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Fiscal Sustainability in Poland: How Did the Public Policy Shift of 2016–2019 Impact the Country's Long-Term Sustainability?

Introduction

In 2016–2019 Poland experienced a major social and fiscal policy shift: new government decreased the statutory retirement age and launched several new social programs, including the so-called Family 500+ program under which social expenditure on family and children support increased suddenly from 1.5% to nearly 3% of GDP. Under the program (expanded additionally in 2019 in the run-up to parliamentary elections) families started to receive a tax-free benefit of PLN 500 (about EUR 120) per month for children until they reach the age of 18 (see EC 2018 or Sawulski 2017). Simultaneously VAT gap reduction policies have been swiftly implemented which resulted in added fiscal revenues in recent years.

The new policy move became highly controversial. Many economists argued that overall it would lead to a significant deterioration of long-term fiscal sustainability. The government argued in turn that the new social program was well financed by a complementary policy of VAT gap reduction and saw no risk to country's fiscal sustainability. The controversy remains strong to date, because as the fiscal sustainability parameters are essentially unobservable variables that need to be estimated, the observable current public debt and deficits levels have decreased in relation to GDP and the country saw one of the biggest improvements in VAT gap reduction in the EU in recent years (see e.g. CASE 2019). Against this backdrop, a pertinent policy question remained: how did the changes in social and fiscal policy implemented in 2016–2019 affect Poland's long-term fiscal sustainability?

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In this paper we address this question by providing some new evidence of the impact of the fiscal and social public policy shift in 2016–2019 on long-term fiscal sustainability. We approach this problem by analyzing the fiscal sustainability in Poland empirically using the fiscal response approach of Bohn (1991, 1995, 1998). Specifically, we test whether the primary surplus relative to GDP is a positive function of public debt relative to GDP, which is now a widely accepted measure of fiscal sustainability.

The outline of the reminder of the paper is as follows. Section 1 lays down the theoretical underpinnings of fiscal sustainability. Section 2 presents empirical literature review. Section 3 presents our empirical analysis of fiscal sustainability in Poland, including data, empirical methods and results. Final section concludes.

1. Theoretical underpinnings of fiscal sustainability

Fiscal sustainability is most often defined in theoretical literature as the ability of fiscal authorities to maintain the public debt to GDP ratio within the limits that allow, on the one hand, to minimize the negative effects of over-indebtedness, and, on the other hand, maximize the benefits of fiscal stabilizers. This means that fiscal policy is considered sustainable if public debt to GDP ratio in the long run converges to the initial level (see Blanchard 1990).[1]

To illustrate, consider an economy in which the government cannot use seignorage or inflation to reduce debt. Under the assumption that government cannot resort to money creation to reduce the level of public debt, the dynamics of public debt over time can be described as follows (Greiner and Fincke 2009):

$$\dot{D}(t) = r(t)D(t) - PS(t), \tag{1}$$

where

$D(t)$ – real level of net public debt stock at time t,
$\dot{D}(t)$ – derivative of net public debt stock over time $\dfrac{dD}{dt}$,
$r(t)$ – real interest rate over time t,
$PS(t)$ – primary budget surplus at time t, i.e. government revenues minus government expenditures (without interest payments).

Suppose now that the government selects a primary surplus that is a linear function of public debt $\gamma(t)D(t)$ as well as an autonomous component $\varphi(t)Y(t)$ which is independent from debt and is a function of GDP growth. Of course, the component $\varphi(t)Y(t)$ can be controlled to some extent by the government, but not completely, as it also depends on the business cycle, which may periodically affect the amount of government spending (see Bohn 1995, 1998; Canzoneri et al. 2001). Then the primary surplus $PS(t)$ can be expressed as follows:

$$PS(t) = \gamma(t)D(t) + \varphi(t)Y(t). \tag{2}$$

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[1] See also: Uctum and Wickens (2000), Marchewka-Bartkowiak (2008), Włodarczyk (2011).

Dividing the identity (2) by the amount of GDP $Y(t)$ on both sides, we obtain the following form of the fiscal reaction function:

$$ps(t) = \gamma(t)d(t) + \varphi(t), \tag{3}$$

where:

$$ps(t) = \frac{PS(t)}{Y(t)},$$

$$d(t) = \frac{D(t)}{Y(t)}.$$

Substituting the decomposition of the primary budget surplus $PS(t)$ from formula (2) to equality (1), we obtain the following identity:

$$\dot{D}(t) = \big(r(t) - \gamma(t)\big)D(t) - \varphi(t)Y(t). \tag{4}$$

If we express the dynamics of public debt over time not in absolute terms, but as GDP ratios, we get:

$$\dot{d}(t) = \left(\frac{\dot{D}(t)}{Y(t)}\right) = \frac{1}{Y(t)}\left(\dot{D}(t) - D(t)\frac{\dot{Y}(t)}{Y(t)}\right). \tag{5}$$

Note that by dividing the identity (5) by $d(t)$, we get:

$$\frac{\dot{d}(t)}{d(t)} = \frac{\dfrac{1}{Y(t)}\left(\dot{D}(t) - D(t)\dfrac{\dot{Y}(t)}{Y(t)}\right)}{\dfrac{D(t)}{Y(t)}} = \frac{\dot{D}(t)}{D(t)} - \frac{\dot{Y}(t)}{Y(t)}. \tag{6}$$

Dividing the identity (4) by $D(t)$, we get:

$$\frac{\dot{D}(t)}{D(t)} = \big(r(t) - \gamma(t)\big) - \varphi(t)\frac{Y(t)}{D(t)}. \tag{7}$$

By transforming the identity (6) and substituting it to the left side of the equation (7), we get:

$$\frac{\dot{d}(t)}{d(t)} + \frac{\dot{Y}(t)}{Y(t)} = \big(r(t) - \gamma(t)\big) - \varphi(t)\frac{Y(t)}{D(t)}. \tag{8}$$

Let:

$$\frac{\dot{Y}(t)}{Y(t)} = g(t).$$

Then, we can insert the parameter $g(t)$ denoting the GDP growth rate into equation (8):

$$\frac{\dot{d}(t)}{d(t)} + g(t) = \big(r(t) - \gamma(t)\big) - \varphi(t)\frac{Y(t)}{D(t)}. \tag{9}$$

Thus, after simple transformations of equation (9), we get:

$$\dot{d}(t) = \big(r(t) - \gamma(t) - g(t)\big)d(t) - \varphi(t). \tag{10}$$

Equation (10) shows that the first derivative of public debt-to-GDP ratio is a linear function of public debt $d(t)$. The directional parameter of this function depends on the average level of interest rates $r(t)$, parameter $\gamma(t)$ from the fiscal reaction function (3) and $g(t)$ which is the GDP growth rate (see Greiner and Fincke 2009).

