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Public Debt Sustainability and the COVID Pandemic: The Case of Poland

Abstract

This paper aims to analyse and assess the impact of the COVID pandemic effect on the public debt sustainability level in Poland. We put the following research hypothesis in our study: the pandemic period disallowed the production of primary fiscal surpluses and increased the level of fiscal unsustainability in Poland. We took the data from Eurostat and the European Commission databases. We used the *Primary gap indicator* and *no-Ponzi condition* as the research methods (for the short-term and the long-term analyses, respectively). Both methods derive from the theory of the intertemporal budget constraint. The results of the empirical studies did not allow us to reject the research hypothesis.

Keywords

COVID | public debt | sustainability | Poland

JEL Codes

H63, H68

1. Introduction

The COVID pandemic affected the economy on global and national levels. Many sectors of the economy needed support from public funds, which resulted in a rapid increase of the fiscal deficit and public debt values. Poland was not an exception. But, according to the Polish Constitution of 1997, fiscal agents are not allowed to generate public debt higher than 60% of GDP. This provision of law is very similar to the Maastricht Treaty fiscal criterion, according to which the public debt should not be over 60% of GDP. It means that the general idea of public debt limitation exists and should be obeyed; despite the extraordinary pandemic situation, there is still a limit for the maximal value for the public debt in Poland.

The change in the fiscal situation led us to investigate the impact of the pandemic on the degree of the Polish general government debt sustainability. As a result, we hypothesized the following in our

study: the pandemic period disallowed the production of primary fiscal surpluses and increased the level of fiscal unsustainability in Poland.

We divided our paper into five parts. After the short introduction, we outline the theoretical background of public debt sustainability. Then we present the methodology and data. The outcomes of the empirical research follow. Finally, at the end of the paper, we present the most important findings and conclusions.

2. Theoretical Background

The idea of fiscal sustainability – including the deficit and General Government (public) debt issues – dates back to the classical economists and has been widely developed in the economic literature (see, e.g. Bohn, 1991, Rowley, et al., 2002; Tsuchiya, 2016). According to the crucial assumption of debt sustainability,

governments (fiscal agents responsible for public finance) should never run Ponzi schemes (see, e.g. Wigger, 2009). In other words, governments must always be ready to repay their financial liabilities. To avoid the Ponzi scheme scenario (and the consequent bankruptcy), economies should be able to generate primary fiscal surpluses sufficient to repay the current public debt. Formally, in the long run, the sum of the future discounted primary surpluses should cover the initial amount of public financial liabilities. According to Neck and Sturm (2008, p. 6), the condition mentioned above must be met as long as we define debt sustainability as the absence of default risk. In the short run, the primary fiscal surpluses should be sufficient to stabilize the public-debt-to-GDP ratio (Blanchard, 1990).

The research on fiscal sustainability (including debt sustainability) has been presented in the economic literature. However, these results differ and are inconsistent. Moreover, we must remember that the results of particular research studies are sensitive to the quality of data (Filipiak, 2016). Poland is no exception here. According to Leonte (2011), the Polish fiscal policy in 2000–2010 was unsustainable. Stoian and Campeanu (2010) stated that fiscal sustainability in Poland would be difficult to attain. This was followed by Panfil (2018), who suggested that Polish fiscal rules should be improved and strengthened. However, according to Mackiewicz and Krajewski (2009), the Polish public sector could be considered conditionally sustainable. At the same time, they suggested that it can be impossible for the fiscal agents to avoid public finance shocks in the future.

This seems crucial in light of the recent pandemic period. Just before the pandemic started, Polish public debt could be considered sustainable in a short period, and it had been on a straight path to achieve long-term sustainability (c.f., e.g. Mackiewicz-Łyziak, 2015; Tronzano, 2017; Uryszek, 2021). That is why it is essential to check to what extent the pandemic affected this situation.

3. Methodology and Data

We used two different research methods in our study – both deriving from the theory of intertemporal budget constraint (see Bergman, 2001; Bravo & Caporale, 1995; Legrenzi & Milas, 2012; Silvestre, 2002). We investigated the impact of the pandemic in long and short periods.

We used the formal testing of the Ponzi scheme for the long-term analysis (see, e.g. O'Connell & Zeldes, 1988, p. 434). According to this method, the public debt remains sustainable as long as the discount value of the sum of future primary fiscal surpluses can cover it (Zampolli, 2012, p. 158). Thus, the theoretical model can be defined by the following Formula (1):

$$b_t = \sum_{j=0}^{\infty} R(t, t+j)^{-1} d_{t+j}, \quad (1)$$

where

- b_t is the public-debt-to-GDP ratio, in period t ;
- d_{t+j} is the primary fiscal balance (net lending/borrowing less interest on public debt) to GDP ratio, in the period $t+j$;
- $R(t, t+j) = \prod_{k=0}^j R_{t+k}$ is the discount factor applying between periods t and $t+j$;
- $R_{t+k} = 1+r_{t+k}$;
- r_{t+k} is the real interest rate on public debt instruments in the period $t+k$.

