

AN INNOVATIVE APPROACH TO EVALUATE THE EFFECTIVENESS OF COMBATING MONEY LAUNDERING

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Type of manuscript: research paper

Abstract: *The article summarises the arguments and counterarguments within the scientific debate on the issue of improving the system of combating money laundering. The research's primary goal is to evaluate the system's effectiveness in combating money laundering. The study of the issue of evaluating the system's effectiveness for combating money laundering is carried out in the article in the following logical sequence: informative base forming; determination of terminal events as criteria for the system's effectiveness for combating money laundering; survival tables construction, which provide for the probability of a court verdict on financial monitoring issues; evaluation of the system's effectiveness of institutional changes in combating money laundering. Survival analysis methods or survival tables, the Kaplan-Meier method, were used to conduct the research. The developed scientific-methodical approach to evaluating the system's effectiveness for combating money laundering was approved based on financial monitoring data in Ukraine; the study period was 2009-2022. The time intervals and established probabilities of avoiding punishment for the crime of money laundering were defined based on the analysis. The authors of the article empirically determined that with an increase in the time between the time of the commission of the crime and the time of the court's conviction, the probability that the court will not be convicted decreases. If three years and seven months pass after the crime, the probability of a guilty verdict will be 50.9%. Based on the obtained calculations, the changes in the organisational and functional composition of the combating money laundering implemented in recent years could have improved the quality of combating money laundering. Further research should be directed to a detailed analysis of the structural elements in the institutional part of the system of combating money laundering to identify the weaknesses of each stage: financial monitoring, investigation and the judicial system.*

Keywords: financial fraud, effectiveness, money laundering, regulation, survival analysis.

JEL Classification: C25, G18, O17.

Received: 20 December 2022

Accepted: 25 May 2023

Published: 30 June 2023

Funding: This research was funded by a grant from the Ministry of Education and Science of Ukraine (No. s/r 0121U100467, 0122U000783, 0121U100469, 0123U101945).

Publisher: Academic Research and Publishing UG, Germany.

Founder: Sumy State University and Academic Research and Publishing UG (i.G.), Germany.

Cite as: Juhaszova, Z., Boyko, A., Bozhenko, V., Mynenko, S., Buriak, A., & Vynnychenko, N. (2023). An Innovative Approach to Evaluate the Effectiveness of Combating Money Laundering. *Marketing and Management of Innovations*, 2, 227–235. <https://doi.org/10.21272/mmi.2023.2-21>



Introduction. The financial services industry becomes more interconnected with digital and technological innovations every year, and therefore the opportunities for financial crime also increase. UNODC estimates say 2-5% of the global GDP, or 800 billion – 2 trillion dollars, is legalised yearly. However, law enforcement agencies seize or freeze only about 1% of these funds globally.

Ukraine is actively involved in international schemes for laundering criminal money as part of the global financial and economic system. The State Financial Monitoring Service of Ukraine sent 934 materials on suspicious financial transactions to law enforcement agencies. The total amount of financial transactions stopped by state control bodies and funds blocked is equivalent to 7.7 billion hryvnias or 0.24 billion dollars in 2022 (State Financial Monitoring Service of Ukraine, 2022). The comparative analysis shows that the lion's share of income obtained illegally is beyond the attention of the State Financial Monitoring Service, and the origin of an even smaller part of the money can be substantiated with evidence and defend the state's position in court. Money laundering consists of three stages placement, stratification and integration. These stages transform criminal proceeds into financial instruments that differ in place, time, type and structure. Criminals try not so much to diversify the sources of illegal income as to increase the variety of ways of their legalisation. During the stratification stage, the trail of criminal proceeds is hidden, financial operations are complicated, and transactions are confused. Legalisation ends with the return of laundered funds to the national economy but under the guise of official income. In turn, the state can use two ways of combating money laundering: creating favourable socio-economic conditions for the shadow economy, which will lead to the minimisation of the potentially obtained effect of illegal actions, strengthening regulatory influence in the form of increasing control tools and increasing the level of punishment for money laundering.

