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Evaluation of changes occurring in ALM models of banks in Poland after the outbreak of the COVID-19 pandemic***

Summary

The purpose of this paper is to assess the changes in the models of balance sheet structure management in banks in Poland after the outbreak of the COVID-19 pandemic. The main focus is on the changes in the interest rate risk profile in the banking sector, resulting from the low interest rate environment and other reasons after the events of early 2020. The key element of the models, referred to as Asset and Liability Management (ALM) models, is the management of financial result and risk in the banking book (including liquidity and interest rate risk). Lately the large-scale materialization of liquidity risk occurred during the global financial crisis. Since then, the regulatory standards and the tools implementing them have been revised and properly supplemented. In turn, the post-pandemic changes triggered an increase in interest rate risk exposure. The deterioration of financial results, as well as the almost "forgotten" risks turned out to be as severe in their consequences for banks as credit, market or operational risks. This paper evaluates the impact of the change in interest rates after the outbreak of the COVID-19 pandemic on the performance and structure of balance sheets in banks in Poland in terms of adjustment strategies.

Key words: Low Interest Rate Environment, Interest Rate Risk, Asset and Liability Management (ALM)

JEL codes: E43, E58, G01, G21, G28

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Ocena zmian zachodzących w modelach ALM banków w Polsce po wybuchu pandemii COVID-19

Streszczenie

Celem artykułu jest ocena zmian w modelach zarządzania strukturą bilansu w bankach w Polsce po wybuchu pandemii COVID-19. Główny nacisk położony został na zmiany profilu ryzyka stóp procentowych w sektorze bankowym, wynikające ze środowiska niskich stóp procentowych oraz innych przyczyn po wydarzeniach z początku roku 2020. Kluczowym elementem modeli, określanych jako modele Asset and Liability Management (ALM), jest zarządzanie wynikiem finansowym oraz ryzykiem w księdze bankowej (w tym ryzykiem płynności i stopy procentowej). Ostatnio materializacja ryzyka płynności na dużą skalę miała miejsce w czasie globalnego kryzysu finansowego. Od tego czasu normy regulacyjne i narzędzia je wdrażające zostały zweryfikowane a także odpowiednio uzupełnione. Z kolei zmiany zachodzące po wybuchu pandemii spowodowały także wzrost ekspozycji na ryzyko stopy procentowej. Pogorszenie wyników finansowych, podobnie jak „zapomniane" niemal ryzyko okazały się równie dotkliwe w skutkach dla banków, jak ryzyko kredytowe, rynkowe czy operacyjne. W artykule dokonano oceny wpływu zmiany stóp procentowych po wybuchu pandemii COVID-19 na wyniki i strukturę bilansów w bankach w Polsce w ujęciu strategii dostosowawczych.

Słowa kluczowe: środowisko niskich stóp procentowych, ryzyko stopy procentowej, zarządzanie aktywami i pasywami

Introduction

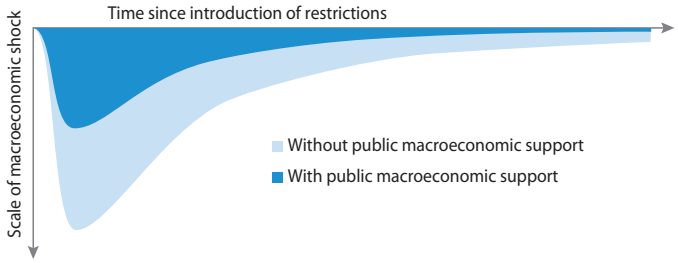
On 11 March 2020 the World Health Organization (WHO) declared a pandemic of the COVID-19. After a brief period without a response, the governments of the affected countries, including Poland, began to gradually declare states of epidemic emergency and then states of epidemic concern. This resulted in the introduction of many restrictions. Generally speaking, this included a prolonged shutdown of the economy and the emergence of an economic recession (see Sułkowski 2020). In order to mitigate the negative consequences of such a situation, the authorities of individual countries implemented aid programmes and central banks applied extraordinary monetary policy measures, such as interest rate cuts, liquidity instruments, credit support programmes, asset purchase programmes, and interventions on the foreign exchange market. The significance of these actions is illustrated by the portrayed significant impact of the pandemic on the economy (Figure 1) included in a special report issued by the NBP (2020).

In Poland, as in other countries using direct inflation targeting in monetary policy, interest rate cuts were introduced first (Niedźwiedzińska 2020). In 2020, for the first time since 2015, despite the persistence of higher levels of the inflation rate[1]

[1] The annual consumer price index for 2019 stood at 102.3 compared to 101.6 in 2018. Source: https://stat.gov.pl/obszary-tematyczne/ceny-handel/wskazniki-cen/wskazniki-cen-towarow-i-uslug-konsumpcyjnych-pot-inflacja-/roczne-wskazniki-cen-towarow-i-uslug-konsumpcyjnych/ (25.10.2021).

and market expectations of an interest rate hike, the Monetary Policy Council (MPC) cut the NBP rates 3 times (on: 18.03., 9.04. and 29.05.), which in the case of the reference rate meant a total reduction of 140 bps. These rates have a direct influence on market interest rates, and thus on interest rates of bank loans and deposits. As a result, interest rates in Poland were at their historically lowest level (Adrianowski 2020), as shown in Figure 2.

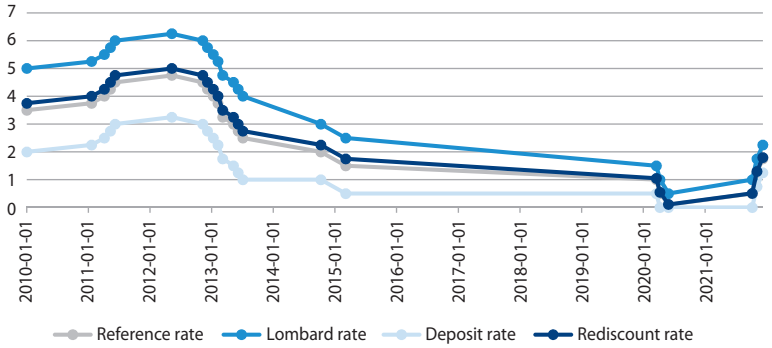
Figure 1. The stylized impact of a pandemic shock on the economy



Notes: the figure presents a stylised impact of the healthcare measures and macroeconomic support measures, and not a forecast of the impact.

