








RISK-BASED REGULATION AND SUPERVISION OF SECOND-TIER BANKS: EXPERIENCE OF EU COUNTRIES

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Abstract. The aim of the study was to determine the impact of increased capital adequacy standards of second-tier banks on their performance. The study is based on second-tier banks of EU member states, as these countries are the first to implement the Basel Committee recommendations, so their experience should be studied and taken into account when building risk-based regulation of second-tier banks of Ukraine and Kazakhstan. The study covers the period of 2009–2022, as the Basel III regulations were adopted after 2008, and they began to operate for the second-tier banks of EU member states in 2013. The study was conducted using econometric modelling with an analysis of the dependence of banking indicators on the capital structure established by Basel III. Functional interrelationships of the dependence of Net Interest Income, Profit, Return on Assets, Return on Equity, Risk Costs to Operating Income were tested. The impact of capital adequacy requirements on the performance of second-tier banks was determined: capital adequacy requirements have a positive impact on net interest income and profit of second-tier banks. The obtained results can be used to substantiate increasing capital adequacy requirements to increase the reliability of the banking system as an element in the system of factors of economic growth of the national economy.

Keywords: bank capital, risk-based regulation, banking system, second-tier banks, Basel III.

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1. Introduction

Banking is one of the most regulated types of economic activity in the world. Banking requires a high level of trust on the part of economic agents, which can be based only on objective evidence of the reliable financial position of the bank. The issue of trust in banks is especially important during recessions and crises (Li et al., 2023; Trinh et al., 2023; van der Crujssen et al., 2023). As the experience of the economic crises of the 1990's and 2008–2009 showed, the control over banking activities should be significantly strengthened by the banking supervisory authorities in view of the ability of the banking system to withstand external challenges.

The main cause of the 2008 global crisis was the untimely recapitalisation of second-tier banks, which led to large-scale destructive consequences for many economies around the world. This problem was especially acute for developing countries, such as Ukraine and Kazakhstan (Rohovska-Ishchuk, 2022). While economically developed countries have a sufficient amount of capital because they are capital-recipient countries, developing countries always have problems with its deficit. Supranational banking regulatory bodies developed recommendations for banking regulation after the global financial and economic crisis. The main body is the Basel Committee, which made significant changes to the Basel III standard compared to Basel II (Callens, 2023; Pervez et al., 2022). The main changes

related to capital adequacy requirements as a guarantee of financial stability of banks.

Basel III requirements are developed to reduce the risks that banks may face, requiring additional reserves (Durango-Gutiérrez et al., 2023). As a result, the withdrawal of part of the funds from circulation may negatively affect the profitability of banks, which is a guarantee of their stability in the long run. So, there is a contradiction between the short-term and long-term risk-based management of banking. Based on the Basel III terminology, we consider the norms of regulation of banking as norms of risk-based regulation of second-tier banks.

In the structure of the research, several key stages can be distinguished, each of which contains an in-depth analysis of a specific economic indicator of banks. This analysis consists of determining the dynamics of indicators in the period after the global economic crisis of 2008–2009 and the characteristics of the impact of Basel III capital adequacy requirements on such indicators. Accordingly, the elements of the structure of the article can be represented as a sequence of the following areas of analysis:

- analysis of Dynamics of Net Interest Income of second-tier banks;
- analysis of Dynamics of net profit of second-tier banks;
- analysis of Dynamics of Return on Assets of the second-tier banks;
- analysis of The impact of changes in the capital adequacy requirements on the Return on Equity;
- analysis of The impact of changing capital adequacy requirements on the Risk Costs to Operating Income.

2. Literature review

The system and requirements of banking supervision are the subject of many studies. Studying the evolution of banking regulation, Měřo (2021) notes that the principles of supervision change depending on the phase of development of the world economy. In the pre-crisis period, banking regulation was based on principles that are less sensitive to risks. After the crisis of 2008–2009, the principles of banking regulation were reoriented towards increased risk-orientation. This was determined by the need to reduce the probability of repeating the negative consequences of high activity risks. However, the peak phase of the crisis was followed by a reorientation towards reducing risk-orientation. Such alternations occur because increased risk-based regulation is accompanied by increased bank capital adequacy requirements, thereby reducing their ability to dispose of existing assets.

Holod et al. (2020) conclude that risk-based regulation of banking can reduce the riskiness of banks' trading operations. However, this effect disappears in banks with high capitalisation. Such results testify to the effectiveness of risk-based management for banks that are exposed to such risks because of low capitalisation. This is

especially relevant for the banking systems of countries with low economic capitalisation, such as Ukraine and Kazakhstan.

Hasan et al. (2021) studied the impact of risk-based banking regulation on income inequality. The authors found that improving the risk assessment indicators of the borrowing country because of increased requirements for banks significantly increases bank flows, which entails decreased income inequality. Moreover, a stable banking system enables the country to attract loans on more favourable terms, which also helps reduce inequality.

Munawaroh and Azwari (2019) determined the influence of a bank's place in the ranking by risk level on its performance. The authors established that the increased reliability of banks, which is reflected in the improved position in the ranking, results in improved performance. In particular, the values of profitability of assets increase.

Information on bank risk ratings is also used to predict bankruptcy (Sistiyarini & Supriyono, 2017). However, the study showed that the bank's place in the ranking or other risk assessment indicators does not have a significant impact on bank bankruptcy. Such results show that in the vast majority of cases, bankruptcy is associated with other factors that affect a particular bank and do not characterise the country's banking system as a whole.

Demir et al. (2017) established that the increased risk level of a bank entails a decreased share of the letter of credit settlements it serves. And vice versa – a decreased risk level of a bank entails an increased share of letter of credit settlements. The volume of the country's foreign trade does not change in such a case. So, the stability of the bank affects its choice as an institution for conducting international settlements.

The ranking of banks by risk level is also used to evaluate their activity. In particular, Sjahrifa et al. (2018) established that those banks that can be classified as reliable in terms of risk level demonstrate the best performance indicators. Such banks have higher rates of return on assets, investment, and capital.

Artemenko and Bychkova (2020) argue that digitalisation can increase competition in the banking sector. On the one hand, this can lead to increased risks and strengthened risk-based regulation. On the other hand, the efficiency and profitability of the banking sector will consequently increase. However, it also carries certain risks, creating serious challenges for regulators, as a balance between a sufficient level of regulation and freedom to encourage development is required.

Kulyniak et al. (2021) emphasise the need to increase the financial security of banks and offer a theoretico-methodological approach to assessing the level of bank financial security by functional components. The results of their research emphasise the relevance of risk-based regulation of banking.

Hogan et al. (2018) argue that bank capitalisation indicators are better indicators for predicting bankruptcy than positions in risk rankings. At the same time, effective

risk-based regulation ensures the reliability of the banking system as a whole.

Studying the impact of banks' risk ratings on their profitability, Su et al. (2020) found that non-performing loan indicators have a direct impact on profitability. According to the authors, the management of such assets should be focused on effective risk management.

