

Banks' profitability determinants in post-crisis European Union

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Abstract

The purpose of this article is to examine the impact of selected internal and external factors on a bank's profitability. The research investigates the impact of operational size, liquidity, risk appetite, management efficiency, product diversification, concentration, GDP growth and inflation change on the profitability of sample of 4179 European commercial banks for the period between 2011 and 2015. The input data were obtained from the Orbis Focus and the World Bank databases. The determinants were used to construct two models with ROAA and ROAE as a proxies and regression analysis using between groups panel approach was conducted. It has been found that growing economy impacts banks' profitability positively. It has been robustly confirmed that management efficiency, product diversification, market concentration and inflation result in decreased profitability. The operational size has been found to be negatively linked to changes in net results but was confirmed only with ROAA model. Similarly, statistically significant results with regard to liquidity were found only for ROAA model and the correlation was positive. The strong negative impact of market concentration on profitability is an interesting finding allowing for further exploration of reasons for this unexpected vector of correlation.

Keywords: Bank; Profitability; ROAA; ROEE; European Union

JEL classification: G17; G21

Introduction

Which feature for which there is a publicly accessible data, influence bank's profitability? There have been a significant number of studies to categorize and establish factors that can be considered as bank's profitability determinants and findings of this article should allow to understand their validity. Confirming of empirical evidence could prove useful also outside of academic society as a fairly simple tool to understand drivers of bank financial results that could be used by individual investors to support their analysis in case of bank's bond or equity purchase.

Early findings of (Short, 1979) and (Bourke, 1989) has shown that statistically significant determinants influencing banks profitability do exist. Most of the studies approached the analysis by categorizing studied factors as internal (dependent on the individual banks decisions) and external which comprised of macroeconomic and sector data. There has been a number of different proxies utilized to assess the

relationship of the determinants with net result achieved by the banks, amongst which ROA and ROE were oftenly used. To allow easier application of the findings of this research, for comparability purposes adjusted ROA and ROE has been used. Impact on profitability is analysed from perspective of operational size, capital adequacy, liquidity, risk appetite threshold, product base diversification, market growth, inflation and sector concentration, all which were previously analysed in differentiated arrangements as presented in the reviewed literature. The between groups panel regression has been conducted in 2 models, using ROAA and ROAE as proxies based on sample of 4179 commercial banks from European Union covering time period between 2011 and 2015. The body of the article begins with literature review summarizing previous findings in the field which are used for hypothesis development in the following chapter. Further, the basis for used methodology are explained followed by results of the analysis and conclusions on the findings. The results of the research indicated that most of selected factors had an statistically important influence on the profitability of analysed banks but vectors of correlation for selected factors were not in line with anticipated result or previously proven conclusions. This could lead to conclusion that the presented approach seems to be useful as proven analysis tool but the nature of relationship between the determinants and profitability remain volatile over time and different regions which should be taken into account if implication of below findings would be utilized for any decision making process.

