

Economics of Money Laundering : A Primer

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1. INTRODUCTION

Only in recent times has economic analysis developed a special, original focus on financial issues related to the study of criminal activity, thus far completely absent in the international literature. The basic theoretical reason lies in the absence of special treatment of monetary and financial aspects within the traditional Becker model. Furthermore the complexity of the topic also concerns the need to adopt a multidisciplinary approach, using cognitive instruments associated with different disciplines: economic, legal and social sciences.

In this working paper I propose a simple but hopefully useful framework to understand the mechanisms of the black finance markets. The paper builds extensively on different works of the author (see references), which provide considerable details that space precludes presenting here.

The emphasis on the study of money laundering has progressively increased, recognizing its role in the development of any crime that generates revenues. In fact, the conduct of any illegal activity may be subject to a special category of transaction costs, linked to the fact that the use of the relative revenues increases the probability of discovery of the crime and therefore incrimination.

Those transaction costs can be minimized through an effective laundering action, a means of concealment that separates financial flows from their origin, an activity whose peculiar economic function is to transform potential wealth into effective purchasing power.

In this paper I will show how, from a microeconomic point of view, money laundering performs an illegal monetary function, responding to

the overall demand for black finance services, expressed by individuals or groups that have committed income-producing crimes.

The micro foundations of money laundering allow us to shed light on its macroeconomic effects. In fact, if at the micro level the demand should be matched by an effective supply – that I analyse in Masciandaro, Takats and Unger 2007 – it is possible to demonstrate that money laundering, in a given economy with legal and illegal sectors, can play the role of multiplier of the volume of the economic endowments that concerns to criminal and illegal agents.

In the following pages I will analyse in depth the study of money laundering of illegal capital, highlighting its crucial function, theoretical and practical, in the development of any crime that generates revenues.

In fact, any illegal activity must deal with a peculiar category of transaction costs, linked to the fact that the use of the relative revenues increases the possibility of detection of the crime itself and thus incrimination. These transaction costs can be minimized by effective laundering, an activity whose distinctive economic function is precisely to transform potential purchasing power into actual purchasing power. In this sense, money laundering performs a peculiar illegal monetary function.

The economic analysis of money-laundering will necessarily start from its precise economic definition, which will stress the following characteristics:

Generality: money-laundering activity can concern any proceeds generated by criminal or illegal activities;

Peculiarity: the purpose of this activity is to reduce peculiar transaction costs, concealing the illicit origin of the proceeds.

Money laundering is an autonomous criminal economic activity whose essential economic function lies in the transformation of liquidity of illicit origin, or potential purchasing power, into actual purchasing power usable for consumption, saving, investment or reinvestment. The money-laundering phenomenon can then be studied through microeconomic analysis of the behaviour of the criminals, consistent with the Becker base model.

This approach, that will be illustrated in this paper, proposes a model to study in general the choices of an economic agent who must decide whether and to what extent to launder the proceeds of a crime. It assumes that the economic agent (the ‘criminal’) derives a flow of income from an illicit activity. This illegal income represents potential purchasing

power, in a specific sense: its direct use would increase the probability that the crimes committed by the agent will be discovered. More generally, a 'laundered' euro, or dollar, has greater value for the criminal agent than a 'dirty' euro, since the former can be invested with lower risks of incrimination. The criminal agent thus must decide, for each euro of illicit income, whether to launder it or not.

The criminal's utility is decreasing in the probability of detection of the crime and the severity of the sanction, while it is rising in the expected average return on the laundered cash. The criminal agent must therefore determine the optimal level of cash to launder, taking into account the maximum resources available to him. The optimal value represents the limit over which it is no longer advantageous to request money-laundering services: the damage deriving from detection of the crime and the relative sanction becomes so great as to make the expected utility negative.

The critical value can be interpreted as the propensity to launder, which depends on the model parameters: more effective and/or more severe anti-money-laundering policies reduce the propensity to launder; increasing the profitability of laundered cash and reducing the costs of money-laundering operations increase the propensity to launder.

Having defined a microeconomic approach to the money-laundering choices enables the formulation of a macroeconomic model of the relationship between development of the illegal markets and the laundering activity.

The macro analysis can be faced by using the traditional multiplier approach in a novel analytical framework. I will represent the multiplying effects of money laundering with respect to the criminal subject's economic endowment. Starting from the initial crime that produces some dirty revenues, the laundering process allows – given some laundering costs – such capitals to be re-invested in the legal and illegal sectors of the economy. The portion which is destined to the illegal sector will further produce some other dirty revenues to undergo the laundering process; the money-laundering cycle has therefore taken off and each step – provided that no obstacle hinders the process – contributes to strengthen the economic and financial power of criminal subjects.

