SUGGESTING SOME INDICATORS FOR A BETTER MEASUREMENT OF PUBLIC DEBT SUSTAINABILITY

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Abstract: *Ensuring the sustainability of public debt is an extremely important element in the context of instability and the conjectural or structural vulnerability of the economies of the world and of our country. The article proposes a theoretical and applicative analysis on the improvement of public debt sustainability analysis tools, through a series of indicators, for countries with unrestricted access to international capital markets, starting from the framework developed by the International Monetary Fund. These indicators aim at completing the image of the public debt sustainability analysis based on the International Monetary Fund model and implicitly the International Monetary Fund indicators. Without claiming to provide a perfect picture, the proposed indicators are meant to improve the content and usefulness of the public debt sustainability analysis of countries with unrestricted access to international capital markets (including Romania) as a desirable complement to the International Monetary Fund methodology.*

Key words: *public debt, sustainability, indicators, Romania*.
JEL Classification: *H63, O23, E63.*

1. Introduction

According to the International Monetary Fund (IMF) analysis of the debt sustainability framework reformulated in 2011, when debt service issues arise (eg. maturity issues, volatility of the interest rate or the denomination of debt), it is realizing an analysis of the impact of these issues (eg. through stress tests and forecasts of government financing needs, baseline scenarios, alternative scenarios, etc.) and attempts to stabilize public debt. However, the analysis of public debt sustainability is a delicate issue that involves, in addition to analyzing indicators of public debt (example, a strong standardized analysis) also qualitative aspects regarding: the economic, political and institutional characteristics of the country under review, the economic and regional policy context, fiscal or monetary policy to be adopted by the government or the monetary authority etc. The article aims to treat the sustainability of public debt only in countries, according to IMF criteria, identified as "market-access" (MACs), more exactly, with unrestricted access to international capital markets, as opposed to countries that mainly receive external financing, from concession sources (low income countries - LICs).

According to the IMF, the debt sustainability analysis is looking at the analysis of a country's ability to finance its macroeconomic policy objectives under the condition that public debt management is carried out without major adjustments.

By deepening the issue of public debt sustainability, the article aims to contribute to improving the coordination of macroeconomic policies (especially fiscal-budgetary policy) and to the best possible respect for the short, medium and long-term commitments assumed by MACs (including Romania) on public debt financing. Thus, the article attempts to make a series of proposals and suggestions for widening the area of tools for analyzing the sustainability of public debt.

According to the IMF framework, debt sustainability analysis in MAC and LIC countries combines a series of solvency and sustainability indicators. It also takes into account the trajectory, debt level and financing needs according to scenarios (standardized but also individualized according to the characteristics of the analyzed economy). For MACs, the IMF debt sentiment analysis takes into account both the realism of the formulated hypotheses and the market perception of the state as well as the risks arising from the debt profile. But the framework also takes into account the specific features of a

country and the debt-specific elements, the history of the evolution of public debt, as well as the changes in the economic and financial environment of the country, the region and the world as a whole. It should be noted that, according to the IMF, for the MAC countries, public debt covers only the public debt without the guaranteed public debt. At the same time, it is worth mentioning that in the context of increasingly advanced globalization, which "exports" and mixes realities, but also the acute need for modernization, it can be considered that the IMF should flatter as much as possible the differentiated assessments between the MAC countries and the LIC, but also between advanced and emerging economies, using rather common indicators and thresholds.

According to the framework formulated, the IMF aims: to assess the current public debt position, maturity, structure and possible indexing of the debt, to pursue the status of exchange rate regime (floating or fixed), to identify vulnerabilities related to the public debt structure and prevent possible payment difficulties, and if payment difficulties appear, to make alternative scenarios of debt stabilization. Therefore, the analysis starts with a baseline scenario and with macroeconomic variables and projections that incorporate government policy targets, with clearly established assumptions and factors, including alternative scenarios, then to apply some sensitivity tests to the baseline scenario, providing a higher margin for debt dynamics. In the case of alternative scenarios, there are taking into consideration either the assumption of a steady primary balance or historical developments, or the hypothesis of shocks on contingent liabilities. Also, in the case of stress tests, it is being analyzed the evolution of the gross nominal government debt to the shock of increasing: real economic growth or the real exchange rate or the real interest rate or all of these elements combined.