Highly effective functioning of the system for combating money laundering is possible with the practical work of investigative bodies, the prosecutor's office and the court. It does not matter how well the financial monitoring revealed probable money laundering cases; if the evidence base is incorrectly formed and contains insufficient evidence in court, the prosecution's position will be unfounded and will lead to a positive, for it will be challenging to acquit the accused.

Literature Review. Countermeasures against money laundering are in the field of study and constant improvement among the scientific community and representatives of business and international organisations. The mutual activity of national and supranational structures forms the system combating money laundering. Supranational structures include international, continental, and regional organisations that influence the prevention of money laundering. International organisations include the Financial Action Task Force (FATF), the Egmont Group, International Monetary Fund, the World Bank, and the Bank for International Settlements. Interpol and others. The continental organisations include the Committee of the Council of Europe for evaluating measures to combat money laundering and terrorist financing (MONEYVAL), the Organization for Security and Cooperation in Europe (OSCE), and the European Parliament. The Organization for Democracy and Economic Development (GUAM) and the cooperation of financial intelligence units of different countries can be included in the regional organisations that contribute to combating money laundering. Data from the Scopus scientometric database were used to carry out a comprehensive bibliographic analysis of publications on this issue. Several keywords and phrases were selected to search for the necessary publications, allowing us to reflect on the current trends in the study of economic crime and the legalisation of criminal proceeds. The search results for scientific publications in the scientometric database Scopus are presented in the Table 1.

Table 1. Dynamics of scientific publications on economic crime and money laundering

Keywords	Number of publications, units				Compound annual growth rate, %	Study geography
	2002	2012	2022	2002-2022		
Financial fraud	88	218	737	5705	11,21	United States (1148), China (532), United Kingdom (504),
Economic fraud	21	93	280	2403	13,83	United States (543), United Kingdom (238), China (202)
Money laundering	37	123	377	3311	12,31	United States (466), United Kingdom (462), Australia (197)
Anti-money laundering	4	39	172	1153	20,69	United States (176), United Kingdom (123), Australia (80)
Financial crime	6	30	131	932	16,67	United Kingdom (181), United States (132), Norway (63)

Sources: compiled by the authors based on the Scopus scientometric database.

The data in Table 1 show that interest in studying illegal activity among the scientific community is permanently growing. Among the researched keywords, the most dynamically developing direction is anti-money laundering, with an annual growth rate of publications at 20.7%. Mainly scientists from the United Kingdom and the United States are actively researching the issues of illegal activities and money laundering.

Data mining and artificial intelligence methods are actively used to combat money laundering (Yarovenko and Rogkova, 2022). In particular, Salehi et al. (2017) classified bank transactions using various econometric methods (multi-neural perceptron network, probabilistic neural network, radial basis function, linear neural model). They chose the approach with the highest indicators of the quality of the constructed models. Instead, Canhoto (2021) investigated the possibilities of using machine learning methods to combat money laundering. The author rightly notes that the main problem of using mathematical modelling methods to combat money laundering is the need for high-quality data sets.

Kuznetsova et al. (2022) developed strategic plans to combat illicit financial flows involving financial institutions. Scientific publications studying the determinants of influence on the spread of illegal activities in the world's countries deserve special attention. Authors conclude that cash remains the primary tool for accelerating money laundering, and the introduction of cashless payment technologies still needs to produce the expected effect by reducing the amount of money laundering using cash flows. The authors established a direct relationship between the demand for cash and the shadow economy. In addition, corruption is also a significant factor in increasing social tension and destabilising society (Aliyeva, 2022), causing the deformation of new forms of economic business relations and the growth of the shadow economy (Lu et al., 2019), impunity for unlawful acts (Tiutiunyk and Kozhushko, 2022) and excess burden of taxation (Mazurenko et al., 2021). There are approaches to assessing the national risk of a country's involvement in illegal activities. In particular, Lyeonov et al. (2019) estimated the country's attractiveness for money laundering using the gravity model. Dmytrov and Medvid (2017) developed an approach to estimate the national risk of money laundering and terrorist financing risks using international indexes. Jiroudkova et al. (2017) and Strielkowski and Höschle (2016) argued that one of the main obstacles to integrating Central and Eastern European countries into the European Union is the lack of fiscal discipline and high risk of money laundering. A group of scientists (Stojanov et al., 2011; Bracco, 2022) believed that immigration and unrecorded economic activity have a destructive impact on economic growth.

