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Money laundering and corruption: Birds of a feather flock together

Abstract

This paper is the first to analyse the three-way relationship among money laundering, anti-money-laundering efforts and corruption. On the one hand, if we assume that the goal of criminals involved in corruption is to minimize the probability of being detected, then corruption represents a demand for money laundering (trigger effect), while money laundering can serve as an effective way to clean the revenue from corruption for re-investment (multiplier effect). On the other hand, criminals can try to maximize the likelihood that anti-money-laundering activities will be ineffective. Corruption can be an effective device for maximizing this likelihood, as organized crime may corrupt financial institutions – both regulators and regulated firms – in order to prevent crime detection (accelerator effect). The paper proposes a novel theoretical framework for these interconnections, which is then used to simulate the three effects in 101 countries for the period 1990 to 2040.

JEL-Codes: D730, K140, K200, K420.

Keywords: money laundering, corruption, calibration.

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I. INTRODUCTION

This paper aims to offer a dynamic framework that systematically addresses the following question: How are corruption and money laundering intertwined? We find that the relationship between these two crimes is special, as three different channels can be activated. First, public and private corruption can produce a demand for money laundering (trigger effect). Second, corruption can influence the probability that organized crime's money-laundering activities will be discovered.

A single, widely accepted definition of "corruption" is not available. However, with regard to public corruption, a common definition is "the abuse of public office for private gain". Thus, a public official who misuses his or her power to derive benefits for himself/herself, relatives, friends or politicians is engaging in an act of corruption (Tanzi, 1999). Bribes may occur in corruption, but corruption can also take other forms, such as the sale of state property, kickbacks in public procurement and misappropriations of government funds (Svensoon, 2005). Corruption can also take place in the private sector, where it can interfere with market mechanisms and result in inefficiencies and the misallocation of resources. A manager or employee who acts in his or her own interests exposes the company to risks, such as the loss of markets, reputations or careers (Sööt, Johannsen, Pedersen, Vadi and Reino, 2016).

Money laundering provides a solution for those engaged in corruption, as it can be used to clean the revenue gained through corruption for re-investment purposes (multiplier effect). The trigger effect and the multiplier effect usually characterize the interactions between the demand for and supply of money laundering. This is where the "specialness" of corruption enters the picture. Given the necessity of hiding their "dirty" money, criminals may corrupt financial institutions – both regulators and regulated firms – in order to prevent detection of their crimes. The intuition is straightforward: if we assume that the criminal's goal is to minimize the probability of being detected, then he or she will try to maximize the likelihood that type-I and type-II errors will be made[4] (Dalla Pellegrina et al., 2019) in anti-money laundering (AML) activities. Corruption can be an effective way to maximize that likelihood and, thereby, increase the effectiveness of money laundering (the accelerator effect).

In fact, bribes may be paid to individuals who are entrusted with the operation of the AML system, such as representatives of government agencies (e.g., a Financial Intelligence Unit (FIU)), or private individuals and enterprises. Chaikin (2008) observes that although there is little empirical evidence on the involvement of FIUs in corruption operations, the potential vulnerability of FIUs to corruption must be recognized. In the private sector, it seems that significant opportunities for corruption arise in the placement stage of money laundering, as this phase generally involves financial institutions. For instance, a briber may pay employees in financial institutions to ignore reporting re-

[4] Dalla Pellegrina, Di Maio, Masciandaro and Saraceno (2019).

quirements imposed by the law. As pointed out by Chaikin (2008), corruption in this case can be defined as an illegal payment made to a private party. The purpose of the payment is to influence the behaviour of the person who receives the bribe. The corrupted people act in favour of the briber to the detriment of other employers, principals, fiduciaries or clients. Mechanisms that counteract private corruption (i.e., commercial corruption) are necessary in order to safeguard companies from unfair competition in both national and international markets. If commercial corruption becomes systemic, it may have adverse effects on the legal and political systems.

