

## **MODELING OF SHADOW WAGES FORMATION**

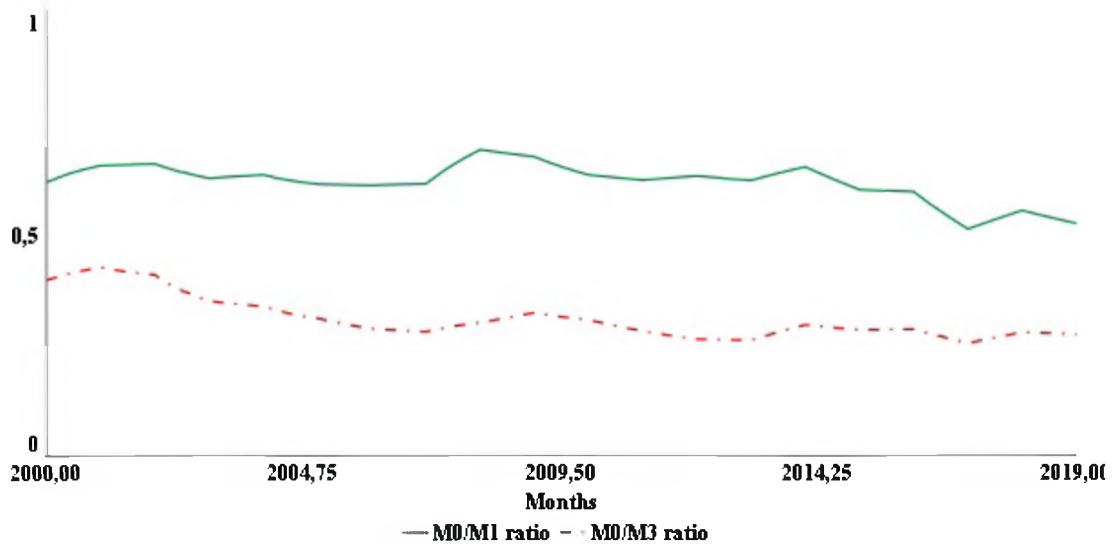
At the present stage of economic development, Ukraine is characterized by a high level of the shadow sector in the economy, which affects the effective functioning of all spheres and enhances the slowdown in economic growth. It plays a particular role in the effective functioning and regulation of the labor market through the high share of “black” and “gray” payroll schemes and tax evasion through the use of schemes with the creation of individual entrepreneurs [1]. The shadow economy has a particularly large impact on the efficient functioning of the labor market. The prerequisites for the emergence and functioning of the shadow component are ineffective legislation on the regulation of monetary transactions, which leads to the possibility of tax evasion through the use of schemes with the creation of individuals-entrepreneurs and artificially lowering the "white" share in the share of wages, as well as public distrust of social state guarantees. In this regard, the pension fund receives a smaller share of taxes, which causes a low level of retirement benefits, as well as abolishes social guarantees for employees who receive wages in envelopes.

According to the multiple researches, almost 18% of all the shadow transactions are connected with payment of wages in envelopes, which causes lots of problems for the Ukrainian economy and deprives social security guarantees, which can lead to an effect on the loss of productive working-age population [4]. On the other hand, wages in envelopes help to keep people from moving abroad, which can be a good effect in the short run, but leads to the distrust of governmental institutions in the long run [2]. Before making the policy of enhancing the part of the wages paid in the envelopes, it is important to understand how this system works.

To invade their taxes, the enterprises pay officially the minimum wages to their employees, and as a result, both enterprises and employees pay fewer taxes than they would if they would be paid the full amount and show it in the income statements. According to the Ukrainian legislation, the amounts received on the banking cards should have a clear source, which results in cash payments in envelopes. The estimation of Cash in monetary aggregates in a data provided by National Bank of Ukraine shows that the ratio of M0 (cash) in a monetary aggregate M3 is lower in 2019 than in 2000 but still estimated as approximately 27% in a monetary mass, and approximately 52% in M1 monetary aggregate, which is represented on figure 1. Such a big amount of cash in the economy propels the shadow activity, and it is clear that shadow activity reinforces the use of cash.

