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SOVEREIGN ASSET AND LIABILITY MANAGEMENT (SALM): PERSPECTIVE OF PANDEMIC COVID-19 OUTBREAK IN OECD COUNTRIES, INCLUDING POLAND

Abstract. The COVID-19 pandemic is global and affects all countries in the world. The difference in the financial impact assessment of its outbreak concerns, inter alia, the state of preparation of the public sector in the previous period. The article assumes that countries which coordinated the structure of sovereign assets and liabilities before 2020 were less exposed to the negative effects of financial risks resulting from the COVID-19 pandemic.

The study uses data and methodology of the International Monetary Fund and the authors' measures dedicated to the public sector to assess the sovereign asset and liability management (SALM).

As part of the results, the negative value of net worth and the national net welfare index for the studied countries, including Poland in the period before the pandemic crisis, were indicated. In addition, the level of the loans mismatch on the public balance sheet and the scale of the increase in financial risk in the first year of COVID-19 are presented. Conclusions of research make it possible to assess the impact of COVID-19 on Sovereign Asset and Liability Management.

Keywords: sovereign asset and liability management, SALM, public sector, OECD, Poland.

1. Introduction

Asset and liability management (ALM) is a concept dating back to the 1970s used in practice primarily in financial institutions to manage market risk, liquidity risk and credit risk by appropriately adjusting the structure of the right and left side of the balance sheet. The adoption of this management method determines operational decisions both on the as-

sets and liabilities in terms of interest rate rules, maturities or currencies of individual financial transactions among others (Rajan and Nallari, 2004; Rosen and Zenios, 2006). In a narrow sense, the ALM concept is used primarily to manage interest rate risk, which is the most important in the business model of financial institutions (John Brick, 2012). In turn, in a broad sense, the ALM concept is “the continuous process of formulating, implementing, monitoring and revising strategies related to assets and liabilities to achieve an organization’s financial objectives, given the organization’s risk tolerances and other constraints” (Abbott et al., 2003).

The latter, comprehensive strategic approach using the ALM concept, was the basis for its application in the public sector as the so-called sovereign asset and liability management (SALM). The first attempts in this respect were made in the 1990s and concerned the assessment of sovereign financial risk (Sheng and Cho, 1993). Subsequently, an approach to the management of the entire state balance sheet and, more specifically, consolidated sector accounts was proposed, in particular in the context of financial crises, including currency crises (Allen et al., 2002; Cottarelli and Vinals, 2009). In addition to theoretical research, the concept of SALM has also become the basis for the practical assessment of public finance and sovereign risk both internationally (by the OECD, the IMF and the World Bank), but also nationally (e.g. in New Zealand, the USA or the United Kingdom). According to the latest available surveys conducted by the above international institutions in 2018, among the 28 countries surveyed (including Poland), as many as 84% of them develop a sovereign balance sheet, whereby half of them calculate and monitor the net worth of the sovereign, but only 25% assess potential mismatches between assets and liabilities (Cangoz et al., 2018). Following the 2008 financial crisis, it is pointed out that many countries have increased their interest in the concept of SALM in the context of macro-prudential risk assessment.

In this article, the authors attempted to assess the impact of yet another crisis – this time of an epidemic nature, which affected all spheres of the socio-economic life, including the public sector. Therefore, the article assumes that as a result of the COVID-19 pandemic in 2020, the countries that did coordinate the structure of assets and liabilities were less exposed to the negative effects of financial risk. In order to verify this assumption, an analysis of the adopted measures of the assessment of sovereign asset and liability management in OECD countries will be carried out on the basis of aggregate information on the *general government* sector in the years 2010–2020.

The article consists of four sections, such as literature review, research methodology and databases, empirical results and conclusions.

2. Literature review

To our knowledge, there is currently a scarcity of studies available on the impact of the pandemic crisis on changes in sovereign asset and liability management.

The effects of the COVID-19 pandemic are considered mainly in relation to liability management operations (LMOs) and sovereign debt management. Particular attention is drawn to the fact that as a result of the need to counteract the fiscal effects, it has become necessary to strengthen the cooperation of public debt managers with the banking sector within the framework of new aid mechanisms and government bond purchase operations (Allen, 2021; Boitan and Marchewka-Bartkowiak, 2021). The new anti-crisis support packages for both economic entities, public institutions (including increased financing of the health care system) and the society have significantly raise the level of public debt. Molina (2021), pointing to the results of analyzes including the IMF among others, emphasizes that underdeveloped countries will have the biggest problem with public debt management, due to the need to spend funds on vaccines and the lack of budgetary reserves, among other issues. It therefore calls for public debt management to be treated by most countries as the major pillar of the national macroeconomic frameworks.

After the COVID-19 pandemic, the stabilization of public debt is thus once again a challenge for many countries in the world, regardless of the fact if high, medium and low-developed. In this context, it is worth referring to the important postulate to use this process to counteract yet another crisis, i.e. the imminent climate crisis (Ruiz and Stupariu 2021). It is recommended that the risk of climate change become one of the risks taken into account in public debt management strategies (Zenios, 2021). According to the analysis of this issue so far, in European countries only a few sovereign debt management institutions decide to integrate aspects of climate change into their strategic and operational solutions (Boitan and Marchewka-Bartkowiak, 2022).

The pandemic crisis again required rapid and large-scale action by public authorities of an aid nature. Therefore, an important thread of the analysis also concerns the possibility of using the accumulated assets in specially created the so-called sovereign wealth funds (SWFs). However, it is pointed out that countries with surpluses from the trade of natural resources and having SWFs, withdrew more than USD 200 billion from them in the first period of the outbreak of the pandemic (Lopez 2022). The authors investigating this issue therefore indicate that the golden age of SWFs has already

passed (Bortolotti, Fotak and Hogg, 2020) and that new adaptation strategies in the management of state funds' assets will be necessary. Lopez (2022) even indicates that SWFs entered a new phase "SWFs 3.0" and focuses on sustainability, collaboration, and long-term survival.

