Bvd Bankscope database) and macroeconomic information (sources Eurostat and BIS) for the period 2005-2013 (see Table 1) to explore the relationship between income diversification and the risk-return profile of banks activity.

Table 1 - *Variables definition and sources*

Variable Name	Variable Description	Source
ROAE	Return on Average Equity	Bankscope
ROAA	Return on Average Assets	Bankscope
σROAE	Return on Average Equity volatility	Bankscope
σROAE	Return on Average Assets volatility	Bankscope
RAROAE	Risk Adjusted Return on Average Equity (ROAE/σROAE)	Bankscope
RAROAA	Risk Adjusted Return on Average Assets (ROAA/σROAA)	Bankscope
NON_{SH}	Non-interest revenues on Operating Income	Bankscope
HHI	1 - Herfindahl-Hirschman index (built on NON_{SH})	Bankscope
ASSETS	Natural logarithm of total assets	Bankscope
KA	Equity to total assets	Bankscope
$LOAN_{SH}$	Loans to total assets	Bankscope
DEP_{SH}	Customer Deposits to total funding (excluding derivatives)	Bankscope
COSTINCOME	Cost income ratio	Bankscope
LLP	Loan loss provisions to loans	Bankscope
GDP	GDP at market prices. Annual rate of change	Eurostat
HICP	All-items HICP. Annual average rate of change	Eurostat

Our balanced panel comprises 110 commercial, saving and cooperative banks from 8 Euro area countries[1]; this latter choice allows us to limit the drawbacks usually linked to cross country

[1] Austria, Finland, France, Germany, Italy, Netherlands, Portugal, Spain. We initially included all the first entrant countries in EMU; however, the lack of selected information in bank balance sheet and income statement has reduced the number of nations in our dataset.

analysis, given the homogeneous regulatory framework that characterizes this area. We consider only banks with a total asset greater than 10 bln Euros in 2013 and with a complete set of balance sheet and income statement information along the whole selected sample period.

The time span under investigation includes several years of harsh economic and financial crisis; we explore the effect of this deep recession on the link between income diversification and bank profitability adopting different approaches in computing the values assumed by our variables.

More specifically, the analysis is conducted through two different set-ups. Following Stiroh and Rumble (2006) we start calculating the mean value of each variable over the whole period covered by our dataset, running a cross-section regression on the resulting data. Then, we employ a fixed effect regression on the raw annual data to explore the time dimension of our panel; in this case, since infra-annual data are not available to calculate volatility measures, we can only explore the level of ROAE and ROAA as dependent variables.

Equation 1 reports the baseline econometric model used to estimate the effects of revenue diversification on banks' economic results.

$$\Pi_i = c + \sum_{b=1}^{B} \beta_j X_i^b + \sum_{m=1}^{M} \beta_m X_i^m + \sum_{d=1}^{D} \beta_d X_i^d + \varepsilon_i \qquad (1)$$

where X_i^b is a vector of bank-specific information, X_i^m a vector of macroeconomic indicators, X_i^d identifies a set of bank type and time dummies, *c* is the constant term and ε_i is the error term.

Since we are interested both in the level and volatility of bank profitability measures, we use six different dependent variables (Π_i), defined as follows:

ROAE	Return on average equity
ROAA	Return on average assets
σROAE	Standard deviation of Return on average equity
σROAA	Standard deviation of Return on average assets
RAROAE	Risk adjusted Return on average equity (Roae/σRoae)
RAROAA	Risk adjusted Return on average assets (Roaa/σRoaa)

These measure of bank profitability are widely used in literature. Typically ROAE is more volatile then ROAA; moreover, the former measure is more influenced by the bank leverage. For these reasons, the two variables are used to crosscheck – under different points of view – the effect of selected items on bank profitability. As previously reported, a common wisdom among banking practitioners ascribes an expected virtuous portfolio-effect to income diversification; in this sense, it is relevant to observe not only the

level of bank profitability but also its standard deviation over time. This has led to the widespread use of measures of revenue volatility and risk adjusted return as dependent variables (Stiroh and Rumble, 2006; Mercieca et al. 2007; Goddard et al., 2008).

According to these same latter references, we calculate two key explanatory variables to account for the level of income diversification: NON_{SH} and HHI. NON_{SH} measures the share of net operating income represented by non-interest revenues; to prevent potential outliers, we drop banks that show value of this variable outside the 0-1 range. Low levels of NON_{SH} suggest the prevalence of a "traditional activity" carried out by the bank, through borrowing and lending money; this is the typical shape of the commercial banking business. In this sense, a greater share of non-interest income signals an income diversification strategy; however, over a certain threshold, this source of revenue tends to prevail (as occurs, for example, in corporate banking).