After investigation of the main factors which influence the formation of shadow wages, such hypotheses were created:

1. The share of monetary aggregate M0 in the money supply has a positive effect on shadow flows.



**Figure 1. The dynamics of cash weight in monetary mass and M1 monetary aggregate**

Source: created by the author based on [1]

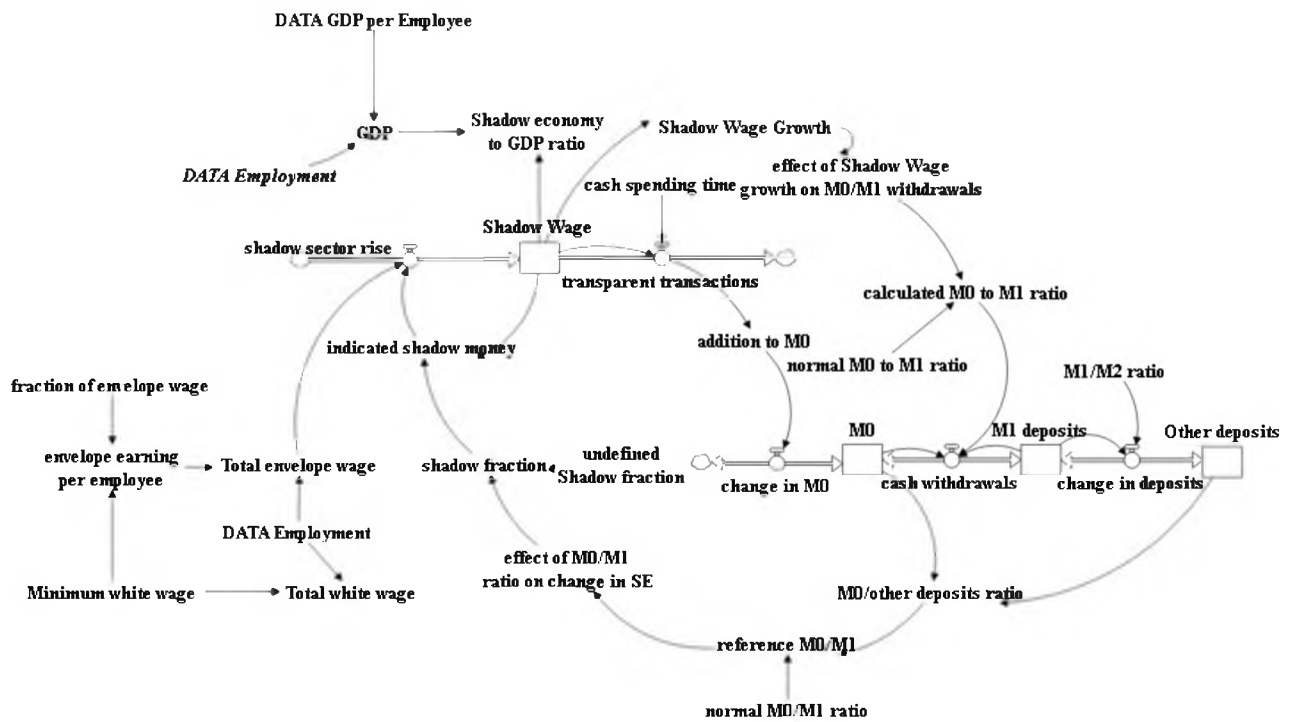
2. Increasing the accumulated value of the shadow salary positively contributes to the increase in the share of the monetary aggregate M0 in the money supply/

3. The total wage is calculated as the average on the labor market for such vacancies, thus the shadow wage is defined as the difference between the total and the "white" component.

4. The reduction of the share of shadow money received in the form of salary in envelopes is made by carrying out "white" transactions in cash.

