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Effect of Structural Liquidity on Profitability of Polish Commercial Banks in 2009–2016

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This study estimated determinants of Polish banks' profitability in the context of their liquidity policy. Return on equity (ROE) served as an independent variable in the model, whereas balance sheet measures were used as liquidity risk predictors. The surveys conducted based on four biggest commercial banks demonstrated relationships between liquidity risk and rates of return of banks. It should be emphasized that in the Polish economic landscape the growing share of both liquid assets and loans has a positive effect on ROE. Only a higher ratio of very highly liquid assets, identified with cash in the central bank, to the balance sheet total is a factor to limit ROE. Consequently, due to the specific conditions, Polish banks do not have to be interested in maintaining an increasing growth rate of lending activity since financial investments do not substantially inhibit their profitability (measured with ROE).

Keywords: liquidity risk, bank, profitability, determinants.

Wpływ strukturalnej płynności na rentowność polskich banków komercyjnych w latach 2009–2016

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W artykule estymowano determinanty efektywności banków polskich w kontekście ich polityki płynnościowej. W konstrukcji modelu zmienną niezależną był poziom rentowności kapitałów własnych (ROE), a predyktory ryzyka płynności stanowiły mierniki bilansowe. Badania przeprowadzone na czterech największych bankach komercyjnych wykazały istniejące zależności pomiędzy poziomem ryzyka płynności banków a ich rentownością. Należy podkreślić, że w warunkach polskiej gospodarki zarówno rosnący udział aktywów płynnych, jak i kredytów oddziałuje dodatnio na poziom ROE. Jedynie wyższy udział aktywów bardzo wysoko płynnych, utożsamianych z gotówką, w banku centralnym w łącznej sumie bilansowej ogranicza poziom ROE. W efekcie banki polskie, z uwagi na te specyficzne uwarunkowania, nie muszą być zainteresowane utrzymywaniem rosnącej dynamiki akcji kredytowej, bowiem inwestycje finansowe nie zahamują w znaczącym stopniu ich poziomu rentowności (mierzonego wskaźnikiem ROE).

Słowa kluczowe: ryzyko płynności, bank, rentowność, determinanty.

JEL: G21, G28

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1. Introduction

In the empirical examinations, relationships between the performance of commercial banks and liquidity risk may be grouped into two basic areas: estimation of liquidity risk determinants and performance determinants. Surveys performed in these areas have shown that liquidity risk has a varied effect on the rate of return. Due to the lack of studies into the effect of liquidity policy that reflects structural liquidity (measured using balance sheet measures) on the Polish banks' performance, the determinants of performance were estimated for the biggest Polish banking institutions. Based on the empirical studies, the following research hypotheses were proposed and verified:

1. There is a negative relationship between liquidity risk measured with ratios of highly liquid or liquid assets to return on equity.
2. The measure of liquidity gap and the share of loans in total assets is positively correlated with ROE.
3. The predictor of engagement in the interbank market has an effect on ROE.

2. Liquidity Risk and Methods of Its Measurement in Space and Time Research

In literature, liquidity risk in bank's activities is treated as "the risk of not being able to raise liquidity or of raising liquidity at a high cost" (Bessis, 2010; Jajuga, 2016). An important feature of liquidity risk is the two-element structure covering liquidity risk of market assets and of funding sources. The occurrence of liquidity risk of bank assets is a part of price risk related to assets with a low, or in fact non-existent, trading volume in the market. On the contrary, financing risk concerns a situation where a bank is unable to obtain additional financing at a reasonable price, and the cost of obtaining it can reach extreme values, which prevents an inflow of additional capital. The original cause of liquidity risk is the structure of the balance sheet resulting in a mismatch between asset and liability operations of the bank. However, this structural liquidity gap does not reflect the actual cash flows of a single institution. In order to determine the actual difference, the value of net flows in different periods of time must be estimated. Thus, an essential tool for estimating liquidity provides for taking into account the relationship between expected inflows and outflows (both balance sheet and off-balance sheet items), which identifies a mismatch gap and allows for determining the level of cash that enables financial security resulting from a potentially negative gap (Niedziółka, 2014). Cash flow projections, which depend on the specific characteristics and a business profile of the bank, are an essential tool for measuring risks from the perspective of internal policy. In addition, they are supported by