The actualisation of the system's effectiveness in combating money laundering in Ukraine is also increased because, in recent years, this system has undergone specific changes: some bodies have ceased to exist, and some, on the contrary, have just started their activities. Thus, there is a growing need to find innovative methods for evaluating the system's effectiveness in combating money laundering in the country under an ever-increasing risk of illegal activity.

Methodology and research methods. The survival analysis methods (Wang et al., 2019; Baio, 2020; Njoku et al., 2021) evaluate the system's effectiveness in combating money laundering. This approach determines the probability of avoiding punishment at each stage of transforming the institutional component of combating money laundering. Findings from an information base for making effective management decisions regarding the further improvement of the reform of state penal bodies reveal the level of success of the general trend of the institutional component of combating money laundering. The scientific-methodical approach to assessing the system's effectiveness in combating money laundering involves the implementation of the following steps:

1. The statistical research base formation. Ukraine was chosen as the country for the study. Thus, 42 observations were selected from the Unified State Register of Court Decisions in Ukraine, representing court proceedings that ended in a guilty or acquittal verdict from 2019 to 2022. The established beginning of the commission of a criminal act aimed at obtaining illegal income for its further laundering was from 2009 to 2022. A fragment of the information base for the study is presented in Table 2. Determination of terminal events as criteria for the system's effectiveness in combating money laundering is sentencing by the court.

2. Survival tables construction reflects the time distribution until a particular analysed event occurs.

The survival table's essence is that the sample's observation period is divided into smaller intervals. All observations that occurred at least during this time are used to calculate the probability of the occurrence of a terminal event during this time interval. Then, the probability estimations calculated for each interval are used to evaluate the probability of an event occurring at different points in time. Survival tables calculate the probability of an event such as a court sentencing not appearing for the perpetrators and, therefore, the low efficiency of the anti-money laundering system during a certain period.

Table 2. Input data for evaluating the system’s effectiveness in combating money laundering based on the construction of survival tables (fragment)

The date of the beginning of the crime commission	The date of the court verdict	D ₁	M ₁	Y ₁	D ₁	M ₁	Y ₁	NRA	ALL	RCC	ND	NUM	Censo-red	NYCV
21 February 2022	03 August 2022	21	2	2022	3	8	2022	1	37 755,47	0	2	26	1	3
15 August 2019	29 July 2022	15	8	2019	29	7	2022	1	1 416 140	0	3	68	1	4
10 September 2018	26 October 2021	10	9	2018	26	10	2021	1	359 345 949	10 984	1	12	1	5
29 December 2016	03 September 2021	29	12	2016	3	9	2021	1	131 072	-5 720	1	1	0	0
10 June 2020	23 October 2021	10	6	2020	23	10	2021	1	54 700	0	1	4	0	0
01 September 2020	01 July 2021	1	9	2020	1	7	2021	1	257 550	5 000	1	0	1	5
01 July 2014	02. July 2019	1	7	2014	2	7	2019	1	1 180 080	47 139	1	1	1	3
01 June 2019	05 October 2021	1	6	2019	5	10	2021	1	1 080 730	0	1	0	1	5
12 June 2017	30 August 2021	12	6	2017	30	8	2021	1	67 229	0	1	0	1	3
04 April 2019	31 October 2019	4	4	2019	31	10	2019	1	16 000	12 750	1	0	1	3
01 August 2015	20 May 2019	1	8	2015	20	5	2019	1	195 346 710	0	2	0	1	5
02 September 2015	29 March 2019	2	9	2015	29	3	2019	1	1 074 833	803 800	1	0	1	3
01 January 2014	20 May 2020	1	1	2014	20	5	2020	1	20 426 692	1 059 884	1	0	1	5

Notes: NRA is the number of related articles of the Criminal Code of Ukraine, describes the crimes using which the accumulation of illegal income was implemented; All is the amount of income obtained illegally, hryvnias; RCC is the number of funds compensated to the state in the form of confiscations or reimbursement of court costs, hryvnias; ND is the number of defendants, according to which the proceedings were conducted; NUM is the number of injured individuals and legal entities; censored is a binary variable that takes the value of 1 in the case of a guilty verdict; NYCV is the number of years of imprisonment according to the court verdict.