The second measure of income diversification, HHI, accounts for this issue. This variable is built on the Herfindahl-Hirschman Index approach and measures the level of revenue diversification in the composition of net operating income: it is calculated as shown by equation 2:

$$HHI = 1 - [\ (NONSH)^2 + (1-NONSH)^2\ ] \qquad (2)$$

By construction, the variable assumes values between 0 and 0.5; the minimum value is associated to banks that exhibit a single source of operating revenues (i.e. a maximum level of income concentration). The maximum value of the variable is reached when there is an equal contribution of interest and non-interest revenues in total operating income (i.e. a maximum level of income diversification).

Besides these two measures, our set of independent variables includes several information from banks' balance sheet and income statement. Firstly, we account for bank dimension using the natural logarithm of Total Assets (ASSETS): since the recent crisis period has severely affected banks economic results, we want to explore through this variable the existence of a "size effect" on bank profitability. To control for different levels of leverage, we include the ratio between Equity and Total Assets (KA): typically, higher levels of this variable are associated with lower ROAE, but signal a greater resilience capacity of the bank in troubled periods. Our work focuses on the traditional "commercial banking model", based on gathering and borrowing money; we observe the orientation towards this model through two measures (the ratio between Loans and Total Assets and the share of Customer Deposits to Total Funding – respectively $LOAN_{SH}$ and DEP_{SH}).

With regard to income statement items, we include two variables that account for banks efficiency and credit portfolio quality (namely Cost Income ratio – COSTINCOME – and Loan Loss Provisions to

Loans – LLP). The long-lasting period of crisis, widespread over different countries and economic sectors, has boosted the deterioration of credit portfolios: this has led to a severe reduction in bank profitability. In effect, loan loss provisions are likely to be one of the most important factors affecting the risk-return figures shown by European banks during the last years. Given this pressure on bank profitability, efficiency has renewed its importance in bankers and regulators concerns.

We account for the surrounding environment through two macroeconomic variables (this excludes country dummy variables in our econometric estimations). The advent of the crisis has led to remarkable effects on GDP dynamics and inflation levels; in particular, during the period under observation, both these variables has recurrently experimented negative values. We then include for each county the annual rate of change of GDP at market prices and the annual average rate of change of HICP as explanatory variables. Inflation plays a relevant role in influencing the level and dynamics of interest rates, but shows different cross-country patterns; this makes this variable preferable than other ones, like the Euribor or the key interest rates set by the ECB.

Finally, we introduce two dummies (COOP for cooperatives and SAV for saving banks) that control for specific bank type features and one dummy for the crisis period (years 2009-2013)[2].

Tables 2-5 summarize the descriptive statistics of the variables included in our dataset; these figures (including minimum and maximum values) vary in the tables because of the different time span used to evaluate means and standard deviations.

Table 2 - *Descriptive statistics (whole period, mean values)*

Variable	Observations	Mean	Std. Dev.	Min	Max
ROAE	110	5.886	6.703	-19.341	39.777
ROAA	110	0.418	0.345	-0.677	1.560
σROAE	110	5.455	6.827	0.237	40.677
σROAA	110	0.310	0.331	0.016	2.219
RAROAE	110	2.710	2.586	-0.535	13.666
RAROAA	110	3.021	3.250	-0.513	17.923
NON_{SH}	110	37.239	8.832	14.471	64.830
HHI	110	0.444	0.052	0.245	0.497
ASSETS	110	16.929	1.157	14.837	21.217
KA	110	7.371	2.690	1.992	14.436
$LOAN_{SH}$	110	61.967	17.835	12.475	86.696
DEP_{SH}	110	57.090	19.509	11.393	94.635
COSTINCOME	110	62.839	10.595	32.493	90.672
LLP	110	0.505	0.364	-0.311	1.778

[2] We also tested a different set-up with a dummy accounting for the period 2008-2013; main results are unchanged, but the statistical significance of the coefficient associated to this dummy (and the overall quality of regressions, including R-squared) is lower.

GDP	110	0.293	0.720	-0.970	1.380
HICP	110	1.975	0.261	1.820	2.790
COOP	110	0.373	0.486	0.000	1.000
SAV	110	0.282	0.452	0.000	1.000

Table 3 - *Descriptive statistics (pre-crisis period, mean values)*

Variable	Observations	Mean	Std. Dev.	Min	Max
ROAE	110	9.015	7.504	-8.413	52.495
ROAA	110	0.605	0.392	-0.298	2.355
σROAE	110	3.430	4.186	0.196	23.932
σROAA	110	0.184	0.145	0.013	0.689
RAROAE	110	5.912	5.802	-0.442	29.511
RAROAA	110	5.763	5.630	-0.450	25.232
NON_{SH}	110	36.798	9.434	11.155	67.428
HHI	110	0.440	0.057	0.198	0.499
ASSETS	110	16.770	1.184	13.941	21.252
KA	110	7.115	2.951	1.473	14.228
$LOAN_{SH}$	110	61.380	19.146	12.231	87.332
DEP_{SH}	110	55.340	20.459	8.253	91.885
COSTINCOME	110	62.720	11.209	32.535	81.955
LLP	110	0.436	0.361	-0.125	2.383
GDP	110	1.270	0.755	0.250	2.775
HICP	110	2.086	0.403	0.950	3.225
COOP	110	0.373	0.486	0.000	1.000
SAV	110	0.282	0.452	0.000	1.000