The macro polluting effect of money laundering is higher: the lower is the opportunity cost; the bigger is the share of reinvestment in illegal activities, as well as the necessity of financing this reinvestment with clean liquidity; the bigger is the differential of the expected real return of the illegal activities; the lower is the expected riskiness of the illegal activi-

ties; the bigger is the initial volume of the revenues of the criminal sector.

In conclusion the paper discusses similarities and differences between money-laundering and terrorism finance, or money-dirtying.

The goal of terrorism finance is to channel capitals of any origin to individuals or groups to enable acts of terrorism. As in the money-laundering activity, the financial flows may increase the probability that the crime of terrorism will be discovered, thus increasing the probability of incrimination. The main difference between money laundering and terrorism finance is in the origin of the financial flows. While in money laundering the concealment regards capitals derived from illegal activity, terrorist organizations use both legal and illegal funds for financing their action.

2. MONEY LAUNDERING: DEFINITION

First of all, we need a definition of money laundering, in terms of economic analysis, that points up its specificity with respect to other illegal or criminal economic activities, typically involving accumulation and/or reinvestment. It is the following: given that the conduct of any illegal activity may be subject to a special category of transaction costs, linked to the fact that the use of the relative revenues increases the probability of discovery of the crime and therefore incrimination, those transaction costs can be minimized through an effective laundering action, a means of concealment that separates financial flows from their origin.

In other words, whenever a given flow of purchasing power that is potential – since it cannot be used directly for consumption or investment as it is the result of illegal accumulation activity – is transformed into actual purchasing power, money laundering has occurred.

Focusing attention on the concept of incrimination costs enables us to grasp not only the distinctive nature of this illegal economic activity but also its general features. The definition we have adopted maintains basic unity among three aspects that, according to other points of view, represent three different objects of the anti-laundering action: the financial flows; the wealth and goods intended as terminal moments of those flows; the principal actors, or those who have that wealth and goods at their disposal.

In our scheme of analysis there will always be an agent who, having committed a crime that has generated accumulation of illicit proceeds,

moves the flows to be laundered, so as to subsequently increase his financial assets, by investment in the legal sector or re-accumulation in the illegal sector.

The first crucial agent to place under observation is therefore the criminal organization. By criminal organization we mean a group of individuals and instrumental assets associated for the purpose of exclusively exchanging or producing services and goods of an illicit nature or services and goods of a licit nature with illicit means or of illicit origin.

The criminal organization accumulates resources through its activity in the illegal markets. The moment it accumulates illegal resources, however, a problem of laundering arises. The purpose of money-laundering activity is to transfer the 'dirty' liquidity coming from any criminal or illegal activity into funds that, since they are 'clean', i.e. devoid of traces that could connect them to the underlying crimes, can be allocated to consumption, savings, or investment in legal sectors or reinvestment in illegal markets. The phase of legal investment and illegal re-accumulation complete the model.

In general, following the classic intuition à la Becker, we can claim that the choices of an economic agent to invest his resources in illegal activities, thus becoming a criminal, will depend, *ceteris paribus*, on two peculiar magnitudes, given the possible returns: the probability of being incriminated and the punishment he will undergo if found guilty. An analysis of the choices of organized crime would undoubtedly follow the same approach.

This analysis of the conduct of criminal organizations in terms of rationality can certainly not be considered exhaustive. One cannot exclude, in fact, the possibility that criminals are constrained by forms of logic other than rationality. It should also be noted that the economic component has become the characterizing element, if not the predominant one, of the more recent type of criminal organizations.

Now, to undertake money-laundering activity, an organization possessing liquidity coming from illegal activity will decide whether to perform a further illicit act, in a given economic system – i.e. money laundering – assessing precisely the probability of detection and relative punishment and comparing that with the expected gains, net of the economic costs of this money-laundering activity.

The choice of the organization requires that the crime in question, and the relative production function, be basically autonomous with respect to other forms of crime, those that generated the revenues in the accumulation phase. Furthermore, the crucial role that money-laundering activity

plays in the growth and profitability of the entire criminal industry suggests that it is central, qualitatively and quantitatively, to all criminal organizations.

Assigning a monetary utility to the crime of money laundering, by giving it a unitary expression, actually summarizes the value of a series of more general services that stimulate the growth of demand for money-laundering services on the part of criminal organizations that accumulate illegal resources. Money laundering, in fact, produces for its users:

1. the economic value, in the strict sense, of minimizing the expected incrimination costs, transforming into purchasing power the liquidity deriving from a wide range of criminal activities (transformation); transformation, in turn, produces two more utilities for the criminal agent;
2. the possibility of increasing his rate of penetration in the legal sectors of the economy through the successive phase of investment (pollution);
3. the possibility of increasing the degree to which the criminal actors and organizations are camouflaged in the system as a whole (camouflaging).