The analysis of the literature revealed that the research is mainly focused on comparing the place in the banks' rating according to the risk level and their profitability (generalised in Table 1). However, this issue requires much deeper research because the strengthening of risk-based regulation affects the ability of banks to dispose of their assets. In particular, part of the assets is taken out of circulation when it is necessary to increase the reserves. This may have long-term negative consequences for the performance of second-tier banks. This issue is especially acute for developing economies. The banking systems of such countries operate under limited liquidity in the domestic market, and raising capital adequacy standards can significantly worsen their situation.

On this basis, the aim of this research is to determine the impact of risk-based regulation of second-level banks on their economic indicators. The study relies on the assumption that risk-based regulation is designed to reduce the risks of second-tier banks, and the main indicator of low-risk operation is economic indicators that correspond to the norms established by the regulator. This implies the fulfilment of two research objectives:

- Determine the dynamics of the economic indicators of second-tier banks after the global economic crisis of 2008–2009. After 2008, risk-based regulation norms reached the international level;
- Determine the impact of Basel III capital adequacy requirements on the economic performance of second-tier banks. The Basel III requirements are aimed at reducing the risks of banking, and their impact on the economic performance of second-tier banks will give grounds to quantitatively assess the effect of risk-based regulation in terms of the economic parameters of banks.

Table 1. Analysis methods used in other authors' studies

Source	Methods	Purpose
Méró (2021)	methods of analysis and comparative analysis of regulatory policies	to analyse two transformations of regulatory policy (before and after the crisis)
Holod et al. (2020)	difference-in-difference (DID)	to analyse the impact of regulations on the risks associated with trading in banks
Hasan et al. (2021)	empirical analysis based on data for the period 1999–2013, as well as threshold estimates	to study the impact of international banking flows on income inequality in borrowing countries, taking into account such factors as capital adequacy within the framework of Basel II and the level of financial market development
Munawaroh and Azwari (2019)	descriptive statistics, determination of regression models, classical hypothesis tests, multivariate linear regression and hypothesis testing	to analyse the impact of a bank's assessment by the Risk Based Bank Rating (RBBR) system on its financial performance (ROA), taking into account indicators such as Risk Profile, Good Corporate Governance, Earning and Capital
Sistiyarini and Supriyono (2017)	logistic regression	to analyse the impact of various financial indicators (Risk Based Bank Rating and others) on predicting the possibility of bankruptcy of conventional banks in Indonesia
Demir et al. (2017)	method of controlling the bank credit channel	to test the effect of trade finance costs on exports and to examine whether this effect changes after the implementation of Basel II in Turkey in July 2012
Sjahrifa et al. (2018)	Risk-based Bank Rating (RBBR)	to measure and analyse the financial performance of four banks in Indonesia
Artemenko and Bychkova (2020)	logical, system functional and situational analysis, as well as methods of grouping and monographs	to analyse the existing supervisory tools used in different countries, in particular in the context of ensuring financial stability, protecting clients and promoting innovation in the digital ecosystem of the financial sector
Kulyniak et al. (2021)	economic and statistical method, method of analysis of hierarchies, expert method, survey, the principle of normalisation, method of ranking and grouping, logical generalisation and systematic approach	to assess and improve the level of financial security of banks using the example of Ukrainian banks using official statistics of the National Bank of Ukraine
Hogan et al. (2018)	statistical analysis, regression analysis, regression analysis	to assess the effectiveness of capital risk-based regulation and compare the predictive capabilities of simple capital measures with complex RBC measures
Su et al. (2020)	statistical analysis, regression analysis, analysis of financial statements of banks, use of RBBR indicators, interpretation of results	to study and determine the factors that most affect the financial performance and health of banks in the field of risk management

3. Methods

3.1. Research procedure

The procedure for conducting the research involves dividing it into several consecutive stages. Each of the stages consists of carrying out an analysis that contains two key areas: determining the dynamics of a separate economic indicator of the activity of second-tier banks in the period after the global economic crisis of 2008–2009 and characterising the impact of Basel III capital adequacy requirements on these indicators. The specified analysis involves the implementation of the following steps in relation to each of the studied indicators:

- assessment of the dynamics of the indicator;
- identification of the indicator's dependence on Basel III capital adequacy requirements;
- determination of the impact of changes in the values of the requirements of capital adequacy standards on the indicator;
- providing analytical conclusions at each step.

3.2. Sample

The research sample includes second-tier banks of EU member states. The norms of risk-based regulation were first introduced in the European Union, and the banks of the EU member states are the object of our research. The aim of this research will be achieved through the analysis of their activities. The sample of the study includes information on all EU banks, as the large sample size enables improvement in the quality of the results obtained. The study includes the analysis of the data on the profitability of the second-tier banks of the EU member states (European Central Bank, 2022) in terms of the following indicators: Net Interest Income, Profit for the reporting period, Return on Assets, Return on Equity, Risk Costs to Operating Income. The following elements of Basel III are considered instruments of risk-based regulation: Tier 1 basic capital, Buffer capital, Countercyclical capital, Equity capital, Capital adequacy ratio (European Council, 2021).

3.3. Methods

The main research method is econometric modelling with regression analysis of the impact of independent variables on the resulting indicators. Linear regression and correlation analysis were used to establish the dependence of performance indicators of second-tier banks on Basel III capital adequacy requirements. The following functional relationships were built and tested in the course of the study:

Functional relationship 1. Dependence of Net Interest Income on Basel III capital adequacy requirements:

$$NII = f(Tier1/RWA, CapCB/RWA, CouCB, CEC, CAR), \quad (1)$$

where: *NII* – Net interest income, thousand EUR; *Tier1/RWA* – Tier 1 capital / risk-weighted assets, %; *CapCB/RWA* – Capital conservation buffer / risk-weighted

assets, %; *CouCB* – Countercyclical capital buffer, %; *CEC* – Common equity capital, %; *CAR* – Capital adequacy ratio, %.

Functional relationship 2. Dependence of Profit on Basel III capital adequacy requirements:

$$P = f(Tier1/RWA, CapCB/RWA, CouCB, CEC, CAR), \quad (2)$$

where: *P* – Profit, thousand EUR; *Tier1/RWA* – Tier 1 capital / risk-weighted assets, %; *CapCB/RWA* – Capital conservation buffer / risk-weighted assets, %; *CouCB* – Countercyclical capital buffer, %; *CEC* – Common equity capital, %; *CAR* – Capital adequacy ratio, %.

Functional relationship 3. Dependence of Return on Assets on Basel III capital adequacy requirements:

$$ROA = f(Tier1/RWA, CapCB/RWA, CouCB, CEC, CAR), \quad (3)$$

where: *ROA* – Return on assets, %; *Tier1/RWA* – Tier 1 capital / risk-weighted assets, %; *CapCB/RWA* – Capital conservation buffer / risk-weighted assets, %; *CouCB* – Countercyclical capital buffer, %; *CEC* – Common equity capital, %; *CAR* – Capital adequacy ratio, %.