Source: Narodowy Bank Polski, *Raport o stabilności systemu finansowego, Wydanie specjalne: skutki pandemii COVID-19*, czerwiec 2020 r., p. 14, https://www.nbp.pl/systemfinansowy/rsf062020.pdf (25.10.2021).

Figure 2. NBP base interest rates in 2010–2021



Source: https://www.nbp.pl/home.aspx?f=/dzienne/stopy_archiwum.htm (25.10.2021).

The low interest rate environment entails various types of multidimensional effects. Although they affect a wide range of stakeholders (Barembruch and Gostomski 2020), they are strongly felt in banking sector institutions (Molyneux et al. 2019) and it is their perspective that is considered in this article. Moreover, the phenomena

and processes that become apparent in the banking sector, which adjusts to low interest rates, have consequences not only for the sector, but also affect society and the economic system as a whole. These include: lowering the cost of financing public debt, increasing the balance sheet totals of central banks, weakening the national currency, lowering the cost of credit for customers, lowering interest rates on deposits, lowering the price of bank shares on the stock exchange, searching for alternative and more profitable ways to invest savings or increased demand in the real estate market.

Of course, not all the effects mentioned above resulted equally from the reduction of interest rates by the Monetary Policy Council. They were also influenced by other aspects resulting from the outbreak of, and concerns about, the consequences of the COVID-19 pandemic, which included: a clear reduction in the demand for investment loans and an increase in the propensity to save, support for enterprises within the framework of the Financial and Anti-Crisis Shield financed from the issue of Treasury bonds or bonds guaranteed by the State Treasury, and a reduction in the level of the reserve requirement[2]. However, regardless of the significance of each above aspect, they have had a broad impact on specific economic sectors, the financial market and their participants, as well as society. In addition, there have been varying degrees of adjustment to the changes taking place.

It is worth noting that an important part of the analysis of the low interest rate environment is looking at the interest rate risk manifested in the activities of banking sector entities (Memmel et al. 2016). Due to the pandemic, there was not only an increase in banks' risk exposure (especially interest rate risk), but also a deterioration in their financial performance. The history of savings and loan associations (S&Ls) can illustrate how strongly a change in rates and the materialisation of interest rate risk can adversely affect the functioning of not only financial institutions, but also the economy as a whole. The bankruptcy of 747 associations with assets worth over USD 407 billion in 1986–1995, referred to as the S&L crisis, was a unique event in the economic history of the United States for many reasons. With the exception of the Great Depression of the 1930s, it was the largest financial crisis of the 20th century. The final cost to taxpayers was estimated at $124 billion. Never before had any sector of the economy experienced such a large and violent wave of bankruptcies, and never before had private institutions forced taxpayers to bear such huge costs.

The above considerations clearly indicate the importance of the problem of low the interest rate environment and other factors affecting the condition of banks after the announcement of the COVID-19 pandemic. Therefore, the aim of this article is to assess the changes occurring in the banks in Poland in the low interest rate environment after the events of early 2020. Attention had been paid to the balance sheet structure management strategies implemented by them, referred to as Asset

[2] Informacja na temat sytuacji sektora bankowego w 2020 roku, KNF, Departament Bankowości Komercyjnej i Specjalistycznej Zespół Analiz Sektora Bankowego, Warszawa, lipiec 2021, p. 5.

and Liability Management (ALM) models, in which two pillars can be identified, i.e. managing the financial result and managing the risk in the banking book[3]. The book most often points to liquidity risk and interest rate risk (IRRBB). The large-scale materialisation of liquidity risk occurred during the global financial crisis. Since then, the tools and standards to monitor them have been revised and effectively supplemented[4]. In contrast, the low rate environment and other post-pandemic changes have triggered a shift in the interest rate risk profile in the ALM space.

Just as the rate management strategy common in banks in the 1960s – the "3-6-3" rule[5] was verified by the market after the collapse of the Bretton Woods system, after the emergence of the crisis related to the COVID-19 pandemic the ALM models underwent such a process. After the outbreak of the pandemic, analogous to the situation that occurred during the global financial crisis with liquidity risk, the "forgotten"[6] interest rate risk turned out to be as severe for banks in its consequences as credit, market or operational risk.

With respect to the analysis conducted and the research objective set, two research propositions have been formulated. (P1) The low interest rate environment negatively affects not only the sensitivity of net interest income (NII), but also the sensitivity of the economic value of equity (EVE). While awareness of the impact of rates on NII is widespread, awareness of their impact on the sensitivity of EVE remains decidedly limited. The changes in the structure of banks' balance sheets following the March 2020 events and the interest rate characteristics of their various positions, as presented in this article, mean that (P2) EVE is now more sensitive to increases than decreases in interest rates. Thus, the NBP rate hikes initiated in Q4 2021 imply a depreciation of economic value of equity. This is unfavourable, since it reflects the real capital needs, and is treated as a buffer to absorb the identified significant risks occurring in the bank's activities and changes in the economic environment (Iwanicz-Drozdowska 2021, p. 227).

Due to the specificity of the research objective, a broad observation of reality was carried out (cf. Apanowicz 2002, pp. 60–77) with regard to the banking sector in Poland in 2020 and the process of collecting financial assets of Poles. In the study of changes in the structure of financial performance of banks, the method of document research was primarily used and – when analysing models of rate risk management – additionally the individual cases method. The use of the individual case method

[3] A bank distinguishes between two books: the banking book and the trading book. The banking book includes all transactions that are not included in the trading book, while the trading book includes the portfolio of assets and off-balance sheet transactions entered to profit from short-term fluctuations in market factors (cf. Nowak 2017, pp. 197–198).

