Determinants of Profitability of Commercial Banks

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Abstract. The paper is devoted to the identification of key factors which influence commercial banks’ economic profit. The data of 50 Russian banks from 2011 to 2020 are analysed. Among the determinants of banks’ profitability, the factors of operational, financial, and macroeconomic profile are investigated with the use the system generalized method of moments (GMM). The novelty of the study concerns the expansion of the existing list of determinants which influence the banks’ profitability with additional factors, such as the level of service, the type of business model, insolvency risk. Also, the paper implies the use of spread of Economic Value Added as a measure of banks’ profitability, which relates to rather new and less studied economic approach in the existing literature compared with traditional ROA and ROE indicators. It is important to establish that there are no actual studies of Russian banking sector in the existing literature. The obtained results of the current study of Russian commercial banks can be used for both internal and external purposes.

1 Introduction

When studying the factors influencing the creation of economic profit by banks, it is necessary to choose a result measurement indicator with a high explanatory ability, which can be calculated using data from published reports of financial organizations, will be available for understanding at the level of management and owners of banks. One of the areas of theoretical study in this field of research is devoted to the evaluation of various profitability metrics for their explanatory power of the dynamics of the market value added (MVA) of banks. There are two main approaches of profitability measurement: traditional (using Return on Assets (ROA), Return on Equity (ROE), Net Interest Margin (NIM), Cost of Income Ratio (CIR)), which can be calculated on the base of the accounting statements, and economic measurements (Risk-Adjusted Return on Capital (RAROC) and Economic Value Added (EVA)) [1-7].The results of traditional method often do not reflect a real change of the effectiveness of the organization's management because it contains the subjective opinion of accountants (the choice of depreciation method, cost calculation method, etc.) and, as a result, managers can manipulate performance indicators in the desired direction for them. The method of EVA calculation is the alternative way to the

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tradition approach and was developed by the consulting company Stern Stewart & Company [8]. EVA is calculated with the use of 3 components: net operating profit after taxes (NOPAT), weighted average cost of capital (WACC), total costs (TC). This method has several advantages. Firstly, Capital Asset Pricing Model (CAPM) is used to define the cost of a bank’s equity which allows us to consider the specific risk and the market assessment of a bank’s risk. The first comprehensive empirical study in which the explanatory power of profitability indicators in relation to the economic profit of banks was quantified is the paper of scientists Uyemura, Kantor and Petit [9]. They examined the American banks in 1986-1995 by construction of regression models of several profitability indicators: EVA, EPS, NI, ROE, ROA by the market value added (MVA). The highest correlation was observed between EVA and MVA equalled to 40%, the explanatory power of NI was 3%, EPS – 6%, ROE and ROA - 21% and 25%, correspondingly. Heffernan, Taufik and their colleagues, analysing data on banks in developing countries, also concluded that EVA indicator had the greatest explanatory power [10]. They constructed regressions using a systematic generalized moment method and a model with fixed effects on a large sample of banks (95% of the assets of the entire Chinese banking system) for 7 years from 1999 to 2006. After evaluating 4 performance indicators EVA, ROAA (return on average assets), ROAE (return on average equity), NIM, the authors preferred two of them: EVA and NIM. Based on data on public banks in Indonesia for 2002-2005 Taufik and colleagues assessed the relationship between the EVA, ROE and ROA indicators and the average annual returns of the shares of the respective banks listed on the Jakarta Stock Exchange [10]. Only two indicators EVA and ROE were significant. Totally, the three examined indicators explained 28% of the variation in current bank yields. As stock prices consider long-term market expectations, so there is a temporary discrepancy between the current values of EVA and MVA. For this reason, the calculated value of the EVA indicator can explain only part of the changes in market value, the other part will be explained by the value of EVA expected by economic agents in future periods. As a result of the analysis of existed scientific works, the choice among profitability indicators has been made in favour of the concept of the EVA, which is able to explain most of the dynamics of the market value of banks. With the help of this indicator, factors that significantly affect the value created by banks will be determined.

