Analysis of the determinants of bank profitability in the context of Ireland during the period of 2012-2018: national vs. foreign banks

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Abstract

The aim of the present study is to determine the bank-specific, industry-specific and macro-specific determinants' impact of on the profitability indicators – Return on assets and Net Interest Margin of Irish retail banks for the post crisis period of 2012 - 2018.

The research sample includes data of Irish and Non-Irish retail banks, which were collected from banks' annual and semi-annual reports published on their official websites. Determinants indicators were collected from the Central Statistics Office of Ireland, European Central Bank and Statistical Data Warehouse. A multiple linear regression model was used for the purposes of the study. The empirical analysis covers the post crisis period of 2012-2018. Banks were divided into three groups: first - group of all bank samples together; second - Irish main retail banks with headquarters in Ireland, third - Non-Irish banks from euro area working in Ireland. The results are presented in tables and comparison analysis is provided.

Although there are many studies conducted in order to explain the impact of determinants on bank profitability from different angels, the present study is based on empirical analysis about bank profitability determinants in the context of Ireland. The research covers after crisis recovering period. Within the present research the author investigates whether such determinants as Common Equity Tier 1, specifically attributable to the Irish post crisis environment. Also, this research investigates whether other macroeconomic factors such as economic growth, inflation, bank concentration, and EURIBOR determine bank profitability, measured as Return on Assets and Net Interest Margin. The new determinant Residential Property Price Index is tested for being also one of the determinants of bank profitability in Ireland. In addition, this study provides a literature review of the relevant theoretical and empirical studies.

Keywords: Profitability determinants, net-interest margin, return on assets, banks, Ireland, CET1, HHI, Residential Property Price index, Euribor, GDP, CPI Inflation.

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Contents

Chapter 1.

Introduction

Banks have always played a valuable financial and intermediary role in the country economic development. They serve as the central channels of credit and savings distribution. Efficient banking sector should prove growth in profitability, increasing the volume of capital flowing from savers to borrowers and improving the quality of services for consumers (Sufian and Habibullah, 2012).

Recent global financial crisis contemplated the significance of banks' profitability for the stability of banking sector and economy as a whole, reflecting the need to maintain it under surveillance all the time. Poor financial performance of banks has negative repercussion on economy which can lead to economic failures and crises. Banking crisis results in financial crisis, which in turn leads to economic crisis (Boora and Kavita, 2018).[i] Banking sector profitability not only impacts stakeholders, but stable banks performance shows both financial strength and economic prosperity (Nevin, 2018). Therefore, their health is critical to the health of the economy in general.

One of the key challenges for any country is to assess the bank profitability and to find its main drivers (Fidanoski, F., Choudhry, M., Davidović, M. and Sergi, B. 2018). The difficulty is that as macroeconomic and legal environment changes, determinants of banking sector profitability might change as well (Alper, D. and Anbar, A. 2011). They are different during the crisis and post-crisis periods.

Due to global financial crisis and consequently, recent upsurge of bank failures and the deteriorating financial health of banking institutions, there is an increased need of bank profitability investigation by industry analysts and scholars (Boora and Kavita, 2018).

Irish context

Ireland had one of the most disruptive experiences of the last decades during the global financial crisis of 2008. Since that time, economy of Ireland has recovered impressively. However, being a small open economy, it still remains vulnerable to detrimental effects (Conefrey, O'Reilly, and Walsh, 2018).

After crisis, Central Banks and Basel Committee are revising old and developing new policies and regulations in order to protect financial institutions from unexpected losses. (Suganya and Kengatharan, 2018)[ii]. Sharon Donnery, CBI Deputy Governor,

in her presentation devoted to measures undertaken during a decade after crisis, disclosed that a huge change was made in banking sector, particularly in the institutional architecture, legislative framework and policy tools (Donnery, 2018).

In the Financial Stability Notes of Central Bank of Ireland related to Irish retail bank profitability over the last 15 years, it is stated that the profitability of Irish banks (with headquarter in Ireland) has been more volatile than that of banks from euro area countries working in Ireland. The analyst finds that profitability of Irish banks and its volatility is largely driven by the following two factors: (1) write backs and loan loss provisions; and (2) a cost/ yield effect on deposits and loans. Banks have benefited from funding reduced costs, and low interest rates during the post crisis period. Accordingly, those factors contributed to the bank profitability. However, there is a difference indicated in the research, particularly while Irish banks have benefited more from lower funding costs, for majority of banks in the euro area in recent years, these benefits diminished. The same report stated that given how the findings differed considerably between the sample of Non-IE OSII banks and Irish banks, further research into the competition and macroeconomic factors in the Irish context would be useful (Nevin, 2018).

Taking that into account a following question must be posed: what determinants influence banks' profitability differently given that they all serve the same territory of one country – Ireland?

In light of these developments, the purpose of the present study is to provide insights and to identify what determinants influence profitability of banks in Ireland during post crisis period of 2012-2018. Within the research the author investigates if Common Equity Tier 1, market concentration and other macroeconomic factors such as economic growth (GDP), inflation, interest rate (Euribor) and residential property price index impact bank profitability.

Within the frameworks of this study, Irish domestic banks determination refers to Allied Irish Banks, Permanent TSB and Bank of Ireland (Central Bank, 2018)[iii]. Foreign banking groups or foreign-owned resident banks are those that have a presence (either branch or bank) in the Republic of Ireland[iv]. In the context of the present research the sample of three banks were included for the empirical analysis – KBC Ireland, Ulster Bank Ireland and UniCredit bank Ireland[v].

As the measures determining profitability of the bank, analysts usually use return on assets (ROA), net interest margin (NIM) or return on equity (ROE). However, all of them to some extent focus on different aspects of profitability. ROE is a measurement of the profit amount generated by firm using equity. ROA focuses on profitability from operating activities using total assets (Suganya and Kengatharan, 2018). NIM measures asset productivity. For the purposes of this research ROA and NIM are used as determinants of bank profitability.

Identifying banks profitability determinants would be helpful for financial regulatory authorities and bank management as they work on creation of policies for the Irish banking sector. It is also of interest to analysts, investors, bank employees and other experts interested in the field of finance to make more informed decisions related to Irish banking performance, especially during the challenging Brexit period.

Research Aim and Objectives

The aim of the present research is to determine the bank-specific (capital adequacy ratio, CET1), industry-specific (market concentration, HHI) and macro-specific determinants' (economic growth, inflation, interest rate and property price change) impact of on the profitability indicators – Return on assets (ROA) and Net Interest Margin (NIM) of Irish retail banks for the post crisis period of 2012 – 2018.

The objectives for conducting the research are to:

- Identify and assess the main banks' profitability determinants in Ireland during the post crisis period of 2012-2018 with the focus of the groups of banks – domestic, foreign and all together.
- Expand the earlier works on the determinants of banking sector performance and to establish empirical evidence determinants of bank profitability in the context of Ireland during the post crisis period of 2012-2018.

Research Questions

Considering discussions above, in this paper the author pursues to answer the following questions:

1. Whether CET1 has negative and significant effect on the Irish Banks banking performance with the focus on three groups – all together/Irish banks/foreign banks.

2. Whether HHI has positive and significant effect on the Irish Banks banking performance with the focus on three groups – all together/Irish banks/foreign banks.
3. Whether GDP has positive and significant effect on the Irish Banks banking performance with the focus on three groups – all together/Irish banks/foreign banks.
4. Whether an Inflation has positive and significant effect on the Irish Banks banking performance with the focus on three groups – all together/Irish banks/foreign banks.
5. Whether Euribor has positive and significant effect on the Irish Banks banking performance with the focus on three groups – all together/Irish banks/foreign banks.
6. Whether Residential Property Price Index has positive and significant effect on the Irish Banks banking performance with the focus on three groups – all together/Irish banks/foreign banks.

Research Structure

The structure of the present research is as follows: the first part outlines the context and rationale of the study; second part is devoted to the review of literature and theories in the field of factors influencing banking sector and profitability indicators. The section also includes review of literature on methodology used in the similar research studies. The third part of the paper addresses the methodological part, more specifically: description of data sample, data collection and sources, variables included in the bank profitability models, model specifications, as well as limitations of the research. The fourth part presents analysis and research results. Finally, the fifth part draws conclusions and provides recommendations for future researches.

Research Method

In order to achieve the aim of the research and to answer questions set up within the research frameworks the quantitative methods of research, correlation, multiple regression analyses were used.

Chapter 2.

Literature review

Introduction to the Theories on bank profitability determinants

Theories on profitability determinants are mostly offered in literature and studies devoted to bank profitability factors. According to Rasiah (2010), bank profitability determinants theory in its broadest definition are divided into three main parts: internal and external determinants, bank profitability measures and hypotheses related to the bank profitability (Rasiah, D. 2010).

Thus, the purpose of this chapter is to review the studies that have been written on the different aspects of bank profitability. Onwards we will consider internal and external determinants that are represented by industry specific and macroeconomic determinants as well as hypothesis related to bank profitability.

HYPOTHESIS RELATED TO BANK PROFITABILITY

The banking profitability represents significant interest for the academic community, bank officials, and state authorities around the world (Witowschi and Raluca, 2013).

In addition to bank profitability determinants, there were several theories worked out in order to explain the relationship between profitability and market structure or its' absence. The following profitability theories are considered in the literature:

Structure Conduct Performance Hypothesis

The Structure Conduct Performance (SCP) Hypothesis suggests that bank behaviour in a market is defined by conditions of the market structure, specifically by the size and number of competitors and market entry conditions (Rasiah, 2010) In this context, many authors find confirmation and provide support for the SCP hypothesis. As such Bourke (1989), one of the first authors who studied bank profitability determinants found that concentration was positively related to return on assets.

Efficient Structure Hypothesis

According to Rasiah (2010) the Efficient Structure (ES) hypothesis, ability to generate higher profits explained by lower cost of production processes or saving on superior management that are more efficient in the large companies that increase in size and market share. Increase in size and market share leads to higher market concentration. Accordingly, under ES hypothesis the positive relationship between profits and market

concentration is traced. The hypothesis was criticized by many researchers who did not find confirmation of the hypothesis in their studies. Consequently, it was not clear whether the relationship between market share and profitability was long term or short-term.

Expense Preference Hypothesis

Under the Expense Preference hypothesis (EP) the company is maximizing profit through non-profit activities. Particularly, it increases staff expenditures, managerial remuneration and discretionary profit for which it has a positive preference. Bourke (1989) used empirical test to investigate the presence of the expense preference behaviour in banking. His findings do not support the expense preference hypothesis in banking (Rasiah, 2010).

Galbraith-Caves Risk Avoidance Hypothesis

The risk-aversion hypothesis was introduced for the first time in the industry by Galbraith and expanded by Cave. It is based on the theory that banks placed in more concentrated markets may choose to trade on less risk and safe portfolios. Hence, within most bank market structure studies, one of the possible explanations for reported low values for R Square is failure to include risk as an independent variable in the models to control for inter-bank differences in risk (Rasiah, 2010).

Literature review of empirical studies

There is a large and diverse number of empirical studies related to bank profitability and determinants of bank performance. Empirical literature on determinants of banks profitability can be divided into those focused on a signle country, region and/or groups of countries, and comparative studies of two or more countries or regions.

One of the first empirical studies on bank performance assessment was conducted by Short and Bourke (Short B., 1979; Bourke, 1988). Short in his paper assessed the dependence of the bank profit rates on concentration in the banking market (1979). Bourke reviewed the bank performance and assessed internal and external factors of profitability in 12 countries in North America, Europe, and Australia (1988).