Functional relationship 4. Dependence of Return on Equity on Basel III capital adequacy requirements:

$$ROE = f(Tier1/RWA, CapCB/RWA, CouCB, CEC, CAR), \quad (4)$$

where: *ROE* – Return on equity, %; *Tier1/RWA* – Tier 1 capital / risk-weighted assets, %; *CapCB/RWA* – Capital conservation buffer / risk-weighted assets, %; *CouCB* – Countercyclical capital buffer, %; *CEC* – Common equity capital, %; *CAR* – Capital adequacy ratio, %.

Functional relationship 5. Dependence of Risk Costs to Operating Income on Basel III capital adequacy requirements:

$$RCOI = f(Tier1/RWA, CapCB/RWA, CouCB, CEC, CAR), \quad (5)$$

where: *RCOI* – Risk costs to operating income, %; *Tier1/RWA* – Tier 1 capital / risk-weighted assets, %; *CapCB/RWA* – Capital conservation buffer / risk-weighted assets, %; *CouCB* – Countercyclical capital buffer, %; *CEC* – Common equity capital, %; *CAR* – Capital adequacy ratio, %.

It is worth noting that the proposed approach is effective for establishing the dependence of performance indicators of second-tier banks on capital adequacy requirements established by Basel III. This approach corresponds to the direction and purpose of the research, and its key advantage is the quantitative substantiation of the identified dependencies and impacts on the main indicators of banking activity. However, the analysis of risk-oriented regulation and management is not limited to the methods used, as evidenced by a number of works by other researchers. Thus, Buzaubayeva and Makysh (2022), along with the analysis of the dynamics of key banking indicators, use trend and comparative analyses, paying the main attention to ratings and reliability indices of banks. This allows us to determine the most effective global

practices in risk management and regulation and to use the experience gained to improve the situation within the country. Khiaonarong et al. (2023) conclude that in order to improve macro-financial supervision of risks and vulnerabilities, it is effective to use such methods as macro-stress testing and correlation analysis. In addition, risk-oriented prospective forecasting, along with retrospective forecasting, is effective, allowing an understanding of the dynamics and preventing the risks of banking activity. Cevikcan and Tas (2022) applied a three-stage least squares method in a panel data structure in the course of risk-based performance evaluation, which allowed the researchers to identify a positive and significant relationship between risk incentive and performance. The research of Haque (2019) is based on a dynamic two-step system generalised method of moments estimation technique to analyse an unbalanced panel data set. The applied method made it possible to reveal the direction and strength of the connection between foreign ownership of shares and bank risk, as well as between official supervisory powers and bank risk. Abou-El-Sood and Shahin (2023) use the GLS regression method on bank competition on various indicators of bank risk. This made it possible to determine the relationship between the level of banking competition and the risks taken by the bank, as well as financial vulnerability in the absence of bank capital regulation. These and other approaches and methods make it possible to evaluate risk-oriented regulation and supervision of second-tier banks from different points of view and analyse the influence and connection of banking indicators with factors of various origins.

3.4. Instruments

The source data for analysis and graphing were prepared in Microsoft Excel. Testing of functional relationships was carried out using GRET.

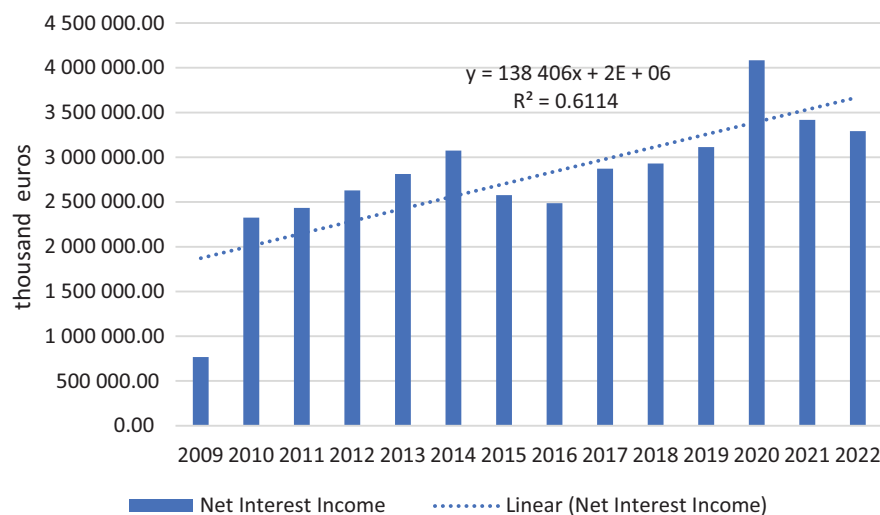


Figure 1. Dynamics of Net Interest Income of second-tier banks (EUR thousand) (source: constructed by authors)

4. Results

Assessment of the impact of capital adequacy requirements on the economic performance of second-tier banks is not definite. On the one hand, raising capital adequacy requirements creates a buffer for the banking system in case the macroeconomic situation worsens. On the other hand, the withdrawal of funds from circulation to reserves reduces the banks' development opportunities. This is especially relevant in countries that have problems with capital saturation, such as developing countries. In this case, the increased capital adequacy requirements can inhibit the development of not only second-tier banks but also the economy in general. Figure 1 shows the dynamics of net interest income of the second-tier banks.

The data indicate a positive trend in the values of banks' Net Interest Income. The exception is only the period of recession in the EU of 2013–2014, as well as the period of the 2020 pandemic. Functional relationship 1 is tested for a more detailed analysis of the impact of capital adequacy requirements on Net Interest Income.

Table 1. Dependence of Net Interest Income on Basel III capital adequacy requirements. Model 1: OLS, using observations 2009:1–2022:4 (T = 56). Dependent variable: Net Interest Income

	Coefficient	Std. Error	t-ratio	p-value	R-squared
Tier1/RWA	353 273	142 730	2.475	0.0292**	0.337973
CapCB/RWA	470 911	145 495	3.237	0.0071***	0.466091
CouCB	471 310	173 065	2.723	0.0185**	0.381968
CEC	243 022	80 861.9	3.005	0.0110**	0.429451
CAR	471 310	173 065	2.723	0.0185**	0.381968

Calculations showed that all independent variables have a statistically significant effect on interest income: Tier 1 capital (p-value 0.0292), buffer capital (p-value 0.0071),

countercyclical capital (p-value 0.0185), equity capital (p-value 0.0110) and capital adequacy ratio (p-value 0.0185). At the same time, all capital adequacy requirements ensure the growth of interest income, as evidenced by the positive values of the coefficients. The data in Figure 2 are analysed for a more detailed analysis of the impact of increasing the capital adequacy requirements on the net interest income.

The data in Figure 3 testify to the positive dynamics of net interest income depending on the capital adequacy requirements. The increased ratio of Tier 1 capital to risk-weighted assets from 2% to 4.5% results in an increase in net interest income for all banking systems of EU member states. An increase in the ratio of buffer capital to risk-weighted assets from 0% to 2.5%, which is established by Basel III, and an increase in the net interest income is also observed. The growth of the required amount of countercyclical and equity capital also contributed to the growth of net interest income, and this indicator was even higher than the trend for some EU countries. The increased

capital adequacy ratio also contributed to the growth of net interest income. Such results can be explained by the fact that interest income depends not only on market rates but also on the amount of invested capital. Capital adequacy requirements provided for its increase, which also made it possible to increase the investment portfolio of banks as a result of their increased reliability.