Despite its importance, the three-way nexus among money laundering, anti-money laundering and corruption has thus far been neglected in the literature.[5] Corruption and money laundering are two illegal phenomena, each evidently acting as a feeder of the other. Markovska and Adams (2015) analysed the relationship between political corruption and money laundering in Nigeria, where corrupt politicians used European banks to launder illegal funds. Nigeria is one of the most corrupt states – in fact, corruption is seen as part of the nation's culture. The danger of corruption and its negative impacts (FATF, 2011) made the fight against corruption a priority.[6] More recently a series of Nordic banks, including Danske Bank, Swedbank, SEB, Nordea and DNB, that control almost all banking in Estonia, Latvia and Lithuania found themselves embroiled in a money-laundering scandal that threatened their reputations. It is natural to wonder whether corruption played a role in the implementation of such a large-scale money-laundering operation.

The close relationship between money laundering and corruption has led governments and non-governmental organizations to a variety of international initiatives. Of these, several have been key, including those launched by the United Nations (UN), the Organization for Economic Cooperation and Development and the Financial Action Task Force (OECD/FATF), the World Bank, the International Monetary Fund (IMF), and Interpol. However, as Shahu (2005) notes, consensus about the problem is necessary to facilitate collective action. This lack of consensus may be why AML systems have thus far failed in the fight against corruption.

In this paper, we propose a novel model that allows us to empirically calibrate the nexus between money laundering and corruption.[7] The paper is organized as follows. In Section 2, we present our theoretical framework and implement the calibrations. In Section 3, we discuss the empirical results. Our conclusions are found in Section 4.

[5] Dreher and Schneider (2010) examine the nexus between corruption and the shadow economy, and find no robust relationship between corruption and shadow-economy size.

[6] Despite the FATF's efforts to fight money laundering in Nigeria, corruption is deeply rooted in the country. This seems to be due to the Nigerian constitution's immunity clause, which protects politicians in power. As Coker, Ugwu and Adams (2012) observe, politicians should be accountable to the collective and the immunity clause should be removed, thereby allowing the relevant agencies to conduct investigations.

[7] Mendes and Oliveira (2013) propose a theoretical model on money laundering and corrupt officials, but it is based on a microeconomic approach.

II. CORRUPTION AND MONEY LAUNDERING: THE THREE-WAY NEXUS AND ITS CALIBRATION

We modify the general framework proposed in Barone, Delle Side and Masciandaro (2018) to estimate the special relationship between corruption and money laundering. Corruption can affect money-laundering activities in two ways. First, corruption yields dirty money that needs to be laundered (the trigger effect). The laundering of corruption proceeds can take a variety of forms depending on the nature of the corrupt act (e.g., FATF (2011) found that in the grand corruption context, the most prevalent forms of proceeds are those arising from: 1) bribes or kickbacks; 2) extortion; 3) self-dealing and conflicts of interest; and 4) embezzlement from the country's treasury by a variety of fraudulent means). Although there are no official data on illicit financial funds attributable to corruption, Medina and Schneider's (2018) estimations of the worldwide shadow economy indicate that illegal revenue due to corruption ranged from USD 1.8 billion to USD 8.24 billion annually over the period 1991 to 2017.[8]

In the following, we consider these figures as indicative of illegal capital produced by corruption. Moreover, we assume that the figures grow according to the logistic equation:[9]

$$K'(t) = \alpha\left(1 - \frac{K(t)}{K^*}\right)K(t). \tag{1}$$

In other words, we assume that there is a horizontal asymptote, K^*, which represents the "maximum carrying capacity" for total profits that a criminal organization can attain. Consequently, the simplest choice for the growth rate is:

$$\tilde{\alpha}\left(K(t)\right) = \alpha\left(1 - \frac{K(t)}{K^*}\right), \tag{2}$$

where $\alpha = \log[(1 + r_i)(1 - y)]$ with the initial condition $K(t_0) = K_0$. Although equation (1) is a non-linear differential equation, its general solution can be expressed as:[10]

$$K(t) = \frac{K^* K_0}{K_0 + (K^* - K_0)e^{-\alpha t}}. \tag{3}$$

[8] These data reflect percentages of nominal global GDP at current prices over the period 1991 to 2017. The last set of data was collected from the International Monetary Fund.

[9] Equation (3) is generally used in biology to model the growth of a population that has to compete for resources. The logistic model is not the only growth model available in the literature. However, a different choice would introduce unnecessary complexity without any corresponding benefits. See Banks (1994).

