Methodical Approach to the Assessment of Risks Connected With the Legalization of the Proceeds of Crime

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ABSTRACT

The aim of the research is to develop a scientific and methodical approach, which consists in the timely identification of systemic risks connected with the legalization of the proceeds of crime, their formalization, assessing and monitoring in order to prevent these transactions occurrence. The article analyzes the state of the Ukrainian economy in terms of its level of shadow economy, the corruption index, and the amount of illegal withdrawal of funds from the country. The key ways and methods of money laundering in Ukraine are defined. The components of the process of illegal withdrawal of funds abroad have been studied as well as key drivers and methods of shadow economy have been identified. The theoretical foundations of the development of the of formalization and assessment model of systemic risks of hiding proceeds are highlighted. A model for assessment of the risk occurrence probability of the legalization of proceeds of crime is developed. The risk occurrence probability of the legalization of proceeds with the participation of Ukraine and partner countries was assessed.

INTRODUCTION

To date, the problem of legalization of the proceeds of crime is a challenge for the financial and economic stability of many countries. Stable activity of the financial system of the country is possible through providing the effective mechanisms and measures on deterring and combating money laundering at the level of different agents of the national economy and financial institutions (Lyeonov at al., 2018; Vasylieva at al., 2018; Polko, 2016). Recently, there is the process of bringing the existing legislative and regulatory framework in compliance with the requirements of the international standards of the national system for combating the legalization of the proceeds of crime and terrorism financing.

In order to determine the areas of activity and channels for the financial flows transferring, where the probability of money laundering and terrorism financing is the highest one, it is necessary to analyze and assess the risk of these transactions (Buriak at al., 2015). The risk assessment approach will involve identifying and monitoring of the potential risks of legalization of the proceeds of crime, that will allow to prevent the money laundering processes (Lazanyi et al., 2017). The implementation of a risk assessment approach is possible due to the cooperation of competent authorities and financial institutions (Vasylyeva at al., 2014).

1. PROBLEM DEFINITION

The financial and economic crisis of 2008-2009, which has affected its negative consequences all over the world, has demonstrated the need to improve the system of protecting from illegal operations (Alikariev et al., 2018). Based on the results of the analysis that was carried out by the International Anti-Money Laundering Group, the annual amount of money laundering is 700 billion - 2 trillion US$, that on average is equal to 2-5% of world GDP and is said to cause insignificant impact on the indicators of socio-economic development of the society (Report on money laundering methods typology in 2002-2003, 2013). However, despite the fact that the average world level of hiding proceeds does not exceed the conventionally safe value, this indicator is critical for some countries (Table 1) and reflects rather developed and extensive system of shadow relations.

Table 1. The shadow economy level of the countries of the world, 2016

Country	The economy shadow level (% of GDP)
Azerbaijan	60,04
Ukraine	52,2
Nigeria	48,37
The Russian Federation	39,07
Sri Lanka	37,76
Brazil	34,76
Pakistan	31,78
Spain	17,2
Germany	10,4
Australia	9,4
Canada	9,8
China	8,1
Switzerland	8,4
Japan	8,6
The USA	5,4

Source: Angelko, 2011

According to the above data, in Ukraine, as a result of deep economic and political crisis, the number and amount of the schemes used for illegal withdrawal of capital from the country has increased significantly, the level of economic crime has increased. According to the index of hiding proceeds, the country ranks second and has more than 50% of the total volume of added value of hidden proceeds (Figure 1). According to F. Schneider's (2015) calculations, the EU average shadow economy level in 2014 was 18.6 % of GDP, 10.8 % in France, 12.2 % in Germany, and 23.5 % in Poland respectively. At the end of the first decade of the 21st century, Ukraine's economy becomes one of 15 most shadow intensive economies (Vasylyeva at al.., 2014) with an indicator 17 % higher than the world average shadow economy level, 41.2 % higher than the minimum level of the shadow economy level in Switzerland, but 16.4 % less than the highest indicator of the shadow economy level in the world from 1999 through 2007, which was recorded in Bolivia.

Figure 1. Integral indicator of the shadow economy in Ukraine (in % of the official GDP) and real GDP growth/reduction rate (in % of the corresponding period of the previous year)
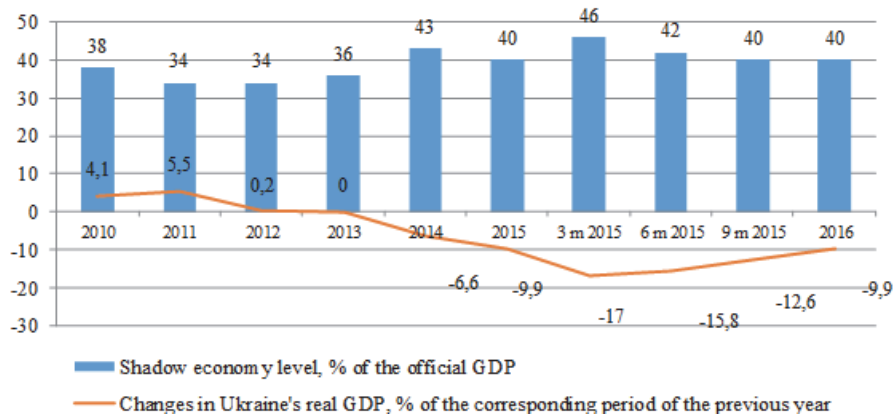
Source: National risk assessment report on preventing and countering legalization (laundering) of proceeds of crime and financing of terrorism, 2016

The graph (Fig. 2) shows that Ukraine is on the right side of normal distribution (see the red vertical line), which is another illustrative example of the abnormal situation related to the national shadow economy. According to the experts of Global Financial Integrity, illegal financial flows are the illegally earned capital, transferred or used, which includes all unaccounted private financial flows that lead to the accumulation of foreign assets by residents that violates the existing regulatory framework and limits of capital controls (Dev and Sarah, 2011). However, a significant component of the hidden withdrawal of capital is formed through legal activity that is possible due to the gaps in legislation. In general, the illegal withdrawal of funds from developing countries made to 7,28 trillion dollars during the period from 2000 to 2008, with an average annual illegal withdrawal from 725 billion to 810 billion dollars per year for the period 2000-2008 (Leonov at al., 2013). Most of the illegal flows come from Asian countries - almost half a trillion dollars in 2008. For nine years, from 2000 to 2008, the cumulative flows were: China - 2.2 billion dollars, Malaysia - 291 billion dollars, Philippines - 109 billion dollars, and Indonesia and India - 104 billion dollars (Nelson, 2017). Ukraine is included in the TOP-20 countries, whose economy suffers from illegal withdrawal of capital.