The profit dynamics of second-tier banks in the EU countries are analysed next (Figure 3).

Although the long-term profit trend of second-tier banks is positive and upward, its volatility was quite significant during the analysed period. The tendency to decrease profit during the crisis of 2008–2009 and in subsequent years, when banks were forced to clean their portfolios of illiquid assets, was clearly expressed. After 2015, the profit of second-tier banks increased, but there is a steady tendency to decrease after 2017. Table 2 shows the results of testing the functional relationships of the impact of capital adequacy requirements on the profit of second-tier banks.

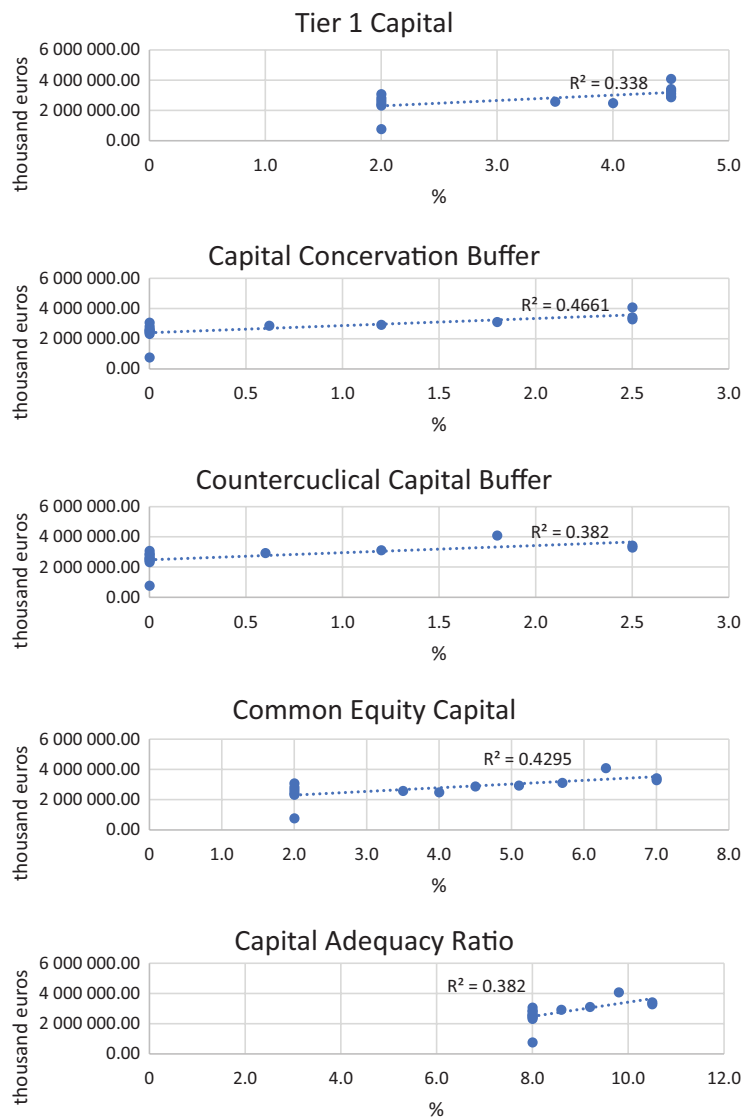


Figure 2. The impact of changes in the capital adequacy requirements on the net interest income (source: built by the authors)

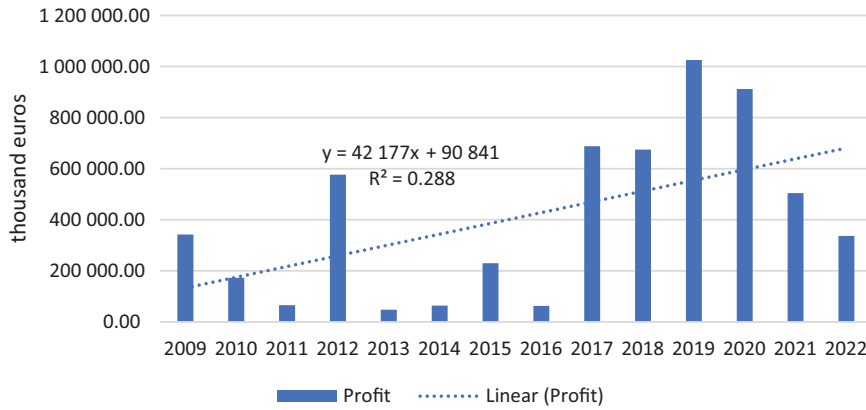


Figure 3. Dynamics of net profit of second-tier banks (EUR thousand) (source: built by the authors)

Table 2. Dependence of profit on Basel III capital adequacy requirements. Model 2: OLS, using observations 2009:1-2022:4 (T = 56). Dependent variable: Profit

	Coefficient	Std. Error	t-ratio	p-value	R-squared
Tier1/RWA	170 439	60 383.5	2.823	0.0154**	0.399012
CapCB/RWA	196 014	67 935.5	2.885	0.0137**	0.409592
CouCB	153 180	87 174.6	1.757	0.1043	0.204646
CEC	99 699.4	37 830.6	2.635	0.0218**	0.366601
CAR	153 180	87 174.6	1.757	0.1043	0.204646

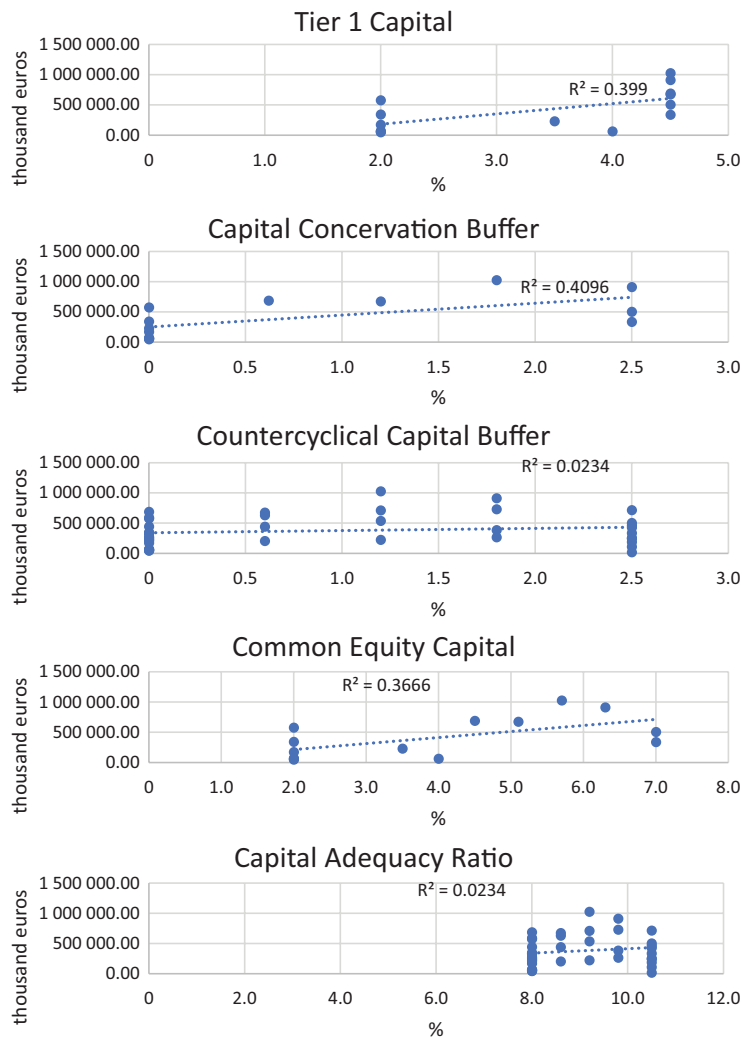


Figure 4. The impact of changes in the capital adequacy requirements on profit (source: built by the authors)