Let's assume that $r(t) - \gamma(t) - g(t) = const \neq 0$ and $\varphi(t) = const > 0$. We can simply conclude that if $\gamma > r - g > 0$, then $d(t) \xrightarrow{\infty} A < \infty$. Then, in the long run, the public debt decreases and converges to some finite level A. This is due to the fact that the first derivative of the public debt dynamics equation is negative. This condition is sometimes referred to as fiscal sustainability in the strong sense (see Greiner and Fincke 2009). It should be noted that $r(t)$ in this case does not mean the repo rate, but the average yield on government bonds.

One of the first and classic methods of examining fiscal sustainability applied in empirical research was testing the stationarity of public debt stock-to-GDP ratio, which was proposed by Hamilton and Flavin (1986) and developed by Wilcox (1989). According to this concept, intertemporal budget constraint could be satisfied if public debt stock-to-GDP ratio is a stationary or a variable is integrated of order one. Quintos (1995) denotes this condition as a weak sustainability of fiscal policy.

Another approach to the study of fiscal sustainability is the analysis of the existence of cointegrating vector between budgetary expenditure-to-GDP ratio and budget revenue-to-GDP ratio, proposed by Hakkio and Rush (1991). Note that the long-term relationship between the above budget aggregates can be presented as follows:

$$\frac{E(t)}{Y(t)} - C\frac{R(t)}{Y(t)} = \varepsilon(t), \tag{11}$$

where:

$\dfrac{E(t)}{Y(t)}$ – vector of budgetary expenditure-to-GDP ratio over time,

$\dfrac{R(t)}{Y(t)}$ – vector of budgetary revenue-to-GDP ratio over time,

$\varepsilon(t)$ – vector of random error over time.

The vector of budgetary expenditure-to-GDP ratio can be expressed as a linear combination of the vector of budgetary revenue-to-GDP ratio and the constant c:

$$\frac{E(t)}{Y(t)} = C\frac{R(t)}{Y(t)} + \varepsilon(t). \tag{12}$$

Note that assuming there are no macroeconomic shocks that would disturb the long-term relationship between these variables, for $0 < c < 1$ the following relationship exists:

$$\frac{E(t)}{Y(t)} < \frac{R(t)}{Y(t)}. \tag{13}$$

This means that in the long run budgetary expenditure-to-GDP ratio is lower than budgetary revenue-to-GDP ratio, which guarantees fiscal sustainability. However, this condition is widely discussed in the literature, since this approach is not robust on the appearing of macroeconomic shocks. As Bohn (2007) argues, analysis based on cointegration between fiscal variables may not be a sufficient approach in testing fiscal sustainability. Due to the above limitations, this approach is recently used much less frequently in empirical research and also could be classified as a measuring of fiscal sustainability in a weak sense.

2. Empirical studies of fiscal sustainability

Empirical analysis of fiscal sustainability received much attention in recent years because of its far-reaching practical implications for the effective conduct of economic policy both in stable and post-crisis periods (Greiner and Fincke 2015). As it has been already mentioned, there are two main empirical approaches to examining fiscal sustainability: in the weak sense and in the strong sense. The former approach has been pioneered by Hamilton and Flavin 1986 (see also Wilcox 1989) and is primarily based on the stationarity tests of public debt stock-to-GDP ratio), as well as on the testing of the presence of cointegrating vector between budgetary revenues and expenditures (see also Hakkio and Rush 1991). Examining the fiscal sustainability in a strong sense, in turn, involves estimation of the fiscal reaction function in which the primary surplus-to-GDP ratio is a dependent variable, while the level of the public debt-to-GDP ratio is an independent variable (Bohn 1998, 2007). An interesting attempt to synthesize these two approaches mentioned above is the proposal of a stepwise algorithm (Özkaya 2013).

Several recent studies have employed these different approaches to the analysis of fiscal sustainability for a set of the new EU member states, including Poland. However, there are little or no studies so far that look specifically at Poland after 2016. For example, in one of the most recent studies, Wysocki and Wójcik (2018) looked at the evolution of fiscal sustainability in Poland between 2004–2016 with a specific aim of analyzing the impact of the global financial crisis on fiscal sustainability. They found that that fiscal policy in Poland was sustainable in the strong sense throughout the whole period and that – importantly – fiscal sustainability has in fact significantly improved in the post-crisis period of 2009–2016. However, due to short time series the paper could not address the post-2016 policy measures and their impact on sustainability.

Similarly, Krajewski et al. (2016) have used panel stationarity and cointegration tests as well as estimates of certain parameters of fiscal reaction function for

Bulgaria, the Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovakia, Romania and Hungary. They found out that despite financial turmoil these countries demonstrated the existence of a long-term relationship between revenues and expenditures and they have estimated statistically relevant parameters of the fiscal reaction function. The study indicates that public finances in those countries were sustainable only in the weak sense, whereas panel data analysis used in the paper limits somewhat inferences on individual countries. Similar conclusions were obtained also by Wysocki (2017) or Pączek-Jarmulska (2016). However, none of these studies could at the time provide an analysis of the post-2016 period.

Other country studies evaluated fiscal sustainability in the CEE countries before the outbreak of the global financial crisis, but not after 2016. Particularly, Stoian and Câmpeanu (2010) estimated regression equations based on Bohn's fiscal response mechanism individually for all CEE countries, with OLS based on quarterly data for 2000 until 2008. The results were mixed as they indicated sustainable behavior for some countries (Bulgaria, Czechia, Estonia and Lithuania), whereas others (Latvia, Poland, Romania and Slovenia) have faced difficulties. In another paper Włodarczyk (2011) investigates fiscal sustainability of V4 countries, however his analysis covers only pre-crises period.

There are also several studies that analyzed fiscal sustainability in the CEE countries using panel fiscal reaction function (see e.g. Staehr 2010; Bökemeier 2017; Lee et al. 2018). Particularly interesting approach has been used in the research by Baldi and Staehr (2016). They analyzed fiscal reaction functions using quarterly data for the period 2000–2012, before and after the global financial crisis in order to explain the different fiscal performance situation of EU economies and found a change in fiscal policy: there was only a slight and rather similar response before the crisis, but a stronger debt effect after 2008, especially for crisis-affected economies. It should be mentioned that there are country studies that evaluated fiscal sustainability in the CEE countries before the outbreak of the global financial crisis. Particularly, Stoian and Câmpeanu (2010) estimated regression equations based on Bohn's fiscal response mechanism individually for all CEE countries, with OLS based on quarterly data from 2000 until 2008. The results were mixed as they indicated sustainable behaviour for some countries (Bulgaria, Czechia, Estonia and Lithuania), whereas others (Latvia, Poland, Romania and Slovenia) have faced difficulties.