[4] This issue, in a synthetic way, is presented later in the article.

[5] This rule was in effect in American retail banking in the 1950s, 1960s, and 1970s. It involved banks paying 3 percent on deposits and making loans at 6 percent. Because there was no interest rate risk – the bank president could go golfing at 3 in the afternoon (Walter 2006).

[6] In 2007, the term "forgotten risk" was used by A. Clarke, advisor to the Governor of the Bank of England, in relation to liquidity risk. A statement made at a seminar „Financial Stability: Specialist Topics", Bank of England, 30.03.2007: Liquidity is a foregotten risk (see: Hałaj 2008, pp. 14–27).

is due to the limited number of banks that revealed information about changes taking place in this area[7] in their financial statements and other reports[8], and from individual approaches (including presentation) applied by banks in this regard. The analysis was narrowed down to the commercial banking sector. The use of literature review in the analysis and criticism of literature was to some extent limited due to the small comparability (to other countries) of the interest rate environment in Poland and factors affecting it[9].

In addition to this introduction, the article consists of four parts. It starts off with presentation of a review of the subject literature. However, the key part is the analysis of the structure of balance sheets and financial performance of banks in Poland from the perspective of changes that occurred after the outbreak of the pandemic, followed by an analysis of the change in the interest rate risk profile in terms of adjustment strategies to the actions taken in the face of the crisis caused by the pandemic, with particular emphasis on the impact of reduced interest rates. It ends with a summary, including the main conclusions of the analyses.

1. Literature review

Monetary policy in highly developed countries is aimed at price stabilisation, which in the long run has led to a decline in the level of interest rates to values close to zero (Bednarczyk and Brzozowska-Rup 2018). This mentioned level means interest rates at 2 percent and below – even negative interest rates (Rzońca 2014, pp. 19–20). Consequently, in highly developed countries, the banking sector has been operating in a low interest rate environment for several years. Further enforcing the strategy of maintaining low interest rates was observed when central banks responded to the global financial crisis (GFC) by introducing large-scale quantitative easing into monetary policy in order to boost economic growth (Kozak 2016). Following the outbreak of the COVID-19 pandemic, many central banks, including the National Bank of Poland (NBP), continued (or implemented) the above policy. It should be emphasized that the scope of comparisons of the Polish economy to developed countries of the European Union is limited. At some point after the GFC many of them introduced negative interest rates (Rosati 2016).

[7] These are primarily the so-called Bank Disclosures, resulting from Pillar III introduced under the New Capital Accord, which obliges banks to maintain adequate market discipline by mandating them to disclose information about their risk profile and capitalization levels (cf. Zombirt 2007, p. 65–67).

[8] The same approach was presented by Olech and Miszczak (2020), i.e., capital groups that presented information on the levels of bank portfolio risk measures in their 2020 interim financial statements at a level that would allow comparison with end-2019 data were analyzed.

[9] That is, in late 2019, due to rising inflation in Poland, there were isolated forecasts indicating market expectations for interest rate hikes. However, the Monetary Policy Council, after the outbreak of the pandemic, decided to lower them. Por. https://michaelstrom.pl/raporty-i-analizy/artykuly/296/jak-wzrost-stop-procentowych-i-wynagrodzen-wplynie-na-zdolnosc-kredytowa-polakow (20.12.2021).

Due to its consequences, the above-mentioned monetary policy raises doubts (see Rogoff 2017; Heider et al. 2019; Nasir 2021). One of the more outlined problems in this area is the so-called Zero Lower Bound (ZLB), relating to interest rates so low that the central bank loses the ability to stimulate the economy with its rates (Khoury and Pal 2020). However, this assumption is questioned due to the introduction of negative interest rates in some countries and the noticeable lack of weakening of the transmission mechanism in specific cases (see Altavilla et al. 2019).

An important thread in the area of the importance of the low interest rate environment (including the negative interest rate policy) is their impact on the commercial banking sector. As noted by Eggertsson, Juelsrud, Summers and Wold (2019), the literature focuses in this case on several issues, in particular: the impact of interest rates on the deposit rates, on the lending rates and on the bank equity values. Ulate Campos (2019) points to a number of examples of studies devoted to the impact of monetary policy on bank profitability in the context of low interest rates. Another issue raised in the literature (although so far much more often in various trade studies and reports devoted to the banking sector) is the change in the risk profile (especially in the field of interest rate risk) in the face of low interest rates, which translates into the need to change the models of balance sheet structure management in banks. This is pointed out by the authors of publications edited by Gnan and Beer (2015), edited by Bohn and Elkenbracht-Huizing (2018), or in individual works – Chaudron (2016), Deliovorias (2016). However, it seems that the problem is not sufficiently recognized and described, so this article may help fill the gap in this area.

2. Analysis of changes in financial results and balance sheet structure of banks in Poland after the outbreak of the COVID-19 pandemic

The outbreak of the pandemic, actions taken by policy makers and changes in macroeconomic factors directly affected the financial condition of banks and the level of accompanying risks. Despite the implementation of hedging measures by banks, the performance of the banking sector in Poland as well as the level of risk in 2020 are significantly different compared to 2019 and previous years. This section looks at the change in financial performance caused by the above-mentioned factors, which are also reflected in the structure of balance sheets.