Figure 2. World Economies' Shadow Economy Level Probability Distribution Density
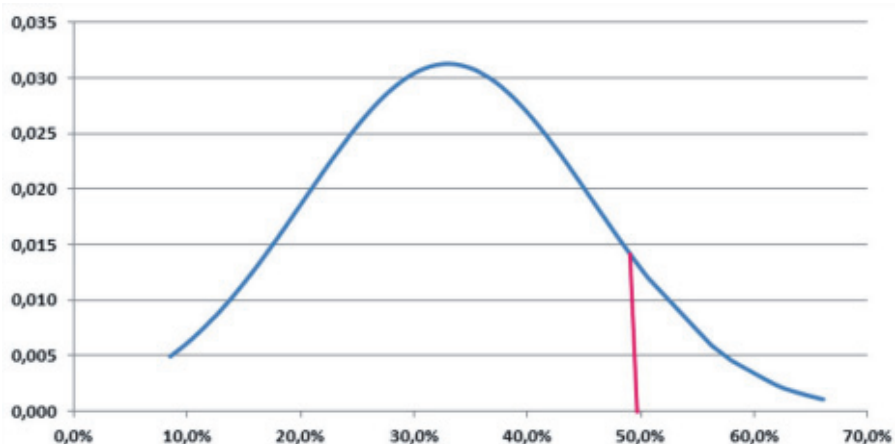
Source: National risk assessment report on preventing and countering legalization (laundering) of proceeds of crime and financing of terrorism, 2016

The shadow economy index in Ukraine is at a sufficiently high level, which reflects the fundamental gaps in public policy. The largest share in the overall structure of money laundering is occupied by transactions of illegal withdrawal of funds abroad - 27 billion UAH or 60% of the total volume (Figure 3). According to the results of 2016, extractive industry, real estate transactions, recycling industry, financial and insurance activities are the main fields of the economy where the various schemes of hiding proceeds were used the most (Morscher et al., 2017).

Figure 3. The most widespread money laundering schemes in Ukraine (billion UAH)
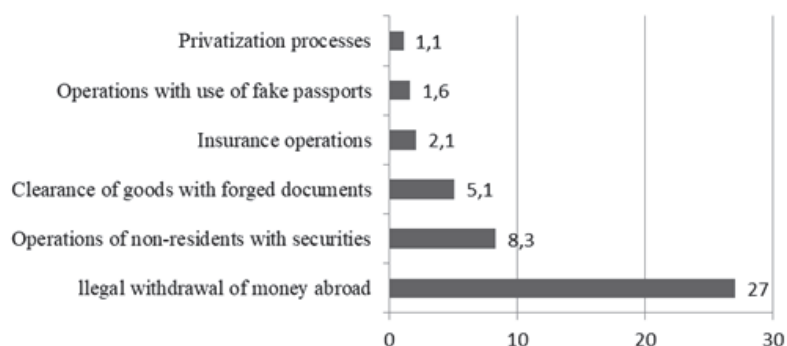
Source: The most widespread money laundering schemes connected with the operations on the illegal withdrawal of money abroad and investment from offshore zones

Money laundering has both macro and micro levels. There are three main stages of money laundering on macro level: placement, layering and integration (Figure 3).

Placement: Financial resources are deposited into financial institutions or converted into negotiable instruments for example money orders or traveler's checks. The main aim of placement is to remove the cash from the location of acquisition in order to conceal from the authorities and transform into other asset forms.

Layering: includes the separation of proceeds from the illegal source through the use of complex transactions designed to obscure the audit trail and hide the proceeds. This stage can include the transfer of money from one bank account to another, from one bank to another, from one country to another, or any combination thereof. For example, money can be moved into and out of various offshore bank accounts through Electronic Funds Transfers. Layering is the most international and complex step of the money laundering cycle because funds are typically moved from one foreign account to another. Considering the difficulty in obtaining account information to identify owner, using shell corporations and offshore banks is the most frequently way of money laundering at this stage.

Integration: represents the conversion of illegal proceeds through financial or commercial operations. Integration creates the illusion of a legitimate source for criminally derived funds and involves techniques by legitimate businesses to increase profit and reduce tax liability. Integration includes producing false invoices for goods purportedly sold by a firm in one country to a firm in another country, using funds held in a foreign bank as security for a domestic loan, commingling in bank accounts of companies earnings and illegitimate income, and purchasing property to create the illusion of legal proceeds upon disposal (Tiutiunyk, 2017; Sroka and Vveinhardt, 2018)

In recent years, a tendency of reducing the level of shadow economy has been observed. According to the official data of the Ministry of Economic Development and Trade of Ukraine, the level of shadow economy is 34% of the official GDP (European Business Association). Despite the positive trend of reducing the shadow economy, there is a number of potential risks that may contrib-

ute to growing of the shadow economy. First of all, they are associated with a possible recession in the EU and significant financial commitments of Ukraine in foreign markets, leading to a sharp slowdown in economic growth of Ukraine.

There are a number of factors that influence on money laundering both directly and indirectly around the world. In general, they can be classified into 6 groups: political, social, technological, environmental, legislative, and economic. In more detail, their structure is shown in Figure 4.

Figure 4. The factors of money laundering
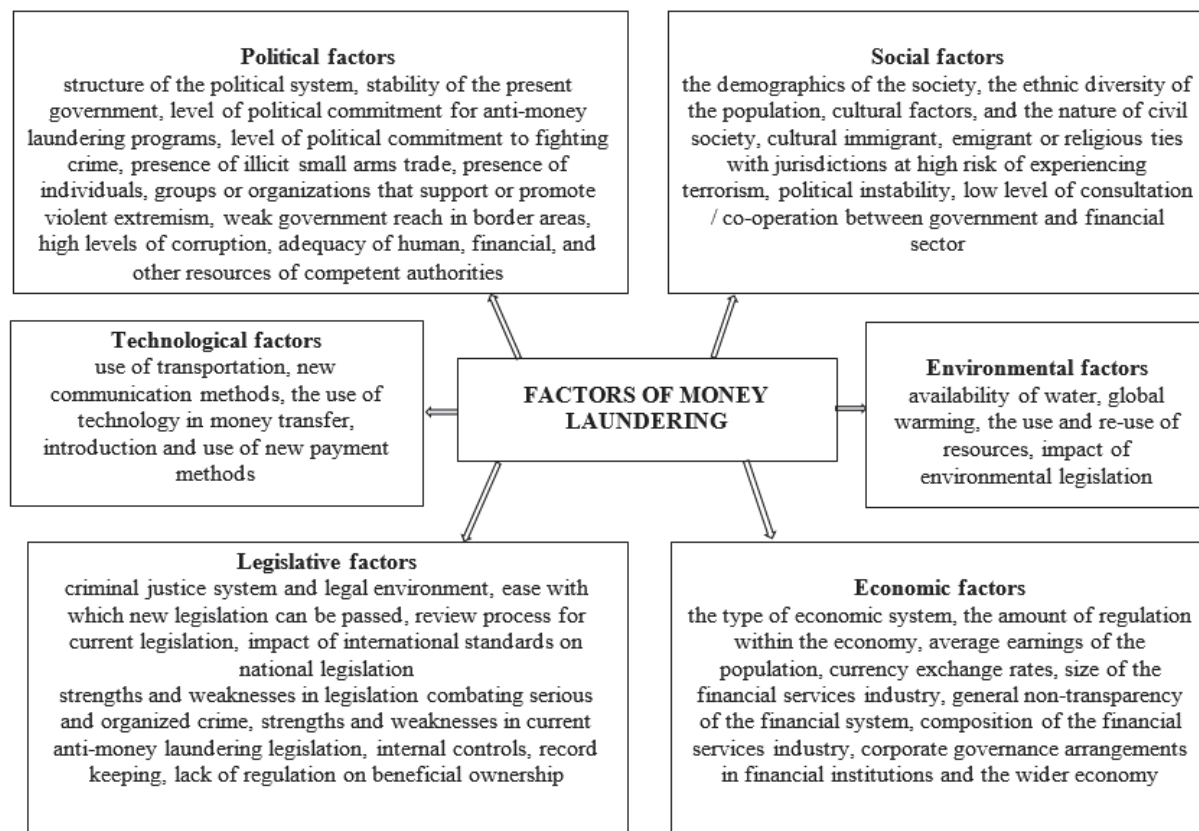
Source: Ayodegi, 2011.

