Net Interest Margin of Cooperative Banks in Low Interest Rate Environment

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Abstract—This paper deals with the impact of decrease in interest rates on the performance of commercial and cooperative banks in the Eurozone measured by net interest margin. The analysis was performed on balanced dataset of 268 commercial and 726 cooperative banks spanning the 2008-2015 period. We employed Fixed Effects estimation panel method. As expected, we found a negative relationship between market rates and net interest margin. Our results suggest that the impact of negative interest income differs across individual banking business models. More precisely, those cooperative banks were much more hit by the decrease of market interest rates which might be due to their ownership structure and more restrictive business regulation.

Keywords—Cooperative banks, performance, negative interest rates, risk management.

I. INTRODUCTION

ENVIRONMENT of low, or even negative marker interest rates can have serious negative consequences on banking performance. The European Central Bank (ECB) entered the unfamiliar territory of negative interest rates on June 10th 2014 when it decreased its deposit facility to -10 bps [1]. The ECB policy rates continued in reaching record low levels in the following years. Finally the two-week repo rate hit zero bound (decreasing the deposit facility to -40 bps at the same time) in March 2016.

There would have not been a problem with negative rates if the banks were able to pass them symmetrically to their clients. In order to keep net interest margin (NIM) at the same level, banks need to decrease interest rates on both asset and liability side of the balance sheet as market rates go down. In other words, they need to pass-through negative market funding rates to the clients.

It is often politically as well as legally difficult to charge negative interest rates on deposits. No one wants to be the first mover to the negative rates in order to draw negative publicity towards the bank. Moreover, it is legally questionable whether it is possible to charge negative rates on deposits to retail clients as well as to small corporates. For this reason, we cannot find negative interest rates on retail deposits in price list of any bank in the Eurozone. The banks therefore often try to keep positive margin on the asset side by adding interest rate floors on reference rates (EURIBORs) of the floating rate loan contracts. These tries triggered series of lawsuits against such practices across Europe.

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Goal of this paper is to test relative resiliency of European cooperative and commercial banks to current low market interest rate environment. Our hypothesis is that low market interest rate environment has more severe impact on performance of the cooperative banks. There are several reasons to support this hypothesis. First, shareholders can take actions faster than cooperative bank members (because of dispersed ovnership) in case of need. Second, commercial banks tend to operate more on financial markets and therefore are able to crowd out part of relatively expensive client funding by market funding in rates below zero. Third, there are less restrictions on commercial banks' business e.g. on the usage of derivatives. Therefore, commercial banks are able to use interest rate swaps (IRSs) in order to hedge against adverse interest rate movements. Fourth, commercial banks tend to be bigger than cooperatives. Higher business diversity can help in risk mitigation.

Cooperative banks focus on traditional banking activities that are tightly connected to the real economy (taking deposits and granting loans to retail clients and small enterprises). As cooperative banks form around 20% of European banking market (and even close to 40% in some countries), we find the focus on their performance in current market situation as absolutely crucial for the health of the banking sector and the whole economy of the European Union [2].

The structure of this paper is as follows. Literature review of influential papers interested in banking performance in low interest rate environment from theoretical as well as from empirical perspective is included in the second section. Data included in our analysis are described in the third section. Methodological approach of this paper is described in Section IV. Results of our analysis are provided in Section V. Finally, conclusion is given and further research opportunities are outlined in Section VI.

II. LITERATURE REVIEW

Negative interest rate environment was only theoretical concept until few years back from now. Practical evidence on the effect of low interest rate environment on banking performance is therefore very recent. The reader therefore should not be surprised that most of the papers in this review section come from 2015+ period. Nevertheless, the impact of low interest rates on the banks and the economy as a whole is significant and the amount of related literature skyrocketed.

Bikker and Vervliet used both static and dynamic modelling methods and showed that unusually low interest rate environment did not decreased profit of the US banks [3]. The profit was maintained due to lower credit provisioning as

World Academy of Science, Engineering and Technology
International Journal of Economics and Management Engineering
Vol:13, No:2, 2019

interest income of banks decreased. Lower credit provisioning however brings significantly higher risk for banks' stability. The study also showed that the banks did not try to replace decreasing interest income by expanding their trading activities.