Table 4 - *Descriptive statistics (crisis period, mean values)*

Variable	Observations	Mean	Std. Dev.	Min	Max
ROAE	110	3.767	7.991	-38.570	33.140
ROAA	110	0.292	0.405	-1.383	1.092
σROAE	110	4.453	7.393	0.125	43.173
σROAA	110	0.253	0.382	0.000	2.695
RAROAE	110	4.157	4.712	-0.893	29.230
RAROAA	110	5.712	8.786	-0.967	60.020
NON_{SH}	110	37.545	9.392	15.156	64.504
HHI	110	0.446	0.056	0.255	0.499
ASSETS	110	17.035	1.151	15.433	21.286
KA	110	7.546	2.673	2.338	14.682
$LOAN_{SH}$	110	62.360	17.728	12.638	90.598
DEP_{SH}	110	58.251	19.653	11.200	96.468
COSTINCOME	110	62.916	11.314	32.465	96.660
LLP	110	0.554	0.553	-0.848	2.553
GDP	110	-0.358	0.813	-1.783	0.683
HICP	110	1.901	0.256	1.667	2.650
COOP	110	0.373	0.486	0.000	1.000
SAV	110	0.282	0.452	0.000	1.000

Table 5 - *Descriptive statistics (annual data)*

Variable	Observations	Mean	Std. Dev.	Min	Max
ROAE	990	6.218	9.959	-84.760	83.590
ROAA	990	0.434	0.536	-5.880	3.120
NON_{SH}	990	37.189	11.048	2.141	84.178
HHI	990	0.443	0.068	0.042	0.500
ASSETS	990	16.917	1.182	13.686	21.533
KA	990	7.330	2.911	0.932	16.830
$LOAN_{SH}$	990	62.007	18.816	8.293	93.155
DEP_{SH}	990	56.528	20.439	5.270	100.000
COSTINCOME	990	62.779	13.555	26.960	145.120
LLP	990	0.499	0.641	-5.741	4.611
GDP	990	0.312	2.325	-8.700	6.600
HICP	990	2.055	0.886	-0.900	4.100
COOP	990	0.373	0.484	0.000	1.000
SAV	990	0.282	0.450	0.000	1.000

3. *Econometric estimations*

Table 6 shows the empirical results for the cross-section regression over the whole period under investigation. The first evidence that emerges is the weak significance of the coefficients associated to income diversification; only the share of net operating income represented by non-interest revenues shows positive effects on the level of ROAE and ROAA. Other variables show a greater statistical significance over economic results; for example, the level of capitalization (KA) has a negative and significant impact on ROAE

and a positive one on ROAA. This mixed result is explained by the different nature of the two measures of profitability; being the equity the denominator of ROAE, higher levels of capitalization tends to reduce (coeteris paribus) ROAE. The coefficients associated to the traditional features of commercial banking model ($LOAN_{SH}$ and DEP_{SH}) are positive, while not always significant. During the period under examination, a greater ability to gather money from retail customer (and consequently a lower debt exposures on the interbank market) may have reduced funding costs for banks, enhancing profitability; this has been probably due to a weaker perception of the risk-return profile of deposits on behalf of retail customers. Unsurprisingly, the cost-income ratio and the level of loan loss provisions have a significant and negative effect on bank profitability: high efficiency and good credit portfolio quality confirm to be key drivers of success in banking. These latter elements have a high importance also in determining bank revenue volatility. The size of the bank shows a positive (and feebly significant) effect on σROAE and σROAA, while $LOAN_{SH}$ and DEP_{SH} lose their econometric relevance. Interestingly, macroeconomic indicators seem to affect more the volatility than the level of bank profitability. The negative coefficient associated to inflation indicates that the variability of banks profits has been higher in countries that have experimented lower levels of HICP; it must be noted that during the period under examination inflation has

sometimes reached negative values, leading some countries in a painful deflation.

In a medium-term perspective, the risk-adjusted return should be the most important item to be considered in assessing banks health profile. The outcomes of our regressions show that three main drivers explain RAROAE and RAROAA figures: good efficiency, sound portfolio quality and economic growth.