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the indicator analysis defining the relationship between the size of real assets and liabilities components (including off-balance sheet liabilities) (Matz and Neu, 2007). However, it should be noted that the actual size of the gap is a result of the adopted subjective assumptions adjusted to individual features of a particular entity. The gap is estimated on the basis of ex post events and most often includes expected net cash flows. Nevertheless, banks can also calculate a dynamic gap based on projected cash flows from continuing operations which include also the amortization schedule of payments of new credits granted and deposits taken. Joel Bessis (2010) points out, however, that such an approach to analyzing both current and potential future asset and liability operations refers in general to the process of budgeting rather than to liquidity risk management. The liquidity management process consists in fact in focusing on existing components of assets and liabilities that will enable determining the gap and generally do not require, among others, investing funds that have not been obtained. Additionally, one should also take into account the fact that during a disruption in the market potential (available under normal conditions) sources of capital may generate additional costs, and financing through them may be limited or even impossible. It can, therefore, be assumed that a classic formula for estimating liquidity risk is based on an analysis of the balance sheet and includes the assessment of: degree of asset liquidity, stability of funding sources, and the balance sheet gap showing relations in particular between illiquid assets (loans and receivables) of the bank and sources of its financing (Stopczyński, 2016).

A significant drawback of this methodology is that it provides for estimating liquidity by taking into account contractual dates of both asset and liability operations. For this reason, the analysis of the balance sheet will be accompanied by an indicator analysis that defines the relationship between the size of real assets and liabilities components mentioned before, taking into account the ability to pay off-balance sheet liabilities, which means identifying the relationship between the size of anticipated inflows and outflows in certain periods of time. The process of realignment follows an individual approach, which depends on the profile, customer structure and operations conducted by a single institution.

For this reason, even supervisory authorities have chosen not to introduce universal measures of liquidity risk on a global scale, which seems to result from a relatively narrow range of research undertaken in this area and from a specific nature of liquidity risk. It was only the consequences of the sub-prime crisis that geared both practitioners and supervisory bodies towards the issues of liquidity risk and, in particular, highlighted the methodological problems of calculating it.

Diamond and Kashyap emphasize that, despite the lack of adequate research, supervisory authorities have introduced mandatory prudential thresholds for maintaining a safe level of liquidity (NSFR and LCR meters:

Zaleska, 2016). According to Allen, the introduction of these thresholds seems to suggest that business practice has been "ahead of" broad scientific discussion and empirical research, which is very limited in this area. This position is shared by Bai, Krishnamurthy and Weymuller (2016), who indicated that the introduction of prudential regulations preceded by very narrow empirical research now results in a number of problems that need to be empirically verified by scientists.

There have been attempts aimed at constructing liquidity indicators that dispute the effectiveness of the methodology of measuring liquidity proposed by Basel III. This area of research includes a systemic (theoretical) proposition for risk and liquidity risk measurement in the financial system as indicated by Brunnermeier, Gorton and Krishnamurthy (2012), allowing for estimating the Liquidity Mismatch Index (LMI) that identifies the mismatch between market liquidity of components of balance sheet assets and their funding at the level of individual institutions. The effectiveness of this model (with some modifications) was verified by Bai, Krishnamurthy and Weymuller (2016). The authors indicate that the LMI measure is more effective than the indicators defined by Basel III both in the micro- and macro-area. This is due to the fact that, according to the authors, "Basel measures cannot be aggregated to provide an aggregate view of the banking system to a liquidity stress event".

Despite the conducted exploration in the latest scientific discourse (presented in 2016), economists continue to emphasize that in practice even a reference theory to regulate liquidity assigned to financial intermediaries does not exist (Diamond and Kashyap, 2016). Allen presents his considerations in a similar spirit, arguing that the issue of regulation of bank liquidity, despite the outbreak of the sub-prime crisis, has not been sufficiently studied. He emphasizes that there is a broad body of empirical analysis as to the need to implement capital regulations through which a consensus has been reached allowing for the development of a methodology for capital quantification. Some discrepancies in the selection of an optimal level are stressed in the literature; however, the extent of such exploration in this area is very large. Considering this background, there is no basis for a proper scientific discourse in the area of liquidity regulation (Allen, 2014).