There are studies on bank performance devoted to a single country: for the Czech Republic (Paleckova, 2016), Pakistan (Rashid, A. and Jabeen, S. 2016), Malaysia (Trofimov I. et al, 2018), Ireland (Nevin, 2018); and a group of countries of the

selected region: Central and Easten European countries (Antoun R., Coskun A., Georgievski B., 2018; Carparu B. and Ihnatov I.,2014; Bucevska, V. and Hadzi Misheva, B. 2017), EU 27 (Petria N., Carparu B., Ihnatov I., 2015); group of countries: Ireland, UK, Australia (Fitzpatrick T., McQuinn, 2008). Some of them are devoted to the comparison of bank performance of different regions, for example, emerging markets and advanced economies (Ghosh A., 2016) and some - assess specifically one or more determinants influencing bank profitability such as liquidity (Sahyouni, A. and Wang, M. 2018) or bank concentration (Bourke, 1989).

Irish banks' performance within different time frames is partially covered by investigations on European region or group of countries. In Fitzpatrick and McQuinn's study authors proposed to use inefficiency model of Battese and Coelli as a consistent and unified framework for exploring profit inefficiency scores of financial institutions using the samples of banks from Canada, UK, Australia and Ireland (Fitzpatrick T., McQuinn, 2008).

There is a Financial Stability Note of Central Bank of Ireland on the retail banking sector profitability in Ireland over the period 2003-2018. It was found that this study, being an industry note, explores and analyse general trends in profitability based on decomposition of profitability into its components. (Nevin, 2018)

Therefore, the purpose of the present study is to expand the existing literature on determinants influencing bank profitability in Ireland with the focus on the following bank groups: Irish all together, domestic and foreign for the post crisis period.

Increasing vulnerability of the banking system of Europe due to European and international shocks were highlighted in the Vallascas and Keasey's (2013) study. It was underlined that under the conditions of increasing likelihood of cross-border banking crises and in order to safeguard the systemic stability of European banking in the future, the need for regulatory reforms that focus on effective cross-border crisis management and resolution becomes acute.

In the following sections, we will consider, (1) literature review on banking profitability measures, (2) determinants used in numerous studies devoted to the factors influencing banks profitability and (3) their results and then move to the (4) methods used within those studies.

Banking Profitability measures and methods used in the literature

Introduction

The objective of this part of research is to present a literature review on banking profitability measures used within studies devoted to determinants of bank profitability, where bank profitability is used as a dependant variable within multiple regression analysis method of the research.

This part is devoted to the following research questions:

- What banking profitability measures suggested in the literature?
- What banking profitability measures are used by researchers while evaluating the determinants of bank profitability?
- What are the advantages and disadvantages of the accounting and market based Profitability measures?

In the context of the research questions, the sections presented in this part are devoted to banking profitability measures existed in the literature, accounting and market based bank profitability measures, the advantages and disadvantages of bank profitability measures, conclusion.

Banking profitability measures used in the literature

Bank performance or profitability's characteristics is actual subject for financial institutions around the world. But how to measure bank performance or profitability is very disputable question among business and academic community. In the European Central Bank paper of 2010 (European Central Bank, 2010) it is underlined that bank performance is bank capacity to generate sustainable profitability and the basic concepts of the performance are earnings, efficiency, risk-taking and leverage. It also identified three main categories of measures of performance: traditional measures of performance (ROA - Return on Assets, ROE - Return on Equity, Net interest Margin, Cost to income ratio) and market-based (Price-earnings ratio - PE, Total share return, Price-to-book value - PBV, Credit default swap) and additionally, economic measure of performance (Economic value added - EVA, RAROC Risk adjusted return on capital) (Socol A. and Dănuleţiu E. 2013).

Within the frameworks of this paper we consider only traditional measures, namely accounting and market-based bank profitability measures.

However, insight overview of the concept of performance generates different results depending on the interests of users of financial information who analyse the performance parameter, i.e - equity holders, banks' managers, employees etc. Such variation of banking performance interpretation needs opens different opinions and areas for discussion. In the range of this paper we use performance indicators that based on the capacity of banks to gain profit.

As Palečková (2016) pointed out in her work, the profitability is an important management performance factor in its strategic and leadership activities (Palečková, 2006).

So, as it was mentioned before, bank profitability can be measured through a number of ratios. Each ratio covers a different aspect of profitability. There is common distinction between market-based and accounting measures of bank profitability used in empirical studies.

Accounting based measures of bank performance generally based on data from financial statement and are measured by Return on Assets, Return on Equity or Net Interests Margin (Derbali, 2011). Market based measures are estimated based on daily stock return.

Return on Assets

The first accounting measure is the ROA being the ratio of net income and total assets, measures the bank ability to use efficiently its assets. As such, by many researchers, it is recognized to be one of the best single ratios for evaluating performance of the management. ROA evaluates management performance in converting assets into earnings. It is a widespread measure in empirical research that studies bank profitability (Palečková, 2006, Curry, Fissel, & Hanweck, 2008).

ROA reflects the management's ability to generate profits from the bank's investment resources (Hassan & Bashir, 2003).[vi] It shows how profitable a bank is in terms of using its total assets and how efficient bank management is in earnings generating from available assets.[vii] And as such it is recognized to be one of the best single ratios for evaluating the management performance by many researchers.

The useful variation of ROA is the return on average assets (ROAA), being an average of yearly values of assets measure, expresses more accurate performance than the end

year values. ROAA is also widely used by researchers (Petria et al, 2015[viii], Nevin, 2018).

Return on Equity (ROE)

Return on Equity (ROE) is a measure of financial performance, which focuses on the equity component of the investment. It estimates the net benefit that stockholders have received from capital investment (Rose and Hudgins, 2013). ROE relates the earnings left for equity investors after costs paid for debt service. ROE is calculated by net income divided by shareholders' equity. This ratio is measuring how effective management uses a company's assets to create profits for equity holders (Investopedia, 2019).

Jenkins admits that until now, most banks around the world use ROE as the main metric of profitability, saying that it is the most common measurement of banking profitability (Jenkins, 2011).[ix] This ratio indeed has been widely employed in existing studies while researching determinants of bank profitability (Wiyono and Rahmayuni, 2012; Almazari, 2014).

Again, the variation of ROE is return on average equity (ROAE) being an average yearly values of equity measure of a bank's ability to generate earnings from its assets and express more accurate performance than the end year values. ROAE were also used by some authors (Petria et al, 2015, Nevin, 2018).

Net interest income (NII) and net interest margin (NIM)

Net interest income (NIl) shows the amount by which the interest received from the loans exceeds paid interests on funds borrowed or deposits, in interest rate term, it represents the interest spread differential. Net interest margin (NIM), a measure of asset productivity represents the difference between the generated interest income and the interest paid out amount relative to interest earning assets (Palečková, 2016; Nevin, 2018).

Net interest income (NIl) shows the amount by which the interest received from the loans exceeds paid interests on funds borrowed or deposits, in interest rate term, it represents the interest spread differential. The net interest margin (NIM) provides a measure of asset productivity. (Palečková, 2016).

Many researchers use interest margin as a performance measure for banks. It is defined as the difference between interest income and expense divided by total assets (Kosmidou K. and Zopounidis C., 2008).

As an advantages of accounting profitability measures it should be underlined that they are readily observed, and are used as the most common measures of performance. It is also easy to use for benchmarking proposes. However, there are sufficient evidences that banks actively seek to improve performance on both dimensions (Pernell-Gallagher, K. 2015).

There is an evidence of the Report on EU Banking Structure (European Central Bank, 2010)[x] issued shortly after the financial crisis that ROE has provided misleading information in discriminating good banks from the bad ones over different phases of the financial crisis. Also the report has stated that although ROA, adjusted for leverage, is considered to be more reliable indicator of profitability of banks than ROE, it failed to provide any meaningful negative indication before the crisis (Saha A., Ahmad N. and Yeok S, 2016).

Market based and other bank profitability measures used in studies

Some studies also employ Economic Profit, Economic Value Added and cost to Income (Cost/Income) (Barth et al, 2012).

The efficient capital markets theory suggests that the market return is a valuable measure to determine the market's assessment of bank performance. Some studies use the stock return as market-based measure. The stock returns are calculated on a daily and annual basis accounting for the bank daily stock prices. Based on these variables different stock performance evaluation is undertaken.

It is recognized that share prices may already contain information, for example analyst opinion before official data on bank profitability published; therefore, share prices may reflect prompt and comprehensive measure of bank performance. On other hand, share prices may also be, similarly, influenced by other factors (Köster A. and Zimmermann J, 2017).[xi] Among Market based bank performance measures are Total Share Return, which is the ratio of dividends and increase of stock value over market stock price, PriceEarnings ratio, Price to Book Value ratio and others (Saha A., at al, 2016).

Conclusion

As a conclusion of the literature review, the prevalence of using of Return on Assets, Return on Equity and Net Interest Margin as indicators of bank profitability in the studies devoted to determinants influencing banks' performance should be underlined. They are employed as dependent variables, while economic bank-specific, industry or macroeconomic factors are used as explanatory variables and cover multitude of economic bank-specific, industry-specific or determinants of banks' profitability. Therefore, considering advantages of profitability measures, the author decided to use Net Interest Margin and Return on Assets in the present study.

Determinants of bank profitability

In the literature, it has been noted that the bank 'profitability factors are generally divided into two categories: internal, so called bank-specific factors and external, usually industry specific and macroeconomic determinants (Petria et al, 2015; Bourke, 1986). Some authors distinguish macroeconomic determinants such as inflation and economic growth into a third category (Carparu and Ihnatov, 2014; Antoun et al, 2018).

It is necessary to say that empirical results on bank determinants vary significantly depending on data sample included in the analysis as well as on time period under the review. However, there are common factors influencing banks' profitability like bank size, credit risk, management efficiency, liquidity risk, capital adequacy, inflation, economic growth, banking concentration that can be identified (Carparu and Ihnatov, 2014).

Internal determinants

The internal determinants such as liquidity, investment in subsidiaries and in securities, loans, overhead expenditure, non-performing loans represent management controllable factors. Other factors such as fixed deposits, savings, total capital and capital reserves, current account deposits, and money supply also recognized as playing a major role in influencing bank profitability(Rasiah, 2010).

According to many authors, the internal determinants can also be divided into Financial Statements variables and Non-financial statement variables. Financial Statements variables related to decisions which directly influence data in a balance sheet and profit and loss accounts (Guru and Bala, 1998; Guru, B., Staunton. J.,

Balashanmugam, 2002). Non- financial statement variables involve factors which do not directly impact the financial statements (Rasiah, 2010).

Number of hypotheses related to internal determinants influencing positively or negatively bank performance were considered within many studies. Some of internal determinants and how they impact profitability of banks will be highlighted in the paragraphs below.

Capital adequacy ratio

Capital adequacy ratio is a measurement of bank financial strength meaning the ability of the bank to carry unexpected losses. It is an essential mechanism to protect bank from solvency. The formula for estimation Capital Adequacy Ratio is represented as follow: (Tier One Capital + Tier Two Capital) x 100/ Risk Weighted Asset. In many studies, the positive relationship between capital adequacy ratio and financial performance of the banks was identified because of its ability to generate cheap profits and invest into quality assets. (Obamuyi, 2013)[xii]. However, there are studies, where researcher came to the conclusion that there is a negative relationship between capital adequacy ratio and profitability of bank (Swarnapali 2014)[xiii].

To have adequate capital according to the requirements is not only for banks to remain solvent, but also to avoid the failure of the financial system as whole and remain efficient while implementing its operational activities (Aggarwal and Jacques 2001).[xiv]

Financial crisis of 2007-2008 has clearly demonstrated how failure of one bank may negatively affect other banks and the economy as whole. To prevent repetition of crises or at lease to mitigate its consequences banks need to be controlled externally. It might prevent banks to adjust regulatory capital via risk-weighted assets (Marra and Steiner, 2016).[xv] In order to review and monitor the capital adequacy of banks the set of international standards was formulated and reformed by Basel Committee (Investopedia, 2019).[xvi] One of such requirements set up is Common Equity Tier 1 (CET1).

