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Net Fee and Commission Income Determinants of European Cooperative Banks

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***Abstract*—**Net fee and commission income is one of the key elements of a bank's core income. In the current low-interest rate environment, this type of income is gaining importance relative to net interest income. This paper analyses the effects of bank and country specific determinants of net fee and commission income on a set of cooperative banks from European countries in the 2007-2014 period. In order to do that, dynamic panel data methods (system Generalized Methods of Moments) were employed. Subsequently, alternative panel data methods were run as robustness checks of the analysis. Strong positive impact of bank concentration on the share of net fee and commission income was found, which proves that cooperative banks tend to display a higher share of fee income in less competitive markets. This is probably connected with the fact that they stick with their traditional deposit-taking and loan-providing model and fees on these services are driven down by the competitors. Moreover, compared to commercial banks, cooperatives do not expand heavily into non-traditional fee bearing services under competition and their overall fee income share is therefore decreasing with the increased competitiveness of the sector.

***Keywords*—**Cooperative banking, dynamic panel data models, net fee, commission income, system GMM.

I. Introduction

THE topic of banks' non-interest income (NONII) became to be largely analyzed because its share increased significantly during the last decades. NONII has increased from 26% to 41% of total income between 1989 and 1998 in Europe [1]. It is assumed that the technological development and digitalization of banking led to increased competition, which decreased the cost advantages, and in turn, the profitability of traditional - deposit taking and loan providing - banking services. By seeking new profits, commercial banks expanded their activities into non-traditional fee and commission bearing services, such as retail brokerage, insurance sales, securities issuance [2], [3]. Contrary to commercial banks, many European cooperative banks still stick with their traditional deposit taking-loan granting model.

This paper examines the determinants of net fee and commission income (NFCI) magnitude in cooperative banks in European countries between 2007 and 2014. We analyze NFCI separately, since it represents the most pronounced part of NONII. It accounted for on average for 58% of all NONII between 1993 and 1998 in EU countries [4]. We are testing the relationship between NFCI and different bank, banking sector and country specific variables with a special emphasis on market concentration. Increased competition among financial institutions is assumed to be one of the main reasons that is forcing commercial banks to switch to fee bearing non-traditional activities, and therefore in their case, NFCI to total income (NFCI/TI) tends to increase with rising competition [5], [6]. We hypothesize that the relationship between market concentration and NFCI/TI will be the opposite in cooperative banks, i.e. cooperative banks will display higher share of fee income in concentrated markets. The hypothesis is based on the fact that many European cooperative banks are not providing non-traditional services and their fee income is generated only by fees imposed on deposit-taking and loan-providing. Fees on these services dropped during the last few years significantly due to new market entrants, so-called "low-cost" banks that are providing services without fees and are making profits mainly on interest income or trading income. However, this business model proved to be contrary to cooperative banks making them very unstable during the crisis in 2008 and many of them ceased to exist in this period. The crisis also resulted in banking sector consolidation in many countries and the competition among European banks decreased in the years following the crisis.[1]

The rest of the paper is structured as follows: Chapter II provides the literature review. Chapter III describes the methodology used for the estimation. In Chapter IV, the used variables are described. Chapter V contains data analysis. Chapter VI provides the results and their discussion. Chapter VII concludes the paper and states the final remarks.

II. Literature Review

The number of literature examining the determinants of bank NONII has grown. Rogers and Sinkey find that banks with high NONII shares tend to be larger, have smaller net interest margins (NIM), and have relatively fewer core deposits and exhibit less risk [7]. Banks with low NIM and few core deposits earn less revenue from traditional activities and must therefore engage in NONII bearing services in order to remain profitable. A similar link between NONII, bank size and NIM was found also in [8] using a set of China's commercial banks.

The group of researchers around DeYoung also concluded that NONII share is positively correlated with bank size [9]-[11]. They also find that well managed banks generate lower amounts of NONII, because they do not tend to expand into activities that have poor risk-return tradeoff. DeYoung and

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[1] See Fig. 2 for the development of Herfindahl index in the examined EU countries between 2007 and 2014.

