MEASURING MONEY LAUNDERING USING "THE WALKER GRAVITY MODEL"

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ABSTRACT: Addressing money laundering in terms of measurement possibilities of its dynamics and size is a relatively recent concern. The hidden nature of this phenomenon (money laundering can't be directly observed) make it impossible to obtain a comprehensive estimate of its size and growth rate. This situation has been widely discussed in economic literature, which has exposed a number of illegal economic transactions measurement methods. Unfortunately, many case studies, econometric variables, or some other techniques used to measure shadow economy are tending to underestimate or overestimate money laundering. Moreover, estimating the size and volume of financial resources generated by organized crime is an extremely difficult task mainly due to lack of appropriate data. Therefore, all existing estimates contain considerable errors and they are only preliminary scientific estimates. Since the official statistics are not able to capture the dynamics of illicit financial flows, the researchers have developed a number of estimation methods. These include "hot money" method, World Bank residual method, the model based on international market prices, the Walker Gravity model, and many similar. The model presented in this paper is the gravity model that makes possible to estimate the illicit funds flow from some jurisdictions to others. Developed in 1994 the method is permanently updating. We try to prove that Walker Model estimates are compatible with nowadays findings on money laundering. Once it knows the money laundering level, one can quantify its economic effect, the impact of money laundering prevention rules, and transnational crimes.

Keywords: money laundering, Walker Gravity model, illegal transactions, black market, organized crime

JEL Codes: K40, K42, H26, O17

Introduction

The most important goal of the money laundering process is to realize a large number of economic transactions or activities in order to generate individual or groups profits and then to legitimate them. Money laundering is the process by which the illicit source of money or goods obtained or generated by criminal activities is concealing to hide the connection between the funds and the original illegal activities.

All researchers have agreed that money laundering expresses the economic transnational organized crime (Schneider Fr., 2010). Cross-border crime' features refers to high human and financial resources, which demonstrate good skills, ingenuity, and professionalism. In addition, it succeeds a permanent and fast correlation to market needs. Organized crime organizations have the advantage given by a state having institutional authority crisis and generalized corruption.

Money launderers have always tried to hide their activities, which generate illegal gains. Based on black market openings, such organizations generate bigger and bigger profits. Their problems come from the more difficulties that appear when they try to blind these gains in order to spend them on official and legal market.

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Nowadays globalization offers a very important facility for legalization of illegal activity incomes. The freedom of capital movement and the international financial market are an appropriate way to clean dirty money. Obviously, such operations generate negative effects for worldwide countries and societies because underground businesses have got an international character. In order to prevent such activities, international organizations have adopted a lot of issues and legal rules referring to transnational crime and money laundering. International community makes important efforts and progresses to find the best way to fight against organized crime using anti-money laundering policies. A proper policy has to account that a boost of national and international sanctions can produce higher crime rates. A higher sanctions policy does not hold. It can extend organized crime because the corruption rings may extend on state domain controlling in order to obtain a real reduction of expected punishments. So, we can think to a criminal sanctions paradox where the higher punishments level and frequency lead to higher organized crime activities and higher level of corruption (Kugler, Verdier, Zenou, 2003).

Even if data on crimes have improved substantially within the last years, Romania has not a quite detailed database on the underground economy activities. International community specialized organizations report annual statistics and partial data regarding groups of crimes, prices, and black market valuations. Unfortunately, all these information are approximate, econometric estimates that have limited capacity to reflect the real money laundering situation because as the term suggests, they all stand under uncertainty.

Assets confiscation could be an effective way to combat organized crime and money laundering. Could be these assets evaluate? Are they generating by financial illegal flows? Where these financial flows come from? They are generating by local, national, regional, and international underground economies. They generate a strong impact on legal economies and official financial systems. That's why we should explore money laundering financial counterpart.

Masciandaro (2007) statutes that "money laundering is an illegal and autonomous economic activity whose essential function implies liquidity transformation by converting illicit purchasing power into real purchasing power used for consumption, savings, investment or reinvestment". This definition implies two key features: illegality, because money laundering profits are generating by illegal activities, and concealment, that result from profits illegal source hiding. Starting from this definition and characteristics, we can introduce the economics of money laundering which aims to explore the scale and impact of illicit/illegal funds. Financial Action Task Force (FATF) politically supports these goals. It is an intergovernmental body created in 1989 by the G7. Their main target is to fight against money laundering and terrorism financing. They "work to generate the necessary political and bring legislative and regulatory reforms in these areas."

The power of money laundering phenomenon generate critical effects on the economic growth, brings a lower productivity for the real economic sector, diverts financial resources, and encourages corruption. It erodes the structure of financial institutions that are vulnerable to corruption carried out by criminal elements who seek to acquire a greater influence on money laundering channels. The diversion of financial resources and their orientation to less productive activities by fostering corruption and organised crime, minimize the economic growth rate, placing those savings in contrast with the principles of sustainable growth.