Money laundering and the financing of terrorism are global problems that not only threaten security (Siemiątkowski, 2017), but also compromise the stability, transparency and efficiency of financial systems (Logan et al., 2017), thus undermine economic prosperity. It was considered as a threat to the integrity of financial and commodities markets, undermines fair inside and outside competition, distorts financial, material and nature resource allocation, destroys public trust and undermines the rule of law.

If growth rates of shadow revenues outpaced the official GDP growth rate, this could lead to an underestimation of the real need of the economy in money, an increase in investment risks, a decrease in investment activity and, as a result, a reduction in the supply of investment resources (Bhowmik, 2018). Shadow activity limits the ability of the entrepreneurs to attract investment resources, especially foreign ones (Bobenic Hintosova, 2018). Expansion of the shadow sector stimulates the growth of speculative financial, trade and intermediary transactions to the detriment of

the development of real production. The growth of the shadow sector is characterized by concealing the sources of investment. Thus, Ukrainian investors during the crisis insure against investment risks. It should also be noted that the "shadow" accelerates the process of concentration of capital, which is extremely important for countries with market economies.

While analyzing the impact of money laundering on developing economies (Bartlett, 2002), five directions of money laundering flows in such economies were specified. First, domestic flow, in which illicit domestic funds are laundered within the country. Second, returned flow means criminal activities occurred in the developing country, fund placed outside the country and later on integration occurred in the developing country. Third, inbound funds, for which the predicate crime occurred abroad, is either initially laundered abroad or within the developing country, and ultimately is integrated into the developing economy. Fourth, outbound funds, constitutes laundered fund originated in the developing country and integrated outside the economy or capital flight. Fifth, flow-through funds originates and integrates in the developed country, by using the financial institution of developing country during the period of layering.

The sources of illegal financial flows also include the proceeds in the form of tax evasion and manipulation of prices in foreign economic transactions (i.e. transfer pricing, which is the most significant component of such flows - Yakubovskiy and Rodionova, 2014).

The shadow outflow of proceeds abroad is due to a violation of the current tax legislation (for example, without payment of relevant corporate taxes or violations of the rules of currency control and regulation, etc.).

Analysis of the data of the State Committee for Financial Monitoring 2004-2006 showed that popular methods of money laundering in Ukraine are as follows:

– operations on illegal withdrawal of funds abroad;
– operations with use of lost passports;
– operations with precious (banking) metals;
– operations connected with illegal refunds of value added tax;
– operations on illegal conversion of funds into cash ("conversion centers");
– smuggling and crimes against property;
– drug-related crimes;
– foreign economic operations (cargo customs declarations with signs of forgery, exports at inflated prices or non-existent companies);
– securities transactions;
– real estate transactions (compiled by the authors based on the data of the State Financial Monitoring Service of Ukraine, *Typology of legalization of proceeds of crime, 2003*).

Despite the existence of a significant range of hiding proceeds channels, for Ukraine the most widespread ones are tax channels. Their purpose is to minimize the amount of tax liabilities. To date, there is significant number of ways to hide proceeds through tax channels in Ukraine, namely: the maintenance of two sets of books; the occurrence of accounting errors; understatement of profits; hiding part of assets.

In addition, the operations on the withdrawal of profits abroad by distributing business processes between business entities of different countries are quite widespread. As a rule, the production processes are carried out on the territory of Ukraine, and financial operations and operations on assets management - at foreign enterprises abroad. The process of distribution of proceeds and expenditures of these enterprises is constructed in such a way that the maximum part of proceeds is accumulated abroad.

In addition to the above mentioned scheme of hiding proceeds, some business entities use mechanisms aimed at obtaining VAT refunds through illegal operations with hiding proceeds (Figure 5), which can result in increasing VAT gap in a country (Majerova, 2016).

Figure 5. Algorithm of illegal VAT refunds during carrying out the operations on hiding proceeds through tax channels
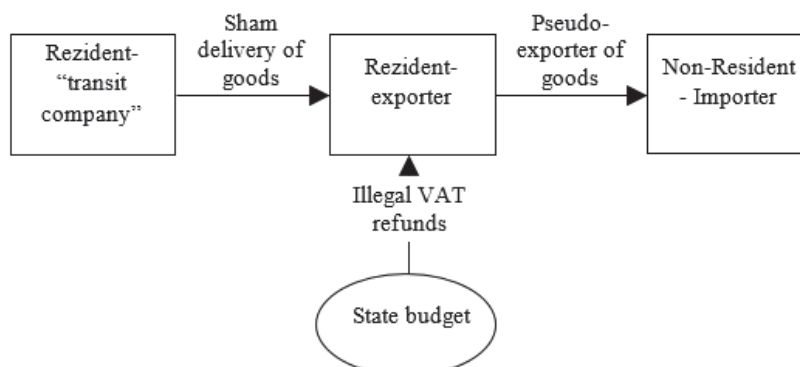
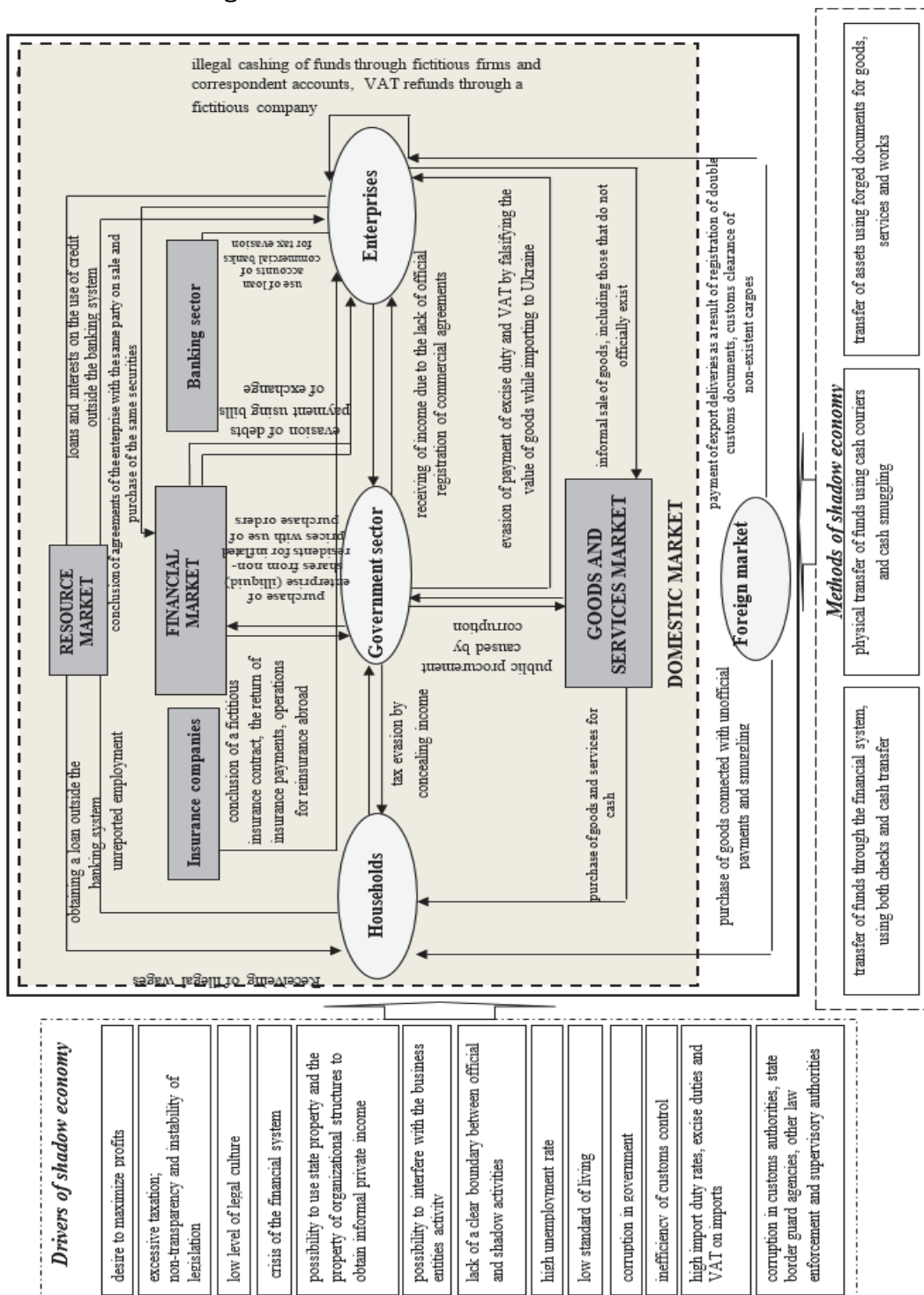Source: Typology of legalization of proceeds of crime, 2003