Having defined the problem in the most general terms possible, we can now investigate in detail and in depth the choices of a generic criminal organization that, having accumulated resources in the illegal markets, must decide whether, and to what extent, to launder the proceeds of a given crime. In other words, we shall analyse the determinants of the demand for money-laundering of a single criminal organization at the microeconomic level.

3. THE MICRO MODEL

Let us assume that the agent – a criminal organization – derives a certain flow of income from illegal activity equal to W . This income cannot be spent immediately, since it would increase the probability that the crimes committed by the criminal organization are detected. This may seem a rather drastic assumption: in effect, we can imagine that some expenditures can be made without risk, others less, and others with a very high probability of incrimination. In any case, clean liquidity, unlike dirty fi-

nancial resources, permits the maximum freedom of allocation, given its smaller expected incrimination costs.

The general circumstance whereby not all the illegal revenues need necessarily be laundered, but that at the same time the clean liquidity has a competitive advantage over dirty funds, can be represented in a very simple way: a clean euro (or dollar) 'is worth more' – in the eyes of the Criminal Organization – than a dirty euro. The greater utility value of the clean euro is reflected in greater profitability, at least potentially. The illegal income W therefore represents only potential purchasing power; without laundering, it has less value. For each euro of illegal income, the Criminal Organization must first decide whether to launder it or not. A dirty euro is worth less than a laundered one.

If we consider that the clean euro can be used in a welfare-increasing manner or invested with profit and without risk of incrimination, activating the phase of investment and re-accumulation with the utmost effectiveness, and that therefore the dirty euro can be spent with less profit and/or greater risk of incrimination, for the sake of simplicity we can assume that the expected value of the dirty euro is zero: in fact, we could even assign it a smaller positive value, with respect to the cleaned euro, or a negative expected value, given the incrimination costs.

We shall adopt the zero value case, so by calling the utility function of the Criminal Organization U we shall be assuming that the expected utility of the unlaundered income is zero, whatever its amount:

$$U(W)=0 \quad (1)$$

If the decision to launder were cost-free, indicating with Y the amount of illegal income the Criminal Organization seeks to launder, it is trivial to deduce that we shall have $Y = W$. But money laundering is a crime, and as such it is characterized by a sanction T and a probability that the said crime will be detected, equal to p . The dilemma for the criminal is the following: if I have the liquidity laundered, and all goes well, I derive maximum benefit from the clean money in the investment and re-accumulation phase, net of the cost of the money-laundering operation. If all goes badly, I will not only lose the liquidity paid for the money-laundering operations but will also suffer the sanction of the law.

Now, let us define the hypotheses related to the monetary value of the benefit B of having laundered cash, the cost C of the money-laundering operation, and the damage T deriving from the law sanction.

Each laundered euro can be invested without restrictions and with profit in the reinvestment phase. The fact that the laundered cash Y has a positive expected profitability can be represented by imagining that the monetary value B of that benefit is equal to:

$$B = (1 + r)Y = mY \quad (2)$$

where r is the average rate of return expected from reinvestment – licit (investment) and/or illicit (re-accumulation) – of the laundered cash.

The cost C of the money-laundering operation will be proportional – according to a parameter c between 0 and 1 – to the amount of the liquidity that is laundered:

$$C = cY \quad (3)$$

The monetary value of the damage of the sanctions T against money laundering must be – as an amount – at least equal to value Y of the laundered liquidity (due to seizure of the sum, for example). In reality, the damage of a sanction is undoubtedly a multiple, whether due to the monetary amount or to the value of the intangible damage of such a sanction. We can therefore hypothesize that the amount of the value of the sanction is a multiple of the detected ‘laundry’, the square of that sum for simplicity of calculation.

Furthermore, once the crime is discovered, the sanction can be applied with a variable degree of efficiency and/or severity. The rapidity and mode of execution of the punishment can be variables, affected by national or international institutional variables; the severity (or the laxity) of executing the sanctions can be represented by variations in the parameter t :

$$T = tY^2 \quad (4)$$

Having defined the terms of the question, the Criminal Organization is faced with the problem of deciding whether and how much of the sums obtained in the accumulation phase to launder. The expected utility E of the Criminal Organization, previously expressed in generic terms, can now be better specified as:

$$\begin{aligned}
 E &= u[(1 - p)(B - C) + p(-C - T)] \\
 E &= u[(1 - p)(my - cy) + p(-cy - ty^2)]
 \end{aligned}
 \tag{5}$$

The linear specification of the utility function of the Criminal Organization shows us that it is risk-neutral. This utility function is consistent with the economic characteristics we requested and recalled earlier. In fact:

$$\begin{aligned}
 \frac{\partial E}{\partial p} &= -uy(ty + m) < 0 \\
 \frac{\partial E}{\partial t} &= -upy^2 < 0 \\
 \frac{\partial E}{\partial m} &= uy(1 - p) > 0
 \end{aligned}
 \tag{6}$$

The utility of the Criminal Organization is reduced to an increase in the probability of detection of the crime and the severity of the sanctions, while it increases as the expected return on the laundered liquidity, reinvested in the investment and re-accumulation phase, rises.

