European Research Studies Journal
Volume XXVII, Issue 2, 2024

pp. 517-530

Capital Adequacy Standards on the Case of Selected Banks in Poland Under Economic Uncertainty

Submitted 08/04/24, 1st revision 26/04/24, 2nd revision 24/05/24, accepted 30/06/24

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Abstract:

Purpose: *The aim of the study was to identify and assess the determinants of capital adequacy on the case of selected banks in Poland under economic uncertainty.*
Design/Methodology/Approach: *The research used selected capital adequacy measures recommended by the central bank and the Financial Supervision Commission. The standards were verified in 2018-2022 for purposively selected banks in Poland: ING Bank Slaski S.A., mBank S.A. and Bank Millennium S.A. The assessment was based on a comparative analysis of the reviewed banks' financial statements.*
Findings: *As a result of the descriptive analysis, it was confirmed that the reviewed banks, despite the risk of economic uncertainty, met the stansards of capital adequacy during the set period. In this context, particularly sensitive risk areas of banking activities were identified..*
Practical Implications: *In business practice, the monitoring of financial adequacy standards informs both banks and entrepreneurs: about business risks, the need to modify credit policy, the need for recapitalization. It is a useful 'barometer' of economic uncertainty verification.*
Originality/Value: *Permanent evaluation of banks' capital adequacy standards, based on selected evaluation measures, allows monitoring the risk of banking activity under conditions of economic uncertainty.*

Keywords: *Banking, economic uncertainty, capital adequacy standards, pandemic period, Poland.*

JEL classification: *G21, G28, E44, E61.*

Paper Type: *Research study.*

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1. Introduction

Under conditions of economic uncertainty, enterprises pay special attention to the security considerations of their business in order to try to minimize risks. Capital adequacy is one of the tools for assessing the security of business conducted by banking sector entities (Grzyb, 2020; Muminovna *et al.,* 2024). What is the significance of this 'adequacy'?

In the changing economic environment, which includes technological advances, internationalization of financial markets, development of financial products and services, the area of risk is also expanding (Słodowa-Hełpa, 2013; Chudobiecki *et al.,* 2016; Ostraszewska, 2017; Wanat *et al.,* 2018; Ahmed *et al.,* 2021; Do *et al.,* 2022).

This is, of course, not just so-called systemic risk. It means 'the likelihood of disruption in access to financial sector services as a result of deterioration in the situation of market participants', or rather in the financial system (Borri and Di Giorgio, 2022). It is also the consequences of the impact of this 'system' on the market (Potkański *et al.,* 2011; Wanat and Potkański, 2011; Klus *et al.,* 2021).

The banking sector, exposed to the presence of various turbulences, seeks 'adequate' regulatory instruments, usually with prudential characteristics (BCBS, 2017; Wanat *et al.,* 2019; Klus *et al.,* 2023). This includes capital adequacy (Benetton *et al.,* 2021). We are talking, first of all, about such an objective of the financial sector supervisor, which should be implemented as "a mechanism to control the ability of the capital of a financial institution to cover potential losses, which result from the conduct of business" (Ostraszewska, 2017; Gehrig and Iannino, 2021).

The measurement, as well as the evaluation of such a "measure", should determine the minimum level of own funds that a bank should have in order for the business conducted to be considered (adequately) safe (Gropp *et al.,* 2024). What does this mean in practice? This minimum level of capital (own funds), should be adequate to the scale and business risk profile of the bank concerned.

Thus, capital adequacy can be managed (Coccorese and Girardone, 2021). This process involves the quantification of specific metrics by businesses (Syafrizal *et al.,* 2023). Their value makes it possible to 'adequately' determine the level of security of the entity's business.

How does the outlined background relate to the overall business security policy in the banking sector? The starting point is, of course, the fundamental policies (De Haan *et al.,* 2020), microprudential (goal: to mitigate risk in individual financial institutions) and macroprudential (goal: to mitigate risk in the financial sector).

The two areas indicated reflect the financial system stability, understood as a set of institutions (entities, stakeholders) that make up the system, including the banking system (Begenau and Landvoigt, 2022; Keister and Monnet, 2022).