While studying the global competitiveness of 2017-2018, it is determined that the effectiveness of the tax system of Ukraine ranks 81 among 148 countries (World Economic Forum, 2017). The use of optimization schemes facilitates the development of channels for the withdrawal of funds from the national economy and it is a sufficiently flexible and universal tool for companies of various types of activities. Thus, the payment of interests for the use of loans from controlled foreign companies can become a convenient channel for domestic business entities for the hidden withdrawal of capital from the country. If foreign company is located in a country with which Ukraine has signed an agreement on avoidance of double taxation, and this country is not included in the list of offshore zones of the Cabinet of Ministers, the interests for using such loan belong to the expenditures of the Ukrainian company, which, accordingly, allows to minimize income tax liabilities. There are almost no barriers to the hidden withdrawal of capital in Ukraine and that is why the profits are withdrawn from the country almost without any interference. In some countries, in order to prevent illegal withdrawal of capital, there are created the conditions when the legal transfer of profits to "tax havens" is accompanied by additional payments to the budget and expenditures, and illegal – by risks of prosecution.

Investment flows in Ukraine, in addition to their common purpose, are often a chain of the schemes of hidden withdrawal of capital. The prominent example is the large volume of investments from Cyprus, which amount to more than 32% of the total volume of foreign direct investment in Ukraine. According to the data of the State Statistics Service, Cyprus accounts for the largest share - 19 billion USD of 58,2 billion USD foreign direct investment attracted during all the years of Ukraine's independence since 1991. Only in 2013 the investors, who were registered in Cyprus, invested 1.8 billion USD of 3.7 billion USD of foreign direct investment (3,9 billion USD of 4,1 billion USD in 2012).

The experts' evaluations of Tax justice network (*The Financial Secrecy Index*, 2018), certify that there are about 80% of the volume of trade in financial services in the world market per ten jurisdictions, which according to *"The Financial Secrecy Index"* have the highest indicators of financial secrecy. More than 50 % of bank assets flow through a jurisdiction that has a high degree of secrecy (Dheera-aumpon, 2017). According to the data of Stolen Asset Recovery Initiative almost all large multinational companies use jurisdictions with high degree of secrecy in order to minimize the tax base for corporate taxes (The Stolen Asset Recovery Initiative - StAR). Financial systems in developing countries are more likely to accumulate and implement the systemic risks, despite the small size and complexity of their financial systems in comparison with the developed countries. The level of the financial stability risk in the country depends on the behavior of many participants in the financial system (Sysoyeva and Buriak, 2014).

Taking into account the constant systemic interaction of economic entities in the domestic and foreign markets of resources, goods and services and financial markets, and the consequences of these interrelationships in the form of synergistic explicit and implicit effects, we have determined the drivers and methods of shadow economy. The main components of the illegal withdrawal of funds abroad are shown in Figure 6.

Figure 6. Structural and logical scheme of formation of shadow financial flows

2. MODELS OF ASSESSMENT OF RISK OCCURRENCE PROBABILITY OF LEGALIZATION OF PROCEEDS OF CRIME: CRITICAL ANALYSIS AND PROSPECTS OF APPLICATION

It is a difficult task to develop a unified approach to the assessment of the risk occurrence probability of the legalization of proceeds of crime, due to the multifaceted and multichannel phenomenon of the shadow economy. Since the factors and causes of the shadow economy differ significantly in each country, the determination of the scale of illegal activity depends on the features of the economic system functioning. So, if in the developed countries the shadow economy is a defined criminal activity and makes only a small share of the illegal operation, then in countries with transformational economy (including Ukraine) this is the share of the legal economy, without which the official economy functioning is impossible.

The Bureau of International Narcotics and Law Enforcement Affair developed the classification of countries, depending on the effectiveness of measures to combat the legalization of proceeds of crime and terrorism financing:

− countries that have "minor shortcomings" in systems of combating money laundering and try to eliminate them (Afghanistan, Austria, Burma, Great Britain, Canada, China, France, Germany, Iran, Italy, Nigeria, Russia, the USA, Turkey, Switzerland, Japan, Ukraine);
− countries that have "minor shortcomings" in systems of combating proceeds legalization and do not take measures to minimize them (Azerbaijan, Belgium, Chile, Hungary, North and South Korea, Moldova, Poland, Portugal, Serbia, Syria, etc.)
− countries that have a lot of shortcomings and do not try to eliminate them (Cameroon, Cuba, Estonia, Macedonia, Nepal, Norway, Slovenia, Sweden, etc. - Koldovsky, 2008)

Table 2 shows the comparative characteristics of countries in terms of index of combating the legalization of proceeds of crime.

Table 2. Comparative characteristics of the countries in the context of combating the legalization of proceeds of crime

Country	The USA	Great Britain	China	Russia	Ukraine
The declared participation in combating money laundering	+	+	+	+	+
Limit amount of funds for carrying out the operation	$10 000	$20 000	$10 000 cash payment, $100 000 ($500 000) for private persons/legal entities - non-cash	$11000	$3000
Centralized management at the state level	+	+	-	+	not all aspects are covered
Approaches to the organization of the anti-money laundering system	principle "know your customer"	principle "know your customer"	Identification of the operations adding the principle "know your customer"	control of operations	control of operations
The part of the anti-money laundering organization	FATF, APG	FATF	EAG, OGBS	FATF, MONEYVAL, EAG	MONEYVAL

Source: Koldovsky, 2008

The results of the table confirm the argument concerning a significant differentiation of tools and mechanisms on preventing the hiding proceeds. Taking into account the above mentioned, in our opinion, the development of a unified methodical approach and the development of mathemat-

ical models for estimation of the shadow economy size and propositions for their substantial re-duction are one of the priority areas of the research.