The alternatives for the Criminal Organization can thus be summarized in Figure 1.1.

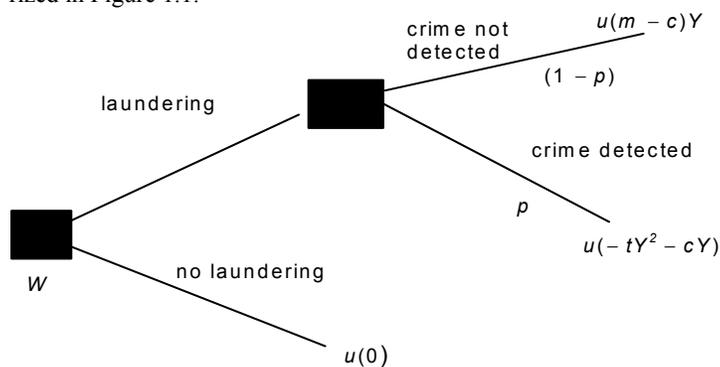


Figure 1 The alternatives for the criminal organization

The Criminal Organization must find the optimal level Y^* of liquidity to launder, bearing in mind that the maximum resources at its disposal, obtained in the accumulation phase, amount to W . Deriving (1.5) twice respect to that variable subject to decision of the Criminal Organization – in order to observe the conditions necessary and sufficient for a maximum – we find that:

$$\begin{aligned}\frac{dE}{dY} &= -u[2pty + c - m(1-p)] \\ \frac{d^2E}{dY^2} &= -2upt\end{aligned}\tag{7}$$

The function reaches its optimal point when:

$$Y^* = \frac{m(1-p) - c}{2pt}\tag{8}$$

The expected utility of the Criminal Organization therefore depends on the level of liquidity laundered (Figure 1.2):

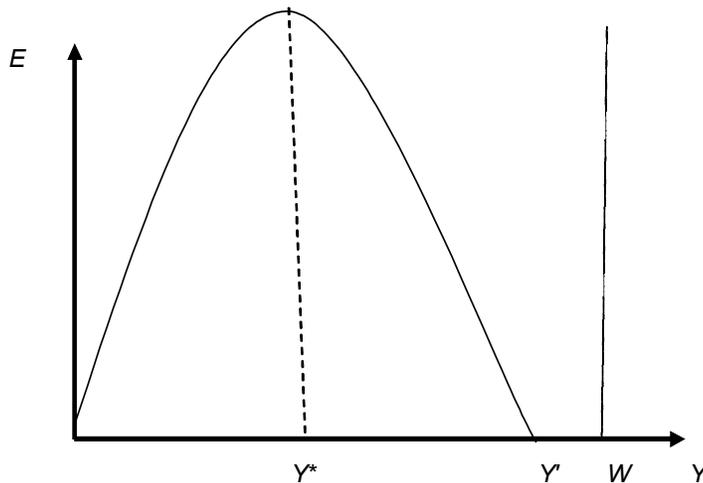


Figure 2 The expected utility of the criminal organization

First, let us observe that the value of this utility is positive for levels of laundered liquidity between 0 and:

$$Y' = \frac{m(1-p) - c}{pt} \quad (9)$$

The threshold value Y' tells us the limit over which it is undoubtedly optimal for the Criminal Organization to abstain from money-laundering activity. Above a certain amount, the damage associated with the risk of discovery and punishment is so high that the expected utility is negative, so it is best to hold onto the dirty money and invest it in those expenditures or uses where the expected value – as we said earlier – is less or, in the case of our model, zero. This result depends, all other conditions being equal, on the fact that the amount of the sanctions is a multiple of the liquidity to be laundered, so as that value rises the damage of crime detection rises more than proportionately.

The critical value Y' must obviously be compared with the level of the illegal resources available from the accumulation activity W .

If $Y' < W$ (as in Figure 1.2), the amount of resources ($W - Y'$) will be excluded a priori from any decision on laundering.

If, on the contrary, $Y' > W$, it is potentially advantageous to launder all the illegal resources available.

The threshold value Y' – or, if divided by W , the propensity to launder the accumulated illegal funds – will depend on the structural parameters of the model. In fact:

$$\begin{aligned} \frac{dY'}{dp} &= \frac{c-m}{p^2 t}, \quad \frac{dY'}{dt} = \frac{-m(1-p)+c}{pt^2} \\ \frac{dY'}{dm} &= \frac{(1-p)}{pt}, \quad \frac{dY'}{dc} = -\frac{1}{pt} \end{aligned} \quad (10)$$

Regarding the reactivity of the propensity to launder compared to the probability of incrimination and the severity of the sanctions, it is crucial to assume that the profitability of each euro laundered is greater than the per-euro cost of money laundering. In this case, more effective policies (p rising) and/or greater severity (t rising) reduce the propensity to launder.