Literature Review

This article builds-up on already significant research done on the bank's profitability determinants. The research beginning can be attributed to 80's, when (Short, 1979), (Berger, Hanweck, & Humphrey, 1987) and (Bourke, 1989) papers have been published. The matter gained attraction with time, while each study focused on a different aspect. Number of research has been done analyzing single economic area (i.e. country), like the research of (Mamatzakis & Panagiotis, 2003) which assessed the factor-profitability relationship in Greece, as well as (Saeed, 2014) and (Kosmidou, Pasiouras, Doumpos, & Zopounidis, 2006) which both scrutinized the subject based on data regarding Great Britain. The single-market analysis was fruitful and allowed to list a significant number of researched countries. (Williams, 2003) focused on Australia, (Naceur & Goaid, 2001), as well as (Ines, Ben, & Mhiri, 2013) studied Tunisia, (Gul, Irshad, & Zaman, 2011) and (Karim, Sami, & Hichem, 2010) analyzed Pakistan, (Tarus, Chekol, & Mutwol, 2012) verified Kenya, (Sufian & Chong, 2008) focused on Philippines and latter (Sufian & Habibullah, 2009) done the research on China. The profitability determinants in USA were analyzed by (Wheelock & Wilson, 1995), as well as (Miller & Noulas, 1997), Turkey by (Alp, Ban, Demirgüneş, & Kiliç, 1997) while Switzerland by (Dietrich & Wanzenried, 2011). The area under review in this article, European Union member countries, has also been subject of number of studies (Angbazo, 1997; Bourke, 1989; Demirgüç-Kunt & Huizinga, 1999; Goddard, Molyneux, Wilson, & Tavakoli, 2007; Mendes & Abreu, 2003; Pasiouras & Kosmidou, 2007; Short, 1979; Smith, Staikouras, & Wood, 2003) where influence of factors like interest rate environment, inflation, industry concentration has been investigated, of which all were found to have positive impact on return on equity being the study proxy, based on data representing market condition before the financial crisis of 2008. More recent studies of European Union banking sector included research done by (Menicucci & Paolucci, 2016; Petria, Capraru, & Ihnatov, 2015), as well as narrower regions, i.e. Central and Eastern Europe (Căpraru & Ihnatov, 2014).

The reviewed literature comprised of similar approach to classification of analyzed factors, by dividing them into two subgroups of which one was defined as internal-factors dependent (factors that can be influenced by the decisive person in the bank's structure) and external-factors (defined as being out of bank's management direct influence). Particular studies varied in the selection of analyzed determinants and specific proxy being utilized (ROA, ROE, ROAE etc.). In the scope of internal factors, significant research has been applied to understand effects of cost, capital, liquidity and financing management on bank's profitability. Some literature focused solely on internal factors' impact on profitability (Menicucci & Paolucci, 2016). The other group, external factors, does incorporate the influence of macroeconomic environment in which given bank operates. Within this subset, a significant focus has been put on economic growth, stability of currency's purchase parity strength and degree to which the economy is financed through the capital market rather than banking system. There has been little research done on the direct influence of regulatory framework on overall bank's profitability and the research performed indicates weak influence

(Barth, Nolle, Phumiwasana, & Yago, 2003). The reviewed literature predominantly analyzes influence on profitability with use of internal and external factors. Whereas a number of studies confirmed that size of operation (Berger et al., 1987; Bikker & Haaf, 2002), capital adequacy (Molyneux & Thornton, 1992) and liquidity (Bourke, 1989) has statistically significant influence, the strength and vector of the relationships differentiate.

Taking into account the findings of the review, it has been assessed that further empirical research could provide confirmation of identified determinant-profitability relationships for banks operating within European Union single market. Number of called research was performed on pre-crisis data. Consistency of variables correlation vectors with the findings of conducted review would lead to the conclusion that financial crisis of 2008 had not materially impacted banks' profitability determinants.

Hypothesis development based on literature findings

The choice of proxy for assessing bank's profitability determinants is based on the literature review. In some cases Net Interest Margin (NIM) has been applied but due to regulatory changes within European Union some banks tend to take on less interest products on their balance sheet (Goddard et al., 2007) and therefore use of NIM as a proxy for assessing bank's profitability rather than loans asset class would lead to distorted results. In this paper, focus was shifted to other two often utilized proxies being Return on Assets (ROA) and Return on Equity (ROE). Some researchers found that measuring the return on assets rather than equity allows to omit disturbances that might result from leverage differentiation throughout the banking system and is considered the basic proxy for measuring bank's profitability (Athanasoglou, Delis, & Staikouras, 2006). Taking into account the European banks trend of taking on more off-balance sheet positions in this study it was considered more appropriate to primary measure economic effectiveness of the bank with ROE proxy which should better reflect the influence of selected determinants of bank's profitability with entities having different balance-sheet structures.