The coefficients associated to the dummies that capture the specific bank-type features (and in particular the one that identifies cooperative banks) show a peculiar pattern across the regressions. Cooperative banks have lower profitability levels but, at the same time, lower volatility of economic results during the period under investigation; the combined effect of these two elements is a better risk-adjusted return that, with regard to RAROAE, is also strongly significant. In order to further explore the impact of bank type over the topic of interest, the sample has been split in two subsamples (Cooperative vs. non-cooperative banks): results are reported in Tables 6a and 6b.

With regard to the effects of revenue diversification on banks profitability, these two sets of regressions show a different pattern of coefficients. Cooperative banks seem to enjoy a more diversified portfolio of activities; a higher degree of diversification increases ROAE and ROAA and reduces profit volatility. Non-cooperative banks, on the contrary, show a positive coefficient for NON_{SH} and a

negative one for HHI; this indicates that an increase in alternative sources of revenue is beneficial, but also that it is fundamental the existence of a core-business activity. The sign and statistical significance of the other coefficients are mainly unchanged.

Since we aim to identify the effects of revenue diversification on bank profitability, the use of mean values during the whole period 2005-2013 may prevent us to appreciate the distinctive features of bank-specific and macroeconomic information before and during the recent crisis. For this reason, we split the time span under investigation into two sub-periods: pre-crisis period (2005-2008) and crisis period (2009-2013). Table 7 reports the results of the regressions.

Overall, previous findings are confirmed; it emerges more clearly the different impact of selected variables on bank profitability across time. In particular, during the crisis, it becomes crucial the role played by the quality of the bank credit portfolio; results confirm that this variable was not previously an element of particular concern and, hence, that its relevance in explaining bank profits pattern was widely lower. At the same time, during the crisis, a higher level of efficiency has reduced the volatility of economic results for the banks; a wise cost management helps to maintain a stable level of profitability also during a troubled period.

With regard to macroeconomic conditions, the coefficients associated with GDP growth change sign before and during the crisis

in ROAE and ROAA regressions. These outcomes suggest that, before 2009, banks profitability was experimenting a counter-cyclical pattern; however, the advent of a severe financial and economic shock has seriously wounded the soundness of banks income statements, increasing the correlation between profitability and surrounding economic environment.

In order to explore the time dimension of our panel of data, we run a fixed effect panel regression on the yearly-collected observations[3] (Equation 3).

$$\Pi_{it} = c + \sum_{b=1}^{B} \beta_j X_{it}^{b} + \sum_{m=1}^{M} \beta_m X_{it}^{m} + \sum_{d=1}^{D} \beta_d X_{it}^{d} + \varepsilon_{it} \qquad (3)$$

where X_{it}^{b}, X_{it}^{m}, X_{it}^{d} , c and $\boldsymbol{\varepsilon_i}$ assumes the same meanings previously described.

Regarding the model specification, the advent of the crisis has produced a more scattered pattern of financial results in the banking system, reducing the serial recurrence of bank profits over time; this makes less appropriate the adoption of dynamic models recently employed by literature (Goddard et al. 2011).

[3] Hausman tests support the appropriateness of the fixed effect model against the random effect specification.

Using annual data, we can't estimate standard deviation and RAR figures[4]; hence, the analysis is limited to ROAE and ROAA. Given the observed differences between cooperative and non-cooperative banks, we have tested our model on the whole sample and on two subsamples according with the bank type (Table 8).

Results confirm that efficiency and quality of loans are the main determinants of bank profitability during the period under examination; the crisis has naturally contributed to cut the level of ROAE and ROAA. With regard to the variables of main interest in our work (NON_{SH} and HHI), we observe a pattern of results that is really different from the content of Table 6. The level of non-interest income shows a weak statistical significance and a changing sign in the regressions focused on cooperative and non-cooperative banks, while HHI fails to obtain a sufficient p-value.

Bearing in mind that Table 6 and Table 8 show respectively a static/average and a dynamic view of the link between income diversification and economic results of the banks included in our sample, we can coordinate the results as follows.

In a long-term perspective, a greater average level of non-interest income can improve bank profitability; however, the expansion of this source of revenue – in particular during crisis period – may produce adverse effects. This results corroborate the idea that

[4] In a separate attempt, we tried to overcome this problem using a moving-average approach; in particular, each observation x_t was equal to the average of the observation in year t-1, t and t+1 (the same occurs with regard to standard deviation computation). Estimation results are available on request.

diversification should be a strategy, and not a mere tactic, in bank management.

