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Measuring the Macroeconomic Performance of Public Finance Management

SUMMARY: In international practice, the performance of public finance management is usually assessed on the basis of quality indicators of the subsystems of the public finance system. The experts of the State Audit Office of Hungary have developed an evaluation system capable of measuring the performance of public finance management on the basis of quantitative indicators and quantifying the contribution of the factors that determine performance most. This article describes this system. It also shows how the assessment system was used to analyse the risks to the ongoing reduction of Hungarian public debt.

In the past decades, budgetary revenues in Hungary amounted to approximately 45% of the GDP, and budgetary expenditure was even higher. This means that the performance of the Hungarian economy is significantly influenced by the performance of public finance management. The ratio of redistribution in EU member states is between 35 and 60 percent, and it is high enough everywhere to have a significant impact on economic performance. It is similar in most countries around the world, as the role of the state has been increasing, with significant regional differences and with its extent fluctuating over time, since World War 2. Economists have been researching for decades how the performance of public finance

management can be measured and assessed. This article presents a method for measuring the macroeconomic performance of public finance management.

DEFINING THE TASK TO BE SOLVED

First of all, the concepts in the title need to be clarified, as they are defined in many different ways in literature. In this article we don't intend to describe these in detail, we just describe how we use these concepts, relying on internationally accepted definitions.

Public finances are *'processes with financial flow, where the movement of funds are regulated by bodies with public authority to perform public tasks and to meet public needs,*

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by centralising a significant part of the GDP and redistributing it through the subsystems of public finances. In public finances, the state imposes payment obligations to provide appropriate funds for the performance of public tasks and for meeting public needs' (Orosz, 2017).

By public finance management we mean the collection and use of public funds. According to a more detailed definition, *'public financial management practices are a collection of sufficient resources from the economy in an appropriate manner along with allocating and use of these resources efficiently and effectively. The practices include resource generation, resource allocation, and expenditure and resource utilization'* (Fung, 2012).

In corporate management, financial performance means whether the company has achieved or is achieving its financial goals. In a broader sense it means that the organisation is financially healthy, for example it has a steady stream of liquidity, the maturity profile of its assets and that of its liabilities are consistent, and the extent of its indebtedness is safe when compared to its own resources. Basically the performance of public finance management can be approached from the same aspect, where you consider both the achievement of the public finance goals that have been set and the balance of public finances.

Public finance management takes place on several levels: at institutions, at local governments, at the ministries and at government level. The performance of public finance management can be assessed at all levels. The method described in the article is basically meant to measure government-level performance, i.e. to measure and assess whether macroeconomic objectives in public finances have been achieved and whether public finances can be considered healthy (e.g. balanced, less vulnerable) on a macroeconomic level.

INTERNATIONAL EXPERIENCE IN THE MEASUREMENT OF THE PERFORMANCE OF PUBLIC FINANCE MANAGEMENT

International organisations have developed several methodologies and frameworks for the assessment of the performance of public finance management. The primary aim of these was to strengthen the public finance management system of the countries they financially supported (with aids, soft loans). It became obvious that these countries can only use this support properly if the state manages (public) funds in a responsible manner at all levels. The so-called diagnostic review systems that were developed to expose the weak points of public finance management. The first such system was the *Public Expenditure Tracking Assessment* system developed by the International Monetary Fund and the World Bank. This system was mostly used to assess the public finance management performance of indebted countries. The system applied 16 indicators to track, primarily, whether the funds that became available after debt relief were used to alleviate poverty in the country concerned.

Several other systems were developed later. Some assess the performance of the whole public finance management, others assess only select aspects. It is not only the public finance management of developing countries that is assessed. A non-exhaustive list of such systems:

- the Fiscal Transparency Code of the IMF and the methodology to assess compliance,
- the World Bank's country financial accountability assessment system,
- the system the United Nations Development Programme (UNDP) developed for the assessment of the transparency and accountability of countries.

Another system that assesses specific aspects of public finance management is the

Open Budget Survey operated by an NGO, the *International Budget Partnership*. The survey is conducted every second year about the transparency of the budgetary process, in approx. 100 countries, including Hungary. An analysis by the experts of the State Audit Office of Hungary published in March 2019 (Pulay et al., 2019) provides detailed information on the Open Budget Survey and the IMF's Fiscal Transparency Code.

A professional organisation, Public Expenditure and Financial Accountability (PEFA), was established by the Word Bank, the IMF, the European Commission and the competent ministries of the UK, France, Norway and Switzerland to measure the performance of public financial management, which published the *Public Financial Management Performance Measurement Framework* in 2005, and renewed it in 2011. The latter applies 28 indicators to measure the effectiveness of public financial management in 3 dimensions (PFM).

❶ PFM-out-turns: here there are 4 indicators to present direct results by comparing expenditure out-turn and revenue out-turn to the original approved budget, and by capturing the level of and changes in expenditure arrears.

❷ Key cross-cutting issues: these 6 indicators describe characteristics (e.g. transparency) that must be present in every phase of the budgetary cycle.

❸ Characteristics of the budget cycle: these 18 indicators describe the central budgetary cycle's key systems, processes and institutions.

In the present article we do not intend to provide a detailed description of the various methods for measuring the performance of public finance management. This brief overview was provided to show that in the international practice of the performance measurement of public finance management, the qualitative assessment of the specific subsystems' performance is dominant, which is supplemented by assessments based on qualitative indicators of partial performance.

QUANTIFIED MEASUREMENT OF THE PERFORMANCE OF PUBLIC FINANCE MANAGEMENT

Without calling into question the importance of the qualitative assessment of the performance of public finance management, we describe a method that uses quantified indicators to assess the macroeconomic performance of public finance management. (We intentionally use the term quantified indicator instead of quantitative indicator, as in several cases we tried to describe the qualitative characteristics of public finance management with quantified indicators.) First of all, we need a synthetic performance indicator that appropriately describes the complex performance of public finance management.

Is there a synthetic performance indicator for public finance management?