[10] Banks (1994).

The criminals will choose to launder a share "y" of the illegal capital, while the remainder "$(1-y)$" will be reinvested in the illegal market. A share "f" of the cleaned money (multiplier effect) will be reinvested in the legal market, while the remainder will be spent on consumption goods. Laundering activities are costly. Moreover, these costs may be influenced by corruption (the accelerator effect). For example, when a briber makes payments to individuals who are entrusted with the operation of the AML system (e.g., government agencies, or the regulated private individuals and enterprises that are actively involved in AML activities), then the accelerator effect is in action.[11]

The accelerator effect will be present under certain conditions. The criminal knows that the standard AML architecture that is in place in almost all countries[12] consists of a two-layer hierarchy: (1) financial intermediaries, and (2) other professionals who are required to monitor transactions and report those that might be related to money laundering to public regulators. In this system, which adopts a "risk-based approach", an analysis of the incentive design for both regulated professionals and regulatory officials[13] shows that they must actively exploit their knowledge in order to identify truly suspicious operations. In other words, the effectiveness of the AML policy depends on whether such agents are able to reduce the number of I-type errors (false positives) – reports of transactions that are not actually money-laundering operations – as well as the number of II-type errors (false negatives) – transactions related to money-laundering activities that are not reported as suspicious. In this context, the goal of the criminals is to use corruption to maximize the likelihood that professionals and/or public officials will have more I-type and II-type errors in their monitoring of economic and financial activities.

In order to take this relationship into account in our aggregate perspective, we assume that the cost (C) of money-laundering activities, which does not depend on time, is composed of two parts: the technical cost (C_0) of money-laundering procedures and the cost (R) of AML regulations. The latter is a function of AML laxity, which can be influenced by corruption. The cost, R, ranges from 0 to 0.8.

We assume that the AML index depends on the fact that a country is listed on the FATF blacklist and/or it is an Egmont Group member. Among the countries included on the blacklist, we identify three groups: 1) countries more vulnerable to money laundering; 2) countries more exposed to financial terrorism; and 3) countries exposed to both risks. We assign a value of 1 if a country is an Egmont Group member, and 0 otherwise. Moreover, if a country is a non-cooperative country (i.e., it is listed on the FATF blacklist), we assign a value of -2 (when it poses a serious threat in terms of

[11] FATF (2011) reports several cases of weakness in financial institutions' due diligence related to allowing suspected proceeds of corruption to flow freely through accounts.
[12] FATF (2011).
[13] Dalla Pellegrina and Masciandaro (2009).

both money laundering and terrorism), -1 (if the risk only relates to money laundering) or 0 (if the risk only relates to financial terrorism). Consequently, we obtain an average index that ranges between -1 and 1 (= 1 if a country is not on the blacklist). A low level of the index suggests ineffective AML regulations and a lower probability of crimes being discovered. The probability of being discovered (AML) ranges from 0 (ineffective AML regulation) to 1 (effective AML regulation). In other words, $0 < AML < 1$.[14] The probability of being discovered may be influenced by a weight, CI, obtained from the corruption index of each country. Precisely:

$$CI = \ln(1 + CPI/100). \tag{4}$$

In line with the above-mentioned literature, we assume that a higher level of corruption makes the AML regulation more ineffective (the accelerator effect). Therefore, the cost of the AML regulation (R) decreases. The relationship is:

$$R = AML * CI. \tag{5}$$

This relationship ensures that C ranges from a lower level of 10% and an upper limit of 90%, so that it is never equal to 100% (i.e., no money laundering) or 0% (i.e., no consequences for money laundering). The index of corruption, *CI*, is calculated using data collected from Transparency International (corruption perception index, CPI).[15] We evaluated the averages of the values from 1995 to 2018 for 101 countries.

The legal money produced by organized crime is equal to:

$$L(t) = yf(1 - C)\frac{1+r_l}{1-f(1+r_l)}\int_{t_0}^{t}\frac{dK(s)}{ds}ds. \tag{6}$$

When we replace C with:

$$C_0 + AML * ln\left(1 + \frac{CPI}{100}\right), \tag{7}$$

we have:

$$L(t) = yf\frac{1+r_l}{1-f(1+r_l)}[1 - C_0 - AML * ln(1 + CPI/100)]\int_{t_0}^{t}\frac{dK(s)}{ds}ds. \tag{8}$$

[14] The functional relation could be even more complicated. However, we assume that AML activities only have minor variations, which allows us to assume in the first approximation that this contribution depends on it in a linearly fashion.