One more issue that should be considered with regard to the choice of a proxy is the timing of underlying data. ROA is a ratio of net income generated throughout reporting period divided by total assets at the end of that period. ROE incorporates the same dependency, where net income generated throughout reporting period is divided by equity value at the end of that period. Taking into consideration that the net income generated is a result of economic use of assets or equity that was present throughout the reporting period, not only on the point of time when the period ends, it should be more suitable to use proxy which addresses change of total assets or equity value during the financial year (Petria et al., 2015). It is proposed to use ROAA (Return on Average Assets) and ROAE (Return on Average Equity) to tackle the issue, as it has been demonstrated in the papers by (Beltratti & Paladino, 2015; Dietrich & Wanzenried, 2014; Pasiouras & Kosmidou, 2007). In course of this paper, the influence of selected macro- and micro-economic factors will be verified using both presented proxies, which will allow for a more robust interpretation of the results.

As discussed before, generally the factors of profitability are grouped into two categories; seldom the third one is allotted where in case of multi-country analysis subgroup-specific factor like corporate tax rate is included. This approach will not be used in this research.

When it comes to choice of internal factors to be selected for the model, based on previous research it was concluded that focus should be applied to size of the bank (measured by total assets), capital ratio (measured as a ratio of equity to total assets), liquidity ratio (measured as ratio of loans to total assets), risk appetite (measured as ratio of loan loss provision to loans gross value) and management efficiency (measured by ratio of cost to income).

The issue of size of bank's operation has been given a fair share in the reviewed literature, it is one of the factors where positive correlation with increased net income is expected, nonetheless, a number of findings have been inconclusive.

In papers by (Alp et al., 1997; Bikker & Hu, 2002; Boyd & Runkle, 1993; Doğan & Yildiz, 2013) statistically significant correlation between banks' size and profitability has been assessed. This has been also the case with studies performed by (Athanasoglou, Brissimis, & Delis, 2008; Camilleri, 2005; Gul et al., 2011;

Pasiouras & Kosmidou, 2007; Saeed, 2014). The identified relationship has been attributed to the fact that with increasing size of operations, fixed costs grow at lower pace resulting, *ceteris paribus*, in higher profitability (Bikker & Hu, 2002; Bourke, 1989; Goddard, Molyneux, & Wilson, 2004; Goddard et al., 2007; Molyneux & Thornton, 1992).

It should be expected that increase in operational size should lead to easier access to the market (i.e. through increased awareness of the brand), as well as mitigate the operational risk (through the capacity for greater diversification) which, *ceteris paribus*, would result in increased profitability.

Part of the literature emphasizes, that positive correlation of return on equity and size is expected but in some instances regional and product diversification does not result in lowering of the risk and therefore compensate for size-related efficiency (Menicucci & Paolucci, 2016).

Analysis performed in the reviewed literature does not answer conclusively whether the positive correlation between banks operational size and profitability exists. Some literature suggests that such positive correlation is observable only with regard to the biggest banks in given area (Altunbaş, Gardener, Molyneux, & Moore, 2001) as a result of greater capacity to implement cost optimizing technologies. Berger (1987) stipulates that smaller banks can achieve higher profitability compared to their bigger peers which suffer from increased inefficiency due to its operational size.

Numerous approaches to the selection of appropriate proxy for measuring the influence of the bank's size on profitability have been proposed throughout literature. Often researchers decided on total assets (Kosmidou, 2008) while others proposed using the logarithm of total assets (Căpraru & Ilnatov, 2014) or a ratio of given bank's total assets to gross domestic product (Ghosh, 2016).

H1: Increase of operational size of the bank (measured by the natural logarithm of total assets) results in greater profitability of the bank (measured as the ratio of net income to average own funds).

