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INNOVATIONS IN ASSESSING THE EFFICIENCY OF THE INSTRUMENTS FOR THE NATIONAL ECONOMY DE-SHADOWING: THE STATE MANAGEMENT ASPECT

Abstract. *The article deals with the development of the methodology for improving the state policy of the national economy de-shadowing. It generalizes arguments and counterarguments within the framework of scientific discussion on the main instruments for the national economy de-shadowing. It has been established that tax instruments used for the state influence on the shadow economy allowed achieving a complex effect in all spheres of public life. The purpose of the article is to form an innovative methodology for assessing the efficiency of instruments for direct influence on business entities, which will allow adopting the deliberate management decisions by state authorities regarding the national economy de-shadowing. The systematization of literary sources and approaches to solving the problem of the national economy de-shadowing showed the lack of empirical calculation of the efficiency of tax instruments for the state regulation of the economy. The relevance of solving this scientific problem consists in the need to identify both the level of increase in the social contribution tax due to the salary de-shadowing and the implicit effect of increasing indirect taxes and savings. The problem considered in the article was solved by developing a methodological approach to assessing the efficiency of the instruments for the national economy de-shadowing based on the calculation of the probability of a decision on the application of a specific instrument, a posteriori probability of achieving a certain level of efficiency and fuzzy logic methods. The efficiency of public administration of the national economy de-shadowing was determined by the example of reducing the level of tax burden on the labour compensation fund in Ukraine. The study empirically confirms and theoretically proves the need for a systematic assessment of the level of the national economy de-shadowing, depending on the type of state influence instruments and their quantitative characteristics. The article proposes theoretical and methodological principles for the formation of the national economy de-shadowing strategy, depending on the efficiency of the state tax policy instruments. The results of the study may be used by state executive agencies in the field of tax regulation of the national economy.*

Keywords: efficiency, de-shadowing instruments, national economy, public administration, taxation level.

Introduction. Active state regulation of the economy, corruption, inequality of income, excessive desire for enrichment and illegal activity are the causes of the shadow economy worldwide. Its extent ranges from 60% in developing countries to 5% in developed countries. In response to the development of the shadow economy and its spread beyond the limits of the national economy, countries with the seven largest advanced economies in the world (G7), as well as state regulators within economic unions (EU), begin to create an institutional and regulatory framework for the fight against this phenomenon. Thus, since 1989, the international community has been actively fighting the shadow economy and money laundering through the Financial Action Task Force on Money (FATF) instruments aimed at introducing of anti-money laundering measures and principles at the international level. It should be noted that since 2016, the activities of all economic entities in the EU countries have been regulated by the Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, which clearly establishes

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the list of all illegal operations and the mechanism for their detection. Business entities that cooperate with companies from the EU are also subject to this directive.

It should be noted that the active fight against the shadow economy of international and national state management entities should not lead to the creation of such a regulatory framework that would prevent economic agents from developing their own activities as a result of significant costs of complying with legislative requirements. Thus, state executive agencies should adequately assess the national economy de-shadowing instruments through deliberate management decisions regarding the time and the extent of their application. Moreover, we note that the complexity of the state policy of the national economy de-shadowing consists in the fact that these instruments should be applied when the risks of the legalization of illicit incomes are insignificant. This increases the risk of undeliberate management decisions due to political and social risks.

It is fair to note that there is none methodological toolkit that would allow forming an effective strategy of the national economy de-shadowing. Thus, the development of the latest methodology for assessing the efficiency of state instruments for the national economy de-shadowing and the calculation of their explicit and implicit effect for economic agents becomes relevant. Given the deliberate use of a specific state instrument for the economy de-shadowing, taking into account the time and extent of its application, it is possible to achieve a significant reduction in the level of illegal activity and, in parallel, to intensify the processes of social and economic growth of the country.

Literature Review. Many scholars studied theoretical and practical aspects of the development of the shadow economy, the peculiarities of its evaluation and the mechanisms of minimization. The international scientific community pays the greatest attention to issues related to the peculiarities of the functioning of the shadow economy, the definition of its causes and the factors stimulating its spread, as well as the characteristic national features. Thus, Dilnot A. (1981), Gutmann P. (1985), Thomas J. (1992), Sutherland E. H. (1949), Ozerskyi I. V. (2005) studied the essence of the shadow economy, namely, the mechanisms for its functioning and formation.