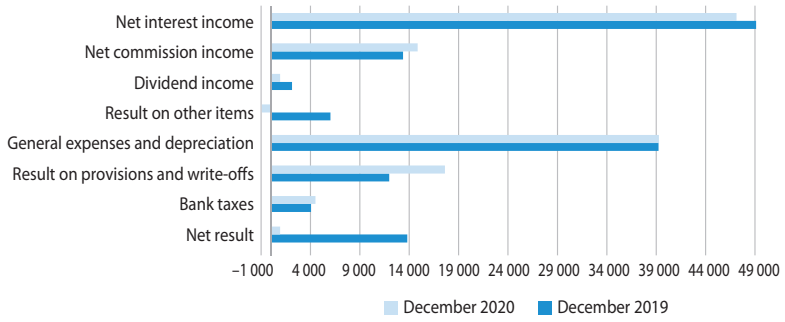
According to information on the situation of the banking sector in 2020, published by the KNF, the net result of banks in 2020 amounted to PLN 932 million. Compared to 2019 it decreased by over PLN 12.8 billion, i.e. 93.3 percent, including the commercial bank sector examined here – by PLN 13.07 billion, i.e. by. 98.7 percent.

Based on Figure 3 it can be concluded that the decrease of net interest income and net other income (down by almost PLN 2 billion and PLN 7 billion respectively) and the increase of provisions and write-downs (by PLN 5.6 billion) had the main

impact on the result. The level of provisions and impairment allowances was mainly influenced by provisions created for risks related to:

(1) the effects of the COVID-19 pandemic (and expectations of deterioration in the quality of the loan portfolio),
(2) the increase in the number of court cases and the value of the subject matter of litigation for CHF mortages (following the CJEU 260/18 judgment of 3 October 2019),
(3) the reimbursement of part of the costs associated with consumer loans repaid before the contractual deadlines consumer loans (following the CJEU judgment 383/18 of September 11, 2019).

Figure 3. Selected income statement items of the banking sector in Poland as at the end of December 2019 and 2020

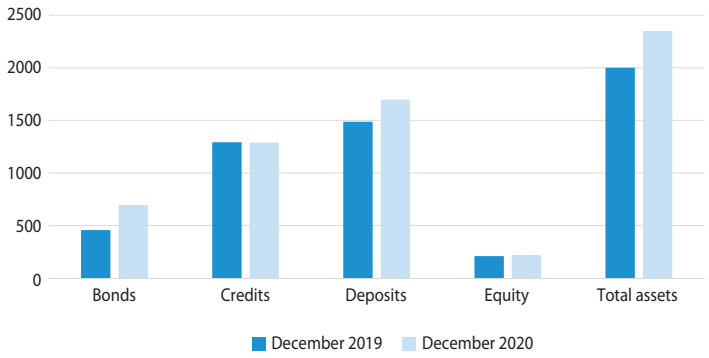


Source: own work, based on: Informacja na temat sytuacji sektora bankowego w 2020 roku, KNF, https://www.knf.gov.pl/knf/pl/komponenty/img/Informacja_na_temat_sytuacji_sektora_bankowego-_w_2020_roku.pdf [30.10.2021].

The deterioration in net interest income, in turn, was a consequence of the reduction in interest rates. In 2020, banks had to flexibly adjust deposit rates to the decline in lending rates. The average interest rates on home loans to households and loans to businesses decreased from 3.7 percent in December 2019 to 2.3 percent in December 2020, while the interest rates on household and business time deposits decreased from 1.4 percent and 1.3 percent in December 2019 to 0.5 percent and 0.3 percent in December 2020, respectively. In 2018–2019, the share of net interest income in banks' total operating income reached almost 70 percent, hence the reduction in net interest income significantly weighed on the low overall financial performance. This reduction was not offset by an increase in net fee and commission income, which increased by almost PLN 1.5 billion in 2020 compared to 2019.

At the same time, the prevailing situation in 2020 not only significantly changed the level and structure of banks' financial results, but also had an impact on the balance sheet and its individual components (Figure 4).

Figure 4. Selected balance sheet items of the banking sector in Poland as at the end of December 2019 and 2020



Source: own work, based on: Informacja na temat sytuacji sektora bankowego w 2020 roku, KNF, https://www.knf.gov.pl/knf/pl/komponenty/img/Informacja_na_temat_sytuacji_sektora_bankowego-_w_2020_roku.pdf (30.10.2021).

In the period under review, a 17.5 percent increase in total assets (over PLN 350 billion) was clearly visible. This growth, resulting from the increase in deposits of both retail and corporate clients (an increase of over PLN 210 billion), financed the increase in debt securities, the volume of which increased by over PLN 237 billion (almost 52 percent) in 2020.

It should be noted that the increase in corporate clients' funds resulted directly from the support of Polish companies affected by the effects of the pandemic in the form of domestic financial disbursements under the Financial Shield and the Crisis Shield[10], as well as a significant decline in corporate lending (resulting from a lower level of investments)[11]. Their increase was therefore temporary in nature, and irrelevant for banks in the long run, and an unstable source of financing. This can be evidenced by the fact that banks not only lowered interest rates for corporate clients in H1 2020[12], but also three of them withdrew their offer to companies.

In the context of the reported increase in retail customer funds at banks, which are stable sources of their funding, it is worth to look at the structure of Poles' financial assets. In order to capture the changes that were a direct response of households to the outbreak of the pandemic, the value of household financial assets will be presented[13] in Poland at the end of 2020 compared to the end of 2019 and

[10] According to the website of The Republic of Poland, the level of funds allocated to companies is: PLN 100 billion from the Financial Shield of the Polish Development Fund S.A. and PLN 104.2 billion from the Anti-Crisis Shield, see https://www.gov.pl/web/tarczaantykryzysowa (13.12.2021).

[11] Informacja na temat sytuacji sektora bankowego w 2020 r., KNF, Departament Bankowości Komercyjnej i Specjalistycznej Zespół Analiz Sektora Bankowego, Warszawa, lipiec 2021.

