Checking econometric models in times of market and consumer change

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Abstract
The aim of the article is to present the checking of econometric models in times of market and consumer changes. The development of the SFP balance, the budget deficit against real GDP in the years 2010-2019 and the debt forecast for the years 2021-2024 are presented here. It can be noted that different factors in different countries shape the budget balance. In 2009, the Baltic States were in the most difficult situation. The budget deficit and real GDP in Poland mean that a large part of the deficits in the economic situation is subordinated here. This shows that it is not cyclical factors that are behind it, but factors related to fiscal policy. The biggest problem was the problem in which the global financial crisis began and our deficits began to increase rapidly. The source of coverage had to be found. An additional problem was the pension reform related to OFE when we did not see it in the deficit, but we still had to incur a debt for funds transferred to OFE about PLN 20 billion per year. There was an idea to take some of these funds out of the sector. The pandemic has cast a shadow over our finances. The strategy prepared before the pandemic assumed that public debt would increase in nominal terms, but there would also be a significant decrease in relative terms to GDP. The flexibility that took place in 2015 caused that there was an expenditure expansion in Poland, and this consequently led to the appearance of the "gluttony effect". In Poland, there was a high increase in GDP, but Poles spent more, which made Poles "overeat" this increase. In addition, we are glad that we have a high GDP, and in fact it is falsified by inflation.

Keywords: Econometric model, market and consumer changes, GDP, debt, forecast.

Introduction
The expenditure of the Public Finance Sector in accordance with the Public Finance Act (Dz.U.2021.0.305 t.j. Ustawa o finansach publicznych z dnia 27 sierpnia 2009 r.) and the expenditure of General Government institutions according to the Brussels (https://pl.wikipedia.org/wiki/Deklaracja_Brukselska, 1874) methodology are significantly worrying. This is because in the initial period from 2006 to 2011 there was a difference of more than 30 billion. In 2006 – PLN 34.1 billion. These are expenses made by entities not included in the public finance sector. Therefore, the deficit is smaller, which is shown in the public finance sector, in the balance sheet of the public finance sector, in the light of the report on the implementation of the state budget (https://www.gov.pl/web/finanse/wykonanie-budzetu-panstwa). From 2012 to 2014, the situation improved significantly. But since 2015, there has been an increase in this diversity. In 2019, this difference is not large. However, in 2012 there is a very big difference between one and the other shot, where it is at the level of about PLN 200 billion.
Material and methods

Consumer price index and inflation target

The chart below shows the consumer price index and the inflation target for the period 2013–2018.


In the chart above, the horizontal line shows at what level the inflation target is formed. It is 2.5%. The blue line, on the other hand, is the actual formation of prices. In 2015-2016 there were deflationary phenomena, so we should reduce spending compared to the previous year. In 2015, social programs such as 500 plus, etc. came into force. This rule is not able to fit these expenses, so the forecast inflation was replaced by the Inflation target of the Central Bank, which opened up greater opportunities for spending funds. What's more, this rule does not cover all expenses because there is no Polish Spending Development Fund (https://pfr.pl). This rule covers 98% of the general government sector. There is currently a discussion about this rule, which should be excluded. It is considered that expenditure which is investment expenditure and that which is related to environmental protection should be excluded. Of course, this is not a simple rule because it has a very extensive adjustment mechanism in a situation where spending will be too high depending on the size of the deficit and public debt.

The flexibility that took place in 2015 resulted in an expenditure expansion in Poland, which in turn led to the appearance of the "gluttony effect". In Poland, there was a high increase in GDP, but Poles spent more, which made Poles "overeat" this increase. In addition, we are glad that we are dealing with a high GDP, and in fact it is falsified by inflation.

The chart below shows revenue and expenditure between 2000 and 2019.


Income and expenditure are expressed in relation to Gross Domestic Product. These are the figures that refer to the EU methodology. From 2000 to 2019, the revenue line never exceeded the expenditure line, and therefore budget deficits have been constantly occurring in Poland, i.e. in general, the public finance sector has a permanently inscribed deficit. They are permanent. In 2018, both income and expenses approached each other. Then there was a state close to budget balance.