To date, there is a significant variety of techniques for assessing the level of hiding proceeds, which differ in the different quantitative and qualitative composition of the indicators. The most common method for estimating the volume of hiding proceeds in countries with developed market economies is money-and-credit (monetary) methods. Their use is based on the thesis that only cash is used for the shadow schemes implementation.

One of such methods is a method based on the analysis of the demand for cash (Turchinov, 1995). The increase in demand for cash during studied period, compared to the base one, indicates an increase of the level of the shadow economy. As a rule, the period with the lowest level of shadow economy in relation to the analyzed one is used as the base period.

The most simple algorithm for using this method was developed by P. Gutmann (1982), who calculated the ratio of cash and deposits while studying the size of the shadow economy by the following formula:

$$f_{(t_0)}^t = \frac{C^t D^{t_0}}{C^{t_0} D^t},\qquad(1)$$

where $f_{(t_0)}^t$ – change in the ratio of cash and deposits during the studied period t relative to the base period t_0;

C^t, C^{t_0}– cash during studied period t and base period t_0;

D^t, D^{t_0}– deposits (time deposits, demand deposits) in banks during studied period t and base period t_0.

The size of the shadow economy is calculated by the formula

$$T^t = W^t\left[f_{(t_0)}^t - 1\right] = W^t\left(\frac{C^t D^{t_0}}{C^{t_0} D^t} - 1\right) = W^t \frac{C^t D^{t_0} - C^{t_0} D^t}{C^{t_0} D^t}\qquad(2)$$

where T^t– size of the shadow economic activity in year t;

W^t– the volume of the official gross domestic product in year t.

The application of this group of methods has its own peculiarities that are connected with the following:

- significant errors in the obtained results that are caused by the change in the time interval, during which the shadow economy phenomenon can be absent;
- probabilistic nature of the assumption of the existence of a shadow economy in the country for a certain time;
- the lack of reliable and confirmed data concerning the fact that any changes in the ratio of cash and deposits are caused by the influence of the shadow economy.

The Ministry of Economic Development and Trade of Ukraine proposed to estimate the size of the shadow economy on the basis of 4 methods: "expenditure of population - retail turnover", un-profitability of enterprises, electricity consumption method and monetary method. The electricity consumption method is a common method of estimating the size of the shadow economy. According to it, the dynamics of real GDP should correspond to the growth of domestic volumes of electricity consumption. If the growth rate of consumed electricity exceeds the analogous GDP indicator, then it is assumed that electricity is consumed in the production sphere of the shadow economy. The formalization of the electricity consumption method is based on the determination of index indicators of the studied and base periods by the formula:

$$T_{E_{t(t_0)}} = \frac{I_{E_{t(t_0)}} - I_{GDP_{t(t_0)}}}{I_{GDP_{t(t_0)}}} \times 100,\qquad(3)$$

where $I_{E_{t(t_0)}}$–index of change in electricity consumption during the studied period compared to the base one;

$I_{GDP_{t(t_0)}}$ – index of GDP change during the analyzed period compared to the basic;

t – studied period;

t_0 – base period (the index of changes in domestic electricity consumption and GDP is equal to 1).

The assessment of the risk of hiding proceeds using the method of "expenditure of population - retail turnover" provides the monitoring and identification of the existence of an excess of consumer money expenditure for goods purchasing over the total volume goods sold to the population by all economic entities in the legal sector of the economy. Data on household expenditures are obtained through a sampling observation of their living conditions on a voluntary basis, and data on the total volume goods sold to the population by all business entities are received through statistical reporting.

The method of unprofitability of the enterprises provides the determination of the minimum and maximum coefficients of the shadow economy as a share of GDP within which the level of the shadow economy lies. While using the method of unprofitability of enterprises, the following assumptions are used:

− all unprofitable enterprises are actually profitable according to the official statistical data, that is considered as overestimation of the size of the shadow economy.
− the return of unprofitable enterprises is equal to the return of profitable enterprises during the studied period.

In addition to the above analyzed methods, the risk occurrence probability of hiding proceeds is determined by use of soft modeling methods that involve the calculation of the relative size of the shadow economy through the determining of a set of factors that cause it. The peculiarity of this method is that it takes into account various factors leading to the formation and growth of the shadow economy, as well as the change in the shadow economy over time. This is important, since the shadow economy simultaneously influences production, labor and money markets.

The structural method is based on the use of retrospective data on the scale of shadow economy in various industries. The expert method is based on the intuition and experience of qualified specialists, which determine the degree of data reliability, interrelations and relationships that cannot be quantified. Similarly, the latency of economic crimes is assessed. The method of comparing proceeds and expenditures uses the differences between statistical data on their volumes. In the system of national accounts, the volume of proceeds should be equal to the amount of expenditure. Thus, if an independent assessment of the expenditures of national accounts is available, then the difference between expenditures and proceeds can be used as an indicator of the level of shadow economy.

3. STUDY RESULTS

According to the results of the conducted analysis, to date, the problem of illegal withdrawal of funds abroad and their subsequent legalization requires the development of a set of sequential measures aimed at both timely identification and punishment of participants of the shadow withdrawal of funds abroad and minimization of the risk of these transactions occurrence. At the same time, in our opinion, it is necessary to consider the risk of legalization of proceeds of crime as the possibility of a transaction related to the legalization of proceeds that were illegally withdrawn abroad. We propose to evaluate this risk by the following components:

Authorities which are directly or indirectly involved in the operation. To date, in Ukraine, there is a significant level of corruption in most executive authorities at all levels. It is manifested both in concealing the facts of hiding proceeds, and in direct participation in these operations. Thus, according to the estimations of the international experts, for most authorities the level of corruption is above the average. The data on the level of corruption in Ukraine is shown in Fig. 7.