Common Equity Tier 1

CET1 is a Tier 1 capital adequacy ratio component, which mostly consists of common stock held by financial institution itself or another bank. It is expected that by 2019, all banks within EU should meet the required minimum CET1 ratio of 4.50% (Investopedia, 2019).[xvii]

So, CET1 measures the connections between capital adequacy and the bank risk-weighted assets. (Marra and Steiner, 2016).[xviii]

Within the present research we are going to examine if the Common Equity Tier 1 (CET1) influence significantly bank performance of Irish banks. There are only few researches that study CET1 and bank profitability. As such, the European Banking Study of 2018 called Navigating the Road Ahead – Market Trends & Strategic Options For European Banks, underlines that while CET1 now exceed minimum requirements, bank profits remain at historically low (European Banking Study, 2018).[xix]

Banks' sizes

The effect of the banks' sizes to bank profitability were also contradictory: whilst Seemule, M., Sinha, N. and Ndlovu, T. (2017)[xx] showed that bank size is positively related to profitability of bank in case of Botswana, Obamuyi (2013) in his work on Nigeria demonstrated negative effects.

Industry determinants

Determinants, which are outside of management control, are the external determinants of bank profitability. Among determinants impacting bank profitability are: Ownership, Financial Regulation, Market growth, Competitive conditions, Market Share Concentration (Rasiah, 2011)[xxi].

Bank ownership

Assessments of the determinant of private vs. public bank ownership were conducted in many studies (Trofimov I, Aris N, Kho Ying Ying J, 2018). In case of Swiss banks, the positive affect was rejected by Dietrich and Dietrich and Wanzenried (2011).

HHI Bank concentration

As it was presented earlier, according to the SCP hypothesis, more competitive market contributes to efficiency, and as consequence to positive effects on bank profitability. In order to evaluate the market structure impact on bank profitability, researchers usually use HHI as an indicator. In contrast, market structure which is more concentrated, impacts negatively efficiency and profitability of banks, because it creates market frictions that contribute to transactional costs and destroy intermediation efficiency of banks (Fidanoski, F., Choudhry, M., Davidović, M. and Sergi, B. 2018).[xxii]

Within the present research we are going to examine if Bank Concentration (HHI) influence significantly bank performance in the context of Ireland.

Macro-specific determinants

In order to see how macroeconomic factors affect bank profitability, the present study uses economic growth indicators such as GDP, inflation, Euribor, property price change index. Therefore the following parts are devoted to literature review on each of them and existed relationship between last and bank profitability.

Inflation

The effect of inflation on banking performance is widely researched by many authors. Many of them have found a positive and significant impact (Athanasoglou et al. 2006)[xxiii], Pasiouoras and Kosmidou (2007)[xxiv]. There are also studies, that revealed opposite results (Ben Naceur and Kandil, 2009[xxv], Boyd and Champ, 2006). The explanation was provided that the main bank activity is credit granting. Inflation would reduce the credit demand in the market, because inflation increases future uncertainty. The demand fall would bring credits decrease and impact bank performance accordingly (Nouaili et al, 2015).[xxvi]

Pervan et al. (2015) in his study based on research of determinants of Croatian bank profitability, came to the conclusion that inflation has no impact on bank profitability.

Business cycle

The positive impact of the development of economic activity, measured by the GDP on bank profitability was found in many studies and explained by the fact that a period of strong growth characterized by an increase in consumption and investment, and consequently rise in credits and banks performance (Arpa et al. , 2001[xxvii], Dietrich and Wanzenried, 2011).

Interest rate

Some studies on external determinants of bank profitability, found that interest rates have negative effect on profitability of banks in Malaysia in 1986-95 (Guru et al., 2002), while in the case of US banks, Chaudhry, M, Chatrath, A. and Kamath, R. (1995) find a positive impact of interest rates on bank profitability in 1970-80s.

According to the studies related particularly to EURIBOR it was revealed that it has a positive impact on profitability of bank in the research of Pervan et al. (2015) who

researched Croatian banks and Antoun et al, 2018, who researched banks of Central and Easten Europe.

According to Fidanovsky et al, (2018) based on assumption that low and stable inflation rate as well as sustainable economic growth represent goal of the national bank monetary policy, while assessing impact of EURIBOR on bank profitability, the impact of CNB monetary policy on banks' profitability we can assess indirectly (Fidanovsky et al , 2018).

Within our research, three months Euribor will be used as Interest rate factor.

Property Price Change

Property Price Change is a variable that have not been considered before. The reason for including this factor was based on the fact that during pre-crisis period, i.e in the years leading up to 2007, Irish house prices had become overvalued increasingly. This was considered as one of financial crisis causes. Thus, within the framework of our research the property Price Change Index will be included in the model as an external factor.

Conclusion

The following independent variables will be considered under the present study: Common Equity Tier 1 (CET1), HHI, Inflation, GDP, EURIBOR. They were selected as they are widely used in the studies on bank profitability determinants. Property Price Change Index was selected based on its cause-effect connection to financial crisis.

We expect that GDP would have positive impact on bank profitability as many researches confirm it. The effects of interest rate and inflation might be contradictory, depending on the period under review, central bank policy, bank's balance sheet.

Literature review on methodology

Scholars on bank profitability determinants employ different research methods. As such we can list balanced and unbalanced panels, cointegration models and many others. For example, in order to evaluate if bank-specific and macro-specific determinants had impact on bank profitability in Hong Kong Jiang et al. (2003) panel regression model by Jiang et al (2003)[xxviii] is used.

Regarding the sample of banks, it varies from ten to hundreds. Researchers usually use Bankscope as a source of bank data. For example, Antoun et al. (2010) conducted their study based on the data from Bankscope on 128 banks from nine Central and Eastern European countries. (Antoun et al, 2018). Also, studies covered different research periods and used a wide range of performance indicators to capture the effects on profitability measures. But it should be kept in mind while interpreting, that the macroeconomic determinants are sensitive and depend on the period under review (Fidanoski, et al, 2018)[xxix]

According to most empirical studies bank profitability is measured by NIM, ROA and ROE (Nevin, 2018, Capraru and Ihnatov, 2014).

Alternatively, ROAA as a method used by Nevin (2018), with it broken down into two measures in order to check the bank financial health: NIM being Net Interest Margin and NNIR is Net-Non-Interest Ratio. Based on results, the trend analyses were conducted (Nevin, 2018).

The return on average assets (ROAA) and return on average equity (ROAE) being an average yearly values of equity and assets measure of a bank's ability to generate earnings from its assets and express more accurate performance than the end year values. ROAA and ROAE were also used by some authors (Petria et al, 2015, Nevin, 2018).

Many researchers (in their methods of defining factors of banks' profitability use ROA, ROE, NIM as a measurement of bank profitability and within their empirical studies used the equation, where:

$$y=\alpha+X_1\beta_1+X_2\beta_2+X_3\beta_3+\varepsilon$$

Where Y, represent dependent variables ROA, ROE or NIM; X_1 stands for a vector internal factors of the bank; X_2 stands for a vector factors of a banking sector; X_3 stands for a vector of macroeconomic variables; ε stands for the error term; βi stands for the matrix of variable coefficients (Capraru and Ihnatov, 2014 Short 1979, Bourke 1989, Molyneux and Thornton, 1992, Dietrich and Wanzenried, 2011). NIM, ROA, ROE are dependant variables, and determinants of the bank profitability are independent.

Some analysts used CAMEL, which stands for capital adequacy, asset quality, management efficiency, earnings ability, and liquidity to evaluate bank - specific determinants (Antoun, et al 2018).

There are studies where researchers used simple linear regression to test the impact of all the independent variables on dependant variable separately. [xxx]

Conclusion of Literature Review

- For the purpose of our research we will employ a multiple linear regression. It is also in line with the reviewed literature. This type of function selection was made based on many similar studies, such us of Antoun et al (2018), Bourke (1989), Short (1979), Molyneux and Thornton (1992), Dietrich and Wanzenried (2011).
- As a conclusion of the literature review, the prevalence of using of Return on Assets, Return on Equity and Net Interest Margin as indicators of bank profitability in the studies devoted to determinants influencing bank performance should be underline. They are employed as dependent variables, while economic bank-specific, industry or macroeconomic factors are the explanatory variables that cover multitude of economic bank-specific, industry-specific or banks' profitability determinants. Considering advantages of profitability measures, the author decided to use Net Interest Margin and Return on Assets in the present study.
- Since the period under review is post-crisis 2012-2018, the author focused on independent variables that were widely researched and data available from open resources. Therefore, the following independent variables will be considered under review: Common Equity Tier 1 (CET1), HHI, Inflation, GDP, EURIBOR.
- Additionally, within the framework of our research Residential Property Price Index will be tested as a new independent variable.

HYPOTHESES

Based on the literature review of theoretical and empirical studies on bank internal and external profitability determinants and in line with our research aim, the following assumptions are to be tested in this study:

H0 1: The CET1 has a significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks.

H0 2: The HHI has a positive and significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks.

H0 3: The GDP has a positive and significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks.

H0 4: The Inflation has a positive and significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks.

H0 5: The Euribor has a positive and significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks

H0 6: The Residential Property Price Index has a negative and significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks.

Chapter 3.

Methodology

This chapter is devoted to the research philosophy, research approach and method including description of variables, data source and characteristics of variables, statistical methods employed. This chapter will also addresses the ethical consideration and limitations of the research.

RESEARCH PHILOSOPHY RESEARCH APPROACH

Present research is positioned within frameworks of positivism as a research philosophy and uses deduction as an approach to theory development.

The positivist researchers focus on empirical scientific method of research and design their work to get clear data uninfluenced by human interpretation or bias (Saunders, Lewis and Thornhill, 2009).[xxxi] So the research is mainly associated with observations and experiments, based on numerical data collected. Similarly, researchers of studies on determinants of bank profitability as well as of the present paper, basically, set hypothesis and based on empirical analysis came to the conclusion if hypothesis set up is true or false.

According to positivism researcher developed a set of hypotheses based on existed theory a, Depending on whether these hypotheses are confirmed or refuted partially or

in full, the results might lead to the further theory development or new research (Saunders, Lewis and Thornhill, 2009).[xxxii] Researcher would also have to remain detached and neutral from the research conducted and data gathered (Crotty 1998).[xxxiii]

As it was mentioned earlier deductive approach is deemed as appropriate for the present research development.

Deductive reasoning occurs when the conclusion is derived logically from a set of premises, the conclusion being true when all the premises are true (Ketokivi and Mantere 2010).

According to Saunders, Lewis and Thornhill, a deductive approach is often, used when research starts from reading of the academic literature and afterwards, a research strategy developed in order to test the theory (Saunders, Lewis and Thornhill, 2009).[xxxiv]

The present research aimed, based on the literature and theories existed on banks profitability determinants studies, to test the determinants and corresponding theories in the context of Ireland.

However, it is necessary to add that even if conclusion is supported by observations, it is not guaranteed as there might be limitations to the methods used within this study. (Saunders, Lewis and Thornhill, 2009).[xxxv]

There are several important deduction characteristics. First, researcher tries to explore and explain causal relationships between concepts and variables. To test this proposition quantitative data should be collected. The researchers usually use a highly structured methodology to facilitate replication. An important issue of the research is to ensure reliability. An additional important characteristic of deduction is that concepts need to be operationalised in a way that enables facts to be measured, often quantitatively. In our case, most variables that are needed within the research represent ratios: ROA, NIM, CET1. The final characteristic of deduction is generalisation. In order to be able to generalise it is necessary to have carefully selected enough sample size and for it (Saunders, Lewis and Thornhill, 2009).[xxxvi]

Sample size of our research is discussed in the following sections.