Sources: developed by the authors.

3. Determination of the probability of the occurrence of an event (the pronouncement of a court sentence) in a certain period based on the Kaplan-Meier method according to equation 1

$$S(t) = \prod_{j=1}^t \left(\frac{n-j}{n-j-1} \right)^{\delta_j} \quad (1)$$

where S(t) is the estimation of the survival function; n is the total number of events; $\prod_{j=1}^t (...)$ is the geometric sum of all observations completed by time t; δ_j is equal to 1 if the observation contains complete information and equal to 0 if it is incomplete; j is the number of observations, ranked in order of increasing number of days in the list.

4. Uniformity of survival function distribution analysis.

Specialised software for statistical analysis, STATISTICA, was used to construct survival tables. This software implements a non-linear evaluation block of survival analysis based on vital signs and distribution analysis.

Results. Given the need to improve the efficiency of law enforcement agencies in Ukraine, this system is constantly being transformed: new investigative bodies emerge, and the activities of the prosecutor's office and the organisation of the courts are being reformatted. Recently, the National Police (2015), the National Anti-Corruption Bureau of Ukraine (2015), the State Bureau of Investigation (2016), and the Bureau of Economic Security of Ukraine (2021) were created. Judicial reform began in 2016. Authorised state bodies constantly make decisions on improving the activities of law enforcement agencies: changes to laws, resolutions of the Cabinet of Ministers, and internal normative legal acts of law enforcement agencies.

Survival tables were built to define the probabilistic evaluation of the effectiveness of combating money laundering based on the formed database of statistical data from the Unified State Register of Court Decisions of Ukraine (Table 3). During the first 500 days after the commission of a crime to obtain illegal income with the subsequent money laundering (columns Interval Start and Interval Width), among 42 observations (Number Entering), only in 8 cases was a guilty verdict issued (Number Dying) based on the data in Table 3. Accordingly, the proportion of surviving observations for the first 500 days, i.e. those for which the date of conviction has not arrived, was 0.807 (Proportion Surviving). On the other hand, the share of deceased, that is, those observations for which a guilty verdict was passed, is 0.193. Accordingly, the probability of a guilty verdict during the corresponding interval (0-500 days) in observations was 0.0004 (Hazard rate). Moreover, the expected median duration of life (Median Life Exp), i.e. the median time between the commission of the crime and the court verdict, was 1329 days.

Table 3. A probabilistic evaluation of the effectiveness of combating money laundering based on the construction of survival tables