The directions of government debt ratios, both under the baseline scenario and the stress tests, can provide valuable insights on a country's vulnerabilities to a possible payment crisis.

However, in addition to liquidity risks and debt roll-over risks reflected by debt ratios such as the gross financing needs-to-GDP ratios and indicators that reflect the vulnerability of the debt profile, other indicators could be considered necessary in order to facilitate some conclusions drawing and ease decision-making process. For example, it could prove useful the indicators that may relate to the evolution of the public budget balance (which is relatively limited in IMF analysis), such as indebtedness, financial stability, financial autonomy, global solvency, patrimonial solvency, etc. These indicators could complete or at least can contribute to the image of public debt sustainability.

2. Literature review

The most important part of the profile literature deals with the effects of the leverage on economic growth, for example Krugman (1988) states that a high indebtedness reduces the supply of new credits to the economy and acts as a marginal tax on investment, creating fear that (public) debt growth will be reflected in higher corporate taxes. Also, the state, in order to diminish the debt service, will significantly reduce its government investment. Also, regarding the impact of debt on the economy, according to Borio and Disyatat (2011) and Rey (2015), the capital flows from which the debt is constituted are more likely to generate spectacular credit growth than other types of flows.

If we think in reverse, on the implications of economic growth and other macroeconomic variables on debt, most studies deals with determinants of debt crises depending on income, being analyzed mainly samples of middle-income countries (MIC), composite samples made of medium and low income countries (MIC and LIC), and very few studies focus only on low income countries (LIC), as in Kraay and Nehru (2006). Equally, the literature shows that the probability of a debt crisis is positively associated

with high levels of total debt, with a higher share of borrowing on short term and is negatively correlated with the rate of GDP growth (especially in countries low income LIC, example in the studies of Pattillo, Poirson and Ricci, 2002) and with the level of international reserves. From the perspective of structural variables, the default of debt is related to persistent fluctuations in production, income inequality, a discouraging business climate, a limited trade opening, weak institutions, unclear regulations and history on the unpaid debt. According to Easterly (2001), the collapse of economic growth plays an important role in triggering the debt crisis in LIC countries.

In order to develop an optimal debt policy, the composition of debt is extremely important. According to Drazen (1998), the manner in which debt is expressed (the composition of debt) can be an important element of debt stimulation / blocking, for example whether internal or external indebtedness can have serious implications for probability of default. Also, according to De Groot, Holm-Hadulla and Leiner-Killinger (2015), when government spending is higher than the government's expectations, the payment of interest on the debt should be structured to such an extent that it is kept at a lower level. In addition, the higher interest rate on external borrowing, especially for emerging economies, may be a serious source of financial stress (Eichengreen and Hausmann, 2002). Therefore, reducing debt service costs can be seen as an important factor in minimizing vulnerabilities and financial risks (Debrun and Kinda, 2016).

In many studies (such as Allen et al., 2002 and Abbas et al., 2014), the sovereign debt structure is interpreted in a holistic manner in which maturity and currency composition of debt are important elements (early warning indicators) to prevent the occurrence of crisis.

Thus, the currency in which the external public debt is expressed can have a considerable impact on the economy that is borrowing. The US dollar plays a predominant role in financing world economies. Thus, according to Bruno and Shin (2015), a depreciation / appreciation of the US dollar against a national currency may lead to ease / tightening financial conditions in the borrowed country. At the same time, in order to improve the structure of indebtedness instruments and macroeconomic shocks, Pienkowski (2017) notes that in low-income countries a beneficial factor may be the issuance of local currency debt (to save the economy from a series of direct potential effects of the of high exchange rate volatility), while in advanced economies the debt limit can be increased by bond issuance that allows an indexing according to GDP developments, implicitly stabilizing the debt-to-GDP ratio. In this respect, for a better debt management, a number of authors (e.g. Barro, 1995, Chamon and Mauro, 2005 and Benford et al., 2016) recognize the benefits of linking bonds with GDP developments, especially for advanced economies, in which public debt is high, interest rates are extremely low, and prospects for more dynamic economic growth are low. However, as Pienkowski (2017) points out, countries within a monetary union can control to a lesser extent the nominal GDP developments, due to the single monetary policy and to the limited fiscal framework, which makes it less attractive to link bonds of GDP developments for better sovereign debt management.