The above analyses indicate that the pandemic crisis required the mobilisation of additional public reserves and increased coordination of the public sector with the financial sector. However, for the authors of this article, an important question is whether the countries under analysis were adequately prepared in terms of their budgets in the event for the pandemic and what effects this crisis exerted on the state's balance sheet? The use of appropriate measures of sovereign asset and liability management will also enable the indication of a reference point for 2020, enabling further analysis of the reconstruction of public finance following the pandemic crisis.

3. Methodology and data

Public statistics provide a wealth of information to support the analysis of the impact of COVID-19 on the situation of asset and liability management in the public sector. The basis for the calculations was the data at the *general government* level in the field of *Balance Sheet (Stocks of Assets and Liabilities)* presented by the International Monetary Fund (IMF) in accordance with the methodology described in the Government Finance Statistics Manual 2014 (GFSM 2014). The time scope of the analysis covers the period 2010–2020. The period is related to the availability of data. Data for 2021 were not available at the moment of the study. The subjects of the study are countries belonging to the group of OECD countries with the exception of Chile, Israel and Mexico due to the lack of data available for these countries. Additionally, Poland was taken into account separately in order to assess the situation of our country in the context of international results.

The GFSM 2014 methodology is used for IMF reporting. The subjective approach of the *general government* sector does not differ from the definition formulated within the *European System of Accounts* (ESA 2010). In turn, differences relate to the recognition of individual financial data and the method of valuation of assets and liabilities. In order to analyze the management of assets and liabilities and to assess the impact of the COVID-19 pandemic, a set of variables presented in Table 1 was used.

Table 1

List and description of variables with source

Variable	Description	Data source
Assets	An asset is a store of value representing a benefit or series of benefits accruing to the economic owner by holding or using the resource over a period of time. It is a means of carrying forward value from one reporting period to another. A distinction is made between non-financial and financial assets.	IMF, Government Finance Statistics (GFS)
Non-financial assets	Non-financial assets are economic assets other than financial assets. The main categories of non-financial assets are: produced assets (such as fixed assets, inventories, and valuables) and non-produced assets (such as natural resources, contracts, leases, and licenses, and goodwill and marketing assets). Non-financial assets are stores of value and provide benefits either through their use in the production of goods and services or in the form of property income. Unlike financial claims, non-financial assets have no counter-part liability – that is, the owner of the non-financial asset does not have a claim on another institutional unit. Non-financial assets may come into existence as the output from a production process, or in other ways, such as natural occurrences	IMF, Government Finance Statistics (GFS)
Financial assets	Financial assets consist of financial claims and gold bullion held by monetary authorities as a reserve asset. The classifications of financial assets are based primarily on the liquidity and legal characteristics of the instruments that describe the underlying creditor-debtor relationships. The liquidity of a financial instrument embraces characteristics such as negotiability, transferability, marketability, and convertibility.	IMF, Government Finance Statistics (GFS)
Liabilities	A liability is established when one unit (the debtor) is obliged, under specific circumstances, to provide funds or other resources to another unit (the creditor). Normally, a liability is established through a legally binding contract that specifies the terms and conditions of the payment(s) to be made and payment according to the contract is unconditional. These are typically established through the provision of economic value by one institutional unit, the creditor, to another, the debtor, normally under a contractual arrangement. Liabilities can also be created by the force of law, and by events that require future transfer payments. In many cases, liabilities (and their corresponding financial claims) are explicitly identified by formal documents expressing the debtor-creditor relationship. In other cases, liabilities are imputed to reflect the underlying economic reality of a transaction, such as the creation of a notional loan when an asset is acquired under a financial lease.	IMF, Government Finance Statistics (GFS)

Variable	Description	Data source
Currency	Currency consists of notes and coins that are of fixed nominal values and are issued or authorised by the central bank or government. All sectors may hold currency as assets, but normally only central banks and government may issue currency. In some countries, commercial banks are able to issue currency under the authorization of the central bank or government. Gold and commemorative coins that are not in circulation as legal tender, or as monetary gold, are classified as non-financial assets in the form of valuables or inventories of materials and supplies, as appropriate, rather than currency.	IMF, Government Finance Statistics (GFS)
Deposits	Deposits are all claims, represented by evidence of deposit, on the deposit-taking corporations (including the central bank) and, in some cases, the general government or other institutional units.	IMF, Government Finance Statistics (GFS)
Loans (liabilities)	A loan is a financial instrument that is created when a creditor lends funds directly to a debtor and receives a non-negotiable document as evidence of the asset. This category includes overdrafts, mortgage loans, loans to finance trade credit and advances, repurchase agreements, financial assets and liabilities created by financial leases, and claims on or liabilities to the IMF in the form of loans.	IMF, Government Finance Statistics (GFS)
Gross Domestic Products	GDP is the sum of consumption expenditure, gross fixed capital formation, changes in inventories, and exports of goods and services, less the value of imports of goods and services.	IMF, International Finance Statistics (IFS)

Source: own study based on the Government Financial Systems Manual 2014 and International Finance Statistics.

The above variables were used in the statistical and indicator analysis. The individual measures were compared against the value of GDP, thanks to which the results that were obtained made it possible to compare countries with each other, as well as to analyse the phenomenon in relation to the changes in GDP in individual years. The statistical study includes, in particular, the analysis of dynamics, because it allows the identification of deviations from the trend that may have been caused by the COVID-19 pandemic. In the framework of the indicator analysis, two indicators were of interest: the national net welfare index and the debt financing of assets index. In addition, the financial risk related to debt financing of assets, liquidity risk and loan mismatches on the public balance sheet were assessed. Formulas and description of indicators are presented in Table 2.