The assessment of the performance of the various activities within public finance management does not equal the measurement of actual performance. If you want to measure that, first you need to answer the question: what do you consider the macro-level performance of public finance management? Economics has several answers to this question. However, in Hungary the situation is clear, as the 'Public funds' section of the Fundamental Law of Hungary sets a rule the National Assembly must observe when it adopts the central budget. The so-called public debt rule set in sections 36 (4) and (5) of the Fundamental Law says that:

'(4) The National Assembly may not adopt an Act on the central budget as a result of which government debt would exceed half of the total gross domestic product.

(5) As long as government debt exceeds half of the total gross domestic product, the National Assembly may only adopt an Act on the central budget which provides for a reduction of the ratio of government debt to the total gross domestic product.'

According to the rule there is an indicator, namely the public debt to GDP ratio (public debt indicator), and the National Assembly is required by the Fundamental Law to decrease it every year. A cardinal law, Act CXCIV of 2011 on the Economic Stability of Hungary (hereinafter: Economic Stability Act) lays down the exact calculation method for the denominator and numerator of this indicator. Section 5 (1) of the Economic Stability Act unambiguously says that the reduction of the public debt indicator is an obligation also in the course of the execution of the budget, as it provides that *'(1) based on half-yearly data, the Government reviews the functioning of the debt rule, and informs the competent committee of the National Assembly and the Fiscal Council about the result. Upon the review, the Government puts forward a bill to the National Assembly to amend the act on the central budget if*

a) public debt on the last day of the reference year and/or the preliminary data on the GDP in the reference year, or

b) the public debt expected for the last day of the fiscal year based on public finances and macroeconomic processes and/or the predicted GDP of the fiscal year are different from the data provided for in the act on the central budget in such a way that it would lead to an increase of the public debt indicator.'[1]

Section 6 of the Economic Stability Act also strengthens the performance indicator-quality of the public debt indicator, as it provides that at the calculation of the numerator of the indicator, several factors over which the government has basically no control (the exchange rate of the Forint or when expenditures of the EU-funded programmes spent in the budget year are refunded by the EU in the next year only) must be disregarded.

One could ask whether defining an indicator and the obligation to improve that indicator in legal regulations at the highest level means, in itself, that the indicator is suitable for measuring the performance of public finance management. The answer is that one of the Maastricht criteria is also a requirement regarding the public debt to GDP ratio (it can't exceed 60%), which means that the public debt to GDP ratio is (also) a performance criterion for public finance management in every EU member state.

One could also suggest that public finance management has a relatively direct effect only on the numerator of the indicator, the denominator is unattached to public finance management. This, however, is not at all true. If we were to measure the performance of public finance management only through the change in public debt, measures that decrease budget deficit and through that public debt but curb GDP growth would seem like performance. This would not be appropriate, as a positive effect on GDP must be the aim both in collecting and using public funds.

Based on that, we use the public debt indicator as defined in the Economic Stability Act as the macro-level synthetic performance indicator for public finance management in Hungary. *Table 1* shows the evolution of this indicator since the introduction of the public debt rule.

The table shows that the value of the indicator has been improving since 2012. This means that public finance management has met the constitutional requirement of decreasing public debt for several years.

THE PUBLIC DEBT INDICATOR BETWEEN 2011 AND 2018

Year	Public debt indicator at the end of the year (%)
2011	80.8
2012	79.2
2013	77.7
2014	74.1
2015	73.9
2016	72.3
2017	71.9
2018	69.0

Source: final accounts acts 2012–2018

Naturally the public debt indicator has been influenced by several factors that are independent of public finance management, so effectiveness cannot be exclusively attributed to public finance management. For a more accurate assessment of the performance of public finance management, it is expedient to separate the key factors that influenced public debt indicator. The next section describes the method for this.

Decomposing the synthetic performance indicator for public finance management into factors using the value driver tree model

Corporate performance has been measured in the private sector for decades. In economics, it is universally accepted that, despite all potential problems, the performance of private sector companies is best expressed by the return on equity, as it is this indicator that the owners of the company want to improve. This is the indicator that has the most direct effect on the market (stock market) value of the company and on the dividends payable

to the owners. However, from a corporate performance management aspect, one of the major questions is how the specific factors of corporate management contributed to the improvement of this indicator. To be able to answer this question, *Tim Koller, Marc Goedhart and David Wessels* at the international consultancy company, McKinsey, developed the value driver tree model and published in their book, Valuation: Measuring and Managing the Value of Companies. *Figure 1* shows the structure of the model.

In the model, the analysis focuses on return on invested capital, which is then, at the first node, divided into two components that determine its value. From then on, groups of factors affecting the numerator and the denominator of the indicator can be analysed separately. At the second node, the key groups of factors directly affecting the numerator and the denominator are identified. At the third node, factors within the groups are identified. (Theoretically, the value driver tree can branch off even more times, but a 4th node would involve such a huge amount of elements that it would be difficult to manage.) Finally, you need to assign indicators to the factors

THE ORIGINAL VALUE DRIVER TREE MODEL
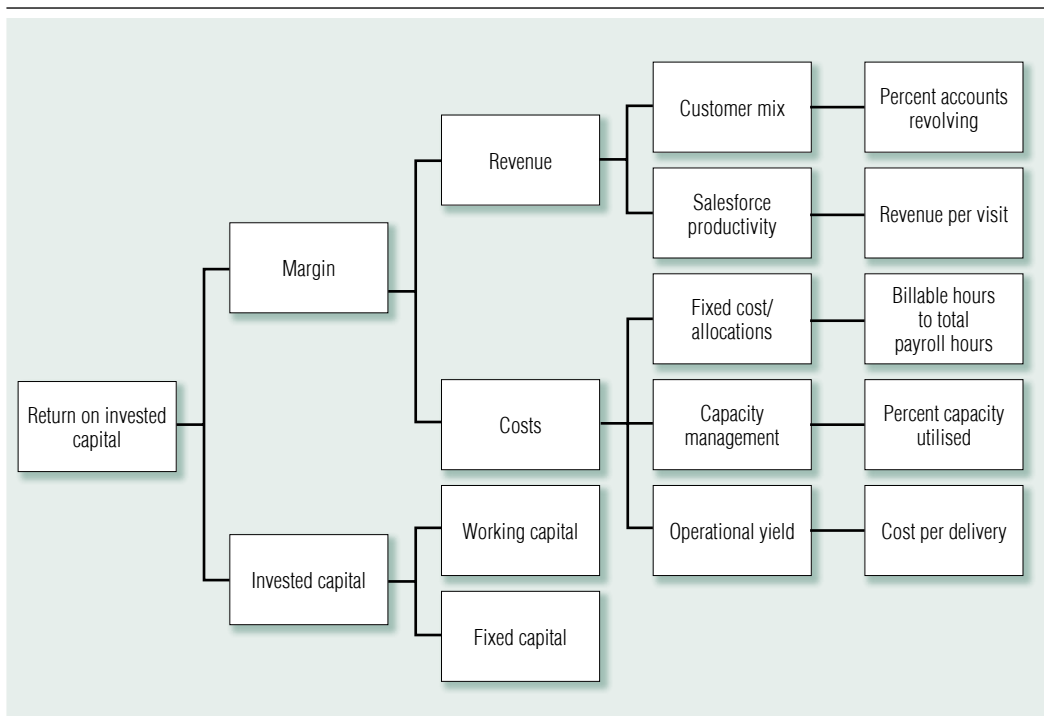
Source: Koller (1994) Figure 4