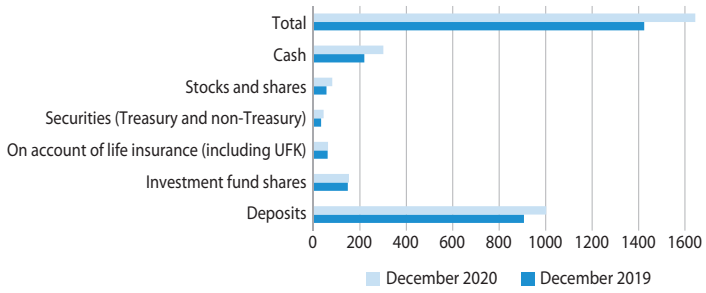
[12] Average corporate rates fell from 0.95 percent in January to 0.11 percent in July and 0.1 percent in December 2020. Cf. Ibidem.

[13] The analysis does not take into account, among others, funds in accounts in OFE or funds transferred by OFE to ZUS in February 2014. (no possibility to freely dispose of them).

the changes taking place, triggered primarily by the outbreak of a pandemic, the reduction in socio-economic activity and the exceptionally low level of interest rates.

According to information presented in the NBP report The Development of the Financial System in Poland in 2020 (NBP 2021), at the end of December 2020 total household financial assets amounted to PLN 1.64 trillion, a year-on-year increase of 15.5 percent. This growth is also confirmed by the results of the InfoKREDYT report (ZBP 2020) commissioned by the Polish Bank Association (ZBP), according to which, at the end of 2020, as many as 35 percent of Poles declared that the post-pandemic situation had increased their propensity to save and decreased their propensity to consume.

Figure 5. Value of household financial assets at the end of December 2019 and 2020



Source: own work, based on: Rozwój systemu finansowego w Polsce w 2020 r., NBP 2021, https://www.nbp.pl/systemfinansowy/rozwoj2020.pdf [21.12.2021].

Analysis of Figure 5 indicates that traditionally Poles accumulate most assets in banks (over 60 percent) and in cash (over 15 percent)[14]. There were also big changes in the level and structure of customer funds in banks. According to the statement of the Analysis Office of the Polish Development Fund S.A. (Kolasa 2021), there is a clear conversion of time deposits (down by almost 34 percent) into current funds (up by more than 30 percent). This phenomenon was a result of lower interest rates and a widespread withdrawal from offering bank deposit by banks[15].

[14] The dynamics of cash growth was the highest at the beginning of the pandemic. It resulted from the fears of Poles about its availability, in connection with the expected restrictions on leaving home and working hours and even closure of bank branches. The highest outflow was recorded in the period from March to May 2020, when the level of cash in circulation increased by PLN 54 billion. In subsequent months, the situation stabilized (NBP 2021).

[15] The number of placements gradually decreased from 486 in January to 407 offerings in December 2020. See Informacja na temat sytuacji sektora bankowego w 2020 roku, KNF, Departament Bankowości Komercyjnej i Specjalistycznej Zespół Analiz Sektora Bankowego, Warszawa, lipiec 2021, p. 41.

Changes in the level and structure of customer funds in banks had implications. Their growth – in view of the freezing of lending – resulted in significant over-liquidity of the banking sector. The high level of corporate clients' funds may have contributed, from the liquidity point of view, to an unfavourable increase in the concentration of deposits[16]. The conversion of time deposits into current deposits reduced interest costs (albeit with their growth and the over-liquidity of the banking sector), but these costs, due to the lack of the possibility of introducing a negative interest rate (discussed later in this article), were still at a relatively high level. At the same time, it should not be forgotten that current deposits are less stable than time deposits, which – as was indicated above – is important in building ALM model strategies.

Due to an increase in the public's propensity to save and the government's support for economic entities as part of the Anti-Crisis Shield, as well as the already signalled reduction in the reserve requirement rate after the outbreak of the pandemic, there was an inflow of funds to banks and an increase in their balance sheet totals. The significant increase in balance sheet totals did not translate into lending[17], but resulted in an increased demand for securities from banks. Banks purchased mainly debt securities offered by the government and specialised institutions (BGK or PFR[18]) (Olech i Miszczak 2020, p. 6), guaranteed by the State Treasury. This can be seen in the information presented by the NBP in its December 2020 Financial System Stability Report. At the end of June 2020, compared to the end of 2019, the value of the portfolio of these bonds in banks increased by 33 percent. Their share in the assets of the banking sector accounted for more than 20 percent of assets, and their value exceeded the banks' own funds almost 2.5 fold. What is also important is that their share in the assets of banks in Poland is at one of the highest levels among the EU countries[19]. While their relatively high share in previous years was due to the introduction of new supervisory prudential liquidity standards[20] (and the demand for treasury bonds in 2020, which in Poland are mainly held in the form of government debt securities), and the existing tax on certain financial institutions, the tax base of which excludes treasury bonds, in 2020 the demand for them resulted mainly from the banking sector's involvement in financing aid from public funds through the purchase of treasury securities and securities

[16] Concentration risk is regulated by Recommendation C regarding concentration risk management, KNF, Warszawa, maj 2016, source: https://www.knf.gov.pl/knf/pl/komponenty/img/Rekomendacja_C_2016_47196.pdf (13.12.2021).

[17] Although gross loans to households increased by nearly PLN 22 billion (i.e. 2.9 percent), loans to businesses decreased by PLN 16.2 billion (i.e. 4.2 percent). At the same time, the quality of loans deteriorated, but may still be underestimated due to the so-called "credit vacations" applied by banks. See: Informacja na temat sytuacji sektora bankowego w 2020 roku, KNF, Departament Bankowości Komercyjnej i Specjalistycznej Zespół Analiz Sektora Bankowego, Warszawa, lipiec 2021.

[18] Raport o sytuacji ekonomicznej banków, BANKI 2020, Nr 11/2021, WIB, na zalecenie ZBP, kwiecień 2021, p. 123.