Table 2

List and description of indicators

Indicator	Formula	Description
National net welfare index	$NNW = Assets - Liabilities$	The indicator makes it possible to determine the differences between the available assets and the source of their financing in the form of debt. An increase in the ratio means an increase in national net welfare index.
Debt financing of assets index	$DFA = \frac{Liabilities}{Assets}$	The indicator determines the degree to which public assets are financed by the liabilities incurred. The higher the ratio, the more debt is a source of financing for public assets.
Financial risk	$DFA > 100\%$ $DFA \leq 100\%$	High risk Low risk
The cash and deposit gap (Liquidity risk)	$Currency\ and\ Deposits\ (assets) - Currency\ and\ Deposits\ (liabilities)$	The value < 0 indicates a high liquidity risk, i.e. a situation in which to settle the most liquid liabilities are at risk. Value > 0 means the ability to settle the most liquid liabilities.
Loans mismatch on the public balance sheet	$Loans\ (assets) - Loans\ (liabilities)$	It makes it possible to assess the involvement of individual countries in the analysed financial instrument. The value < 0 indicates a greater involvement in the loan instrument as a source of capital Value > 0 indicates a greater involvement in the loan instrument in order to 'place' free funds

Source: own study based on Budzeń, Edwarczyk, Marchewka-Bartkowiak (2021, 2022) and Marchewka-Bartkowiak (2011).

For the purpose of assessing the change in the situation in 2020 relative to 2019 in terms of national net welfare conceived as the difference between assets and liabilities, it was proposed to classify countries according to four groups. The level of the indicator in 2020 and the change in 2020 compared to 2019 were taken into account as criteria for membership in groups. The proposed method allows for an assessment of the improvement or deterioration of the situation in the first year of the COVID-19 pandemic.

Table 3

Classification of groups of national net welfare in 2020

Group	Index level in 2020	Amendment 2020/2019	Specification
I	>	>	countries in the best position – countries that achieved a positive indicator in 2020 and increased in comparison to 2019.
II	>	< 0	countries in a good but deteriorating position – countries that achieved a positive indicator in 2020 and deteriorated in comparison to 2019.
III	< 0	>	countries in a poor but improving position – countries that achieved a negative indicator in 2020 and improved in comparison to 2019.
IV	< 0	< 0	countries in a poor and deteriorating position – countries that achieved a negative indicator in 2020 and deteriorated in comparison to 2019.

Source: authors' own work.

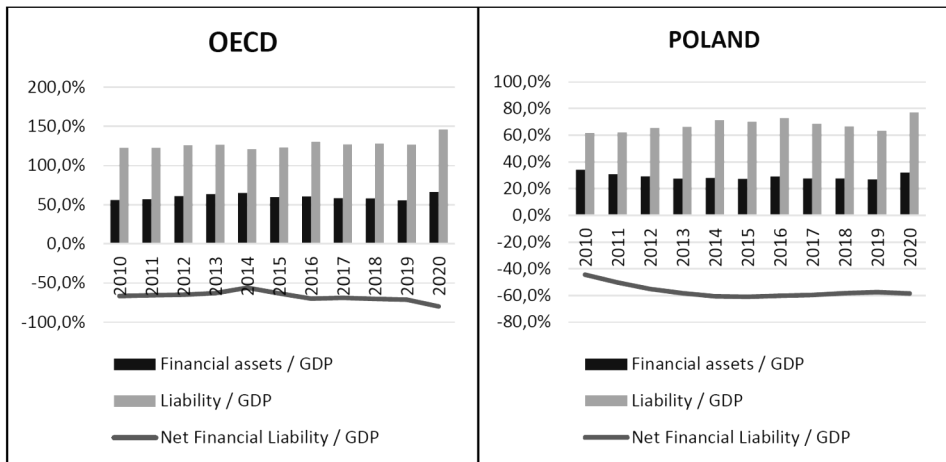
For the purpose of verifying the formulated hypothesis, the test procedure covers all variables. The conclusions are complemented by an analysis of the change in the time of individual balance sheet values, with particular attention to the situation in 2019–2020. This is related to the onset of the COVID-19 pandemic in 2020. The results of the research will be presented below, in accordance with the order presented in Table 2.

4. Research results

An overall assessment of the situation related to the adjustment of elements of public balance sheet, can be presented on the basis of the balance of financial transactions. In order to obtain comparable data, the analyzed volumes were compared to GDP. A positive balance of financial transaction will indicate the pursuit of coordination between assets and liabilities as a part of the debt management policy. In turn, a negative result will indicate a lack of coordination. First, the balance of financial transactions in relation to GDP will be presented (Fig. 1).

In the vast majority of countries, the negative balance of the transaction was maintained, which means liabilities higher than assets. In the period under review, only seven countries achieved a positive balance in all years. This group of countries includes Estonia, Finland, South Korea, Luxembourg,

Figure 1
Financial assets, liabilities and balance of financial transactions



Source: Own study based on the IMF, International Finance Statistics and Government Finance Statistics data.

New Zealand, Norway and Sweden (see also below tables). The above result indicates that the indicated countries sought to increase the level of their assets while reducing liabilities, which translated into a positive trend also in 2020. On the other hand, in the case of Switzerland and Denmark, positive values have been recorded since 2016 (Switzerland) and as of 2018 (Denmark). By the end of the period under review, both countries were increasing their positive balance, which indicates that the applied debt management policy was aimed at coordination between assets and liabilities. For the other countries, it should be noted that the purpose of the policy was not to coordinate between assets and liabilities. In 2020, the impact of COVID-19 on the balance, which was at the lowest level in relation to GDP, is visible. In addition, in 2020, there was a relatively highest decrease in the balance over the entire analyzed period. The decrease amounted to nearly 9 percentage points. For comparison, in 2019, the decrease in the balance in relation to GDP amounted to only 0.9 percentage points.