RESEARCH METHOD

In order to achieve the goal of the research and answer research questions quantitative analysis method is used.

A literature review of existing theories and studies, that was conducted as an integral part of this research showed extensive use of multiple regression in the studies devoted to determination of factors influencing bank profitability. Therefore, multiple regression was chosen as an appropriate quantitative method.

According to DeFusco, multiple linear regression allows us to determine the effect of more than one independent variables on a dependent variable (DeFusco et al, 2007)[xxxvii]. The correlation analysis will also be undertaken within the study.

Data sample

Within the frameworks of this study, the data will be consisting of three group of samples: all samples together, Irish banks and Non-Irish foreign banks. Irish domestic banks determination refers to Allied Irish Banks, Bank of Ireland and Permanent TSB[xxxviii]. Foreign-owned resident banks[xxxix] are foreign banking groups that have a presence (either bank or branch) in the Republic of Ireland[xl] - UlsterBank Ireland, KBC Ireland and UniCredit Ireland[xli]. Unfortunately for the purpose of empirical analysis in the context of the present research, the sample of Non-Irish banks includes only three banks – KBC Ireland, Ulster Bank Ireland and UniCredit Bank Ireland, due to limited availability of bank specific data on official websites. Most of foreign banks data are reported within their parent bank's consolidated reporting system.

The five retail banks that survived the crisis in Ireland and included into the present study are Bank of Ireland, AIB, Ulster Bank (owned by Royal Bank of Scotland), Permanent TSB and Belgian-owned KBC Bank Ireland. Nowadays, these five main banks operate some 680 branches and 3,400 ATMs for cash withdrawal nationwide (European Banking Federation, 2018).[xlii]

Data collection, Data source; Validity and Reliability

In order to implement the empirical analysis, there are several steps to conduct under the present research: collecting data on dependent variables; collecting data on independent variables; employment of multiple regression model; presenting analysis and discussions.

Further on all those steps are described.

Collecting dependent variable data

As the first stage, ROA, NIM for the research period 2012-2018 is collected from the data published annually and in half-year financial reports. While collecting data the author faced with constrains that not all foreign banks place ratio necessary for the purpose of the present study. Accordingly, where missing, determinants of profitability were calculated according to the formula presented below. Also, not all half-year data obtained. For two foreign banks, data is presented on annual based only. As results, there might be an issue related to the limitation of research and heteroskedasticity while employing multiple regression analysis.

Within the present study ROA and NIM is used as a bank profitability measures and represent a dependant variables Y.

Return on assets is an estimation of the Profit After Tax*100/Total Assets

Net interest margin is a Net Interest Income*100 /Earning Assets

These ratios were found from the bank's annual and half year reports published on company's website.

Collecting independent variable data

As a second step, data of independent variables, that might have impact on bank profitability, is collected. Banks specific factors' data such as CET1 are taken from banks annual/half-year report, industry specific factors and macroeconomics indicator such as GDP, inflation, HHI, Euribor rate are taken from the publicly available resources – Statistical Office of Ireland, World Bank, Central Bank of Ireland, OECD. Variables selection was based on review of studies, as most studies and data availability. Additionally, author is going to test a new variable, Residential Property Price Index.

Knowledge of those indicators allows us to employ statistical method – multiple regressions for making analysis and draw conclusions about the relationship between bank profitability indicators and factors influencing it.

The variables and their definitions are presented in the table below.

Symbol		Variables	Variable Definition	Source	Expected relation (+/-)
Dependent Variables					
ROA	y	Return on Assets	ROA is the ratio of net income and total assets		
NIM	y	Net Interest Margin	NIM represents the difference between the interest income generated and the amount of interest paid out relative to (interest earning) assets	Banks website	
Independent Variable					
Bank specific					
CET 1	x1	Common Equity Tier 1	CET1 is a component of capital adequacy ratio and measures the connections between capital adequacy and the banks' risk-weighted assets	Banks website	+/-
Banking system specific factors (external)					
HHI	x2	Herfindahl-Hirschman Index (HHI) for Irish Mortgage Credit	"The Herfindahl-Hirschmann Index (HHI) is a measure of the level and trend of concentration in a particular market. The HHI is calculated by squaring each entity's market share (relative to the total market), and summing the values attained. A higher index represents a more concentrated, or less competitive lending market. A decrease indicates the opposite." Central Bank	Central Bank of Ireland	+/-
Macroeconomic factors (external)					
Three month Euribor rate	x3	Three month Euribor rate	"Euribor is a reference rate that is constructed from the average interest rate at which eurozone banks offer unsecured short-term lending on the inter-bank market(Investopedia). Euribor 3-month - Historical close, average of observations through period - Euro, provided by Reuters" European Central Bank	European Central Bank, Statistical Data Warehouse	+/-
Inflation (CPI)	x3	Annual growth rate	"The Consumer Price Index (CPI) measures the average change in the price of consumer goods and services purchased by private households. The inflation calculator is designed to calculate the percentage change in the CPI between two periods of time" Central Statistics Office	Central Statistics Office	+/-
GDP growth (annual %)	x3	Gross Domestic Product	"Gross Domestic Product at market prices is equal to Gross Value Added at basic prices plus taxes on products less subsidies on products. It represents total expenditure on the output of final goods and services produced in the country ("final" means not for further processing within the country) and valued at the prices at which the expenditure is incurred"Central Statistics Office	Central Statistics Office	+/-
Residential Property Price Index (Base Jan 2005 = 100)	x3	Residential Property Price Index (Base Jan 2005 = 100)	"Residential Property Price Index is a measure of the change in the average level of prices paid for residential properties sold in Ireland, mix-adjusted to discount the effects of varying property characteristics"Central Statistics Office	Central Statistics Office	+/-

Employment of multiple regression model

Using ROA and NIM as dependant variables, and determinants of bank profitability as independent varialbe, the multiple regression equation will be employed as a method to find out if factors impact the profitability.

So the multiple regression equation is $y = \alpha + X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + \varepsilon$

Where Y, represent dependent variables ROA and NIM;

X_1 stands for a vector bank specific factors of the bank; X_2 stands for a vector industry factors of a banking sector; X_3 stands for a vector of macroeconomic variables; ε stands for the error term; βi stands for the matrix of variable coefficients (Capraru and Ihnatov, 2014).

Since we have only one bank specific (internal) factor X_1, represented by CET1 and only one industry factor X_2, represented by HHI, as, and several macroeconomic factors X_3, of which we have several indicators to test, we execute equations with unchanged X_1, bank specific factor represented by CET1 and X_2, as industry factor represented by HHI, and macroeconomic factors X_3, will be every time changed as each macroeconomic factor will be tested separately one by one.

Each sample group will be done separately in order to find out to what extent each factor influences profitability of bank depending on all banks working in Ireland and groups of banks based on their domicile (domestic or foreign).

Therefore, for the purpose of our research we are going to execute the following equations for three groups of banks:

For all banks	
NIM as Profitability Measure	ROA as Profitability Measure
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$
For Irish	
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$
For Non-Irish	
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$
$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$	$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$

Presenting analysis and discussions

The results will be summarized and presented in the dissertation.

Ethical consideration

Due to using of data from publicly available official websites of the sample banks as well as Central statistical office, Central Bank of Ireland, ECB, World Bank, the present research does not pose any ethical concerns.

Limitations of the research

Data limitations

- Data availability: data for dependant variables ROA and NIM were not available equally for all banks under consideration. In case there was no ratio available from the annual reports, it was estimated according to the widely accepted standards: NIM as Net Interest Income*100 /Earning Assets and ROA as Profit after Tax*100/Total Assets.
- Data for two foreign banks were only available on annual basis while for the rest of banks data is available on annual and half year basis. Heteroskedasticity might be an issue within multiple regression analysis.
- The sample size of foreign banks was limited due to limited data available. Most of foreign banks data are reported within their parent bank consolidated reporting system

Time period constrain

- Only relatively small time period which covers post-crisis period 2012-2018 is considered within the present research. Accordingly, number of observations is also limited

Model constrains

- Only limited number of indicators are used in the frameworks of the present study. The models are based only on three indicators each time without consideration of other factors
- Parameters instability should be considered while doing assumptions and interpret the results based on regression analysis. Regression relations can change over time (Imdadulah et al., 2016)
- Regression analysis might face with multicollinearity, heteroskedasticity and autocorrelation of data, which impact estimation of regression analysis and results could become imprecise and unreliable (DeFusco et al, 2007)[xliii]

Chapter 4.
Reporting the results

In this chapter the results of regression and correlation analysis are presented. Estimations are summarised in the tables and explained. The full tables with more details are presented in the attachment of the present work. It should be underlined that we accept results at the 0.05 level of significance.

NIM as a predictors of bank profitability

Model 1. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and GDP

Figure 1.

$Y(NIM) = \alpha + \beta 1\ X1(CET1) + \beta 2\ X2(HHI) + \beta 3\ X3(GDP) + \varepsilon$	All banks together Group Model*			Irish Banks Model			Non-Irish Banks Model		
	B	Std. Error	Sig.	B	Std. Error	Sig.	B	Std. Error	Sig.
(Constant)	-1.789	1.747	0.310	-1.229	1.558	0.435	-7.552	8.161	0.364
CET 1	**-0.053**	**0.005**	**0.000**	**-0.069**	**0.028**	**0.019**	**-0.057**	**0.009**	**0.000**
HHI	0.001	0.001	0.227	0.001	0.001	0.376	0.004	0.004	0.325
GDP	**0.014**	**0.003**	**0.000**	**0.017**	**0.003**	**0.000**	0.008	0.008	0.306
R Square	0.66			0.551			0.631		
Observations	66			39			26		

A multiple linear regression was calculated to predict NIM based on CET1, bank concentration - HHI, and GDP. The highest quality capital ratio, Common Equity Tier 1, CET1 has a negative and significant impact on profitability of bank measured as NIM for all banks working in Ireland, showing significance in all three tested groups, based on their difference on domicile. GDP has a positive and significant effect on Bank Profitability measured as NIM for 'all banks working in Ireland' and on 'Irish Banks' groups and have not showed an effect on Non-Irish Banks Profitability measured as NIM. It should be taken into account that these results are only valid when performance is measured by NIM and in absence of other factors.

Model 2. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and CPI Inflation

Figure 2.

Y(NIM) = α + β1 X1(CET1)+ β2 X2(HHI)+ β3 X3(CPIInflation)+ ε	All banks together Group Model			Irish Banks Model			Non-Irish Banks Model		
	B	Std. Error	Sig.	B	Std. Error	Sig.	B	Std. Error	Sig.
(Constant)	1.027	12.078	0.932	-12.730	14.593	0.3890	26.887	24.615	0.286
CET 1	**-0.047**	**0.006**	**0.000**	-0.001	0.032	0.9660	**-0.047**	**0.010**	**0.000**
HHI	**0.004**	**0.001**	**0.000**	**0.002**	**0.001**	**0.0450**	**0.009**	**0.002**	**0.001**
CPIInf	-0.076	0.129	0.561	0.092	0.157	0.5630	-0.426	0.250	0.102
R Square	0.527			0.233			0.656		
Observations	66			39			26		

A multiple linear regression was calculated to predict NIM based on Capital ratio - CET1, bank concentration - HHI, and CPI Inflation. The highest quality capital ratio, Common Equity Tier 1, CET1 has a negative and significant impact on profitability of bank measured as NIM for the group 'all banks together' group and Non-Irish banks Group. Under this model we also should underline that bank concentration, measured as HHI has a positive and significant impact on profitability of bank measured as NIM for all three tested groups. CPI Inflation found to have no significant effect on profitability of bank. It should be taken into account that this result is only valid when profitability is measured by NIM and in absence of other factors.