As we have already mentioned, the illicit output funds coming from developing countries are facilitating by local or international financial institutions, offshore financial centres, but also by international stock exchanges. The illegal capital outflow diverts resources and reduces developing world economies. In addition, the international money laundering contributes to these economies development discouraging.

The first important attempt to quantify money laundering was "Walker Gravity Model". According to this model, the value of global money laundering extend was 2.85 trillion US dollars in 1995 (Walker, 1995). Some countries have to reduce anti-money laundering money rules to attract more financial resources for their economies. That is the perfect way to place and increase

financial transfers of dirty money. According to Walker's gravity model, capital flows geographically and legalization of profits coming from black market becomes a cross-border problem (Walker & Unger, 2009). The model becomes popular only in the last years. In the next sections, we will present a short historical background of this method, including its theoretical framework. In the same time, we will explore its advantages and disadvantages for measuring money laundering in Romania.

Literature review

Economic literature highlights four main approaches relating to money laundering quantification (Quirk P.J., 1996):

- Approaches that investigate money laundering in terms of limitations and case studies presented by financial institutions;

- Approaches regarding underground economy; the models use monetary aggregates and estimate the money laundering contribution to underground economy size;

- A third approach category focuses on criminal economy, showing the criminal aspects of social well-being, social costs, and economic costs, involving actions that fall within the criminal law;

- Another approach analyzes illicit capital flows involved in cross-border transactions.

Money laundering involves significant funds that affect all economic sectors and generates significant macroeconomic effects. Economic models could reveal the multiplier effect that dirty money plays when they are generating in underground economy and they are spending in formal economy. Unfortunately, data regarding "clean" money spending are insignificant or not available. However, the identified illegal profits and offences are always higher than penalties or punishments imposed to cover the economic damages.

As we have mentioned, traditional methods, case studies, quantitative or econometric techniques used to estimate underground economy size tend to under or over valuate money laundering contribution to these phenomenon exacerbation. Walker gravitational model is a completely different approach. It makes possible to estimate illicit financial flows between different worldwide jurisdictions. Walker model seems to be the most promising because it has a scientific methodology. It realizes that a realistic money laundering quantification must combine criminology, economics, and financial elements.

Walker's approach started from Newton universal law of gravitation developed in 1687. According to gravitation law formula, the attraction force between two objects depends on their mass, the distance between them and a gravitational constant.

$$F_{12} = \frac{g \cdot M_1 \cdot M_2}{d_{12}^2} \tag{1}$$

Where:

F_{12} – the attraction force between objects 1 and 2;

M_1, M_2 – the objects mass;

d_{12} – the distance between the two objects;

g – the gravitational constant.

Walker's Gravity model estimated different types of streams, such as labour migration, road traffic, workers flow, a hospital patients' flow etc. Jan Tinbergen (1962) explained the economics of international trade by applying Newton's formula for bilateral trade flows. According to this approach, commerce between two countries is dependent of their economic weight (measured as GDP) and the physical distance between partner states.

Based on such evidences, we appreciate Walker gravitational model is the first serious attempt of money laundering quantification on a global economic world. It wad developed in 1994 by Professor John Walker from Wollongong University (Australia) and firstly published in 1995.

He has permanently improving his model, gaining popularity in the context of international trade economic models.

The sounding of justice officials' opinion, documents relating to restriction orders, suspicious transactions reports, and criminal proceeds estimates regarding financial transactions and international transfers were proper to the Bank of Australia. Based on research results Walker concluded that criminal patterns and money laundering intention presents many similarities from one country to another.

The initial Walker model had the following hypothesis:

- Criminal activities generate illegal incomes all over the world;
- Illegal incomes are greater in case of sophisticated criminal networks, better organized, than in the case of individual offenders;
- The countries where GDP per capita is high, the crime offender revenues are higher.

Based on these assumptions, Walker described a theoretical model that connects money laundering illegal with individuals incomes derived by various offences. Obviously, money laundering involves all these illicit incomes or a part of them. Professor Walker established three ratings categories of illegal laundered incomes: 1% for very little, 10% for least, and 80% for considerable incomes. He applied these coefficients to illegal incomes to determine the proportion of laundered money.

Walker gravitational model makes a connection between inputs and outputs similar with industry balance of Leontief. He also introduces an axiom stating that the trade value between two countries depends on population number in each country, on "attractiveness" of the two countries, but also the distance that separates these countries.