On the basis of the review of research, a classification can be proposed according to which the implemented methodology for measuring liquidity in a broad academic discourse is focused on proposed solutions, including:

1. the methodology for calculating the level of liquidity creation in the banking activity proposed by Berger and Bouwman (2009), which some authors treat as a pioneering concept that identifies the importance of the issue of quantification of liquidity,
2. the systemic concept of measuring liquidity risk in the financial system, estimating the Liquidity Mismatch Index (LMI) (Brunnermeier, Gorton and Krishnamurthy, 2012) and its subsequent modifications,

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which also take into account off-balance sheet items (Bai, Krishnamurthy and Weymuller, 2016),
3. supervisory regulations introduced by Basel III (Dziwok, 2015),
4. classic balance sheet measures, in particular defining the structure of liquid assets and reflecting the liquidity gap by estimating the relationship between the components of balance sheet assets and sources of their financing, taking into account (intermittently) cash flow projections, as well as balance sheet relations identifying the commitment in the unsecured interbank deposits market.

It should be stressed that space-time studies are still dominated by the fourth group of indicators focused on balance sheet relations, which mainly use liquidity of assets or the modifications gap related to the structural components of the balance sheet. The recognition of balance sheet liquidity risk measurement is not accurate. Nevertheless, the calculation of balance sheet indicators enables a diagnosis of the basic strategy of the bank influencing the structure of capital and assets and identifies the selection of the type, nature and degree of liquidity of the bank's assets and sources of funding.

3. Literature Review

An extensive body of literature has been focused on the identification of performance of commercial banks. The effect of the individual predictors on the performance was diagnosed both before and after the onset of the sub-prime crisis. In the group of exogenous determinants, the potential effect of liquidity risk on profitability is analyzed in almost all cases. Nevertheless, empirical studies have found that the relationships are determined by various macroeconomic factors concerning, in particular, the degree of development of a specific financial system or its model which, through the effect on costs of capital, has a substantial effect on the performance of specific institutions. This area of research has been also present in the Islamic banking environment.

Some authors stressed (Dietrich and Wanzenried, 2014) that pioneer studies on performance determinants were published by Short (1979) and Bourke (1989). Other very extensive studies on these problems focused, in particular, on either the specific nature of performance determinants in the individual banking system or on cross-country evidence. Another important point is the choice of determinants with respect to macroeconomic or microeconomic determinants (that depend on the specificity of an institution) and/or industry-specific variables. Regardless of the criterion adopted, an important factor that affects the rate of return in the group of microeconomic determinants is liquidity risk. As an independent variable, liquidity risk has been widely implemented in performance modelling. The very wide array of such studies includes: Trujillo-Ponce (2013); Francis (2013); Masood and Ashraf (2012); Kosmidou (2008); Athanasoglou, Brissimis and

Delis (2008); Alexiou and Sofoklis (2009); Detragiache, Poonam and Thierry (2006); Said and Tumin (2011); Abreu and Mendes (2002), Owusu-Antwi, Mensah, Crabbe and Antwi (2015); Lee (2008); Guru, Staunton and Balashanmugam (2002); Kosmidou, Tanna and Pasiouras (2005).

In these studies, liquidity risk is diagnosed based on the balance sheet parameters, and most frequently the level of asset liquidity or a value that expresses the loans/deposits ratio is taken into consideration.

The examinations of the relationships between liquidity risk accepted by banks and banks' rates of return are non-homogeneous. A very broad area of research reflects the presence of relationships both in the groups of highly-developed and developing countries.

Abreu and Mendes (2002), who examined banks in Portugal, Spain, France and Germany, find that the loans-to-assets ratio, as a proxy for risk, has a positive impact on the profitability of a bank. A positive association was identified between liquidity risk and profitability in a study conducted by Molyneux and Thornton (1992). However, the study conducted in China and Malaysia found that the level of banks' liquidity shows no correlation with the performance of the banks (Said and Tumin, 2011). Kosmidou, Tanna and Pasiouras (2005) found a significant positive relationship between liquidity and bank profits. An indirect relationship between the liquidity level and performance was found in a study by Guru, Staunton and Balashanmugam (2002). On the other hand, Trujillo-Ponce demonstrated (using a sample of Spanish banks in the period of 1999–2009) that liquidity risk was substantially correlated with performance in Spanish banks. In particular, this concerned the relationship between loans granted and total assets as well as the share of deposits in total liabilities. According to the author, the growth in these indices is accompanied by improving performance of Spanish banks. It should also be stressed that in certain studies the liquidity ratio was found to have no significant effect on the performance of banks (Ongore and Kusa, 2013), or its effect is very small (Lartey, Antwi and Boadi, 2013).

