



AN ATTEMPT TO ASSESS THE IMPACT OF SECURITIES ON THE STABLE AND SAFE OPERATION OF COOPERATIVE BANKS IN POLAND

Katarzyna Mikołajczyk, Józefa Gniewek

Summary

Over the past 10 years, cooperative banks in Poland have significantly increased their share and changed the structure of financial instruments in their portfolio. Asset structure is key to both performance and risk resilience. There can be various reasons for increasing the share of non-credit current assets, including regulatory requirements, the need for revenues diversification or effective liquidity management, and the effects of such decisions depend on various factors, whether macroeconomic, sectoral or individual. The paper aims to assess the role of securities for the stable and safe operation of cooperative banks in Poland and to try to answer the question of whether these relations are similar to those in the commercial banking sector. The theoretical part of the paper includes a short definition overview related to the studied problem, i.e. identification of concepts related to the safety and stability of banks, financial instruments and the specificity of cooperative banks. In addition, an analysis was made of the regularities that can be encountered when shaping the optimal structure of assets in banks. To verify the research hypothesis about the positive impact of financial instruments on the stability of cooperative banks, a linear regression model was used. For measuring the stability the *Z-Score* indicator was adopted. The research period covered annualised monthly data for the period 12.2010–09.2021. Obtained results confirm the importance of the role played by financial instruments in building cooperative banks' stability. The increase in the level of financial instruments had a beneficial effect on bank stability, but only when it took place in a smooth manner and, in addition, when their share in the asset structure was small.

Keywords

financial instruments • security • stability • *Z-Score* • cooperative banks

1. Introduction

The structure of assets and their proper management affect not only banks' performance, security, stability or their liquidity in the short term, but also in the long term. It is well known that there are components of the balance sheet with a significant proportion of assets that are clearly of interest and are most frequently assessed, but no asset

component should be underestimated. Following this notion, this paper aimed to analyse and evaluate the role of securities for the stable and safe operation of cooperative banks in Poland. The growing share of financial instruments, mainly debt securities, in the balance sheets of cooperative banks raises the following research question: what is the impact of the growing share of securities in the portfolio of cooperative banks on their safe and effective functioning and whether these relations were similar to the commercial banking sector? To verify the research hypothesis on the positive impact of financial instruments on the stability of cooperative banks, a linear regression model was used. The research period consists of monthly data from 12.2010 to 09.2021 and was divided into sub-periods taking into account the outbreak of the Covid-19 pandemic at the beginning of 2020. The evolution of securities in the cooperative banking sector was compared to commercial banks because both subsectors constitute the banking sector and a similar relationship could be expected. Whether it is so, the considerations in the study explain.

2. Conceptualisation and conceptual operationalisation

Conceptualisation and operationalisation of concepts are important stages in a properly conducted research process. As Blaikie [2009] writes, conceptualisation in social sciences should refer to theories of phenomena that are the subject of the researcher's interest, hence the key feature is precision in defining the concepts applied. Whereas operationalisation is the process of selecting indicators that correspond to the definitions of specific phenomena adopted in the course of conceptualisation, allowing the research procedure to determine unambiguously whether and to what extent we are dealing with a given phenomenon in the studied reality [De Vaus 2001].

Regarding the definitions of conceptualisation and operationalisation presented above, the following concepts were identified: cooperative banks, financial system stability and security and its features including the banking segment, financial liquidity or financial instruments and securities. When defining the concepts needed in further discussion, it is worth noting that cooperative banks function in many countries, usually having a long history and defined importance in the banking system, and are characterised by relatively low asset values and a limited area of operation. Moreover, their operations in all countries are based on similar principles. In Polish law, a cooperative bank is understood as a bank that is a cooperative [Ustawa o funkcjonowaniu banków spółdzielczych] (Act on the functioning of cooperative banks) and as an extension of this definition, it should be added that a cooperative is understood as a voluntary association of an unlimited number of persons, with variable composition and a variable share fund, which in the interest of its members conducts joint activities [Ustawa Prawo spółdzielcze] (Act of Cooperative Law). Two phrases are noteworthy in this definition, i.e. 'voluntary association of an unlimited number of persons' and the term 'interest of its members' for the benefit of whom the cooperatives operate. Therefore, it can be presumed that the members' welfare should also be considered as their primary goal of cooperative banks operations. For this to happen,