On the other hand, an increase in the profitability of the economic activities, which require clean liquidity in the investment phase (m rising), increases the propensity to launder. Finally, a drop in the costs of the money-laundering operation (c declining) increases it.

Having defined the framework of values in which the Criminal Organization can exercise its money-laundering choice, we must find the optimal level Y^* of that choice from (1.7):

$$Y^* = \frac{m(1-p) - c}{2pt} \quad (11)$$

always below the constraint:

$$Y^* < W \quad (12)$$

As for the potential propensity to launder, we can also identify the optimal level of laundering respect to the structural variables of the model. First, the liquidity to be laundered will be inversely proportional to the probability of detection of the crime (Figure 1.3).

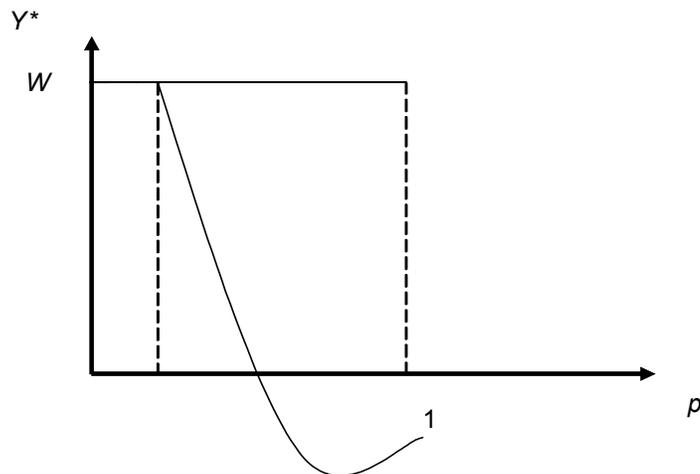


Figure 3 The optimal level of money laundering respect to the probability of detection

As we expected, as the probability of detection of the money-laundering crime increases, the level of that criminal activity declines. It is interesting to note that the liquidity to be laundered becomes zero when the probability of incrimination is high ($p = (m - c)/m$), but not maximum ($p = 1$).

This result depends on the fact that the money-laundering operation has an economic cost that, when added to the costs associated with the risk of incrimination, makes the laundering activity not advantageous in the absolute sense, even when the probability of discovery of the crime is not maximum. In fact, only if money laundering cost nothing ($c = 0$) would this activity be zero only for $p = 1$.

Given the constraint on available illegal resources we can identify the minimum value of the probability of detection ($p = (m - c)/(m + 2tW)$); lower values of that probability have no effect on the level of money-laundering.

Secondly, money laundering is affected by the severity of the punishment (Figure 1.4): the more severe the law, the less advantageous it will be to attempt to launder dirty money. Again, given the constraint on available illegal resources, a minimum level also exists for the severity of the punishment ($t = [m(1 - p) - c]/(2pW)$). Overall, the incrimination costs matter.

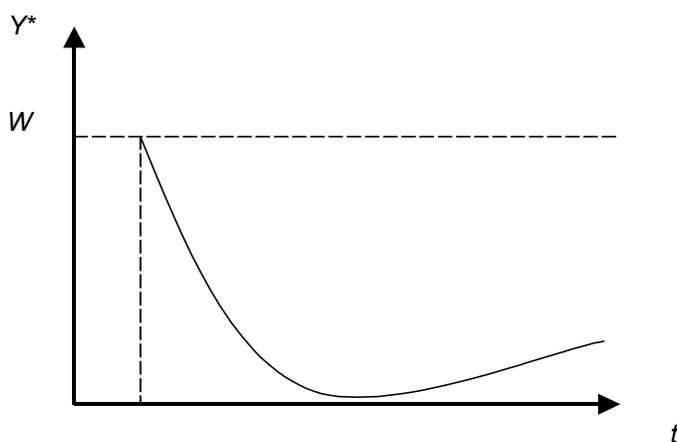


Figure 4 The optimal level of money laundering respect to the severity of the punishment

Money laundering will also depend on the profitability of the laundered money in the investment phase (Figure 1.5). We have seen that the Criminal Organization decides to launder depending on the profitability of the clean money with respect to dirty money. The more this profitability increases, the more advantageous it will be to invoke money-laundering services. On the other hand, if the profitability of clean money tends to decline – as when dirty money can be used for consumption or investment without risk of incrimination – the incentive to utilize laundering services also declines. More specifically, money laundering becomes zero if:

$$m = (1 + r) \leq \frac{c}{(1 - p)} \quad (13)$$

Again, given the constraint on the available illegal resources, the maximum relevant value of profitability from the laundered liquidity ($m = (c + 2ptW)/(1 - p)$) is found.