Many scientific works deal with the main causes of the emergence and further increase of the shadow economy. We note that Simon J., Kaufmann D., and Zoido-Lobaton P. (1998b) follow the thought of anticipatory importance for unofficial economy corruption and public finances. Tensi V. (1983) studied the connection between the causes and effects of the shadow economy. The works of Shpytchuk R. M. (2009) and Koretska S. O. (2001) deal with the disclosure of the destructive effects of the shadow economy functioning.

Morris M. L. (1989) examines the national peculiarities of the shadow economy by the example of Senegal. Portes A., Sassen-Kub S. (2000) studied the regional features of the shadow economy, namely, the regularities of the development of the informal sector in the market economy of Western countries. Schneider F. (1997), in turn, dwells on the causes of the formation of the shadow economy in Western Europe. Numerous scientific works consider the processes of analytical assessment of the shadow economy. Thus, Schneider F. and Dominik E. (2000) investigated the triad of the shadow economy: Size, Causes, and Consequences, and established the causal relationships between these determinants. Another group of scholars, such as Smith P. (1994), Buehn A., Montenegro C.E. (2010), Bazylevych V., Mazur I. (2004), Lamanova T. (2000), Prylypko Yu.I. (2008), developed the proprietary methods and determined the size of the shadow economy in different countries worldwide. The work by Feige E. (1979) dealt with the solution of the tasks of assessing the size of the shadow economy, however, taking into account the numerous implicit factors. Lopatin O.K. (2008) and OGREBA S. (2001) use official explicit statistical indicators to assess the level of the shadow economy. Positive and negative features of applying the results of calculating the shadow economy are analysed in the studies of Tanzi V. (1999). Torgler B., Schneider F. (2007) developed significant works in the study of tax morale, governance, and institutional quality, along with the shadow economy. The legal regulation that was investigated in the

works of Cherniavskiy S. S., Nekrasov V. A., Tytko A.V. (2017) and Popovych V. M. (2001) is an important cluster of the study of the shadow economy and the identification of possible aspects of its legalization.

The development of the national economy de-shadowing instruments received particular attention in the scientific literature. Thus, the works of Prokopyk O. I. (2008), Mazur I. I. (2008) and Kirzhetskiy Yu. I. (2011) are devoted to the peculiarities of the use of the de-shadowing instruments depending on the level of development of the national economy. The most rational vectors of the national economy de-shadowing, in the conditions of its constant transformation and the necessity of compliance with the sustainable development, are investigated in works of Predborskiy V.A. (2005), Baranov S.O. (2015) and Bryginets O. O. (2014). Zadvornyyk S. S. (2014) and Skrypnyk A., Lytvynenko S. (2002) refer to specific instruments for the national economy de-shadowing. Thus, the first author defines the financial policy as the basis for the legalization of illegal income, while the second group of scientists focuses on the tax rate as a basic instrument. However, none of the scholars paid enough attention to the development of a toolkit for assessing the efficiency of instruments for state influence on shadow processes in the national economy.

Results. After having determined the leading role of international institutions in the processes of the national economy de-shadowing, it is fair to note that the FATF principles and the provisions of the EU Directives form only a general direction and requirements for the system of internal state management. Authorized executive agencies of each individual country should independently determine the concept of using one or another instrument for the national economy de-shadowing and form the appropriate legal and regulatory framework for their lawful use. We note that the process of choosing the instruments for the national economy de-shadowing should take into account: the scale of the risk of legalization of illicit proceeds, the cause of the shadow channel of accumulation of capital, the impact on the financial cycle of economic growth of the state, the vector of the instrument and its side effects. In the future, it is necessary to harmonize the strategy of the national economy de-shadowing with other types of state policy (monetary, currency, investment, etc.), as well as to establish the consistency or complexity of their application.