identified at the 3rd node that describe the evolution of the value of these factors well. You can see that in 3 steps (nodes), the model can identify the key factors affecting corporate performance and it can measure their effect on total performance.

Naturally it is important what principles you rely on when you decompose the components and groups of factors when applying this methodology. Mathematically, there are two ways to do this: to a ratio (product) or to a difference (sum). In the first case you take the *A/B*-type indicator and decompose it to *A* and $1/B$, or take the $A \times B$-type indicator and decompose it to *A* and *B*. In the second case you can use the $C = (A + B)$ or the $C = (A - B)$-type decomposition. In the figure, the *A/B* ratio is decomposed to A and $1/B$ at the first node, and A is decomposed to *(C − D)* and *B*

to $(B1 + B2)$ at the second node. This division cannot be done mechanically, though, you must always consider the economically meaningful relationship between the components, groups of factors and factors. The difference (or sum) should be used if the change in composition is important economically. The ratio (product) should be used if the change in intensity (how many Y factor units per X factor unit) is meaningful economically.

Several factors can be identified as a result of this decomposition. A mathematical model would use all of them. However, this model is meant to select the key *value drivers* that affect the synthetic performance indicator the most, and to measure their changes through the indicators assigned to the factors. The third node of Figure 1 shows only these factors. This means that based on the model, the

expert analysis identified 5 factors that require special attention. To this end, an indicator was assigned to each factor that expresses the evolution the given factor well.

When selecting the key value drivers, you must consider three aspects:
- the change in the factor must have a significant effect on the synthetic performance indicator,
- the organisation which performance is measured must be able to influence the change in this factor directly,
- there must be reliable data available for calculating the indicator that expresses the change in the factor.

The value driver tree model of the performance of public finance management

To create the value driver tree model of the performance of public finance management, we decomposed the public debt indicator at 3 levels: to components, groups of factors and factors. The first two nodes are shown in *Figure 2*.

You can see that at the first node we separated two components (the numerator and the denominator) of the public debt indicator, and at the second note we selected the groups of factors with the greatest influence on public

Figure 2

THE VALUE DRIVER TREE MODEL OF THE PERFORMANCE OF PUBLIC FINANCE MANAGEMENT
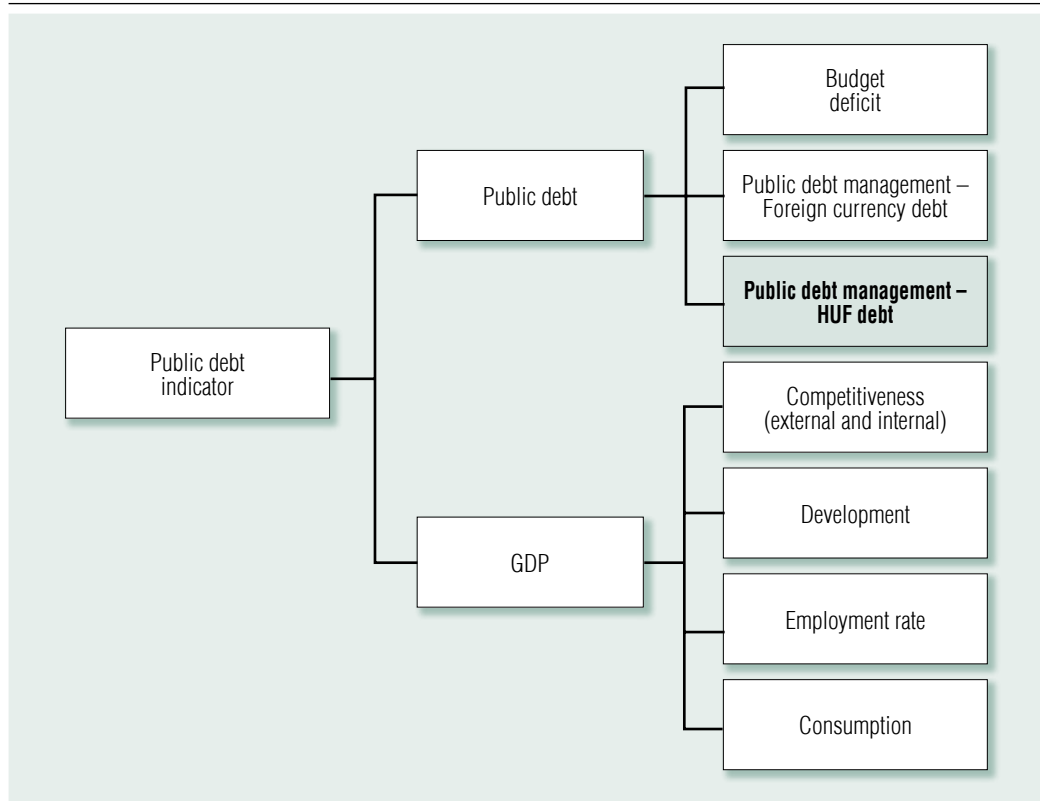
Source: edited by the authors

debt and GDP. The development of public debt is determined by two groups of factors, the first is the budget deficit in the given year, and the other is the change in the already existing public debt that does not appear in the budgetary deficit. As different techniques are needed to tackle foreign currency debt and HUF debt, debt management was divided into two groups of factors on this level already. The 3 key components of GDP are consumption, capital formation and net exports (the value of exports minus the value of imports). We used the group of factors of competitiveness to describe the latter, and the group of factors of development to describe capital formulation. There is a strong connection between the employment rate and GDP, so the group of factors of employment is also present in the model.