We were unable to use Equation (1) for our study, as it is impossible to predict the future values of the primary balance in the infinitive horizon. We modified this formula by introducing 10 years of detailed forecasts followed by the residual value of the primary balances. Besides, we could not expect that – especially during the pandemic, an extraordinary situation – the outstanding amount of public debt will be covered by the discounted value of the sum of future primary surpluses. That is why we modified the model slightly more. Instead of checking whether the future primary fiscal surpluses could cover the public debt, we investigated whether the sum of the future discounted primary fiscal balances would be at least positive. This approach was defined by Uryszek (2021) as the *initial Ponzi scheme condition*¹, and it is formally defined by Formula (2),

$$\sum_{j=0}^{10} R(t, t+j)^{-1} d_{t+j} + R(t, t+j)^{-1} ResV_n \geq 0, \quad (2)$$

¹ The Ponzi scheme in the context of the public debt sustainability has been widely described in the literature (see, e.g. Domeij and Ellingsen, 2018; Mosolygo, 2011; Wigger, 2009). However, the *initial condition* has not been defined by other authors. We believe the *initial condition* approach can be useful for short- and medium-term analyses, especially in the Central and Eastern European (CEE) countries (characterised by the relatively short history of the free market economy).

where

- $ResV$ is the residual value;
- $ResV = \frac{\bar{d}}{\bar{r}}$;
- \bar{d} is the estimated average primary fiscal balance for the years 2019–2028,
- \bar{r} is the estimated average real interest rate on public debt instruments for the years 2019–2028.,

The rest of the variables are the same as in Equation (1).

We also used the *primary gap indicator* for the short-period analysis. It was originally developed by Willem Buiter (1985). However, we used the modified version prepared by Olivier Blanchard (1990). It is relevant to the short-term public debt sustainability analysis, and it is defined by Formula (3),

$$d^* = (r_t - n_t) b_t, \quad (3)$$

where

- d^* is the primary fiscal balance necessary to stabilize the debt ratio to GDP;
- r_t is the real interest rate on public borrowing in period t ;
- n_t is the real GDP growth rate in period t ;
- b_t is the GG debt volume to GDP in period t .

The outcomes of Equation (1) are lower than the value of the actual primary fiscal balance, suggesting that the primary fiscal surpluses are sufficient (or values of the primary deficits are low enough) to stabilize the public-debt-to-GDP ratio (i.e. the public debt volume may be considered sustainable in the short run). Otherwise, the public debt remains unsustainable in the short term.

We used both research methods described above for actual and structural data. We focused on the *No-fiscal policy change scenario* data prepared and published by the European Commission. We used the data from Eurostat and the European Commission's official documents and publications.

To check the pandemic period's influence, we implemented the *ex post* observations and the forecasts based on the *No-fiscal policy change scenario* data published by the European Commission (2019; 2020). According to this scenario, there will be no policy changes in public finance management. Besides, the primary fiscal balance (before aging costs) at the structural level remains unchanged at the level of its last detailed forecast value (i.e. the 10th forecast value for the 10-year horizon).

4. Results of the Empirical Research

The pandemic period caused a considerable increase in public debt in most economies all over the world. The European Union (as a whole) and Poland were no exceptions here: debt-to-GDP ratios rose significantly there – see Table 1.

Data presented in Table 1 show that in Poland, before 2020, the public-debt-to-GDP ratio decreased from 54.2% in the fourth quarter of 2016 to 45.7% of GDP in the fourth quarter of 2019. Then, during the pandemic, it increased rapidly to 57.6% of GDP in the last quarter of 2020. It related to the financing of extra government expenditures relevant to anticrisis programs.

The dynamic changes in the area of public finance and particularly, public debt volume, can be illustrated by the data outlined in Table 2. The data show two different official predictions of public debt volumes for 2020 and 2021, prepared by the European Commission. The first one was published in January 2020 (before the pandemic), while the second one was published in June 2020 (during the pandemic). The differences between them are huge.

We started our empirical research by investigating the effect of the COVID pandemic period on the long-term Polish public debt sustainability. We calculated the formula described in Equation 2. First, we used the prediction (at the actual and structural levels) prepared by the European Commission (2019). The document entitled *Fiscal Sustainability Report 2018. Volume 2, Country Analyses* was published in February 2019, so it could not include the pandemic effect. The EU official predictions regarding the primary balance and the primary structural balance are presented in Table 3.