Rice [11] include to the model bank external factors and they claim that banks located in states with strong economies and banks with high market power are able to generate more NONII. Moreover, they find that banks with more developed payment technologies generate increased fee income.

In [12], the authors applied the Rogers and Sinkey model on a panel of Malaysian Islamic commercial banks. They concluded that banks with higher levels of fee-generating activities tend to have higher assets and core deposits as well as exhibit less risk. This indicates that Islamic banks with traditional sources of funds are associated with more non-traditional activities as sources of income. A similar result was found in [13] where higher NONII is connected with a higher level of core deposits.

In South Korean banks, based on 1999–2009 panel data, the lending strategy (loan to assets ratio) as well as the core deposit to total assets ratio are negatively correlated with NONII share [14]. Besides those two indicators, only technology variables turned out to be significant in this study. While some technologies increase income diversification, others tend to decrease it.

Reference [15] finds, based on data from 29 OECD countries that large and more profitable banks with relatively low NIM and low loan to asset ratio tend to exhibit higher NONII ratio. It also claims that risk-taking banks and less cost efficient banks are diversifying their revenue more aggressively by increasing their NONII. Among macroeconomic factors, GDP growth rate, inflation rate and market capitalization seem to be important determinants of NONII ratio.

While there are more studies trying to document the determinants of NONII share at the bank level, the literature studying the relation between market concentration on the country level and the magnitude of NFCI is very limited. The first paper that examined the correlation between HI and NONII was Moshirian et al. in 2011 [5]. Based on data from 20 developed countries (109 banks) for the sample spanning the period from 1996 to 2010, they find that banks in high concentration countries have lower levels of NONII activity. Moreover, they include a variable measuring the change in market competition which turns out to be significant and negative. This means that even though the concentration is a slowly moving variable, also small changes can influence the income composition of banks significantly. This indicates that banks in highly competitive markets are more likely to engage in risky behavior including expansion in non-traditional activities. Similarly, large banks with smaller NIM exhibit higher NONII. The negative relationship between market concentration and fee income share is supported by [6].

The current literature dealing with the impact of market concentration on magnitude of fee income used the data sets with different types of banks. We believe that the impact of market concentration on fee income is not equal for different banking business models. Since commercial banks, which mainly rely on traditional businesses may be forced to diversify into non-traditional services by the competition, for investment banks it may be the opposite. In general, banks are getting more universal (combining traditional and non-traditional services) in recent years.

There is no single model of cooperative banking in Europe. In fact, the cooperative banking scheme differs significantly from country to country, as can be seen in [16]. For example, cooperative banks in some regions became universal companies almost indistinguishable from commercial banks [17]. In the countries we are dealing with[2], this does not hold true. In those countries, cooperative banks are still mainly oriented on traditional banking services. Therefore, their fee income share should be in general lower than in investment or universal banks and it should be decreasing with higher competition.

We conclude that common factors determining the income diversification can be found. But their impact on the NONII varies across countries and individual business models. Moreover, there are factors influencing the composition of bank income that need to be studied more deeply.

III. Methodology

Since NFCI share is persistent in time, we will use a dynamic panel data model for the estimation. We will apply System GMM which can deal with endogeneity and leads to robust estimates. The general model of the data-generating process is as:

$$y_{i,t} = \alpha y_{i,t-1} + X'_{i,t}\beta + \varepsilon_{i,t} \quad (1)$$

$$\varepsilon_{i,t} = \mu_i + v_{i,t}$$

$$E[\mu_i] = E[v_{i,t}] = E[\mu_i v_{i,t}] = 0$$

where $|\alpha| < 1$, $i = 1, \dots, N$ is the individual's index and $t = 1, \dots, T$ is a time index. The disturbance is composed of the fixed effects μ_i and the idiosyncratic shocks, $v_{i,t}$. The exogeneity assumption required for consistency of the pooled OLS estimation model is violated since $y_{i,t-1}$ and μ_i are correlated [18]. Least Squares Dummy Variable or Within Groups estimator (FE) are not able to eliminate the dynamic panel bias [19], [20]. It is suggested to use both pooled OLS and Within Groups estimator as a robustness check since both methods are biased in opposite directions [20]. While FE tends to underestimate the true value of the coefficient pooled OLS overestimates it.