Equally, the external public debt maturity can have a considerable impact on the economy in the sense that lower maturity favours lenders and less borrowers (the inability of rolling the credit), while longer maturities are more beneficial to borrowers (Gruić, Hattori and Wooldridge, 2014), and the latter can mitigate the impact of external shocks, but can also create the possibility of accumulation of imbalances over time (Blanchard and Missale, 1994).

Regarding the analysis of the sustainability of public debt, Cottarelli, C. and Moghadam, R. (2011) emphasize the need to update the fiscal policy analysis framework and public debt sustainability in the context of recent crises, highlighting those areas that

require methodological improvements, proposing a basic analysis, especially for discerning the risks.

According to the World Bank, the debt sustainability analysis is a tool used by the World Bank and the IMF to assist countries (especially low income countries - LICs) and focuses in particular on vulnerabilities caused by political, institutional and external shocks over a horizon the 20-year forecast of the debt burden. The European Commission works (2017) also discusses a series of challenges to the sustainability of public debt for all EU countries, alongside a synthesis of public debt sustainability and a series of fiscal sustainability indicators in order to achieve a horizontal perspective on the sustainability of debt.

A more focused approach on indebtedness indicators is found in the work of the International Organization of Supreme Audit Institutions (INTOSAI, 2010), which details three types of indicators: debt vulnerability, debt sustainability and financial indebtedness. In this paper, between the sustainability indicators can be highlighted: Fiscal Sustainability Indicators with Long-Term Restrictions (Bagnai, 2003), Sustainable fiscal position indicator (Croce and Juan-Ramón, 2003) Fiscal Consistency Indicator (Blanchard, 1990), Macro-adjusted primary deficit indicator (Talvi and Végh, 2000), Short term primary gap indicator, Buiter's Indicator (Buiter, 1985), but also Currency availability indicators (Calvo, Izquierdo and Talvi, 2003).

3. Methodology

The article starts in analysis from the use of the IMF conceptual framework, as well as from the use of data, studies and reports of: the European Commission, the World Bank, the National Bank of Romania, the National Institute of Statistics (INS), the Ministry of Public Finance of Romania, but also of the "Victor Slăvescu" Centre for Financial and Monetary Research. In order to complete the IMF methodology on the analysis of public debt sustainability, I have proposed and used a series of indicators such as: Overall Public Debt Rate (%) (OPDR), Public Financial Debt Rate (%) (PFDR), Financial Stability Indicator of the state depending on the outcome of the year or fiscal balance and debt (FSI), Global financial autonomy in relation to the fiscal balance (GFA), Long-term financial autonomy in relation to the fiscal balance (%) (LTFA), Financial leverage in relation to the fiscal balance (FL), Interest Rate Coverage (IRC), Overall public solvency (%) (OPS), Public Patrimony Solvency of the fiscal balance (%) (PPS), Gross public debt per capita (GPDcapita), Elasticity of Gross public debt in relation to the unemployment rate (Egpdur), Elasticity of Gross public debt in relation to state social insurance budget expenditures (Egpdssibe), Elasticity of Gross public debt in relation to unemployment insurance budget expenditures (Egpduibe), Elasticity of Gross public debt in relation to the Health Insurance Fund expenditures (Egpdhife).

Through the empirical approach, applying some of these indicators to the case of Romania, I was able to extract a series of important conclusions on the sustainability of public debt (also these results could be extrapolated, as far as there are available data, to other countries with unrestricted access to international capital markets - MACs).

4. Results

According to the IMF, for MAC countries, debt sustainability analysis (DSA) is grounded on a risk-based approach, with countries divided into two categories of analysis: *lower scrutiny and higher scrutiny*, thus ranked on the basis of access to funds and a set of indicators, including those of indebtedness. It is recalled that debt indicators, according to the IMF, are considered liquidity ratios and solvency indicators. For example, the stock of debt to repayment is considered as a solvency indicator, while debt service rate and gross

financing needs reflect potential liquidity problems. In general, with differentiated thresholds if they belong to emerging or advanced economies, or to the lower scrutiny or higher scrutiny frameworks, the indicators used in the DSA under the IMF framework are: Public debt level (% of GDP), Public gross financing needs (% of GDP), Three year cumulative primary balance adjustment (% of GDP), Coefficient of variation of growth, Bond yield spreads (base points), External financing requirement (% of GDP), Public debt held by non-residents (share of total), Public debt in foreign currency (share of total), Annual change in the share of short-term debt at original maturity.