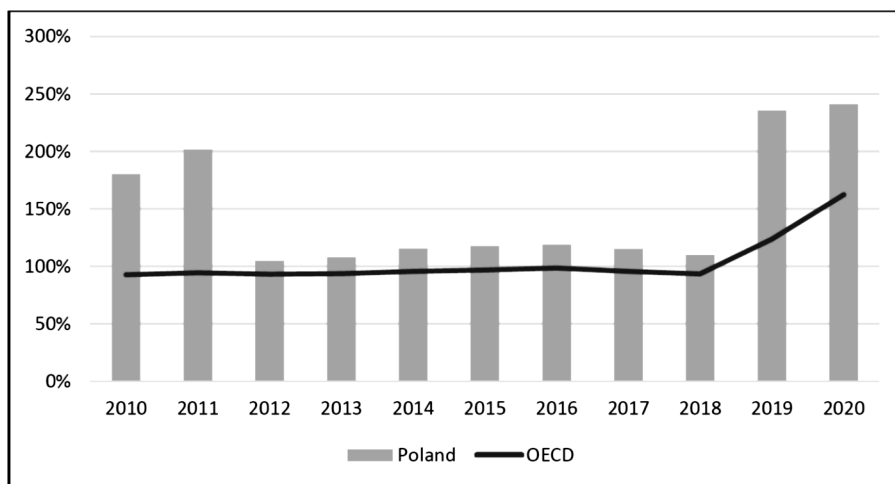
It is also important to look at the case of Poland, for which the trend in the compared sizes is similar as in the case of the entire OECD group. During the period considered there was an increase in the negative balance of financial transactions. Nominal growth in financial liabilities was much faster than in financial assets. This is evidenced by the trend lines for both categories. On this basis, it can be concluded that there was no coordination between sovereign assets and liabilities in the area of public

debt policy. It is also worth noting that the lowest level of the public balance of financial transactions in relation to GDP in the case of Poland was recorded in 2015. It was 16 percentage points lower than in 2010. On the other hand, against the background of aggregate values for the OECD group of countries, the situation in Poland is relatively positive, as, with the exception of 2014, the value of the balance of financial transactions was at a higher level. In 2020, however, the impact of the pandemic crisis is visible in the case of a higher increase in liabilities than financial assets among others. Year on year, the value of liabilities increased by 24.5%, while financial assets increased by 21.6%. In turn, the change in the negative balance of financial transactions amounted to 26.7%.

From the point of view of the impact of COVID-19 on the situation related to sovereign assets and liabilities, financial risk is important, which also depends on the management activities undertaken by individual countries. One of the indicators determining the level of financial risk using the balance sheet method is the ratio of financial liabilities to the amount of assets (Fig. 2).

Figure 2

Debt financing of assets index



Source: Own study based on IMF data, Government Finance Statistics.

In 2010–2018, the average level of debt financing in the group of OECD countries was below 100%. On the other hand, in 2019, the ratio increased above 100%, and in 2020 not only did the trend continue, but also the ratio of financial liabilities to public assets increased.

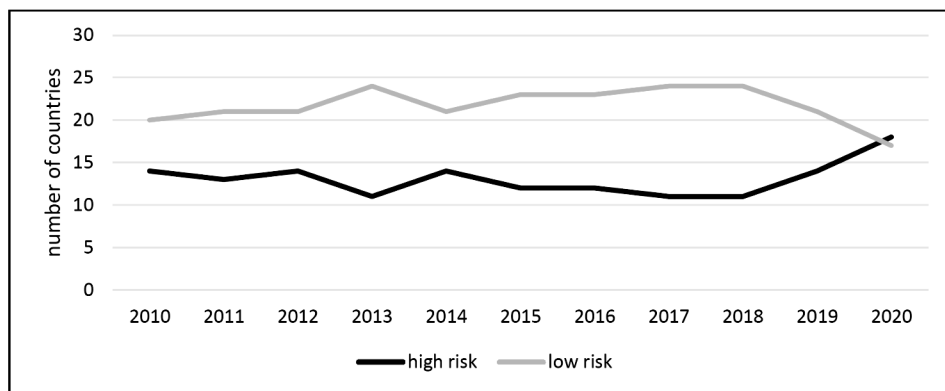
In the case of Poland, in each of the analyzed years, the index was not only above the OECD average, but also above the reference value of the index, i.e. above 100%. In addition, in 2019, there was a high increase confirming the previous findings of a faster increase in the amount of liabilities than that of assets. In turn, the highest value of the indicator, and thus the highest risk was recorded in 2020. This could be the result of actions taken as a result of minimizing the negative effects of COVID-19.

In 2010–2018, the average value of the DFA index for a group of OECD countries was below 100% and amounted to 95%. This was a positive trend, as the indicator remained stable during this period. In turn, in 2019–2020 it amounted to 143%. Exceeding the index level above 100% means that the carrying amount of the property is lower than the value of the debt. Thus, such a situation indicates that in 2020 the increase in financial risk deepened, which indicates a deterioration of the situation in the group of OECD countries. At that time, the number of countries where the indicator reached values above 100% increased.

Starting from 2019, there has been a successive increase in the number of countries with high financial risk (i.e. with the index exceeding 100%) (Fig. 3).

Figure 3

Change in financial risk in OECD countries



Source: Own study based on the IMF data, Government Finance Statistics.

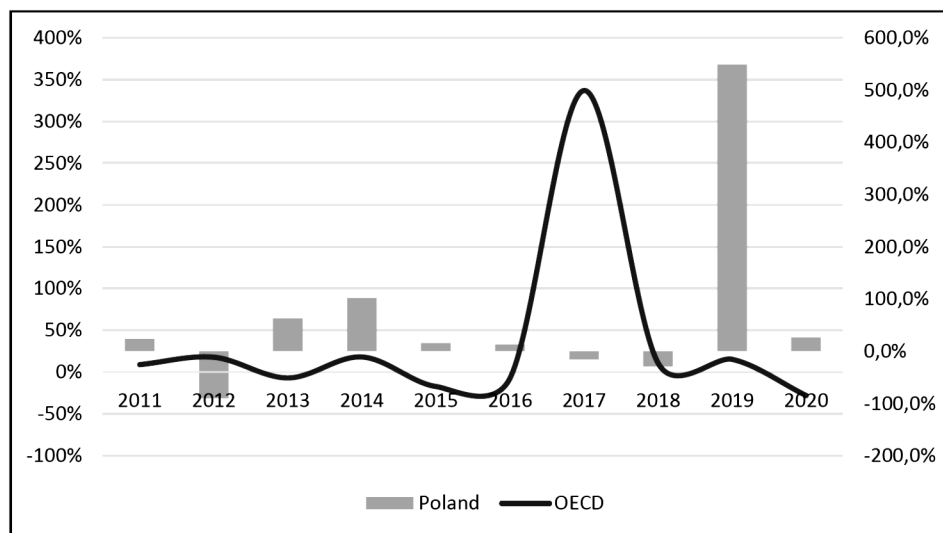
In 2020, the number of countries in the OECD high-risk group was the highest in the entire survey period, and at that time there was the highest increase in both the number of countries and the average level of financial risk measured by the debt financing of assets index. This situation means that the examined countries will secure the total amount