There are two approaches how to deal with endogeneity problem. The first method is Difference GMM which uses the first-difference transformation applied on the original model [21], [22]. This yields:

$$\Delta y_{i,t} = \alpha_1 \Delta y_{i,t-1} + \Delta X'_{i,t}\beta_1 + \Delta v_{i,t} \quad (2)$$

The fixed effects are no more present, but the lagged dependent variable is still endogenous which can be addressed by assuming that $v_{i,t}$ are serially uncorrelated. The drawback of the difference GMM method is that it does not allow for

[2] See chapter V for the countries list.

time-invariant variables.

The second method is called the System GMM which combines the differences in equation (2) with the level equation (1) [23]. The instruments are differenced to make them uncorrelated with the fixed effects. This method allows using time-invariant variables.

To make the assumption of no correlation between idiosyncratic shocks more likely to hold, we include time dummies in the regressions [24]. We use a two-step System GMM with clustered standard errors robust to heteroscedasticity and autocorrelation within individuals and with small sample corrections to the covariance matrix. We apply Windmeijer correction order to prevent the downward bias of standard errors that may arise when the number of instruments is large [25], [22].

Our estimated model takes following form:

$$Y_{i,c,t} = \alpha + \beta Y_{i,c,t-1} + \gamma X_{i,c,t} + \delta Z_{c,t-1} + \epsilon W_{c,t} + \theta D_i + \vartheta T_t + (\mu_i + v_{i,c,t}) \quad (3)$$

where: $Y_{i,c,t}$ NFCI/TI share of bank i in country c at time t, $Y_{i,c,t-1}$ NFCI/TI share of bank i in country c at time $t-1$, $X_{i,c,t}$ vector of bank-specific variables for bank i in country c at time t, $Z_{c,t-1}$ vector of country-specific variables for country c at time $t-1$, $W_{c,t}$ vector of banking sector-specific variables for country c at time t, D_i bank type dummy, T_t time dummy, μ_i unobserved bank-specific time-invariant effect, $v_{i,c,t}$ disturbance term which is independent across banks.

IV. Variables

The dependent variable captures the NFCI magnitude that is measured by NFCI/TI ratio (*nfci_ti*). The independent variables are summarized in Table I.

TABLE I
List of Independent Variables

Variable	Description
Bank-specific explanatory variables	
Natural logarithm of total assets (ln_ass)	size measure
Net interest margin (nim)	a ratio of the difference between income from investment of depositors' fund and income attributable to depositors to total assets
Total customer deposits to asset ratio (depos_ass)	a proxy for traditional relationship banking
Total equity to total assets ratio (eq_ass)	a measure of capital risk
Loans impairment charge to gross loans ratio (impaired)	a measure of the credit risk as well as loan quality
Loans to assets ratio (loans_ass)	a measure of the loan volume and the lending strategy of a given bank
Return on average equity (roae)	a proxy for management quality. It captures the bank's profitability
Cost to income ratio (cost_inc)	a measure of the efficiency in expenses management
Banking sector-specific explanatory variables	
Herfindahl index (hi)	a proxy for the banking sector concentration: The HI's values range between 0–10,000 (0%–100%). Values below 1,000 indicate low concentration, values of 1,000 to 1,800 correspond to moderate concentration, and a HI over 1,800 indicates high concentration [26].
Number of automated teller machines per 100,000 adults (atms)	a measure of the development and application of new technology in a given banking sector
Number of all cards transactions (except e-money function) per capita (cashless)	a measure of the development and application of new technology in a given banking sector
Country-specific explanatory variables	
Lagged real annual GDP growth rate (lag_gdp)	a measure of the economic activity in the country
Lagged annual inflation rate (lag_inf)	percentage increase in consumer price index
Lagged annual unemployment rate (lag_unem)	affects besides other the decisions of customers about their use of certain banking services
Lagged long-term annual interest rate (lag_int)	10 year government bond yield in the given country

Correlation matrix of all variables is provided in Table II. We decided to drop some variables due to their high correlation with other explanatory variables, mainly with HI, in order to avoid multicollinearity. Furthermore, we excluded those variables that were insignificant in the initial estimation.