Similar findings are found in Europe as well. Analysis of Altavilla et al. show that monetary easing and unconventional monetary policies (such as negative interest rates) do not translate into lower profit of banks in the short term thanks to lower provisioning which offsets negative impact of decreasing interest income [4]. This study also shows that protracted period of low interest income harms banks profit.

Borio et al. use dataset of 109 large international banks (both from the Europe and from the USA) and show that there is strong dependence of banking profits on the monetary policy rates, especially if they are on low level [5]. They found the same correlation between interest rates, loan loss provisions and interest income of banks as the authors above. Furthermore, they claim that unusually low interest rates and an unusually flat term structure erode bank profitability. Next, in case of interest rate increase, [5] shows that higher interest income over-weights loss provisions and the profit is higher. This is contradicting to [4] which found just the opposite conclusion. Studies [3] and [4] further showed that both effects offset each other in case that the rates go down. This points to asymmetric reaction of banks to interest rates' increases and decreases.

Claessens et al. tackle the effect of long-lasting low interest rate environment on banking profitability (in terms of NIM) [6]. They use sample of more than 3000 banks from 47 countries from 2005 to 2013. They quantify that one percentage point decrease in market rates translates to 8 bps decrease of NIM. The effect is much stronger if the market rates are low (defined as 3M EURIBOR below 1.25%) - the decrease of net interest rate margin is 20 bps then. Furthermore, every additional year of low rates decreases NIM by 9 bps thanks to gradual balance sheet repricing.

Reference [7] is tracing evolution of profitability of Swedish and Danish banks. Monetary policy rates in both countries are negative. Authors show that banks in both countries rely mainly on wholesale funding. They claim that this fact decreased interest expenses and therefore improved their interest margin. The study shows that despite decreasing interest rates profitability of banks improved in time. They attribute the fact to the boom of housing loans (thanks to low interest rate levels). However, central banks of both countries see this reliance on housing market as a risk to a financial stability in the region.

Analysis of Genay and Podjasek from the Federal Reserve Bank of Chicago on the set of American banks shows that low interest rate period is associated with decreased profitability for banks, particularly for small institutions [8]. Nevertheless, such effects are small compared to positive effects that small interest rates bring to the economy.

Memmel showed that the worst possible interest rates scenario (260 historical interest rates shocks were applied) for German cooperative and savings banks profit is bear flattener

(short-term interest rates go up and the long term remains nearly unchanged) [9].

Most of the studies presented in this literature overview used panel data methods in order to estimate the effects of monetary policy (and low interest rates specifically) on banking performance. Either simple pooled OLS, Fixed Effects model, Random Effects model or in case of persistence in the dependent variables, dynamic panel data models such as System GMM were used.

Stylized facts to be taken from this review are that low market interest rate harm banking NIM [3]-[8]. In [3]-[5] was showed that low interest rate environment is connected with lower loan loss provisions which may increase instability in the future.

III. DATA DESCRIPTION

We use BankScope as a main data source of banking data. Interest rate statistics is retrieved from the Eurostat. We use primarily unconsolidated bank statements (consolidated bank statements are included only in case no unconsolidated statements are available for the bank in the database) in order to avoid double counting of individual banks on different level of consolidation. Same setup is used in paper written by Hesse and Čihák [10].

We included all banks in the Eurozone which had all necessary data available for the whole 2008-2015 period. The period is selected in order to include whole current period of decreasing market interest rates. In the analysis, we include only the Eurozone countries, where both cooperative and commercial banks are active. Full data availability is needed in order to have balanced data set.

We obtained data of 726 cooperative and 268 commercial banks. Altogether we have 994 institutions from 11 Eurozone countries included in our dataset. Because of different degree of vertical integration and distinct history, there are several cooperative banking models among the European countries. Therefore we may see only one cooperative bank in the whole country such as in Finland or in the Netherlands or there can exist plenty of small institutions alongside each other, such as in Germany or in Italy. For detailed information about cooperative banking models in different European countries please see [11], [12] or [13].

For the number of banks in our dataset divided by country and by ownership structure see Table I.

We retrieved annual averages of 1M EURIBOR rates in order to have proxy for short rate interest rates in the Eurozone. 1M EURIBOR is on clearly downward trend during the observed period. Annual average fell from 4. % in 2008 to -0.07% in 2015. 1M EURIBOR development is depicted on Fig. 1.