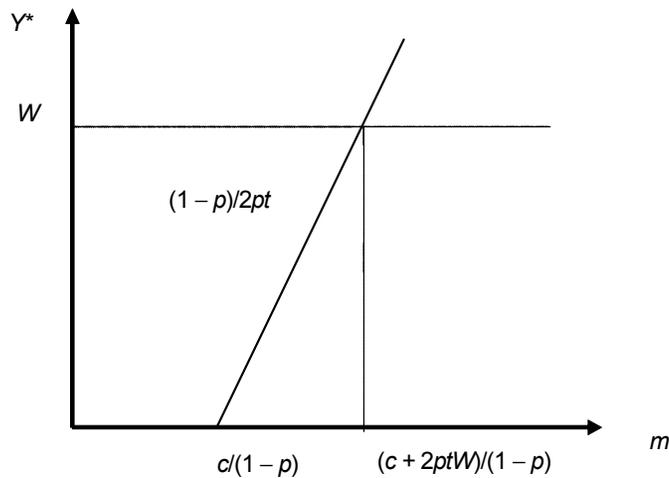


Figure 5 The optimal level of money laundering respect to the value of the profitability

Finally, it is possible to analyse the relationship between the cost of laundering operations and the amount of liquidity to be laundered, i.e. the demand for laundering in the strict sense, where the demanded good is precisely the laundering service and its price the cost (Figure 1.6).

The price-quantity relationship – as one might imagine – is an inverse one, and the sensitivity of the demand for money-laundering services compared to their price (elasticity) is equal to:

$$\eta_{Y^*c} = \frac{c}{2ptY^*} \tag{14}$$

The elasticity of the demand for money-laundering varies along a curve that rises as the cost rises (from zero to infinity) and is equal to one at point $Y^{**} = c/(2pt)$. Money laundering is zero with a price of $c = m(1 - p)$, while, on the contrary, with a price of zero the optimal level of money-laundering would be $Y^* = [m(1 - p)/(2pt)]$. In reality, the constraint of illegal resources must be taken into account, and when it hurts, the minimum value of the price is not zero but rather $c = m(1 - p) - 2ptW$.

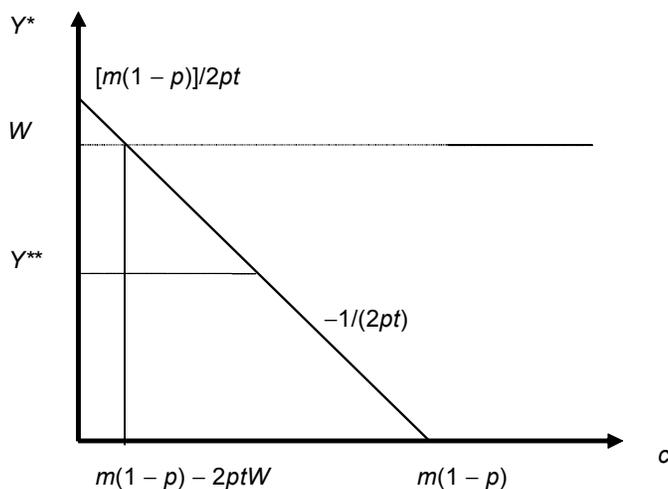


Figure 6 The optimal level of money laundering respect to the cost of laundering operations

As with elasticity, the position of the money-laundering demand curve also changes as the structural parameters of the model vary. An increase in the profitability of laundered liquidity causes an upward movement, while an increase in the probability of detection and the severity of the punishment produces a downward movement.

In conclusion, the choice of the Criminal Organization regarding the amount of liquidity to launder is influenced in certain directions by a series of key variables: the variables are summarized in Table 1.1, along with the extent of their influence on the ‘laundering’.

Table 1 Money laundering: the determinants

Key Variables	Elasticity
W = amount of the proceeds of criminal activity related to the accumulation phase	$\eta_{Y^*,W} = \frac{W}{Y^*} > 0$
p = probability of detection of the crime in the money-laundering phase	$\eta_{Y^*,p} = -\frac{(m-c)}{2ptY^*} < 0$
T = severity of the sanctions in the money-laundering phase	$\eta_{Y^*,t} = \frac{-(1-p)m+c}{2ptY^*} < 0$
M = profitability of the laundered cash compared to that of dirty cash in the investment phase	$\eta_{Y^*,m} = \frac{(1-p)m}{2ptY^*} > 0$
c = cost of money-laundering operations	$\eta_{Y^*,c} = -\frac{c}{2ptY^*} < 0$

4. THE MACRO MODEL

To define a macro model of the accumulation-laundering-investment process, we focus on the behaviour of a general Criminal Sector that derives its income from a set of illegal activities and that, under certain conditions, must launder the income to invest it. We will highlight the role of money laundering as a overall multiplier of the Criminal Sector endowment.