Table 6 - *Regression results (whole period)*

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**ROAE**	**ROAA**	**σROAE**	**σROAA**	**RAROAE**	**RAROAA**
NON_{SH}	0.23*	0.01*	-0.07	-0.00	0.02	0.06
	(0.125)	*(0.005)*	*(0.122)*	*(0.006)*	*(0.050)*	*(0.063)*
HHI	-8.23	-0.11	2.52	-0.28	5.52	4.87
	(20.226)	*(0.879)*	*(19.652)*	*(0.912)*	*(8.077)*	*(10.233)*
ASSETS	-0.21	-0.00	0.76	0.04	-0.36*	-0.40
	(0.532)	*(0.023)*	*(0.517)*	*(0.024)*	*(0.213)*	*(0.269)*
KA	-0.81***	0.03**	-0.07	0.03***	0.00	0.23*
	(0.266)	*(0.012)*	*(0.258)*	*(0.012)*	*(0.106)*	*(0.135)*
$LOAN_{SH}$	0.07*	0.00	0.04	0.00	-0.00	0.01
	(0.036)	*(0.002)*	*(0.035)*	*(0.002)*	*(0.014)*	*(0.018)*
DEP_{SH}	0.09***	0.00**	-0.00	0.00	-0.01	0.00
	(0.032)	*(0.001)*	*(0.031)*	*(0.001)*	*(0.013)*	*(0.016)*
COSTINCOME	-0.44***	-0.02***	0.13**	0.01**	-0.06**	-0.08***
	(0.058)	*(0.003)*	*(0.056)*	*(0.003)*	*(0.023)*	*(0.029)*
LLP	-5.38***	-0.24***	8.04***	0.41***	-2.78***	-2.03**
	(1.766)	*(0.077)*	*(1.716)*	*(0.080)*	*(0.705)*	*(0.894)*
GDP	0.15	0.03	-1.05	-0.12**	0.87**	1.41***
	(0.988)	*(0.043)*	*(0.960)*	*(0.045)*	*(0.395)*	*(0.500)*
HICP	-4.85*	-0.20*	-4.53*	-0.15	2.31**	0.05
	(2.785)	*(0.121)*	*(2.706)*	*(0.126)*	*(1.112)*	*(1.409)*
COOP	-3.12**	-0.13*	-6.14***	-0.29***	1.67***	0.79
	(1.563)	*(0.068)*	*(1.519)*	*(0.070)*	*(0.624)*	*(0.791)*
SAV	-2.74	-0.12	-5.34***	-0.20**	0.35	0.13
	(1.733)	*(0.075)*	*(1.684)*	*(0.078)*	*(0.692)*	*(0.877)*
Constant	42.82***	1.66***	-6.78	-0.46	6.31	8.04
	(14.039)	*(0.610)*	*(13.641)*	*(0.633)*	*(5.607)*	*(7.103)*
Observations	**110**	**110**	**110**	**110**	**110**	**110**
R-squared	**0.51**	**0.65**	**0.55**	**0.59**	**0.47**	**0.46**
Adj. R-squared	**0.40**	**0.40**	**0.40**	**0.40**	**0.40**	**0.40**

Level of statistical significance: *** p<0.01, ** p<0.05, * p<0.10. Standard errors in italics.

Table 6a - *Regression results (whole period): cooperative banks*

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**ROAE**	**ROAA**	**σROAE**	**σROAA**	**RAROAE**	**RAROAA**
NON_{SH}	-0.00	-0.00	0.05	0.00	-0.03	0.05
	(0.054)	*(0.005)*	*(0.052)*	*(0.004)*	*(0.086)*	*(0.138)*
HHI	23.47**	2.31**	-18.25**	-0.97	25.11*	17.08
	(9.075)	*(0.860)*	*(8.893)*	*(0.650)*	*(14.596)*	*(23.396)*
ASSETS	-0.64**	-0.05	1.28***	0.08***	-1.21**	-1.03
	(0.311)	*(0.029)*	*(0.305)*	*(0.022)*	*(0.500)*	*(0.802)*
KA	-0.53***	0.01	0.11	0.03**	-0.41*	-0.29
	(0.149)	*(0.014)*	*(0.146)*	*(0.011)*	*(0.240)*	*(0.384)*
$LOAN_{SH}$	-0.03	-0.00	0.09***	0.00***	-0.00	0.04
	(0.023)	*(0.002)*	*(0.022)*	*(0.002)*	*(0.036)*	*(0.058)*
DEP_{SH}	0.01	0.00	-0.01	-0.00	-0.02	-0.03
	(0.015)	*(0.001)*	*(0.015)*	*(0.001)*	*(0.024)*	*(0.039)*
COSTINCOME	-0.15***	-0.01***	0.04	0.00	0.05	0.04
	(0.044)	*(0.004)*	*(0.044)*	*(0.003)*	*(0.072)*	*(0.115)*
LLP	-7.77***	-0.52***	7.84***	0.36***	-5.50**	-4.68
	(1.413)	*(0.134)*	*(1.385)*	*(0.101)*	*(2.273)*	*(3.644)*
GDP	-0.65	-0.03	0.01	0.01	0.16	0.45
	(0.745)	*(0.071)*	*(0.731)*	*(0.053)*	*(1.199)*	*(1.922)*
HICP	3.54	0.23	-0.91	0.45*	0.38	-0.87
	(3.592)	*(0.340)*	*(3.520)*	*(0.257)*	*(5.777)*	*(9.260)*
Constant	17.81	0.82	-23.38**	-2.65***	17.68	14.33
	(10.903)	*(1.033)*	*(10.685)*	*(0.780)*	*(17.537)*	*(28.110)*
Observations	**41**	**41**	**41**	**41**	**41**	**41**
R-squared	**0.77**	**0.82**	**0.80**	**0.78**	**0.54**	**0.42**
Adj. R-squared	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**