The outcomes of our research that exclude the pandemic effect (i.e. based on data shown in Table 3) are presented in Table 4. Table 4 shows the results of the formula described in Equation 2, calculated based on variables included in the European Commission (2019) document).

Unfortunately, we observe that Poland could not reach long-term public debt sustainability, even if we excluded the pandemic effect. It means that the discounted value of the future primary balances would be insufficient to cover the initial volume of public debt.

Table 1. Public Debt in EU and in Poland: Quarterly Data, 2016–2020 (in % of GDP, Actual Level)

Period	EU	Poland
2016Q1	85.8	51.9
2016Q2	85.7	53.6
2016Q3	84.7	53.2
2016Q4	84.0	54.2
2017Q1	84.2	53.8
2017Q2	84.0	53.1
2017Q3	82.9	51.9
2017Q4	81.5	50.6
2018Q1	81.3	51.2
2018Q2	80.7	50.5
2018Q3	80.6	49.4
2018Q4	79.5	48.8
2019Q1	79.9	48.9
2019Q2	79.7	47.7
2019Q3	79.2	47.0
2019Q4	77.6	45.7
2020Q1	79.4	47.6
2020Q2	87.7	54.8
2020Q3	89.8	56.6
2020Q4	90.8	57.6

Source: Own elaboration based on Eurostat database: Quarterly government debt [gov_10q_ggdebt], accessed: May 15, 2021.

Table 2. Official European Commission Predictions on Public Debt for 2020 and 2021 in Poland (Actual Data, in % of GDP)

Date of Publication	2020	2021
January 2020	45.5	44.3
June 2020	58.5	58.3

Source: Own elaboration based on European Commission (2019, 2020).

Table 3. Primary Balance Excluding the Pandemic Effect (in % of GDP)

Variable	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Primary balance	0.6	0.4	0.1	-0.2	-0.6	-0.7	-0.7	-0.8	-0.8	-0.8	-0.8
Structural primary balance ^a	-0.5	-0.4	-0.5	-0.5	-0.6	-0.7	-0.7	-0.8	-0.8	-0.8	-0.8

^aBefore costs of aging (CoA)

Source: European Commission (2019).

At the second stage of the long-term public debt sustainability investigation, we used data and forecasts published by the European Commission in the document entitled *Debt Sustainability Monitor 2019*, published in January 2020, around two months after the COVID outbreak started. The crucial variables from this document are presented in Table 5.

The fiscal deficit and public debt forecasts included the additional public expenditures relevant to the control and eradication of coronavirus outbreaks and the necessity of their financing. This is particularly evident when comparing the European Commission's forecasts for 2020 and 2021 (shown in Tables 3 and 4, respectively).

The outcomes of our research that include the pandemic effect (based on data shown in Table 5) are presented in Table 6. Table 6 shows the results of Equation 2, calculated on the basis of data published in the European Commission (2020) document.

We may conclude the COVID outbreak made the public debt in Poland more unsustainable in the long run. The outcomes presented in Table 6 are much worse than those shown in Table 4, mostly because of the extra government spending. The expenditure of the public sector led to a rapid increase in the public sector deficit. We may then conclude that the COVID outbreak deteriorated the long-term public debt unsustainability to a significant extent.

The values of public debt – excluding and including the pandemic effects – are presented in Table 7. The differences regarding the pandemic effects are relevant to 2019 and 2020. These variations resulted in differences in the outcomes obtained in Tables 4 and 6.

In the second part of our empirical research, we used the preliminary data and the official predictions by the European Commission to calculate the *primary gap indicator* (modified by O. Blanchard, defined by Equation 3). In this way, we checked the public debt sustainability in the short run. We did it using two

Table 4. Initial no-Ponzi condition *Excluding the Pandemic Effect (in% of GDP)*

1 ^a	2 ^a	3 ^a	4 ^a
Actual	-3.75	-22.75	-26.50
Structural	-6.46	-37.56	-44.03

^a1. level of data;

2. sum of the discounted primary balances for the years 2019–2028;

3. discounted residual value;

4. sum of the discounted primary balances (1) + discounted residual value (3).

Source: Own calculations based on European Commission (2019).

situations: excluding and including the pandemic effect. The outcomes on the actual level of data, excluding the pandemic effect, are presented in Table 8.

Analysis of the actual data from Table 8 lets us conclude that Poland would stabilize the public-debt-to-GDP ratio if there were no pandemic situation. In other words, the Polish public debt could be considered sustainable in the short run.