Let us assume that in a given economic system there is a Criminal Sector that controls an initial volume of liquid funds ACI , fruit of illegal

activities of accumulation. Let us further suppose that, at least for part of those funds, determined on the basis of the optimal microeconomic choices studied in the previous pages, there is a need for money laundering. Without separating these funds from their illicit origin, given the expected burden of punishment, they have no value. Money-laundering activity is therefore required.

Incidentally, to underscore the general nature of the analysis, we can claim that the demand for money-laundering services could be expressed – distinguishing the different potential components of a criminal sector according to their primary illegal activity – by organized crime in the strict sense, by white collar crime, or by political corruption crime, also considering the relative cross-over and commingling.

Each laundering phase has a cost for the Criminal Sector, represented by the price of the money-laundering supply. The price of the money-laundering service, all other conditions being equal, will depend on the costs of the various money-laundering techniques. If we suppose, as in the previous section, that the Criminal Sector is price taker, i.e. the cost of money laundering cR is constantly proportional to the amount of the illicit funds, designating the costs c , both regulatory and technical, we can write:

$$cR = cACI \quad (15)$$

If the first laundering phase is successful, the Criminal Sector that expressed the demand for this service may spend and invest the remaining liquid funds $(1 - c)yACI$ in both legal economic activities (investment) or illicit activities (re-accumulation).

The Criminal Sector will spend part of the laundered liquidity in consumer goods, equal to d , while a second portion will be invested in the legal sectors of the economy, for an amount of f , and then a third portion, equal to q , will be reinvested in illegal markets (giving, of course, $d + f + q = 1$).

If the Criminal Sector makes investment choices according to the classical principles of portfolio theory, indicating with $q(r, s)$ the amount of laundered funds reinvested in illegal activities, with r the differential between the actual expected return on the illegal re-accumulation and the actual expected return on the legal investment, and with s the relative risk of the two investments, we might think that the differential in return between illicit and legal activities is positive. We use this assumption if for no other reason than the presence of taxation in computing the return on

legal economic activity, while the various assumptions on the relative risk are anything but certain. Furthermore, it should be noted that the relative risk of the illegal sector will depend in part on the effectiveness of the public action to combat it.

Finally, we can assume that the re-accumulation of funds in the illegal sector requires their laundering only in part, thus indicating with the positive parameter y the portion of illegal re-accumulation that requires laundered liquidity.

The Criminal Sector reinvests and a new flow of illegal liquidity will be created. The illegal revenues will be characterized again by incrimination costs, that will generate a new demand for money-laundering services. Obviously, the laundering will concern the overall proceeds of the new phase of investment in illicit activities, whether they have been financed, for a portion equal to a , with laundered cash, or have been financed, for a portion $(1 - a)$, with dirty cash. It will be therefore equal to:

$$(1 + r)(1 - c)^2 qy^2 ACI \quad (16)$$

The crucial assumption, in fact, is that both the lawful investment and part of the unlawful re-accumulation require financing with 'clean' cash. This assumption can be supported by the presence of rational, informed operators in the supply of services to the Criminal Sector for the illegal re-accumulation, or by rationality of the criminal himself, who wishes to minimize the probability of being discovered.

Repeating infinite times the demand for money-laundering services, which each time encounter a parallel supply, with the values of the parameters introduced remaining constant, the total amount of financial flows generated by money-laundering activity AFI will be equal to:

$$AFI = \frac{yACI(1 - c)}{1 - yq(1 - c)(1 + r)} = mACI \quad (17)$$

with $0 < c, q, y < 1$.

The flow AFI can represent the overall financial endowment generated by the money-laundering activity, and m can be defined as the multiplier of the model. Doing comparative static exercises, it is easy to show that the amount of liquidity laundered will increase as the price of the money-laundering service declines:

$$\frac{\partial AFI}{\partial c} = -\frac{ACIy}{[1 - qy(1 - c)(1 + r)]^2} < 0 \quad (18)$$

the amount of re-accumulation of laundered cash in illegal activities increases, which in turn depends on expected profits, in terms of return and risk:

$$\frac{\partial AFI}{\partial q} = \frac{(1 - c)^2 (1 + r) ACIy^2}{[1 - qy(1 + r)(1 - c)]^2} > 0 \quad (19)$$

the differential of expected actual return on the re-accumulation in illegal activities rises, given the return on legal investment:

$$\frac{\partial AFI}{\partial r} = \frac{(1 - c)^2 ACIqy^2}{[1 - qy(1 - c)(1 + r)]^2} > 0 \quad (20)$$

the initial volume of illegal proceeds increases:

$$\frac{\partial AFI}{\partial ACI} = \frac{y(1 - c)}{[1 - qy(1 - c)(1 + r)]} > 0 \quad (21)$$

the optimal share of the initial volume of illegal revenues requiring cleaning increases:

$$\frac{\partial AFI}{\partial y} = \frac{(1 - c)ACI}{[1 - qy(1 + r)(1 - c)]^2} > 0 \quad (22)$$