At the third node, the groups of factors are decomposed into factors. Here we didn't follow the logic of the value driver tree model used in the corporate environment. A novel element is that we differentiate between quantitative, qualitative and sustainability factors, since the performance of the national economy cannot be described by quantitative factors only.

We considered factors as quantitative if their change is directly and quantitatively reflected in public debt or in the GDP. Another characteristic of these factors is that they mostly have a short-term influence on the public debt indicator.

Qualitative factors have an indirect influence on the public debt indicator. These factors have a significant impact on the performance of their group of factors. However, their effect is usually visible in the medium term, not immediately.

Sustainability factors express the general framework conditions of the processes in their group of factors. Typically they affect long-term economic processes. Another characteristic of these factors is that the direction and extent of

their change have an impact on the evolution of qualitative and quantitative factors.

Table 2 shows the factors separated at the 3rd node of the value driver tree model and the indicators assigned to them. Sustainability factors are in bold, qualitative factors are in italics, and quantitative factors are in regular font.

In the selection of factors and their assigned indicators, we focused on fundamental logical and professional connections, and we also strived to use factors that are internationally used for the assessment of public finance management. To this end, we reviewed the indicator systems used for monitoring economic and budgetary processes developed by the European Commission, the UN and the OECD.

In 2011, the European Commission created an alert mechanism for the early detection of macroeconomic imbalances, which uses a scoreboard with 14 indicators. The scoreboard consists of macroeconomic and macro-level financial indicators. The scoreboard indicators have indicative thresholds. The thresholds are defined to pinpoint macroeconomic risks, taking the evolution of the indicators into consideration.[2]

From the indicators used by the Commission, we included the following in our model:
- change in export market shares,
- change in the net international investment position,[3]
- change in the current account balance, % of GDP,
- change in labour costs,
- change in the activity rate.

From the indicators developed by international and Hungarian organisations (e.g. OECD, the UN, the National Sustainable Development Council in Hungary) and research labs (e.g. National University of Public Services, Good State Research Lab)

Table 2

THE GROUPS OF FACTORS, FACTORS AND INDICATORS OF THE VALUE DRIVER TREE MODEL

Groups of factors	Factors	Indicators
Budget deficit	Centralisation of revenues	**Change in the rate of centralisation**
	Accrual based deficit	*The change of the government sector's deficit based on EU methodology as percentage of the GDP*
	Cash based deficit	Change in the primary budget balance as percentage of GDP
Public debt management – Foreign currency debt	Exchange rate exposure	**Change in the foreign currency debt to total debt ratio**
	Risk assessment	*Change in the premium of Eurobonds*
	Exchange rate sensitivity	Change in the exchange rate sensitivity
Public debt management – HUF debt	Long term financial viability	**Change in export market shares**
	Security of funding	*Change in the net international investment position*
	Security of funding	Change in the current account balance as percentage of GDP
Competitiveness (external and internal)	Competitiveness - exports	**Change in export market shares**
	Competitiveness - investments	*Change in the net international investment position*
	Competitiveness against imports	Change in the current account balance as percentage of GDP
	Competitiveness of the industry	**Change in the competitiveness of industrial production**
	Competitiveness of labour	*Change in labour costs*
	Dynamics of services	Change in the gross value added of services
Development	Enterprises' willingness to develop	**Change in corporate sector credit volume**
	Support to research and development	*Change in R&D expenditure as percentage of GDP*
	Increase in fixed capital formation	Change in gross fixed capital formation as percentage of GDP
Employment rate	Willingness to work	**Change in the activity rate**
	Flexibility of the labour market	*Change in long-term unemployment rate*
	Employment potential	Change in the employment rate
Consumption	Household wealth gain	**Change in the financial assets of households**
	Dynamics of the compensation of employees	*Change in gross real earnings*
	Household consumption	Change in household consumption expenditure

Source: edited by the authors

that are related to sustainable development and general economic development, we selected, according to the selection criteria, the following for our model:

- change in the primary budget balance as percentage of GDP,
- change in R&D expenditure as percentage of GDP,
- change in gross fixed capital formation,
- change in the employment rate,
- change in household consumption expenditure.

Additional indicators were selected taking the specificities of the Hungarian economic and budgetary system into account, naturally based on what direct or indirect effect they have on economic growth and on the public debt indicator. These indicators are the following:

- change in the rate of centralisation,
- the change of the government sector's deficit based on EU methodology as percentage of the GDP,
- change in the foreign currency debt to total debt ratio,
- change in the duration of HUF debt,
- change in the competitiveness of industrial production,
- change in the gross value added of services,
- change in the financial assets of households,
- change in gross real earnings.

The selected indicators represent time series data. This means we can't run the classical test of independence on them. The correlation between the values of the indicators (the covariance of the time series) can be examined with time series regression and by testing cointegration. Based on the result of the statistical testing, the correlations between the indicator pairs are not significant. Covariance occurred mostly in case of the 'change in the rate of centralisation' and the 'government sector's deficit based on EU methodology as percentage of the GDP' indicators, but its scale was not significant.

APPLYING THE VALUE DRIVER TREE MODEL OF THE PERFORMANCE OF PUBLIC FINANCE MANAGEMENT FOR RISK ANALYSIS

The model developed can be used for several purposes. First, it can be used to assess the performance of public finance management and its key factors over a given period. Second, based on past trends, the model can be used to estimate expected future changes as well. At the State Audit Office of Hungary (SAO) we developed and used the model to assess the risks of the sustainability of public debt reduction, relying on previous research and methodological development work in this field.