[19] The banking sector held almost 50 percent of the bond issues issued by the Treasury. See: Raport o stabilności systemu finansowego. Ocena skutków pandemii COVID-19, NBP, Departament Stabilności Finansowej, Warszawa, grudzień 2020 r., p. 15 and 55.

[20] These are the liquidity ratios LCR and NSFR.

guaranteed by the State Treasury. To this regard, it should be borne in mind that the mentioned securities, often with a fixed interest rate, purchased in a low interest rate environment, may produce unsatisfactory financial results in the long term, especially in the materialising perspective of rising interest rates[21].

As one can seen, actions taken after the outbreak of the pandemic, taking into account the low interest rate environment, have a negative impact not only on reducing the financial result (including interest income), but also on the level and structure of the balance sheet, which in turn – together with the interest rate characteristics of individual balance sheet items – has a bearing on the interest rate risk profile of banks.

3. Changes in the interest rate risk profile of banks in Poland after the outbreak of the COVID-19 pandemic

The shielding actions of the economy, including the reduction of interest rates, had, under the ALM models, an impact not only on the performance and changes in the structure of banks' balance sheets, but also on the risk of the banking book. As it was already signaled in the introduction, the book identifies liquidity risk and interest rate risk. The problem of liquidity risk mitigation was regulated after the global financial crisis. This includes the implementation of two prudential standards, i.e., the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR), as well as additional liquidity monitoring metrics (ALMM). In order to ensure a comprehensive and comparable evaluation of the adequacy of the liquidity risk management system by the financial supervisors, the Internal Liquidity Adequacy Assessment Process (ILAAP) was implemented, similarly to the Internal Capital Adequacy Assessment Process (ICAAP)[22], which specifies what information, relevant from the perspective of liquidity and liquidity risk assessment, supervisory authorities should obtain from banks in order to carry out assessments in accordance with the criteria contained in the Supervisory Review and Evaluation Process (SREP) guidelines arising from Pillar II capital requirements. After the outbreak of the pandemic, the decisions made by policymakers and the behavior of customers contributed to deepening over-liquidity of the banking sector[23], and a new challenge became managing intraday liquidity following the MPC's reduction of the reserve requirement level[24], limiting the level of banks' funds on settlement accounts with the NBP.

[21] On 6.10.2021, 3.11.2021 and 8.12.2021 the MPC decided to increase interest rates.

[22] ICAAP and ILAAP are defined in the Guidelines on ICAAP and ILAAP Information Collected for the Supervisory Review and Evaluation Process (SREP), February 10, 2017 (EBA/GL/2016/10).

[23] At the end of 2020, the average LCR in commercial banks reached 193 percent. This phenomenon will not be analyzed further. See: Informacja na temat sytuacji sektora bankowego w 2020 roku, KNF, Departament Bankowości Komercyjnej i Specjalistycznej Zespół Analiz Sektora Bankowego, Warszawa, lipiec 2021.

[24] 17.03.2020 r. Monetary Policy Council lowered the reserve requirement rate from 3.5 percent to 0.5 percent, and 7.10.2020. – increased the reserve requirement from 0.5 percent to 2 percent. The level of the reserve requirement is therefore still below the pre-pandemic level (3.5 percent).

The materialisation of interest rate risk in the banking book may now be much more important. Therefore, the following study assesses whether the changes that occurred after the outbreak of the pandemic, including the reduction of interest rates, have affected the profile of this risk in banks in Poland. Due to the limited and often incomparable presentation of information on interest rate risk management in the banking book in the reports and statements disclosed by banks, the analysis of changes in the IRRBB profile after the outbreak of the pandemic will be carried out on the example of selected commercial banks in Poland. The data presented by these banks and appearing on reports (Olech and Miszczak 2020, p. 8) indicate that the increase in the banking sector's exposure to this risk has been recognised. The analysis of changes in the IRRBB profile will be preceded by a synthetic overview of this risk in order to give an idea of its fundamental aspects.

In accordance with the definition formulated by the European Banking Authority (EBA) in its Guidelines[25], it is the risk of changes in the current and future Net Interest Income (NII) and the market value of the bank's capital under the influence of interest rate changes (Economic Value of Equity (EVE). The impact on earnings is materialised in the impact on net interest income (NII). The market value of a bank's capital, in turn (also called the economic value of equity (Cicirko 2012)), is the value of capital estimated as the difference between the market value of receivables and payables. Thus, the purpose of interest rate risk management in the banking book is to mitigate the opportunity cost and losses incurred as a result of rate changes so that they do not exceed the acceptable sensitivity of interest income and the economic value of equity to interest rate changes[26] (Nowak 2021, p. 313). This is achieved by appropriately structuring the bank's balance sheet, taking into account both changes in the bank and its environment.

From the information published in 2020 by banks in terms of IRRBB, it is clear that after the outbreak of the pandemic the profile of this risk has changed. This is evidenced by the data disclosed on the sensitivity of net interest income (NII) and sensitivity of economic value of equity (EVE) after the outbreak of the pandemic by (for example): PKO BP S.A., BOŚ S.A. and Santander Bank Polska S.A. (Tables 1–3).

Table 1. Measures of interest rate risk of the banking book in PKO BP S.A. in 2020 and 2019

Nazwa miary	31.12.2020	31.12.2019
Sensitivity of interest income (PLN million)	(510)	(901)
Sensitivity of economic value (PLN million)	(454)	(273)

Source: Financial Statements of PKO Banku Polskiego SA for 2020, www.pkobp.pl (25.10.2021).

[25] The Guidelines for the Management of Interest Rate Risk from Banking Portfolio Activities, July 19, 2018 (EBA/GL/2018/02).

[26] In the case of NII sensitivity testing, a change in interest rates by +/- 100 bp. is most often assumed, while in the case of EVE – by +/-200 bp.

