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## OPTIMIZATION OF OFFENSES LEVEL AND THEIR DETERRENCE FUNCTION: ECONOMIC APPROACH

**Abstract.** Whereas elimination of shadow activity is impossible, there is the problem of setting the limits of offenses deterrence overall level, which minimizes the total costs for society and preventive costs for their avoidance. The purpose of the article is further development of theoretical basis of regulating and controlling the shadow sphere according to economic theory of offenses based at G. Becker approach. The optimal range of offenses can't be always closer to zero. The deterrence function is analyzed by impacting on indicators of probable revealing offenses and the level of their punishment. According to other scientists' empirical studies, it is demonstrated that more effectively to deter offenses by increasing probability of their revealing than to increase the punishment. Two regulative factors are interchangeable: minor penalties with high probability of offenses deterrence have the same deterrent effect as the severe punishment with low probability of detection and punishment of the offender. The locality of punishment deterrence effect is grounded by self-seeking offenses. Punishment dilemma remains still unresolved: it is necessary to find methods of law enforcement, which would provide the society with a certain balance between economic efficiency and social justice.

**Keywords:** offenses; optimization; deterrence; social costs; shadow economy.

**JEL Classification:** B22, E60, N10

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#### ОПТИМІЗАЦІЯ РІВНЯ ПРАВОПОРУШЕНЬ ТА ФУНКЦІЯ ЇХ СТРИМУВАННЯ: ЕКОНОМІЧНИЙ ПІДХІД

**Анотація.** У статті досліджено теоретичні аспекти оптимізації загального рівня правопорушень та ефективність їх стримування на засадах економічного підходу Г. Беккера і його послідовників. Обґрунтовано необхідність балансу між суспільними витратами та масштабами детінізації економіки. Визначено пріоритетність виявлення правопорушень порівняно із покаранням за них як базових інструментів регулювання при формуванні й реалізації державної політики детінізації.

**Ключові слова:** правопорушення, оптимізація, стримування, витрати суспільства, тіньова економіка.

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#### ОПТИМИЗАЦИЯ УРОВНЯ ПРАВОНАРУШЕНИЙ И ФУНКЦИЯ ИХ СДЕРЖИВАНИЯ: ЭКОНОМИЧЕСКИЙ ПОДХОД

**Аннотация.** В статье исследованы теоретические аспекты оптимизации общего уровня правонарушений и эффективность их сдерживания на основе экономического подхода Г. Беккера и его последователей. Обоснована необходимость установления определенного баланса между общественными издержками и масштабом детенизации экономики. Определена приоритетность выявления правонарушений по сравнению с наказанием за них как базовых инструментов регулирования при формировании и реализации государственной политики детенизации.

**Ключевые слова:** правонарушение, оптимизация, сдерживание, издержки общества, теневая экономика.

**Introduction.** The emergence of the economic theory of offenses (neo-institutional mainstream direction) is associated with the publication in 1968 fundamental paper by Nobel Laureate G. Becker «Crime and punishment: an economic approach» [1]. One of the most important aspects of G. Becker's economic approach is to establish degree of public danger from various offenses and to determine their optimal low level. In this case, criminological and economic approaches much differ: in the first approach – the main task is formulated as a «liquidation», in the second one – as the optimization of costs of society between damages from crime and costs for its minimization. So, for any country is urgent to resolve such issues [2, p. 283]:

- what number of offenses should be recognized as acceptable, which minimizes the total costs of society, but also remains unpunished (search of optimum level);
- how much money and punishments measure are necessary to ensure the effectiveness of the current legislation (function of offense deterrence).

**Brief Literature Review.** An important contribution to the development and verification of mentioned economic theory was made by such prominent scholars as A. Ehrlich (1999), S. Cameron (1999), P. Rubin (1999), G. Tullock (1999), L. Turrou (1999), M. Sesnowitz (1972) and others. The importance of

scientific research in this field is evidenced by the fact that except G. Becker the works of Nobel Laureates are devoted to the economic aspects of the offenses: J. Buchanan (1999), J. Stigler (1970), M. Friedman (1999), T. Schelling (1999).

Analysis of these authors' scientific works showed some controversial statements. Besides, the theoretical aspects of the offenses in the hidden («gray») sector of the shadow economy are not enough examined in contrast to the criminal areas of offenses. Therefore, this area of research remains actual today, especially in the countries with a substantial share of the national economy shadow.

**The purpose** of the article – further developing theoretical fundamentals of offenses optimization and instruments for regulating shadow sphere based on economic approach.