Of course, local and regional policies are also not insignificant, including safety regulations for fintech companies (Klus *et al.,* 2022). It seems that the tools of macroprudential policy, as well as monetary policy, complement each other, creating a macro-stabilization state policy (Cavaco Silva, 2021).

It is therefore necessary to emphasize the importance of central bank monetary policy instruments and supervision. In Poland, this function is performed respectively by the National Bank of Poland and the Financial Supervision Commission (Liulov *et al.,* 2020; Pyka and Nocon, 2020; Király *et al.,* 2022).

It would seem that the task of minimizing systemic risk in banking is the domain of macroprudential policy (Czaplicki, 2022). This is performed using, for example capital buffers (counter cyclical buffer, buffers for systemically important institutions, systemic risk buffer), the level of own funds, or capital requirements, among others (Corbae and D'Erasmo, 2021; Matyunina and Ongena, 2022).

However, from the point of monetary policy, a natural addition to the 'safety area' will also be measures of capital adequacy, the minimum level of which is determined by banking supervision (Thalassinos *et al.,* 2014; 2015; Thalassinos and Liapis, 2024; Deceanu *et al.,* 2010; Liapis *et al.,* 2020).

On this background, reference was made both to the state of the art and to regulatory acts. It should be noted that bank risk management is not only the responsibility of business, but also the primary task of state and sector institutions (De Jonghe *et al.,* 2020; Hirtle *et al.,* 2020; Granja and Leuz, 2024). This recommendation is valid not only in favorable macroeconomic conditions, but also in economic uncertainty and crisis (Rupeika-Apoga and Thalassinos, 2020).

An example of a period of economic uncertainty was 2018-2022. Signs of this uncertainty, including for the financial sector, have turned out to be both the coronavirus pandemic (Dursun-de Neef and Schandlbauer, 2021) and the continuing war, sometimes called a “creeping world war, in pieces” (Spadaro, 2022), a consequence of Russia's aggression against Ukraine (Athari, 2021).

These reasons alone justify undertaking research on capital adequacy standards in the banking sector, including on the case of Poland. An important challenge, therefore, would seem to be to try to answer the question of how selected Polish banks maintain their capital adequacy standards, especially under conditions of economic uncertainty.

2. Materials and Methods

The starting point for determining the methodological basis of the designed study was to define the concept of capital adequacy (Ostraszewska, 2017), which was done at the beginning of this paper. So, is it possible to verify the ability of a financial institution's capital to cover potential losses of the banking business?

Is it enough just to maintain the value of capital at the required level? Individual financial requirements are determined primarily by banking supervisory institutions, national and international, including European ones (BCBS, 2017; Gehrig and Iannino, 2021).

The European Union has Capital Requirements Directive IV (CRD IV), Directive 2013/36/EU of the European Parliament and of the Council of June 26, 2013, on the conditions for the admission of credit institutions to the activity and the prudential supervision of credit institutions and investment firms (Neisen and Schulte-Mattler, 2020; Benetton *et al.*, 2021).

In Poland, both the Central Bank (National Bank of Poland, NBP, n.d.) and the Financial Supervisory Commission recommend that capital adequacy standards should be linked to market development (Financial Supervisory Commission, KNF, n.d.). Measures of adequacy will be dynamic, therefore.

The study, as a point of reference, adopted the principles of distribution of a bank's own funds, used in the literature (Koleśnik, 2014; Kumhof and Noone, 2021; Choudhry, 2022). It includes core capital, "Tier I", additional capital, "Tier I" and "Tier II" capital (the sum of common and additional "Tier I" capital). Based on this classification, in accordance with Polish law and European regulations (Veil, 2022) as of 2020, the following capital requirements (denoted hereafter by letters A through F) apply:

(A) a ratio of minimum 'Tier I' capital to total risk exposure of at least 4.5%, determined according to formula (1):

$$\text{CET1} = \frac{\text{Tier 1 core capital}}{\text{Rk} + 12{,}5*(\text{Rr}+\text{Ro})} \qquad (1)$$

where:
CET1 – common capital ratio;
Rk – credit risk;
Rr – market risk;
Ro – operational risk;