Level of statistical significance: *** p<0.01, ** p<0.05, * p<0.10. Standard errors in italics.

Table 6b - *Regression results (whole period): non-cooperative banks*

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**ROAE**	**ROAA**	**σROAE**	**σROAA**	**RAROAE**	**RAROAA**
NON_{SH}	0.70***	0.03***	0.01	0.00	-0.05	0.02
	(0.198)	*(0.008)*	*(0.219)*	*(0.010)*	*(0.056)*	*(0.059)*
HHI	-97.42**	-4.40***	-23.81	-0.37	-0.10	1.33
	(37.474)	*(1.577)*	*(41.478)*	*(1.891)*	*(10.630)*	*(11.152)*
ASSETS	0.61	0.03	1.11	0.05	-0.29	-0.27
	(0.703)	*(0.030)*	*(0.778)*	*(0.035)*	*(0.199)*	*(0.209)*
KA	-0.98*	0.01	-0.86	0.04	-0.21	0.13
	(0.509)	*(0.021)*	*(0.563)*	*(0.026)*	*(0.144)*	*(0.151)*
$LOAN_{SH}$	0.18***	0.01**	0.02	0.00	-0.03*	-0.00
	(0.052)	*(0.002)*	*(0.058)*	*(0.003)*	*(0.015)*	*(0.015)*
DEP_{SH}	0.16***	0.01**	0.02	-0.00	-0.02	0.01
	(0.058)	*(0.002)*	*(0.065)*	*(0.003)*	*(0.017)*	*(0.017)*
COSTINCOME	-0.53***	-0.03***	0.13	0.01	-0.07***	-0.09***
	(0.072)	*(0.003)*	*(0.080)*	*(0.004)*	*(0.020)*	*(0.021)*
LLP	-7.09***	-0.26***	10.61***	0.50***	-2.49***	-1.56**
	(2.290)	*(0.096)*	*(2.534)*	*(0.116)*	*(0.650)*	*(0.681)*
GDP	-1.12	-0.07	-3.63*	-0.14	0.15	0.93*
	(1.679)	*(0.071)*	*(1.858)*	*(0.085)*	*(0.476)*	*(0.500)*
HICP	-8.56**	-0.39**	-4.43	-0.11	1.61	-0.62
	(3.496)	*(0.147)*	*(3.869)*	*(0.176)*	*(0.992)*	*(1.040)*
Constant	54.97**	2.72***	-2.98	-0.99	14.93**	11.87*
	(21.648)	*(0.911)*	*(23.961)*	*(1.092)*	*(6.141)*	*(6.442)*
Observations	**69**	**69**	**69**	**69**	**69**	**69**
R-squared	**0.60**	**0.64**	**0.46**	**0.52**	**0.48**	**0.48**
Adj. R-squared	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**

Level of statistical significance: *** p<0.01, ** p<0.05, * p<0.10. Standard errors in italics.

