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MODELING OF THE UKRAINIAN TAX SYSTEM

The country's tax system is a key element in the economy of the country because it ensures its livelihood and acts as an instrument of influence on socio-economic processes. Taxes have a significant impact on the level of financial security in the country and contribute to the development of the financial system in terms of socio-economic stability of society, state, regions, businesses, and citizens.

In Ukraine, governmental spending has always exceeded revenues, but over the last 8 years, the deficit has been gradually reduced in 2014, it amounted to almost 5% of GDP, and in 2019 - only 2% [1]. In 2020, due to the pandemic and quarantine restrictions, the country's economic situation deteriorated somewhat, but in 2021 the positive dynamics of financial indicators were restored.

However, as a result of Russia's invasion of Ukraine on February 24, 2022, the country suffered significant destruction, which led to an economic downturn. Running businesses in some regions have become impossible, and in the consumer market, panic behavior increased significantly. The government has decided to introduce temporary restrictions and new tax reforms to support the economy and prevent panic. The system modeling method was used to create a generalized model of the Ukrainian tax system to analyze the consequences of the implementation of tax reforms and restrictions that were introduced to alleviate the tax burden during the war.

The model is based on the scheme of building public sector relationships, which is shown in Figure 1. Blue arrows are used to indicate a positive impact of one factor on another, while red - indicates the negative impact. Governmental revenue, spending, and budget deficit were key components in building the model, as they are the main economic indicators by which the success of fiscal policy can be assessed. The budget deficit is a key factor, the results of which determine the effectiveness of tax reforms. It is defined in the model as the difference between government revenue and spending.

The main types of taxes were identified as the main sources of tax revenue:

- personal income taxes and corporate profit taxes,
- rent on subsoil use,
- domestic taxes on goods and services (such as excise duty on imported goods, excise tax from the realization of excise goods by entities retail, VAT on domestically produced goods and services, VAT on imported goods and services)
- non-tax revenues.