In Fig. 2, we plot development of average NIM of commercial and cooperative banks in time. We can see that the NIM of cooperative banks is higher compared to commercial banks but it is decreasing much faster in time (as market rates go down). Of course, more sophisticated analysis is needed in order to assess impact of low interest rates on both ownership structures. Our procedure is methodologically

World Academy of Science, Engineering and Technology
International Journal of Economics and Management Engineering
Vol:13, No:2, 2019

described in the following section.

TABLE I
BANKS IN DATASET BY COUNTRY AND BY OWNERSHIP STRUCTURE

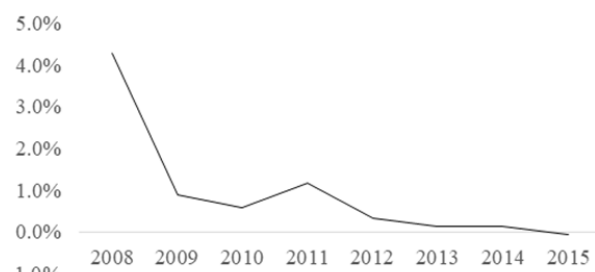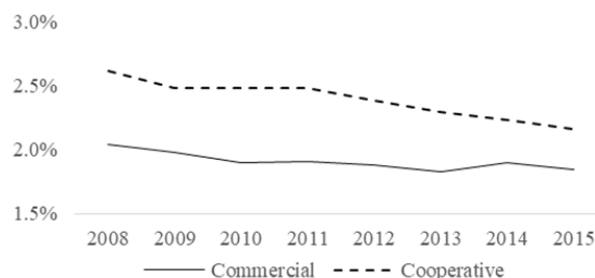| Country	Number of Banks		
	Cooperative	Commercial	Total
Austria	23	28	51
Belgium	3	12	15
Germany	390	56	446
Spain	2	11	13
Finland	1	5	6
France	46	58	104
Italy	257	45	302
Luxembourg	1	25	26
Netherlands	1	13	14
Portugal	1	8	9
Slovenia	1	7	8
Total	**726**	**268**	**994**

Fig. 1 Development of 1M EURIBOR

Fig. 2 Average NIM by ownership structure in time

IV. METHODOLOGICAL APPROACH

The studies focused on banking performance in low interest rate environment mostly use panel data analysis methods. This can be seen from papers presented in literature review section of this paper. We would like to estimate following equation:

$$NIM_{ijt} = \alpha + \beta_1 EQ_{ijt} + \beta_2 NONINT_{ijt} + \beta_3 SECSH_{ijt} + \beta_4 STRATE_t + \beta_5 STEEP_t + \varepsilon_{ijt}, \quad (1)$$

where *NIM* is net interest margin for bank *i* from country *j* in time *t*, *EQ* is share of equity to assets for given bank, *NONINT* is a share of non-interest income on total banking income, *SECSH* stands for share of securities on total balance sheet size, *STRATE* stands for 1M EURIBOR (short term market rate), *STEEP* stand for yield curve steepness (it is difference between 10 year and 3M market interest rate) and finally ε stands for error term. Variable selection is based on studies presented in the literature review section.

Now, series of test is to be run in order to decide, which panel data method we should use for our estimation. Breusch-Pagan Lagrange multiplier test strongly rejects and pooled OLS estimation is therefore less efficient compared to Random Effects Model. In order to decide between Fixed Effects and Random Effects model we use Hausman test. The test rejects null hypothesis at 1% significance level, showing that Fixed Effects estimation is efficient but Random Effects is not. Tests show us that we should employ Fixed Effects estimation for our analysis.

Cooperative banking model differs significantly from country to country. Studies show that in such case in order to avoid problems with precision of the estimates, cluster-robust standard errors on country level should be used [14], [15].

Altogether, we will run three regressions. The first one will be run on dataset comprised solely of cooperative banks, the second one will include only commercial banks and finally the third one will include all the banks in our dataset. This will help us to reveal, whether cooperative banks are really hit more by period of low interest rates.