In view of the above, it is expedient to analyse the entire spectrum of instruments for the national economy de-shadowing and to determine the relevance of their application under the current conditions of development of the global and national economy. Thus, summarizing existing scientific developments (Baranov SO (2015), Mazur II (2008), Schneider F. and Dominik E. (2000)) that are associated with the instruments for the national economy de-shadowing, they can be grouped into five categories: 1) tax; 2) customs; 3) investment; 4) banking; 5) anti-corruption. Each of these groups has numerous instruments, which application depends both on the channel of the legalization of illegal proceeds and features of unlawful actions, and on the financial capabilities of the state administration, their institutional capacity and the stage of development of the national economy. Thus, dwelling in more detail, we note that tax instruments are tax rates, their number and the basis of accrual. The most influential tax instruments for de-shadowing are reducing social tax, speeding up the process of returning value added tax and introducing a tax amnesty. These instruments can be used in any period of economic development and do not require coordination with other state policies. Their only limitation is the financial capacity of the state, which manifests itself in reducing the revenue part of the budget. Thus, if the tax burden or tax assessment base is reduced, the first years will be marked by a clear reduction in budget revenues. Restoration of the volume of tax revenues to the budget by increasing the number of taxpayers and legalizing shadow flows will only occur over time. Thus, the interrelation with other state policies can be achieved through the activation of additional sources of filling the treasury, for example, the revitalization of the privatization policy. At the same time, tax instruments for the national economy de-shadowing have a complex effect, as they increase the economic activity of business entities and households by increasing their incomes.

In addition to the establishment of a fair value of goods and rates of duty, the customs instruments for the national economy de-shadowing also include the fight against smuggling. The smuggling may be reduced through the introduction of new technical equipment for scanning containers, as well as creating conditions for the good faith of customs officers to prevent the transportation of illegal goods. It should be noted that, apart from the fight against smuggling, which should take place continuously, other customs instruments for the economy de-shadowing depend on foreign trade policy, because it stimulates their emergence depending on the support of domestic or foreign producers.

Investment instruments for the economy de-shadowing include the amendment of national legislation on: 1) offshore zones, namely, increased monitoring of operations of national entities with companies registered in "tax harbours"; 2) stock market, namely, increased monitoring of transactions with promissory notes and savings certificates. The use of investment instruments for the national economy de-shadowing is a procedurally difficult task that requires a change in a large number of regulatory documents and may affect the national economic stability since in some countries more than 50% of foreign direct investment comes from offshore areas. The expected positive effect of the introduction of these instruments is manifested through a long period after a certain stagnation of the investment market. Thus, the use of investment instruments for the economy de-shadowing should strictly coincide with other state programs and be supported by deliberate calculations. The instruments preventing the use of banks for money laundering consist in creating a risk-oriented financial monitoring system both at the level of the central bank and at the level of commercial banks. The use of instruments to counteract the use of banks for money laundering is international in nature, subject to the provisions of the FATF, Basel 4 and EU directives. The policy of the central bank aimed at countering the use of banks for money laundering and terrorist financing is independent, but its effectiveness is manifested after a long period of time.

The anti-corruption instruments for the national economy de-shadowing include: 1) the enshrinement of the mechanism for the transparent tenders and the prevention of affiliations in business and politics at the legislative level; 2) the development of the institutional component of the executive branches through the independent and fair functioning of the anti-corruption court and anti-corruption bureau of investigations. The implementation of these instruments is the most complex state management task since it requires the adoption of a large number of laws and regulations, as well as changes in the existing system of economic and legal relations in the state. Thus, it is fair to note that the main step towards the efficiency of the national economy de-shadowing strategy is the development of a methodological approach to assessing the efficiency of state instruments for minimizing the level of the shadow economy. This will allow establishing the expected effect of the reforms being implemented and formulating a further strategy of state management, taking into account the specifics of the relations of economic agents. It is fair to note that among the instruments of national economy de-shadowing, tax instruments are, in our opinion, the most independent and complex ones. Thus, the relevant executive authorities have all means, including the necessary legislative base. In addition, we note that their implementation leads to a positive effect in all spheres of public life, due to increased free financial resources of business entities and households. Proceeding from this, we propose to develop a methodological approach to assessing the efficiency of the instruments for the national economy de-shadowing. The efficiency of the application of the social contribution tax rate for the Ukrainian economy de-shadowing was chosen as an example. The choice of this instrument for the national economy de-shadowing is determined by the fact that the social contribution tax rate ranged from 36.76% to 49.7% before 2015, depending on the class of professional risk of production. Since January 1, 2015, social tax contributions have been applied with a certain adjustment factor, provided that the employer fulfils the conditions. This enabled some economic entities to reduce their social tax contribution rate from 41% to 16.4%. Since 2016, a single social tax has been set for all taxpayers in the amount of 22%. Three different stages of using the tax instrument for the national economy de-shadowing will allow for a thorough study of its efficiency.