It is worth mentioning that also the European Commission (EC) in its "Debt Sustainability Monitor" it carries out an assessment of fiscal sustainability, namely an analysis of the sustainability of public debt along with a series of fiscal sustainability indicators. In the view of this institution, the framework allows for a consistent horizontal but also in time (on short, medium and long-term) assessments of the challenges to fiscal sustainability. To capture short-term risks, the European Commission uses an S0 indicator that is a composite indicator based on 25 tax and financial variables that have proven useful on the basis of earlier developments in detecting tensions or stresses of a fiscal nature. In order to detect the medium-term challenges, the European Commission also uses, as the IMF, a public debt sustainability analysis (DSA), but also an S1 indicator to reveal the necessary additional adjustments to the public primary balance so that the public debt / GDP ratio (%) to reach 60% by 2031, including debt financing in order to cover the problem of aging. For example, according to the EC assessment, Romania has an analysis of the sustainability of the public debt which falls under a low risk, but the S1 indicator (and, within it, the initial budgetary position) places it at the level of the average risk among the European economies. Equally, the EC assesses long-term sustainability through an S2 indicator. This indicator reveals the initial primary balance adjustment to stabilize the debt / GDP ratio on an infinite horizon (also taking into account the aging of the population). One of the weaknesses of this indicator may be to indicate the stabilization of public debt at relatively high levels, undesirable in the situation of countries that already have a high indebtedness in relation to the Stability and Growth Pact (SGP). According to the Commission, regarding the S2 indicator, Romania can be assessed as registering a medium risk. At the same time, the EC, like the IMF, complements the analysis of public debt sustainability by analyzing the public debt structure (maturity, contracting currency and holders), public assets and contingent liabilities related to the banking sector. Without attempting to imitate the analysis of the European Commission and the IMF, I propose a series of indicators of public debt sustainability with regard to MAC countries, in order to complement the IMF methodology (Table no.1).

Table no. 1. Indicators of public indebtedness that could supplement the image of a DSA

Indicators	**Formula**
Overall Public Debt Rate (%) (OPDR)	Overall Public Debt Rate = Gross public debt *100/Total State Assets under the Consolidated Balance Sheet of Public Administration =GPD*100 /TA
Public Financial Debt Rate (%) (PFDR)	Public Financial Debt Rate = Gross public debt *100/Financial assets of the state according to the consolidated balance sheet of the public administration PFDR=GPD*100/FA
Financial Stability Indicator of the state depending on the outcome of the year or fiscal balance and debt (FSI)	Financial Stability Indicator = Long-term public debt *100/Fiscal balance and loans FSI=LTPD*100/(FB+L)