By applying Bohn's approach, this article goes into a similar direction like Stoian and Câmpeanu (2010) or Baldi and Staehr (2016). At the same time, we use longer sample and additional statistical and econometric tests that allow us to re-evaluate and extend the results of Wysocki and Wójcik (2018) in the context of policy changes in 2016–2019.

3. Measuring fiscal sustainability in Poland

In this section we provide an analysis of fiscal sustainability in Poland with a particular focus on 2016–2019 policy shift. We first discuss data and recent devel-

opments in order to see the larger context of fiscal policy. Next we lay down our estimation methods and discuss the results.

3.1. Data and recent developments

We use quarterly data from Eurostat for the period from 2004 Q1 to 2019 Q4 for the following time series: government consolidated gross debt (D), budget deficit (BD), primary budget surplus (PS) and output gap (OG). The output gaps were calculated by the usage of Hodrick–Prescott filter[2] (1997). The unit of all the variables was percentage of GDP.

When we look at the government consolidated gross debt in Poland we see a slight reduction of the debt to GDP ratio between 2016–2019. The debt had been growing steadily (similarly as in the other CEE countries) since 2008 Q4 until 2014 Q1 (see Figure 1) which resulted from a fiscal expansion on the one hand and from a huge drop in tax revenues after outbreak of global financial crisis on the other. In 2014 Q1 Poland experienced a rapid drop in government gross consolidated debt which was a result of the redemption of the government-bond share of open pension funds assets in the amount of 8.5% of GDP. The debt level
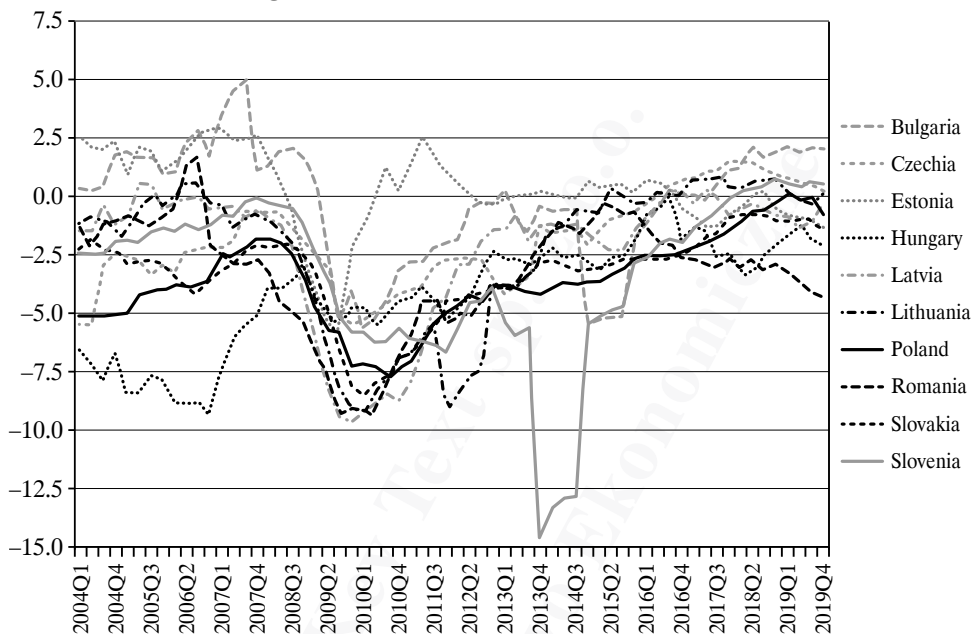
Figure 1
Public debt stock-to-GDP ratio in CEE countries
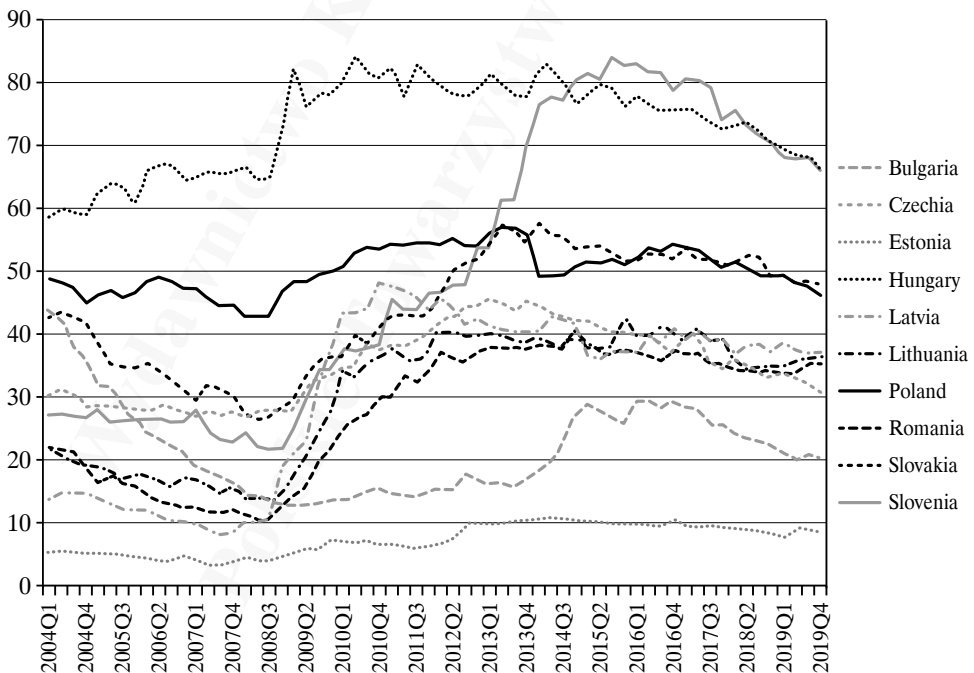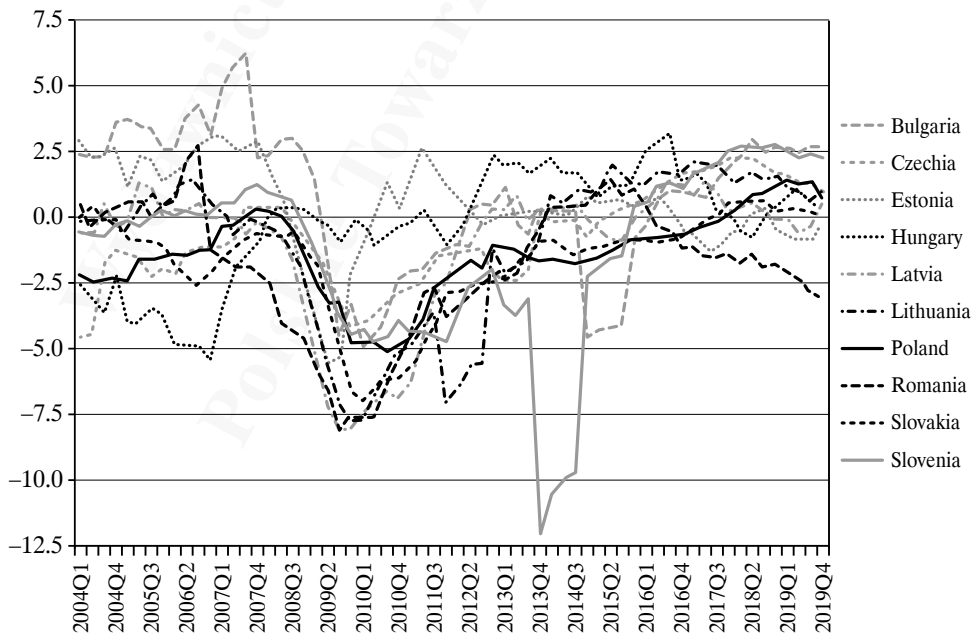