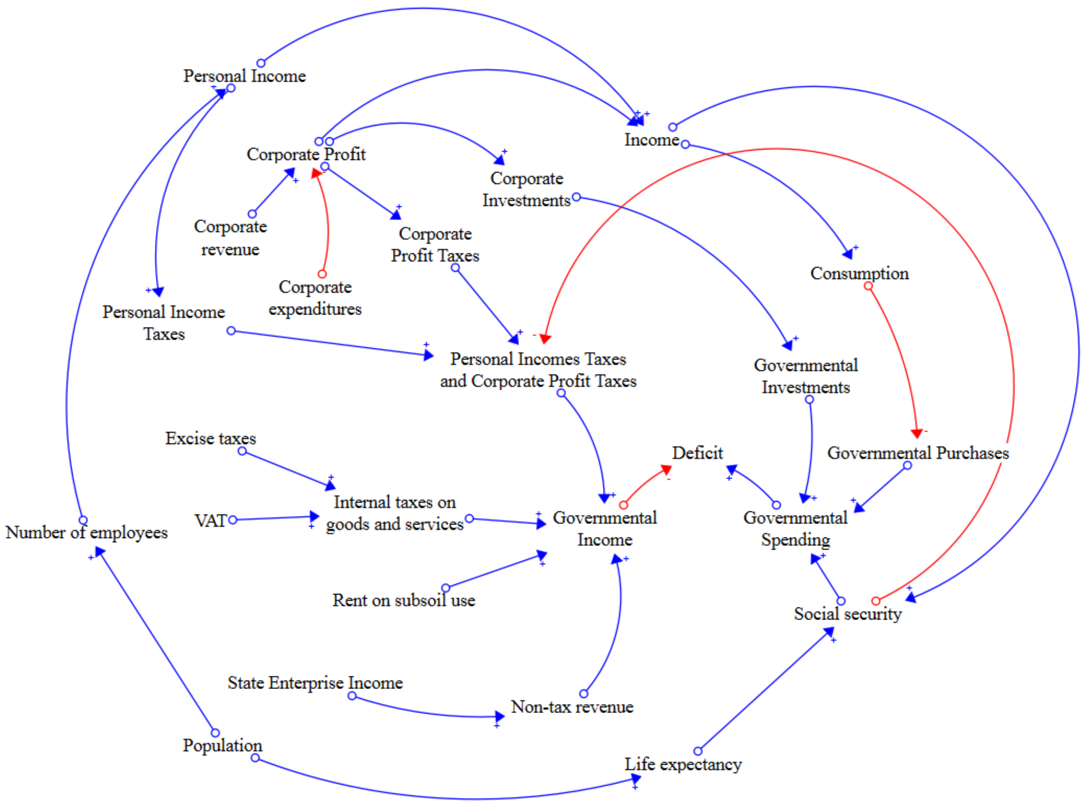

Figure 1. CLD

The logic of this distribution is based on the amount of revenue for each of these tax types in the budget revenues for 2021, and those indicators that occupied a small share were not taken into account to simplify the model. The amount of each type of tax revenue is calculated as the product of the nominal tax rate and tax base.

The approximation base for income taxes was the nominal wages and salaries of private entrepreneurs, for income taxes - the nominal profits of enterprises, taking into account their decline/growth due to dependence on consumption. All other variables that makeup budget revenues are exogenous and built on historical volumes in 2021 and their projected values are based on their growth rate in the past.

Among the budget expenditures, three main categories were identified:

• governmental investment,
• governmental purchases,
• social security.

The variables "Governmental investment" and "Governmental purchases" are endogenous and change in proportion to fluctuations in the volume of investment in the country and changes in aggregate demand, respectively. Social security depends on the average pension, which in turn depends on employees' income, its` growth rate, and the number of retirees. Therefore, the system was modeled taking into account the population dynamics of several social groups: children, the working age population, and pensioners.

During the simulation, the tax system behavior was considered in two scenarios:

1) a full-scale war has not begun, and the country's economy would continue to grow at the same pace as it was in the past,
2) the invasion took place and would continue until June-July 2022.

In the first scenario, the projected values were calculated according to past growth rates. The simulation results showed that in the case of a full-scale war, tax revenues would gradually increase, the budget deficit would decrease and by the beginning of 2025 this economic indicator would be equal to zero (Figure 2).