of debt in terms of their assets as well as the budgetary surplus from previous years. Thus, the higher risk in the era of COVID-19 resulted in the increased importance of financial flows, including those related to the main budget items, i.e. the level of income and expenditure. The issue of the market valuation of public assets is therefore important. The carrying amount of the asset presented in the balance sheet does not reflect its market value, which could constitute a security for the debt. The above data may indicate that the deterioration in the situation in OECD countries was not directly caused by the occurrence of COVID-19. The first symptoms of the deterioration of the public balance sheet figures were observed as early as 2019. However, an important conclusion is that in 2020 (the first year of the pandemic) not only did the situation persist but it also deepened, as evidenced by the increase in the number of countries with financial risk.

On the basis of the SALM method, it is possible to measure the national net welfare in a group of OECD countries. Figure 4 presents the average dynamics over the years 2011–2020.

Figure 4

Average dynamics of national net welfare



Source: Own study based on the IMF data, Government Finance Statistics.

The adopted time range in Figure 4 results from the fact that the average dynamics of the indicator is presented on the year to year basis. 2011 marks a change compared to 2010.

In 2017, the highest positive change in national net welfare was recorded in the group under study. The indicator formula allows determining the differences between the public property owned and the source of its financing in the form of debt. Thus, the value of the net wealth can be conceived as assets not encumbered with debt, which can be used in the long term. An important observation is the fact that in 2020 there was a decrease in prosperity, as its total value decreased by 27.9% compared to 2019. This is the highest decrease in the entire period under review, which confirms the negative impact of the COVID-19 crisis on the size of assets unencumbered by debt. The above observation confirms that the result of the shock caused by the pandemic was an increase in debt financing of assets. The observations may confirm the conclusion that the lack of coordination between assets and liabilities increased the negative effects of financial risk related to COVID-19. In order to minimise the negative effects of the pandemic, many countries opted for anti-crisis programmes aimed at supporting entrepreneurship and the whole society, including maintaining the stability of the labour market and the supply chain.

In the case of Poland, it is worth noting that the negative dynamics took place only in 2012/2011 and then again in 2017/2016 and 2018/2017. In the other years, it was relatively higher than in the case of aggregated values for the OECD group of countries. On the other hand, while in the case of the OECD group the highest positive pace of changes took place in 2017, in the case of Poland such a change took place in 2019. However, in 2020, the pace of change was not maintained as high as in the other countries under survey. This is due to a faster increase in liabilities than in financial assets.

Table 4 reflects the level (in the years 2010–2019) and the percentage change in the level of net welfare in relation to GDP (in the years 2019–2020).

Table 4

Level and evolution of national net welfare relative to GDP

Country	2010 [%]	2011 [%]	2012 [%]	2013 [%]	2014 [%]	2015 [%]	2016 [%]	2017 [%]	2018 [%]	2019 [%]	2020 [%]	average change 2010– 2019	change 2019– 2020
Group I – countries with the best results													
CH	22	23	26	25	32	29	32	43	42	50	53	3	3
TH	336	336	329	313	299	283	270	265	261	255	266	–9	11
DK	52	48	43	45	44	44	44	47	50	55	61	0	6

Country	2010 [%]	2011 [%]	2012 [%]	2013 [%]	2014 [%]	2015 [%]	2016 [%]	2017 [%]	2018 [%]	2019 [%]	2020 [%]	average change 2010– 2019	change 2019– 2020
KR	0	0	157	154	153	150	150	150	150	157	162	17	5
NO	216	211	221	260	305	346	356	373	344	331	370	13	39
Group II – countries with a good but worsening results													
AT	10	7	2	3	–1	1	0	4	7	9	1	0	–8
AU	67	61	47	53	51	50	45	49	49	40	35	–3	–5
CO	–1	9	9	11	27	19	5	6	14	11	4	1	–7
CR	12	8	30	22	33	57	34	27	18	16	1	0	–15
EE	84	81	79	83	83	84	80	80	78	21	17	–7	–4
FI	120	109	112	116	118	116	116	120	114	122	64	0	–58
FR	41	38	29	28	16	13	9	12	12	13	8	–3	–5
LU	104	102	104	104	105	104	105	106	107	54	50	–6	–4
NZ	111	102	92	91	92	96	96	99	103	108	102	0	–6
SE	87	89	92	92	90	86	91	94	96	100	27	1	–73
TR	–9	–6	–2	5	31	32	31	112	97	78	60	10	–18
Group III – countries with a bad but improving results													
None													
Group IV – countries with a bad and worsening results													
BE	–43	–44	–52	–49	–51	–50	–49	–44	–42	–43	–101	0	–58
CA	–50	–53	–54	–48	–47	–46	–45	–38	–36	–33	–45	2	–12
DE	0	–2	–1	0	0	3	4	8	11	15	–32	2	–47
ES	–39	–47	–58	–69	–81	–80	–82	–80	–79	–83	–107	–5	–24
GB	–71	–84	–85	–81	–88	–85	–94	–98	–93	–96	–123	–3	–27
GR	–32	–10	–36	–51	–63	–72	–75	–79	–78	–147	–180	–13	–33
HU	54	50	41	41	36	39	39	41	48	–54	–60	–12	–6
IS	–40	–46	–48	–46	–44	–43	–30	–21	–17	–24	–32	2	–8
IE	–47	–62	–78	–80	–79	–57	–56	–50	–47	–43	–47	0	–4
IT	–38	–32	–47	–53	–65	–68	–67	–66	–62	–69	–152	–3	–83
JP	–104	–115	–118	–116	–114	–125	–122	–120	–122	–125	–126	–2	–1
LT	57	47	41	41	41	42	41	41	42	–14	–21	–8	–7
LV	70	73	75	68	64	68	67	66	67	–12	–17	–9	–5
NL	26	22	20	19	15	15	15	19	22	25	–35	0	–60