these banks must, above all, be profitable and financially stable. Further, it is worth emphasizing that cooperatives operate based on cooperative principles, which include self-help (nowadays, self-help could be replaced by 'cooperation'), personal responsibility of members, democracy, equality, justice and solidarity, and ethical values such as honesty, openness, social responsibility and care for others [Gniewek 2016]. These features harmonise with contemporary understanding of the mission of cooperatives, which focuses on cooperation as a fundamental behavioural principle of human social life [Riling et al. 2002], which is the key to humanity's survival. It is further noted that the explanation of the existence of social cooperation between unrelated persons has long been a challenge for evolutionary biologists, and despite advances in resolving this paradox, the question of how collaborative behaviours evolved is considered to be one of 25 most difficult questions facing modern science [Pennisi 2005].

Another important concept in this paper is the stability of the cooperative banking sector, which in scientific studies most often refers to the financial system. Keeping in mind that the banking system is the leading link of this system, concepts from the entire financial system could be related to it. The broader financial system is continuously exposed to many factors that can affect its security and stability. Some of these factors may generate risks of deterioration in the performance of individual institutions and, consequently, give rise to the need to identify downside risks and seek ways out of an unfavourable situation.

A review of the literature on the subject indicates that the term 'financial stability' began to be used in the 1980s and 1990s. Earlier, one would rather find terms like price stability or currency stability [Iwanicz-Drozdowska 2014]. It should be added that there is a lack of certainty among researchers in defining the concept of financial stability, which may be related to its complexity. It should also be noted that while analysing financial stability, the authors of scientific studies point to various features that such a system should have to be able to talk about its stability. Referring to the paper by B. Pietrzak and K. Wasiak [2017], it can be noticed that these factors are described, among others, by A. Crockett [1997], G. Schinasi [2004] and R. Ferguson [2003]. They focus more on specifying the term of financial instability and its causes, rather than on stability.

A. Alińska [2017] gives a very short and general definition of financial stability, describing it as a state of dynamic and permanent equilibrium in related financial markets. In its documents, NBP (National Bank of Poland) defines the financial system's stability as a state in which it continuously and effectively performs its functions, even in the event of significant, unexpected and adverse disturbances [NBP 2014]. Similarly, Fell and Schinas [2005] describe stability as a state, in our case of the financial system, which may lie on the threshold between stability and the limit of instability or even be outside it – in the sphere of instability.

According to the opinions of researchers, bank stability can be assessed at the individual level as well as at the level of the entire sector. The basic measure of stability is the *Z-score* stability index [Mercieca et al. 2007]. Assuming normal bank's profitability, this index measures the number of standard deviations by which the obtained profitability

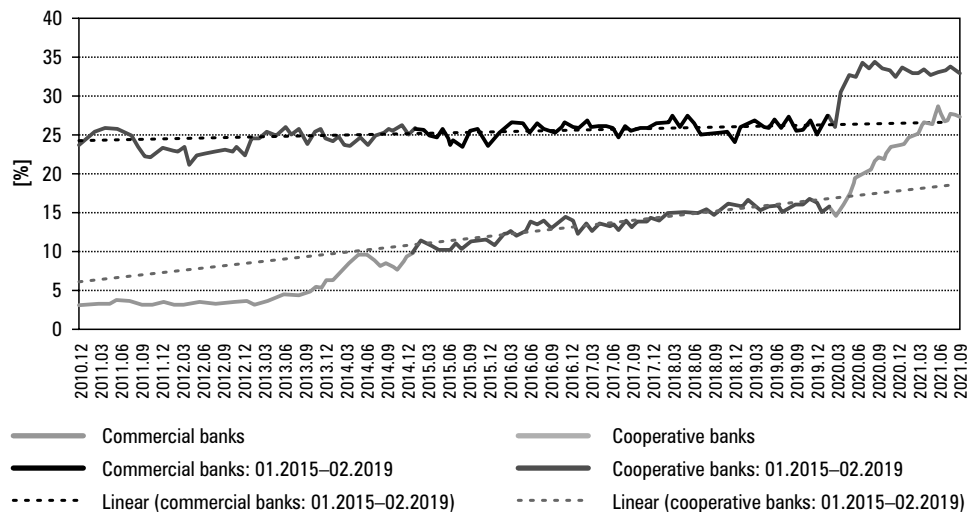
must drop to lead to a loss of equity [Hesse and Cihac 2007]. The higher the *Z-score* is, the less likely a bank is to default and the higher its stability.