Source: own elaboration based on Eurostat.

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[2] We have also launched Hamilton filter (2018), but since the results in both cases were similar and in Hamilton filter there is a loss in sample size, we decided to use Hodrick-Prescott filter (1997), which is still very popular and commonly used in the research (see e.g. Rubaszek 2012).

F i g u r e 2
Budget balance-to-GDP ratio in CEE countries

Source: own elaboration based on Eurostat.

F i g u r e 3
Primary budget surplus-to-GDP ratio in CEE countries

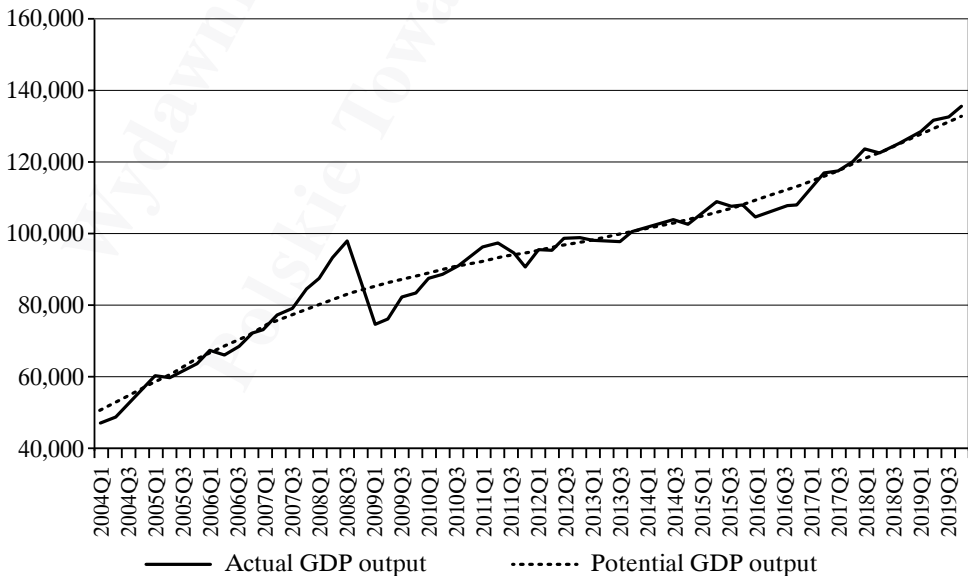Source: own elaboration based on Eurostat.

was stable and slightly decreasing thereafter, with some noticeable reduction of its level in relation to GDP after 2016. Importantly, throughout the whole period the government consolidated gross debt in Poland has not exceeded 60% of GDP, which is the threshold level guaranteed by article 216, clause 5 of the Polish Constitution.

Secondly, the budget balance has been improving steadily, after it reached its minimum at the level of 7.6% of GDP in the crisis year 2010. Since 2011 Q1 the fiscal conditions in Poland have begun to improve gradually (see Figure 2). Furthermore, in January 2011 Poland introduced a formal expenditure rule, which has had a positive impact upon the pace of the reduction of the budget deficit (see more detail in Działo 2012). The fiscal deficit was also improving since 2016 when the new social policy programs, including Family 500+ and VAT gap reduction polices, were introduced by the government.

Thirdly, Poland and the entire CEE region experienced massive impact of the global financial crisis also on the levels of primary surpluses (see Figure 3). Almost every country had a significant primary budget deficit in the year 2009. Poland reached the pick of the primary deficit in 2010 Q3. However, primary deficits started to improve thereafter and in 2019 it was in surplus.

The developments in the fiscal area have been reflecting variation of the output gap which in Poland reached its peak just before the crisis in 2008. The output gap dropped strongly to negative values during the crisis time between 2009–2010. While output gap turned negative in 2016, it started to improve thereafter and since 2017 output gap was positive until the end of 2019 (see Figure 4).

Figure 4
Actual GDP output vs potential GDP output in Poland (in thousands of EUR)
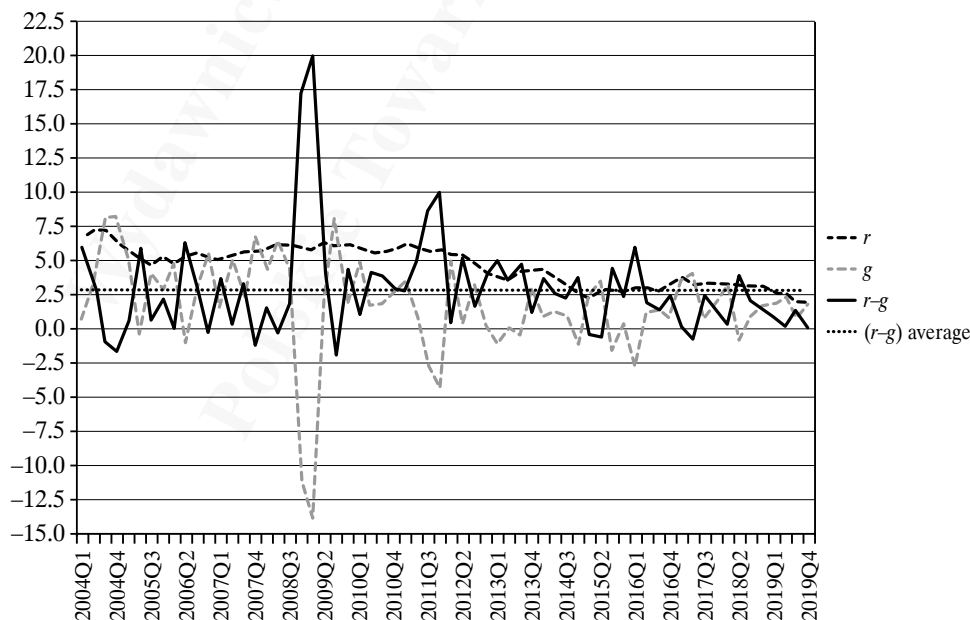

Source: own calculations based on Eurostat data with the usage of Hodrick–Prescott filter.