Interval	1	2	3	4	5	6	7	8	9	10	11	12
Interval Start (years)	0,00	1,37	2,74	4,11	5,48	6,85	8,23	9,60	10,97	12,34	13,71	15,1
Mid Point (years)	0,69	2,06	3,43	4,80	6,17	7,54	8,91	10,28	11,65	13,02	14,39	
Interval Width (year)	1,37	1,37	1,37	1,37	1,37	1,37	1,37	1,37	1,37	1,37	1,37	
Observation Entering	42,00	33,00	27,00	17,00	9,00	2,00	2,00	2,00	2,00	2,00	1,00	1,00
Observation Withdrawn	1,00	0,00	0,00	2,00	2,00	0,00	0,00	0,00	0,00	1,00	0,00	1,00
Observation Exposed	41,50	33,00	27,00	16,00	8,00	2,00	2,00	2,00	2,00	1,50	1,00	0,50
Number Observation Dying	8,00	6,00	10,00	6,00	5,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Proportion Observation Dead	0,19	0,18	0,37	0,38	0,63	0,25	0,25	0,25	0,25	0,33	0,50	1,00
Proportion Observation Surviving	0,81	0,82	0,63	0,63	0,38	0,75	0,75	0,75	0,75	0,67	0,50	0,00
Cumulative Proportion Surviving	1,00	0,81	0,66	0,42	0,26	0,10	0,07	0,05	0,04	0,03	0,02	0,01
Probability Density	<	<	<	<	<	<	<	<	<	<	<	<
Hazard Rate	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005
Standard Error Cumulative Survived	< 0,005	< 0,006	< 0,007	< 0,008	< 0,009	< 0,010	< 0,011	< 0,012	< 0,013	< 0,014	< 0,015	
Standard Error Probability Density	0,00	0,06	0,07	0,08	0,07	0,05	0,05	0,04	0,04	0,03	0,02	0,02
Standard Error Hazard Rate	<	<	<	<	<	<	<	<	<	<	<	<
Standard Error Median Life Expectation (years)	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005
Standard Error Life Expectation	3,64	2,85	2,12	1,81	1,10	3,35	3,35	3,20	2,74	2,06	0,68	
Standard Error Life Expectation	158,76	225,44	203,92	160,12	141,52	1257,99	1257,99	943,49	707,62	612,82	500,36	

Sources: developed by the authors.

Analysing the next time interval (from 500 to 1,000 days), we note that the number of observations on which a guilty verdict was passed was six units. However, a guilty verdict's relative expression and probability were almost unchanged. However, the median expected duration of the investigation decreased to 1,040 days. Accordingly, in the first 1000 days from the commission of the crime to the court verdict, 80.72% of criminals will not receive punishment (Cum. Prop. Surviving). Based on this, the system of combating money laundering was effective by 19.28% in approximately two years and nine months.

The trend of passing guilty verdicts changes at 3-5 intervals (from 1000 to 2500 days). During these periods, the proportion of convictions (for observations with no prior convictions) was 0.37, 0.38, and 0.63 for intervals 3, 4, and 5, respectively. The probability of a guilty verdict was 0.0009, 0.0009, and 0.0018 units, and the median time between the beginning of the crime and the verdict was 775, 660, and 400 days, respectively. It can be expected that 74% of criminals will receive guilty verdicts within six years and ten months.

According to the end of the studied period, two observations did not result in convictions; we consider these cases as exceptions. They had a similar probability of a guilty verdict at each interval, but it was never delivered. The results of researching the effectiveness of institutional changes in the system in combating money laundering based on the Kaplan-Meier approach (equation 1) are shown in Table 4.

Table 4. The result of calculations using the Kaplan-Meier method

Case Number	24	1	10	18	6	27	21	22	5+	17	32	14	36	8	40	34	26	23	28	2	3	
Time (years)	0,16	0,45	0,58	0,72	0,83	0,96	1,03	1,32	1,37	1,41	1,93	2,05	2,24	2,35	2,36	2,82	2,85	2,95	2,96	2,96	3,13	
Cumulatv Standard	0,98	0,95	0,93	0,91	0,88	0,86	0,83	0,81		0,79	0,76	0,74	0,71	0,69	0,66	0,64	0,61	0,59	0,56	0,54	0,52	
Case Number	12	33	11	20	9	31	35+	4+	19	29	7	38	25	16	15	30	13	41+	37+	42+	39+	
Time (years)	3,57	3,76	3,80	3,95	4,22	4,43	4,54	4,68	4,95	4,97	5,01	5,42	5,69	5,92	6,14	6,33	6,39	6,54	6,58	13,28	15,08	
Cumulatv Standard	0,49	0,47	0,44	0,42	0,39	0,37			0,34	0,31	0,28	0,26	0,23	0,20	0,17	0,14	0,11					
Standard	0,08	0,08	0,08	0,08	0,08	0,08			0,08	0,07	0,07	0,07	0,07	0,07	0,07	0,06	0,06	0,05				

Sources: developed by the authors.