Table 2. Measures of interest rate risk of the banking book in BOŚ S.A. in 2020 and 2019

Date	ΔNII		ΔEVE	
	–100 bps	+100 bps	–200 bps	+200 bps
31.12.2020	–95,408	39,378	67,413	–98,089
31.12.2019	–43,737	33,718	29,975	–66,589
Change	–51,671	5,660	37,433	–31,496

Source: Financial Statements of Banku Ochrony Środowiska Spółki Akcyjnej for 2020, https://www.bos-bank.pl (25.10.2021).

Table 3. Measures of interest rate risk of the banking book in Santander Bank Polska S.A. in 2020 and 2019

	NII Sensitivity		MVE Sensitivity	
1 day holding period	**31.12.2020**	**31.12.2019**	**31.12.2020**	**31.12.2019**
Maximum	410	298	613	360
Average	334	273	339	194
as at the end of the period	396	292	135	168
Limit	**505**	**355**	**540**	**500**

Source: Financial Statements of Santander Bank Polska S.A. for 2020, https://www.santander.pl (25.10.2021).

The above information indicates that in 2020 versus 2019, the level of these sensitivities has changed. In 2020 versus 2019, in PKO BP S.A. the sensitivity of net interest income decreased by PLN 380 million (i.e. from PLN –907 million to PLN –527 million), while the sensitivity of economic value of equity – increased by PLN 177 million. Changes were also recorded in the other two banks, with Santander Bank Polska S.A. also disclosing a change in the level of appetite/tolerance limits for the IRRBB, i.e. in the case of NII – the limit increased from 355 to 505, while the EVE limit increased from 500 to 540. The change in the level of limits clearly indicates an increase in the exposure of this bank to the IRRBB.

Not only figures, but also descriptions in the banks' financial statements highlighted the fact that the most significant risk of the banking book is interest rate risk. For example, according to the disclosure of Bank Millennium S.A.[27], the exposure to this risk resulted primarily from a mismatch between the repricing dates of receivables

[27] Sprawozdanie finansowe Banku Millennium S.A. za rok zakończony 31 grudnia 2020 roku, www.bankmillenium.pl (25.10.2021).

and liabilities (net of equity), including mainly receivables and liabilities bearing fixed interest rates (or 0 percent). The negative impact of this mismatch on the interest result was exacerbated by the legally established upper limit of the interest rate on consumer loans, which may not be higher than twice the reference rate plus 7 percentage points. In the case of banks significantly involved in this type of lending, due to low and additionally lowered NBP rates (including the reference rate) – the impact on the result is negative[28]. mBank S.A., in turn, reported a complete reversal of the structural position of sensitivity of economic value of equity in 2020, which caused a change in this sensitivity from a decrease to an increase in interest rates. It cited the following as the primary reasons: a significant increase in current account balances (with liabilities to banks up nearly 208 percent and to customers up over 38 percent), with the vast majority of funds from customers characterised by fixed interest rates[29]. The same problem was signalled by Santander Bank Polska S.A., which reported even exceeding internal limits monitoring EVE sensitivity to rate changes in Q2 2020. At this bank it was due to a significant increase in the balance of customer funds (non-interest bearing, no maturity) and the inflow of funds under government assistance programmes implemented in connection with the pandemic. To neutralise the increase in rate risk, this bank increased the scale of investment in fixed-rate securities.[30] Bank Pekao S.A. indicated changes in sensitivity of both NII and EVE, which were also caused by interest rate cuts, increased liquidity of the banking sector (as a reaction to COVID pandemic) and asymmetry of interest rate changes on receivables and liabilities side in scenarios of decreasing / increasing interest rates[31]. The Bank stressed that in order to mitigate this risk, it monitored on changes in the environment, balance sheet structure and product offering and its interest rates[32] an ongoing basis. ING Bank Śląski S.A. also reported increased sensitivity of net interest income in the interest rate decrease scenario (parallel decrease by –125 bps). Due to the reduction of interest rates by the Monetary Policy Council, a minimum level of zero was activated on the customer price in the scenarios of decreasing interest rates (mainly activation at 0 percent on the customer price for retail savings accounts)[33].

[28] According to the aforementioned legal solutions, in March 2020, with the reference rate at the level of 1.5 percent – the interest rate on consumer loans could not be higher than 10 percent, after the last – third rate cut by the MPC in May 2020. – this interest rate dropped to 7.2 percent.

[29] Sprawozdanie finansowe mBanku S.A. według Międzynarodowych Standardów Sprawozdawczości Finansowej za 2020 rok, www.mbank.pl (3.11.2021).

[30] Sprawozdanie finansowe Santander Bank Polska SA za rok zakończony 31 grudnia 2020 roku, www.santander.pl (25.10.2021).

[31] This refers to the impossibility of lowering low or zero interest rates on the liabilities side (assuming no possibility of introducing a negative interest rate) as compared to interest rates on the receivables side, which increases the sensitivity exposure of the interest result. In the event of an increase in rates – such limitations apply only to the above described limitation on the increase in interest rates on consumer loans.

[32] Jednostkowe sprawozdanie finansowe Banku Pekao S.A. za rok zakończony 31 grudnia 2020 roku, www.pekao.com.pl (25.10.2021).

[33] Jednostkowe sprawozdanie finansowe ING Banku Śląskiego S.A. 2020, www.ing.pl (15.12.2021).

A confirmation of the observations reported by banks was also reflected in the reports of institutions related to the financial market. An example is EY's report entitled The situation of the banking sector in Poland after H1 2020, which highlights the significant impact of changes in bank balance sheets (i.e. an increase in current account balances and securities portfolios) on banks' risk profiles. These changes translated into a sharp increase in liquidity measures and sensitivity of economic value of equity, as well as into a trend of decreasing sensitivity of interest income (Olech and Miszczak 2020, p. 8). It is clear from this that the risk profile of the IRRBB has evolved significantly.