Article 7 of the Public Finance Act states (Dz.U.2021.0.305 t.j. Ustawa o finansach publicznych z dnia 27 sierpnia 2009 roku, art. 7) that the positive difference between public revenues and public expenditures, determined for the accounting period, is a surplus of the public finance sector, while the negative difference is the deficit of the public finance sector (Dz.U.2021.0.305 t.j. Ustawa o finansach publicznych z dnia 27 sierpnia 2009 roku, art. 7).

The imbalance occurs both on a cash basis and on an accrual basis.

The cash shot is a simple shot. What counts is the date of receipt as well as the date of outflow of funds. This method can monitor on an ongoing basis the realized income and expenses with those assumed in the Act. (Dz.U.2021.0.305 t.j. Ustawa o finansach publicznych z dnia 27 sierpnia 2009 roku, art. 7). In addition, it gives you the opportunity to determine what are the loan needs for the implementation of given state tasks. The disadvantages of this approach include many economic events such as: omitting the entire property situation. This is, of course, a disadvantage, but from the point of view of managers, it is an additional advantage by manipulating the balance by postponing payment dates in time. This is not possible with accruals (https://ksiegowosc.infor.pl/raport-dnia/75965,Jak-prawidlowo-stosowac-metody-kasowa-i-memorialowa.html). The advantage of the accrual approach is that it is more comprehensive. It takes into account the entire financial situation of the State. It has disadvantages such as personal income tax settlement, which is carried out up to 30 april in the stated tax year to which it relates (https://poradnikprzedsiebiorcy.pl/-forma-opodatkowania-jaka-wybrac). The settlement will be taken into account on a cash basis for 2021 but applies to 2020. Then additional funds will be received, while in accrual terms we still have to estimate how much additional income will be attributed to 2020, as well as with tax arrears.

**SFP Balances**

Table 1 below shows SFP balances between 2010 and 2019.

**Table 1. SFP balances 2010 – 2019**

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</tr>
</thead>
<tbody>
<tr>
<td><strong>SFP deficit (PLN billion)</strong></td>
<td>109,7</td>
<td>76,3</td>
<td>60,5</td>
<td>66,9</td>
<td>55,2</td>
<td>46,7</td>
<td>46,1</td>
<td>33,0</td>
<td>5,0</td>
<td>16,8</td>
</tr>
<tr>
<td>% GDP</td>
<td>-7,6</td>
<td>-4,9</td>
<td>-3,7</td>
<td>-4,0</td>
<td>-3,2</td>
<td>-2,6</td>
<td>-2,4</td>
<td>-1,5</td>
<td>-0,2</td>
<td>-0,7</td>
</tr>
<tr>
<td><strong>Central level</strong></td>
<td>-88,6</td>
<td>-63,2</td>
<td>-59,5</td>
<td>-59,5</td>
<td>-36,2</td>
<td>-38,9</td>
<td>-56,9</td>
<td>-75,1</td>
<td>-13,4</td>
<td>-27,1</td>
</tr>
<tr>
<td><strong>Local level</strong></td>
<td>-18,0</td>
<td>-11,7</td>
<td>-4,5</td>
<td>-2,8</td>
<td>-2,9</td>
<td>-0,2</td>
<td>8,7</td>
<td>1,5</td>
<td>-6,6</td>
<td>-4,4</td>
</tr>
<tr>
<td><strong>Social Security Funds</strong></td>
<td>-3,1</td>
<td>-1,3</td>
<td>3,5</td>
<td>-4,6</td>
<td>-16,1</td>
<td>-7,6</td>
<td>2,2</td>
<td>42,4</td>
<td>13,2</td>
<td>1,5</td>
</tr>
</tbody>
</table>

*Source: https://stat.gov.pl/obszary-tematyczne/ludnosc/migracje-zaganicze-ludnosci/*

SFP balances – from 2010 – 2019 we use the EU method. During the global crisis in 2010, the deficit amounted to PLN 109.7 billion, and in 2009 – PLN 116 billion. Then, successively, as the crisis emerged, the situation improved and then there was a slight difference between income and
expenditure. In 2018 – PLN 5 billion. 2019 – 16.8 billion. The main fund in which the budget deficit is created is the state budget. It is being created at the central level. Unfortunately, every year it is negative. The deficit in 2010 was close to PLN 89 billion, but later it improved. At the local level, unfortunately, there are no such great opportunities for debt.