[15] CPI ranges from 0 (the highest level of corruption) to 100 (the lowest level of corruption). Therefore, our index of corruption, CI, varies between 0.09 and 0.65 given equation (4).

In other words:

$$L(t) = yf\frac{1+r_l}{1-f(1+r_l)}[1 - C_0 - AML * ln(1 + CPI/100)]\left[\frac{K^*K_0}{K_0+(K^*-K_0)e^{-\alpha t}} - K_0\right]. \quad (9)$$

The parameters of equation (9) are listed in Table 1**.**

Table 1 Model parameters and their sources

Parameters	**Source**
y = 0.7 (*share of illicit capital to be laundered*)	Unger (2007)
f = 0.89 (*share of legal reinvestment*)	Unger (2007); Barone and Masciandaro (2011)
r_l = 0.03 (*legal rate of return*)	Barone et al. (2018)
alpha = 0.148	Result of fit calculations
C_0 = 0.1 (*technical cost of money laundering*)	Reuter and Truman (2004); Barone and Masciandaro (2011)
AML = [0-1] (*index of AML laxity; assumes different values for each country*)	Own elaboration based on data from FATF and Egmont Group
CPI = [0-100] (*corruption perception index; assumes different values for each country*)	Transparency Corruption Perception Index
K^* = USD 9.907 bn (*the carrying capacity of the illegal revenue arising from corruption*)	Result of fit calculations
K_0 = USD 0.762 bn (*the starting illegal revenue arising from corruption*)	Result of fit calculations

The parameters C_0, f and r_l are collected from the economic literature. C_0 represents the difference between the amount laundered and the amount eventually kept by the offender. Although this parameter can assume several values, Reuter and Truman (2004) find that it often ranges from 5% to 10%. Therefore, to derive a cautious estimation of the weight of organized crime in the legal economy, we assume a value of 10% for the parameter.

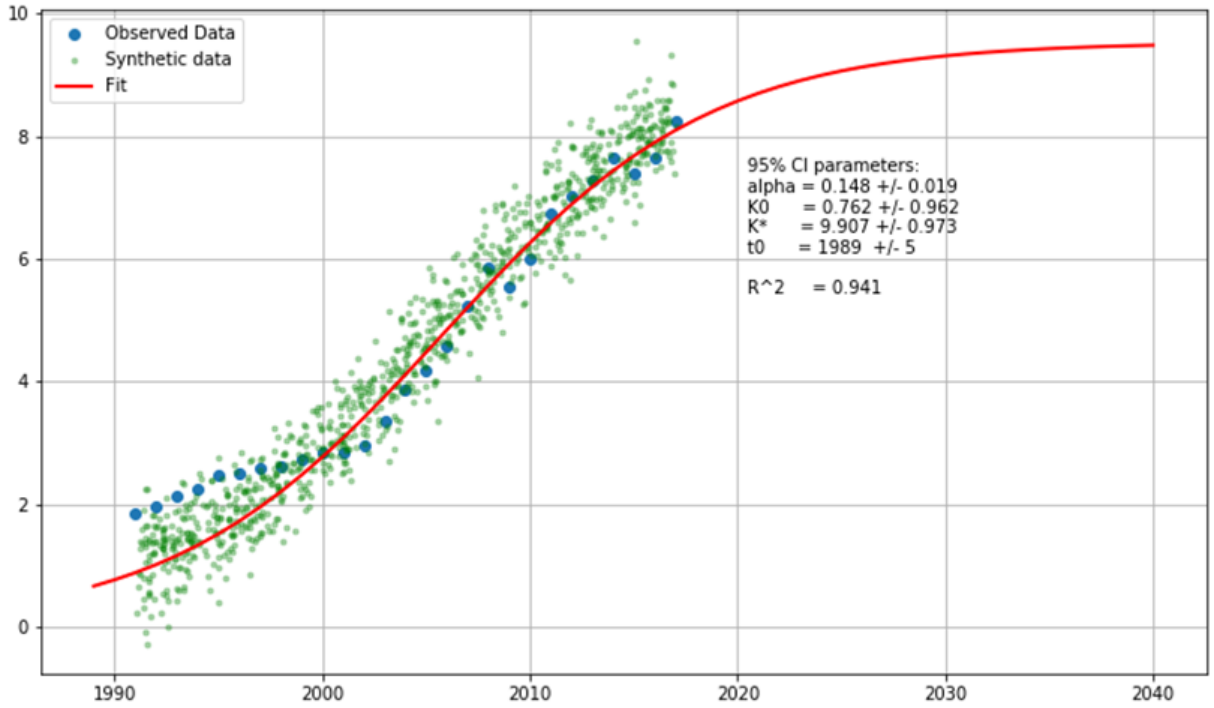
The parameter "f" is the percentage of laundered money that is reinvested in the legal sector. We calculate this percentage using data from Unger (2007) on the share of laundered money that is spent on consumption goods (11%). We fix "f" at 89%. We calculate r_l as the annual average of long-term interest rates for OECD member countries for the period from 1962 to 2015 (see Barone et al., 2018). With regard to the other parameters, we cannot simultaneously know (by means of the fit) the exact value of the percentage of illegal capital that needs to be laundered (y) and the value of the illegal interest rate r_i. However, we can derive the growth rate of illegal capital $alpha$ (α). Given this value, we can fix the parameter y equal to 70% according