Interest rate risk was also recognised several years ago by financial regulators and is now treated as particularly important. This is reflected in the EBA's 2018 Guidelines on the management of interest rate risk from activities included in the banking book. [EBA/GL/2018/02] and in the draft amendment of Recommendation G on interest rate risk management in banks, assumptions of which were adopted by the FSA in February 2019[34]. In addition to studying the impact of rate changes on the financial result and the economic value of equity, supervisors oblige banks to conduct stress tests and model customer behavior. KNF in Recommendation G imposes obligatory monitoring of interest rate risk both in banking books and trading books. The regulator's standpoint on interest rate risk is reasonable, especially in light of the aforementioned example of problems of American S&Ls, where the lack of control over those institutions was mainly to blame, but the primary reason was the lack of awareness of the existence and control of interest rate risk caused by the mismatch between the repricing periods of interest rates on the active and passive side of the balance sheet, or rather – the lack of flexibility in adjusting the interest rate of loans to interest rate changes[35].

Final remarks

Asset-liability management has become increasingly important in banks' business models in Poland, including the adjustment of interest rate changes on the asset and liability side to changes in market rates, the persistent over-liquidity of the banking sector, and the increase in the share of fixed-rate balance sheet items (securities). The impact of these challenges is multidirectional, ranging from changes in the composition of balance sheets, through the reduction of the financial result, to the change in the interest rate risk profile analysed in the article.

Low rates, undoubtedly, have a negative impact on interest margins and net interest income. Therefore, banks have to look for other, non-interest sources of income. They do so by increasing the existing fees and commissions or introducing new ones.

[34] https://www.knf.gov.pl/o_nas/komunikaty?articleId=64612&p_id=18 (1.12.2021).

[35] A similar situation occurred in the case of the collapse of Barings Bank, which, although the main reason was inadequate control, the root cause was a lack of awareness of market risks and their consequences.

These changes take place with strong competition in the financial services market, as well as high expectations as to the protection of consumer rights, naturally meeting customer dissatisfaction. Especially as the latter have become accustomed to so-called cheap banking, are price-sensitive and finally become disloyal, as indicated, inter alia, by systematically conducted research[36]. In response, banks offer new types of services, not only of financial nature, which allow for the diversification of the service portfolio and generate additional income. On the other hand, the very low level of interest rates on deposits, especially in relation to the inflation level, also changes customers' preferences with regard to investing their savings, including increasing the share of current deposits. While this change reduces interest costs, it also requires banks to take a different approach to monitoring and estimating the so-called current account sediment, which is the basis for the transformation of the term of short-term deposits into loans.

Changes in the structure of bank' balance sheets in Poland, in the form of increases in current account balances and a greater share of securities portfolios, translated significantly into the risk profile in the ALM models. It is especially about increasing the liquidity measures and the sensitivities of net interest income and economic value of equity. The net interest income indicates sensitivity to low interest rates in the long term, as well as their decline. On the other hand, limiting lending (characterised by variable interest rates) and the search by banks for sources of greater financial income (e.g. by investing in securities issued by Polish Development Found with fixed interest rates)[37], increases the sensitivity of the economic value of equity to an increase in interest rates (Olech and Miszczak 2020, p. 8).

Although the results of stress tests carried out by the central bank (on the basis of data from June 2020) show that this sensitivity to changes in market factors is not significant, taking into account the historically recorded volatility (NBP 2020a), the banks themselves noticed this risk and applied hedging strategies[38]. The use of such strategies by banks is, inter alia, confirmed by the information disclosed by PKO BP S.A. on entering into IRS (Interest Rate Swap) hedging transactions[39] or information published by Bank Pekao S.A., on securing current accounts and protecting the interest income in the low interest rate environment, when buying fixed-rate bonds, using hedging strategies and derivative transactions – interest rate swaps (IRS)[40].

[36] According to the research carried out on behalf of PwC in 2020, for 40% of customers, the price is the most important factor when choosing banking products such as: mortgage, deposit or savings account. At the same time, one change in the bank's fee and commission tariff noticed by customers results that the percentage of customers declaring their willingness to change banks increases three-fold. Source: https://serwisy.gazetaprawna.pl/finanse-osobiste/artykuly/1494174,klienci-staja-sie-coraz-bardziej-wrazliwi-na-ceny.html (6.12.2021).

[37] https://pfrsa.pl/relacje-inwestorskie/obligacje-pfr.html (25.10.2021).

[38] It is about appropriate hedge accounting strategies. See: Rozdz. 7 Rozporządzenia Ministra Finansów z dnia 1 października 2010 r. w sprawie szczególnych zasad rachunkowości banków (Dz.U.2019.957 t.j.).

[39] Sprawozdanie finansowe PKO Banku Polskiego SA za rok zakończony 31 grudnia 2020 roku, www.pkobp.pl (25.10.2021).

[40] Jednostkowe Sprawozdanie Finansowe Banku Pekao S.A. za rok zakończony dnia 31 grudnia 2020,

As it results from the analysis based on selected banks, they recognised the interest rate risk of the banking book and applied mitigating strategies. In 2020, due to excessive liquidity of the whole banking sector, they actively adjusted their deposit interest rates to the changing market conditions[41]. However, they experienced a deterioration in their net interest income, which influenced their financial results. ROA declined at the end of 2020: –0.7 pp y/y, ROE: –6.4 pp y/y, while net interest income ratio (NIM): –0.4 pp y/y (KNF 2021).

Further challenges for banks' ALM models may result from the increases in NBP base rates initiated by the Monetary Policy Council (MPC) in October 2021[42]. The resulting increase in market rates, however, will most likely lead to an increase in deposit interest rates, encourage customers to transfer funds from current deposits to long-term deposits, and thus – increase the interest costs of current and short-term deposits. At present, it is too early to analyse the impact of a Council decisions.

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41 *Banki 2020. Raport o sytuacji ekonomicznej banków*, 2021, p. 125.

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