The basic source of funding for the banks are deposits taken in from the clients. The growth of deposit base, assuming sufficient capital requirements are met, allows for the production of additional loans and income as a result. If the bank is characterised by lower ratio of deposits taken into total assets than its comparative peers, it forces the bank to subsidise the deposits in order to attract more deposits from the clients.

High ratio of deposit taken in compared to loans granted should allow for cheaper cost of funding as a result of lower expected liquidity shortfall in event of market distress (Alexiou & Sofoklis, 2009) unless the ratio exceeds value of 1,0 implying that the banks have more funding at disposal than ability to assign it to profitable assets. It is important to consider that mismanagement of credit creation in case of extensive deposit base may result in a situation where an expected increase of efficiency will not occur. Such situation may be a result of decision to attract new customers by lower than average margin or sign of adjusted risk appetite for higher yield products with lesser credit quality. It also may be considered that high ratio of loans to deposits is a signal that bank has taken on a strategy to hold a significant amount of liquid assets in the balance sheet, which in the spectrum of financial products tend to have low profitability (Petria et al., 2015). It is expected that deposits to loans ratio held at a mid-high level should result in increased profitability but banks which tend to have a ratio close to extreme values will most probably represent negative correlation.

H2: Increase of deposits to loans ratio (measured as the ratio of total net loans to total deposits) should result in an increase of banks profitability (measured as the ratio of net results to own funds).

Another factor that was assessed in the literature as having a direct influence on net results generated by a bank is the individual approach to risk appetite. Banks solely focused on the production of mortgage loans which are highly collateralized tend to bear less credit risk than universal banks which in its broad scope of products offer i.e. uncollateralized consumer loans or corporate loans. Banks which tend to take higher risk on their balance sheet should charge higher average interest margin and as a result are expected to be more profitable but only to the extent where the gains from strategy to produce high margin loans outweigh

increased cost of risk and therefore mitigating the increase in profitability or even reversing the effect (Miller & Noulas, 1997).

High level of loan loss reserves may be perceived as a sign of the low quality of loans portfolio of given bank (Cooper, Jackson, & Patterson, 2003) and result in decreased profitability.

Alternative approach to the subject stipulates that the impact of management of quality of portfolio on profitability is superior to the impact of size of loan loss reserves, as some researchers concluded, that appropriate mitigation of the risk arisen from high margin products may result in above market average gains (Athanasoglou et al., 2008; Kosmidou, 2008; Vong & Chan, 2009) and therefore utilizing ratio of loans loss reserve to gross loans as measure of risk appetite should show the positive correlation of increased risk appetite on overall profitability of the bank (Mansur, Zangeneh, & Zitz, 1993).

Additionally, it is important to underline that other than risk appetite (which reflects banks strategy toward all classes of assets held) individual approach to management of non-performing loans may have a significant impact on the profitability of the banks. The ones which have high efficiency of in-house vindication or those which actively dispose of exposures with certain day past due threshold should have lower loan loss reserve ratio than peers which tend to keep the overdue exposure on their balance sheet and therefore have increased capacity for new loans production from regulatory capital perspective.

Heffernan and Fu (2010) stipulate that correlation between the ratio of loan loss reserves to gross loans and profitability of the bank can be both positive or negative because the increase in loss loan reserve may be representative of future loss that is still to be materialized or recognition of loss already incurred.

Taking into account that most of the reviewed literature assumed positive correlation it is chosen for this research, to assume positive correlation between risk appetite and profitability as a base hypothesis.

H3: Increase of risk appetite (measured as the ratio of loan loss reserve to gross loans) should result in an increase of banks profitability (measured as the ratio of net results to own funds).

Another ratio which is often disclosed in banks financial statements, as valuable to understand the efficiency of operational management, is a cost to income. The correlation is expected to be negative. Mirror result would be illogical and could be a proof of low data quality. This variable has been introduced to mitigate the impact on the other variables coefficients which could distort the results and increase the overall quality of the model.

H4: Worsening cost management (measured as increasing ratio of total cost to gross income) should result in a decrease of banks' profitability (measured as the ratio of net results to own funds).