**Results.** Inheriting neoclassical methods and mathematical tools of expected utility theory of von Neumann-Morgenstern, G. Becker (1968) made a relatively simple analysis of the possible proceeds of crime compared to the probable losses from punishment. The theoretical model is presented by him as a formula [2, p. 294]:

$$EU = p * U(Y - f) + (1 - p) * U(Y), \quad (1)$$

where  $EU$  – the expected utility of a crime;

$p$  – probability of detection and punishment of the offender;  
 $U$  – utility function for the subject of the criminal offense;  
 $Y$  – subject's income as a result of the crime;  
 $f$  – the monetary equivalent of the punishment.

Note that formula (1) is not completely universal, because it does not solve the problem of monetary assessment of human life value and a possible offense like death. The specified formula is based at the total integrated indicators and needs further details, e.g. during the development of economic and mathematical models.

G. Becker's theory was developed on the example of the criminal sphere. At the same time the author focuses on the universal opportunities of economic approach that allows applying his theory to any type of crime. Given in formula (1) dependence can be used in opportunistic behavior of any economic agent (individual, household, business or organization), both in the criminal sector and concerning hidden (semi-legal) component of the shadow economy.

In his theory, G. Becker showed that there are mutual costs both of the offenders and the society: besides the direct losses of economic agents from punishment for offenses, the state also losses out in the form of budget costs for penitentiary system. While J. Stigler (1970) noted that limit deterrence needs its appropriate limit costs [10, p. 528]. Hence the paradoxical conclusion: the legalization of the economy is not always profitable business not only for the direct participants of shadow activity, but also for the state, so any undesirable extreme options should be avoided.

According to the tasks it is necessary to find a balance in such formulation: what has greater costs for society – offenses or resistance to them? The solution to this problem was offered by economists L. Phillips & H. Votey (1981) [13] and C. Eskridge (1981) [14]. They studied the origin of various transaction costs and their change depending on the level of illegal activity in the criminal segment of the shadow economy. In general graphic form, the relationship between direct and associated costs of the society and the level of offenses are shown in Figure 1.

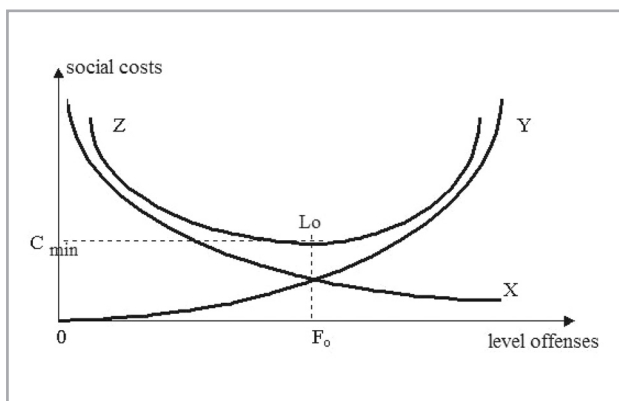


Fig. 1: Social costs of offenses

X – the cost of detecting and deterring offenses (to law enforcement);  
 Y – direct losses of committed offenses;  
 Z – total costs of society (X + Y);  
 $F_0$  – optimal level of offense;  
 $C_{min}$  – minimum allowable level of total costs of society;  
 $L_0$  – optimum point (equilibrium between limit losses of committed offenses and limit costs for their prevention).

Source: [13, pp. 29-30]

We believe that as according to the graph in Figure 1, curve «Z» proves unrealistic achieving of zero level of the shadow economy (perfect condition). Using the concept «shadow economy elimination» is absolutely unacceptable in scientific research. In this aspect, G. Becker's hypothetical supposition is doubtful, that the number of offenses may be minimized to any desired level [2, p. 299]. World empirical experience suggests that regardless of increased funding, strengthened measure of punishment  $f$  and attempts to bring as close as possible indica-

tor  $p$  to a value of «1», the shadow economy in any country is not at zero level.

Figure 1 shows that low level of offenses can be achieved only with major amounts of funding law enforcement. According to Becker's theory steady increasing amounts of funding law enforcement should help to achieve a low level of shadow economy, if a major portion of financial resources is spent on preventive measures and actions. At the same time it should be noted that the control and regulation of shadow processes are expensive.