In the end, we decided to use following independent variables in the proposed model: NIM, ratio of equity to assets, loans impairment charge to gross loans ratio, cost to income ratio and deposit to assets ratio, Herfindahl index, lagged real annual GDP growth rate and lagged annual inflation rate.

V. Data Analysis

We created a balanced dataset containing 189 European cooperative banks with annual data from 2007-2014 period. The source for banking variables is BankScope database. Moreover, macroeconomic data are retrieved from the Eurostat database and banking sector concentration data are taken from the European Central Bank database. We included only banks with all requested data available for every time period. In order to deal with double-counting problem, we used consolidated banks statements only in the case no unconsolidated statements were available for a given cooperative bank. This treatment is needed because cooperative banks in some countries tend to create complex hierarchical structures.

Most of the banks in our dataset come from four countries (Austria, Germany, Spain and Italy). This is no surprise regarding the high share of cooperatives on total banking market in these countries. France also traditionally has a high

share of cooperative banking in total, but it is formed by a couple of big institutions unlike in the above mentioned countries. For an overview of number of cooperative banks by country see Table III.

TABLE II
CORRELATION MATRIX

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
nfci_ti [1]	1.00							
ln_ass [2]	0.17	1.00						
nim [3]	-0.12	0.11	1.00					
depos_ass [4]	-0.26	-0.42	-0.11	1.00				
eq_ass [5]	-0.01	-0.23	0.34	-0.11	1.00			
impaired [6]	-0.07	-0.13	-0.34	-0.12	0.00	1.00		
loans_ass [7]	0.08	-0.08	0.10	-0.12	0.30	-0.08	1.00	
roae [8]	-0.11	0.18	0.88	-0.06	0.09	-0.37	0.00	1.00
cost_inc [9]	0.33	-0.14	-0.41	0.16	-0.14	-0.21	0.04	-0.34
hi [10]	0.12	-0.02	0.05	-0.03	0.21	0.09	0.07	-0.01
atms [11]	-0.29	-0.29	-0.02	0.47	-0.09	-0.11	0.05	0.02
cashless [12]	0.24	0.00	0.03	0.09	0.16	-0.01	0.03	-0.02
lag_gdp [13]	-0.58	-0.03	0.04	0.15	-0.12	-0.13	-0.06	0.03
lag_inf [14]	-0.05	-0.12	-0.01	-0.02	0.05	0.04	0.07	-0.05
lag_unem [15]	-0.15	-0.08	-0.02	0.13	0.12	0.18	0.00	-0.01
lag_int [16]	-0.04	-0.12	-0.01	-0.32	0.19	0.33	0.12	-0.04

	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
nfci_ti [1]								
ln_ass [2]								
nim [3]								
depos_ass [4]								
eq_ass [5]								
impaired [6]								
loans_ass [7]								
roae [8]								
cost_inc [9]	1.00							
hi [10]	-0.03	1.00						
atms [11]	-0.01	-0.19	1.00					
cashless [12]	0.09	0.69	-0.17	1.00				
lag_gdp [13]	0.04	-0.12	0.07	-0.02	1.00			
lag_inf [14]	-0.01	0.01	0.11	-0.01	0.44	1.00		
lag_unem [15]	-0.12	0.31	0.38	0.06	-0.29	-0.08	1.00	
lag_int [16]	-0.14	0.14	-0.04	-0.04	-0.10	0.14	0.40	1.00

TABLE III
NUMBER OF BANKS BY COUNTRY[3]

Country	Number of banks	Share
Austria	53	28%
Germany	56	30%
Denmark	2	1%
Spain	29	15%
Finland	1	1%
France	8	4%
Italy	40	21%
Total	**189**	**100%**

[3] All banks with negative operating income or NFCI were excluded from the final dataset since their NFCI/TI would be misleading.