When assessing factors of banks' profitability determinants, some research focused on the analysis of the impact of the product diversification. It is broadly assumed that in case of market distress, well-diversified entities should be less impacted by the market turmoil than their less diversified peers. The basic measure for diversification proposed in the reviewed literature assumed utilizing loan ratio understood as a relation of net loans to total assets (Menicucci & Paolucci, 2016). Some papers suggest positive correlation of abovementioned ratio and banks' profitability (Hassan & Bashir, 2005; Sufian & Habibullah, 2009). From one perspective high ratio of banks' basic income assets, being loans granted, should make for decent return on invested equity (Rhoades & Rutz, 1982) on the other higher than market average ratio of loans in total assets may be a result of market penetration strategy which requires below the market premiums thus negatively impacting the profitability.

When it comes to assessing the impact of the ratio on banks' profitability, observations in the reviewed literature are not consistent. Abreu and Mendes (2003) found out on basis of research conducted for Spain, Germany, France and Portugal that the correlation is positive. Hassan and Bashir (2005) on a sample of Islamic banks came to the conclusion that increase in the ratio of net loans to total assets will impact the net result negatively. Some research found out the relation between the level of risk undertaken and volatility of net result thus implying that increase of the ratio of net loans to total assets will be positively or negatively correlated with profitability depending on structure and quality of the bank's portfolio.

Taking into account observed tendency of European banks to increase revenue from off-balance sheet assets in the recent years it is assumed that loan ratio will result in decreased profitability.

H5: Increase of loan ratio (measured as the ratio of net loans to total assets) should result in a decrease of banks profitability (measured as the ratio of net results to own funds).

When analysing the impact of different factors on banks' profitability, so far, we have focused on internal factors that are (up to some extent) depended on management decisions. The second group of analysed factors is external, which implies that they are out of individual banks' control. The statistical significance of those factors has been observed in the reviewed literature, for instance by Dietrich and Wanzenried (2014). Banks have an important role as an intermediate in transferring capital surpluses to entities requiring additional investments, especially in the continental Europe where stock exchange plays lesser role than i.e. in United States, should be correlated with macroeconomic factors.

If we assume that in continental Europe banks play a basic role in providing funding, we should also assume that there is a correlation of change in the size of the economy and banks' profitability. This is a case when the overall economy is shrinking; existing banks compete on lesser field, thus implying lesser profitability. If the economy grows, each bank should have more clients with financing needs to choose from, thus allowing for selection of optimal risk/reward. Growing economy should also be represented by increasing savings (at least in nominal terms) which should ease the conditions for banks to access financing.

When analysing the impact of the overall economy on banks' profitability, mostly used proxy in the researched literature is the change of gross domestic product year over year (Beltratti & Paladino, 2015; Djalilov & Piesse, 2016; Ghosh, 2016; Pasiouras & Kosmidou, 2007; Saona, 2016).

Other researchers also used gross domestic product per capita (Hassan & Bashir, 2005).

(Căpraru & Ihnatov, 2014; Hassan & Bashir, 2005) and the natural logarithm of gross domestic product (Albertazzi & Gambacorta, 2009).

H6: Growth of the economy (measured as the change of gross domestic product year over year) should result in an increase of banks' profitability (measured as the ratio of net results to own funds).

Another analysed macro-factor is inflation. Some research has concluded that expectation of a change of inflation is more important than the actual change, therefore only in an instance where the level of yearly change of inflation will be close to the market anticipated value correlation might be observable (Dietrich & Wanzenried, 2014).

If the level of inflation change differs significantly from previously anticipated shift, either a bank will operate using the table of fees and commission priced below its peer average rendering lower than achievable income or above its peer pricing which poses a risk of faster client base attrition. On the cost side, appropriate forecasting allows for optimal wage increase policy which in case of below the expectancy inflation would result in extensive cost hike and thus lowering overall profitability.