2 Materials and methods

2.1 Tested hypotheses

To identify the determinants of the Russian commercial banks’ profitability, the several hypotheses have been formulated which will subsequently evaluate the results of the research.

Hypothesis 1. Factors of the financial and operational profile of banks affect their profitability.

The size of the bank has a positive impact on EVA.

The positive impact of the bank's assets on profitability is achieved through economies of scale: the value of fixed costs increases at a slower pace than when creating a new organization, which leads to lower unit costs and increased marginality [11]. Also, in the unstable economic situation in the country, the size of the bank can act as a guarantee of stability for potential customers and characterize its high reputation.

The level of asset immobilization negatively affects the profitability of the bank.

The quality of service has a positive impact on EVA.

The type of the bank's business model affects banks’ profitability.
Hypothesis 2. Risk factors are key in relation to EVA of banks.
1. The increase of credit risk contributes to a decrease of profitability.
2. The risk of the securities portfolio negatively affects the bank’s EVA.
3. The risk factors of the securities portfolio are open positions on government bonds, sub-federal and municipal bonds, corporate and bank bonds, and equity investments. Effective management of this type of risk implies a regular revaluation of market instruments, the formation of reserves for losses and the establishment of limits on financial instruments and the structure of portfolios, which, ultimately, will contribute to the increase of the bank's profitability [12]. With the growth of capital risk, the profitability of banks decreases.
4. The risk of insolvency negatively affects EVA.

Hypothesis 3. The state ownership in the bank has a negative influence on the bank’s profitability.
Under normal conditions of the economic environment, state ownership is characterized by a decrease in the motivation of owners and a lack of flexibility in making managerial decisions, which has a negative effect on profitability [13].

Hypothesis 4. The ownership of foreign organizations in the bank does not have an impact on the bank’s profitability.

Hypothesis 5. EVA is significantly affected by the level of development of the banking sector.

Hypothesis 6. The macroeconomic conditions of the bank's functioning have a significant impact on the bank’s profitability.
1. GDP growth has a positive impact on EVA.
2. The size of the key rate significantly positively affects EVA.

2.2 Empirical approach to the study

Panel data is used to analyze the impact of various factors on the amount of economic profit created by banks. The study of determinants is carried out by constructing a regression, the spread of Economic Value-Added EVA acts as a dependent variable. The use of the relative value of economic profit in this case is due to the need to exclude the direct influence of the size the bank by the absolute value of the EVA indicator, when large banks have a higher value of the studied indicator, other things being equal, which may distort the evaluation results. Thus, the formula of the estimated indicator will take the form (Equation 1):

\[
EVAS_t = \frac{NOPAT}{Capital\ Invested} - Cost\ of\ Capital
\]

The necessary adjustments were made to the indicators included in the spread, considering the peculiarities of banking activity. When calculating net operating profit after taxes (NOPAT), expenses for creating reserves for possible losses on loans and receivables in credit institutions, adjusted for the income tax rate, are deducted from net profit [14-19]. Reserves are not actually incurred expenses but reflect the estimated sum of potential losses. Their reflection in the balance sheet will lead to a discrepancy in the values of accounting profit and cash flows, which in its turn will lead to an underestimation of real profitability and an underestimation of the value of real assets. Moreover, when determining the sum of reserves, there is a subjective assessment of management, which can distort the real situation in the company in the direction desired by management.

Net non-interest income is deducted from net profit, which contains the result of non-banking activities, the source of which is not the assets and liabilities of the bank, which may be one-time income and expenses of the bank. Net profit has also been adjusted by the amount of change in deferred tax liabilities and/or deferred tax assets. They arise due to
differences in accounting and tax accounting and must be paid as expenses (or accounted for as income) in future periods.