The Case Number column in Table 4 corresponds to the observation numbers, sorted in ascending order of the number of days that have passed from the beginning of the crime to the court's conviction. The number of days is indicated in the Time column. Observations marked with a «+» demonstrate incompleteness of the input data. Accordingly, observation 24 corresponds to a crime that took 58 days from the beginning of its commission to the issuance of a guilty verdict, while for observation 13, this value corresponds to 2331 days.

The Cumulative Survival value represents the probability that, for any randomly selected crime, the time between the start of the crime and the conviction will be greater than the value in the Time column.

For observation 24, the time is equal to 58, and therefore the probability that the court's conviction for the crime of money laundering will be more than 58 days is 97.6%. The probability that the court will issue a guilty verdict in 481 days is 81% (observation 22). With a probability of 73.6%, punishment for the crime will occur in 749 days, which is more than two years (observation 14). The values of the Standard Error column indicate a small margin of error, and therefore the calculated values can be trusted.

As the time between the crime and a conviction increases, the probability of a conviction decreases, but the process takes years. Moving on to the fifth stage of the scientific-methodical approach to assessing the effectiveness of combating money laundering, we will construct Figure 1 based on the graphical analysis of the survival function.

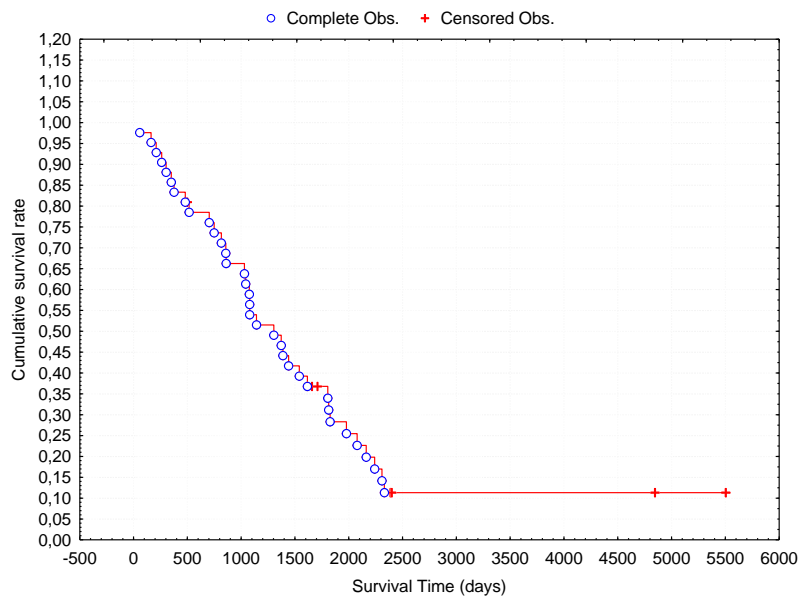


Figure 1. Visualisation of the dependence effectiveness of combating money laundering

Sources: developed by the authors.

Figure 1 graphically displays the obtained dependence with an increase in survival time (x-axis), the number of non-survivors decreases, and therefore the number of observations for which a guilty verdict was issued in court under Article 209 of the Criminal Code «Legalization (laundering) of income received» increases criminally.

To reflect the essence of the effectiveness of institutional changes in combating money laundering, we will display the quartile distribution of observations. According to Table 5, a quarter of the observations have a survival time of 723 days, meaning that 25% of the crimes will have at least two years until a conviction is reached. The second quartile, corresponding to the median number of crimes, will take approximately 1,242 days (3 years and five months). For the third quartile (75% of observations), about 1,995 days (5 years and six months) will pass between committing a crime and passing a guilty verdict.

Table 5. Visualisation of the dependence on the effectiveness of combating money laundering

Percentiles	Survival time
25 th percentile (lower quartile)	722,618
50 th percentile (median)	1242,059
75 th percentile (upper quartile)	1994,765

Sources: developed by the authors.