We have to consider each stage of the implementation of the proposed method in more detail. At the first stage, the probability that the national economy de-shadowing instrument will be effective provided that information on it is available to the population and business entities. For the implementation of this stage, it becomes necessary to characterize the efficiency of the de-shadowing instrument based on determining the set of binary variables (attributes) taking the value "1"/"0" ("1" – in the case of accessing the corresponding characteristic at the limit of the permissible values and "0" otherwise) (Table 1).

Table 1 – The dynamics of the binary indicators of the efficiency of the de-shadowing instrument (by the example of the social tax contribution rate in Ukraine)

Characteristic	Year					
	2012	2013	2014	2015	2016	2017
transparency of the process of regulatory formalization of the de-shadowing instrument	0	0	0	0	0	0
dissemination of information on the peculiarities of the implementation of the de-shadowing instrument and its expected effect	0	0	1	1	1	1
the historical aspect of using the appropriate de-shadowing instrument	0	0	0	0	1	1
the absence of a political risk of interfering with the activity of the executive agency, which applies the de-shadowing instrument	1	0	0	1	1	1
the availability of financial resources to control the compliance of economic agents with the requirements of the de-shadowing instrument being implemented	1	1	0	1	1	1

Sources: developed by the authors

The matrix containing zeros and units is an encoded information on the level of efficiency of the national economy de-shadowing instruments for each of these periods. It may be used to determine the probability ($p_B(H_{1t})$) that the applied de-shadowing instrument will be effective provided that information about it is available to the population and business entities (B) (Merenkova O. V. Koldovs'kyi V. V. (2007)). To determine the probability ($p_B(H_{1t})$) we first calculate the value b_k – the probability of the event $B_t = 0$, and g_t – the probability of the event $B_t = 1$, over each period of time (from 2012 to 2017) for all $k=5$ characteristics. After determining b_k and g_k , we calculate parameters (table 2):

$$\lambda_k = B_{kt} \cdot \ln \left(\frac{b_t(1-g_t)}{g_t(1-b_t)} \right) \quad (1)$$

$$\lambda_0 = \left| \ln \left(\frac{1-b_t}{1-g_t} \right) \right| \quad (2)$$

Table 2 – Interim calculations for assessing the probability that the de-shadowing instrument will be effective, provided that information about it is available to the population and business entities (by the example of the social contribution tax rate in Ukraine)

Year	Symbols										
	b_t	g_t	$\ln(1-b_t)/(1-g_t)$	λ_0	λ_k					L	$p(t)$
2012	0.6	0.4	-0.41	0.81	0.00	0.00	0.00	0.81	0.81	1.62	0.11636
2013	0.8	0.2	-1.39	2.77	0.00	0.00	0.00	0.00	2.77	2.77	0.01538
2014	0.8	0.2	-1.39	2.77	0.00	2.77	0.00	0.00	0.00	2.77	0.01538
2015	0.4	0.6	0.41	-0.81	0.00	-0.81	0.00	-0.81	-0.81	-2.43	0.88364
2016	0.2	0.8	1.39	-2.77	0.00	-2.77	-2.77	-2.77	-2.77	-11.09	0.99994
2017	0.2	0.8	1.39	-2.77	0.00	-2.77	-2.77	-2.77	-2.77	-11.09	0.99994