Figure 7. Corruption level in different institutions of Ukraine
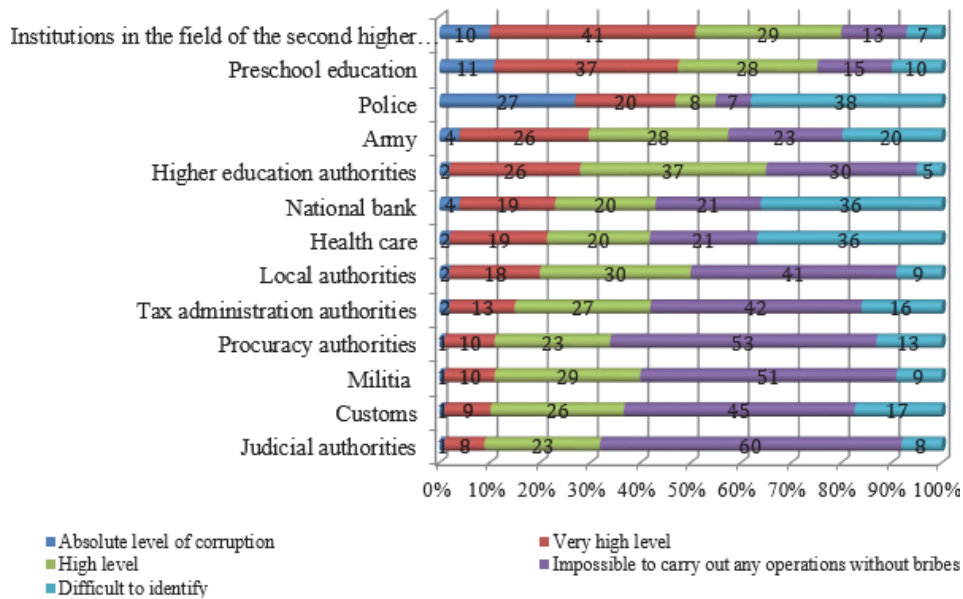
Source: National risk assessment report on preventing and countering legalization (laundering) of proceeds of crime and financing of terrorism, 2016

We propose to calculate the probabilistic value of the risk of proceeds legalization, that were illegally obtained by different government authorities, as a weighted average of the levels of corruption in a single institution with weighted coefficients from 1 - a high level of corruption (it is impossible to carry out any operations without a bribe) to 5 - a low level of corruption.

➤ Countries involved in operations. Globalization phenomenon and changes in the main development determinants of industrialized countries lead to growing interdependencies among economies (Pietrzak, 2017). This criterion provides taking into account the risk occurrence probability of hiding proceeds in the partner countries, business entities or public authorities which are involved in operations.

We propose to base the overall assessment of this risk on the value of the corruption index that was determined by the international organization Transparency International. The choice of this index is caused by the fact that, in our opinion, the country's corruption index is a direct evidence of the possibility of legalizing the proceeds of crime in a particular country, since these transactions are always the result of the accumulation of proceeds of crime, as a result of the corruption schemes in the country. Transformation of this index into the probabilistic value, in our opinion, should be done by the following formula:

$$Rml = \alpha \cdot \frac{(10 - l_k)}{10} \cdot h \qquad (4)$$

where R_{ml}– probabilistic assessment of the risk of legalization of proceeds of crime of a partner country;
α – weighted coefficient;
l_k – corruption index of a particular country;
h– limit value of the interval.

To determine the optimal number of groups for ranking countries, we use the Sturgess formula:

$$n = 1 + 3.322 \cdot lg\ N, \qquad (5)$$

where n – number of groups,
N – sample size.

After determining the number of groups, we calculate the upper and lower limits of the variable characteristics of each group. The length of the interval is determined by the formula:

$$h = \frac{R}{n-1}, \qquad (6)$$

where R = x_{max} − x_{min} – sample range;
x_{max}, x_{min}– maximum and minimum value of characteristic.

Based on the calculations, the grouping of countries in terms of the probability index of hiding proceeds is carried out at three levels: countries with a corruption index of 0-5 - have high risk of money laundering operations (limits of interval are 0.165-0.66) 5-6 have medium risk level , with the limits of 0-0,165; more than 6 – have low level of risk. The index of corruption of countries, according to the calculations of 2016 is shown in Table 3.

Table 3. Corruption index of the countries

Country or territory	Corruption index	Risk assessment	Country or territory	Corruption index	Risk assessment
Korea	0	high	Latvia	4,8	high
Iraq	1,5	high	Lithuania	4,8	high
Uzbekistan	1,7	high	Slovakia	4,9	high
Afghanistan	1,8	high	Korea	5,1	average
Venezuela	2	high	TRepublic of South Africa	5,1	average
Turkmenistan	2	high	Italy	5,2	average
The Central African Republic	2	high	The Czech Republic	5,2	average
Azerbaijan	2,1	high	Cyprus	5,3	average
The Republic of Belarus	2,1	high	Hungary	5,3	average
Kazakhstan	2,1	high	Israel	6,1	low
Tajikistan	2,1	high	Portugal	6,5	low
Nigeria	2,2	high	Estonia	6,5	low
The Russian Federation	2,3	high	Slovenia	6,6	low
Syria	2,4	high	Spain	6,7	low
Iran	2,5	high	Chile	7	low
Ukraine	2,7	high	USA	7,2	low
Moldova	2,8	high	France	7,3	low
Argentina	2,9	high	Ireland	7,5	low
Egypt	2,9	high	Japan	7,5	low
Bosnia and Herzegovina	3,3	high	Germany	7,8	low
Montenegro	3,3	high	Austria	8,1	low
Georgia	3,4	high	Great Britain	8,4	low
Saudi Arabia	3,4	high	Luxemburg	8,4	low
Serbia	3,4	high	Australia	8,6	low
India	3,5	high	Canada	8,7	low
China	3,5	high	Norway	8,7	low
Romania	3,7	high	Netherlands	9	low
Bulgaria	4,1	high	Switzerland	9	low
Turkey	4,1	high	Iceland	9,2	low
Croatia	4,1	high	Sweden	9,3	low
Poland	4,2	high	Denmark	9,4	low
Greece	4,6	high	New Zealand	9,4	low

Source: constructed based on the data (Transparency International)

In addition, during the assessment process, it is necessary to take into account the fact that carrying out the operations involving offshore zones is characterized by an increased degree of risk. Thus, countries with high GDP indicators per capita are also world leaders in the volume of offshore financial services providing. In particular, 65% of the total volume of offshore financial services is concentrated in five countries with high GDP per capita (the USA, the UK, Luxembourg, Switzerland and Germany). According to the results of the Tax Justice Network survey, Ukraine is

among the top twenty countries where residents have accumulated the largest offshore capital (almost 170 billion USD), that is more than triple the volume of foreign direct investment in Ukraine in 2014 (58,2 billion USD). The list of offshore zones is defined by the Decree of the Cabinet of Ministers of Ukraine No. 143-p of February 23, 2011. (On the list of offshore zones, 2011), is given in the Table 4.

Table 4. List of offshore zones

Country	Corruption level	Country	Corruption level
Andorra	0	Anguilla (territory of Great Britain)	0
Antigua and Barbuda	0	Niue (territory of New Zealand)	0
Bahamas	0	The Turks and Caicos Islands	0
Barbados	6,9	The Netherlands Antilles	0
Bahrain	5	Montserrat	0
Belize	3	The Cayman Islands	0
Vanuatu	3,1	The Virgin Islands	0
Grenada	3,4	Puerto Rico	0
Dominica	5,6	Bermuda Islands	0
Liberia	2,1	Gibraltar	0
The Republic of Maldives	3,3	Alderney	0
The Marshall Islands	0	Isle of Man	0
Monaco	0	Isle of Jersey	0
Nauru	0	Isle of Guernsey	0
Samoa	4,5	Saint Kitts and Nevis	0
Seychelles	4,5	Saint Lucia	6,8
Saint Vincent and the Grenadines	6,1	Commonwealth of Puerto Rico	0
Aruba	0	The Cook Islands	0

Source: On the list of offshore zones, 2011

Formula 4 is a universal formula with help of which it is possible to transform relative indicators into probabilistic values. However, taking into account the uneven influence of different criteria on the final indicator of the probability of hiding proceeds in a particular operation, the use of a correction coefficient (α) will help to take into account these factors. Values of weighted coefficients for various risk components, which are determined by the expert assessments method, are given in Table 5.