(B) ratio of 'minimum Tier 1 capital' to total risk exposure of at least 6%, determined according to formula (2):

$$T1 = \frac{\text{Tier 1}}{Rk + 12{,}5*(Rr+Ro)} \quad (2),$$

where:
T1 – 'Tier I capital' ratio;

(C) minimum solvency ratio of at least 8%, determined according to the formula (3):

$$TCR = \frac{\text{Tier I} + \text{Tier II}}{Rk + 12{,}5*(Rr+Ro)} \quad (3),$$

where:
TCR – total capital ratio;

(D) having regulatory capital to cover unexpected losses, set individually;

(E) undergo evaluation by the Financial Supervision Commission and apply the individually imposed capital requirements, the so-called 'add-on';

(F) use of a combined buffer, including: hedging at 2.5%, taking into account systemic, countercyclical and institutional risk (Corbae and D'Erasmo, 2021; Matyunina and Ongena, 2022).

Table 1 provides the Polish Financial Supervisory Commission's guidelines on capital requirements for banks. Failure to meet the condition of maintaining capital at the prescribed level results in sanctions (Czechowska *et al.*, 2021).

Table 1. *Recommendation of the Polish Financial Supervision Commission (KNF) defining individual capital requirements in 2018 [formula].*

Ratio	Minimum value
CET1	4,5% + 56%*add-on + combined buffer requirement
T1	6% + 75%*add-on + combined buffer requirement
TCR	8% + add-on + combined buffer requirement

Source: *Own elaboration based on Kochaniak et al. (2020).*

The main purpose of the study was to try to verify whether the reviewed banks were prepared for the risks associated with the effects of economic uncertainty. ING Bank Śląski S.A., mBank S.A. and Bank Millennium S.A. were selected for the study, in the subject scope. The analysis was conducted in the time scope: 2018-2022. It was verified whether these banks met financial adequacy standards. Ratio and comparative analysis was carried out on the basis of secondary data.

These data were obtained from financial statements, published in the form of reports of the investor relations department of the public websites of the banks under study.

The study also used the results of Łukasiewicz's (2023) verification of banks' financial statements.

The paper's authors are grateful for sharing these data. As a result of the comparative analysis of the financial statements of the three Polish banks, aggregate tabular statements were prepared. On this basis, the most important conclusions were formulated.

3. Results and Discussion

The primary criterion in the study of capital adequacy standards was considered to be the correct recognition of the reviewed banks' own funds and risk-weighted assets (Pyka and Pyka, 2023). The tables summarize the verified capitals for the examined banks in 2018-2022, that is: mBank S.A. (Table 2), ING Bank Śląski S.A. (Table 3), Bank Millenium S.A. (Table 4).

Table 2. *Own funds and risk-weighted assets for mBank S.A. in 2018-2022 [in PLN billion].*

Type of capital / fund	2018	2019	2020	2021	2022
Own funds / Equity	15,77	16,36	17,59	15,87	14,40
Tier I common / core	13,32	13,88	15,05	13,55	12,15
Tier I supplementary	0,00	0,00	0,00	0,00	0,00
Tier II	2,45	2,48	2,54	2,32	2,25
Risk-weighted assets	76,24	84,11	88,54	95,74	88,03

Source: *Own elaboration based on financial reports made available on the website: https://www.mbank.pl/ and Łukasiewicz, (2023).*

It was noted that mBank S.A. has no capital that qualifies as supplementary "Tier 1" capital. Core "Tier 1" capital, on the other hand, accounts for about 85% of the bank's own funds, throughout the period under review. The level of risk-weighted assets ranged from PLN 76.24 billion to PLN 95.74 billion in each year.