Experts at the Institute for Development and Methodology at the SAO (later: SAO Research Institute) developed a methodology for the analysis of the macroeconomic risks of the budget (see Báger, Pulay, 2008/a; Báger, Pulay, 2008/b; Báger, Galbács, Pulay, 2010; Pulay, 2011). The aim of this was to assess the risks of the government's macroeconomic projection on which the budget appropriation bill was based. The analysis using this methodology exposed the macroeconomic risks involved in the measures taken to achieve the target deficit in the bill. The methodology is based on the realisation that trend that started in the past will continue in the future, and it exposed these trends and quantified their future effects to point out risks. Every year the SAO provides its opinion whether the budget appropriation bill is well substantiated, so the methodology and the analyses using it were utilised in this process. The President of the SAO submitted the analyses assessing the macroeconomic risks of the 2008 and 2009 budget appropriation

bills to the National Assembly as well. Since 2009, the Fiscal Council has been responsible for assessing whether the budget appropriation bill is well-substantiated macroeconomically. The SAO writes analyses to support the Fiscal Council in this task. Several elements of the risk-based approach developed by the SAO's Research and Methodology Institute were incorporated in the methodology (State Audit Office of Hungary, 2014) the SAO has been using since 2014 to form its opinion on the budget appropriation bill.

The focus of the risk analysis shifted from the annual target deficit to the sustainability of the continuous reduction of the public debt indicator, partly because the budgetary situation in Hungary had changed considerably. Experts at the SAO's Research and Methodology Institute developed their macroeconomic risk assessment method in 2007, in a period when keeping the budget deficit under 3% of the GDP was an impossible task. Between 2002 and 2007, the annual average budget deficit was around 7% of the GDP in Hungary. The stabilisation of the budget started in 2010, and as a result, the budget deficit decreased to under 3% of the GDP in 2012 and stayed there persistently, i.e. the EU requirement regarding government sector deficit was met. An article by *Kolozsi* and his colleagues (Kolozsi, Lentner, Parragh, 2017) describes the fundamental differences in budget policy before and after 2010 and the resulting renewal of state finances. After 2013, meeting the target deficit is not enough a challenge to conduct a risk analysis just for that. Reducing state indebtedness permanently is a much more complex task with more inherent risks.

The shift in the focus of risk analysis was mostly prompted by the fact that since the adoption of the Fundamental Law of Hungary, it is not the target deficit of a given fiscal year (which is still important) that is the

main focus of public finance management, but compliance with the public debt rule. Moreover, this is not a target to achieve in a given year, the reduction of the public debt indicator is a requirement that must be met continuously as long as public debt is over 50% of the GDP. Consequently, the focus of the SAO's risk analysis also needed to be changed. The aim was to develop a methodology that can be used to explore and assess the risks in the continuous reduction of the public debt indicator. The next sections of the article describes this method and the findings of the risk analysis in which it was used.

Analysing the risks threatening sustainability

We classified risks into two larger groups:
- risks of unexpected future events,
- risks of the future escalation of ongoing (adverse[4]) processes.

Let's take a look at an example. The first risk group: your car that you have parked in the street in front of your house for years is stolen. The second risk group: as the car is parked outdoors, a corrosion process starts in the chassis. The car will be unsuitable for use eventually, but it is not yet clear when and exactly how this will happen. Both events incur serious damage when they occur and you need to take measures to prevent both. Even these measures might be similar. (E.g. you rent a garage and keep your car there.)

However, the approach you take when analysing the risks in these two groups is very different. In case of risks in the first group, you need to estimate the occurrence of unexpected events. As opposed to this, in case of risks in the second group, you assess the type (and likelihood) of the damage that may happen if processes that started in the past continue. Optimally, the two approaches of risk analysis

are synthetised, and the question what risks are involved if past (negative) processes continue and external conditions change (for the more dangerous) is also answered.

Risk analysis in the second group is called sustainability risk analysis, as it seeks to establish to what extent processes that started in the past threaten the future, i.e. the sustenance of the present achievements. (The analysis also shows how favourable processes that started in the past can help preserve and even improve achievements.) *Figures 3 and 4* show the different approaches of the two types of risk analysis.

Figure 4 reveals the similarities between performance analysis and the exploration of risks inherent in past processes. This is because a lack of performance is a risk for the future. For example if you study for only half of the test questions, you are twice as likely to fail compared to the case when you study for 75% of the questions (all else being equal). A lack of performance is obviously a factor that increases risk, and this is also true for economic processes.

The value driver tree model is a good framework for exploring the risks inherent in past processes, as it arranges the factors that affect the phenomenon examined in a logical system. Another advantage is that its structure with the nodes allows for the aggregation of risks detected in the factors at the last node at pervious nodes. In our analysis this meant that the risks measured at the factors were aggregated for the groups of factors, and then we could establish whether these risks occurred more in relation to public debt or to the GDP. As a final result, we could establish how many of the factors we examined in the context of the continuous reduction of the public debt indicator had a past trend that implied negative or positive risks for the future. We calculated the trends of the indicators assigned to the factors for the past 3 years, except for

the change of the export market share, here we considered the past 5 years.

However, another condition had to be created for the identification of the risk factors: we needed to define, for each factor, the extent of change in the indicators that we considered as a negative or positive risk. For most of the indicators we defined an extent of change: if it was exceeded in a negative direction, it was considered a negative risk, if it was exceeded in a favourable direction, it was considered a positive risk. If the extent of the change was between these two values, the factor was considered stable. (See *Table 3*)

In case of other factors, risk rating depended on several conditions, and the extent of the occurrence of negative and positive risks was not the same. Threshold values that indicate the negative and positive movement of these indicators are presented in *Table 4.*

When defining the threshold values in tables 3 and 4, we considered the following aspects:

- the evolution of the value of the indicators in the recent period,
- the average value and change of the factor assigned to the indicator over the past 10 years,
- the type and nature of the factor and the related indicator,
- the economic connection between the specific factors (e.g. the change in the financial assets of households and the change in the household consumption expenditure).