Table 5. Values of weighted coefficient for the components of the probability of the hiding proceeds of an operation

Component	Value of weighted coefficient
Partner country	0,33
Country of origin	0,19
Type of economic activity	0,37
The authority involved in the operation	0,11

Source: own calculations

Thus, the formula for determining the probability of hiding proceeds by the criterion "*partner country*" has the following form:

$$Rml_{contr} = \begin{cases} 0.33 \cdot \frac{(10-I_k)}{10} \cdot 0{,}66, \text{if } I_k < 5 \\ 0.33 \cdot \frac{(10-I_k)}{10} \cdot 0{,}165, \text{if } I_k \geq 5 \\ 0.33 \cdot \frac{(10-I_k)}{10} \cdot 0{,}825, \text{with the participation of the offshore country} \end{cases} \tag{7}$$

The type of economic activity is the next parameter in the model of qualitative assessment of the risk occurrence probability of hiding proceeds. During the process of risk assessment by this parameter, we propose to use the approach to the classification of economic activities defined by the National Classifier of Ukraine (Classification of types of economic activity, 2010). The score of certain types of economic activity in accordance with the National Classifier is given in Table 6.

Table 6. The score of certain types of economic activity

Title	Score
Duplication of recorded media	10
Jewelry production	10
Trade in motor vehicles	10
Retail trade by mail order firms	10
Activity of hotels and restaurants	10
Financial leasing	10
Extension of credit	10
Insurance	10
Advertising activity	10
Activity on organization of gambling	10
Operations on stock exchange with stock valuables	10
Activities of real estate agencies	10
Operations with real estate for third parties	8
Trade in motor vehicles and motorcycles, their maintenance and repair	7
Management of financial markets	7
Musical instruments manufacturing	6
Post and communication activity	6
Financial intermediation	5
Research and development	5
Management in the social sphere	5
Non-ferrous metals manufacturing	4
Precious metals manufacturing	4
Furniture production; manufacturing of other products	4
Operations with real estate	4
Activities in the field of compulsory social insurance	4
Activities in the field of transport	3
International activity	3
Activities in the field of military defense	3
Activities on the ensuring the safety of the population in emergency situations	3
Fire safety activities	3
Vocational-oriented education	3
Higher education	3
Extraction of fuel and energy minerals	3
Fur and fur products manufacturing	3
Publishing and printing activities, duplication of recorded media	3
Scientific and technical activity	3
Chemical industry	3
Construction	3
Agriculture, hunting and related services	2
Recycling industry	2
Food production	2
Textile industry	2
Metallurgy industry	2
Public administration	2

Source: systematized by the authors on the basis of (Classification of types of economic activity, 2010)

The application of the above mentioned approach will allow to obtain probabilistic indicators of the risk of illegal withdrawal of funds abroad by its individual components. The general formula for these components calculation is as follows:

$$p(R_{ml}) = 1 - \prod_{i=1}^{n} p(\overline{R_{ml_i}}) = \prod_{i=1}^{n} p(R_{ml_i}) \qquad (8)$$

where $p(\overline{R_{ml_i}})$ – probabilistic assessment of the risk of the non-legalization of the proceeds of crime by operation;

R_{ml_i} – an integral index of the risk occurrence of legalization of the proceeds of crime by operation using the following factors:

$$R_{ml_i} = \{R_{ml_{inst}}, R_{ml_{contr\ partn}}, R_{ml_{contr}}, R_{ml_{econ\ activ}}\} \qquad (9)$$

The total number of scores by all components by the operation is calculated by the formula:

$$ML = MAX \left\{ \sum_{i=1}^{n} \left[ML_{contr_i} + ML_{contr\ partn_i} + ML_{inst_i} \right] \right\} + (n-1) + ML_{inst_i}$$

$$+ MAX_{i=1}^{m} \left\{ ML_{contr\ partn_i} \right\} + (m-1) + MAX_{i=1}^{k} \{ML_{econ\ activ}\} + (k-1) \qquad (10)$$

where *ML* – total number of scores by operation; $ML_{contr\ partn_i}$ – number of scores by "partner country" component; ML_{inst_i} – number of scores by indicator "authority directly or indirectly involved in the operation"; ML_{contr_i} – number of scores by indicator "country where the main operation participants are located "; $ML_{econ\ activ}$ – number of scores by indicator "economic activity"; *k* – number of types of economic activity involved in operation; *n* – number of persons involved in the operation n=1; *m* – number of countries involved in operation.

The above approach allows to assess the probability of legalization of proceeds of crime as a whole by all components of the operation. Effective implementation of any managerial activities requires the identification of the specific factors that caused the possibility of corruption schemes use and the development of mechanisms for their neutralization. That is why it is important to study the most risky components by determining the degree of excess of the calculated risk occurrence probability of the legalization of proceeds by a specific operation over its allowable value. Calculation of the deviation of these indicators, in our opinion, is advisable to carry out if the integral index of the risk occurrence probability is within the acceptable values, however, the analysis of the certain directions demonstrates the excess of the critically acceptable values. A rapid assessment of the level of risk for a specific country is shown graphically in Figure 8.

Figure 8. Graphical representation of the integral rapid assessment of the risk of the country's hiding proceeds
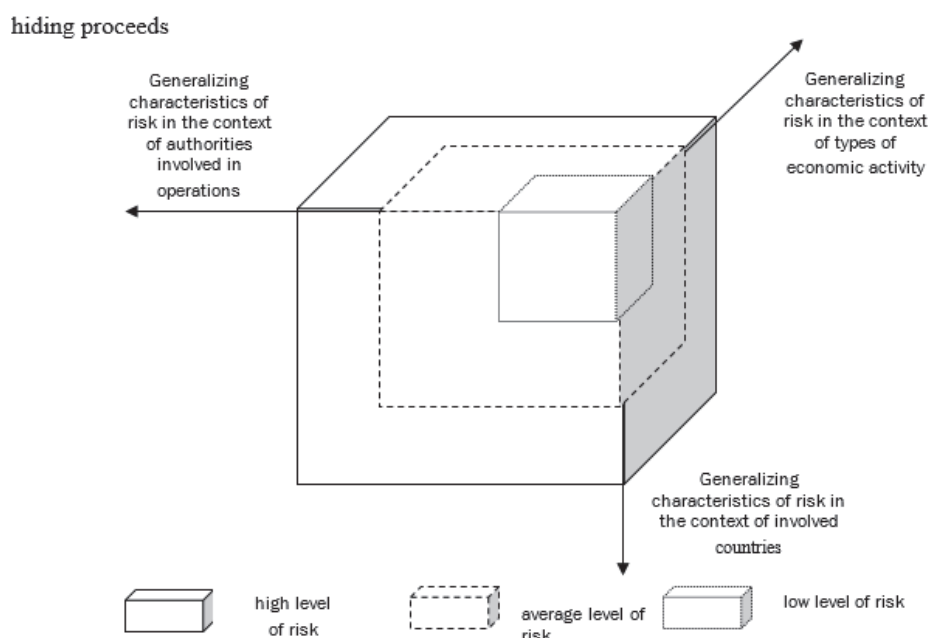

Source: compiled by the authors

4. STUDY RESULTS

Practical approval of the proposed approach to the risk assessment of hiding proceeds will be carried out using the example of investment channels for withdrawal of funds. According to the data of the State Statistics Service of Ukraine for the period 2010-2016, the volume of direct foreign investment from Ukraine amounted to 39 billion USD. Cyprus and Great Britain were the main recipients. The share of countries in terms of direct investment from Ukraine is shown in Figure 9.