Social Security Funds in the years under review are negative values. The Social Insurance Fund cannot take out a loan or credit to finance this negative result, so it means that it has received a sufficiently low subsidy from the state budget, which is to cover expenses that are not covered by contributions.

In 2014, the financial situation improved compared to 2013, the budget deficit decreased by over PLN 20 billion. But if we look comprehensively at the public finance sector, we can see that in the Social Security Fund -4.6 increased to -16.1. This is a shift between the different levels within the public finance sector. Therefore, it follows that too low a subsidy was provided. Thanks to this, expenditures in the state budget were lower. The budget balance was lower. What should the Social Security Fund do in such a situation? He can borrow but only from the state budget. But if we borrow, it will not be included as an expense. Loans are an expense, so we financed it from public debt.

However, in 2017, the financial result is very large in Social Security. This is the result of the cancellation of those previously taken loans that have been excluded from the public debt. Financed by public debt. As a consequence, the cancelled loans will affect the positive result of the Social Security Fund (Jakie są konsekwencje podatkowe umorzenia pożyczki udzielonej pracownikowi z zfśs - Infor.pl).

Table 2 shows the deficit for the period 2020-2021.

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2021</th>
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</thead>
<tbody>
<tr>
<td>Expenditure</td>
<td>4,3% PKB -</td>
<td>6% PKB</td>
</tr>
<tr>
<td>96,2 mld zł</td>
<td>138,2 mld zł</td>
<td></td>
</tr>
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</table>


The deficit for 2020 is expected to amount to 4.3%, which will amount to PLN 96.2 billion. In 2021, we see that we are accelerating, there will be 6% of GDP, which will constitute PLN 138.2 billion. This is, of course, a record figure since 1990, where we have had two crises. We can see that the public debt over these two years will increase by PLN 42 billion.

**Budget balances**

Budget balances are used to assess the balance of public finances. We divide them into given types (https://www.wikiwand.com/pl/Saldo_budżetowe):

- nominal
- real
- primary
- cyclical
- structural

The year 2009 was the year of the biggest problems in public finances in the European Union countries.

Different factors in different countries shape the budget balance. In 2009, the Baltic States were in the most difficult situation. In the case of Estonia, this was a year-on-year decrease in the growth rate of 18 percentage points in real terms. In the case of Estonia, 14% of GDP (https://inwestycje.pl/gospodarka/ke-proponuje-przedluzenie-ogolnej-klausul-korekcyjnej-na-2023/). And in Poland 2.6 in the plus. In the case of Estonia, which recorded a 14% decline in GDP, it closed the balance sheet of the public finance sector with a deficit of 2% of GDP (https://tvn24.pl/biznes/najnowsze/koniec-prosperity-w-estonii-spadek-pkb-po-czterech-latach-wzrostu-ra427417-4441413). An excessive deficit procedure has not been initiated against it for Luxembourg or Sweden. In 2009 alone, other countries have found an excessive deficit. In the case of Sweden, where the growth rate fell to 7% year-on-year, there was a state close to budgetary balance. It is believed that Sweden pursues a healthy public finance Policy (https://pl.wikipedia.org/wiki/Polityka_pieniez-na_Szwecji). In the years of good economic
situations, it develops security buffers and allocates these additional funds to expenses in the period of economic downturn. Luxembourg sees a decline of 5% year-on-year (https://9lib.org/article/konsekwencji-dokonanie-podzialu-analizowanego-kryteriow-konjunktury-gospodarczej-konjunktury.rz3809qk). There is, of course, almost a budgetary balance. In Greece, where it was most heard about during the global crisis, through huge debt and problems in public finances, the decline was visible only 2.5% of GDP (https://pl.wikipedia.org/wiki/Kryzys_zadluzenia_a_w_Grecji). They recorded a deficit of 15% of GDP. Ireland in 2009 had a decline in real GDP of 9% and a deficit of 15%, and in 2010 a deficit of 35% of GDP, which was a record (https://www.bankier.pl/wiadomosc/Fitch-Deficyt-general-government-Polski-spadnie-do-3-2-PKB-w-2013-r-2649082.html). Greece, with a relatively low negative GDP index, had a high deficit, and Poland had a positive economic growth rate, and a deficit exceeding 7% (https://pl.tradingeco.com/greece/gdp-growth-annual). This means that other factors are occurring in other countries to some extent and they are cyclical or structural.