Considering the field of research of this study, it is still necessary to clarify the concept of the safe operation of a bank, especially a local bank, which – like any other financial institution – is still at risk of failing to reach its goals. In academic research on banking as well as in banking practice, there is considerable discussion of profit-making in the context of bank safety. If safety is lacking or threatened, an equally important issue is for banks to maintain their financial liquidity. It was noticed that *'banks constantly deal with a liquidity deficit or surplus. This requires developing many methods that are conducive to maintaining liquidity, both through asset management and the possibility of obtaining financing'* [Zawadzka and Iwanicz-Drozdowska 2017]. This leads to the assumption that when analysing the importance of securities for the safe operation of banks, attention should be paid both to the profits achieved by these entities and their relation to other financial values, as well as the financial liquidity held.

The last important concept for further considerations is the definition of securities, which can be analysed in groups of debt instruments, equity instruments and derivatives, according to the KNF nomenclature. In the academic literature, it is possible to encounter the view that financial instruments are confused with financial categories, and the ambiguity of this concept results from its use in various fields and with different contexts [Owsiak 2015]. At this point, it should be added that narrowly defined, financial instruments are evidence confirming the title of ownership or debt, meaning that they are identified with securities [Owsiak 2015]. Regarding this paper's research subject, securities can be divided from the point of view of legal functions, e.g. into securities representing cash claims, mainly bonds, and securities confirming ownership, e.g. stocks and shares. There are no derivative instruments in cooperative banks (the third group in the division), and the issue of bank securities and the acquisition of stocks and rights from stocks or shares of another legal person and participation units in investment funds are allowed only with the consent of the affiliating bank [Kozłowski 2016]. In summary, securities can not only support the periodic financial performance of banks but also have a positive impact on their liquidity. Liquidity in securities trading provides the ability to buy or sell specific instruments freely and, in principle, instantaneously at the current market price, which can have an impact on the stability of the functioning of individual economic units and entire banking sectors.

3. Securities in the portfolio of cooperative banks

Cooperative banks, representing the traditional model of relationship banking based on deposit and lending activities, invest the raised capital mainly in lending activities. The share of other working assets, which are mainly financial instruments, in the balance sheet of cooperative banks was noticeably lower than in commercial banks, but this difference was significantly reduced in the analysed period (Fig. 1).



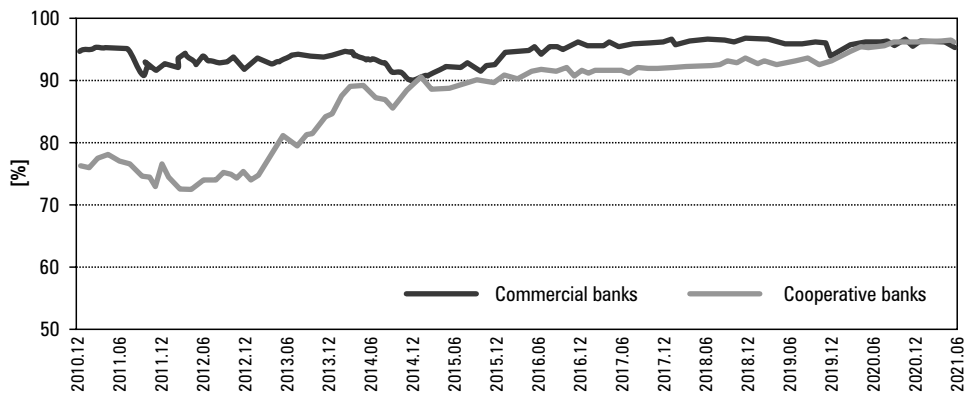
Annotation: The trend line was determined based on data from the period 2015–February 2019