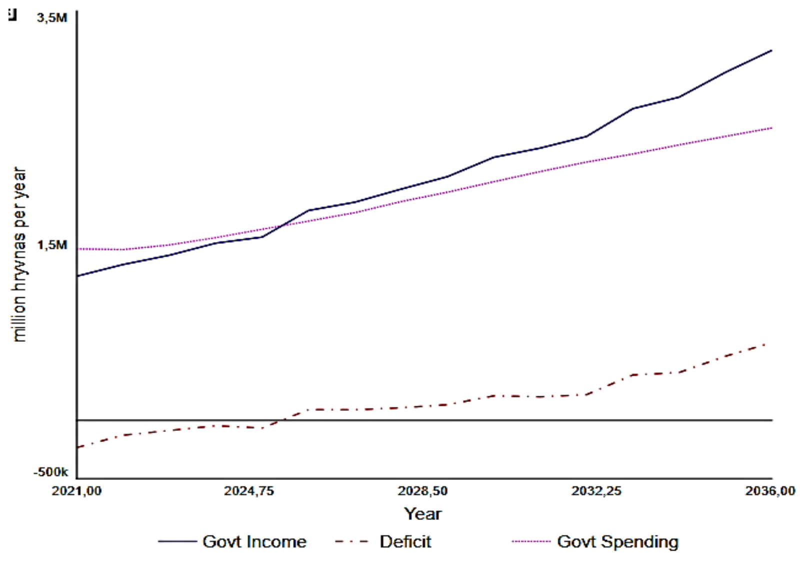

Figure 2. Deficit in the 1st scenario

To analyze the second scenario, the tax reforms introduced during the war were taken into account: the reduction of the VAT rate from 14% to 7% and the abolition of the single social tax for individual entrepreneurs [2]. According to opinion polls in March, the percentage of the population who were employed before the war and lost their jobs was equal to 53%, while in April it dropped to 46% [3]. Also, according to official sources, about 5 million Ukrainians went abroad as refugees and half of them – were of the working age. According to a poll, 90% of temporarily displaced Ukrainians plan to return to Ukraine after the war [4]. As the number of employees affects tax revenues, this information has been adapted to the model.

In addition, about 50% of Ukraine's natural resources are located in areas where active war is taking place, and according to tax reforms, their owners do not need to pay rent and fees for the use of other natural resources while martial law is in effect [5]. This was also taken into account in the second scenario of the model.

According to the simulation of the 2nd scenario, which takes into account the martial law, by the end of 2022 tax revenues will be significantly reduced, which also means a significant increase of the budget deficit to 326 thousand hryvnias, compared to 234 thousand in 2021 (Figure 3).

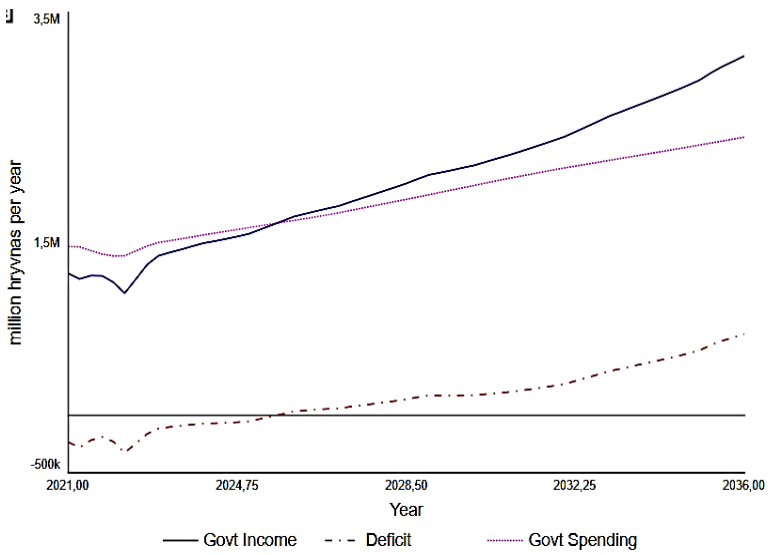

Figure 3. Deficit in the 2nd scenario

Also, in this case, the level of the deficit will reach zero only in the third quarter of 2025, which is slightly later than it is expected in scenario 1. Such a small difference is due to relatively positive expectations about the duration of the war and the amount of time needed to restore business processes. However, further research should consider a more negative scenario, as in this case, the budget deficit may increase much higher because of a lack of tax revenue, and the economic recovery will take much longer.

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PRODUCTION MODEL FOR AGRICULTURE SECTOR IN DONETSK AND LUHANSK REGION: SYSTEM DYNAMIC EVALUATION

Donetsk and Luhansk regions had an industrial-oriented economic structure and a big impact on the whole Ukrainian economy. However, the beginning of the war led to a reduction in the activity of enterprises and migration of the region's population. This led to a decrease in gross domestic product, investment, exports, and rising unemployment in the region. Until 2013, the share of Donetsk region in the GDP of Ukraine averaged about 12%, and Luhansk 4%. The war changed the situation - during 2014-2020 Donetsk region produced an average of 6% of GDP, for the Luhansk region only 1% of GDP.

The model “Dynamic Planning Model for Donetsk and Lugansk Regions” is performed by David Wheat and MAEX Group for Ministry of Economic Development and Ministry for Reintegration of the Temporarily Occupied Territories of Ukraine.