The following have a statistically significant influence on the volume of banks' profits: capital of the first level (p-value 0.0154), buffer capital (p-value 0.0137), share capital (p-value 0.0218). An increase in the specified capital adequacy requirements contributes to the growth of the volume of profit, which generally correlates with the growth of the volume of net interest income. The data in Figure 4 will be analysed for a more detailed analysis of the impact of an increased basic Tier 1 capital, buffer capital and equity capital on the profit of second-tier banks.

The data in Figure 5 show that the increased Tier 1 capital requirement from 2% to 4.5% had a positive effect on profit. However, the intermediate values of this indicator showed the profit below the trend level. It is worth noting that this behaviour of profit, depending on the dynamics of the requirement for the ratio of Tier 1 capital to risk-weighted assets, may be a consequence of certain problems faced by the EU banking system during the period of the intermediate values of this parameter, which were provoked by the consequences of the recession of 2012–2013 years. So, after setting the requirement at 4.5%, second-tier banks were able to sufficiently ger rid of illiquid assets.

When the requirements for the amount of buffer capital increase, the dynamics of profit show that are higher values than the trend. This resulted in a significant increase in the profit of second-tier banks. Of course, it cannot be argued that this is determined by increased standards only, but the increased standards also had a positive effect on the growth of banks' profitability. The increased required amount of equity also had a positive effect on the volume of banks' profits. The highest profit is typical for the standard of 6%, not 7%, which is currently in effect. However, this may be determined by the rise of the world economy during the period when the standard of 5.7% was applied and 6.3% – in the period of 2017–2018. Now, when the standard of 7% is in effect, the world economy is suffering from the economic consequences of the pandemic.

The dynamics of Return on Assets of the second-tier bank will be analysed next (Figure 5).

In general, the dynamics of Return on Assets correlates with the dynamics of banks' profit, which reflects

the change in the economic environment. A slight economic recovery after the 2008–2009 crisis turned into a 2012–2013 recession, reflecting the dynamics of return on assets. The period of growth in the return on assets up to and including 2017 was replaced by a tendency to decrease, which is still observed. In part, this dynamic can be explained by excess liquidity in the EU economies, which reduces the profitability of assets.

The results of Functional relationship 3 are analysed for a more detailed analysis of the impact of capital adequacy standards on the banks' return on assets (Table 3).

Table 3. Dependence of Return on Assets on Basel III capital adequacy requirements. Model 11: OLS, using observations 2009:1–2022:4 (T = 56). Dependent variable: Return for Assets

	Coefficient	Std. Error	t-ratio	p-value	R-squared
Tier1/RWA	0.0484682	0.0601633	0.8056	0.4361	0.051309
CapCB/RWA	0.0807763	0.0661227	1.222	0.2453	0.110606
CouCB	0.0646763	0.0752343	0.8597	0.4068	0.058013
CEC	0.0333453	0.0364456	0.9149	0.3782	0.065209
CAR	0.0646763	0.0752343	0.8597	0.4068	0.058013

The results show that capital adequacy requirements do not have a statistically significant effect on the profitability of second-tier banks' assets. This confirms the idea that these are not capital adequacy requirements that have a determining impact on the return on assets but the external environment, which determines the rate of return and directions of asset placement.

The data in Figure 6 show that despite the absence of a cause-and-effect relationship between capital adequacy requirements and return on banks' assets, a certain correlation of these indicators is still observed. As the value of the buffer capital ratio increases, so does the profitability of assets. The same trend is characteristic of countercyclical capital and equity capital. As for the capital adequacy ratio, it can only be asserted that the extremely large and small indicators of return on assets disappeared after

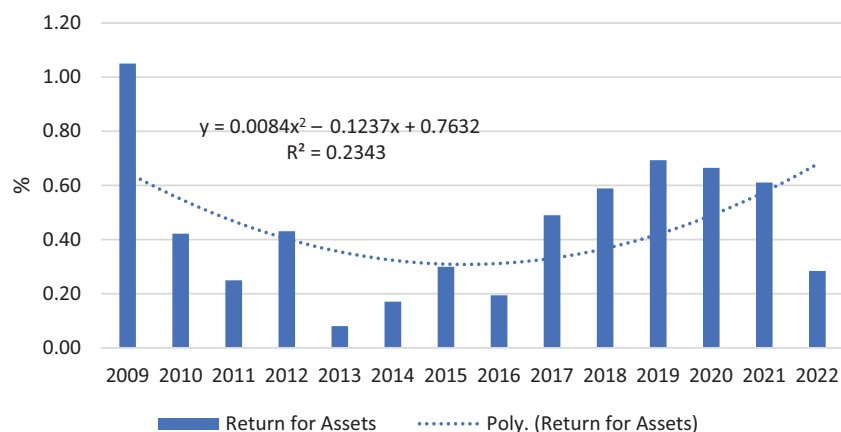


Figure 5. Dynamics of return on assets of the second-tier banks (%) (source: built by the authors)

raising its value from 8% to 10.5%. This testifies to the equalisation of asset profitability indicators at the average market level, which generally describes the market for placement of bank assets as perfect competition.

Figure 7 provides information on the dynamics of return of second-tier banks' equity.

The dynamics of the Return on Equity is similar to the dynamics of the Return on Assets. A certain cyclicity is