Source: Authors' own study based on PFSA (The Polish Financial Supervision Authority) data. https://www.knf.gov.pl/publikacje_i_opracowania/dane_statystyczne (15.11.2021)

Fig. 1. Financial instruments in bank assets, 12.2010–09.2021

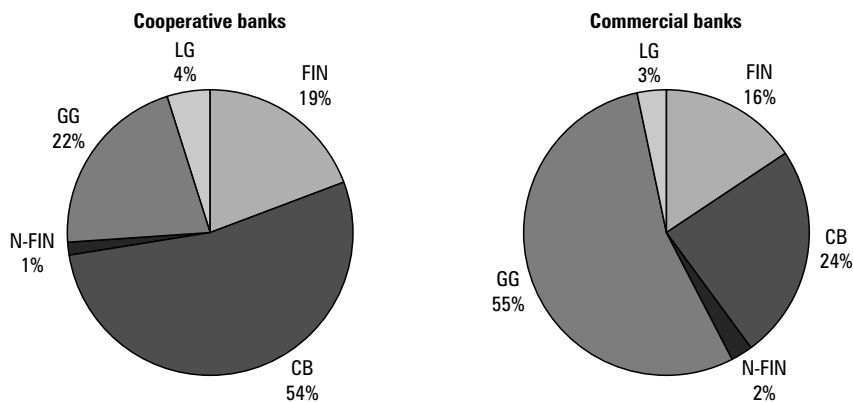
Until 2013, financial instruments did not account for more than 5% of the total assets of cooperative banks. This clearly distinguished them from commercial banks, where this ratio was several times higher (between 20 and 25%), which showed a much higher degree of diversification of their operations. However, since 2013, cooperative banks began to slowly but systematically expand their securities portfolio, the value of which already in 2018 accounted for 15% of total assets. If this trend continued in the long run, the share of financial instruments in assets would reach 25% in 2027. However, the outbreak of the Covid-19 pandemic disrupted the current trend and from March 2020 both cooperative and commercial banks sharply increased their investments in financial instruments, as a result of which their share in assets increased, and at the end of Q3 2021 it amounted to 33% in commercial banks and 27% in cooperative banks.

When analysing the financial instruments portfolio of cooperative banks, its different structure becomes clear, both in terms of the type of issuers and the type of securities. The structure of securities held by banks is dominated by debt securities. In commercial banks, their share throughout the analysed period was stable and amounted to approx. 95%. As for the cooperative banks, in the initial period covered by the analysis, the share of debt instruments amounted to approx. 75% (share of equity instruments 25%, no derivatives). However, it continued to show an upward trend and, consequently, in 2015 it exceeded the level of 90%, and in the last two years it equalled with the level of commercial banks (Fig. 2).



Source: Authors' own study based on PFSA data. https://www.knf.gov.pl/publikacje_i_opracowania/dane_statystyczne (15.11.2021)

Fig. 2. Share of debt securities in the securities portfolio: cooperative banks vs commercial banks