Country	2010 [%]	2011 [%]	2012 [%]	2013 [%]	2014 [%]	2015 [%]	2016 [%]	2017 [%]	2018 [%]	2019 [%]	2020 [%]	average change 2010– 2019	change 2019– 2020
PL	–27	–31	–3	–5	–10	–11	–12	–9.	–6	–36	–45	–1	–9
FR	5	12	–5	–16	–27	–29	–27	–34	–30	–99	–113	–12	–14
SI	60	59	57	54	46	42	38	37	41	38	–40	–2	–78
SK	66	64	65	62	56	57	55	55	55	54	–51	–1	–105
USA	–24	–30	–33	–35	–37	–39	–40	–36	–38	–38	–49	–2	–11

* countries with high financial risk are marked in grey.

Source: Own study based on the IMF data, Government Finance Statistics.

Norway, the Czech Republic, South Korea, Denmark and Switzerland were among the top rated countries in the first group. Group II includes countries where the situation deteriorated in 2020. Group II includes New Zealand, Turkey, Finland, Luxembourg, Australia, Estonia, France, Sweden and Colombia. No group III countries were identified, which, despite the negative values of the indicator, improved their position in 2020. The largest group (IV) are the countries that suffered the most from the negative effects of the pandemic crisis. These include Germany, the Netherlands, Belgium, Italy, Greece, the United Kingdom, the United States and other OECD countries. The change in the indicator in the period considered was also analysed. The time range was divided into two parts: a change in 2010–2019 and a change in 2019–2020. Comparing both periods, it should be noted that at the time of the occurrence of COVID-19, the situation deteriorated in 74% of the surveyed entities.

The application of the balance sheet method to the management of public debt enables the analysis of liquidity risk. It can be defined as a mismatch between cash and deposits on the financial assets and liabilities side (Table 5).

Table 5

**The cash and deposit gap of public sector – liquidity risk
in relation to GDP in 2010–2020 [%]**

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average gap 2010– 2019 [%]
IT	–8.0	–8.5	–8.8	–8.7	–8.9	–9.7	–8.5	–8.9	–8.5	–7.7	–7.7	–8.6
IE	3.8	–22.8	–20.8	–3.9	–1.4	–1.0	–2.4	–1.3	0.0	0.6	0.8	–4.9
GB	–3.9	–3.5	–3.2	–2.5	–3.3	–4.0	–4.5	–4.4	–4.2	–4.3	–5.0	–3.8
FR	–5.4	2.0	3.8	3.9	1.1	–2.8	–2.6	–5.1	–7.2	–8.3	–4.7	–2.1

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average gap 2010–2019 [%]
FR	0.7	1.1	0.7	0.3	0.1	0.5	0.5	1.1	1.3	1.3	4.7	0.8
CR	1.8	0.7	3.3	1.8	0.5	0.7	1.3	0.7	0.4	1.9	0.2	1.3
AU	1.4	1.6	1.5	1.5	1.7	2.0	1.5	1.9	1.7	1.7	2.1	1.7
SE	0.2	0.9	0.6	0.9	2.9	2.5	2.1	2.6	2.1	1.9	2.9	1.7
NL	2.3	2.2	2.5	1.8	1.6	1.4	1.2	1.7	1.6	1.6	2.4	1.8
TR	3.7	3.7	3.4	3.7	2.9	3.3	2.9	3.5	2.6	3.1	5.4	3.3
CH	3.6	3.8	4.3	4.3	3.6	3.7	3.0	4.4	4.2	5.2	4.4	4.0
BE	4.5	4.6	4.3	4.1	4.0	3.9	4.3	4.2	3.8	3.2	4.1	4.1
CA	2.9	2.8	3.6	4.2	4.4	4.7	5.1	5.2	5.3	5.3	9.7	4.4
USA	4.9	3.5	3.6	4.0	4.3	4.8	5.1	4.0	4.7	4.7	11.6	4.4
PL	4.7	4.5	4.8	3.6	4.6	3.4	4.6	4.2	4.7	4.6	7.5	4.4
SK	3.5	2.2	6.3	6.8	3.8	3.9	5.0	5.6	5.9	4.7	9.8	4.8
EE	5.7	5.6	5.9	6.6	6.2	4.5	4.7	5.6	4.6	6.1	9.8	5.6
HU	5.9	6.8	6.7	5.1	5.5	4.3	6.1	5.2	5.7	4.6	9.0	5.6
LT	8.5	3.7	5.5	3.6	6.7	5.5	4.1	7.0	5.2	8.5	12.7	5.8
LV	10.0	5.2	7.6	6.2	7.4	2.8	6.4	5.5	6.6	6.7	7.2	6.4
AT	4.0	5.0	5.0	5.6	6.9	8.1	9.2	8.7	7.6	7.3	10.1	6.7
NZ	7.9	10.9	9.0	7.9	6.6	6.4	6.3	6.7	7.1	5.9	10.7	7.5
ES	8.5	6.9	7.9	6.8	7.8	7.6	6.7	7.6	8.2	7.3	9.7	7.5
FI	7.9	8.7	7.9	6.9	6.0	8.6	7.8	8.7	7.4	6.3	11.7	7.6
NO	8.5	6.1	8.0	6.2	7.3	6.9	9.5	9.7	9.9	10.3	14.9	8.2
CO	8.9	9.7	5.3	7.2	16.7	15.6	4.0	8.7	7.1	6.4	8.9	9.0
DK	11.4	14.5	10.8	10.5	12.6	10.0	6.2	7.4	6.0	3.8	6.5	9.3
DE	8.6	9.2	9.6	8.8	9.7	9.7	9.9	10.4	10.4	10.4	13.1	9.7
TH	8.5	9.7	12.7	12.0	8.9	8.6	8.8	10.6	10.5	10.3	12.4	10.1
GR	7.1	6.7	9.4	10.8	5.4	5.7	8.8	10.4	20.8	20.4	17.7	10.6
KR	0.0	0.0	13.7	13.1	12.7	13.0	13.3	12.6	13.9	13.2	13.8	10.6
SI	9.3	11.4	11.4	10.5	16.0	18.5	15.4	13.6	16.5	15.2	22.1	13.8
LU	14.5	13.4	13.4	13.7	14.3	14.3	12.3	15.0	15.1	18.1	16.0	14.4
JP	14.4	14.7	15.2	14.5	15.7	18.6	19.7	18.5	17.4	16.5	19.8	16.5
IS	23.0	33.6	29.1	22.8	27.1	19.2	14.7	11.4	12.5	12.9	16.7	20.6

* countries with high financial risk are marked in grey.