Conclusions. According to the research, the system of combating money laundering needs improvement. Its transformation during 2015-2021, namely the appearance of new state bodies for the prevention of economic crimes, did not lead to drastic changes in the system, and most importantly, there was no increase in the number of punishments and the amount of money returned to the state budget of Ukraine. The time that passes from the beginning of the commission of a crime for money laundering to the court issuing a guilty verdict lasts for years. The interval in the survival table is 500 days (1 year and four months), even though only 19.3% of criminal proceedings will end in a guilty verdict. Within the second interval, the share of criminal proceedings with a guilty verdict amounted to 81.8% of those proceedings remaining after the first time interval. Accordingly, only after two years and nine months have passed, the share of closed proceedings will be 37%, and in the fifth interval, it will reach 62%. Based on this, the activity of the institutional component in combating money laundering is monitored only two years and nine months after the crime is committed. According to a Kaplan-Meier analysis of the results, as the time between the crime and the time of conviction decreases, the probability of not being convicted decreases, but the process takes years. For observation 24, for which the sentence was passed in 58 days, the probability of a sentence in a similar proceeding is 2.4%. And for observation 22, the guilty verdict of the court was issued for 481 days – 19%, for observation 14 – 749 days with a probability of 26.4%. The probability of a conviction greater than 50% occurs only for 12 observations (50.9%) after 1304 days. If three years and seven months pass after the crime, the probability of a guilty verdict will be 50.9%.

So, changes in the organisational and functional composition of the system of combating money laundering, which was implemented in recent years, could have improved the quality of combating money laundering. Further research should be directed to a detailed analysis of the structural elements of the institutional part of the system of combating money laundering to identify the weaknesses of each stage: financial monitoring, investigation and the judicial system. Since the inefficient operation of any element of the institutional component leads to its general inefficiency.

Author Contributions: conceptualisation, A. B., Z. J. and S. M.; methodology, S. M.; validation, A. B., S. M., and V. B.; formal analysis, Z. J.; data curation, A. B.; writing-original draft preparation, A. B., Z. J., S. M., V. B. and A. B.; writing-review and editing, A. B., S. M. and V. B.; funding acquisition, V. B.

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Інноваційний підхід до оцінювання ефективності системи протидії легалізації кримінальних доходів

Стаття узагальнює аргументи та контраргументи в межах наукової дискусії з питання удосконалення системи протидії легалізації кримінальних доходів. Основною метою проведеного дослідження є оцінювання ефективності системи протидії легалізації доходів. Дослідження питання оцінювання ефективності системи протидії легалізації доходів в статті здійснено в наступній логічній послідовності: формування інформаційної бази дослідження; визначення термінальних подій як критеріїв ефективності системи протидії легалізації кримінальних доходів; побудова таблиць «виживання», що передбачають визначення ймовірності настання судового вироку з питань фінансового моніторингу; оцінювання ефективності інституційних змін у системі протидії легалізації кримінальних доходів. Для проведення дослідження використано методи аналізу виживання – таблиці виживання, метод Каплана-Мейєра. Апробація розроблено науково-методичного підходу до оцінювання ефективності системи протидії легалізації доходів здійснювалася на основі даних фінансового моніторингу в Україні, періодом дослідження обрано 2009-2022 роки. На основі проведеного аналізу визначені часові інтервали та встановлені ймовірності уникнути покарання за злочин легалізації доходів, одержаних

незаконним шляхом. Автори статті емпірично визначили, що зі збільшенням часу між моментом вчинення злочину та моментом винесення обвинувального вироку суду зменшується ймовірність того, що не буде винесено обвинувальний вирок суду. Визначено, якщо після вчинення злочину пройде 3 роки 7 місяців, ймовірність винесення обвинувального вироку буде 50,9%. На основі отриманих розрахунків справедливо стверджувати, що наразі зміни у організаційно-функціональному складі системи протидії легалізації доходів, одержаних незаконним шляхом, які були впроваджені протягом останніх років не призвели до значного ефекту у підвищенні якості протидії легалізації незаконних доходів. Подальші дослідження повинні бути направлені на детальний аналіз структурних елементів інституційної частини системи протидії легалізації незаконних доходів, щоб виокремити слабкі сторони кожного етапу: фінансового моніторингу, слідства та судової системи.

Ключові слова: фінансове шахрайство, ефективність, відмивання грошей, регулювання, аналіз виживання.