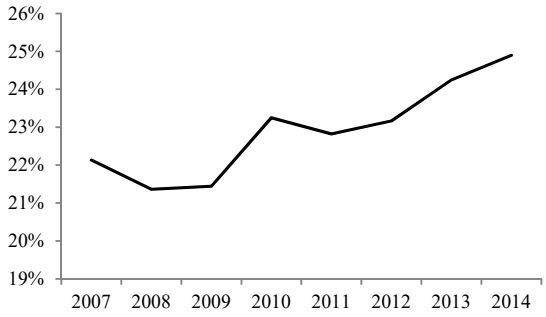

Fig. 1 Evolution of average NFCI/TI, 2007-2014

Looking at the evolution of the dependent variable: NFCI/TI, we can clearly see an increasing trend (see Fig. 1). This is in line with statements in the first two sections of this paper.

We are mainly interested in the effect of competition on banking fees, and therefore, we also present the evolution of average the Herfindahl index from countries in our dataset (Fig. 2). The Herfindahl index has a slightly increasing trend which means a more concentrated (or less competitive) market. This is no surprise, as time span of our analysis covers the period of economic crisis where market consolidation is common. In our sample, an increase of the Herfindahl index can be seen especially in Spain and Italy.

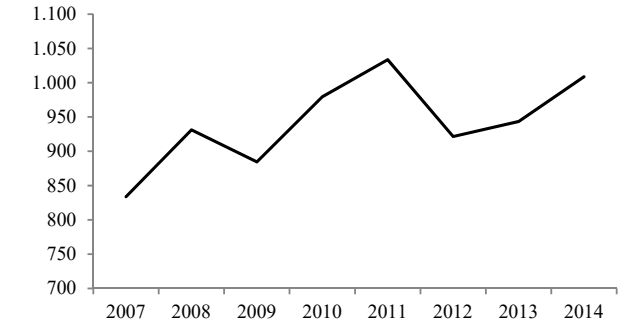

Fig. 2 Evolution of average HI, 2007-2014

For better orientation in the data, descriptive statistics of all variables is presented in Table IV.

VI. RESULTS

This paper is focuses on the effect of banking concentration on the fee income of European cooperative banks. We can see strong positive effect of market concentration on NFCI/TI from the regression results in Table V. A positive link between NFCI/TI and the Herfinadahl index was suggested also by the correlation matrix in Table II as well as by Figs. 1 and 2. This indicates that cooperative banks in the competitive markets lose their NFCI from their operations because they tend to stick with the traditional deposit-taking and loan-granting model, as cooperative banks typically do not expand into fee extensive services as other banks do. On the other hand, if the market is becoming less competitive, cooperative banks are able to gather fees from traditional banking products. This is

also the case for the current post-crisis consolidation of banking market in selected European countries.

TABLE IV
DESCRIPTIVE STATISTICS

Variable	Minimum	1st quartile	Median	3rd quartile	Maximum
nfci_ti	1.5	17.7	22.6	27.3	71.2
ln_ass	10.4	12.9	14.2	14.8	21.4
nim	-3.5	0.1	0.3	0.5	2.3
depos_ass	2.0	54.8	73.5	81.2	95.5
eq_ass	1.2	6.0	7.7	9.7	23.8
impaired	-8.1	0.2	0.6	1.0	13.5
loans_ass	4.0	51.7	64.9	75.4	96.0
roae	-116.8	1.8	3.6	5.8	29.0
cost_inc	12.8	56.8	65.1	72.5	320.0
hi	183.0	307.0	406.0	454.0	3700.0
atms	35.7	107.0	113.0	118.3	157.7
cashless	22.6	29.9	40.5	51.7	268.6
lag_gdp	-8.3	-1.0	1.1	3.3	5.2
lag_inf	-0.2	1.6	2.1	2.8	4.1
lag_unem	2.5	3.5	4.2	5.6	17.3
lag_int	1.1	3.1	3.8	4.3	6.8

Looking at the effects of other variables included in the presented model, we can see that higher equity to asset ratio is also connected with a higher relative share of fees to total income. The explanation may be that lesser-leveraged cooperative banks may need their equity for assets with higher risk weights that are connected with significant fee income (just as consumer lending). Another independent variable with positive effect of fee income is lagged annual inflation rate. On the other hand, NIM, loan portfolio quality (loans impairment charges to gross loan ratio), efficiency (cost to income ratio) as well as proxy for traditional banking activities (deposits to assets ratio) and measure of economic activity (lagged real annual GDP growth rate) proved to be insignificant.