In this context, the prototype Walker model has the following formula:

$$\frac{F_{ij}}{M_i} = \frac{\text{Country's attractiveness}_j}{\text{Distance between countries}^2} \tag{2}$$

Or

$$\frac{F_{ij}}{M_i} = \frac{\text{GNP per capita}_j \cdot (3SB_j + AG_j + SWIFT_j - 3CFL_j - COR_j + 15)}{\text{Distance between countries}^2} \tag{3}$$

Where:

F_{ij} / M_i – the share of offenders' incomes transferred from country i to country j;

GNP per capita $_j$ – gross national product in country j;

SB – banking secret index;

AG – government attitudes index;

SWIFT – the existence or lack of SWIFT system;

CFL – the existence of wars on the state territory;

COR – corruption index.

The distance between two states is number of kilometres.

Dutch Professor Brigitte Unger (2007) has reviewed Walker model variables in order to estimate illicit financial flows out of her country. Her structural formula is:

$$P(X, y_i) = \frac{1}{\sum_{i=1}^{n} \left[\frac{\text{Attractiveness}(y_i)}{\text{Distance}(X, y_i)} \right]} \times \frac{\text{Attractiveness}(y_t)}{\text{Distance}(X, y_i)} \tag{4}$$

IMF is now concerned to improve the model variables and collect the necessary data to estimate worldwide money laundering. Still then, Walker model remains the leader of money laundering quantification models on a global basis.

Data and methodology

We try to prove that Walker Model estimates are compatible with nowadays findings on money laundering. We will firstly calculate the gains from domestic crime that are being laundered, and second we will estimates the incomes from foreign crime that flow into our country for laundering. We have to take account that money are laundering in the country in which they are generating or sent for laundering to another state.

In order to estimate Romanian money laundering we will use Unger (2007) formula.

Table 1 presents the features of each variable that makes attractiveness index.

Table 1

Attractiveness Index variables

Variable	Explanation
GDP per capita	A country having a developed economy will attract more money than a country whose economy is smaller or less developed.
Banking secret	A country having a legislation that promotes a policy of guaranteeing bank secrecy is a more attractive destination for money laundering than a country where authorities has the right to violate bank secrecy and identify the client. Variable codes are 0 – confidentiality clauses; 1 – bank secrecy statute; 2 – no access to banking information for fiscal goals; 3 – banking information could be obtained by using a special authorization; 4 – no legal instruments to obtain banking information.
Government attitude	0 - FATF member countries; 1 - FATF member countries having regional courts status; 2 - countries that have been on the FATF's uncooperative states list and which are members of FATF regional courts; 3 - countries that have been on the FATF's uncooperative states list and which are not members of FATF regional courts.
SWIFT system	0 – not SWIFT member; 1 – SWIFT member.
Financial deposits	They represent a share of GDP and include deposits, time deposits and savings certificates under the administration of banks or other financial institutions. The formula is: $$D = 0,5 \times \frac{\dfrac{F_t}{PE_t} + \dfrac{F_{t-1}}{PE_{t-1}}}{\dfrac{PIB_t}{PA_t}}, \text{ where}$$ D - total financial deposits; F – deposits type; PE –consumer price index (at the end of the period); PA - consumer price index (annual average).
Conflicts	Any conflict will generate a negative correlation with country attractiveness index because a conflict generates instability, affecting the reliability and effectiveness of financial transactions and creating money laundering conditions. Variable scale is between 0 and 3, meaning security and civil war.
Corruption	It takes values between 1 (very corrupt state) and 10 (state having insignificant corruption index).
Egmont Group	Group membership gives value 1; otherwise, the value is 0.
+ 15	This constant aim is to avoid estimating negative financial flows in relation to money laundering.

As the formula shows, we determine the percentage P of country y_i's (Turkey) criminal money flowing to a country X (Romania). This percentage of the Turkey total money sent for laundering to Romania depends on how attractive Romania is for the Turkey (attractiveness y_i) and on the distance between Romania and Turkey (distance (X, y_i)).

Romania will be more attractive for Turkey launderers if it has a higher GDP per capita, if it has bank secrecy legislation, if it has SWIFT system, if it has low conflicts and corruption. These conditions guaranties launderers will not lose their laundered money.