Based on those hypotheses, the system dynamics model of shadow wage formation was created, the stock and flow diagram is represented in figure 2. The main stock in the model is Shadow Wage, which represents all the "envelope" money in the economy. When employees receive wages in envelopes, the shadow wages sector rises, but when they spend the money by consuming products or making payments for the services, the money comes back to the economy and can be calculated.

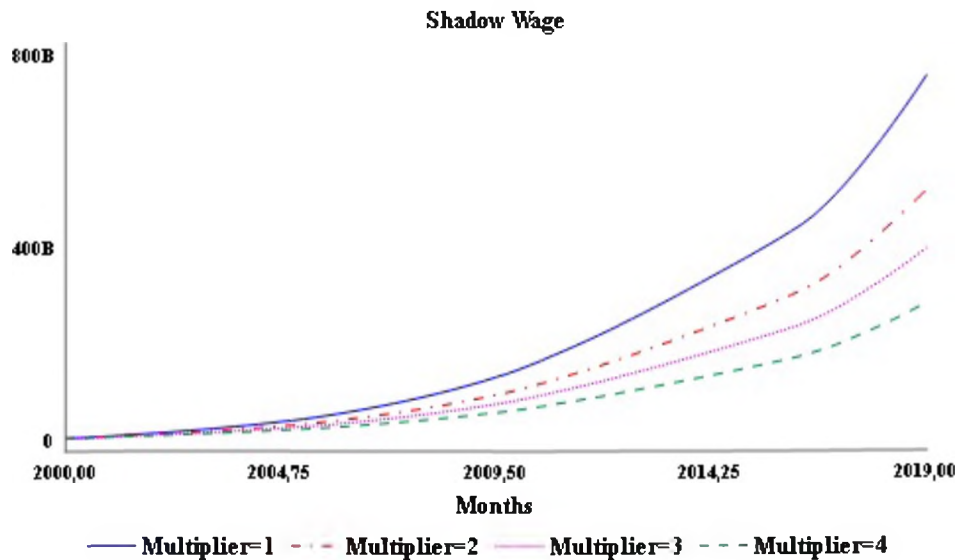
The growth of shadow wage influences the growth of cash share in a monetary aggregate M1, which leads to the change in M0/M1 ratio, because the scheme has the aim to keep the cash, and the higher amount of M0 in M3 stimulates the growth of shadow fraction. Total envelope wages were estimated as a difference between the average normal earning per employee and the minimum "white" wage [3].



**Figure 2. SFD of shadow wages formation in the economy**

Source: created by the author in Stella Architect Software

Based on the idea of the model, the higher minimum wage will eliminate the shadow wage part. On figure 3 it is shown that the increase in the minimum wage leads to the decrease of the shadow wage in the economy if the amount of the normal average wage will stay the same.



**Figure 3. The scenarios of shadow wage formation based on the share of “white” salary**

Source: created by the author in Stella Architect Software

Taking into consideration the threats connected with the rise of the shadow economy, the new effective legislation should be created to provide effective regulation of the salary payments and enforcing the entrepreneurs to pay their employees the worthy salaries, and the new policy also should be directed to decrease the amount of cash in the economy.

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## **ELECTRIC VEHICLES POPULARITY IN NORWAY**

It is an interesting question of why little Norway which has enough oil resources has a supportive policy to EV. Oil production has not changed in recent years, but resource scarcity in the future may lead to problems with the supply of gasoline to the market. The Norwegian government is also worried about the amount of carbon dioxide emissions into the air. So, it formulated a policy to increase electric cars in the country to 50,000 EV from 1990. Thus, electric vehicles became more economical for residents than ordinary cars because of tax and convenience purposes, but conventional cars did not disappear from the market.

All internal energy will be obtained through the use of hydroelectric power stations, so the decision to use electric vehicles was made by the government in 1990. Country's extensive charging infrastructure was funded by the government, but manufacturers began to finance such projects themselves in order to increase the inflow of business investment [1].