Table 3. *Own funds and risk-weighted assets for ING Bank Śląski S.A. in 2018-2022 [in PLN billion]*

Type of capital / fund	2018	2019	2020	2021	2022
Own funds / Equity	11,95	14,59	16,39	15,69	16,46
Tier I common / core	11,30	12,46	14,09	14,02	14,81
Tier I supplementary	0,00	0,00	0,00	0,00	0,00
Tier II	0,65	2,13	2,31	1,67	1,65
Risk-weighted assets	76,60	86,48	87,56	104,07	108,11

Source: *Own elaboration based on financial reports made available on the website: https://www.ing.pl/ and Łukasiewicz, (2023).*

It was noted that ING Bank Slaski S.A. did not report capital, defined as "Supplementary Tier 1 capital". On the other hand, "Common Equity Tier I" accounted for about 90% of the bank's own funds throughout the period under

review. The level of risk-weighted assets ranged from PLN 76.60 billion to PLN 108.11 billion in particular years.

Table 4. *Own funds and risk-weighted assets for Bank Millennium S.A. in 2018-2022 [in PLN billion].*

Type of capital / fund	2018	2019	2020	2021	2022
Own funds / Equity	7,94	9,67	9,97	8,44	6,99
Tier I common / core	7,24	8,14	8,44	6,91	5,47
Tier I supplementary	0,00	0,00	0,00	0,00	0,00
Tier II	0,70	1,53	1,53	1,53	1,52
Risk-weighted assets	36,64	48,12	51,14	48,90	48,50

Source: *Own elaboration based on financial reports made available on the website: https://www.ing.pl/ and Łukasiewicz, (2023).*

It was noted that Bank Millennium S.A. does not have capital that qualifies as "Supplementary Tier 1 capital". On the other hand, the share of "Common Equity Tier I" in total equity, decreased during the period under review. The decrease was recorded from 91% in 2018 to 78% in 2022. Risk-weighted assets, meanwhile, fluctuated in the analyzed years from the level of PLN 36.64 billion to PLN 51.14 billion.

In the next step, the values of the total capital ratio (TCR) (Table 5), the "Tier 1" (T1) capital ratio (Table 6) and the "Common Equity Tier 1" (CET 1) ratio (Table 7) for the reviewed banks are tabulated. These data were compared with values for the banking sector in general.

Table 5. *Total capital ratio of analyzed banks against total Polish banking sector in 2018-2022 [in percentage].*

Reviewed banks	2018	2019	2020	2021	2022
ING Bank Śląski S.A.	15,60%	16,87%	18,72%	15,08%	15,23%
mBank S,A,	20,69%	19,46%	19,86%	16,58%	16,36%
Millennium S.A.	21,68%	20,09%	19,49%	17,25%	14,42%
Banking sector data	19,05%	19,35%	20,67%	19,38%	19,42%

Source: *Own elaboration based on financial reports on website of reviewed banks: https://www.mbank.pl/; https://www.ing.pl/; https://www.bankmillennium.pl/ and Łukasiewicz, (2023).*

It was noted that the value of the total capital ratio (TCR), determined for the entire banking sector in Poland, including ING Bank Śląski S.A., increased until 2020, and then, in 2021, decreased. Then, in 2022, both the sector and ING Bank Śląski saw a slight increase in this ratio. At the same time, this measure (TCR) showed a downward trend for Bank Millennium S.A. (to 14.42%) and for mBank S.A. (to 16.36%).

Table 6. *"Tier I" capital ratio against Polish banking sector in 2018-2022 [in percentage].*

Reviewed banks	**2018**	**2019**	**2020**	**2021**	**2022**
ING Bank Śląski S.A.	14,75%	14,41%	16,09%	13,47%	13,70%
mBank S.A.	17,47%	16,51%	16,99%	14,16%	13,81%
Millennium S.A.	19,77%	16,91%	16,50%	14,12%	11,28%
Banking sector data	17,13%	17,29%	18,47%	17,40%	17,55%

Source: *Own elaboration based on financial reports on website of reviewed banks: https://www.mbank.pl/; https://www.ing.pl/; https://www.bankmillennium.pl/ and Łukasiewicz, (2023).*

Table 7. *"Common Equity Tier I" ratio against Polish banking sector from 2018 to 2022 [in percentage].*

Reviewed banks	**2018**	**2019**	**2020**	**2021**	**2022**
ING Bank Śląski S.A.	14,75%	14,41%	16,09%	13,47%	13,70%
mBank S.A.	17,47%	16,51%	16,99%	14,16%	13,81%
Millennium S.A.	19,77%	16,91%	16,50%	14,12%	11,28%
Banking sector data	17,13%	17,28%	18,47%	17,40%	17,55%