H7: Increase in inflation (measured as relative change year over year) results in bank's increased profitability (measured as the ratio of net results to own funds).

Banking industry concentration has been scrutinized as a potential determinant of banks' profitability. Although some papers have concluded that impact of concentration on banks' profitability is statistically significant, the vector of the relationship has not been consistent (Berger, 1995; Rhoades, 1995). Two approaches to the selection of the factor to measure bank industry concentration are repeated in the reviewed literature, first one takes into account share of five biggest institutions' total assets in given market total assets (Beltratti & Paladino, 2015) and the second one, called Herfindhal-Hirschman index, which comprises of sum of squares of each institution share in market total assets (Căpraru & Ihnatov, 2014; Mansur et al., 1993). The index value ranges between 0 and 1. In market comprising only of peers equal in size, it assumes value of 0. Both, decrease in a number of banks, as well as an increase in market share variation, increases the value of the index (Tan, 2016).

The first method omits structure of the remaining banks in the market, while the Herfindhal-Hirschman index includes all entities comprising the sector assigning higher wage to banks with a bigger share in the market.

It is assumed that on market with a number of dominant banks, they should have the ability to retain part of customers, which in the perfectly equal market would be more price sensitive.

H8: Increased market concentration (measured by Herfindhal-Hirschman index) results in bank's increased profitability (measured as the ratio of net results to own funds).

Research and Methodology

In order to test the hypothesis, regression analysis with between group panel model of 4179 banks operating within European Union has been analysed for the period between 2011 and 2015. All hypothesis has been assessed using two models, where size, capital ratio, liquidity ratio, management efficiency, product diversification, banking sector concentration, GDP dynamic and inflation rate change were scrutinized as dependent variables and differed only by proxy (ROAE and ROAA). The sample size was equal to 14,010 observations of 8 dependent variables each, constituting 112,080 distinctive data points.

The financial data for banks has been retrieved form Orbis Bank Focus (formerly Bankscope) and supplemented with macroeconomic data for each country provided by International Monetary Fund database.

The data has been compiled and enriched to omit year data strings if any independent variable was missing in order to analyze the final data with unbalanced panel data model.

Based on literature review, linear regression has been selected as a tool for assessment of factors influencing banks profitability. Literature review has revealed that the linear regression tool was widely utilized for that purpose (Bourke, 1989; Demirgüç-Kunt & Huizinga, 1999; Goddard et al., 2004; Molyneux & Thornton, 1992; Short, 1979). Similarly, to a number of called literature, data are structured as time-series which allow to minimize the impact of specific circumstances occurring in any of time-series period (year) on regression result.

Following models have been proposed.

$$ROAE_{ti} = \alpha_t + SIZE_{ti} + CAPITAL_{ti} + LIQUIDITY_{ti} + RISKAPETITE_{ti} + PRODUCTDIV_{ti} + GDP_{ti} \\ + INFLATION_{ti} + CONCENTRATION_{ti}$$

$$ROAA_{ti} = \alpha_1 + SIZE_{ti} + CAPITAL_{ti} + LIQUIDITY_{ti} + RISKAPETITE_{t\Box} + PRODUCTDIV_{ti} + GDP_{tj} \\ + INFLATION_{ti} + CONCENTRATION_{ti}$$

Where,

t – time-series (year)

i – bank

α_1 – constant

Findings

In the tables below results of regression analysis using between group panel models for proxies ROAE and ROAA are presented. F statistics for both models are statistically significant, implying that each independent variable considered in the models impacts the proxy.