On the other hand, minimizing the total social costs for law enforcement is only possible to a certain limit, since it would leads to unacceptable scale of the shadow economy, which involves taking some non-zero level of offenses (point  $L_0$ ). Deviation in any way is undesirable, since it leads either to increasing the shadowing or to inadequate increasing total social costs. So, there must be some social optimum, which is achieved at the level of total costs of society  $C_{min}$  and corresponds to the range of offenses  $F_0$ . Optimum condition is not static and depends on the evaluation of (un)safety of the shadow activity by society and requires a certain balance of the benefits and costs of the state.

Rational state policy of the economy shadowing through various measures and instruments of indirect influence on a combination of values  $p$  and  $f$  could lead to the achievement of such condition in which the principle «offense does not recoup itself» is realized. This allows minimizing losses for the state from the shadow economy functioning through adequate influence on these variables. The estimated probability of punishment for economic offenses in Ukraine is within 0.2–0.3 (exact data does not exist because it is difficult to install hidden volumes of shadow economy). In the context of developing and implementing the concept of shadowing the national economy it needs to be clarified what factors of deterrence is more effective: the probability of detecting offenses  $p$  or a measure of their punishment  $f$ .

An important part of G. Becker's economic theory of offenses takes a mathematical formalization of the dominant idea: the elasticity of the reverse reaction of offenders to the change of probability  $p$  influences more significantly compared with measure of punishment  $f$ . This is also pointed out by Ch. Beccaria (2004): the inevitability of punishment plays more important role than the severity of the punishment [15]. Becker grounded that growing rate  $p$  has a greater relative impact on reducing the size of the result  $EU$ , than a similar increasing the factor  $f$  within the approach from the expected utility [2, p. 296]. This statement is proved by the example of scientific experimental data for seven types of criminal offenses, using the differential functions and mathematical apparatus of the theory of expected utility under risk. G. Becker also throws doubts on the idea that the level of economic offenses react less to the changing values  $p$  and  $f$ , than crimes [2, p. 336].

Obviously, the total number of offenses and the total value of their losses to the state essentially depend on the specificity of each country's national economy and significantly differentiated by the subjects of offenses, but the basic regularities are the same. The more significant offense is, the more the subjects of the shadow economy are responding to increasing the probability of its detection, compared with increasing the punishment. At the same time, reducing the elasticity of the number of offenses in indicator  $p$  leads to displacement of the optimum value « $F_0$ » towards growth, but is partly balanced by increasing the elasticity by  $f$ . So agree with G. Tullock (1999), who supposed that the choice of the preferred method of achieving an optimal level of offense is not principal: the probability of punishment  $p$  should investigate only combined with weight of the indicator  $f$  [6].

Empirical studies conducted by some researchers confirm the priority of index  $p$  importance compared with  $f$ . Moreover, this dependence is inverse in direction and non-linear in form: increasing by 1% of the elasticity towards the probability of offense detection gives more deterrent effect than increasing by 1% of the elasticity of the punishment severity [5]. Smigel and Ehrlich (1965, 1967) showed stable relationships based on high

levels of correlation between the components of the formula (1) and the resulting variable, and the influence priority of the probability  $p$  compared with  $f$  [16; 17]. Elasticity  $EU$ , according to the results of their verification both  $p$  and  $f$ , is less than one. According to E. Eide (1994), the average elasticity of offenses by the probability of their detection and punishment in the global dimension is approximately «-» 0.5: increasing the probability  $p$  by 1% usually leads to decreasing the number of offenses by 0.5% [18, p. 156].

Other empirical investigations made in a number of developed countries (USA, England, and Germany) also confirm the deterrence effect. This conclusion was made independently by A. Ehrlich (1999) [3], P. Rubin (1999) [5], G. Tullock (1999) [6] who obtained similar statistical results. During the analysis the economic theory of offenses has been recognized also by sociologists; J. Gibbs (1968) was one of the first who supported the deterrence effect [19].

A large number of publications about economic theory of offenses verification were investigated in E. Eide's work (1994) [18]. His analysis of statistical indicators is aimed at testing several hypotheses:

- 1) the amount of offenses deterred by effective functioning of law enforcement;
- 2) high income differentiation stimulates the failure of law;
- 3) the higher the quality of social welfare is, the less offenses are made;
- 4) the general level of offenses is inertial and cyclic reversed: increases during recessions and decreases in times of economic growth.

As a result, the following conclusions are made:

- probability of detecting  $p$  and punishment  $f$  in general have essential deterrence effect for all types of offenses (in some cases the importance of punishment severity has not been confirmed);
- during increasing income in the formal economy general offenses level decreases (at the same time German scientists who evaluated the level of offenses depending on the income of economic agents in different regions of the country, found that high income is directly linked to the total number of offenses [20]);
- uneven distribution of legal income (Gini index) promotes the growth of total offense amount;
- the majority of elasticities as to above mentioned relationships is positive and significant concerning offenses; however, the studies of the criminal sector (in case of crimes against the person) showed difference of effects and the ambiguity of correlations.