The Gross Domestic Product (GDP) in Turkey is about 820,21 billion US dollars in 2014, and Romania GDP is about only 189,64 billion US dollars (Figure 1).
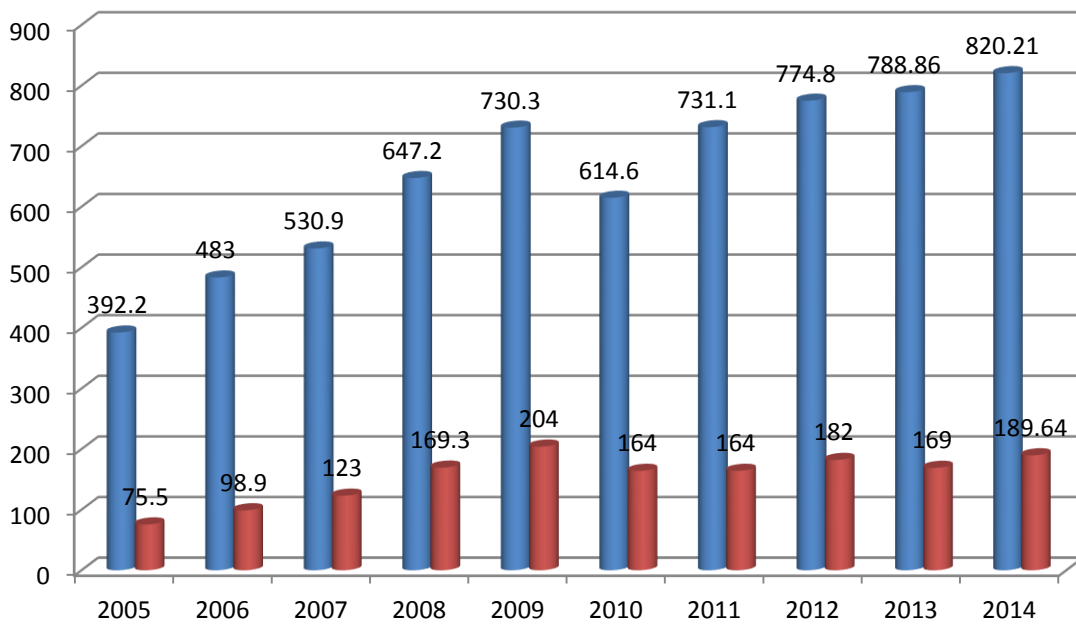

Figure 1. Gross Domestic Product (GDP) in Turkey and Romania (billion US dollars)
Source: http://www.tradingeconomics.com

Table 2 presents the each variable that makes attractiveness index for Romania and Turkey.

Table 2

Romania and Turkey variables

Variable	Romania	Turkey
GDP per capita (current U.S. dollars)	9,499	10,946
Banking secret	3	1
Government attitude	0	1
SWIFT system	1	1
Financial deposits (share of GDP)	30,83591%	46,73239%
Conflicts	0	1
Corruption	45 (1)	43 (2)
Egmont Group	1	0
+ 15 (different languages)	1	1
Distance (km)	1643	

Source: http://www.tradingeconomics.com, http://data.worldbank.org, http://www.transparency.org/cpi2014/results

$$P(Romania, Turcia) = \frac{\text{Distance (Romania, Turcia)}}{\text{Attractiveness(Turcia)}} \times \frac{\text{Attractiveness(Romania)}}{\text{Distance (Romania, Turcia)}} = 1,431532557$$

Findings

According to Walker adapted model (Unger, 2007), about 1,43 billion US dollars of dirty money was sent from Turkey to Romania in 2014. In Romania another 39,82 billion US dollars are generated by underground economy being proceeds of romanian crime (drugs, prostitution and fraud mainly). This means that Romania has to face about at least 41,26 billion US dollars money laundering yearly, which amounts to about 22 percent of the romanian GDP.

Walker Model offer the possibility to precisely calculate how much money flows to some other countries. For this reason, the Walker Model would be applied for all countries and for all distances between countries in the world.

We have to collect new and more data and conduct calibration weights for all the variables of the attractiveness indicators.

Conclusions

According to Walker's gravity model, capital flows geographically and legalization of profits coming from black market becomes a cross-border problem (Walker & Unger, 2009). It is the first serious attempt of money laundering quantification on a global economic world. Walker gravitational model makes a connection between inputs and outputs similar with industry balance of Leontief. He also introduces an axiom stating that the trade value between two countries depends on population number in each country, on "attractiveness" of the two countries, but also the distance that separates these countries.

Romania will be more attractive for Turkey launderers if it has a higher GDP per capita, if it has bank secrecy legislation, if it has SWIFT system, if it has low conflicts and corruption. These conditions guaranties launderers will not lose their laundered money. About 1,43 billion US dollars of dirty money was sent from Turkey to Romania in 2014. In Romania another 39,82 billion US dollars are generated by underground economy being proceeds of romanian crime (drugs, prostitution and fraud mainly). This means that Romania has to face about at least 41,26 billion US dollars money laundering yearly, which amounts to about 22 percent of the romanian GDP.

IMF is now concerned to improve the model variables and collect the necessary data to estimate worldwide money laundering. Still then, Walker model remains the leader of money laundering quantification models on a global basis.

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