Source: *Own elaboration based on financial reports on website of reviewed banks: https://www.mbank.pl/; https://www.ing.pl/; https://www.bankmillennium.pl/ and Łukasiewicz, (2023).*

During the period under review, the "Tier I" ratio for the banking sector and ING Bank Śląski S.A. reached similar values. It increased by about 1.5 pp (percentage points) in 2020, then declined (2021) and stabilized. This measure for the other two banks showed a downward trend, that is, for mBank S.A. (from 17.47% to 13.81%) and for Millennium S.A. (from 19.77% to 11.28%).

Analyzing the financial statements, it was also found that neither of the reviewed banks reported the value of "Supplementary Tier II Capital". In this case, the CET1 ratio was considered to be equal to the "T1" ratio. Here, a stable level was observed in 2018-2019 (17.10% on average), with a short-term increase, in 2020 (to 18.47%), followed by a decrease in 2021-2022 (by about 1 pp).

It should also be noted that the reviewed banks had individually determined levels of capital requirements. These values were determined based on the CRR legal act, the Law on Macroprudential Supervision and the recommendations of the Financial Supervisory Commission (Łukasiewicz, 2023).

The following Tables summarize the minimum requirements for the analyzed banks, namely: mBank S.A. (Table 8), ING Bank Śląski S.A. (Table 9), Bank Millenium S.A. (Table 10). It was verified whether the reviewed bank, shows a surplus or shortfall, in relation to the required level.

Table 8. *Surplus / deficiency of capital ratios for mBank S.A. in 2018-2022 [in percentage / percentage points].*

Rate / minimum requirements	**2018**	**2019**	**2020**	**2021**	**2022**
TCR	16,88%	17,25%	13,86%	13,17%	11,51%
T1	13,97%	14,47%	11,15%	10,64%	9,51%
CET1	n.d.	n.d.	n.d.	n.d.	n.d.
Surplus/deficiency	**2018**	**2019**	**2020**	**2021**	**2022**
TCR	3,81 pp	2,21 pp	6,00 pp	3,41 pp	4,85 pp
T1	3,50 pp	2,04 pp	5,84 pp	3,52 pp	4,30 pp
CET1	n.d.	n.d.	n.d.	n.d.	n.d.

Source: *Own elaboration based on financial reports on website of reviewed banks: https://www.mbank.pl/; https://www.ing.pl/; https://www.bankmillennium.pl/ and Łukasiewicz, (2023).*

Table 9. *Surplus / deficiency of capital ratios for ING Bank Śląski S.A. in 2018-2022 [in percentage / percentage points].*

Rate / minimum requirements	**2018**	**2019**	**2020**	**2021**	**2022**
TCR	13,34%	13,96%	11,00%	11,25%	11,51%
T1	11,34%	11,96%	9,00%	9,25%	9,51%
CET1	n.d.	n.d.	n.d.	n.d.	n.d.
Surplus/deficiency	**2018**	**2019**	**2020**	**2021**	**2022**
TCR	2,26 pp	2,91 pp	7,72 pp	3,83 pp	3,72 pp
T1	3,41 pp	2,45 pp	7,09 pp	4,22 pp	4,19 pp
CET1	n.d.	n.d.	n.d.	n.d.	n.d.

Source: *Own elaboration based on financial reports on website of reviewed banks: https://www.mbank.pl/; https://www.ing.pl/; https://www.bankmillennium.pl/ and Łukasiewicz, (2023).*

It was noted that the minimum requirements for mBank S.A. steadily decreased from 2018 to 2022. The bank maintained safe surpluses for all indicators. The ratios showed the highest level in 2020 (TCR higher by 6.00 pp; T1 higher by 5.84 pp, obviously above the set minimum). Individual requirements for ING Bank Śląski S.A., meanwhile, varied.

Their indications have been decreasing since 2019 (at that time, the maximum TCR=13.96% and T1=11.96% were assumed). It was found that during the period under review the bank maintained a stable surplus (from 2.26 pp to 7.73 pp, respectively).