We obtained similar results while using the structural data. These outcomes, again excluding the pandemic effect, are presented in Table 9.

We can observe that, even if we use the structural data and uphold the assumption that there was no pandemic situation, Poland would be characterised

Table 5. *Primary Balance, Including the Pandemic Effect (in % of GDP)*

Variable	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Primary balance	0.6	-8.1	-2.4	-0.2	-0.6	-0.7	-0.7	-0.8	-0.8	-0.8	-0.8
Structural primary balance ^a	-2,7	-8,3	-2,9	-0,5	-0,6	-0,7	-0,7	-0,8	-0,8	-0,8	-0,8

^aBefore costs of aging (CoA)

Source: European Commission (2020).

Table 6. Initial no-Ponzi condition *Including the Pandemic Effect*

1 ^a	2 ^a	3 ^a	4 ^a
Actual	-14.40	-80.94	-95.35
Structural	-18.59	-103.69	-122.28

^aAs in Table 4.

Source: Own calculations based on European Commission (2020).

by sustainable public debt in the short run because the primary structural surpluses would be more than sufficient to stabilize the public debt-to-GDP ratio.

If we cancel the assumption about the “non-pandemic situation” and include the COVID economic effects, we receive different results. The calculations of the *primary gap indicator* based on the actual level of data are presented in Table 10.

The outcomes of the formula ($d_t - d^*$) were negative. It means that the values of the primary fiscal balance

Table 7. *Public Debt (in % of GDP) Excluding and Including the Pandemic Effect*

Variable	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Gross public debt excluding the pandemic effect	48.3	47.4	46.3	45.9	45.9	45.9	46.1	46.4	46.8	47.3	48.0
Gross public debt including the pandemic effect	46.0	58.5	58.3	45.9	45.9	45.9	46.1	46.4	46.8	47.3	48.0

Source: Own elaboration based on European Commission (2019; 2020).

Table 8. Primary Tax Gap Indicator *Values – Actual Level of Data (Excluding the Pandemic)*

Year	d^*	$d_t - d^*$
2020	-1.29	1.69
2021	-1.13	1.23

Source: Own calculations based on European Commission (2019).

Table 9. Primary Tax Gap Indicator *Values – Structural Level of Data (Excluding the Pandemic)*

Year	d^*	$d_t - d^*$
2020	-1.52	1.12
2021	-1.31	0.81

Source: As in Table 8.

Table 10. Primary Tax Gap Indicator *Outcomes – Actual Level of Data (Including the Pandemic Effect)*

Year	d^*	$d_t - d^*$
2020	2.86	-10.96
2021	-1.93	-0.47

Source: Own calculations based on European Commission (2020).

Table 11. Primary Tax Gap Indicator *Outcomes – Structural Level of Data (Including the Pandemic Effect)*

Year	d^*	$d_t - d^*$
2020	-1.88	-6.42
2021	-1.65	-1.25

Source: As in Table 10.

were insufficient to stabilize the public-debt-to-GDP ratio, and the debt was unsustainable. Similar results were obtained using the structural data (see Table 11).

Analysis of the data from Table 11 shows that the Polish public sector could not produce the primary fiscal balances sufficient to stabilize the public-debt-to-GDP ratio at the structural level. Therefore, by comparing the data put in Tables 10 and 11 with those in Tables 8 and 9, we may conclude that the pandemic COVID affected the loss of the short-term public debt sustainability in Poland to a large extent.

5. Conclusions

The Polish economy has had significant problems with public debt sustainability in the long run. The sum of the discounted values of the primary fiscal balance was insufficient to cover the initial volume of the public debt. The COVID outbreak worsened this situation to a large extent.

In order to reduce the fiscal gap, it seems necessary to limit public expenditure. Imposing additional tax burdens during an economic slowdown may lead to an increase in the scale of the so-called “shadow economy” and may be politically unpopular (it may meet with public resistance). Of course, the question of which expenditures should be limited and to what extent remains open.

It is worth mentioning that, before the COVID pandemic, Poland was able to generate primary fiscal surpluses. Moreover, they were sufficient to stabilize the level of public-debt-to-GDP ratio. In other words, Polish public debt could be considered sustainable in the short run. However, the economic effects of the pandemic destroyed this situation. The additional government expenditure led to the dramatic increase in the fiscal deficit, which had to be financed by the extra debt. That brought the loss of the short-term public debt sustainability.

We may conclude that the hypothesis put in the introduction cannot be rejected: the pandemic period disallowed the production of primary fiscal surpluses and increased the level of fiscal unsustainability in Poland. As a result, the primary fiscal balances became insufficient to stabilize the public debt volume in the future. They were also unable to cover the initial level of public debt in the long run.

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