Table 7 - *Regression results (Pre-Crisis vs Crisis)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ROAE		**ROAA**		**σROAE**		**σROAA**		**RAROAE**		**RAROAA**	
VARIABLES	***Pre-crisis***	***Crisis***	***Pre-crisis***	***Crisis***	***Pre-crisis***	***Crisis***	***Pre-crisis***	***Crisis***	***Pre-crisis***	***Crisis***	***Pre-crisis***	***Crisis***
NON_{SH}	0.22*	0.23*	0.01**	0.01	0.04	-0.11	-0.00	-0.00	0.07	0.11	0.05	0.20
	(0.121)	*(0.133)*	*(0.005)*	*(0.006)*	*(0.072)*	*(0.131)*	*(0.003)*	*(0.007)*	*(0.108)*	*(0.093)*	*(0.106)*	*(0.185)*
HHI	-11.87	-1.38	-0.35	0.41	-5.08	7.72	0.05	0.06	4.69	-4.56	2.28	-26.75
	(18.605)	*(21.324)*	*(0.789)*	*(0.927)*	*(11.082)*	*(20.923)*	*(0.422)*	*(1.097)*	*(16.576)*	*(14.959)*	*(16.185)*	*(29.627)*
ASSETS	-0.12	0.06	0.00	0.02	0.68*	-0.15	0.03**	-0.01	-0.97*	-0.45	-0.67	-0.46
	(0.588)	*(0.615)*	*(0.025)*	*(0.027)*	*(0.350)*	*(0.604)*	*(0.013)*	*(0.032)*	*(0.524)*	*(0.432)*	*(0.511)*	*(0.855)*
KA	-1.23***	-0.63**	0.03**	0.02*	-0.41**	-0.19	0.01	0.02	0.12	0.28	0.29	0.82**
	(0.278)	*(0.284)*	*(0.012)*	*(0.012)*	*(0.166)*	*(0.279)*	*(0.006)*	*(0.015)*	*(0.248)*	*(0.199)*	*(0.242)*	*(0.394)*
$LOAN_{SH}$	0.08*	0.07*	0.00	0.00*	0.03	-0.00	0.00	-0.00	-0.01	0.03	0.02	0.10*
	(0.039)	*(0.039)*	*(0.002)*	*(0.002)*	*(0.023)*	*(0.039)*	*(0.001)*	*(0.002)*	*(0.035)*	*(0.028)*	*(0.034)*	*(0.055)*
DEP_{SH}	0.07**	0.10***	0.00**	0.00**	0.02	-0.04	0.00	-0.00	-0.02	-0.01	0.01	-0.08
	(0.032)	*(0.037)*	*(0.001)*	*(0.002)*	*(0.019)*	*(0.036)*	*(0.001)*	*(0.002)*	*(0.028)*	*(0.026)*	*(0.028)*	*(0.052)*
COSTINCOME	-0.43***	-0.48***	-0.02***	-0.02***	0.04	0.21***	0.00	0.01***	-0.12**	-0.05	-0.15***	-0.03
	(0.061)	*(0.059)*	*(0.003)*	*(0.003)*	*(0.036)*	*(0.058)*	*(0.001)*	*(0.003)*	*(0.054)*	*(0.042)*	*(0.053)*	*(0.083)*
LLP	-1.64	-5.48***	-0.09	-0.24***	1.39	5.36***	0.04	0.28***	-2.56	-1.69	-0.23	-2.18
	(1.744)	*(1.636)*	*(0.074)*	*(0.071)*	*(1.039)*	*(1.605)*	*(0.040)*	*(0.084)*	*(1.554)*	*(1.148)*	*(1.517)*	*(2.273)*
GDP	-2.75***	2.51	-0.11***	0.18***	-0.16	-1.08	-0.05**	-0.08	0.90	1.89*	0.76	2.97
	(0.958)	*(1.530)*	*(0.041)*	*(0.066)*	*(0.570)*	*(1.501)*	*(0.022)*	*(0.079)*	*(0.853)*	*(1.073)*	*(0.833)*	*(2.125)*
HICP	-3.54**	1.57	-0.15**	0.13	-2.72***	-2.90	-0.10***	-0.03	1.97	2.64	1.28	2.89
	(1.570)	*(3.443)*	*(0.067)*	*(0.150)*	*(0.935)*	*(3.379)*	*(0.036)*	*(0.177)*	*(1.399)*	*(2.416)*	*(1.366)*	*(4.784)*
COOP	-4.02**	-2.14	-0.22***	-0.08	-3.59***	-4.07**	-0.15***	-0.23***	3.93**	2.09*	3.07**	1.61
	(1.697)	*(1.659)*	*(0.072)*	*(0.072)*	*(1.011)*	*(1.628)*	*(0.038)*	*(0.085)*	*(1.512)*	*(1.164)*	*(1.476)*	*(2.305)*
SAV	-1.54	-3.20*	-0.05	-0.17**	-3.37***	-4.68**	-0.11**	-0.22**	0.98	0.14	0.67	2.37
	(1.908)	*(1.853)*	*(0.081)*	*(0.081)*	*(1.137)*	*(1.818)*	*(0.043)*	*(0.095)*	*(1.700)*	*(1.300)*	*(1.660)*	*(2.574)*
Constant	48.82***	21.65	1.87***	0.51	-2.61	3.12	-0.15	-0.16	19.64	5.16	14.91	7.34
	(13.681)	*(17.003)*	*(0.580)*	*(0.739)*	*(8.149)*	*(16.684)*	*(0.310)*	*(0.875)*	*(12.188)*	*(11.928)*	*(11.901)*	*(23.624)*
Observations	**110**	**110**	**110**	**110**	**110**	**110**	**110**	**110**	**110**	**110**	**110**	**110**
R-squared	**0.50**	**0.57**	**0.67**	**0.68**	**0.43**	**0.51**	**0.31**	**0.50**	**0.33**	**0.39**	**0.32**	**0.31**
Adj. R-squared	**0.23**	**0.23**	**0.23**	**0.23**	**0.23**	**0.23**	**0.23**	**0.23**	**0.23**	**0.23**	**0.23**	**0.23**

Level of statistical significance: *** p<0.01, ** p<0.05, * p<0.10. Standard errors in italics.