In the above empirical studies, the rate of return is calculated using classic measures that reflect return on assets (ROA), return on equity (ROE), or margin. However, the competitive measures have also been used in the empirical examinations. Some conclusions can be drawn from the analysis presented by Owusu-Antwi, Mensah, Crabbe and Antwi (2015). These authors found that the liquidity level represents a statistically significant determinant if the EVA methodology is employed for the measurement. If ROA and ROE indices are used, the relationship is statistically insignificant.

Due to non-homogeneous results, this study estimated determinants of performance in commercial banks in the context of liquidity policy in the Polish economic conditions. In extensive empirical studies, the problems of relationships between performance and risk level in the banking system

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in Poland have not been verified empirically to date. Therefore, it was assumed that it is essential to determine the effect of fundamental financial decisions concerning the structure of assets and the relationships between non-liquid components of the balance sheet and sources of finance in terms of effect on the rate of return.

4. Methodology

Strategic decisions on the choices concerning the liquidity policy focused on the balance sheet structure represent a significant determinant that affects the rate of return. This study attempts to evaluate the effect of liquidity (balance sheet relationships) on the performance in Polish banks. The banks' return on equity (ROE) served as an endogenous variable. Therefore, the design of the *ANT* model was based on a group of independent variables comprising four predictors of liquidity risk. The group of liquidity indices included measures based on the balance sheet components that concerned the asset liquidity level, financial gap, and relations between active operations in the non-secured market of interbank deposits with respect to passive operations in this market. Table 1 illustrates the structure of measures of liquidity. The model was estimated using the sample of four biggest commercial banks in Poland in the period of 2009–2016 on a quarterly basis. Data sources were financial statements of selected banks (PKO BP SA, PKO SA, mBank SA, and ING SA).

Dependent variable		
ROE	Net profit/equity	Financial statements
Independent variables		
APAO	Liquid assets/total assets	Financial statements
ABAO	Cash, resources in the central bank/total assets	Financial statements
KD	Loans/deposits	Financial statements
KAO	Loans /total assets	Financial statements
INT	Interbank market loans/interbank market deposits	Financial statements

Tab. 1. Variable calculation method. Source: authors' own elaboration.

A dynamic panel-based auto-regression model was developed in order to demonstrate the relationships between the group of liquidity risk determinants and the generated profit (ROE):

$$ROE_{it} = \alpha_i + \beta_{1n} APAO_{it-n} + \beta_{2n} ABAO_{it-n} + \beta_{3n} KD_{it-n} + \\ + \beta_{4n} KAO_{it-n} + \beta_{5n} INT_{it-n} + \delta_n ROE_{it-n+1} + \xi_{it}, \quad (1)$$

where:
ROE_{it} – net profit/equity calculated for the bank i in the period t,
$APAO_{it}$ – liquid assets/total assets calculated for the bank i in the period t,
$ABAO_{it}$ – cash, resources in the central bank/total assets calculated for the bank i in the period t,
KD_{it} – loans/deposits calculated for the bank i in the period t,
KAO_{it} – loans/total assets calculated for the bank i in the period t,
INT_{it} – interbank loans/interbank deposits calculated for the bank i in the period t.

Each variable was lagged to the fourth-order ($n \in 0 \ldots 4$) that corresponds to the analogous quarter of the previous year. A similar order of the lag was used for the endogenous variable. Due to the panel character of the sample and the chance of heteroscedasticity, the estimation was done using the weighted least squares methodology. Eighty-eight observations were used (4 banks x 26 quarters – 4 x 4 lags). The estimation was based on the use of the Gretl package. The results obtained are presented in Table 2. This model also takes into account the credit risk, the estimated share of bad loans in relation to total loans, and the share of cash in total assets. The study found that the level of credit risk and the indicator defining the share of cash in total assets relative to ROE are statistically insignificant. In the course of the estimation, these statistically insignificant variables were discarded. The presented model shows final results that only assess the parameters relating to the variables that have a significant effect on the ROE dependent variable.

Results of ROE model estimation.