Sources: developed by the authors

Followed by determining the value L – integral index (weighted sum) of binary characteristics B and insert it in the general formula:

$$p_B(H_{1t}) = \frac{1}{1 + \exp\left(\ln\left(\frac{1-b_t}{1-g_t}\right) + L\right)} = \frac{1}{1 + \exp\left(\ln\left(\frac{1-b_t}{1-g_t}\right) + \sum_{k=1}^5 B_{kt} \cdot \ln\left(\frac{b_t(1-g_t)}{g_t(1-b_t)}\right)\right)} \quad (3)$$

At the second stage of the implementation of the proposed methodological approach, we consider the sequence of calculations of the probability that it will be decided on the use of the de-shadowing instrument in the t -period. It is necessary to use the formula to calculate the probability for each year of the specified time range from 2012 to 2017 (Dmytrov S. O., Merenkova O. V., Levchenko L. H., Medvid' T. A (2008)):

$$p_t = C_T^t \times \sum_{k=0}^{t-1} (-1)^k \times C_t^k \times \left(\frac{t-k}{T}\right)^T \quad (4)$$

where t – the period of decision-making on the application of the instrument for the national economy de-shadowing; T – duration of the state strategy for the introduction of a particular de-shadowing instrument; $k = 0 : (t - 1)$ – the period until the next decision on the implementation of the de-shadowing instrument; C_T^t , C_t^k – a number of combinations of t elements from the totality of T (respectively, combinations of k elements in the totality of t).

We assume the discount rate of 9% in 2012, 12% in 2013, 35% in 2014, 23% in 2016 and 24% in 2017. We will get the following calculations:

- the probability that in 2012 a decision will be taken on the use of the de-shadowing instrument:

$$p_1 = C_6^1 \cdot \sum_{k=0}^1 (-1)^k \cdot C_1^k \cdot \left(\frac{1-k}{6}\right)^6 = \frac{6!}{1!(6-1)!} \cdot \left((-1)^0 \cdot C_1^0 \cdot \left(\frac{1-0}{6}\right)^6\right) = 6 \cdot \left(\frac{1}{6}\right)^6 = \frac{1}{6^5} = 0,000129 \quad (5)$$

- the probability that in 2013 a decision will be made on the use of the de-shadowing instrument:

$$p_2 = C_6^2 \cdot \sum_{k=0}^{2-1} (-1)^k \cdot C_2^k \cdot \left(\frac{2-k}{6}\right)^6 = \frac{6!}{2!(6-2)!} \cdot \left((-1)^0 \cdot C_2^0 \cdot \left(\frac{2-0}{6}\right)^6 + (-1)^1 \cdot C_2^1 \cdot \left(\frac{2-1}{6}\right)^6\right) = 0,019933 \quad (6)$$

- the probability that in 2014 a decision will be made on the use of the de-shadowing instrument:

$$p_3 = C_6^3 \cdot \sum_{k=0}^{3-1} (-1)^k \cdot C_3^k \cdot \left(\frac{3-k}{6}\right)^6 = \frac{6!}{3!(6-3)!} \cdot \left((-1)^0 \cdot C_3^0 \cdot \left(\frac{3-0}{6}\right)^6 + (-1)^1 \cdot C_3^1 \cdot \left(\frac{3-1}{6}\right)^6 + (-1)^2 \cdot C_3^2 \cdot \left(\frac{3-2}{6}\right)^6\right) = 0,231481 \quad (7)$$

- the probability that in 2015 a decision will be made on the use of the de-shadowing instrument:

$$p_4 = C_6^4 \cdot \sum_{k=0}^{4-1} (-1)^k \cdot C_4^k \cdot \left(\frac{4-k}{6}\right)^6 = \frac{6!}{4!(6-4)!} \cdot \left((-1)^0 \cdot C_4^0 \cdot \left(\frac{4-0}{6}\right)^6 + (-1)^1 \cdot C_4^1 \cdot \left(\frac{4-1}{6}\right)^6 + \right. \\ \left. + (-1)^2 \cdot C_4^2 \cdot \left(\frac{4-2}{6}\right)^6 + (-1)^3 \cdot C_4^3 \cdot \left(\frac{4-3}{6}\right)^6 \right) =$$

$$= 0,502829 \quad (8)$$

– the probability that in 2016 a decision will be made on the use of the de-shadowing instrument:

$$p_5 = C_6^5 \cdot \sum_{k=0}^{5-1} (-1)^k \cdot C_5^k \cdot \left(\frac{5-k}{6}\right)^6 = \frac{6!}{5!(6-5)!} \cdot \left((-1)^0 \cdot C_5^0 \cdot \left(\frac{5-0}{6}\right)^6 + (-1)^1 \cdot C_5^1 \cdot \left(\frac{5-1}{6}\right)^6 + \right. \\ \left. + (-1)^2 \cdot C_5^2 \cdot \left(\frac{5-2}{6}\right)^6 + (-1)^3 \cdot C_5^3 \cdot \left(\frac{5-3}{6}\right)^6 + \right. \\ \left. + (-1)^4 \cdot C_5^4 \cdot \left(\frac{5-4}{6}\right)^6 \right) =$$

$$= 0,231481 \quad (9)$$

– the probability that in 2017 a decision will be made on the use of the de-shadowing instrument:

$$p_6 = C_6^6 \cdot \sum_{k=0}^{6-1} (-1)^k \cdot C_6^k \cdot \left(\frac{6-k}{6}\right)^6 = 1 \cdot \left((-1)^0 \cdot C_6^0 \cdot \left(\frac{6-0}{6}\right)^6 + (-1)^1 \cdot C_6^1 \cdot \left(\frac{6-1}{6}\right)^6 + \right. \\ \left. + (-1)^2 \cdot C_6^2 \cdot \left(\frac{6-2}{6}\right)^6 + (-1)^3 \cdot C_6^3 \cdot \left(\frac{6-3}{6}\right)^6 + \right. \\ \left. + (-1)^4 \cdot C_6^4 \cdot \left(\frac{6-4}{6}\right)^6 + (-1)^5 \cdot C_6^5 \cdot \left(\frac{6-5}{6}\right)^6 \right) =$$

$$= 0,015432 \quad (10)$$

At the third stage of the implementation of the methodological approach to assessing the efficiency of the national economy de-shadowing instruments, a discrete assessment of the result of the implementation of the national economy de-shadowing instrument is being carried out. Thus, accumulating the results of the previous two steps and taking into account the adjusted estimate of additional financial flows (based on the geometric average) that will emerge in the national economy as a result of the implementation of the de-shadowing instrument (based on fuzzy logic methods), we obtain the following equations:

$$C_t = p_B(H_{1t}) \cdot CFP_t \cdot m_t \cdot e^{-r \cdot t} - (1 - p_t) \cdot SSV_t \cdot e^{-r \cdot t} \quad (11)$$

$$p_B(H_{1t}) = \frac{1}{1 + \exp\left(\ln\left(\frac{1-b_t}{1-g_t}\right) + \sum_{k=1}^5 B_{kt} \cdot \ln\left(\frac{b_t(1-g_t)}{g_t(1-b_t)}\right)\right)} \quad (12)$$

$$p_t = C_T^t \times \sum_{k=0}^{t-1} (-1)^k \times C_t^k \times \left(\frac{t-k}{T}\right)^T \quad (13)$$

$$m_t = \sqrt{\frac{T_t^q + 100}{100} \cdot \frac{T_t^s + 100}{100}} \quad (14)$$

where C_t – discrete estimation of the result of the implementation of the instrument (tax rates) for the national economy de-shadowing for the t year; CFP_t – the volume of additional financial flows that will

emerge in the national economy as a result of the implementation of the de-shadowing instrument for the t year; m_t – adjustment factor for the amount of additional financial flows for the t year; r – discount rate, taking into account inflation expectations and level of political risk; p_t – probability that the decision will be made on the use of the de-shadowing instrument in the t period; SSV_t – total cost of the implementation of the de-shadowing instrument (expenses for implementation of the de-shadowing instrument, consisting of explicit and implicit expenses) for the t year; T_t^q – the rate of increase in the number of payers at the end of the reporting period (legal entities and individuals), %; T_t^s – the average growth rate of total expenditures per household per month, %.