In the analysis of each factor, the risk factor was assessed according to the following assessment system:

- a factor was rated stable if the value of the indicator was between the upper and lower threshold defined in the table of criteria, or, in case of criteria that assess change, the value of the indicator did not change,

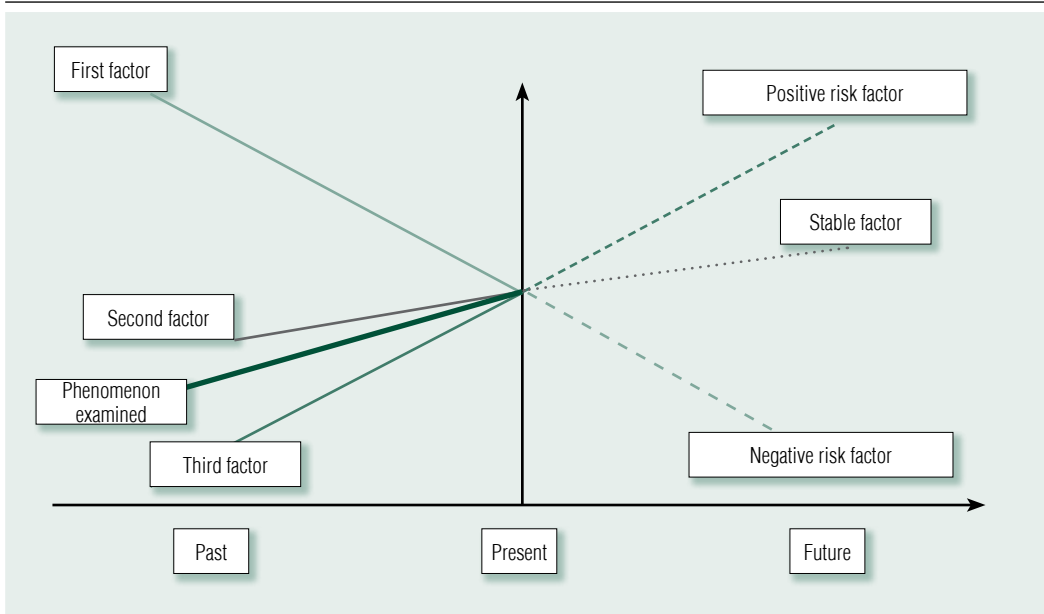## SCHEMATIC FIGURE OF THE ANALYSIS OF FUTURE UNEXPECTED RISKS
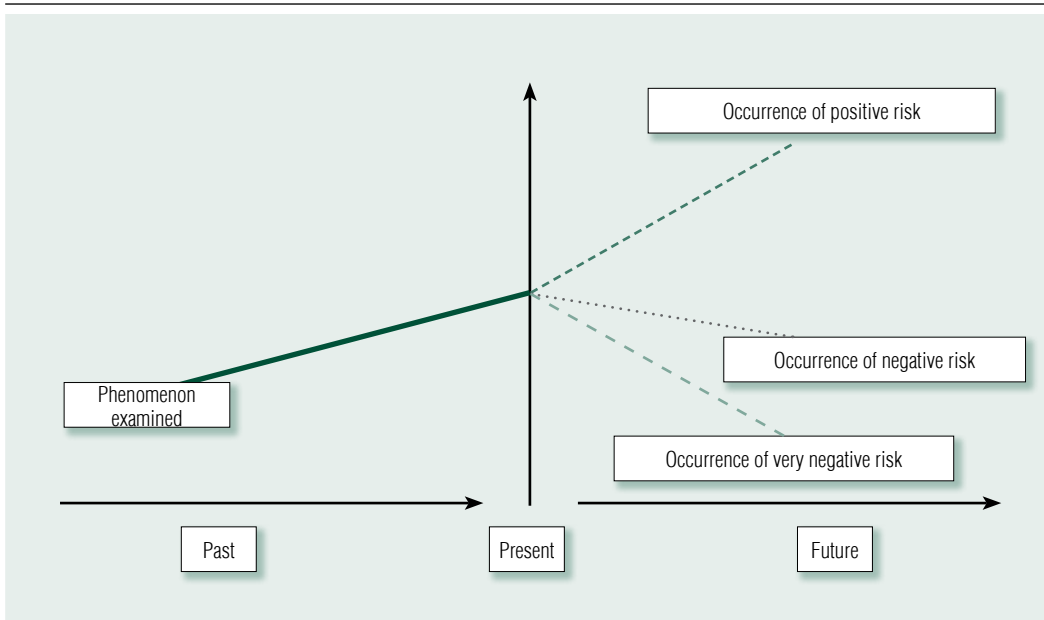
Source: edited by the authors

SCHEMATIC FIGURE OF THE RISK ANALYSIS PERFORMED BY DECOMPOSING THE PHENOMENON EXAMINED TO FACTORS

Source: edited by the authors

Table 3

THRESHOLDS IN THE RISK ASSESSMENT OF SOME INDICATORS

Indicator	Risk threshold
Change in the rate of centralisation	2.0 percentage points
Change of the government sector's deficit based on EU methodology as percentage of the GDP	0.5 percentage point
Change in the premium of Eurobonds	0.5 percentage point
Change in the exchange rate sensitivity	15.0 percentage points
Change in the duration of HUF debt	0.5 year
Change in interest expenditure as percentage of GDP	0.5 percentage point
Change in export market shares	3.0 percentage points
Change in the net international investment position	5.0 percentage points
Change in the current account balance as percentage of GDP	0.5 percentage point
Change in the competitiveness of industrial production	2.0 percentage points
Change in labour costs	5.0 percentage points
Change in the gross value added of services	0.3 percentage point

Source: calculated and edited by the authors

- a factor was rated positive if the indicator changed in a favourable direction and the extent of the change exceeded the set threshold, or if the change in the value of the indicator was in the positive direction as defined in the criteria,
- a factor was rated negative if the indicator changed in an unfavourable direction and the extent of the change exceeded the set threshold, or if the change in the value of the indicator was in the negative direction as defined in the criteria.