to the literature, which enables us to indirectly obtain the illegal interest rate r_i, which is equal to 2.8%. This result is consistent with the economic literature (see Unger, 2007; Barone and Masciandaro, 2011).

In order to estimate the carrying capacity of the illegal capital, K*, we determine the fit using a custom routine written using the Python programming language (see Figure 1). The fit was run against the value collected from Medina and Schneider (2018) and listed in Table 3.

Assuming a logistic growth for the illegal capital gathered by organized crime, the result of the fit calculation was as follows. The starting time (t_0) of the hoarding process was 1989, when the illegal capital due to corruption (K_0) was equal to USD 0.762 billion. The carrying capacity of the illegal capital reaches its maximum value of USD 9.907 billion in 2040. The goodness of fit index (R^2) is equal to 0.941. Moreover, in order to evaluate the accuracy of the estimated parameters, we generated 1,000 synthetic residuals. Then we produced a set of 1,000 synthetic observations given by the illegal capital derived from the fit plus the synthetic residuals. Thereafter, using the bootstrap method, we pinpointed a subset of 100 synthetic observations and, for each of them, again undertook the fit calculations. We obtained 100 different estimations for each fit parameter. Then we calculated a 95% confidence interval (CI) for each of them. This procedure provided us with an error margin for each of the parameters estimated by the fit calculations. In particular, we obtain margins of error equal to: 1) ±0.019 for alpha; 2) USD ±0.962 billion for the starting illegal capital, K_0; 3) USD ± 0.973 billion for the carrying capacity, K*; and 4) ±5 years for the starting time of the accumulation process. We plot the results in Figure 1.

Figure 1 Cumulative illegal capital obtained from the fit parameters, 1989 to 2040



In order to be sure that illegal capital follows a logistic trend, we tested the null hypothesis that the reciprocal of carrying capacity is equal to zero (i.e., the illegal capital follows an exponential trend) against the alternative hypothesis that this parameter differs from zero. In other words, we tested the hypothesis $H_0: \frac{1}{K^*} = 0$ against the alternative hypothesis $H_1: \frac{1}{K^*} \neq 0$. The result of the test shows a t-statistic of 171.8 and a p-value of 0.0000. Therefore, we reject the null hypothesis with a CI of more than 99%.

Moreover, we wondered whether the predicted values of illegal capital derived through corruption and observed values could originate from different distributions. In order to answer this question, we performed a Welch's t-test and a Kolmogorov-Smirnov test. The former is a revision of Student's t-test. With this test, we prove that $H_0 = \mu_y - \mu_{\hat{y}} \neq 0$ against $H_1 = \mu_y - \mu_{\hat{y}} = 0$. The resulting p-values were 0.946 and 0.31, respectively. Therefore, we can reject the null hypothesis that the two samples are drawn from the same distribution.