When analyzing the social expenditure of the Polish government in 2004–2019 the most notable event is certainly the significant increase in expenditure on family and children, which since 2016 has permanently exceeded 2.5% of GDP. This was mainly the result of the Family 500+ program stimulating demographic policy, consisting of subsidizing households of PLN 500 a month for having a second and subsequent child in the family. In 2019, when parliamentary elections took place in Poland, the program criteria were extended and subsidies in the amount of PLN 500 also included the first child in the family. Also other programs (for example, 300+) have been introduced although they were significantly smaller effect than the main Family 500+ program. Among other important social changes statutory retirement age was reduced in 2016 although the immediate impact of the change was contained and more impact is expected in the future. At the same time, the government embarked on a swift policy of VAT gap reduction, and since 2016 Poland was one of the countries with the biggest reduction of the gap among EU countries. The reduction of the tax gap was, however, smaller than the overall increase in public revenues, as an important part of these revenues resulted from improved economic conditions since 2016. Overall, however, Poland experienced significant fiscal and social policy shift between 2016 and 2020.

In Figure 5 we additionally plot times series for r, g, $r - g$, and average $(r - g)$ that we discussed in section 1. It appears that $(r - g)$ in Poland in the period 2004 Q1 – 2019 Q2 on the average was positive and accounted for 2.88 percentage points (see Figure 5).

Figure 5

Average government bond yield vs. dynamics of GDP growth Q/Q in Poland (in %)

Source: own calculations based on Eurostat data.

3.2. Estimation methods and results of the econometric analysis

Our empirical approach involves three stages. First, we verify data quality and ex-amine the integration level of key variables using the following tests: ADF, KPSS, PP, Zivot–Andrews (1992) and Lee–Strazicich (2003). Second, we run cointegra-tion analysis using the Johansen test (1991), the Lütkepohl–Saikkonen–Trenkler test (2004) and the Pesaran–Shin–Smith bounds test (2001). Third, we estimate fiscal reaction functions in which the primary surplus-to-GDP ratio is our de-pendent variable, and the level of public debt stock-to-GDP ratio and the output gap-to-GDP ratio are key independent variables (see Bohn 1995). In doing so, we estimate the parameters of the following behavioural equation (see Krajewski et al. (2016):

$$ps_t = \alpha_0 + \alpha_1 ps_{t-1} + \beta_0 og_t + \beta_1 og_{t-1} + \gamma_1 d_{t-1} + \varepsilon_t, \qquad (14)$$

where
ps_t – primary surplus-to-GDP ratio,
ps_{t-1} – primary surplus-to-GDP ratio 1 period lagged,
og_t – output gap-to-GDP ratio,
og_{t-1} – output gap-to-GDP ratio 1 period lagged,
d_{t-1} – public debt stock-to-GDP ratio 1 period lagged.

The key parameter is γ_1 which indicates the reaction of primary surplus-to-GDP ratio to the changing level of public debt-to-GDP ratio in the previous pe-riod. If this parameter is significantly different from zero (positive) and exceeds the average positive differential between government bond yield and dynamics of GDP growth $(r-g)$, this means that the growing stock of public debt effectively leads to generating a fiscal surplus. In other words, positive value of γ_1 parame-ter means that primary surplus-to-GDP ratio could grow linearly with the public debt stock-to-GDP ratio (especially for high levels of this ratio). In such a situ-ation the government fulfills its inter-temporal budget constraint and ensures the long-run solvency of the public sector. Recently, also non-linear relationship between the primary budget surplus-to-GDP ratio and public debt stock-to-GDP ratio has been investigated (Ghosh et al. 2013; Mussons Olivella 2020).

We first checked the level of integration of every budgetary variable for Po-land. In doing so, we have used three standard unit root tests ADF, PP, KPSS (see Table 1) and two additional tests that take into account the presence of struc-

Table 1

Unit root test results of primary surplus, public debt stock and output gap

Variable	ADF	PP	KPSS
Primary surplus-to-GDP ratio (ps)	I (3)	I (1)	I (0)
Public debt stock-to-GDP ratio (d)	I (2)	I (1)	I (0)
Output gap-to-GDP ratio (og)	I (0)	I (0)	I (3)

Source: own calculations.

tural breaks: Zivot–Andrews and Lee–Strazicich tests. For our calculations we have used RATS software version 10.0. In every test we have chosen the level of significance of 5%. In all cases we have accepted hypothesis about the existence of structural break, so the use of Zivot–Andrews test and Lee–Strazicich test were justified (see Table 2 and Table 3, respectively). It should be underlined that the locations of the breaks don't really correspond to the date of the break that would seem to be appropriate from looking at the data. This is because those procedures are not tests for break, but unit roots tests allowing for breaks, and the break locations are chosen to give the most negative test statistic, not the best fit to the data.

The results of time series integration tests are inconclusive, which is largely due to the presence of structural breaks. However, due to the fact that there is an economic justification for the long-term relationship among variables, we proceeded to study cointegration. To our calculations we have used GNU R software and URCA package. The test shows that according to the maximal eigenvalue test of Johansen procedure (1991) at the level of significance of 5% (see Table 4) we can accept the hypothesis about the existence of one cointegrating vector.

Due to the existence of structural breaks in all aforementioned macroeconomic time series in Poland, we use the Lütkepohl–Saikkonen–Trenkler trace test (2004) with the critical values from Trenkler (2003) (see Table 5). This test takes into account the presence of endogenous structural shifts in the time series, because it includes shift correction in linear trend. In this case, at the level of significance of 5%, the value of test statistics also affirms that there exists in Poland at least one cointegration vector among primary surplus-to-GDP ratio, public debt stock-to-GDP ratio and output gap-to-GDP ratio.

In the light of mixed results on the order of integration, we use Pesaran–Shin–Smith bounds test (2001). Despite the possible difference in the orders of integration of variables, at the level of significance of 5% the value of test statistics confirms that there exists strong cointegration relationship among primary surplus-to-GDP ratio, public debt stock-to-GDP ratio and output gap-to-GDP ratio in Poland (see Table 6).