Global financial autonomy in relation to the fiscal balance (GFA)	Global financial autonomy =Public Debt/Fiscal Balance GFA=PD/FB
Long-term financial autonomy in relation to the fiscal balance (%) (LTFA)	Long-term financial autonomy = Long-term public debt *100/Fiscal Balance LTFA=LTPD*100/FB
Financial leverage in relation to the fiscal balance (FL)	Financial leverage in relation to the fiscal balance= Total State Assets /Fiscal Balance FL=TA/FB
Interest Rate Coverage (IRC)	Interest Rate Coverage = (Fiscal Balance + interest expense)/interest expense IRC=(FB+IE)/IE
Overall public solvency (%) (OPS)	Overall public solvency = Total State Assets under the Consolidated Balance Sheet of Public Administration*100/ Gross public debt OPS=TA*100/GPD
Public Patrimony Solvency of the fiscal balance (%) (PPS)	Public Patrimony Solvency = Fiscal Balance*100/ Total State Assets PPS=FB*100/TA
Gross public debt per capita (GPDcapita)	Gross public debt per capita = Gross public debt / number of inhabitants GPDcapita =GPD/NI
Elasticity of Gross public debt in relation to the unemployment rate (Egpdur)	Elasticity of Gross public debt in relation to the unemployment rate = the change in gross government debt to gross government debt in the first year of analysis divided by the change in the unemployment rate relative to the unemployment rate in the first year of analysis Egpdur =$(\Delta GPD/GPD_0)/(\Delta UR/UR_0)$
Elasticity of Gross public debt in relation to state social insurance budget expenditures (Egpdssibe)	Elasticity of Gross public debt in relation to state social insurance budget expenditures = the change in gross public debt relative to the gross public debt in the first year of analysis divided by the change in the state social insurance budget expenditures related to the social insurance budget expenditures in the first year of analysis Edpchbass=$(\Delta GPD/GPD_0)/(\Delta SSIBE/SSIBE_0)$
Elasticity of Gross public debt in relation to unemployment insurance budget expenditures (Egpduibe)	Elasticity of Gross public debt in relation to unemployment insurance budget expenditures = the change in gross government debt to gross government debt in the first year of analysis divided by the change in the unemployment insurance budget expenditures relative to the unemployment insurance budget expenditures in the first year of analysis Edpchbass=$(\Delta GPD/GPD_0)/(\Delta UIBE/UIBE_0)$
Elasticity of Gross public debt in relation to the Health Insurance Fund expenditures (Egpdhife)	Elasticity of Gross public debt in relation to the Health Insurance Fund expenditures = the change in gross government debt on a gross public debt in the first year of analysis divided by the change in the health insurance budget expenditures relative to the health insurance budget expenditures in the first year of analysis Edpchfass=$(\Delta GPD/GPD_0)/(\Delta HIBE/HIBE_0)$

Source: author's conception

Note: OPDR - expresses the extent to which state assets can contribute to public debt financing. An indicator of over 70% could indicate a higher vulnerability situation related to over-reliance on credit. PFDR - Expresses the extent to which state financial assets can contribute to public debt financing. FSI - Shows the long-term debt ratio in the fiscal balance or the difference between state revenues and expenditures (budget deficit or surplus) plus the bond issue. The indicator shows how to finance the primary balance from attracted sourses or own sources. GFA - highlights the proportion of total public debt financing through the fiscal balance, a decrease in the indicator reflects a strengthening of the self-financing capacity. LTFA - highlights the proportion of long-term public debt financing in the fiscal balance. FL- expresses the correlation between the financial structure and the fiscal balance. It is preferable to have the ratio between the two elements as high as possible. IRC - Expresses the potential ability of the state to cover interest charges. OPS - is the inverse of the public debt ratio and expresses the possibility of covering the gross public debt with assets. PPS - is the inverse of the financial leverage and expresses the possibility of

covering the fiscal balance by the total of the sources of financing. GDPcapita - may be an indicator of appreciation of the quality of life (especially in the medium and long term) in order to identify the importance of debt per capita. Egpdur - Expresses how much public debt is affected by the change in the unemployment rate. The report is analyzed in module, and if the absolute value of the elasticity is above 1, it is considered an elastic public debt. Egpdssibe - is a relationship between the change in gross public debt and the change in the state social insurance budget. Expresses how much public debt is affected by the change in state insurance budget expenditures. The report is analyzed in module, and if the absolute value of the elasticity is above 1, it is considered an elastic public debt. Egpduibe - expresses how much public debt is affected by the change in unemployment insurance budget expenditures. The report is analyzed in module, and if the absolute value of elasticity is above 1, it is considered an elastic public debt. Egpdhife - is a relationship between the percentage change in gross public debt and the percentage change in the health insurance fund's expenditure. Explain how much public debt is affected by the change in health insurance fund expenses. The report is analyzed in module, and if the absolute value of the elasticity is above 1, it is considered an elastic public debt.

We exemplify part of the indicators proposed for completing the ASD analysis on the case of Romania during the period (2011-2015 / 2016) (Table no. 2).