At the final fourth stage of the proposed methodology, the assessment of the efficiency of the national economy de-shadowing instruments is proposed based on the adaptation of the natural approach to the normalization of the absolute efficiency by adjusting to the mean square deviation as follows:

$$E_t = \frac{C_t - \min C_t + \sigma/6}{\max C_t - \min C_t + 2 \cdot \sigma} \quad (15)$$

where E_t – evaluation of the efficiency of the national economy de-shadowing instruments, measured in the range from zero (worst level) to one (the highest best level) for the t year; σ – mean square deviation of discrete estimation of the result of implementation of the national economy de-shadowing instrument (tax rate) for the t year.

Summarizing the practical calculations of the proposed methodological approach to assessing the efficiency of the national economy de-shadowing instrument (by the example of the rate of social contribution tax in Ukraine) (Table 3), we note that there are three periods of different effects.

Table 3 – Results of the assessment of the efficiency of the national economy de-shadowing instrument (by the example of the social contribution tax rate in Ukraine)

Indicators	Year					
	2012	2013	2014	2015	2016	2017
CFP_t	6,568,043.3	7,980,611.6	-5,643,638.1	4,561,916.1	-53,863,140.0	48,978,415.6
T_t^q	4.03	106.56	-2.10	-0.31	4.52	6.42
T_t^s	3.88	6.35	5.98	22.30	15.52	24.81
m_t	1.040	1.482	1.019	1.104	1.099	1.152
r	0.09	0.12	0.35	0.53	0.23	0.24
$CFP_t \cdot m_t$	6,827,740.8	11,828,698	-5,748,586	5,037,335.7	-59,184,453.62	56,446,363
SSV	60,000	60,000	60,000	60,000	120,000	60,000
$p_B(H_{1t})$	0.1164	0.0154	0.0154	0.8836	0.9999	0.9999
p_t	0.0001	0.0199	0.2315	0.5028	0.2315	0.0154
C_t	671,290	96,894	-47,084	530,701	-18,768,031	13,358,898
E_t	0.4015	0.3906	0.3878	0.3988	0.0325	0.6423

Sources: developed by the authors

Thus, during 2012-2015, the level of efficiency of the application of the social contribution tax rate in Ukraine was approximately 40%. The result clearly reflects the ineffectiveness of public administration policies in 2015 when the adjustment rate of social tax reduction was introduced, provided that certain conditions were fulfilled by economic entities (for example, the social contribution tax base in this year should be 2.5 times higher the average value of this contribution in the previous year, the average salary

at an enterprise should increase by 30%, etc.). Due to the impossibility for most enterprises to comply with the established state requirement for social tax payment, the value of the efficiency of the tax de-shadowing instrument remained at the level of previous years. It is important to note the efficiency of lowering the rate in 2016 when it reached its minimum of 3.25%, i.e. the de-shadowing instrument has led to minimal efficiency. However, already in 2017, the level of efficiency of the tax instrument used to de-shadow the national economy in 2016 reached a significant value of 64.23%. This is evidence of an annual delay in the effectiveness of the instrument used and its significant efficiency. The calculations obtained to enable the state executive authorities to form an effective national economy de-shadowing strategy. Thus, the proposed methodology for determining the efficiency of the national economy de-shadowing instruments allows obtaining information on the effectiveness of the public management toolkit in each subsequent year. In the future, based on this information, it is advisable to form both combinations of simultaneous use of de-shadowing instruments and the order of their implementation in each subsequent year. This will allow, in the short run, obtaining a consistently high efficiency of the overall strategy for the national economy de-shadowing and gradually reducing the share of shadow operations.

Conclusions. Thus, our research revealed the most common instruments for the national economy de-shadowing, which are grouped as follows: 1) tax; 2) customs; 3) investment; 4) banking; 5) anti-corruption. The authors proved that the de-shadowing instruments that belong to the group of customs, investment and anti-corruption required significant changes in national legislation and coherence with other policies carried out by the state. The banking instruments for the economy de-shadowing are characterized by a long period of time between application and outcome, as well as the full dependence on the actions of the central bank. Tax de-shadowing instruments depend on changes in legislation but have the most comprehensive impact on socioeconomic processes in the state and effectiveness.