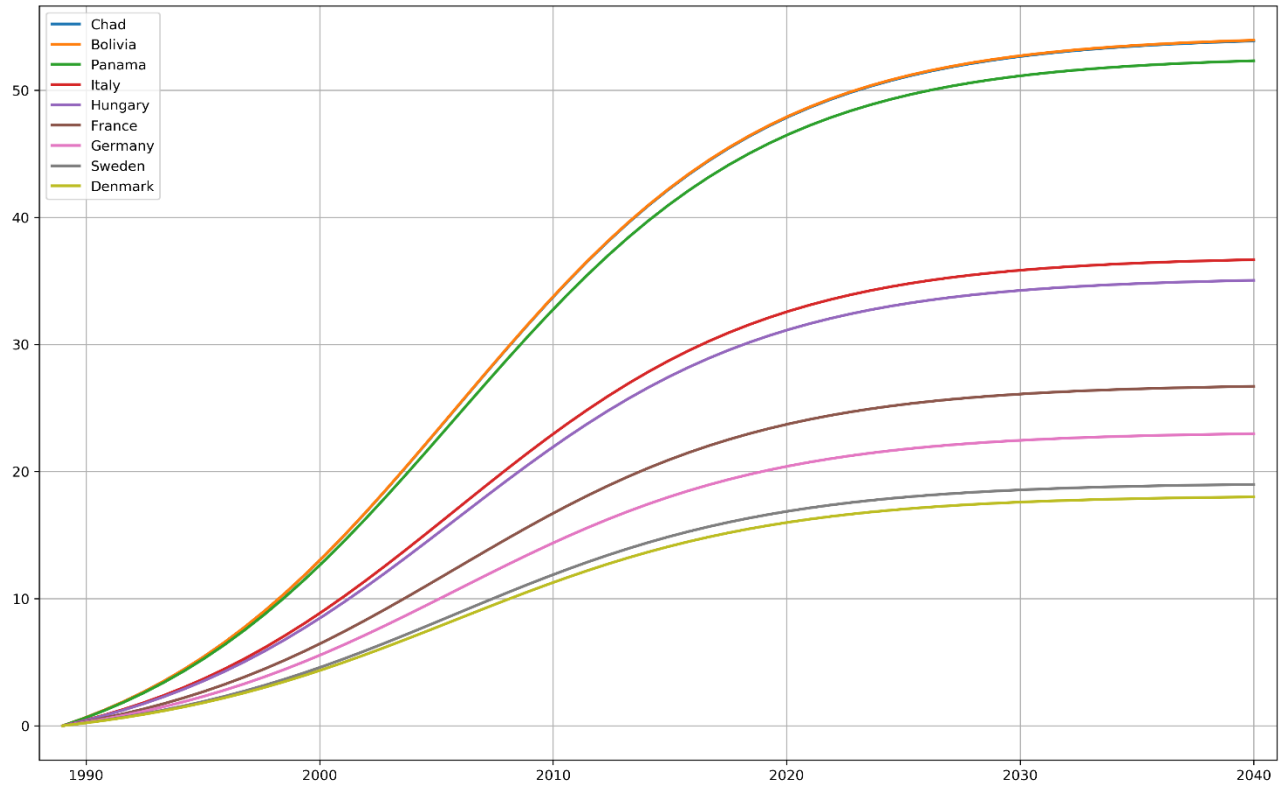
III. CORRUPTION AND MONEY LAUNDERING: WORLDWIDE ESTIMATIONS

We can use our results as estimates of the parameters in equation (9). This enables us to derive the relationship between the initial revenues arising from corruption (the trigger effect) and the final cumulative legal capital in the hands of the criminals (the multiplier effect), taking the potential effect of corruption on weakening the AML policies into account (the accelerator effect).