The risk rating of the groups of factors was based on the risk of the related factors, as follows:

- if the ratings of the quantitative, qualitative and sustainability factors were the same, the rating of the group of factors was the same,
- if the ratings of the quantitative and qualitative factors were the same and the rating of the sustainability factor was different, the group of factors was rated as the two similar ratings,
- if the ratings of the quantitative and qualitative factors were different, the rating of the group of factors was the same as the rating of the sustainability factor.

In case of the groups of factors of public debt and competitiveness, there was an additional rule, namely that we took the two qualitative, the two quantitative and the two sustainability factors into consideration in the overall assessment. Within the competitiveness group, internal and external competitiveness were also assessed separately, according to the same system that was used for the groups of factors.

The two first-level factors that determine the public debt indicator, i.e. public debt and GDP, were rated according to the rating of the groups of factors. Overall risk rating was

determined on a majority basis. For a positive rating for public debt and GDP, a stable rating for the groups of factors was not enough, there had to be a group of factors with a positive rating.

Overall result of the risk analysis

The rating of the factors and groups of factors is presented in *Table 5.*

In case of the two factors in the GROUP OF FACTORS OF THE BUDGET DEFICIT, the centralisation rate and the government sector's deficit based on EU methodology, there were no risks. However, the primary budget balance indicator's value indicates negative risk. The 2017 primary (cash based) budget balance was negative, because EU support was advanced from the central budget. This increased the budget deficit and thus public debt in the short term, but this increase is normally cancelled out when the EU funds are received.

In case of the factors in the TWO GROUPS OF FACTORS OF PUBLIC DEBT MANAGEMENT, no negative risks were detected. The decrease in the share of foreign currency debt was a positive risk, and so was the significant reduction in the fluctuation of the exchange rate of the HUF. Since 2018, yields have been increasing on the financial markets, and as this trend continues, it will increase interest expenditure related to public debt in the coming years.

Overall PUBLIC DEBT is rated stable in terms of risk, as from the 3 groups of factors 2 are rated stable and 1 is rated positive. Nominal public debt kept increasing, but the structure of public debt has become much more favourable from the aspect of vulnerability.

THE GROUP OF FACTORS OF EXTERNAL COMPETITIVENESS was rated positive, as a result of the current account surplus and the improving net international investment position. Overall, export market shares were stable.

The 3 factors of the GROUP OF FACTORS OF INTERNAL COMPETITIVENESS were rated differently. The change in the competitiveness of industrial production is rated stable, due to the fact that the growth in industrial production slowed down in 2016, and the increase in labour costs in the industry was not compensated by the increase in productivity in 2017, either, despite a dynamic increase in production. The dynamic growth of labour costs is a negative risk factor to competitiveness. The evolution of the gross value of services factor was rated positive, as its dynamics was increasing in the period concerned.

In case of the GROUP OF FACTORS OF DEVELOPMENT, dynamic corporate sector credit growth, with the parallel increase in corporate investment, was a positive risk factor. While it was rated stable, it is not favourable that the value of R&D expenditure as percentage of GDP did not change in the 2014-2017 period. The factor gross fixed capital formation as percentage of the GDP was significantly fluctuating in the period concerned and got an overall stable rating.

Indicators in the GROUP OF FACTORS OF EMPLOYMENT all indicate positive risks. The continuous increase of the employment rate contributes to GDP growth, the increase in the activity rate contributes to the sustainability of the process, and the decrease in long-term unemployment indicates that the structure of labour supply can adapt to the increasing demand.

Factors in the GROUP OF FACTORS OF CONSUMPTION were rated positive. Gross real wages, household consumption expenditure, and the value of the financial assets of households all continuously increased in the period concerned.

The continuous decrease of the public debt indicator was a result of the dynamic GDP growth in the period concerned, with a moderate increase in public debt. As 4 of the

Table 4

RISK ASSESSMENT CRITERIA DEFINED WITH SEVERAL CONDITIONS

Indicator	Threshold of negative risk	Threshold of positive risk
Change in the primary budget balance as percentage of GDP	Negative, or when positive, decrease is at least 0.5 percentage point	Positive, and growth is minimum 0.5 percentage point
Change in the foreign currency debt to total debt ratio	1.5 percentage points	The foreign currency debt ratio decreases by at least 1.5 percentage points and the gross interest expenditure to GDP ratio does not increase
Change in the 'divergence' of reference yields	The 10-year reference yield increases and the decrease is at least 0.3 percentage point	The 10-year reference yield decreases and growth is at least 0.3 percentage point
Change in corporate sector credit volume	Negative value	Growth rate is minimum 1% of the GDP
Change in R&D expenditure as percentage of GDP	Negative value	Growth is minimum 0.3 percentage point
Change in gross fixed capital formation as percentage of GDP	Negative value	Growth rate is at least 5 percentage points
Change in the activity rate	Negative value	Growth is minimum 1 percentage point
Change in long-term unemployment rate	Positive value	Decrease is at least 0.5 percentage point
Change in the employment rate	Negative value	Growth is minimum 1 percentage point
Change in the financial assets of households	Downward trend and household consumption expenditure does not increase	Upward trend and household consumption expenditure increases
Change in gross real earnings	Negative value	Growth is minimum 3 percentage points
Change in household consumption expenditure	Negative value	Growth rate is at least 3 percentage points

Source: calculated and edited by the authors

5 groups of factors that affect the GDP were rated positive, it indicates that the process that the debt burden on the economy is decreasing can continue in the mid-term and the long-term.

Based on the assessment of the processes of the specific factors, it can be established that the sustainable decrease of the public debt indicator is supported by 15 factors altogether. However, the two negative risk factors revealed, primary budget deficit and labour costs, need to be monitored and assessed in the future so that their effects can be handled in the mid-term as well.