Source: Own study based on the IMF data, Government Finance Statistics.

Comparing the gap in this respect between 2019–2020, it should be noted that most countries in 2020 sought to obtain a positive result in order to reduce liquidity risk. This is visible, among others, in the number of countries whose result deteriorated compared to 2019 – in total, it was only 5 countries. It should be emphasized that in 2019, the deterioration in the result compared to 2018 was reported in as many as 17 countries. Thus, it should be noted that in 2020, the management of currency and deposits on both the financial assets and liabilities side increased in importance. On this basis, it is possible to formulate the following thesis: the COVID-19 perspective contributed to a change of approach in balancing the indicated elements of the public balance.

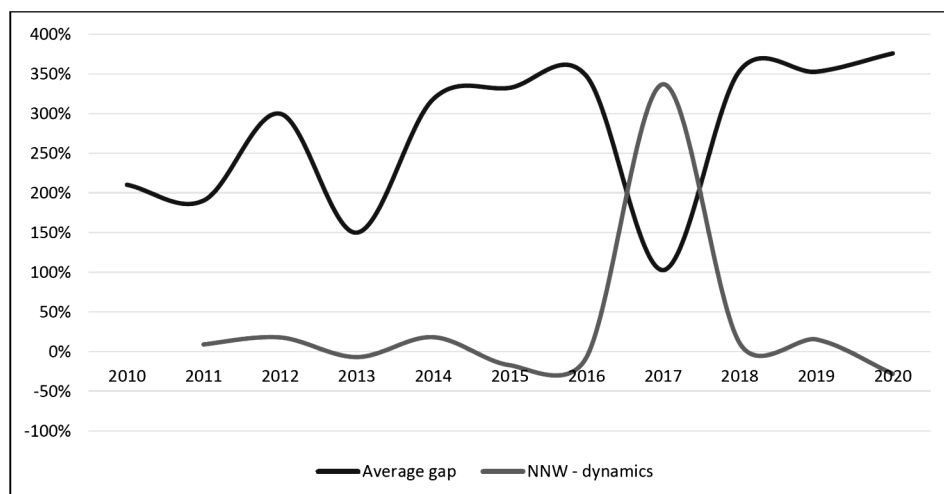
In the analyzed period (2010–2020), the highest rate of changes in the liquidity risk ratio was found in France (69.7%) and Sweden (60.7%). These are the countries included in the group with the lowest average level of cash and deposit gap. On the other hand, the lowest rate of change, with a negative trend, was recorded in Italy (–0.2%), Iceland and Belgium (–0.3%), Denmark (–0.5%), Portugal (–36.9%) and Ireland (–95%). On the basis of the above results, it can be concluded that for most countries (with a positive result) the reason was the faster accumulation of liquid financial assets. The trend increased in 2020, which also reflects the average level in relation to GDP, which is 8.3%, while in 2018–2019 the index was 6%, and in earlier years (with the exception of 2014) it was lower than in 2018–2019. Comparing the average level of the gap in 2010–2019 with the value of the indicator in 2020, it should be noted that countries with high financial risk did not sufficiently coordinate the level of cash and deposits. Countries with the highest level of mismatch in terms of the prevalence of deposits over cash also achieved a negative result in 2020. The exception was Italy, which since 2017 began to coordinate the level of cash and deposits more effectively. Better coordination reduced the liquidity risk at the time of the COVID-19 onset. The above indicates that the policy was aimed at reducing liquidity risk and thus increasing the value of the “liquidity buffer” in order to ensure the ongoing regulation of liabilities at the level of the entire sector.

The last element of the study is the analysis of loan mismatches in the balance sheet. The obtained results were compared against the change in the level of national net welfare (Fig. 5).

On this basis, it can be concluded that in the event of a decrease in the level of the gap (measured by the relation of the loan position in financial assets to the loan position in liabilities), there was an increase in the level of national welfare. In turn, in the case of an increase in the level of mismatch

Figure 5

Average loans mismatch on the public balance sheet and the change in national net welfare in the OECD countries [%]



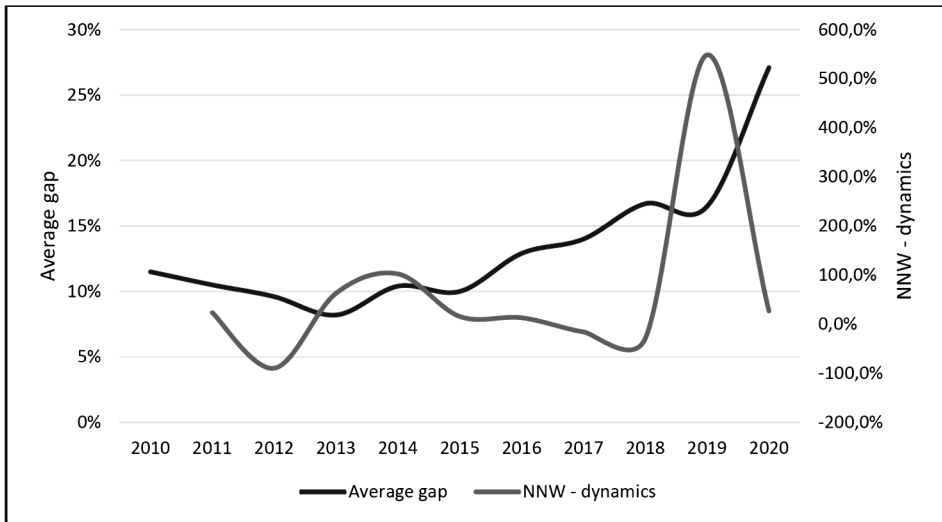
Source: Own study based on the IMF data, Government Finance Statistics.