Table 10. *Surplus / deficiency of capital ratios for Bank Millennium S.A. in 2018-2022 [in percentage / percentage points].*

Rate / minimum requirements	**2018**	**2019**	**2020**	**2021**	**2022**
TCR	16,88%	17,25%	13,86%	13,17%	11,51%
T1	13,97%	14,47%	11,15%	10,64%	9,51%
CET1	n.d.	n.d.	n.d.	n.d.	n.d.
Surplus/deficiency	**2018**	**2019**	**2020**	**2021**	**2022**

TCR	3,81 pp	2,21 pp	6,00 pp	3,41 pp	4,85 pp
T1	3,50 pp	2,04 pp	5,84 pp	3,52 pp	4,30 pp
CET1	n.d.	n.d.	n.d.	n.d.	n.d.

Source: *Own elaboration based on financial reports on website of reviewed banks: https://www.mbank.pl/; https://www.ing.pl/; https://www.bankmillennium.pl/ and Łukasiewicz, (2023).*

Concluding this aspect, as a result of the analysis of Bank Millennium S.A.'s data, similarly to ING Bank Śląski S.A., there was a minimal decrease in ratios from 2019 (maximum TCR=17.25% and T1=14.47%. During the period under review, the bank maintained a stable surplus (values from 2.04 pp to 6.00 pp, respectively).

It seems interesting to note that despite the difficult economic situation, the reviewed banks showed a surplus in terms of the individual capital requirements inflicted on them.

However, this information, without a detailed assessment of other parameters, can be misleading. One can, for example, also evaluate the percentage changes in the dynamics of the equity ratio. These data are summarized in Table 11.

Table 11. *Percentage dynamics of changes in the equity ratio of reviewed banks against the background of the Polish banking sector in 2018-2022*

Reviewed banks	**2018/2019**	**2019/2020**	**2020/2021**	**2021/2022**
ING Bank Śląski S.A.	22,14%	12,35%	-4,29%	4.92%
mBank S.A.	3,75%	7,49%	-9,76%	-9,25%
Millennium S.A.	21,72%	3,11%	-15,37%	-17,13%
Banking sector data	4,60%	8,44%	-5,06%	-0,78%

Source: *Own elaboration based on financial reports on website of reviewed banks: https://www.mbank.pl/; https://www.ing.pl/; https://www.bankmillennium.pl/ and Łukasiewicz, (2023).*

It should be noted that in 2021, the reviewed banks, as well as the Polish banking sector as a whole, showed a decrease in the level of equity. This trend continued in 2022 as well. Yes, this result can be linked to a simultaneous increase in the financial reserves of these banks.

However, the reason may also be different. It's the result of rising interest rates and banks' exposure to government bonds, as data from the National Bank of Poland seem to confirm (see: National Bank of Poland, NBP, n.d.; Łukasiewicz, 2023). Based on the discussion and descriptive analysis, conclusions and recommendations were finally formulated.

4. Conclusions

In conclusion, it should be noted that the study used selected measures of capital adequacy recommended in Poland by the central bank and the Financial Supervision

Commission. The standards were verified in 2018-2022 for purposefully selected banks in Poland: ING Bank Śląski S.A., mBank S.A. and Millennium S.A. The assessment was based on a comparative analysis of the financial statements of the verified banks.

Based on the conducted research and descriptive analysis, the following conclusions were formulated:

1. Reviewed banks doing business in Poland, despite the risk of economic uncertainty, met the standards of capital adequacy during the set period. Based on this background, an attempt can be made to identify particularly sensitive areas of business risk in banking.
2. Permanent evaluation of banks' capital adequacy standards, based on selected evaluation measures, allows monitoring the risk of banking activities under conditions of economic uncertainty.

In business practice, the monitoring of financial adequacy standards informs both banks and entrepreneurs: about business risks, the need to modify credit policy, the need for recapitalization. Linking the experience of econometric analysis (Zhuja et al., 2024), also the proposed study can become a useful 'barometer' for assessing a bank's ability to conduct business in economic uncertainty.

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