The methodological principles have been developed for assessing the efficiency of the national economy de-shadowing instruments. Thus, the proposed probabilistic approach (adaptation of the assessment of the real option), involves the calculation: 1) the probability of a decision on the use of the de-shadowing instrument; 2) a posteriori probability of reaching a certain level of efficiency of the de-shadowing instrument, provided that information about it is available to the population and business entities (adaptation of the Bayesian approach); 3) taking into account the adjusted estimate of additional financial flows (based on the geometric average) that will emerge in the national economy as a result of the implementation of the de-shadowing instrument (based on the fuzzy logic methods); 4) discounting financial flows taking into account the level of inflation and political risk. The developed methodological approach is characterized by the following advantages: provides an objective and multi-parametric assessment of the efficiency of the economy de-shadowing instruments, even when the assessment of traditional methods is ineffective; provides an opportunity to anticipate a large number of options for implementing the de-shadowing instruments; provides a quantitative assessment of implicit strategic opportunities for the implementation of the national economy de-shadowing instruments with a high degree of uncertainty; allows for flexible management solutions for a further strategy to minimize the shadow economy.

Practical calculations of the efficiency of the social contribution tax rate in Ukraine allowed confirming the hypothesis: the unequal efficiency of different approaches to using the same instrument for the national economy de-shadowing; on delay of the efficiency of the used national economy de-shadowing instruments; about the need to evaluate the results of the efficiency of the instruments during several years. It has been proved that the formation of an effective state strategy for minimizing the size of the shadow economy was possible only based on identifying the level of efficiency of the de-shadowing instruments as it enables, firstly, to establish the optimal ratio of the instruments used, and secondly, to synchronize their application in time.

Further research will be aimed at: assessing the efficiency of other instruments for the national

economy de-shadowing; the establishment of an even more implicit effect on the economy from the use of these instruments with the help of the fuzzy logic methods; identification of the optimal time for using the economy de-shadowing instruments depending on the stage of its development, based on the effectiveness of the proposed measures.

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Інновації в оцінюванні рівня ефективності інструментів детінізації національної економіки: державно-управлінський аспект

Стаття присвячена розвитку методичних засад удосконалення державної політики детінізації національної економіки. Узагальнено аргументи та контраргументи в межах наукової дискусії щодо основних інструментів детінізації національної економіки. Встановлено, що податкові інструменти державного впливу на тіньову економіку дозволяють досягти комплексного ефекту в усіх сферах суспільного життя країни. Метою статті є формування інноваційної методики оцінювання рівня ефективності інструментів прямого впливу на суб'єктів господарювання, що дозволить приймати виважені управлінські рішення органами державної влади з приводу детінізації національної економіки. Систематизація літературних джерел та підходів до вирішення проблеми детінізації національної економіки засвідчила відсутність будь-яких емпіричних розрахунків з приводу оцінювання рівня ефективності податкових інструментів державного регулювання економіки. Актуальність вирішення даної наукової проблеми полягає в необхідності ідентифікації не тільки рівня збільшення соціального податку за рахунок виходу заробітних плат з тіні, але й неявного ефекту у вигляді збільшення непрямих податків та обсягу заощаджень. Вирішення зазначеної проблеми в статті здійснено за допомогою розробки науково-методичного підходу до оцінювання рівня ефективності інструментів детінізації національної економіки на основі розрахунку імовірності прийняття рішення щодо застосування конкретного інструменту, апостеріорної імовірності досягнення визначеного рівня результативності та методів нечіткої логіки. На прикладі зменшення рівня податкового навантаження на фонд оплати праці в Україні визначено рівень ефективності державного управління детінізацією національної економіки. Дослідження емпірично підтверджує та теоретично доводить необхідність систематичного оцінювання рівня детінізації національної економіки в залежності від виду інструментів державного впливу та їх кількісної характеристики. Запропоновані теоретико-методологічні засади формування стратегії детінізації національної економіки в залежності від рівня ефективності інструментів державної податкової політики. Результати проведеного дослідження можуть бути корисними для державних органів виконавчої влади в сфері податкового регулювання національної економіки.

Ключові слова: рівень ефективності, інструменти детінізації, національна економіка, державне управління, рівень оподаткування.

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