Table 2

**Zivot–Andrews test results of primary surplus,
public debt stock and output gap**

Variable	ZA (intercept and trend)			
	Order	Test statistic	Critical value at $\alpha = 5\%$	Break
Primary surplus-to-GDP ratio (ps)	I (0)	–5.37	–5.08	2009 Q3
Public debt stock-to-GDP ratio (d)	I (2)	–5.72	–5.08	2014 Q2
Output gap-to-GDP ratio (og)	I (0)	–6.47	–5.08	2008 Q3

Source: own calculations.

Table 3

Lee–Strazicich test results of primary surplus, public debt stock and output gap

Variable	LS (intercept and trend)			
	Order	Test statistic	Critical value at $\alpha = 5\%$	Break
Primary surplus-to-GDP ratio (ps)	I (0)	–5.10	–4.27	2009 Q2
Public debt stock-to-GDP ratio (d)	I (2)	–5.53	–4.32	2015 Q1
Output gap-to-GDP ratio (og)	I (1)	–4.93	–4.09	2007 Q2

Source: own calculations.

Table 4

Values of maximal eigenvalue statistic of Johansen procedure

Number of vectors	Test	10 pct	5 pct	1 pct
$r <= 2$	6.67	6.50	8.18	11.65
$r <= 1$	7.33	12.91	14.9	19.19
$r = 0$	28.30	18.90	21.07	25.75

Source: own calculations.

Table 5

Values of trace statistic of Lütkepohl–Saikkonen–Trenkler test

Number of vectors	Test	10 pct	5 pct	1 pct
$r <= 2$	6.03	5.42	6.79	10.04
$r <= 1$	15.37	13.78	15.83	19.85
$r = 0$	34.11	25.93	28.45	33.76

Source: own calculations.

Table 6

Values of Pesaran–Shin–Smith bounds test (unrestricted intercepts, unrestricted trends)

Level of significance	<------- I (0) ------------ I (1) ------->		F-statistic
10 pct	4.353	5.257	
5 pct	5.137	6.173	865.117
1 pct	7.013	8.230	

Source: own calculations.

After carrying out the tests of integration order and cointegration analysis we have estimated the fiscal reaction function. The structure of the fiscal reaction function is in the line with former specifications by Bohn (2007), Krajewski et al. (2016) and Wysocki and Wójcik (2018). Due to the fact that we use quarterly data, all variables were lagged by 4 instead of 1:

$$ps_t = \alpha_0 + \gamma_1 d_{t-4} + \alpha_1 ps_{t-4} + \beta_0 og_t + \beta_1 og_{t-4} + \varepsilon_t, \tag{15}$$

where:
ps_t – primary surplus-to-GDP ratio,
d_{t-4} – public debt stock-to-GDP ratio 4 quarters lagged,
ps_{t-4} – primary surplus-to-GDP ratio 4 quarters lagged,
og_t – output gap-to-GDP ratio,
og_{t-4} – output gap-to-GDP ratio 4 quarters lagged.

Our analysis of the key parameter γ_1 proceeds in the following steps. First, in order to put our analysis in the context of the earlier literature and use the earlier results as starting benchmark, we first estimate the key fiscal reaction functions by replicating the estimations of the earlier study that looked at the period before the policy shift of 2016–2019 (see Wysocki and Wójcik 2018). We confirm that indeed between 2004–2017 Poland's fiscal policy was sustainable in the strong sense with the γ_1 parameter assuming the value of 0.15418. We confirm also that in the post-crisis period of 2008–2017 fiscal sustainability improved significantly, with the γ_1 parameter assuming the value of 0.21766. In comparison to the whole sample of 2004–2017 the strength of reaction of the primary surplus to a change of the public debt increased in the post-crisis time up until 2017 by nearly 50%.

Second, we ask: what will be the change of the γ_1 parameter if we extend the time series by the years 2017–2019? Our underlying assumption is that if fiscal and social policy shifts of 2016–2019 influenced fiscal sustainability in a positive or negative way, this should be reflected in the respectively increase or decrease of the γ_1 parameter in the time series extended by the years 2017–2019. To make such comparison, we estimate the same fiscal reaction functions for the whole extended period between 2004 Q1 and 2019 Q4, and then we split the sample into the pre-crisis period from 2004 Q1 to 2008 Q3 and the post-crisis period from 2008 Q4 to 2019 Q4 and run sensitivity and robustness tests (see Appendix). We find that when compared to the previous results on pre-2017 time frame the parameter γ_1 has indeed deteriorated, both for the whole sample (2004 Q1 – 2019 Q4) and for the post-crisis sample (2008 Q4 – 2019 Q4). This suggests that the policy shift in 2016–2019 has weakened country's fiscal sustainability. Moreover, we see also that the impact of the 2016–2019 is much stronger in the estimations of the shorter post-crisis period (fall of γ_1 parameter from 0.21766 to 0.15432) which may reflect a higher weight of 2016–2019 period in the shorter time series and its sizable impact (see Table 7 and Table 8). Importantly, while γ_1 the parameter is reduced in the extended time series, it is still positive and statistically significant.

Table 7

Comparison of the results of fiscal reaction function for Poland since 2004

Coefficients	Replication of the estimates for 2004 Q1 till 2017 Q2 (Wysocki and Wójcik, 2018)			Extended time series Period from 2004 Q1 till 2019 Q4		
	Estimate	Std. error	Pr (>|t|)	Estimate	Std. error	Pr (>|t|)
Intercept	−8.48962	2.99832	0.0069**	−7.672820	2.027536	0.000383***
d_4	0.15418	0.06012	0.0137*	0.150669	0.040665	0.000492***
ps_4	0.55059	0.12596	7.21e-05***	0.806149	0.098023	3.77e-11***
og	0.06635	0.04602	0.1563	0.087979	0.031678	0.007480**
og_4	−0.01698	0.0484	0.7274	0.009975	0.032881	0.762753

Source: own calculations.

Table 8

Comparison of the results of fiscal reaction function for Poland since 2008

Coefficients	Replication of the estimates for 2008 Q4 till 2017 Q2 (Wysocki and Wójcik, 2018)			Extended time series Period from 2008 Q4 till 2019 Q4		
	Estimate	Std. error	Pr (>|t|)	Estimate	Std. error	Pr (>|t|)
Intercept	−12.14877	3.51475	0.001657**	−7.77463	3.20753	0.02051*
d_4	0.21766	0.06726	0.002951**	0.15432	0.06139	0.01656*
ps_4	0.46872	0.1183	0.000424***	0.86903	0.09086	2.01e-11***
og	0.19921	0.07687	0.014617*	0.08919	0.06777	0.19652
og_4	0.08874	0.04901	0.080215	0.14276	0.04470	0.00292**

Source: own calculations.