Table 1: Model 1- Between-groups, using observations 1-4149

Dependent variable: ROAE

	<i>Expected correlation</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const		20.8915	2.5660	8.14	<0.0001	***
TOTALASSETS_LN	+	-0.1483	0.1444	-1.03	0.3046	
LIQUIDITY	+	-0.0013	0.0061	-0.21	0.8363	
RISKAPETITE	+	0.0123	0.1194	0.10	0.9181	
MAGEFFIC	-	-0.1403	0.0089	-15.85	<0.0001	***
PRODUCTDIV	-	-3.6811	1.5994	-2.30	0.0214	**
CONCENTRATION	+	-20.6009	6.2824	-3.28	0.0010	***
GDP	+	0.5065	0.2439	2.08	0.0379	**
INFLATION	+	-1.4875	0.4574	-3.25	0.0012	***
Mean dependent var		3.1625	S.D. dependent var		18.4428	
Sum squared resid		1325167	S.E. of regression		17.8910	
R-squared		0.0608	Adjusted R-squared		0.0589	
F(8, 4140)		33.4764	P-value(F)		1.52e-51	
Log-likelihood		-17849.63	Akaike criterion		35717.26	
Schwarz criterion		35774.23	Hannan-Quinn		35737.41	

Table 2: Model 2- Between-groups, using observations 1-4149

Dependent variable: ROAA

	<i>Expected correlation</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const		3.5665	0.2003	17.81	<0.0001	***
TOTALASSETS_LN	+	-0.0849	0.0113	-7.53	<0.0001	***
LIQUIDITY	+	0.0043	0.0005	9.07	<0.0001	***
RISKAPETITE	+	0.0055	0.0093	0.59	0.5556	
MAGEFFIC	-	-0.0204	0.0007	-29.47	<0.0001	***
PRODUCTDIV	-	-1.0673	0.1248	-8.55	<0.0001	***
CONCENTRATION	+	-1.8355	0.4904	-3.74	0.0002	***
GDP	+	0.0877	0.0190	4.61	<0.0001	***
INFLATION	+	-0.1594	0.0357	-4.46	<0.0001	***
Mean dependent var		0.3414	S.D. dependent var		1.5527	
Sum squared resid		8074	S.E. of regression		1.3966	
R-squared		0.1926	Adjusted R-squared		0.1910	
F(8, 4140)		123.4228	P-value(F)		5.4e-186	
Log-likelihood		-7268.46	Akaike criterion		14554.93	
Schwarz criterion		14611.90	Hannan-Quinn		14575.09	

Based on the regression analysis' results presented above, seven hypotheses have been verified. In both models, ROAE and ROAA, the F-test indicates that all dependent variables included in the models are statistically significant for an explanation of changes in the proxy.

MAGEFFIC, CONCENTRATION and INFLATION have been robustly confirmed at $p=0.01$ level to negatively impact bank's profitability in both models. GDP positively influences the profitability which was confirmed with ROAA model at $p=0.01$ significance, and $p=0.05$ for ROAE model. The PRODUCTDIV has been assessed to impact the profitability negatively with same statistical importance as GDP. With LIQUIDITY and LN_TOTALASSETS inconsistent results were observed in the two models. With ROAA as a proxy, the correlation is significantly ($p=0.01$) negative for LN_TOTALASSETS and significantly ($p=0.01$) positive for LIQUIDITY. No statistically significant correlations were assessed using the ROAE model. RISKAPETITE in both models was statistically insignificant to explain changes in profitability.

Conclusion

Some results were in line with previous findings. Risk appetite is positively linked with profitability, as well as growing economy. Findings regarding the impact of operational size were interesting, as in both models they were negative, contrary to the expected result. As natural logarithm of total assets has been used it may be a result of significant disadvantage of the greatest banks. This should be further confirmed with the linear approach and in case that such inconsistency of methods would be assessed it would constitute basis for analysis for reasons of the hypothetical disadvantage of the banks with significant size. The impact of increasing inflation has impacted profitability in the analyzed period negatively. As anticipated, the cost to income ratio is an important tool to explain profitability of the banks. Negative correlation observed for product diversification and market concentration was significantly stronger than for increasing cost to income ratio.

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