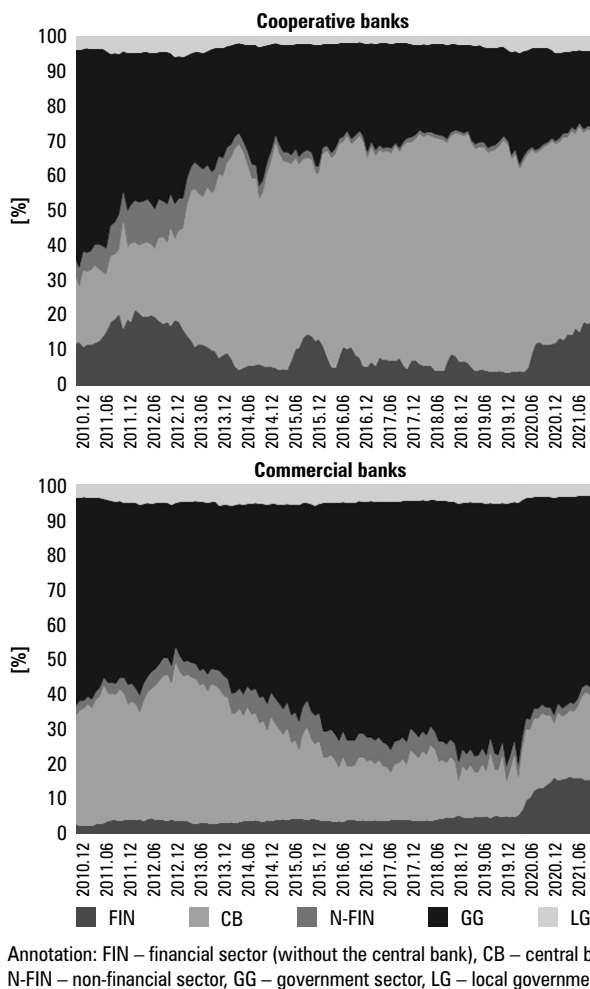
Annotation: FIN – financial sector (without the central bank), CB – central bank, N-FIN – non-financial sector, GG – government sector, LG – local government sector

Source: Authors' own study based on PFSA data. https://www.knf.gov.pl/publikacje_i_opracowania/dane_statystyczne (15.11.2021)

Fig. 3. Structure of financial instruments by the issuer, Sep 2021

Taking the type of issuer as a criterion for dividing financial instruments, it is worth highlighting a similar share of instruments issued by the financial sector (excluding the central bank), accounting for 16–19% of all financial instruments, and instruments issued by the non-financial sector, whose share is only 1–2%. The main difference in the structure of the securities portfolio relates to the role of non-commercial instruments. In cooperative banks, more than half of financial instruments are central bank instruments, and their value is more than twice the value of government securities, while in commercial banks government instruments dominate (Fig. 3).

In cooperative banks, however, the structure of the financial instruments portfolio changed significantly over the years 2010–2021 (Fig. 4). At the beginning of the research period, the share of government securities reached 60% of total securities, similar to commercial banks, while the share of central bank instruments was less than 20% (in commercial banks over 30%). The instruments of the non-financial sector and financial institutions (excluding the central bank) were also of greater importance. For the latter, their share in the structure of financial instruments has returned to a level of several percent since mid-2020.



Source: Authors' own study based on PFSA data. https://www.knf.gov.pl/publikacje_i_opracowania/dane_statystyczne (15.11.2021)

Fig. 4. Structure of financial instruments by the issuer, 12.2010–09.2021

4. Securities and bank stability

The goal of the empirical part of the paper was to answer the question of whether the increasing share of financial instruments in total assets had an impact on the stability of cooperative banks and whether these relations were similar to the commercial banking sector. The monthly data for the banking sector for the period 12.2010–09.2021 were used for the analysis. To eliminate seasonal variability, the financial data, both from the balance sheet and the income statement, was annualised, averaging the data over the last 12 months.

Bank stability can be defined in various ways, often referring to a bank's ability to absorb financial losses through accumulated capital. One of the measures of stability is the *Z-Score indicator*, which refers to the classic *Z-Score* indicator defined by E. Altman to forecast bankruptcy of non-financial enterprises, but with formula adapted to the specificity of banking operations. It represents stability by referring to the level of financial leverage (Capital to Assets ratio, *CAR*) and profitability (return on assets, *ROA*). The profitability ratio takes into account both its level and volatility, measured by standard deviation. A safe bank can therefore be understood as having a high level of capitalisation and generating stable positive financial results. It is worth noting that it is the stability and not the level of profitability itself that is the key element shaping the *Z-Score*, and therefore a bank with long term poor financial performance (low but stable *ROA*) can be assessed as more stable than a bank with positive but volatile financial performance. *Z-Score* indicator was calculated as follows:

$$Z - Score_t = \frac{CAR_t + ROA_t}{\sigma ROA_t}$$

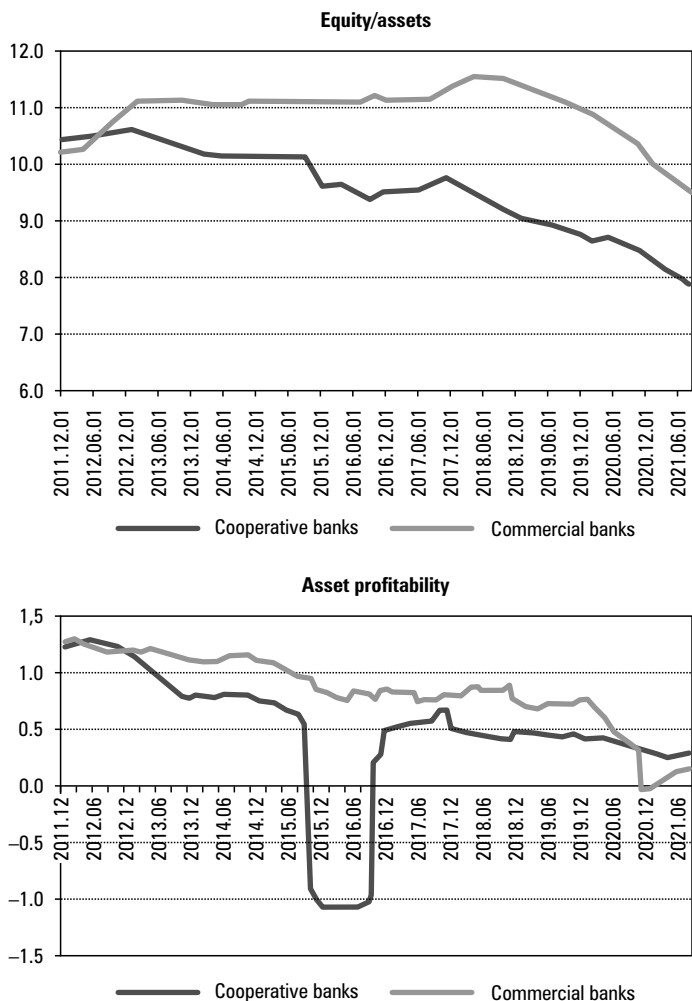
where:

CAR – the equity to assets ratio,

ROA – the ratio of net income to assets,

σROA – standard deviation of *ROA*, calculated in 12-month rolling time window.

As shown in Figure 5, both indicators shaping the *Z-Score* showed declining trends in the analysed period, and this was the case in both the cooperative and commercial banking sectors. Although the leverage ratio in the cooperative banking sector at the beginning of the research period was at a level similar to that of commercial banks (approx. 10.5%), it was systematically decreasing and by the end of the research period, it fell below 8%. The gap between commercial and cooperative banks, which appeared in mid-2012, reached 2 percentage points, but a sharp decline in the *CAR* ratio for commercial banks in the past year has narrowed it slightly. The declining level of the leverage ratio in the cooperative banking sector was mainly a result of slower growth of equity than assets, as well as of the need to cover losses in the last quarter of 2015, being the consequence of very high write-offs related to the impairment of financial assets (the loss for 2015 was almost 1,2 billion PLN). In effect, from December 2010 to September 2021 assets increased in nominal terms by 148%, while at the same time equity by only 87%.



Source: Authors' own study based on PFSA data. https://www.knf.gov.pl/publikacje_i_opracowania/dane_statystyczne (15.11.2021)

Fig. 5. Leverage ratio and asset profitability ratio, cooperative banks vs commercial banks

In terms of return on assets, cooperative banks also performed worse than commercial banks. Figure 5b shows the annualised indicator *ROA*, calculated for the month *t* as a relation of the net financial result for the last 12 months to the average value of assets in this period. As in the case of the *CAR* indicator, profitability in the cooperative banking sector has been significantly below the level of commercial banks since 2013, however, due to the declining results of commercial banks and a stronger declining reaction to the outbreak of the Covid-19 pandemic, this gap was closed in the final months of 2020.