The results of our System GMM regression show that the coefficient of lagged dependent variable is positive, its value is below 1 and it is highly significant, which are the necessary conditions for a correctness of dynamic panel data estimation methods. Arellano-Bond AR (1) strictly rejects the null hypothesis of no first-order autocorrelation in residuals, and thus, also this test points to appropriateness of the selected methodology. Arellano-Bond AR (2) test suggests that we may also include a second lag of the dependent variable into the regression. Inclusion of a second lag was tested during robustness tests; the regression performed generally poorly and therefore, we decided to leave the second lag of the dependent variable out of the main model. The Hansen test for overidentification with null hypothesis of exogenous instruments was not rejected and the Wald test rejects that all the variables are jointly insignificant. Moreover, we run a robustness check as suggested in [20] and described in the methodology. Our model has passed this robustness check since the estimated coefficient by System GMM lies between the values estimated by FE and OLS. The results can be seen in Table VI.

TABLE V
REGRESSION RESULTS

Dependent variable	Coefficient	Std. error	Significance
lagged dependent variable	0.921	0.021	***
constant	0.956	0.126	
nim	-0.659	0.498	
eq_ass	0.146	0.061	**
impaired	-0.156	0.138	
cost_inc	0.003	0.014	
depos_ass	-0.016	0.011	
hi	0.001	0.000	**
lag_gdp	0.127	0.079	
lag_inf	0.872	0.212	***
Diagnostics			
number of observations	1512		
number of instruments	197		
Wald test	361.5		***
Arellano-Bond AR(1) test	-6.28		***
Arellano-Bond AR(2) test	-2.76		***
Hansen test	133.2		***
year dummies	Yes		

*significance codes: *** = 0.01, ** = 0.05, * = 0.1*

TABLE VI
ROBUSTNESS CHECK

Method	FE	GMM	pooled OLS
lag_NFCI/TI	0.643	0.921	0.938
	(0.022)	(0.021)	(0.009)

VII. CONCLUSION

This paper focuses on key determinants of bank fee and commission income in the European cooperative banks. Since fee income represents the largest part of NONII earned by banks, it remains a major challenge for bank management to set and maintain an appropriate fee policy. Nevertheless, solving the optimal fee structure has yet to be accomplished either on theoretical or empirical levels.

The study is performed on balanced panel data form 189 European cooperative banks spanning the period from 2007 to 2014. Unlike existing studies, we use the System GMM estimation method as suitable for time persistent data. Different bank-specific, banking sector-specific and macroeconomic factors are considered. We are primarily concerned about the potential relationship between market concentration and fee income magnitude, which in fact turns out to be present. The analysis suggests that cooperative banks facing higher competition tend to exhibit lower shares of fee and commission income which can be attributed to the fact that they mostly concentrate on deposit-taking and loan-providing and with increased competition, those fees tend to decrease. Compared to commercial banks, cooperatives do not expand into non-traditional fee bearing and potentially more risky services when the competition increases and therefore their overall fee income share is pushed down by the competition.

Cooperative banks with a higher fee income share tend to rely more on equity financing, which in turn means that they report lower capital risk. This is possibly related to the fact

that banks highly involved in fee bearing businesses need more capital to prevent the potential risks of those activities. Other bank-specific explanatory variables: NIM, loan portfolio quality (loans impairment charges to gross loan ratio), efficiency (cost to income ratio) as well as proxy for traditional banking activities (deposits to assets ratio) proved to be insignificant.

Among the macroeconomic conditions, only the lagged annual inflation rate significantly affects cooperative banks´ fee income policy, while other factors seem to play a secondary role by fee income determination.

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