Table no. 2. Indicators of public indebtedness that could supplement the image of a DSA for Romania

	2011	**2012**	**2013**	**2014**	**2015**	**2016**
Overall Public Debt Rate (%) (OPDR)	26.0	29.1	30.4	31.7	31.2	-
Public Financial Debt Rate (%) (PFDR)	124.5	130.8	144.9	144.2	146.8	-
Global financial autonomy in relation to the fiscal balance (GFA)	-8.1	-15.2	-15.7	-21.6	-27.0	-16.3
Financial leverage in relation to the fiscal balance (FL)	-31.1	-52.1	-51.6	-68.3	-86.6	
Interest Rate Coverage (IRC)	-1.2	-0.4	-0.5	-0.2	-0.1	-0.8
Overall public solvency (%) (OPS)	384.7	343.3	328.9	315.6	320.3	-
Public Patrimony Solvency of the fiscal balance (%) (PPS)	-3.2	-1.9	-1.9	-1.5	-1.2	-
Gross public debt per capita (GPDcapita) (mil lei/mil persons)	9.5	11.1	12.4	13.6	14.1	15.1
Gross public debt elasticity in relation to the unemployment rate (Edprsom)	-	3.3	2.4	2.2	24.7	1.0
Elasticity of Gross public debt in relation to state social insurance budget expenditures (Egpdssibe)	-	12.7	3.9	2.1	0.7	1.4
Elasticity of Gross public debt in relation to unemployment insurance budget expenditures (Egpduibe)	-	0.9	4.2	0.7	0.2	0.3
Elasticity of Gross public debt in relation to the Health Insurance Fund expenditures (Egpdhife)	-	1.8	0.6	10.6	1.4	0.6

Source: author's conception and calculations, IMF data, Ministry of Finance and Internal Affairs (Financial Stance, 2016 edition).

5. Conclusions

The analysis of public debt sustainability is a delicate issue that involves, in addition to the analysis of public debt indicators also a series of qualitative analyzes to capture the peculiarities of the economies under review, but the IMF, through its analysis framework, provides an important milestone from the methodological point of view. The article aims, without detailed IMF methodology, to treat the sustainability of public debt only in countries identified as "market-access" (MACs) (according to IMF criteria), including Romania. The article proposes a series of indicators that do not repeat the IMF indicators but represent a step of deepening and supplementing IMF analysis.

Analyzing the results of the proposed indicators for Romania, we can find that:

- The overall public debt rate reflects a rather reserved public policy on recourse to credit, however, the tendency to increase the indicator without a real restructuring of the economy can not be interpreted positively;
- The public financial debt rate expresses the increasingly limited extent in which state financial assets can contribute to public debt financing during the review period, with an important increase in the indicator;
- The financial leverage in relation to the fiscal balance reflects the fact that the fiscal balance is in a permanent imbalance (giving the negative sign to the financial leverage), however the increase of the indicator can be positively interpreted by increasing the total assets of the state;
- Interest Rate Coverage also reflects the negative fiscal balance and expresses the potentially smaller capacity of the state to cover interest expenses;
- The overall public solvency expresses the relatively satisfactory possibility of covering gross debt with assets, but this indicator is also on a downward trend in 2011-2014;
- The public patrimony solvency of the fiscal balance expresses the possibility of covering the fiscal balance by the total of the sources of financing, the negative sign reflects the constantly unfavorable difference between state revenues and expenditures, but the reduction of the indicator shows the improvement of the situation, either by lowering the fiscal deficit or by increasing the state assets;
- Gross public debt per capita (GPDcapita) (mil lei/mil persons) shows an increase in indebtedness during the analysis period, which is all the more worrying as the number of inhabitants of Romania is forecast to decrease year-on-year;
- The elasticity of the gross public debt in relation to the unemployment rate proves over the analysis period to be above the unit value (expressed in module), a similar fact also found for the Elasticity of Gross public debt in relation to state social insurance budget expenditures, elements that call for an increased attention from the governors for the improvement of unemployment and of the state and state social insurance budget, as the values of the indicators show an influence of these elements on the evolution of the gross public debt.

In conclusion, Romania's public debt situation does not present elements that could cause significant concerns in the near future, but the IMF and European Commission (European Commission, 2017) forecasts an increase in public debt, including in relative terms (in terms of GDP) which requires a careful approach to the structural elements of public debt, as well as fiscal-budgetary policy.

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