To verify the research hypothesis on the impact of financial instruments on the stability of banks, measured with the *Z-Score* indicator, the following model was estimated:

$$\ln Z\text{-Score} = \beta_0 + \beta_1 \cdot IF/A + \beta_2 dIF + \beta_3 \cdot NIM + \beta_4 \cdot C/I + \varepsilon$$

in which, as independent variables, the ratios *IF/A*, denoting the share of financial instruments in total assets, and *dIF*, denoting the annualised rate of increase in the value of financial instruments, were used. Moreover, the control variables included the interest margin *NIM* and the cost efficiency ratio *C/I* (operating expenses in relation to the net income on banking activity). The study covered the period of 11.2012–09.2021 (due to the annualisation of the data and the calculation of the *Z-Score* indicator, the number of observations was reduced to 107). However, due to the strong disturbances in the current financial relations after the outbreak of the Covid-19 pandemic, estimates were made both for the entire research period and divided into two sub-periods (the first one until February 2020, and the second one starting in March 2020). The results are shown in Table 1.

Table 1. Linear Regression Model Results (dependent variable: $\ln Z\text{-Score}$)

Variable	Cooperative banks						Commercial banks					
	entire period		until 02.2020		after 02.2020		entire period		until 02.2020		after 02.2020	
Intercept	-0,644		0,072		11,145		9,311	***	2,847		44,875	***
IF/A	0,395	***	0,390	***	0,271	***	-0,085	**	0,020		-0,879	**
dIF	0,022	***	0,024	***	-0,037	***	-0,016	*	0,053	***	0,001	
NIM	3,139	***	3,784	***	-0,040		0,844	**	1,871	***	-6,918	**
C/I	-0,142	***	-0,187	***	-0,135	**	-0,070	***	-0,052	**	0,026	
<i>n</i>	107		88		19		107		88		19	

Note: ***, **, * denote significance at 10%, 5% and 1%, respectively.

Source: Authors' own calculations

The regression analysis confirms the important role played by financial instruments in building the stability of cooperative banks. Their impact proved to be positive as the growing share of financial instruments was conducive to the increase in the stability of cooperative banks, although the strength of this influence weakened after February 2020. Also, the pace of growth of financial instruments held in the portfolio of cooperative banks turned out to be statistically significant. Before the pandemic, when the rate of change was at a lower level, it had a positive impact on the stability of banks, while in the last two years, when there was a sharp increase in dynamics, the coefficient on the independent variable *dIF* turned negative. This may indicate the non-linear nature of the relationship. An increase in the level of financial instruments is beneficial for bank

stability only if it takes place in a smooth manner and, in addition, if their share in the asset structure is small. Such a conclusion also seems to confirm the results of regression for commercial banks. In their case, the impact of the variable IF/A was negative (strong and statistically significant in the pandemic period, when there was a sharp increase in the dynamics of the share of financial instruments in banks' assets).

5. Conclusions

The theoretical problem of bank stability or instability has long been an interesting research problem that is perceived and interpreted in a variety of ways. In each case, determinants that positively affect safety and stability were sought. This study has focused only on the role of securities in managing the structure of assets in cooperative banks. After in-depth analyses and following reasoning, it can be concluded that there are determinants that have a significant impact on the stability of banks, which should be taken into account when creating an appropriate asset structure.

The results obtained from regression analysis made it possible to verify the research hypothesis on the positive impact of financial instruments on the stability of cooperative banks. Throughout the analysed period, the importance of financial instruments for the financial stability of cooperative banks was high, but the excessively high growth rate of the value of financial instruments, which continued throughout the pandemic crisis, turned out to have a negative impact on the stability of banks. However, it should be borne in mind that the conclusions presented are strongly dependent on the definition of financial stability adopted, such as the *Z-Score* indicator, which, although widely used, is a very simplified method of its measurement.