During verification of deterrence hypothesis there is a methodological problem – poor quality of output statistical data that affects the reliability of the results. Official level of offenses usually decreases, especially in the countries with large volumes of shadow economy. Proofing deterrence effect of punishment is complicated by the fact that except the threat of punishment a number of other factors can affect the level of crime. Total welfare, differentiation of economic subjects incomes, the demographic structure of the population, the risk of unemployment, the value of alternative income in case of legal employment, willingness to carry out illegal acts are attributed to variables which have combined influence on the total number of offenses. Representatives of neo-institutionalism often emphasize the great importance of cultural and mental factors, social traditions which influence is quite difficult to formalize and model mathematically during making rational choice. Therefore, the principles and ideas of economic theory of offenses have certain limits of application.

For objectivity, it is necessary to point out that the studies of some scientists concerning the critical analysis of deterrence hypothesis have ambiguous nature of conclusions:

- 1) the same measure of punishment that deters certain types of offenses is ineffective for criminal offenses;
- 2) enhancing the punishment severity that has a positive effect on some offenses could lead to the stimulation of others;
- 3) interrelation has an inverse direction: the current level of offenses affects the value of variables  $p$  and  $f$  by itself.

In addition, there are a number of special effects that lead to doubting the fundamental postulate of Becker's theory: punishment deters offense. S. Cameron (1999) noted that increasing the probability of exposing offenses and punishment weight gain may not decrease their level. He grounded why the enhanced punishment does not always deter the offense on the example of some side effects in such situations [4]:

- a) the substitution effect – reducing business income from one type of offense as a result of certain safety measures realization can cause increasing crimes in other form (typical for the sphere of drug trade targeted to receive regular cash inflows);
- b) the displacement effect – local or temporary restraining strengthening measures leads to the displacement of the shadow activity in other regions or time periods (a typical example – the emergence of offshore zones);
- c) increasing funding for law enforcement can be ineffective in the long run because of the adaptive behavior of economic agents.

It should be noted that monetary rationality is not always the only adequate motive of economic agents' behavior (e.g., the dominance of the motive of revenge). In exceptional cases, the probability of punishment is not perceived as a factor of influence on the offenders' behavior. It should also be said that the deterrence effect of punishment is active within the economic approach for self-interested offenses and does not concern only criminal offenses against the person.

In general, empirical researches about the economic theory of offenses indicate a large number of different results which sometimes contradict each other. Therefore, the postulate «punishment deters offense» causes the biggest debate about its verification and doubts of other authors, including related fields of science.

**Conclusion.** According to economic approach of the theory of offenses, the priority of the national economy strategic development is not the attempt to completely eliminate the shadow segment, but to deter it in acceptable and optimal level for the society. Optimality criterion is to minimize the social costs of offenses. Optimality level is determined by the costs of achieving the target value « $F_0$ ». The greater amount of the costs is – the more optimal values  $p$  and  $f$  are. Indicators  $p$  and  $f$  are interchangeable: minor penalties with high probability of offenses detection provide the same deterrence effect as destination of severe punishment at the simultaneously low  $p$ .

The amount of offenses is negatively correlated with the probability of their detection and measure (degree of severity) of punishment, but positively – with the benefits of offenses. With increasing absolute measure of risk appetite at 1% increasing the probability  $p$  the offense is deterred more than the 1% increasing the size of the punishment  $f$ , but both values of elasticity are less than 1 and differentiated by types of the offenses. According to the author, these results need further verification: an empirical aspect of such studies has considerable difficulties due to limited access and poor quality of statistical information, the influence of non-economic factors.

We believe that the economic approach should be applied only to offenses committed as a result of conscious choice and in self-interest provision. Not all offenses, especially in the criminal segment, are the result of thought out and planned actions. Therefore, in the applied aspect, G. Becker economic approach should be developed exclusively for hidden («gray») sector and not to the whole shadow economy.

Punishment dilemma remains still unresolved: it is necessary to find such methods of law enforcement, which would provide the society with a certain balance between economic efficiency and social justice, but not their contradiction. Developing the measures of the economy deshadowing and mechanisms for their implementation needs to adapt to the national specificities of each country.

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Received 04.06.2014

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Статья найдшла до редакції 04.06.2014

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