According to the adjustments described above, the formula for calculating NOPAT has the form (Equation 2):

\[
NO\text{PAT} = \text{Net Profit} + \text{Change in the provision for possible loan losses} \times (1 - t) - \text{Net non-operating income} \times (1 - t) + \text{Change in deferred tax liabilities} - \text{Change in Deferred Incometax assets}
\]

The formula for calculating the invested capital has the form (Equation 3):

\[
\text{Capital Invested} = \text{Total equity Capital} + \text{Reserve or NPL's} \times (1 - T) - \text{Net Non-operating income} \times (1 - t) + \text{Change in deferred tax liabilities} - \text{Change in Deferred Incometax assets}
\]

The study of the determinants of economic profit of banks was carried out using an empirical model estimated by the system of generalized method of moments (system GMM).

The estimated equation specification has the form (Equation 4):

\[
EVAS_{it} = \beta_0 + \beta_1 EVAS_{it-1} + \sum_j \beta_j X_{jt} + \sum_l \beta_l X_{lt} + m = 1 \beta_m X_{mt} + \gamma b_{typei} + \delta_{stateci} + \theta_{foreignci} + v_i + \mu_{it}
\]

where:
- \(I,t\) – bank number and evaluation period;
- \(EVAS_{it-1}\) is the first lag value of estimated variable;
- \(X_{jt}\) – economic determinants of banks' profitability, divided into 3 groups: financial and operational factors \(X_{jt}\), determinants of banking sector \(X_{lt}\) and macroeconomic factors \(X_{mt}\);
- dummy variables \(b_{typei}\) of the appropriate type of the business model: retail, corporate, interbank, investment;
- dummy variables \(state_{ci}\) and \(foreign_{ci}\) of ownership structure – state or foreign bank;
- time-constant individual banking effects \(v_i\);
- \(\mu_{it}\) - shocks.

### 2.3 Sample characteristics and model variables

The sample consists of 50 banks (90% of the assets of the banking sector) operating in Russia, contains all the largest banks by assets (SBER, VTB Bank, Gazprombank, Alfa-Bank, Otkritie, Rosselkhozbank, Moscow Credit Bank, etc.). The sample contains data for 10 years from 2011 to 2020. For banks which were created later than 2011, the data was collected for all years of existence. Data on financial indicators and operational profile factors are taken from banks’ annual IFRS statements published on the Bank of Russia’s website or on banks’ official websites. The sample consists of 576 observations, which makes it possible to use a sufficiently large number of explanatory variables in modeling. The panel is unbalanced due to the presence of a small number of omissions in the values of some explanatory variables due to the lack of disclosure in the banks’ statements of some indicators necessary for calculating a particular factor.

The level of asset immobilization is calculated as the share of fixed assets and intangible assets, investment property and non-current assets for sale in the bank’s total assets and
reflects the amount of own funds that can be invested in the bank’s profitable operations. To assess the risk of insolvency, the Z-score indicator is used, reflecting the ability of the bank’s capital to cover shock changes in the return on assets and reduce the likelihood of bankruptcy. A higher value of this indicator implies less risk and greater stability. The formula for calculating the indicator has the form (Equation 5):

\[ Z = \frac{ROA + E/A}{\sigma(ROA)} \]  \hspace{1cm} (5)

where:
- \( ROA \) – return on assets,
- \( E/A \) – equity to assets ratio,
- \( \sigma(ROA) \) – standard deviation of the return on assets of the banking sector.

In this study the Z-score indicator is standardized according to Equation 6 by analogy with the work of Tan’s predecessors and his colleagues:

\[ Z \left( \frac{Z - Z_{mean}}{Z} \right) \]  \hspace{1cm} (6)