We focus on nine countries (CPI given in brackets): Chad [10-20]; Bolivia [20-30]; Panama [30-40]; Italy [40-50]; Hungary [50-60]; France [60-70]; Germany [70-80]; Sweden [80-90]; and Denmark [90-100]. These countries have different percentages of AML activities: Chad [0.75]; Bolivia [0.5]; Panama [0.5]; and Italy, Hungary, France, Germany, Sweden and Denmark [0.98] (see Table 2). We show the dynamics of their respective cumulative legal capital in Figure 2. The figure highlights how the cost of AML regulations (and, consequently, the growth rate of legal capital) can be influenced by the different levels of corruption in each country. In fact, countries with higher probabilities of money-laundering discovery (AML) but lower CPIs (i.e., greater prevalence of corruption) are characterized by a lower risk of discovery (R). In other words, the effectiveness of AML regulation may be undermined by corruption in these countries.

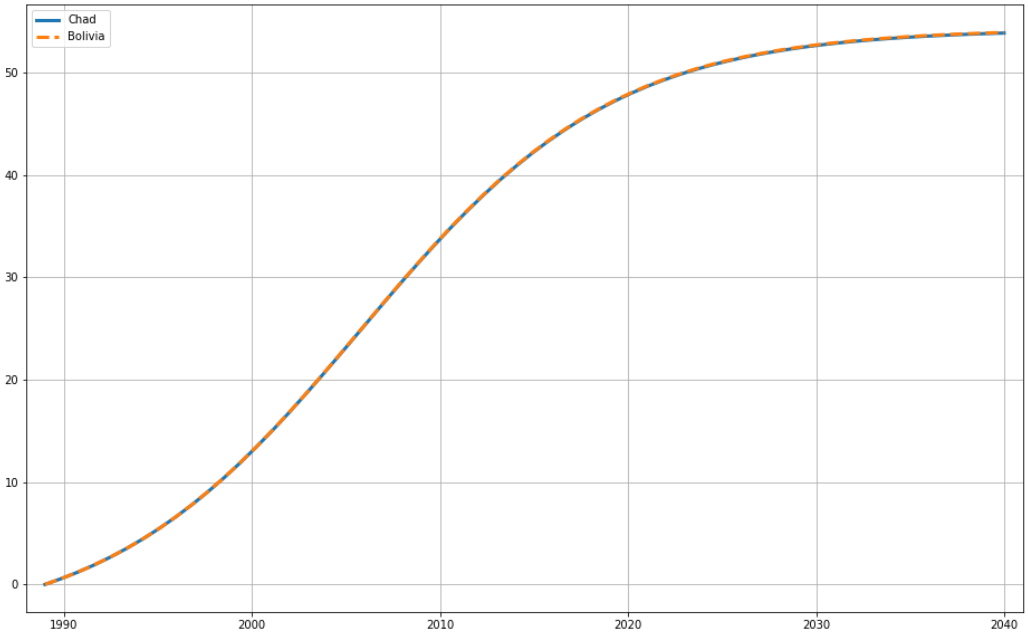
Therefore, only part of the growth rate of legal capital is defined by AML policies. This leads us to stress the relationships among the three effects.