As is evident, whatever the original crime, if failure to launder the proceeds implies greater probability of detection of the crime, then there is no need for additional or specific assumptions about the nature of that criminal activity. The only characteristic that it must satisfy is the ability to produce flows of income that cannot be reinvested without cancelling their origin, thus generating a demand for money-laundering services. Therefore, the more effective the money-laundering action, the greater the cash flows available to the criminal organizations for reinvestment, illegal and legal, will be.

Now we look at the volume of investment in the legal sector. Also the legal investment may grow the more effective the money-laundering is. It helps camouflage the illegal organizations within the economic system. Using ARL to indicate the total flow of legal investments and r_1 the average rate of return:

$$ARL = \frac{f(1-c)(1+r_1)yACI}{1-yq(1-c)(1+r)} \quad (23)$$

So the total investment flow ART – illegal and legal – made possible by the money-laundering activity will be equal to:

$$ART = ARI + ARL = \frac{(1-c)[q + f(1+r_1)]yACI}{1-yq(1-c)(1+r)} \quad (24)$$

where:

$$ARI = \frac{q(1-c)yACI}{1-yq(1-c)(1+r)} \quad (25)$$

Expression (1.24) grasps the central role of money laundering in favouring the growth of revenues for the Criminal Sector. Thanks to laundering, the criminals are able not only to consume and spend but, more importantly, to input capital into the legal and illegal circuits of the economy. Furthermore, the more the investments are successful and profitable, the more the criminals increase their strength, raising the level of pollution in the overall economy.

Returning to the initial expression (1.17), if the money-laundering multiplier is stable, changes in the initial revenues from the criminal activities of accumulation will have a more-than-proportional effect on the volume of funds laundered. The maximum multiplying effect is obtained when the costs are negligible ($c = 0$), while at the same time all the proceeds from the criminal activities must be laundered ($y = 1$). In this case, the degree of expansion of the volume of activity AFI – which coincides with the maximum flow of liquidity available for reinvestment – produced by laundering is equal to:

$$AFI_{max} = \frac{ACI}{1 - q(1 + r)} \quad (26)$$

5. MONEY LAUNDERING AND TERRORISM FINANCE

From September 2001, financial systems have come increasingly into the sights of the state agencies appointed to combat terrorism. In that context, the need to increase the fight against the laundering of illicit capital was included in the agenda.

We should immediately stress that in terms of economic analysis the financing of terrorism (money dirtying) is a phenomenon conceptually different from the recycling of capital (money laundering).

To understand the similarities and differences we must briefly review the economic peculiarities of the money-laundering phenomenon that we described in the previous pages. The conduct of any illegal activity may be subject to a special category of transaction costs, linked to the fact that the use of the relative revenues increases the probability of discovery of the crime and therefore incrimination.

Those transaction costs can be minimized through an effective laundering action, a means of concealment that separates financial flows from their origin. Money laundering performs an illegal monetary function, responding to the demand for black finance services expressed by individuals or groups that have committed income-producing crimes.

The financing of terrorism resembles money laundering in some respects and differs from it in others. The objective of the activity is to channel funds of any origin to individuals or groups to enable acts of terrorism, and therefore crimes. Again in this case, an organization with such an objective must contend with potential transaction costs, since the financial flows may increase the probability that the crime of terrorism will be discovered, thus leading to incrimination. Therefore, an effective money-dirtying action, an activity of concealment designed to separate financial flows from their destination, can minimize the transaction costs. Money dirtying can also perform an illegal monetary function, responding to the demand for 'covertness' expressed by individuals or groups proposing to commit crimes of terrorism.

The main difference between money laundering and terrorism finance is in the origin of the financial flows. While in the money-laundering

process the concealment regards capitals derived from illegal activity, the terrorist organizations use both legal and illegal fund for financing their action.

Money laundering and money dirtying may coexist when terrorism is financed through the use of funds originating from criminal activities. A typical example is the financing of terrorism with the proceeds from the production of narcotics. In those specific situations the importance of the transaction costs is greater, since the need to lower the probability of incrimination concerns both the crimes that generated the financial flows and the crimes for which they are intended. The value of a concealment operation is even more significant.

In summing up, one is prompted to think that the operational techniques of the two phenomena – the laundering of criminal capital and financing terrorism – are at least in part coincident. It is important, however, that the partial overlapping of money dirtying and money laundering remains a hypothesis to be tested from time to time rather than a thesis.

6. REFERENCES

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