**Budget deficit and real GDP in Poland**

Budget deficit and real GDP in Poland. There is a subordination of a large part of the deficits in the economic situation. In 2002, the economy grew by 1.8% and the deficit was 5% of GDP, but when it accelerated significantly 1.4 to 3.9, it accelerated the deficit to 6.2% (https://businessinsider.com.pl/deficyt-w-polsce-siegnal-prawie-20-proc-pkb-to-rekord/jr36zq1). This shows that it is not cyclical factors that are behind it, but factors related to fiscal policy.

Figure 3 shows the cyclical and structural balance between 2001 and 2019.

The graph above shows the deficit that occurred in a given year of the nominal deficit in relation to GDP. The blue bar contains the use of Cobb’s production function – Douglas. It indicates the part that was created under the influence of a specific phase of the business cycle. The red bars are a structural imbalance. In Poland, deficits throughout the period were structural and it is not enough that we will have a faster pace of economic growth to get rid of these budget deficits because then only this cyclical surplus will be created. At the moment when we will always have to deal with a crisis, we will always have to deal with a significant increase in the deficit phenomenon because the cyclical surplus that compensates for the structural imbalance will disappear.


In 2020, there was a spread between the debt calculated according to the national and EU methodology. According to the national public debt is 50.4% (https://www.gov.pl/web/finanse/rzad-przyj-al-projekt-budzetu-na-rok-2021-i-strategie-zarzadzania-dlugiem) but when we count everything that was spent by the Polish the
development fund that was spent by the PGK funds as part of the anti-crisis policy, it is already 61.9% of GDP. These are the figures that are only written in the law as execution at the moment when the Minister of Finance says that the debt calculated according to the Brussels methodology will not exceed 60%. We can see that the span is large. After 2007, this span was increasing. It grew mainly because in addition to the limit that we have given in the Constitution of the Republic of Poland, there is also this limit repeated in the Act on Public Finances. The numerical rule, which was introduced in Poland in 1999 together with the Public Finance Act, which is such a "brake" that we do not allow this constitutional limit of 60% of GDP to be exceeded, assumes that prudential sanation procedures will be introduced. This rule consists in a feedback loop where it is indicated what actions should be taken in a situation where the State public debt to GDP exceeds a certain amount. The first ceiling was set at 50%. At the moment when the state public debt is GDP and at the moment when it exceeds 50%, both in the state budget and in the budget of local government units, a deficit can be adopted, but only at the same level as in the current year. So the next year is the same. The next threshold was set at 55%. At the moment when such a threshold is exceeded, neither in the state budget nor in the budget of a local government unit, a deficit cannot be adopted unless the local government unit closes its budget in the following year with a surplus. In the event that public debt to GDP is equal to or exceeds 60% of GDP we do not adopt a deficit in the state budget and in the budget of local government units and in addition, the Council of Ministers has 3 months to prepare a sanation program, i.e. such a repair program in which it is explained how it allowed such an unfavorable development of this relationship. That is, what actions will be taken to correct this figure. What introductions below this limit specified in the rule. What, of course, will be the forecasts for the coming years and how will the public debt be shaped. The biggest problem was the problem in which the global financial crisis began and our deficits began to increase rapidly. The source of coverage had to be fund.