Table 8 - *Regression results (Fixed effect panel model)*

	(1)	(2)	(3)	(4)	(5)	(6)
	ROAE			**ROAA**		
VARIABLES	**Whole sample**	**Cooperative banks**	**Non-cooperative banks**	**Whole sample**	**Cooperative banks**	**Non-cooperative banks**
NON_{SH}	-0.11*	0.09**	-0.15**	-0.01	0.00*	-0.01*
	(0.058)	*(0.039)*	*(0.073)*	*(0.004)*	*(0.003)*	*(0.005)*
HHI	4.27	0.12	7.79	0.71	-0.05	0.92
	(8.341)	*(5.515)*	*(10.980)*	*(0.520)*	*(0.386)*	*(0.679)*
ASSETS	-0.65	-1.83*	-0.22	-0.02	-0.16	0.03
	(2.165)	*(0.972)*	*(2.710)*	*(0.099)*	*(0.095)*	*(0.124)*
KA	-0.12	-0.28**	0.03	0.05**	0.01	0.07**
	(0.440)	*(0.107)*	*(0.663)*	*(0.021)*	*(0.009)*	*(0.030)*
$LOAN_{SH}$	-0.01	0.09**	0.01	0.00	0.00*	0.00
	(0.079)	*(0.042)*	*(0.109)*	*(0.002)*	*(0.002)*	*(0.004)*
DEP_{SH}	0.05	0.05	0.07	0.00**	0.00*	0.00*
	(0.049)	*(0.032)*	*(0.057)*	*(0.002)*	*(0.003)*	*(0.003)*
COSTINCOME	-0.45***	-0.24***	-0.48***	-0.02***	-0.02***	-0.02***
	(0.072)	*(0.043)*	*(0.078)*	*(0.003)*	*(0.004)*	*(0.004)*
LLP	-5.31***	-4.83***	-5.06***	-0.29***	-0.32***	-0.28***
	(1.365)	*(1.423)*	*(1.528)*	*(0.080)*	*(0.059)*	*(0.092)*
GDP	0.00	0.05	-0.09	-0.01	0.00	-0.01
	(0.145)	*(0.184)*	*(0.192)*	*(0.009)*	*(0.008)*	*(0.011)*
HICP	-0.44	-0.09	-0.78*	-0.04***	-0.01	-0.06***
	(0.272)	*(0.219)*	*(0.419)*	*(0.014)*	*(0.011)*	*(0.021)*
CRISIS	-4.23***	-1.77***	-5.85***	-0.31***	-0.17***	-0.39***
	(0.877)	*(0.449)*	*(1.287)*	*(0.047)*	*(0.038)*	*(0.069)*
Constant	51.74	43.73**	46.32	1.83	3.83**	0.96
	(38.438)	*(18.628)*	*(48.098)*	*(1.760)*	*(1.641)*	*(2.246)*
Observations	**990**	**369**	**621**	**990**	**369**	**621**
Number of banks	**110**	**41**	**69**	**110**	**41**	**69**
R-squared	**0.46**	**0.67**	**0.47**	**0.53**	**0.75**	**0.52**
Adj. R-squared	**0.50**	**0.48**	**0.48**	**0.50**	**0.48**	**0.48**

Level of statistical significance: *** p<0.01, ** p<0.05, * p<0.10. Standard errors in italics.

4. *Conclusions*

Previous literature has found mixed results studying the effect of revenue diversification on banks profitability; our study confirms this ambiguous relationship for a wide sample of large European banks during the period 2005-2013. Overall, empirical results fail to support the common wisdom, also embraced by regulatory authorities, that revenue diversification may improve the level and reduce the volatility of bank profits.

Econometric estimates indicate that efficiency and high quality of loans portfolio have been the main drivers to enhance and anchor bank economic returns, while non-interest streams of revenue and a noticeable level of business concentration often fail to provide statistical significance. Using selected subsamples, we find that revenue diversification can play a role in contributing to bank profitability; however, these results change for different bank specialization models. Our investigation indicates that there exists a significant difference between cooperative and non-cooperative banks; cooperative, that are usually more focused on traditional borrowing and lending business, can improve their performance introducing other sources of revenue. Non cooperative banks, on the contrary, have a more diversified portfolio of product and services; increasing the non-interest share of operating incomes may distract the bank from its natural “commercial-banking-model”, with adverse effects on profits.

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