Conclusions

In this paper we provided some early evidence of the impact of the fiscal and social policy shift in 2016–2019 on Poland's long-term fiscal sustainability. Our analysis reveals that fiscal sustainability parameters have deteriorated between 2016 and 2019. Specifically, our estimations suggest that just after a year since the introduction of the Family 500+ program, the strength of reaction of the primary deficit to a change of the public debt decreased by nearly 50% in 2017. Moreover, the parameter turned negative and statistically significant thereafter which means that from 2018 fiscal policy lacked long-term sustainability. Overall, our estimates suggest that in the period of 2016–2019 fiscal sustainability parameters were the lowest since Poland joined the EU in 2004. While our results are preliminary and should be treated with caution, the significant deterioration of fiscal sustainability may have significantly limited Poland's capacity to respond to COVID-19 pandemic with sound fiscal policy instruments and created added pressure on use of non-standard monetary policy tools in response to the shock.

More studies of this recent period should shed more light on the long-term fiscal sustainability and shock-response ability of Poland. Further research should include policy recommendations as well.

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Appendix

Robustness check analysis – additional estimations

Table 9

Estimation results of the fiscal reaction functions for Poland (2004 Q1–2008 Q3)

Coefficients	Estimate	Std. error	t-value	Pr $(>|t|)$	F-statistic	p-value	Adjusted R^2
Intercept	–15.14501	7.69549	–1.968	0.0692	9.558 on 4 and 14 DF	0.0006087	0.6554
d_4	0.30876	0.16526	1.868	0.0828			
ps_4	0.36630	0.25603	1.431	0.1745			
og	0.07502	0.02662	2.818	0.0137[*]			
og_4	–0.01238	0.06046	–0.205	0.8408			

Source: own calculations.

Table 10

Estimation results of the fiscal reaction functions for Poland (2008 Q4–2019 Q4)

Coefficients	Estimate	Std. error	t-value	Pr $(>|t|)$	F-statistic	p-value	Adjusted R^2
Intercept	−7.77463	3.20753	−2.424	0.02051[*]	28.7 on 4 and 36 DF	9.336e−11	0.7347
d_4	0.15432	0.06139	2.514	0.01656[*]			
ps_4	0.86903	0.09086	9.565	2.01e−11[***]			
og	0.08919	0.06777	1.316	0.19652			
og_4	0.14276	0.04470	3.194	0.00292[**]			

Source: own calculations.

Table 11

Estimation results of fiscal reaction function for Poland (2004 Q1–2019 Q4)

Coefficients	Estimate	Std. error	t-value	Pr $(>|t|)$	F-statistic	p-value	Adjusted R^2
Intercept	−7.672820	2.027536	−3.784	0.000383[***]	21.16 on 4 and 55 DF	1.319e−10	0.5775
d_4	0.150669	0.040665	3.705	0.000492[***]			
ps_4	0.806149	0.098023	8.224	3.77e−11[***]			
og	0.087979	0.031678	2.777	0.007480[**]			
og_4	0.009975	0.032881	0.303	0.762753			

Source: own calculations.

Table 12

Results of Chow test for Poland (structural break assumed in 2008 Q4)

F value	d.f.1	d.f.2	p-value
6.253176e+00	5	50	1.408247e−04

Source: own calculations.

Table 13

Estimation results of fiscal reaction functions for Poland (2004 Q1–2019 Q4) for gross consolidated debt without the effect of the redemption of the government-bond share of the open pension funds

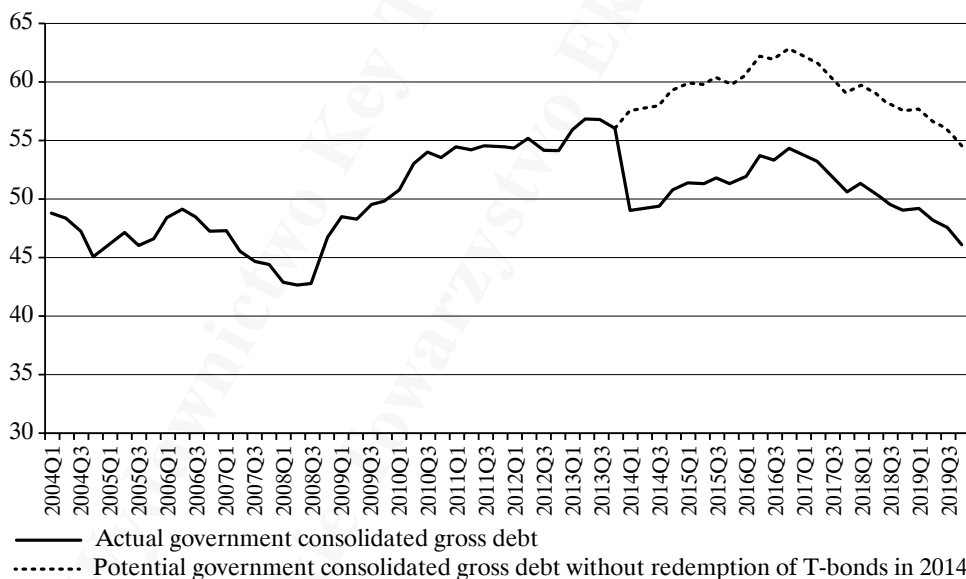| Coefficients	Estimate	Std. error	t-value	Pr $(>|t|)$	F-statistic	p-value	Adjusted R^2
Intercept	−6.45467	1.28378	−5.028	5.61e−06[***]	26.52 on 4 and 55 DF	2.807e−12	0.6337
d_4	0.11430	0.02320	4.928	8.01e−06[***]			
ps_4	0.62392	0.09263	6.736	1.02e−08[***]			
og	0.10253	0.02977	3.445	0.0011[**]			
og_4	0.02710	0.03118	0.869	0.3884			

Source: own calculations.

Table 14

Estimation results of fiscal reaction functions for Poland (2008 Q4–2019 Q4) for gross consolidated debt without the effect of the redemption of the government bond share of the open pension funds

Coefficients	Estimate	Std. error	t-value	Pr $(> |t|)$	F-statistic	p-value	Adjusted R^2
Intercept	−14.69174	1.92479	−7.633	4.94e–09[***]			
d_4	0.25168	0.03229	7.795	3.06e–09[***]	77.2 on 4 and 36 DF	<2.2e–16	0.884
ps_4	0.44022	0.07899	5.573	2.58e–06[***]			
og	0.07687	0.04474	1.718	0.094331			
og_4	0.11628	0.02952	3.938	0.000361[***]			

Source: own calculations.

Figure 6

Public debt-to-GDP ratio in Poland without redemption of T-bonds in 2014

——— Actual government consolidated gross debt

········· Potential government consolidated gross debt without redemption of T-bonds in 2014

Source: own elaboration based on Eurostat and Ministry of Finance of Poland.