References

- Alińska A. 2017. Sieć bezpieczeństwa finansowego jako element stabilności funkcjonowania sektora bankowego. *Studia i Prace Kolegium Zarządzania i Finansów*, 1, 121–142.
- Blaikie N. 2009. *Research Methods for Social Work*. Cengage Learning, Wadsworth, 116.
- Cornee S. et al. 2017. Charakterystyka bankowości spółdzielczej w Europie. In: *Nowa bankowość spółdzielcza w Europie. Strategie adaptacji modelu biznesowego po kryzysie*, ed. M. Migliorelli. Bankowy Ośrodek Doradztwa i Edukacji, Poznań, 33–56.
- Crockett A. 1997. Why is Financial Stability a Goal of Public Policy? In: *Maintaining Financial Stability in a Global Economy. Symposium Proceedings*, Federal Reserve Bank of Kansas City, August, 55–96.
- De Vaus D.A. 2001. *Surveys in Social Research*, Routledge, London, 24.
- Fell J., Schinasi J.G. 2005. Assessing Financial Stability: Exploring the Boundaries of Analysis. *National Institute Economic Review*, 192, 108.
- Ferguson R. 2003. Should Financial Be an Explicit Central Bank Objective? In: *Monetary Stability, Financial Stability and the Business Cycle: Five Views*. BIS Paper, 18, 7–15.
- Gniewek J. 2016. Misja i zasady spółdzielcze jako istotne czynniki rozwoju spółdzielczego sektora bankowego w Polsce. *Annales Universitatis Marie Curie-Skłodowska, Lublin – Polonia*, L, 3, Sectio H, 39–48.

- Hesse H., Cihac M. 2007. Cooperative Banks and Financial Stability. International Monetary Fund Working Paper, 07/02.
- Iwanicz-Drozdowska M. 2014. Definicje i determinanty stabilności finansowej. In: Stabilność finansowa, ed. M. Iwanicz-Drozdowska. NBP, Warszawa, 1–17.
- Kozłowski Ł. 2016. Banki spółdzielcze a deponenci. Wydawnictwo Poltext, Warszawa, 69.
- Mercieca S., Schaeck K., Wolfe S. 2007. Small European Banks: Benefits from Diversification? *Journal of Banking and Finance*, 31, 1975–1998.
- NBP. 2014. Raport o stabilności systemu finansowego, 3.
- Owsiak S. 2015. *Finanse*. Polskie Wydawnictwo Ekonomiczne, Warszawa, 326–327.
- Pennisi E. 2005. How Did Cooperative Behavior Evolve? *Science*, 309, 93.
- Pietrzak B., Wasiak K. 2017. Stabilność i bezpieczeństwo systemu bankowego – aspekty instytucjonalne i operacyjne. *Studia i Prace Kolegium Zarządzania i Finansów*, 1, Warszawa, 121–142.
- Riling J.K., Gutman D.A., Zeh T.R., Pagnoni G., Berns S., Kilts C.D. 2002. A Neutral Basis for Social Cooperation. *Neuron*, 35(2), 95–105.
- Schinasi G. 2004. Defining Financial Stability, IMF Working Paper, WP/04/187.
- Ustawa z dnia 16 września 1982 r. – Prawo spółdzielcze (tj. Dz.U. 2020 poz. 276, 568, 695, 875).
- Ustawa z dnia 7 grudnia 2000 r. o funkcjonowaniu banków spółdzielczych, ich zrzeszaniu się i bankach zrzeszających, art. 2, ust. 1 (tj. Dz. U. 2021 poz. 102).
- Zawadzka Z., Iwanicz-Drozdowska M. 2017. Ryzyko płynności. In: *Bankowość. Instytucje. Operacje. Zarządzanie*, ed. M. Iwanicz-Drozdowska, W.L. Jaworski, A. Szelągowska, Z. Zawadzka. Wydawnictwo Poltext, Warszawa, 253.

Dr Katarzyna Mikołajczyk
Cracow University of Economics
Finance and Financial Policy Department
e-mail: mikolajk@uek.krakow.pl
ORCID: 0000-0002-9120-0897

Dr hab. Józefa Gniewek, prof. UEK
Cracow University of Economics
Finance and Financial Policy Department
e-mail: gniewekj@uek.krakow.pl
ORCID: 0000-0002-9680-0584