of the analyzed items on the assets and liabilities side in the group of OECD countries, there was a decrease in the level of the national net welfare index. The relationship became evident in 2017, when the gap ratio decreased. It is worth noting that the gap ratio was 102.8% at that time, which means that the value of loan items in financial assets was slightly higher than the loan item on the liabilities side. Thus, the optimal matching of the two balance sheet items is evident. It is also important that the interest on the asset side was weaker than on the liability side of the same item. In turn, in the following years, the trend of showing higher interest in loans granted by the public sector was maintained, which resulted in an increase in the loan mismatch in the public balance sheet. It should be noted that the trend continued also in 2020, where further imbalances were reported in the balance sheet items under this analysis, and additionally there occurred a decrease in the level of national welfare.

Similar observations have also been made in the case of Poland, as the lowest value of the gap was identified in 2013, which means that one of the objectives of the then public debt management policy was coordination in the field of loans mismatch on the public balance sheet. This proposal is confirmed by the reduction of the gap from the beginning of the analysis period to 2013. Also in 2015, the surveyed countries attempted to coordinate these items in their balance sheets. On the other hand, from 2016 onwards, the risk

Figure 6

Average loans mismatch on the public balance sheet and the change in national net welfare in Poland [%]



Source: Own study based on the IMF data, Government Finance Statistics.

of a mismatch between loans on the financial assets side and loans on the liabilities side increased. This may be related to an increase in public debt, as confirmed by previous arrangements made in relation to assets. In addition, the relationship observed on the example of the OECD group of countries was confirmed. As the level of the loan gap increases, the pace of change in prosperity decreases. In the opposite situation, i.e. striving for coordination between the indicated items, it is possible to achieve a higher level of the national net welfare index. Thus, the identified observation should serve as a basis for further research on the relationship between the balance sheet approach to sovereign debt management and the level of prosperity. In addition, the above findings indicate that in order to increase the efficiency of sovereign debt management, it is necessary to coordinate activities in the entire public sector, including the local government sub-sector.

Conclusions

In order to verify the hypothesis that the countries that did coordinate the structure of assets and liabilities were less exposed to the negative effects of financial risk, selected indicators developed for the purposes of as-

sessing the applicability of the ALM method in Poland were used (Budzeń, Edwarczyk and Marchewka-Bartkowiak, 2022). The analysis confirms that the possible use of the balance sheet method allows for the management of public balance sheet risk and provides information to stakeholders, which is important, in particular, under crisis conditions.

The conducted research complements the previous literature considerations with the issues of the relationship between financial risk and matching sovereign assets and liabilities and reducing liquidity risk by increasing the value of the most liquid assets in the public balance sheet, among others. The adopted set of data allows for a synthetic assessment and comparison of the management of assets and liabilities in the public sector.

The conducted analysis allows for a positive verification of the hypothesis and the formulation of the following conclusions:

- all analyzed items and balance sheet indicators show a negative impact of COVID-19 on the financial position of the public sector in 2020,
- in 2020, the national net welfare index reached negative values, which means that the carrying amount of public sector assets was lower than the value of liabilities incurred,
- between 2019 and 2020, the financial risk in the public sector balance sheets in the OECD group countries increased,
- most countries sought to reduce liquidity risk in 2020 by pooling liquid assets in response to the pandemic crisis onset.

The above conclusions are indicated, by an increase in the average loans mismatch on the public balance sheet in 2020. Additionally, in the OECD group of countries there was a decrease in the level of the national net welfare. Importantly, in 2020, 74% of the analyzed countries experienced a deterioration in the national net welfare change. It is also important that in 2020 over 51% of these countries were identified with high financial risk, while in 2019 it was only 40% of the indicated countries.

Based on the analysis of the balance of financial transactions, it should be noted that in the case of Poland there was no coordination of management between sovereign assets and liabilities. Nevertheless, compared to the OECD group of countries, the situation in Poland was relatively positive in the period under review. The lack of coordination between the components of the public balance sheet could be confirmed by Poland finding itself in the group of countries where the ratio of the level of economic prosperity to GDP is bad and deteriorating. This phenomenon was accompanied by high financial risk and an increase in the mismatch in terms of loans mismatch on the public balance sheet. The gap in this case has been widening since 2016.

The case of Poland is not isolated as a similar situation occurs in other countries that do not strive for coordination between sovereign assets and liabilities. Therefore, the obtained research results confirm the hypothesis that these countries are more exposed to financial risk.

The obtained results provide an impetus for further research on the financial preparation of countries for the negative effects of crises (e.g. pandemic and climate crises). For this reason, the applied measures allow for the continuation of research on the financial security of countries, taking into account the balance sheet approach. This will be important for the restoration of public finance and the reform of the financial system in response to the past and future crises.

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Attachment 1

List of countries examined with abbreviations

Country	Country abbreviation
Australia	AU
Austria	AT
Belgium	BE
Canada	CA
Colombia	CO
Costa Rica	CR
Czech Republic	TH
Denmark	DK
Estonia, Rep. of	EE
Finland	FI
France	FR
Germany	DE
Greece	GR
Hungary	HU
Iceland	IS
Ireland	IE
Italy	IT
Japan	JP

Country	Country abbreviation
Korea, Rep. of	KR
Latvia	LV
Lithuania	LT
Luxembourg	LU
Netherlands, The	NL
New Zealand	NZ
Norway	NO
Poland	PL
Portugal	FR
Slovakia	SK
Slovenia	SI
Spain	ES
Sweden	SE
Switzerland	CH
Turkey	TR
United Kingdom	GB
United States	USA