For the extended time series the estimations of the majority of parameters are statistically significant and the results of the F-statistic confirm the proper specification of the model.

In our robustness check analysis we have split the sample to investigate the fiscal outcomes prior to and after the crisis. We assumed that structural break occurred in 2008 Q4. In an aim to confirm this we have launched Chow test. At the level of significance of 5% we reject the null hypothesis; we reject the hypothesis about the uniformity of model parameters in two groups of observations in favour of the alternative hypothesis (see Table 12).

Further analysis showed that the γ_1 parameter is positive and statistically significant both for the period 2004 Q1 to 2008 Q3 and for 2008 Q4 to 2019 Q4 as well. That means that the fiscal policy in Poland has been sustainable in a strong sense also since 2008 Q4 (see Appendix 1). Furthermore, redemption of some series of T-bonds in 2014 Q1 in amount of 8.5% of GDP (see Figure 6) had no significant impact upon our conclusions (see Table 13 and Table 14).

FISCAL SUSTAINABILITY IN POLAND: HOW DID THE PUBLIC POLICY SHIFT OF 2016–2019 IMPACT THE COUNTRY'S LONG-TERM SUSTAINABILITY?

Summary

In 2016–2019 Poland experienced a major social and fiscal policy shift: new government decreased the statutory retirement age and launched several new social programs, including the sweeping Family 500+ program under which social expenditure on family and children support increased suddenly from 1.5% to nearly 3% of GDP. Moreover, VAT gap reduction policies have been implemented swiftly. The new policy move became highly controversial. Many economists argued that overall it would lead to a significant deterioration of long-term fiscal sustainability. The government argued in turn that the new program was well financed by a complementary policy of VAT gap reduction and saw no risk to country's fiscal sustainability. This paper provides one of the first evidence of the adverse effect of the policy shift on long-term fiscal sustainability. The analysis reveals that fiscal sustainability parameters have deteriorated significantly after 2016. Overall, the estimations presented in the paper show that in the period of 2016–2019 fiscal sustainability parameters may have been the lowest since Poland joined the EU in 2004. While these results should be treated with caution as they draw on very recent time series, the deterioration of Poland's fiscal sustainability raises a pertinent policy question related to country's capacity to respond to the COVID-19 pandemic, in particular in terms of the ability to use standard and non-standard fiscal policy instruments and monetary policy tools in response to the shock.

Keywords: fiscal sustainability, fiscal policy, social policy, public finance

JEL: C22, E60, H63

STABILNOŚĆ FISKALNA W POLSCE: JAK ZMIANA POLITYKI PUBLICZNEJ W LATACH 2016–2019 WPŁYNĘŁA NA DŁUGOTERMINOWĄ STABILNOŚĆ?

Streszczenie

W latach 2016–2019 Polska doświadczyła dużej zmiany polityki społecznej i fiskalnej: nowy rząd obniżył ustawowy wiek emerytalny i wprowadził kilka nowych programów socjalnych, w tym szeroko zakrojony program „Rodzina 500+", w ramach którego wydatki socjalne na utrzymanie rodziny i dzieci gwałtownie wzrosły z 1,5% do prawie 3% PKB. Ponadto szybko wdrożono politykę zmniejszania luki w podatku VAT. Nowa polityka rządu wzbudziła dużo kontrowersji. Wielu ekonomistów argumentowało, że w konse-

kwencji może to doprowadzić do znaczącego pogorszenia długookresowej stabilności fiskalnej państwa. Rząd argumentował z kolei, że nowe programy są dobrze zbilansowane dzięki polityce zmniejszania luki w podatku VAT i nie widział zagrożenia dla stabilności fiskalnej kraju. Niniejszy artykuł przedstawia jeden z pierwszych dowodów na negatywny wpływ zmiany polityki rządu na długoterminową stabilność fiskalną państwa. Analiza pokazuje, że parametry stabilności fiskalnej znacznie się pogorszyły po 2016 r. Ogólnie biorąc, szacunki przedstawione w artykule wskazują, że w latach 2016–2019 parametry stabilności fiskalnej mogły być najniższe od czasu przystąpienia Polski do UE w 2004 r. Chociaż wyniki te należy traktować z ostrożnością, ponieważ opierają się na bardzo świeżych szeregach czasowych, pogorszenie stabilności fiskalnej Polski rodzi istotne pytanie polityczne dotyczące zdolności kraju do zareagowania na pandemię COVID-19, w szczególności w zakresie zdolności do wykorzystania standardowych i niestandardowych instrumentów polityki fiskalnej oraz pieniężnej w odpowiedzi na szok.

Słowa kluczowe: stabilność fiskalna, polityka fiskalna, polityka społeczna, finanse publiczne

JEL: C22, E60, H63

ФИСКАЛЬНАЯ СТАБИЛЬНОСТЬ В ПОЛЬШЕ. КАК ИЗМЕНЕНИЕ ГОСУДАРСТВЕННОЙ ПОЛИТИКИ В 2016–2019 ГГ. ПОВЛИЯЛО НА ДОЛГОСРОЧНУЮ СТАБИЛЬНОСТЬ?

Р е з ю м е

В 2016–2019 гг. в Польше произошли большие изменения в социальной и фискальной политике: новое правительство понизило пенсионный возраст и вело несколько новых социальных программ, в том числе широкомасштабную программу «Семья 500+», в рамках которой социальные расходы на содержание семьи и детей резко повысились с 1,5% до почти 3% ВВП. Кроме того, были быстро введены инструменты по пресечению ухода от НДС. Новая политика правительства встретилась с разными мнениями. Многие экономисты считали, что в последствии она может привести к значительному ухудшению долгосрочной фискальной стабильности государства. В свою очередь, правительство приводило аргументы, что новые программы хорошо сбалансированны благодаря политике пресечения попыток бизнеса уйти от НДС и не видело угрозы для фискальной стабильности страны. Нынешняя статья представляет одно из первых доказательств отрицательного влияния новой политики правительства на долгосрочную фискальную стабильность государства. Анализ показывает, что параметры фискальной стабильности после 2016 г. значительно ухудшились. По мнению автора, в 20016–2019 гг. параметры фискальной стабильности были самыми низкими со времени вступления Польши в ЕС в 2004 г. Хотя эти результаты следует рассматривать осторожно, так как они опираются на очень свежих временных рядах, ухудшение фискальной стабильности Польши порождает существенный политический вопрос, касающийся способности страны реагировать на пандемию КОВИД-19, особенно в области возможности использования стандартных и нестандартных инструментов фискальной и денежной политики.

Ключевые слова: фискальная стабильность, фискальная политика, социальная политика, публичные финансы

JEL: C22, E60, H63