		Coefficient	**p**
Absolute term	A	–10.8373	0.0018
APAO	β_{12}	0.1754	<0.0001
ABAO	β_{20}	–0.0938	0.0283
KD	β_{30}	0.1149	0.0192
KAO	β_{43}	0.1417	0.0005
INT	β_{52}	0.705337	0.0341
ROE	δ_1	0.998607	<0.0001
	δ_4	–0.2168	0.0008

Tab. 2. Results of ANT model estimation. Source: authors' own elaboration.

The model obtained was characterized by adequate properties in terms of its fitness for empirical data ($R^2 = 0.907$; $F_{(9.78)} = 84.715$ $p < 0.001$).

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5. Conclusion

The estimations contained in Table 2 show that a growing share of highly liquid assets, including cash and resources deposited in the central bank, in total assets is accompanied by a decline in return on equity (Hypothesis 1). This relationship is consistent with the expectations since it is linked to lower revenues generated by highly liquid assets from loan operations. However, it should be emphasized that this relationship is not observed if liquid assets are analyzed with respect to total assets (Hypothesis 1, not confirmed in terms of liquid assets). This means that an increase in liquid assets causes an increase in return on equity. Therefore, it can be concluded that the investments in securities made by commercial banks generate substantial revenues on interest rates, which increases return on equity. Furthermore, there is a strong relationship between the ratio of loans to the balance sheet total and return on equity. This relationship is also natural since it means that the revenues from interest rates increase faster than the costs of interest rates (and, consequently, ROE) (Hypothesis 2). An increasing ratio of loans to total assets is accompanied by an increase in return on equity, which shows that loan activities generate an increase in the ROE index.

Similar relations were found for the index that reflects the contribution of loans to deposits (Hypothesis 2). This phenomenon is due to the fact that in the analyzed banks the value of deposits exceeds the size of loans. As a result, growing credit activity with stable sources of financing, such as deposits from clients, increases return on equity. Furthermore, the estimation showed that an increase in return on equity has an effect on the policy of engagement in the interbank market. A growing share of investment activities in the interbank market with respect to the resources acquired through this channel is accompanied by an increase in ROE (Hypothesis 3). It should be emphasized that the specific nature of the Polish banking system shows that the revenues from interest rates, with particular focus on return on equity, depend on loans and investments. With the positive relation, commercial banks may – in case of certain tensions – insignificantly limit loan activities (loan rationing), while increasing the level of liquid assets, which – as shown by the studies – should not cause a substantial decline in the rate of return. Furthermore, the involvement in loan activities in the interbank market also has a significant effect on ROE.

References

Abreu, M. and Mendes, V. (2002). Commercial Bank Interest Margins and Profitability: Evidence from E.U. Countries. *University of Porto Working Paper Series*, (122).

Alexiou, C. and Sofoklis, V. (2009). Determinants of Bank Profitability: Evidence from the Greek Banking Sector. *Economic Annals*, *LIV*(182), 93–118.

Allen, F. (2014). *How Should Bank Liquidity Be Regulated?* Paper presented at Federal Reserve Bank of Atlanta's 2014 Financial Markets Conference on 'Tuning Financial Regulation for Stability and Efficiency'. Atlanta.

Athanasoglou, P., Brissimis, S., and Delis, M. (2008). Bank-specific, Industry-specific and Macroeconomic Determinants of Bank Profitability. *Journal of International Financial Markets, Institutions and Money*, *18*(2), 121–136.

Bai, J., Krishnamurthy, A., and Weymuller, C. (2016). *Measuring Liquidity Mismatch in the Banking Sector*, http://dx.doi.org/10.2139/ssrn.2343043.

Berger, A. and Bouwman, C. (2009). Bank Liquidity Creation. *The Review of Financial Studies, 22*(9), 3779–3837, http://dx.doi.org/hhn104.

Bessis, J. (2010). *Risk Management in 122Bbanking.* Wiley & Sons.

Bourke, P. (1989). Concentration and Other Determinants of Bank Profitability in Europe, North America and Australia. *Journal of Banking and Finance*, *13*, 65–79.

Brunnermeier, M., Gorton, G., and Krishnamurthy, A. (2012). Liquidity mismatch measurement. In: M. Brunnermeier and A. Krishnamurthy (eds), *Risk Topography: Systemic Risk and Macro Modeling*. NBER.