### 3 Results and discussion

The results of evaluating the model of the influence of financial and operational profile factors, risk indicators, ownership structure factors, the state of the banking sector and macroeconomic factors on spread of Economic Value Added are presented in Table 1.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Coefficient</th>
<th>St.Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVAS with 1 year’s lag</td>
<td>0.577 ***</td>
<td>0.04</td>
</tr>
<tr>
<td>Bank size</td>
<td>0.004*</td>
<td>0.0006</td>
</tr>
<tr>
<td>Level of service</td>
<td>0.012***</td>
<td>0.005</td>
</tr>
<tr>
<td>Credit risk</td>
<td>0.007***</td>
<td>0.0005</td>
</tr>
<tr>
<td>Insolvency risk (Z-score)</td>
<td>0.04***</td>
<td>0.004</td>
</tr>
<tr>
<td>Capital risk</td>
<td>-0.003*</td>
<td>0.002</td>
</tr>
<tr>
<td>Corporate business model</td>
<td>-0.03**</td>
<td>0.01</td>
</tr>
<tr>
<td>Key rate</td>
<td>0.715***</td>
<td>0.072</td>
</tr>
<tr>
<td>GDP growth</td>
<td>-1.085***</td>
<td>0.189</td>
</tr>
<tr>
<td>Inflation rate</td>
<td>-1.011***</td>
<td>0.201</td>
</tr>
<tr>
<td>Const</td>
<td>1.521***</td>
<td>0.158</td>
</tr>
<tr>
<td>Number of observations</td>
<td>526</td>
<td></td>
</tr>
<tr>
<td>Sum of squared residuals</td>
<td>3.155</td>
<td></td>
</tr>
<tr>
<td>St. error of the model</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>Test on AR (1) errors, p-value</td>
<td>0.0031</td>
<td></td>
</tr>
<tr>
<td>Test on AR (2) errors, p-value</td>
<td>0.9378</td>
<td></td>
</tr>
<tr>
<td>Sargan test, p-value</td>
<td>0.7781</td>
<td></td>
</tr>
<tr>
<td>Pesaran test, p-value</td>
<td>0.5012</td>
<td></td>
</tr>
</tbody>
</table>

Note. Asymptotic standard errors are given. Symbols “*”, “**”, “***” they indicate significance at 10-, 5-, and 1% levels, respectively.

As the first lag of the dependent variable is used in the model, the number of observations has decreased from 576 to 526. Providing tests on autocorrelation of first-order errors it is concluded that the model is specified correctly. Sargan test shows that instruments are exogenous, Pesaran test – that there is no spatial correlation. From Table 1 the meaning of first lag of EVAS is rather large and equals to 0.577 and it is significant at 1% level. This result shows that this indicator is rather stable among the banks, and it can be explained by the fact that banks with high economic profits with higher probability will invest in projects which can increase their efficiency. Fiordelisi and Molyneux came to the
same conclusion analyzing the European banks. Tan and his colleagues also had the similar result for the Chinese banks in 2003-2013. According to the results of the model, the size of the bank has a significant positive effect on the amount of economic value added, thereby confirming the Hypothesis 1.1 about the higher value of larger banks, other things being equal. This result corresponds to the conclusions obtained in the papers devoted to banks in the emerging markets of Russia, Kazakhstan, and Ukraine and China [20-22]. The level of service has a significant positive effect on the spread of economic value added, hypothesis 1.3 is confirmed. An increase in the assessment of the quality of banking services rendered and customer satisfaction with banking products provided by 1 on a scale from 1 to 5 leads to an increase in the spread by 1.2% at the 1% significance level, other things being equal. The coefficient estimation for the dummy variable of the corporate type of the bank’s business model turned out to be negative and significant at the 5% significance level.

This result can be explained by the strong exposure of corporate business to the impact of the macroeconomic situation in the country, which significantly differed in the period 2011-2020 used for evaluation in this work: during the crisis, companies’ investments fall and capital investments, often requiring debt financing, decrease, while retail business, for example, is more resistant to economic downturns, the state of the economy affects the need of individuals for borrowed funds to a much lesser extent. Thus, hypothesis 1.4 on the influence of the type of the bank's business model for the value created for shareholders has been partially confirmed. Estimation of the coefficient for level of asset immobilization turned out to be insignificant, thus hypotheses 1.2 is not confirmed. The coefficient of immobilization of own funds is subject of regulation by the banking supervision authorities; the volume of immobilized assets is used in the funding model of banks and affects the transferring price rate for all divisions of the bank, in connection with which, probably, the level of immobilized assets does not go beyond the specified limits and is not critical for the value created for shareholders.