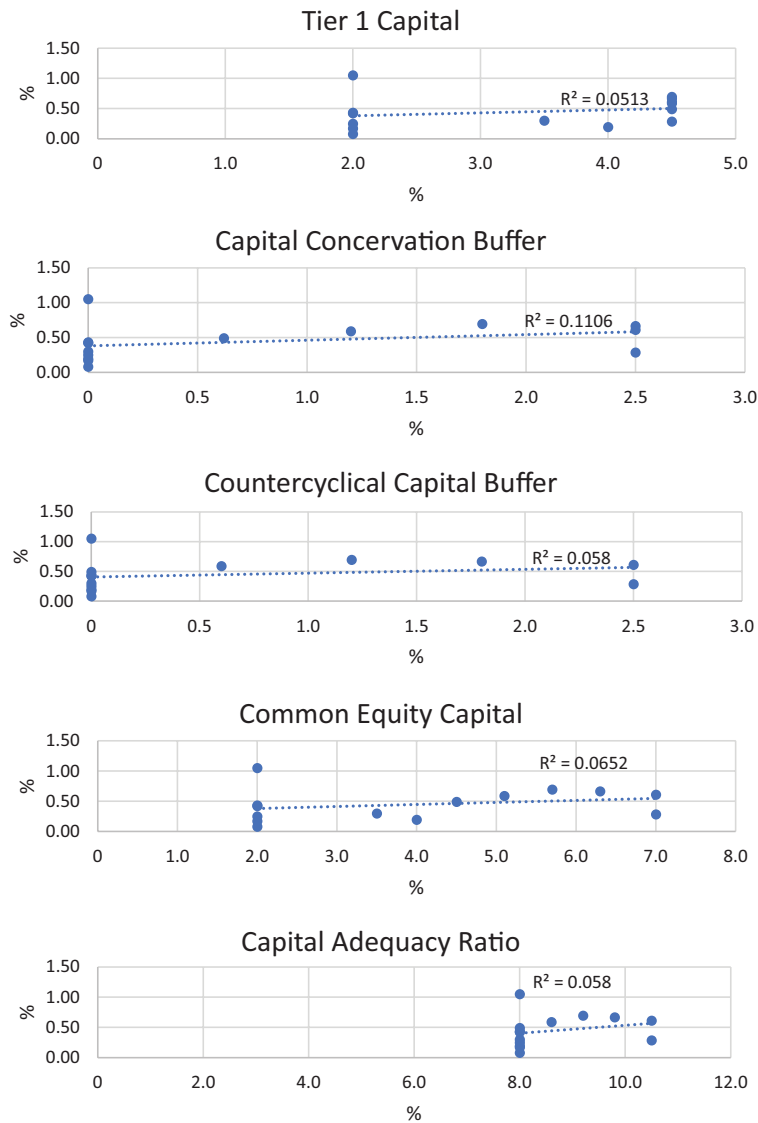


Figure 6. The impact of changes in the capital adequacy requirements on Return on Assets (source: built by the authors)

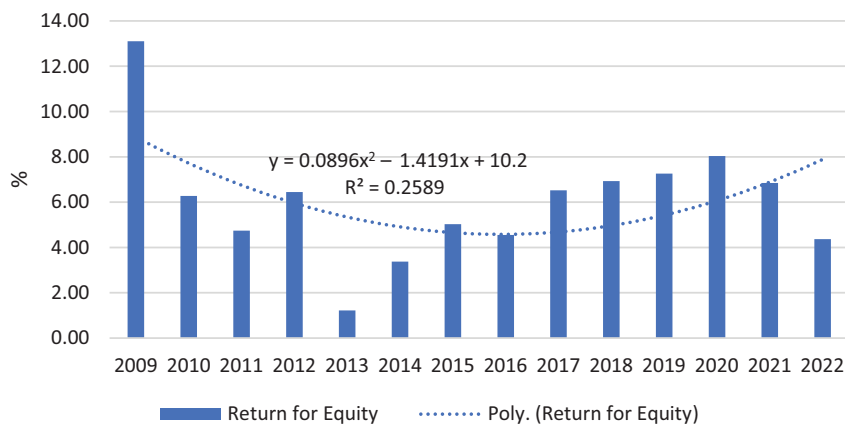


Figure 7. The impact of changes in the capital adequacy requirements on the Return on Equity (source: built by the authors)

observed depending on the phase of development of the world economy. At the same time, the capital adequacy requirements also do not have a statistically significant effect on the return on equity or the return on assets (Table 4).

Table 4. Dependence of Return on Equity on Basel III capital adequacy requirements. Model 4: OLS, using observations 2009:1-2022:4 (T = 56). Dependent variable: Return for Equity

	Coefficient	Std. Error	t-ratio	p-value	R-squared
Tier1/ RWA	0.238713	0.637509	0.3744	0.7146	0.011549
CapCB/ RWA	0.418037	0.717779	0.5824	0.5711	0.027489
CouCB	0.271638	0.800868	0.3392	0.7403	0.009496
CEC	0.153139	0.388811	0.3939	0.7006	0.012762
CAR	0.271638	0.800868	0.3392	0.7403	0.009496

The p-value exceeds 0.05 for all functional relationship factors. In this case, we can state that both the profitability

of assets and the profitability of capital of second-tier banks are influenced by the external economic environment. If the trend of changes in Return on Equity is analysed against the background of changes in the values of capital adequacy parameters, a kind of equalisation of market indicators can be stated (Figure 8).

A significantly greater differentiation of Return on Equity was observed at the Tier 1 capital ratio of 2% than at the ratio of 4.5%. We observe the same trend in other parameters. So, with the introduction of the new Basel III capital adequacy requirements and their implementation in banking, there is a tendency for the differentiation of Return on Assets and Equity to decrease. In the market of banking services, the profitability of assets and capital is equalised, which indicates limited opportunities for growth and development.

The impact of capital adequacy standards on the Risk Costs to Operating Income will be analysed next. The positive dynamics of this indicator is its decrease, which reflects decreased risk costs.

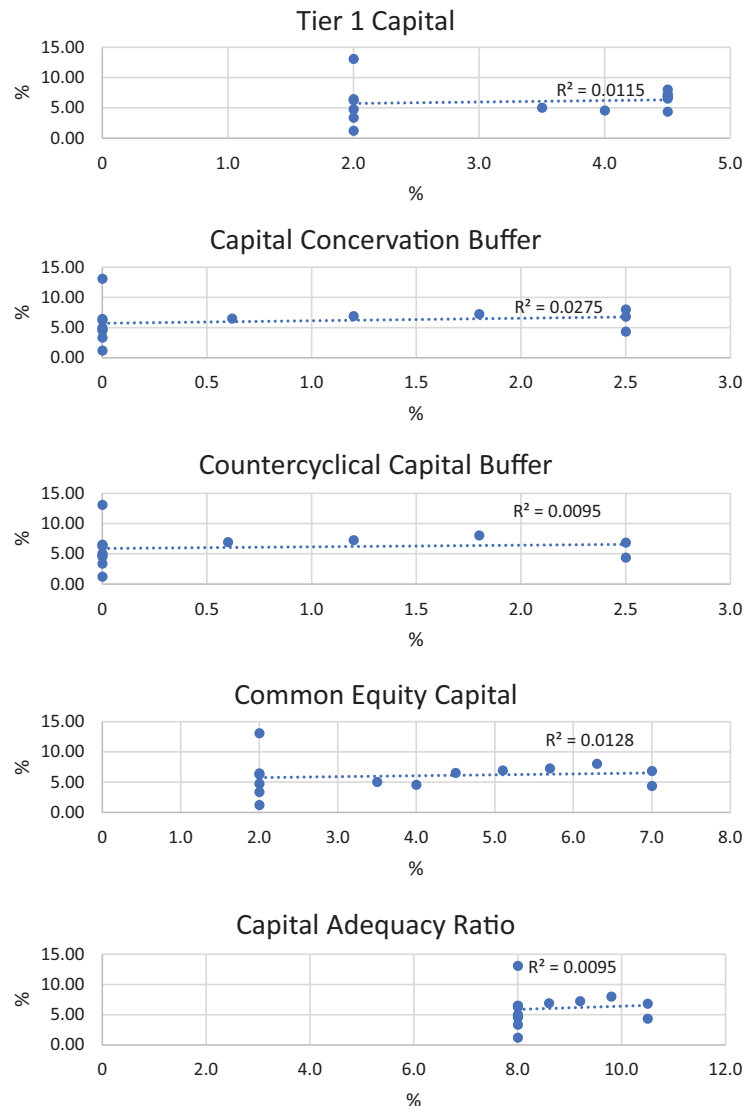


Figure 8. The impact of changes in the values of the capital adequacy requirements on the Return on Equity (source: built by the authors)