V. REGRESSION RESULTS

We use Stata to run regression (1) using methodology described in previous section. The results of commercial banks are presented in Table II. They show positive relation between share of equity (*EQ*) and NIM. The reason is twofold. First, the more equity you have on your balance sheet, fewer liabilities are present and therefore you have fewer problems with their repricing into negative rates territory. The second reason is that the banks with higher share of equity on balance sheet are expected to run riskier business and therefore they need to earn higher margin. The share of non-interest income on total banking income (*NONINT*) as well as share of securities on total balance sheet size (*SECSH*) seems to have no effect on interest margin of commercial banks. This shows that degree of non-traditional business of commercial banks (such as investment into securities) seem to have no or very limited effect on interest margin.

Finally, variable of our interest, short interest rate level (*STRATE*) has positive and significant effect (at the 5% significance level). It shows that for commercial banks, decrease of 1M EURIBOR by one percentage point decreases banks NIM by 6 bps. This result is comparable to [6]. Interestingly, yield curve steepness (*STEEP*) does not seem to affect interest margin of commercial banks.

We repeated the estimation procedure also for the subset of cooperative banks. The results are provided in Table III. We can find several differences compared to regression run on the set of commercial banks. The more cooperative banks rely on traditional deposit-taking and loan-granting activities (represented by NONINT and SECSH), the worse for their interest margin. Yield curve steepness (*STEEP*) now has significantly positive effect on banking margin.

World Academy of Science, Engineering and Technology
International Journal of Economics and Management Engineering
Vol:13, No:2, 2019

TABLE II
REGRESSION RESULTS OF COMMERCIAL BANKS

Variable	Cons	Std Err	Sig.
EQ	3.88	0.64	***
NONINT	-0.47	0.44	
SECSH	0.32	0.51	
STRATE	0.06	0.03	**
STEEP	0.02	0.30	
cons	1.56	0.19	***
Nr. Obs.		2144	
Prob>F		0.00	
R sq		0.10	

Note: * significant at 10%, ** significant at 5%, *** significant at 1%

Interest rate decrease (*STRATE*) lowers the NIM as expected. Interestingly, the effect of rate changes on cooperatives is almost twice as big compared to commercial banks: decrease of 1M EURIBOR by one percentage point decreases cooperative bank NIM by 10 bps. Share of equity (*EQ*) has the same sign as in commercial regression but the effect is once more stronger for cooperative banks.

TABLE III
REGRESSION RESULTS OF COOPERATIVE BANKS

Variable	Cons	Std Err	Sig.
EQ	5.77	1.24	***
NONINT	-5.75	0.42	***
SECSH	-0.93	0.23	***
STRATE	0.10	0.02	***
STEEP	0.07	0.02	**
cons	3.19	0.06	***
Nr. Obs.		5808	
Prob>F		0.00	
R sq		0.57	

Finally, we run the regression equation (1) on the combined dataset of both commercial and cooperative banks. The estimated coefficients show expected signs. The significance codes are mix of what we have seen in the results of both banking ownership types separately. Therefore, it shows that there is important difference in the behavior of both groups and the researchers should take this fact into account.

TABLE IV
REGRESSION RESULTS OF THE WHOLE DATASET

Variable	Cons	Std Err	Sig.
EQ	5.21	1.12	***
NONINT	-0.81	0.51	
SECSH	-0.52	0.38	
STRATE	0.11	0.05	**
STEEP	0.08	0.02	***
cons	1.85	0.17	***
Nr. Obs.		7952	
Prob>F		0.00	
R sq		0.21	

VI. CONCLUSION

This paper investigates relative performance of cooperative banks and commercial banks in current low interest rate environment. In order to do that, we created balanced dataset of 268 commercial and 726 cooperative banks from the Eurozone spanning the 2008 - 2015 period. We employed Fixed Effects estimation panel method for our analysis. Results showed that market interest rate level matters to NIM of both banking groups. Nevertheless the effect of the interest rate change is almost two times stronger for the cooperative banks. Cooperative banks are moreover affected by the steepness of the yield curve. This does not hold for commercial banks. Our results show that cooperative banks react significantly differently than commercial banks to interest rate changes which are important finding for the policy makers and regulators.

Interesting extension of this study would be usage of dynamic panel data methods such as System GMM. Of course, more indicators than NIM could be studied in order to have more complete picture of different behavioral patterns of both ownership structures but it goes beyond the scope of this paper.

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