Model 3. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and interest rate

Figure 3.

Y(NIM) = α + β1 X1(CET1)+ β2 X2(HHI)+ β3 X3(EuriborThreeMonth)+ ε	All banks together Group Model			Irish Banks Model			Non-Irish Banks Model		
	B	Std. Error	Sig.	B	Std. Error	Sig.	B	Std. Error	Sig.
(Constant)	2.647	3.013	0.383	6.243	3.485	0.0820	-9.799	7.605	0.210
CET 1	**-0.049**	**0.006**	**0.000**	-0.046	0.031	0.1460	**-0.055**	**0.009**	**0.000**
HHI	0.000	0.001	0.918	-0.002	0.002	0.2500	0.006	0.004	0.122
EuriborThreeMonth	**-1.192**	**0.348**	**0.001**	**-1.585**	**0.463**	**0.0020**	-0.486	0.615	0.437
R Square	0.599			0.416			0.574		
Observations	66			39			26		

A multiple linear regression was calculated to predict NIM based on Capital ratio - CET1, bank concentration - HHI, and interest rate, measured as Euribor. The highest quality capital ratio, Common Equity Tier 1, CET1 has a negative and significant impact on profitability of bank measured as NIM for 'all banks working in Ireland' and 'Non-Irish Banks' groups. Under this model interest rate, measured as Three-month Euribor has a negative and significant effect on profitability of bank measured as NIM for 'all banks working in Ireland' and 'Irish Banks' groups. It should be taken

into account that this result is only valid when profitability is measured by NIM and in absence of other factors.

Model 4. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and Resident property price Index

Figure 4.

Y(NIM) = α + β1 X1(CET1)+ β2 X2(HHI)+ β3X3(ResPropPriceIndex)+ ε	All banks together Model			Irish Banks Model			Non-Irish Banks Model		
	B	Std. Error	Sig.	B	Std. Error	Sig.	B	Std. Error	Sig.
(Constant)	-1.924	1.725	0.269	-1.863	1.543	0.2350	-2.120	11.723	0.858
CET 1	**-0.053**	**0.005**	**0.000**	**-0.06**	**0.028**	**0.0370**	**-0.058**	**0.009**	**0.000**
HHI	0.001	0.001	0.211	0.001	0.001	0.2140	0.001	0.006	0.828
ResPropPricInd	**0.023**	**0.005**	**0.000**	**0.026**	**0.005**	**0.0000**	0.023	0.020	0.264
R Square	0.663			0.535			0.634		
Observations	66			39			26		

A multiple linear regression on Figure 4. was calculated to predict NIM based on Capital ratio - CET1, bank concentration - HHI, and Resident property price Index. The highest quality capital ratio, Common Equity Tier 1, CET1 confirmed its a negative and significant impact on profitability of bank measured as NIM for all three groups. Under this model Residence property price Index has a positive and significant effect on profitability of bank measured as NIM for 'all banks working in Ireland' and 'Irish Banks' groups. It should be taken into account that this result is only valid when profitability is measured by NIM and in absence of other factors.

ROA as predictor of bank profitability

Model 1. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and GDP

Figure 1.

Y(ROA) = α + β1 X1(CET1)+ β2 X2(HHI)+ β3 X3(GDP)+ ε	All banks together Model			Irish Banks Model			Non-Irish Banks Model		
	B	Std. Error	Sig.	B	Std. Error	Sig.	B	Std. Error	Sig.
(Constant)	1.716	7.875	0.828	5.240	3.816	0.178	-51.756	44.667	0.258
CET1	0.006	0.024	0.811	-0.048	0.069	0.486	0.029	0.050	0.567
HHI	-0.003	0.004	0.490	-0.004	0.002	0.054	0.024	0.023	0.306
GDP	**0.032**	**0.013**	**0.013**	**0.031**	**0.008**	**0.001**	-0.007	0.044	0.869
R Square	0.124			0.307			0.166		
Observations	66			39			26		

A multiple linear regression on Figure 4. was calculated to predict Bank Profitability measured as ROA based on Capital ratio - CET1, bank concentration - HHI, and GDP. GDP showed to have a positive and significant effect on ROA for 'all banks working in Ireland' and on 'Irish Banks' groups and have not showed an effect on Non-Irish Banks Profitability. It should be taken into account that this result is only valid when bank profitability is measured by ROA and in absence of other factors.

It should be taken into account that a coefficient of variation, R^2, called also goodness of fit measure for the linear regression models (Fusco), presented in the table (as RSquare), shows results for three groups: 0.149 for 'All Banks Together' group model, 0.307 for Irish Banks Model and 0.166 for Non -Irish Banks Model. These results suggest that only 14,9 %, 30.7 and 16,7% accordingly of total variables explained by a linear model. The low R^2 might occur when independent variables are correlated even slightly. We test ROA predicted models and visually through graphs, (SPSS *ZRESID*ZPRED), confirmed appearance of heteroskedasticity in the model. Graphs for ROA prediction models are presented in attachments within regression model estimations. Thus, we assume that estimation of regression analysis might be imprecise and unreliable (DeFusco et al, 2007)[xliv].

Model 2. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and Inflation CPI

Figure 2.

Y(ROA) = α + β1 X1(CET1)+ β2 X2(HHI)+ β3 X3(CPIInflation)+ ε	All banks together Model			Irish Banks Model			Non-Irish Banks Model		
	B	Std. Error	Sig.	B	Std. Error	Sig.	B	Std. Error	Sig.
(Constant)	-10.155	48.484	0.835	-39.877	31.650	0.216	118.875	135.303	0.389
CET1	0.018	0.024	0.449	0.072	0.070	0.309	0.058	0.053	0.287
HHI	0.003	0.004	0.411	-0.002	0.003	0.407	0.025	0.013	0.075
InflationCPI	0.025	0.519	0.962	0.429	0.340	0.216	-1.707	1.373	0.226
R Square	0.032			0.073			0.218		
Observations	66			39			26		

A multiple linear regression on Figure 4. was calculated to predict Bank Profitability measured as ROA based on Capital ratio - CET1, bank concentration - HHI, and Inflation CPI. It seems that none of those factors have significant effect on ROA, as a Bank Profitability measure. Such assumption is only valid when performance is measured by ROA and in absence of other factors.

Model 3. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and Interest rate

Figure 3.

Y(ROA) = α + β1 X1(CET1)+ β2 X2(HHI)+ β3 X3(EuriborThreeMonth)+ ε	All banks together Model			Irish Banks Model			Non-Irish Banks Model		
	B	Std. Error	Sig.	B	Std. Error	Sig.	B	Std. Error	Sig.
(Constant)	7.852	12.922	0.546	11.312	8.575	0.195	-38.851	41.192	0.355
CET1	0.015	0.024	0.519	0.025	0.077	0.747	0.026	0.049	0.594
HHI	-0.004	0.006	0.529	-0.005	0.004	0.177	0.018	0.020	0.373
EuriborThreeMonth	-2.177	1.491	0.149	-1.750	1.139	0.133	-0.776	3.328	0.818
R Square	0.064			0.092			0.167		
Observations	66			39			26		

A multiple linear regression on Figure 3. was calculated to predict Bank Profitability measured as ROA based on Capital ratio - CET1, bank concentration - HHI, and Interest rate, represented by three-month Euribor. It seems that none of those factors have significant effect on ROA, as a Bank Profitability measure. Such assumption is only valid when performance is measured by ROA and in absence of other factors.

Model 4. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and Residence Property Price Index

Figure 4.

Y(ROA) = α + β1 X1(CET1)+ β2 X2(HHI)+ β3X3(ResPropPriceIndex)+ ε	All banks together Model			Irish Banks Model			Non-Irish Banks Model		
	B	Std. Error	Sig.	B	Std. Error	Sig.	B	Std. Error	Sig.
(Constant)	2.183	7.723	0.778	4.602	3.578	0.207	-76.170	64.107	0.247
CET1	0.005	0.023	0.824	-0.046	0.065	0.486	0.034	0.050	0.502
HHI	-0.003	0.004	0.415	**-0.004**	**0.002**	**0.048**	0.037	0.034	0.281
ResProPriceIndex	**0.059**	**0.021**	**0.006**	**0.053**	**0.012**	**0.000**	-0.057	0.108	0.606
R Square	0.142			0.359			0.175		
Observations	66			39			26		

A multiple linear regression on Figure 4. was calculated to predict ROA based on Capital ratio - CET1, bank concentration - HHI, and Residence Property Price Index. The Residence Property Price Index has a negative and significant effect on profitability of bank measured as ROA for 'all banks working in Ireland' and on 'Irish Banks' groups and have not showed an effect on Non-Irish Banks Profitability. HHI has a negative and significant effect on profitability of bank measured as ROA for

'Irish Banks' groups. It should be taken into account that this result is only valid when bank profitability is measured by ROA and in absence of other factors.

Correlation

Correlation analysis was done in SPSS through the Person correlation tool. Within Person correlation analysis presented on the Figure 8.

Correlations

		NIM	ROA	CET1	HHI	GDP	InflationCPI	EuriborThree Month	ResProPrice Index
NIM	Pearson Correlation	1	0.131	-.609**	0.237	.316**	0.065	-.315**	.325**
	Sig. (2-tailed)		0.290	0.000	0.053	0.009	0.601	0.009	0.007
	N	67	67	67	67	67	67	67	67
ROA	Pearson Correlation	0.131	1	0.128	0.153	.341**	0.095	-0.229	.363**
	Sig. (2-tailed)	0.290		0.301	0.216	0.005	0.446	0.062	0.003
	N	67	67	67	67	67	67	67	67
CET1	Pearson Correlation	-.609**	0.128	1	0.236	.310*	0.170	-.244*	.301*
	Sig. (2-tailed)	0.000	0.301		0.054	0.011	0.168	0.047	0.013
	N	67	67	67	67	67	67	67	67
HHI	Pearson Correlation	0.237	0.153	0.236	1	.631**	.562**	-.840**	.624**
	Sig. (2-tailed)	0.053	0.216	0.054		0.000	0.000	0.000	0.000
	N	67	67	67	67	67	67	67	67
GDP	Pearson Correlation	.316**	.341**	.310*	.631**	1	.411**	-.837**	.973**
	Sig. (2-tailed)	0.009	0.005	0.011	0.000		0.001	0.000	0.000
	N	67	67	67	67	67	67	67	67
InflationCPI	Pearson Correlation	0.065	0.095	0.170	.562**	.411**	1	-.508**	.411**
	Sig. (2-tailed)	0.601	0.446	0.168	0.000	0.001		0.000	0.001
	N	67	67	67	67	67	67	67	67
EuriborThreeMonth	Pearson Correlation	-.315**	-0.229	-.244*	-.840**	-.837**	-.508**	1	-.779**
	Sig. (2-tailed)	0.009	0.062	0.047	0.000	0.000	0.000		0.000
	N	67	67	67	67	67	67	67	67
ResProPriceIndex	Pearson Correlation	.325**	.363**	.301*	.624**	.973**	.411**	-.779**	1
	Sig. (2-tailed)	0.007	0.003	0.013	0.000	0.000	0.001	0.000	
	N	67	67	67	67	67	67	67	67

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

We found following results from the correlation table:

1. There is a strong negative correlation between the following variables:

CET1 and NIM (-0,609); HHI and Three Month Euribor (-0.840), GDP and Euribor (-0.837),

2. There is a strong positive correlation between the following variable: HHI and GDP (0.631); HHI and Inflation (0,562); GDP and Residential Property Price Index (0,973) Residential Property Price Index(0,624) and HHI

Conclusion

Based on examination of researched groups, the following determinants were identified as impacting bank profitability measures:

Group 'All banks together'	
NIM	ROA
Positive impact: GDP, HHI, Residential Property Price Change Index Negative impact: CET1, EURIBOR No impact: CPI Inflation	Positive impact: GDP, Residential Property Price Change Index Negative impact: No impact: CET1, CPI Inflation, HHI, EURIBOR
Group 'Irish banks'	
NIM	ROA

Negative impact: CET1, EURIBOR Positive impact: GDP, HHI, Residential Property Price Change Index No impact: CPI Inflation	Positive impact: GDP, Residential Property Price Change Index Negative impact: No impact: CET1, CPI Inflation, HHI, EURIBOR
Group 'Non-Irish banks'	
NIM	ROA
Positive impact: GDP Negative impact: CET1, HHI No impact: EURIBOR, CPI Inflation, Residential Property Price Change Index	Positive impact: Negative impact: No impact: CET1, HHI, EURIBOR, CPI Inflation, Residential Property Price Change Index

Chapter 5.