Thus, Hypothesis 1 about the influence of factors of the financial and operational profile of banks on the amount of economic value added is partially confirmed: the size of the bank and the level of service positively affect the amount of economic value added; the influence of the corporate type of business model is negative, the level of asset immobilization has no effect on EVA. Among the risk factors, four are significant. The credit risk indicator has a positive effect on EVAS, which contradicts expectations, thereby hypothesis 2.1 about the negative impact of credit risk on economic profit is rejected. A similar result was obtained in other papers on emerging capital markets [23, 24]. The Hypothesis 2.3 is confirmed as it is concluded from the model that higher capital risk, the less the profitability of the banks. This variable is significant at 10% level. Z-score (insolvency risk) has the strongest impact on EVAS among financial and operational factors. The increase of EVAS by 1% will lead to the increase of Z-score by 4%. It means that the less the insolvency risks, the higher the profit. Thus, it proves the fact that profitability of the banks is strongly connected with its financial stability. This result confirms the Hypothesis 2.4 that the insolvency risk negatively affects the profitability of the banks. The security risk turns out to be insignificant because of the evaluation of the model. Thus, the Hypothesis 2.2 is rejected. The share of investments in securities in working assets in the sample is small – the average value is 18%, the median value is 15%.

In this regard, it is likely that the risks associated with open positions on various types of bonds and stocks are small, and the significant impact of this risk factor on the amount of economic value added is not confirmed. Thus, the Hypothesis 2 is confirmed partially: the hypotheses about negative impact of credit risk (2.1) and security risk (2.2) on EVAS are rejected; the hypotheses about positive impact of capital (2.3) risks and negative effect of insolvency risk (2.4) are confirmed. The Hypothesis 3 is rejected, as the indicator of state ownership in the bank is insignificant according to the model. The results of the impact of
this indicator on banks’ profitability are rather controversial in the existing literature. Ivashkovskaya and colleagues (2005) analysed Russian banks in stable period from 2005 to 2007 and concluded that state-owned banks had lower EVA.

In contrast, Belousova and Kozyr, 2018 concluded that state-owned banks had higher ROA [24]. The Hypothesis 4 about the absence of the influence of foreign organizations in the ownership of the bank on its profitability is confirmed. According to the model, this indicator is not significant. This result corresponds to the earlier studies of Swiss banks and banks of Russia, Ukraine, and Kazakhstan. The Hypothesis 5 is rejected because according to the model, the level of sector development does not affect EVA. This indicator is insignificant. Among the macroeconomic factors, GDP growth, the average value of key rate and inflation turned out to be significant at the 1% significance level. Hypothesis 6.2 about the positive impact of the value of the key rate EVA is confirmed. According to the results of the model, the GDP growth rate and level of inflation have negative effects on the EVAS value, which is consistent with the conclusion obtained in the study. Hypothesis 6.1 about the positive impact of GDP growth on the size of economic profit is rejected. The hypothesis 6.2 about the significant impact of macroeconomic conditions on the ability of banks to create value for shareholders is partially confirmed: the size of the key rate positively affects the amount of economic profit; the GDP growth rate has a negative impact on the value created by Russian banks. Thus, the value of the economic value added of banks is influenced by various factors in combination: financial and operational profile factors, risk factors, ownership structure factors and macroeconomic factors.

4 Conclusion

The empirical analysis has shown that the amount of economic profit of banks is influenced by financial and operational indicators, risk factors, ownership structure and macro-environment factors. The use of the econometric approach in this study allowed us to determine the degree and direction of the influence of the indicators of interest on the value of the spread of economic value added of Russian commercial banks. Thus, the conclusion was obtained about the relative stability over time of the indicator of economic value for banks, which can be explained by the large volume of investments in projects aimed at improving the efficiency of banks with a higher value of economic profit. The conclusion is also made about the negative impact of the insolvency risk on the profitability of Russian banks, which was not studied earlier on the data on Russian banks.
References