Figure 9. Direct investment from Ukraine in the economy of the countries of the world
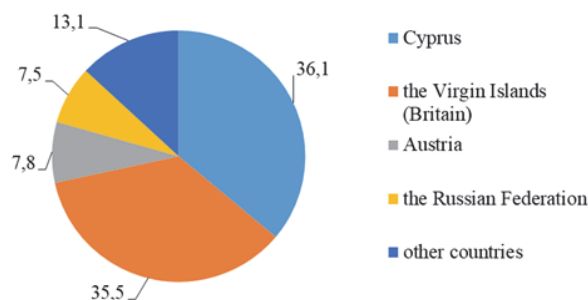
Source: own calculations based on (State Statistic Service of Ukraine, 2017)

Taking into account the above, practical approval of the proposed approach to the determining the probability of occurrence of operations on legalization of proceeds of crime for Ukraine will be carried out using the example of Cyprus and the Virgin Islands, as the countries with the largest volumes of investments from Ukraine. As the largest volumes of funds was invested in scientific activities and recycling industry in Ukraine (according the types of economic activity) (Table 7), that is why these types of activities will be assessed in terms of the risk occurrence probability of hiding proceeds.

Table 7. Direct investments (share capital) from Ukraine by types of economic activity

Type of activity	2013	2014	2015	2016
Agriculture	19,0	19,3	16,7	15,9
Recycling industry	171,2	131,5	108,7	113,0
Manufacture of food products, beverages and tobacco	77,8	59,3	52,2	51,6
Manufacture of wood products, paper and printing	9,5	8,4	7,5	7,2
Manufacture of basic pharmaceutical products and pharmaceutical preparations	0,1	0,1	0,1	6,9
Manufacture of rubber and plastics products, and other non-metallic mineral products	0,6	0,7	0,8	0,9
Metallurgical production, manufacture of fabricated metal products, except machinery and equipment	39,5	25,0	18,0	21,4
Machine building, except repair and installation of machinery and equipment	37,8	31,2	24,8	19,9
Manufacture of furniture, related products; repair and installation of machinery and equipment	*	*	0,2	0,2
Construction	0,8	11,6	1,3	1,3
Wholesale and retail trade; repair of motor vehicles and motorcycles	128,0	112,1	80,1	88,0
Transportation, storage, postal and courier activities	24,2	22,7	24,7	26,6
Information and telecommunication	0,0	2,7	2,6	2,5
Financial and insurance activities	221,7	125,3	73,8	72,5
Real estate operations	66,5	50,7	45,8	44,7
Scientific and technical activity	6 030,6	5 968,6	5 953,2	5 966,4
Activities in the field of administrative and support services	22,4	1,0	0,4	0,4

Source: State Statistic Service of Ukraine, 2017.

The results of the calculations are given in Tables 8 and 9 and they indicate the average level of risk of legalization of proceeds of crime while carrying out the operation of the recycling industry with the participation of Ukraine and the Virgin Islands. While carrying out these operations, we have identified local government and customs as authorities that are directly involved. However, this list is hypothetical, since, as a rule, much larger number of authorities from different institutions, both from one country and from another country, participates in these operations. While assessing the risk of laundering the proceeds of crime, the Virgin Islands, as an offshore zone, was given a high degree, and it caused a change from average to high degree of risk by the operation.

Table 8. The results of the assessment of the risk occurrence probability of legalization of proceeds of crime with the participation of Ukraine and the Virgin Islands

Indicator	Characteristics	Assessment by qualitative scale	Score	Probabilistic assessment
Partner country	The Virgin Islands	high	0	0,27
Authorities directly or indirectly involved in the operation	Local authorities	high	22,13	0,13
	Customs	high	24,26	0,16
Country of origin	Ukraine	high	7,3	0,0085
Type of economic activity	Recycling industry	high	2	0,17
Total assessment		high	55,7 (average)	0,74 (high)

Source: own calculations

The analysis of the results of the assessment of the risk occurrence probability of legalization of proceeds of by operations with the participation of Ukraine and partner countries is given in Table 9.

Table 9. The results of the assessment of the risk occurrence probability of the legalization of proceeds of crime with the participation of Ukraine and partner countries

Type of activity	Cyprus	The Virgin Islands	Austria	The Russian Federation
Agriculture	0,59	0,74	0,61	0,73
Recycling industry	0,59	0,74	0,61	0,73
Manufacture of food products, beverages and tobacco	0,59	0,74	0,61	0,73
Manufacture of wood products, paper and printing	0,59	0,74	0,61	0,73
Manufacture of basic pharmaceutical products and pharmaceutical preparations	0,55	0,70	0,57	0,68
Manufacture of rubber and plastics products, and other non-metallic mineral products	0,59	0,74	0,61	0,73
Metallurgical production, manufacture of fabricated metal products, except machinery and equipment	1,06	0,74	0,61	0,73
Machine building, except repair and installation of machinery and equipment	0,46	0,61	0,48	0,60
Manufacture of furniture, related products; repair and installation of machinery and equipment	0,55	0,70	0,57	0,68
Construction	0,57	0,72	0,59	0,71
Wholesale and retail trade; repair of motor vehicles and motorcycles	0,55	0,70	0,57	0,68
Transportation, storage, postal and courier activities	0,43	0,58	0,45	0,57
Information and telecommunication	0,59	0,74	0,61	0,73
Financial and insurance activities	0,41	0,57	0,44	0,55
Real estate operations	0,43	0,58	0,45	0,56
Scientific and technical activity	0,33	0,72	0,59	0,71
Activities in the field of administrative and support services	0,59	0,74	0,61	0,73

Source: own calculations based on (State Statistic Service of Ukraine, 2017)

CONCLUSIONS

Summing up, we can note that the availability of an effective tool for estimating the volume of hiding proceeds creates favorable conditions for increasing the investment attractiveness of the country and increasing its financial potential. Timely prediction of the probability of carrying out the operations on the illegal withdrawal of funds abroad and the implementation of appropriate preventive measures are necessary preconditions for these goals achievement.

The proposed approach allows to assess the risk occurrence probability of the legalization of proceeds of crime, both by individual components (type of economic activity, authorities involved in operations, country of origin, etc.) and by the operation as a whole. The basis of this approach development is the assumption that the use of corruption schemes for the withdrawal of funds abroad occurs at each level of the economic system and, therefore, should be assessed because it affects the overall degree of risk of the operation.

This approach can be used as a tool for assessing the effectiveness of state anti-corruption policies, especially in the area of shadow flows minimization, both at the micro and macro levels. In addition, the proposed approach can be used to identify the main stabilizing and destabilizing factors of influence on the level of hiding proceeds, with purpose to study them more and transform into controlled ones in the short and long term. The research and assessment of the synergistic effect that can arise from the simultaneous negative influence of these factors on the risk occurrence probability of legalization of proceeds of crime require further development.

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