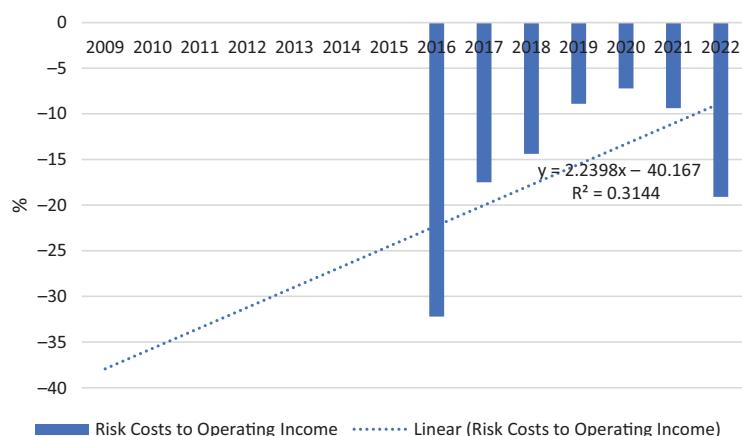


Figure 9. The impact of changing capital adequacy requirements on the Risk Costs to Operating Income (source: built by the authors)

Table 5. Dependence of the Risk Costs to Operating Income on Basel III capital adequacy requirements. Model 5: OLS, using observations 2009:1-2022:4 (T = 56). Dependent variable: Risk Costs to Operating Income

	Coefficient	Std. Error	t-ratio	p-value	R-squared
Tier1/ RWA	38.9163	10.6833	3.643	0.0149**	0.726319
CapCB/ RWA	6.38689	2.52455	2.530	0.0525*	0.561421
CouCB	4.30503	3.01772	1.427	0.2130	0.289282
CEC	4.55781	2.54207	1.793	0.1330	0.391333
CAR	4.30503	3.01772	1.427	0.2130	0.289282

The data of Figure 9 testify to the positive dynamics of the Risk Costs to Operating Income from 2016 to 2020 inclusive. There is also a trend towards its increase in 2021 and 2022, indicating increased risks. Decreased return on assets and equity is observed in the period of 2021–2022, which provokes an increase in operational risks. Table 5 shows the results of testing the functional interrelationship of the impact of capital adequacy requirements on Risk Costs to Operating Income.

The obtained results indicate that only Tier 1 capital and the buffer capital had a statistically significant impact on Risk Costs to Operating Income, which is confirmed by p-values of 0.0149 and 0.0525, respectively. At the same time, increased capital adequacy requirements contribute to the increase in Risk Costs to Operating Income. On the one hand, this leads to increased bank costs, which is negative and worsens their financial and economic situation. On the other hand, the growth of these costs indicates that banks have created reserves to cover risks, which has a positive effect on their reliability rankings.

The data in Figure 10 show that the increased requirement for Tier 1 capital from 2% to 4.5% was accompanied by a significant decrease in risk costs by almost half. A gradual decrease in risk costs accompanied the increased requirements for buffer capital, but this effect practically disappeared after setting the size of the buffer capital at 1.2%. There is also a certain correlation between the

growth of countercyclical capital requirements and the risk costs, although such trends are weakly expressed. There is a certain tendency towards synchronous increase in the requirements for equity and the reduction of risk costs, but the cause-and-effect relationship has not been established.

4.1. Limitations and implications for the research

This study has methodological and implementation limitations. The methodological limitation is that the object of the study is the second-tier banks of the EU member states. The results of the study may differ when banks from less developed economies or from economies where institutions are weakly developed are included in the sample. The implementation limitation is that the obtained results can be used only for those economies where there is a developed system of risk-based regulation of banking, and the work of banks is not affected by administrative pressure.

5. Discussions

In a study of the impact of the Basel Committee requirements on the national requirements for the banking system, the authors (Pham & Daly, 2020) conclude that the increase in capital adequacy standards contributes to the improvement of the financial results of banks in Vietnam. We reach the same conclusions in this research. This research also shows that raising capital adequacy requirements improves the performance of EU banks. So, this impact is characteristic not only for developed economies but also for the developing economies. This testifies to the perspective of implementing Basel III capital adequacy requirements for the banking systems of Ukraine and Kazakhstan.

Hogan (2020) notes that there is no sufficient reason to claim that the benefits of introducing additional capital adequacy requirements outweigh the losses. At the same time, a number of studies (Navas et al., 2021; Bitar et al.,

2018; Roulet, 2018), including this study, demonstrate a positive correlation between increasing capital adequacy requirements and the effectiveness and reliability of the banking system. It is difficult to argue about the comparison of costs and benefits. Still, the increased reliability of the banking system is definitely an acceptable result for a positive assessment of the Basel III consequences. In contrast to the Hogan’s (2020) study, this study clearly established an excess of the additional capital adequacy requirements over banks’ costs. These benefits are manifested in the improvement of their performance.

Taskinsoy (2018) emphasises the positive experience of strengthening capital adequacy requirements. The results show that the banks’ performance has significantly improved upon the reduction in the level of risks. We obtained the same results in this study and confirm the positive effect of strengthening capital adequacy requirements established by Taskinsoy (2018). Such conclusions

are comparable to our results and can be used to implement Basel III capital adequacy requirements in Ukraine and Kazakhstan. Increasing capital adequacy requirements will ensure the reliability of the country’s banking system, which will contribute to the development of the country’s banking system in the long run.

In our research, we assumed that increasing capital adequacy requirements could have a dampening effect on economic growth in the long run. Our assumption is confirmed by the results of Fidrmuc and Lind (2020), which testify to the restraining effect of capital adequacy standards on GDP growth. However, such an effect is accompanied by an increased reliability of the banking system (Basel Committee on Banking Supervision, 2010). It is positive, especially for countries such as Ukraine and Kazakhstan, where the banking system is far from the reliability standard. We did not consider the impact of increasing capital adequacy standards on GDP in this study. However,