THE RATING OF THE FACTORS AND GROUPS OF FACTORS

Group of factors - name	Group of factors - rating	Sustainability factor	Qualitative factor	Quantitative factor
Budget deficit	Stable	Stable	Stable	Negative
Public debt management – Foreign currency debt	Positive	Positive	Stable	Positive
Public debt management – HUF debt	Stable	Stable	Stable	Stable
Competitiveness – external	Positive	Stable	Positive	Positive
Competitiveness – internal	Stable	Stable	Negative	Positive
Development	Stable	Positive	Stable	Stable
Employment rate	Positive	Positive	Positive	Positive
Consumption	Positive	Positive	Positive	Positive

Source: Edited by the authors, based on Pulay, Simon, Nagy, Ördög, Fodor (2019) p 4

Examples for the assessment of the risk of specific factors

The present article mostly aims do describe the methodology we developed and its implementation in practice. Therefore from the 24 factors examined, we only present the analysis of 3, to show how the methodology works. We selected 3 factors, one with negative and one with positive risk, and a stable one. The complete analysis (Pulay, Simon, Nagy, Ördögh, Fodor, 2019) is available at the homepage of the SAO, and it can be downloaded from the address provided in the references.

Example 1: Change in the foreign currency debt to total debt ratio

As laid down in the debt management strategy, the gross foreign currency debt could not exceed 40% of the total debt in the 2014-2016 period. According to the 2017 strategic goal, the share of gross foreign currency debt must be decreased to below 25% and kept between 15 and 25%.

In the 2014-2017 period, the evolution of the foreign currency debt to total debt ratio was favourable, this value decreased continuously, which means the goal set in the debt management strategy was met. *Table 6* shows the foreign currency debt to total debt ratio, and the indicator calculated from the past 3 years.

Based on the value of the indicator, it can be established that the rate of the decrease is a positive risk factor. This is enhanced by the fact that the value of the indicator was similar in 2016 as well, and that the foreign currency debt to total debt ratio decreased further, by 1.6 percentage points, in 2018.

Example 2: Change in the 'divergence' of reference yields

The 10-year reference yield decreased from 3.6% in 2014 to 2.0% in 2017, and the 5-year reference yield decreased from 3.2% in 2014

FOREIGN CURRENCY DEBT TO TOTAL DEBT RATIO 2014–2017, THE VALUE OF THE INDICATOR IN 2017

Year	Foreign currency debt to total debt ratio (%)	Value (%) and rating of the indicator
2014	37.5	
2015	31.3	
2016	24.6	
2017	21.6	−5.3 positive risk factor

Source: Pulay, Simon, Nagy, Ördögh, Fodor (2019), p 17l

to 1.1% in 2017. This means the 'divergence' of the 10-year and 5-year reference yields (calculated from the values over the previous 3 years) increased from 0.4% in 2014 by 1.1 percentage point to 1.5% in 2016, then it decreased to 0.9% in 2017.

The change in the 'divergence' of reference yields also shows that in public finances in the 2014-2017 period, the savings on interest expenses was higher in mid-term debt financing than in long-term debt financing. However, it must be taken into account that long-term financing instruments provide more security for public finances. *Table 7* presents the 'divergence' of reference yields and the calculated value of the indicator.

In 2017, the value of the indicator was 0.2%, which means this factor is rated as stable.

The volatility of this factor is shown by the fact that the 10-year bond yield increased from 2.0% in 2017 to 3.6% in 2018 and the 5-year bond yield increased from 1.1% in 2017 to 2.3%, i.e. compared to the 2014 base year, mid-term yields decreased more dynamically than long-term yields.

Example 3: Change in labour costs

In the 2014-2017 period, there was an upward trend in labour costs. The rate of this growth was slower in 2014-2015, then it accelerated in 2016.

Table 8 presents the evolution of labour costs and the value of the indicator.

Based on the value of the indicator it can be established that this factor entails negative risk to economic growth. Moreover, the continuous increase in labour costs projects an increase in this risk, which is further substantiated by the approx. 10.0% increase in average wages in 2018.

In the 2016-2017 period, the increase in labour costs was mostly a result of increasing wages. Labour costs were also affected by a considerable demand for labour in the private sector, which further increased the upward trend in wages. This effect could be mitigated by the increase in the activity rate and employment rate only to a limited extent. In addition, the government decreased the contributions paid by employers and the inflation rate was low, which had a favourable effect on this factor.

Table 7

THE 'DIVERGENCE' OF REFERENCE YIELDS 2014-2017, THE VALUE OF THE INDICATOR IN 2017

Year	10-year reference yield (%)	5-year reference yield (%)	'Divergence' of reference yields (%)	Value (%) and rating of the indicator
2014	3.6	3.2	0.4	
2015	3.3	2.6	0.7	
2016	3.2	1.7	1.5	
2017	2.0	1.1	0.9	+0.2 stable factor

Source: Pulay, Simon, Nagy, Ördögh, Fodor (2019), p 19

Table 8

THE EVOLUTION LABOUR COSTS 2015-2017, THE VALUE OF THE INDICATOR IN 2017

Year	Evolution labour costs (%)	Value (%) and rating of the indicator
2015	+3.9	
2016	+4.9	
2017	+9.0	+5.9 negative risk factor

Source: Pulay, Simon, Nagy, Ördögh, Fodor (2019), p 26

SUMMARY

The public debt/GDP ratio is a suitable synthetic indicator for the macro-level performance of public finance management. However, it is expedient to identify the groups of factors and factors that contribute the most to the evolution of this indicator, and then these contributions need to be quantified. For this, the *value driver tree model*, developed to decompose corporate value creation to factors, can be adapted. The public finances performance assessment system based on this is also suitable for exploring and assessing the sustainability risks of public finance management. A practical implementation on 2015-2017 data revealed which factors pose positive and negative risks with regard to the continuous reduction of the public debt to GDP ratio.

Notes

[1] Since 2011, the share of foreign currency debt within public debt has decreased from 43.4% to 18.2%, so now there is no reason to use a methodology other than that of the EU for calculating public debt.

[2] European Commission: Alert Mechanism Report 2017 and Statistical Annex of Alert Mechanism Report 2017.; Occasional Papers: Scoreboard for the surveillance of macroeconomic imbalances

[3] Shows the net financial position of the domestic sector of the economy vis-à-vis the rest of the world (the difference between an economy's external financial assets and liabilities).

[4] It is in parentheses, because besides negative risks, there are also positive risks, when processes that started in the past bear fruit.

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