Discussion

In this part we will discuss and interpret our results in connection with literature reviewed within the present study. We are going to discuss each factor separately, focusing on researched group.

CET 1

An essential mechanism to protect banks from solvency is capital adequacy as it is recognized that banking is among the riskiest businesses in the financial market (Lotto, 2018).[xlv]

One of the tasks under this paper was to examine how Common Equity Tier 1 (CET1) impact bank profitability. Poor capital ratios proved to be one of the major shortcomings during financial crisis. In terms of Ireland Sharon Donnery, CBI Deputy Governor, in her presentation devoted to measures undertaken during a decade after crisis time, disclosed that that since the end of 2014, much progress has been made, in terms of the fully loaded CET1 ratio of Significant Institutions in Ireland, as it has increased to 17.7 per cent at end-2017 from 9.4 per cent since 2014 (Donnery, 2018).

As a result of our test, it was found that the highest quality capital ratio, Common Equity Tier 1, CET1 has a negative and significant effect on Bank Profitability measured as NIM for all banks working in Ireland, showing significance in all three tested groups. According to the correlation analysis strong negative relationship is found between NIM and CET 1 with the coefficient equals to -0.6.

There are studies of Swarnapali (2014) in Sri Lanka and Zhang and Dong (2011) that found a negative relationship between capital adequacy ratio and bank profitability. However, as it was mentioned before there are only few researches that studied CET1 and bank profitability. As such, the European Banking Study of 2018 called Navigating the Road Ahead – Market Trends & Strategic Options For European Banks, underlines that while CET1 now exceed minimum requirements, banks' profits remain at historically low.[xlvi] Even though CET1 has a negative effect on bank profitability, we recognize its importance on the overall bank stability taking into account the heavy consequences of the recent financial crisis on Ireland.

GDP

Many empirical results show that economic growth has a positive and significant impact on bank performance, measure by both NIM and ROA performance indicators. This confirms our initial intuition that favourable business cycle effects have a positive impact on bank performance (Rogers Antoun at al, 2018)

According to our results GDP has a positive and significant effect on Bank Profitability measured as NIM for 'all banks working in Ireland' and on 'Irish Banks' groups and have not showed an effect to Non-Irish Banks Profitability measured as NIM.

As we expected and it is consistent with the results of Pervan et al. (2015) who examined Croatian banks and Rogers Antoun at al, (2018), who tested banks of Central and Eastern Europe as well as majority of other researchers (Nouaili et al, 2015).

Therefore, we can conclude that the growth and stable and increasing economic growth prospects bank performances in Ireland. We also assume that Irish banks mostly oriented on local retail market while foreign banks serve transnational companies.

Concentration, measured as HHI

In the model of the multiple linear regression where it was intended to predict NIM based on Capital ratio - CET1, bank concentration - HHI, and CPI Inflation, it was found that concentration, measured as HHI has a positive and significant effect on Bank Profitability measured as NIM for all three tested groups. As such Bourke

(1989), one of the first authors who studied bank profitability determinants found that concentration was positively related to return on assets.

Our results confirm the structure -conduct performance hypothesis and in line with the work of Gilbert (1984) and Antoun et al (2018).

Residence Property price Index

Residence Property price Index was chosen due to it's the fact that one of the critical weaknesses during pre -crisis period was concentration of bank assets in property. Thus, we wanted to test if price change impact bank profitability. Residence Property price Index has a positive and significant impact on bank performance all banks working in Ireland' and 'Irish Banks' groups. Residence Property price Index was new factor that author was trying to test within the present research. It was also found that Residence Property price Index has strong correlation relationship with GDP. It might also brings us to the conclusion that all factors that strongly correlated with GDP, such as GNP, Residence Property price Index might also have effect on bank profitability. Since concentration of bank assets in property became a problem pre-crisis period, i.e in the years leading up to 2007 where Irish house prices had become overvalued increasingly, it is useful to find that Residence Property price Index has a positive and significant impact on bank performance all banks working in Ireland' and 'Irish Banks' groups and further research on this issue might be useful.

Inflation CPI

Within model constructed, it was found that Inflation CPI has no significant impact on bank performance Bank Profitability measured by both ROA and NIM of all three banks groups. It should be taken into account that this result is only valid when performance is measured by NIM and in absence of other factors. Our results are similar to the same of Pervan et al. (2015) In his study he based on research of determinants of Croatian bank profitability and came to the conclusion that inflation has no impact to bank profitability.[xlvii] Antoun et al. also came to the conclusion that inflation has no significant impact into bank profitability (Antoun et al (2018).

The effect of inflation on banking performance is extensively researched by many authors. Many of them have found a positive and significant impact (Athanasoglou et al. 2006)[xlviii], Pasiouoras and Kosmidou (2007)[xlix]. There are also studies, that revealed opposite results (Ben Naceur and Kandil, 2009[l], Boyd and Champ, 2006).

The explanation was provided that the main banks activity of is the granting of credit. Inflation would reduce the credit demand in the market, because inflation increases future uncertainty. The demand fall would bring credits decrease and performance accordingly (Nouaili et al, 2015).

Three-month Euribor

According to our results Three-month Euribor has a negative and significant impact on bank performance all banks working in Ireland' and 'Irish Banks' groups. Euribor has no significant impact on bank performance Bank Profitability measured as ROA of all three banks groups.

We assume that studies devoted to impact of interest rate mainly depend on period under review. It should be also noted that different countries would have different results while study effect of inflation into bank profitability.

According to some of them related particularly to EURIBOR it was revealed that it has a positive impact on profitability of bank in the research of Pervan et al. (2015) who researched Croatian banks and Antoun et al, 2018, who researched banks of Central and Easten Europe.[li]

According to Fidanovsky et al, (2018) based on assumption that low and stable inflation rate as well as sustainable economic growth represent goal of the national bank monetary policy, while assessing impact of EURIBOR on bank profitability, the impact of CNB monetary policy on banks' profitability we can assess indirectly (Fidanovsky et al , 2018).[lii]

Conclusion

The lesson learned from the recent financial crisis constantly reminds that bank performance and efficiency is a pre-requisite for financial stability and global economic development as whole (Fungacova et al. 2014). Over the past years, bank performance in European countries, has been widely investigated. Irish banks' performance within different time frames was partially covered by investigations on European region or group of countries.

The purpose of the present research was to expand the existing literature on the determinants influenced banks' profitability in Ireland with the focus on banks'

groups: Irish all together, domestic and foreign to the post crisis period based on multiple regression analysis. Therefore, our major findings illustrate the following in accordance with hypothesis set up:

H0 1: The CET1 has a significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks.

Fail to reject.

The highest quality capital ratio, Common Equity Tier 1 has a negative and significant effect on Bank Profitability measured as NIM for all banks working in Ireland, as this requirement covers all banks within EU.

H0 2: The HHI has a positive and significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks.

Fail to reject.

In the model of the multiple linear regression where it was intended to predict NIM based on Capital ratio - CET1, bank concentration - HHI, and CPI Inflation, it was found that market concentration, measured as HHI has a positive and significant effect on Bank Profitability measured as NIM for all three tested groups. Our results confirm the structure - conduct performance hypothesis.

H0 3: GDP has a positive and significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks.

Fail to reject for all together/Irish banks and Reject for foreign banks.

GDP has a positive and significant effect on Bank Profitability measured as NIM for 'all banks working in Ireland' and on 'Irish Banks' groups and have not showed an effect to Non-Irish Banks Profitability. GDP was found to has a weak positive and significant effect on ROA for 'all banks working in Ireland' and on 'Irish Banks' groups and have not showed an effect to Non-Irish Banks Profitability. Banks operate by paying depositors to open bank accounts and turning around and lending this money out to other people or businesses. We can conclude that banks in Ireland would benefit from stable and increasing economic growth. Therefore, we can conclude that the growth prospects matter to bank performances.[liii] We also assume that Irish banks

mostly oriented on local retail market while foreign banks serve transnational companies.

H0 4: The Inflation has a positive and significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks.

Reject.

Within model constructed, it was found that Inflation CPI has no significant impact on bank performance Bank Profitability measured by both ROA and NIM of all three banks groups. It should be taken into account that this result is only valid when performance is measured by NIM and in absence of other factors.

H0 5: Euribor is has a positive and significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks.

Fail to reject for all together/Irish banks and Reject for foreign banks.

Three-month Euribor has a negative and significant impact on bank performance, measured as NIM of 'all banks working in Ireland' and 'Irish Banks' groups. However, Euribor has no impact on bank performance Bank Profitability measured as ROA of all three banks groups.

H0 6: Residential Property Price Index has a positive and significant effect on the banking performance of Irish Banks all together/Irish banks/foreign banks.

Fail to reject for all together/Irish banks and Reject for foreign banks.

Residence Property price Index has a positive and significant impact on bank performance, measured by both NIM and ROA of all banks working in Ireland' and 'Irish Banks' groups with no effect showed to Non-Irish Banks Profitability. Residence Property price Index was new factor that author was trying to test within the present research. It was also found that Residence Property price Index has strong positive correlation relationship with GDP with the coefficient of 0.97. It might also bring us to the conclusion that all factors that strongly correlated with GDP, such as GNP, Residence Property price Index might also have affect on bank profitability, the same way as GDP does. As it was mentioned in earlier chapters there should be cause-effect relationship among variables. These relationships should be more explored.

Author assumption was mainly based on the pre-crisis property price change volatility in Ireland.

Knowledge of determinants that impact banks profitability provided within the present study would help for financial regulatory authorities as they work on creation of policies for the Irish banking sector. It would be also useful to know for bank management as they plan and realize bank activities in Ireland. It is also of interest to analysts, investors, bank employees and other interested in the field of finance in making more informed decisions regarding the performance of Irish banks, especially during the challenging Brexit period.

Recommendations for future researches:

As the aim of the study was to determine the impact of factors on bank profitability. In the context of Ireland, the major limitation of this study was that the small number of bank sample analysed in this research due to limited data available through open resources. Therefore, the result might not be suitable for generalisation across the country. The researcher recommends for future research, the number of banks could be expanded to all banks working in Ireland.

Limitation of regression analysis should also be taken into account as there might present heteroskedasticity as we defined through the visual graphical tests and of data that were presented in the regression model test analysis and weak relationship independent variables through the correlation analysis. Consequently, this can be a scope for further research, as different independent variables can be examined using the regression model.

As the present study was focusing on post crises period, the author has a strong belief that NPL being a bank specific factor that have also impact on bank portability in Ireland. Basically, in banks non-performing loans increases may lead to decrease financial performance of the banks. Most of the studies have found the same relationship such as negative relationship between non-performing loans and financial performance of the banks. However, due to the time constrain and data availability limitation this factor was not researched in the present paper, but it has a potential for future studies.