An additional problem was the pension reform related to OFE when we did not see it in the deficit, but we still had to incur a debt for funds transferred to OFE about PLN 20 billion per year. There was an idea to take some of these funds out of the sector. Take to the appropriate institutions. First to BGK, then to the national road fund. Thus, the public debt is smaller, but we cannot show additional public expenditure and debt incurred. There is a large span here. In 2013, according to the Polish methodology, public debt amounted to 52.3% (https://www.bankier.pl/wiadomosc/Polski-dlug-publiczny-w-2013-roku-ponizej-55-PKB-3026952.html), i.e. it exceeded 50%. It was not possible to keep the deficit at the same level as in the previous year. There was a threat here that in the next year it will be more than 55%. Thus, bonds from OFE were transferred to the public sector (https://www.wnp.pl/finanse/mf-dlug-publiczny-w-2013-roku-ponizej-55-proc-pkb.21897.html). So we were assigned additional funds to our accounts while redeeming bonds. Reduction from 53.2 to 48.1 of debt according to the Polish methodology and from 57 to 53 of the Brussels methodology (https://www.bankier.pl/wiadomosc/Polski-dlug-publiczny-w-2013-roku-ponizej-55-PKB-3026952.html). Prudential remediation procedures as there were already crisis problems in 2011, 2012, the first threshold of 50% in prudential and remedial procedures was suspended. In 2013, it was liquidated. Currently, we have only two thresholds of 55% and 60%. It was justified so that the first threshold is not needed because it will be perfectly fulfilled in a stabilizing role. It is one thing that footnotes are really footnotes, and another thing is a value expressed mathematically, which cannot be omitted and has been abolished so that you can make larger expenses without restrictions. In 2020, the debt grows to a very high level. This is a very large range between one and the other methodology.
Results and discussion

Debt forecasts

Figure 4 shows the debt forecast for the years 2020-2023.

![GG debt forecasts (Strategy 2020-2023)](chart4)

Chart 4. Debt forecast 2020 – 2023

Figure 5 shows the debt forecast for the years 2021-2024.

![GG debt forecasts (Strategy 2021-2024)](chart5)

Chart 5. Debt forecasts 2021 – 2024

The pandemic has cast a shadow over our finances. The strategy prepared before the pandemic assumed that public debt would increase in nominal terms, but there would also be a significant decrease in relative terms to GDP. Debt will fall from 48.9 in 2018 to 42.8 – 2023. Why is this happening when we have a decline and the public debt is growing in 2023? An increasingly higher rate of economic growth in individual years has been assumed. Not because of the pandemic. The new strategy was updated and pandemics were taken into account here. In 2023 we forecast a debt of 1200, in 2020 - 1384 billion. So we have an increase until the last year. Up to PLN 1650 billion. General government debt is calculated according to the Brussels methodology. In 2019 - 46.0 rises to 61.9 Above the EU limit it remains until 2023 and we are dealing with a slight decrease below the limit in 2024.

Figure 6 shows the structure of Treasury debt in terms of the place of issue.

![Chart 6. Structure of the debt of the state treasury – criterion of the place of issue](chart6)

From the chart above, we can see that we had high foreign public debt at the level of 87% to 13 domestic. This structure has changed over time under the influence of partial debt cancellation or repayment of debt that we made from funds borrowed on the domestic market, but also the financing of these annual deficits on the domestic market. In 2007, foreign debt accounted for only 23%. The debt should oscillate around 30%.

Foreign debt accounts for about 30% but this is the structure presented according to the issue of debt whether it is a country or a foreign one.

Foreign debt in 2017 was 50.9 and domestic debt was 49.1. In 2018, foreign debt accounted for 47.3 and domestic debt for 52.7. In 2019, foreign debt 41.4 and domestic debt 58.6. So we can see what change took place in the studied period.
Conclusions

The flexibility that took place in 2015 caused that there was an expenditure expansion in Poland, and this consequently led to the appearance of the "gluttony effect". In Poland, there was a high increase in GDP, but Poles spent more, which made Poles "overeat" this increase. In addition, we are glad that we have a high GDP, and in fact it is falsified by inflation. The pandemic has cast a shadow over our finances. The strategy prepared before the pandemic assumed that public debt would increase in nominal terms, but there would also be a significant decrease in relative terms to GDP.

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