Detragiache, E., Poonam, G., and Thierry, T. (2006). *Foreign Banks in Poor Countries: Theory and Evidence*. Paper presented at the 7th Jacques Polak Annual Research Conference hosted by the International Monetary Fund. Washington.

Diamond, D. and Kashyap, A. (2016): Liquidity Requirements, Liquidity Choice and Financial Stability. *NBER Working Paper*, (22053).

Dietrich, A. and Wanzenried, G. (2014). *The Determinants of Commercial Banking Profitability in Low-, Middle-, and High-income Countries.* Retrieved from: https://ssrn.com/abstract=2408370 (13.01.2014).

Dziwok, E. (2015). Metody pomiaru ryzyka płynności w banku komercyjnym. *Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach*, *238*.

Francis, M.E. (2013). Determinants of Commercial Bank Profitability in Sub-Saharan Africa. *International Journal of Economics and Finance*, *5*(9).

Guru, B., Staunton, J., and Balashanmugam, B. (2002). Determinants of Commercial Bank Profitability in Malaysia. *Journal of Money, Credit, and Banking*, *17*, 69–82.

Jajuga, K. (2016). Pomiar i analiza ryzyka – przegląd narzędzi. In: T. Czerwińska and K. Jajuga (eds), *Ryzyko instytucji finansowych – współczesne trendy i wyzwania?* C.H. Beck.

Kosmidou, K., Tanna, S., and Pasiouras, F. (2005). *Determinants of Profitability of Domestic UK Commercial Banks: Panel Evidence from the Period 1995–2002*. Paper presented at the Money Macro and Finance (MMF) Research Group Conference.

Kosmidou, K. (2008). The Determinants of Banks' Profits in Greece during the Period of EU Financial Integration. *Managerial Finance*, *34*(3), 146–159.

Lartey, V.C., Antwi, S., and Boadi, E.K. (2013). The Relationship between Liquidity and Profitability of Listed Banks in Ghana. *International Journal of Business and Social Science*, *4*(3).

Lee, S.W. (2008). Asset Size, Risk-taking and Profitability in Korean Banking Industry. *Journal of Banks and Banks Systems, 3*(4), 50–54.

Matz, L. and Neu, P. (2007). *Liquidity Risk Measurement and Management*. John Wiley & Sons.

Masood, O. and Ashraf, M. (2012). Bank-specific and Macroeconomic Profitability Determinants of Islamic Banks: The Case of Different Countries. *Qualitative Research in Financial Markets, 4*(2/3), 255–268.

Molyneux, P. and Thornton, J. (1992). Determinants of European Bank Profitability: A Note. *Journal of Banking and Finance*, *16*(6), 1173–1178.

Naceur, S.B. (2003). *The Determinants of the Tunisian Banking Industry Profitability: Panel Evidence.* Universite Libre de Tunis.

Niedziółka, P. (2014). Skorygowany o ryzyko kredytowe pomiar płynności banku jako narzędzie wsparcia procesu zarządzania stabilnością finansową. *Problemy Zarządzania*, *12*(4), 132–150.

 DOI 10.7172/1644-9584.66.3

Ongore, V. and Kusa, G. (2013). Determinants of Financial Performance of Commercial Banks in Kenya. *Journal of Economics and Financial Issues, 3*(1), 237–252.

Owusu-Antwi, G., Mensah, L., Crabbe, M., and Antwi, J. (2015). Determinants of Bank Performance in Ghana, the Economic Value Added (EVA) Approach. *International Journal of Economics and Finance*, *7*(1).

Said, M. and Tumin, M. (2011). Performance and Financial Ratios of Commercial Banks in Malaysia and China. *International Review of Business Research Papers, 7*(2), 157–169.

Stopczyński, A. (2016). Zarządzanie ryzykiem płynności w banku. In: T. Czerwińska and K. Jajuga (eds), *Ryzyko instytucji finansowych – współczesne trendy i wyzwania?* C.H. Beck.

Trujillo-Ponce, A. (2013). What Determines the Profitability of Banks? Evidence from Spain. *Accounting and Finance*, *53*(2), 561–586.

Zaleska, M. (2016). Ryzyko bankowe. Zmiany w sektorze bankowym Unii Europejskiej. In: T. Czerwińska and K. Jajuga (eds), *Ryzyko instytucji finansowych – współczesne trendy i wyzwania?* C.H. Beck.