Attached tables

Model 1. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and GDP

$$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	GDP, CET1, HHI[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.812[a]	0.660	0.644	0.44516	0.513

a. Predictors: (Constant), GDP, CET1, HHI

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.239	3	8.080	40.772	.000[b]
	Residual	12.485	63	0.198		
	Total	36.724	66			

a. Dependent Variable: NIM

b. Predictors: (Constant), GDP, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-1.789	1.747		-1.024	0.310		
	CET1	-0.053	0.005	-0.787	-10.166	0.000	0.901	1.109
	HHI	0.001	0.001	0.116	1.220	0.227	0.600	1.668
	GDP	0.014	0.003	0.487	5.021	0.000	0.574	1.742

a. Dependent Variable: NIM

Model 2. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and CPI Inflation

$$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	InflationCPI, CET1, HHI[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.726[a]	0.527	0.504	0.52532	0.578

a. Predictors: (Constant), InflationCPI, CET1, HHI

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.338	3	6.446	23.359	.000[b]
	Residual	17.385	63	0.276		
	Total	36.724	66			

a. Dependent Variable: NIM

b. Predictors: (Constant), InflationCPI, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.027	12.078		0.085	0.932		
	CET1	-0.047	0.006	-0.701	-7.853	0.000	0.942	1.061
	HHI	0.004	0.001	0.437	4.109	0.000	0.663	1.507
	InflationCPI	-0.076	0.129	-0.061	-0.585	0.561	0.682	1.466

a. Dependent Variable: NIM

Model 3. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and interest rate

$$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	EuriborThreeMonth, CET1, HHI[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.774[a]	0.599	0.580	0.48354	0.569

a. Predictors: (Constant), EuriborThreeMonth, CET1, HHI

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.994	3	7.331	31.355	.000[b]
	Residual	14.730	63	0.234		
	Total	36.724	66			

a. Dependent Variable: NIM

b. Predictors: (Constant), EuriborThreeMonth, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.647	3.013		0.878	0.383		
	CET1	-0.049	0.006	-0.728	-8.836	0.000	0.937	1.067
	HHI	0.000	0.001	-0.015	-0.103	0.918	0.294	3.399
	EuriborThreeMonth	-1.192	0.348	-0.506	-3.429	0.001	0.293	3.413

a. Dependent Variable: NIM

Model 4. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and Resident property price Index

$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ResProPriceIndex, CET1, HHI[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.814[a]	0.663	0.646	0.44351	0.520

a. Predictors: (Constant), ResProPriceIndex, CET1, HHI

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.331	3	8.110	41.232	.000[b]
	Residual	12.392	63	0.197		
	Total	36.724	66			

a. Dependent Variable: NIM

b. Predictors: (Constant), ResProPriceIndex, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-1.924	1.725		-1.116	0.269		
	CET1	-0.053	0.005	-0.783	-10.180	0.000	0.906	1.104
	HHI	0.001	0.001	0.119	1.265	0.211	0.608	1.644
	ResProPriceIndex	0.023	0.005	0.486	5.086	0.000	0.586	1.707

a. Dependent Variable: NIM

Model 1. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and GDP

$$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	GDP, CET1, HHI[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.352[a]	0.124	0.082	2.00690	1.873

a. Predictors: (Constant), GDP, CET1, HHI

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.805	3	11.935	2.963	.039[b]
	Residual	253.743	63	4.028		
	Total	289.548	66			

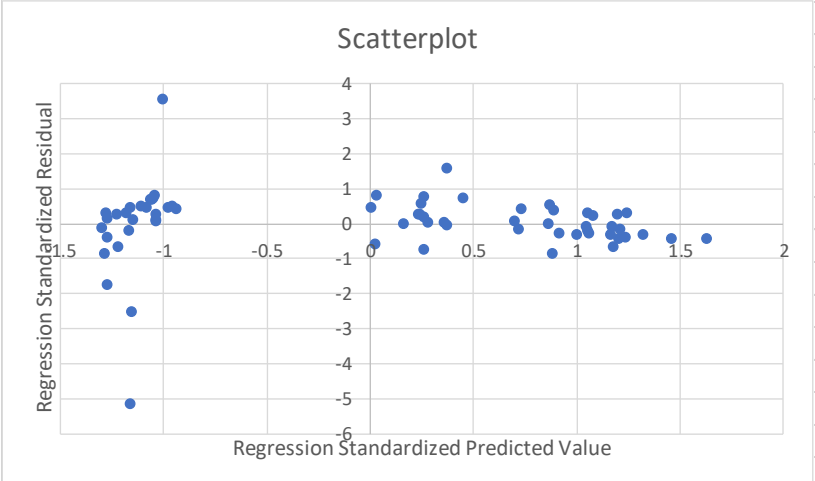
a. Dependent Variable: ROA

b. Predictors: (Constant), GDP, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.716	7.875		0.218	0.828		
	CET1	0.006	0.024	0.030	0.240	0.811	0.901	1.109
	HHI	-0.003	0.004	-0.106	-0.694	0.490	0.600	1.668
	GDP	0.032	0.013	0.399	2.561	0.013	0.574	1.742

a. Dependent Variable: ROA



Model 2. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and CPI Inflation

$$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	InflationCPI, CET1, HHI[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.180[a]	0.032	-0.014	2.10875	1.772

a. Predictors: (Constant), InflationCPI, CET1, HHI

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.397	3	3.132	0.704	.553[b]
	Residual	280.150	63	4.447		
	Total	289.548	66			

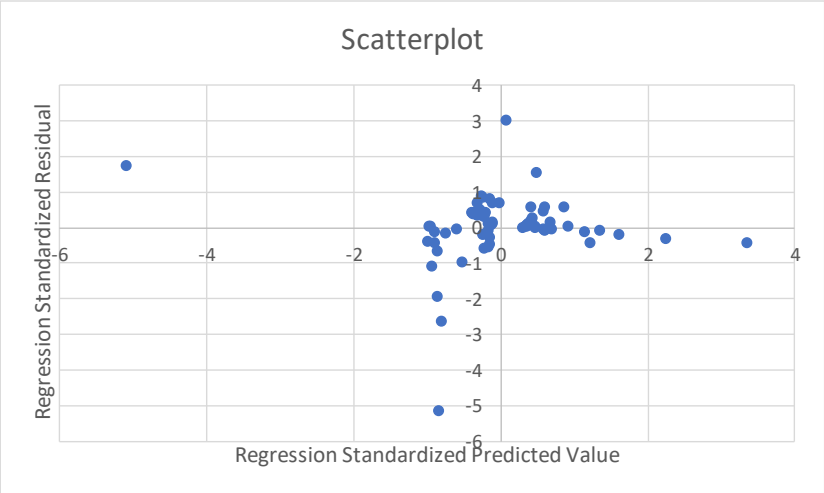
a. Dependent Variable: ROA

b. Predictors: (Constant), InflationCPI, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-10.155	48.484		-0.209	0.835		
	CET1	0.018	0.024	0.097	0.762	0.449	0.942	1.061
	HHI	0.003	0.004	0.126	0.828	0.411	0.663	1.507
	InflationCPI	0.025	0.519	0.007	0.048	0.962	0.682	1.466

a. Dependent Variable: ROA



Model 3. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and interest rate

$$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	EuriborThreeMonth, CET1, HHI[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.253[a]	0.064	0.020	2.07396	1.844

a. Predictors: (Constant), EuriborThreeMonth, CET1, HHI

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.565	3	6.188	1.439	.240[b]
	Residual	270.982	63	4.301		
	Total	289.548	66			

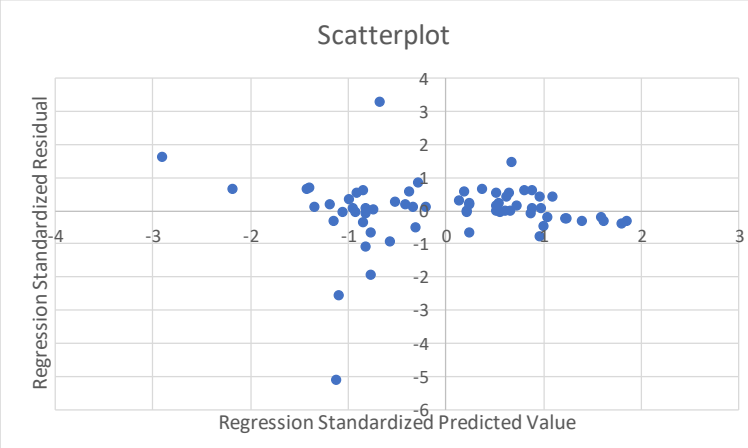
a. Dependent Variable: ROA

b. Predictors: (Constant), EuriborThreeMonth, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	7.852	12.922		0.608	0.546		
	CET1	0.015	0.024	0.082	0.649	0.519	0.937	1.067
	HHI	-0.004	0.006	-0.142	-0.634	0.529	0.294	3.399
	EuriborThreeMonth	-2.177	1.491	-0.329	-1.461	0.149	0.293	3.413

a. Dependent Variable: ROA



Model 4. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and Resident property price Index

$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ResProPriceIndex, CET1, HHI[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.376[a]	0.142	0.101	1.98626	1.807

a. Predictors: (Constant), ResProPriceIndex, CET1, HHI

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	40.998	3	13.666	3.464	.021[b]
	Residual	248.550	63	3.945		
	Total	289.548	66			

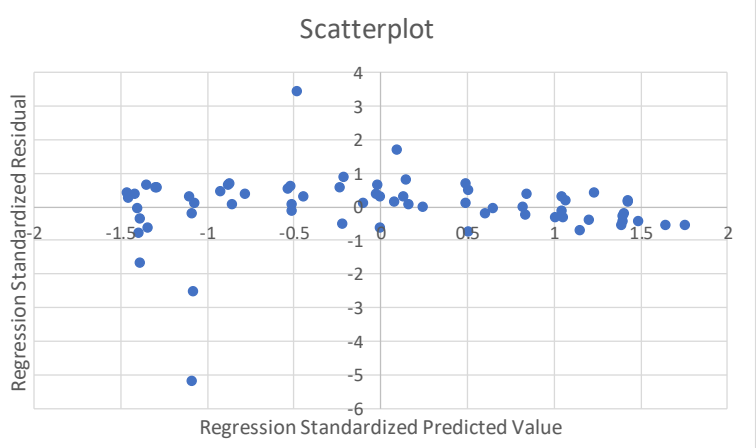
a. Dependent Variable: ROA

b. Predictors: (Constant), ResProPriceIndex, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.183	7.723		0.283	0.778		
	CET1	0.005	0.023	0.027	0.223	0.824	0.906	1.104
	HHI	-0.003	0.004	-0.123	-0.820	0.415	0.608	1.644
	ResProPriceIndex	0.059	0.021	0.432	2.831	0.006	0.586	1.707

a. Dependent Variable: ROA



Model 1. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and GDP

Non-Irish banks

$$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	GDP, CET1, HHI[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.794[a]	0.631	0.582	0.53896	0.581

a. Predictors: (Constant), GDP, CET1, HHI

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.402	3	3.801	13.084	.000[b]
	Residual	6.681	23	0.290		
	Total	18.083	26			

a. Dependent Variable: NIM

b. Predictors: (Constant), GDP, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-7.552	8.161		-0.925	0.364
	CET1	-0.057	0.009	-0.914	-6.227	0.000
	HHI	0.004	0.004	0.248	1.005	0.325
	GDP	0.008	0.008	0.266	1.047	0.306

a. Dependent Variable: NIM

Model 2. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and CPI Inflation

Non-Irish banks

$$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	InflationCPI, HHI, CET1[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.810[a]	0.656	0.612	0.51979	0.846

a. Predictors: (Constant), InflationCPI, HHI, CET1

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.869	3	3.956	14.643	.000[b]
	Residual	6.214	23	0.270		
	Total	18.083	26			

a. Dependent Variable: NIM

b. Predictors: (Constant), InflationCPI, HHI, CET1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	26.887	24.615		1.092	0.286
	CET1	-0.047	0.010	-0.753	-4.842	0.000
	HHI	0.009	0.002	0.513	3.643	0.001
	InflationCPI	-0.426	0.250	-0.260	-1.705	0.102

a. Dependent Variable: NIM

Model 3. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and interest rate

Non-Irish banks

$$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	EuriborThreeMonth, CET1, HHI[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.789[a]	0.623	0.574	0.54430	0.621

a. Predictors: (Constant), EuriborThreeMonth, CET1, HHI

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.269	3	3.756	12.678	.000[b]
	Residual	6.814	23	0.296		
	Total	18.083	26			

a. Dependent Variable: NIM

b. Predictors: (Constant), EuriborThreeMonth, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.799	7.605		-1.288	0.210
	CET1	-0.055	0.009	-0.884	-6.136	0.000
	HHI	0.006	0.004	0.338	1.606	0.122
	EuriborThreeMonth	-0.486	0.615	-0.161	-0.790	0.437

a. Dependent Variable: NIM

Model 4. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and Resident property price Index