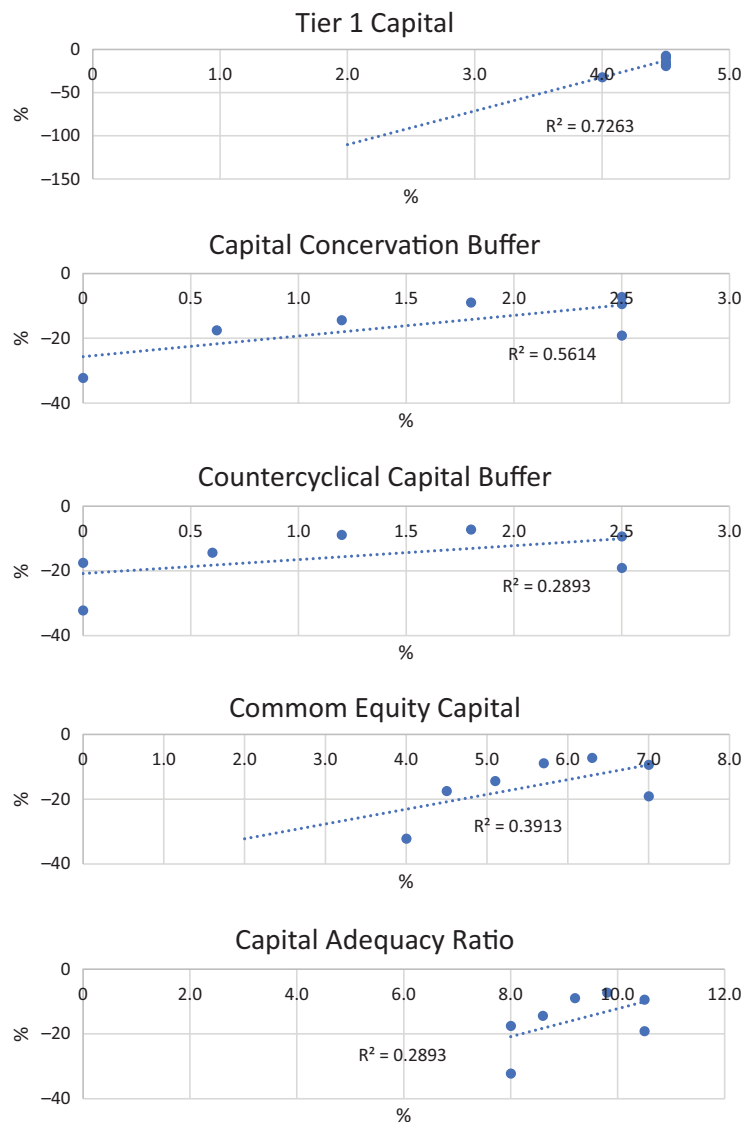


Figure 10. The impact of changing capital adequacy requirements on Risk Costs to Operating Income (source: built by the authors)

our study shows that increasing such requirements entails an increase in the banks' economic indicators.

Increased regulatory capital adequacy requirements contribute to increasing the profitability of banks. Mashamba's (2018) findings evidence this. Such a conclusion can be an argument in favour of the implementation of the Basel III requirements in countries that fear the deterioration of the financial situation of banks. More importantly, increased capital adequacy requirements will ensure the reliability of the banking system, which is an important criterion for economic agents, as evidenced by Althawadi and Kukreja (2017). The results we obtained quantitatively confirm this conclusion of previous authors, as they also show increased economic indicators due to increased capital adequacy requirements. Our results also indicate a positive long-term impact of increasing capital adequacy requirements. The results obtained are important in the context of their implementation in the banking systems of countries such as Ukraine and Kazakhstan. Banks in these countries operate under the conditions of insufficient liquidity when increasing capital adequacy requirements can be perceived as an obstacle to activity. Bank shareholders can be especially worried about this. The obtained results indicate that the introduction of Basel III requirements brings benefits not only to banking institutions but also to the country's economy in general in the long run (Beck & Rojas-Suarez, 2019; Mundt, 2017; Dang, 2021). The results of our research can be used to substantiate increasing capital adequacy requirements to increase the reliability of the banking system as an element in the economic growth factors of the national economy.

During the active phase of the war, it is extremely necessary for Ukraine to ensure the stability of the financial system. The National Bank of Ukraine has implemented a number of measures to curb exchange rate fluctuations and inflation, but the entire second-tier banking system needs special attention. The conducted research shows that risk-based regulation is an effective tool for ensuring the stability of the banking system. For Ukraine and Kazakhstan, which share the risks of the neighbourhood with the Russian Federation, risk-based regulation of the banking system can be a powerful tool for ensuring the stability of this sector of the economy. Basel III capital adequacy requirements for commercial banks increase both the ability of banks to withstand crisis phenomena and increase the level of trust of clients in banking institutions. In Ukraine, Basel III requirements began to be implemented in 2020, but not all at once. In Kazakhstan, the Basel III requirements have not yet been adopted, but such changes are urgent. It is necessary to promote the idea of introducing a current risk-based approach to the regulation of banking activities as soon as possible. The results of the study show that the increased capital adequacy requirements do not cause a significant negative effect on reducing the profitability of banks. Instead, the increase in bank costs is offset in the long run by capital inflows from businesses and households. Increasing stability of the banking system helps to increase the share of capital that circulates in the

banking system, which makes it stable and less vulnerable to external shocks.

Taking into account modern trends in the economy and the banking sphere, the prospective direction of future research should be the study of the impact of technological innovations on risk-oriented management of banks. This will reveal how the introduction of the latest technologies, such as artificial intelligence, big data, blockchain and others, can improve or complicate the process of risk-oriented management, as well as determine the impact of innovations on the economic results of banks.

6. Conclusions

Risk-based regulation and supervision of second-tier banks are becoming increasingly important in the context of changes in the global financial system in the context of globalisation. Against the backdrop of the instability of financial markets and constant changes in the global economy, risk-based regulation is a key element in ensuring the stability and resilience of the banking system. The experience of the European Union, which is one of the leading financial markets in the world, can serve as a valuable source of lessons and best practices.

The aim of the study was to determine the impact of risk-based management of second-tier banks on their performance indicators. The conducted research established that risk-based regulation of the banking sector is designed to minimise risks not only for the banks themselves but also for the entire economic system. For this purpose, the Basel Committee introduces appropriate banks' capital adequacy requirements. The study showed that the net interest income has a statistically significant effect on the Tier 1 capital, buffer capital, countercyclical capital, equity, and capital adequacy ratio. The study showed that Tier 1 capital, buffer capital and equity capital have a statistically significant impact on the amount of net profit. At the same time, no impact of capital adequacy standards on the Return on Assets and Equity of second-tier banks was found. It was proved that increased capital adequacy requirements. However, it entails that increased banks' risk management costs do not lead to a decrease in their profitability due to the need to reserve part of the resources. The Return on Assets and Equity of second-tier banks is affected by factors of the external environment and the phase of the economic development cycle. Taking into account the obtained results, we can conclude about the appropriateness of strengthening risk-based regulation of second-tier banks. This will ensure increased confidence in the banking system both on the part of economic agents and on the part of shareholders of those banks. At the same time, the intensified supervision will not cause a decreased performance of those banks.

Certain limitations characterise the presented research. The methodological limitation lies in the fact that the object of the study is the second-tier banks of the EU member states. Accordingly, the inclusion of banks from less

developed economies or from economies with a weak institutional component in the study could hypothetically lead to different results. The implementation limitation is that the conclusions of the study can be used only for those economies where there is a developed system of risk-oriented regulation of banking activity. At the same time, the work of banks is not affected by administrative pressure.

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