$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$

Non-Irish banks

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ResProPriceIndex, CET1, HHI[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.796[a]	0.634	0.586	0.53655	0.588

a. Predictors: (Constant), ResProPriceIndex, CET1, HHI

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.461	3	3.820	13.271	.000[b]
	Residual	6.621	23	0.288		
	Total	18.083	26			

a. Dependent Variable: NIM

b. Predictors: (Constant), ResProPriceIndex, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-2.120	11.723		-0.181	0.858
	CET1	-0.058	0.009	-0.924	-6.261	0.000
	HHI	0.001	0.006	0.080	0.220	0.828
	ResProPriceIndex	0.023	0.020	0.429	1.146	0.264

a. Dependent Variable: NIM

Model 1. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and GDP

Non-Irish banks

$$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	GDP, CET1, HHI[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.407[a]	0.166	0.057	2.94977	1.810

a. Predictors: (Constant), GDP, CET1, HHI

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39.833	3	13.278	1.526	.234[b]
	Residual	200.126	23	8.701		
	Total	239.959	26			

a. Dependent Variable: ROA

b. Predictors: (Constant), GDP, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-51.756	44.667		-1.159	0.258
	CET1	0.029	0.050	0.128	0.581	0.567
	HHI	0.024	0.023	0.389	1.046	0.306
	GDP	-0.007	0.044	-0.064	-0.167	0.869

a. Dependent Variable: ROA

Model 2. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and CPI Inflation

Non-Irish banks

$$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	InflationCPI, HHI, CET1[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.466[a]	0.218	0.115	2.85714	1.918

a. Predictors: (Constant), InflationCPI, HHI, CET1

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.204	3	17.401	2.132	.124[b]
	Residual	187.755	23	8.163		
	Total	239.959	26			

a. Dependent Variable: ROA

b. Predictors: (Constant), InflationCPI, HHI, CET1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	118.875	135.303		0.879	0.389
	CET1	0.058	0.053	0.256	1.090	0.287
	HHI	0.025	0.013	0.396	1.864	0.075
	InflationCPI	-1.707	1.373	-0.286	-1.243	0.226

a. Dependent Variable: ROA

Model 3. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and interest rate

Non-Irish banks

$$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	EuriborThreeMonth, CET1, HHI[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.409[a]	0.167	0.058	2.94807	1.855

a. Predictors: (Constant), EuriborThreeMonth, CET1, HHI

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	40.064	3	13.355	1.537	.232[b]
	Residual	199.895	23	8.691		
	Total	239.959	26			

a. Dependent Variable: ROA

b. Predictors: (Constant), EuriborThreeMonth, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-38.851	41.192		-0.943	0.355
	CET1	0.026	0.049	0.116	0.541	0.594
	HHI	0.018	0.020	0.285	0.909	0.373
	EuriborThreeMonth	-0.776	3.328	-0.071	-0.233	0.818

a. Dependent Variable: ROA

Model 4. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and Resident property price Index

$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$

Non-Irish banks

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ResProPriceIndex, CET1, HHI[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.418[a]	0.175	0.067	2.93415	1.762

a. Predictors: (Constant), ResProPriceIndex, CET1, HHI

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	41.947	3	13.982	1.624	.211[b]
	Residual	198.012	23	8.609		
	Total	239.959	26			

a. Dependent Variable: ROA

b. Predictors: (Constant), ResProPriceIndex, CET1, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-76.170	64.107		-1.188	0.247
	CET1	0.034	0.050	0.151	0.683	0.502
	HHI	0.037	0.034	0.599	1.104	0.281
	ResProPriceIndex	-0.057	0.108	-0.294	-0.523	0.606

a. Dependent Variable: ROA

Model 1. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and GDP

Irish banks

$$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	GDP, CET, HHI[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.742[a]	0.551	0.513	0.38241	0.330

a. Predictors: (Constant), GDP, CET, HHI

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.449	3	2.150	14.699	.000[b]
	Residual	5.265	36	0.146		
	Total	11.713	39			

a. Dependent Variable: NIM

b. Predictors: (Constant), GDP, CET, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-1.229	1.558		-0.789	0.435		
	CET	-0.069	0.028	-0.335	-2.452	0.019	0.669	1.495
	HHI	0.001	0.001	0.124	0.896	0.376	0.650	1.539
	GDP	0.017	0.003	0.803	5.102	0.000	0.504	1.984

a. Dependent Variable: NIM

Model 2. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and CPI Inflation

Irish banks

$$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	CPIInf, CET, HHI[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.483[a]	0.233	0.169	0.49961	0.376

a. Predictors: (Constant), CPIInf, CET, HHI

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.727	3	0.909	3.642	.022[b]
	Residual	8.986	36	0.250		
	Total	11.713	39			

a. Dependent Variable: NIM

b. Predictors: (Constant), CPIInf, CET, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-12.730	14.593		-0.872	0.389		
	CET	-0.001	0.032	-0.007	-0.043	0.966	0.863	1.159
	HHI	0.002	0.001	0.408	2.082	0.045	0.555	1.802
	CPIInf	0.092	0.157	0.110	0.583	0.563	0.600	1.667

a. Dependent Variable: NIM

Model 3. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and interest rate

Irish banks

$$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	EuriborThreeMonth, CET, HHI[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.645[a]	0.416	0.367	0.43596	0.587

a. Predictors: (Constant), EuriborThreeMonth, CET, HHI

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.871	3	1.624	8.543	.000[b]
	Residual	6.842	36	0.190		
	Total	11.713	39			

a. Dependent Variable: NIM

b. Predictors: (Constant), EuriborThreeMonth, CET, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	6.243	3.485		1.791	0.082		
	CET	-0.046	0.031	-0.225	-1.485	0.146	0.707	1.415
	HHI	-0.002	0.002	-0.313	-1.169	0.250	0.225	4.435
	EuriborThreeMonth	-1.585	0.463	-0.996	-3.424	0.002	0.192	5.213

a. Dependent Variable: NIM

Model 4. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and Resident property price Index

$Y_{(NIM)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$

Irish banks

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ResPropPriceChange, CET, HHI[b]		Enter

a. Dependent Variable: NIM

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.478[a]	0.229	0.165	0.50091	0.383

a. Predictors: (Constant), ResPropPriceChange, CET, HHI

b. Dependent Variable: NIM

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.680	3	0.893	3.561	.024[b]
	Residual	9.033	36	0.251		
	Total	11.713	39			

a. Dependent Variable: NIM

b. Predictors: (Constant), ResPropPriceChange, CET, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-3.649	2.506		-1.456	0.154		
	CET	0.001	0.033	0.006	0.036	0.972	0.844	1.185
	HHI	0.003	0.001	0.420	1.955	0.058	0.465	2.151
	ResPropPriceChange	0.006	0.016	0.078	0.389	0.700	0.527	1.899

a. Dependent Variable: NIM

Model 1. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and GDP

Irish banks

$$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(GDP)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	GDP, CET, HHI[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.554[a]	0.307	0.249	0.93688	1.169

a. Predictors: (Constant), GDP, CET, HHI

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.003	3	4.668	5.318	.004[b]
	Residual	31.599	36	0.878		
	Total	45.602	39			

a. Dependent Variable: ROA

b. Predictors: (Constant), GDP, CET, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	5.240	3.816		1.373	0.178		
	CET	-0.048	0.069	-0.119	-0.704	0.486	0.669	1.495
	HHI	-0.004	0.002	-0.342	-1.988	0.054	0.650	1.539
	GDP	0.031	0.008	0.739	3.779	0.001	0.504	1.984

a. Dependent Variable: ROA

Model 2. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and CPI Inflation

Irish banks

$$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(CPIInflation)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	CPIInf, CET, HHI[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.270[a]	0.073	-0.004	1.08358	1.142

a. Predictors: (Constant), CPIInf, CET, HHI

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.332	3	1.111	0.946	.429[b]
	Residual	42.269	36	1.174		
	Total	45.602	39			

a. Dependent Variable: ROA

b. Predictors: (Constant), CPIInf, CET, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-39.877	31.650		-1.260	0.216		
	CET	0.072	0.070	0.178	1.031	0.309	0.863	1.159
	HHI	-0.002	0.003	-0.181	-0.839	0.407	0.555	1.802
	CPIInf	0.429	0.340	0.261	1.260	0.216	0.600	1.667

a. Dependent Variable: ROA

Model 3. ROA is predicted based on Capital ratio - CET1, bank concentration - HHI, and interest rate

Irish banks

$$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(EuriborThreeMonth)} + \varepsilon$$

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	EuriborThreeMonth, CET, HHI[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.303[a]	0.092	0.016	1.07261	1.376

a. Predictors: (Constant), EuriborThreeMonth, CET, HHI

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.184	3	1.395	1.212	.319[b]
	Residual	41.418	36	1.150		
	Total	45.602	39			

a. Dependent Variable: ROA

b. Predictors: (Constant), EuriborThreeMonth, CET, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	11.312	8.575		1.319	0.195		
	CET	0.025	0.077	0.061	0.325	0.747	0.707	1.415
	HHI	-0.005	0.004	-0.460	-1.376	0.177	0.225	4.435
	EuriborThreeMonth	-1.750	1.139	-0.557	-1.537	0.133	0.192	5.213

a. Dependent Variable: ROA

Model 4. NIM is predicted based on Capital ratio - CET1, bank concentration - HHI, and Resident property price Index

$Y_{(ROA)} = \alpha + \beta_1 X_{1(CET1)} + \beta_2 X_{2(HHI)} + \beta_3 X_{3(ResPropPriceIndex)} + \varepsilon$

Irish banks

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ResPropPriceChange, CET, HHI[b]		Enter

a. Dependent Variable: ROA

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.381[a]	0.145	0.074	1.04050	1.187

a. Predictors: (Constant), ResPropPriceChange, CET, HHI

b. Dependent Variable: ROA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.627	3	2.209	2.040	.126[b]
	Residual	38.975	36	1.083		
	Total	45.602	39			

a. Dependent Variable: ROA

b. Predictors: (Constant), ResPropPriceChange, CET, HHI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	7.179	5.205		1.379	0.176		
	CET	0.098	0.068	0.241	1.437	0.159	0.844	1.185
	HHI	-0.004	0.003	-0.354	-1.565	0.126	0.465	2.151
	ResPropPriceChange	0.071	0.033	0.464	2.183	0.036	0.527	1.899

a. Dependent Variable: ROA

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