Figure 2 Cumulative legal capital for selected countries



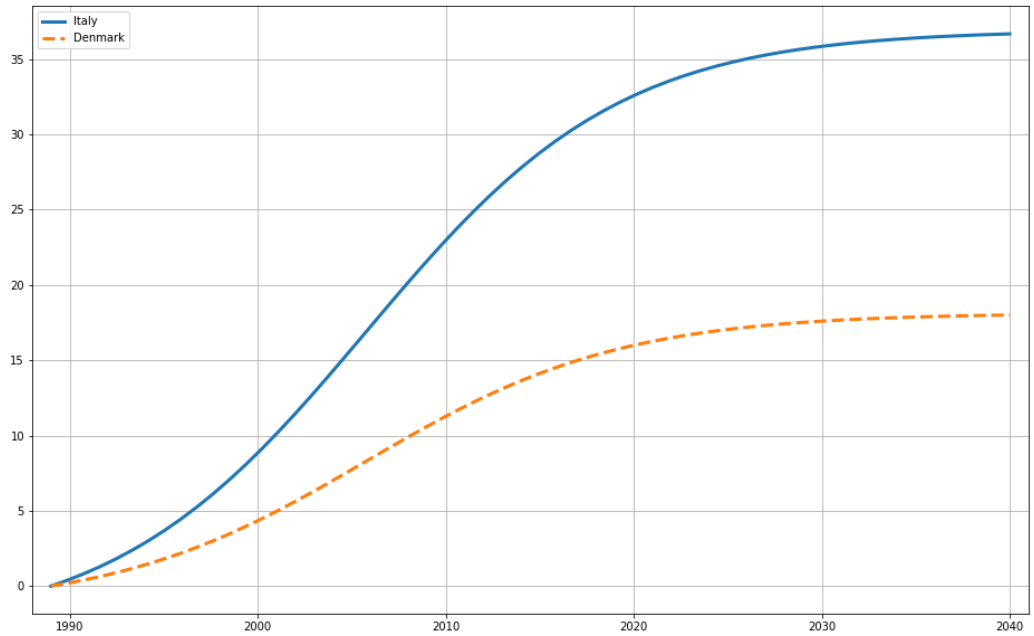
For example, starting with illegal revenue derived from corruption equal to USD 0.762 billion (trigger effect), criminals who launder money in Chad, which has a CPI index of 10-20, an AML equal to 0.75, and an R equal 0.22 (accelerator effect), will be able to camouflage USD 53 billion in clean money in the legal economy in 2040 (multiplier effect), with a multiplier equal to 69.55. If, instead, the cost of the AML regulation (R) was perfectly determined by AML, the multiplier would have only been 25. For the same reason, the growth rate of legal capital of Chad is nearly equal to the corresponding value in Bolivia, which is characterized by lower levels both of AML and corruption (see Figure 3).

Figure 3 Comparison of cumulative legal capital for Chad and Bolivia



Similarly, if we compare the growth rates of legal capital in Italy and Denmark, which are characterized by the same AML but different levels of corruption (Italy has more corruption than Denmark), the growth rate in Italy is higher than in Denmark (see Figure 4). More specifically, Italy reaches a maximum level of cumulative legal capital of USD 35 billion in 2040, while the corresponding figure for Denmark is USD 17 billion.

Figure 4 Comparison of cumulative legal capital for Italy and Denmark



This result can be explained using the distinction between *de jure* and *de facto* accelerator effects, consistent with the suggestions made by Sharman and Chaikin (2009). These authors point out that

establishing an effective AML regime that meets international standards is costly for poor countries. At the same time, corruption is generally the major crime that produces money that needs to be laundered in those countries. However, even when poor countries have already paid the costs of establishing an AML system,[16] they do not press the authorities to use these systems to counteract corruption. As the authors observe, the reason for this apparent paradox might be found in the search for legitimacy by developing countries. In other words, governments might desire to appear modern, progressive and advanced. Therefore, they may commit to international standards in several areas (the *de jure* accelerator effect) even if those standards are unsuitable for local conditions on technical-functional grounds (the *de facto* accelerator effect). In general, developing countries adopt policies from Organization for Economic Co-operation and Development (OECD) countries. Such commitments help minimize the risk of losing a reputation as a country that might be relevant for collaboration in the future. If the discrepancy between *de jure* and *de facto* accelerator effects makes sense, then the multiplier effect is likely to be underestimated in countries where such a discrepancy is relevant.

If we test the correlation between CPI and both the *de jure* accelerator and the *de facto* accelerator, we derive a result consistent with our expectation. More precisely, using the Spearman's rank order correlation, we found a rho of 0.76519184 under the null hypothesis of non-correlation between CPI and *de jure* accelerator with a two-sided $t(99) test = 11.8259$ and a $p - value$ of 0.000. The correlation between CPI and *de facto* accelerator has a rho of 0.89472335 with z = 8.94723 and a two-sided p-value of 0.0000.

[16] As Sharman and Chaikin (2009) note, KPMG surveyed the costs of the AML system for several banks. In 2007, these costs had increased by an average of 58% since 2004 (37% in Asia-Pacific, 59% in Latin America and the Caribbean, 60% in Russia and 70% in the Middle East and Africa (KPMG, 2007)). Moreover, KPMG reported that international banks expected a 34% increase in their compliance costs by 2010.

Table 2 The relationship between AML costs and CPI (average, 1998-2018)

COUNTRY	AML (Probability of the crime being discov-ered)	CPI (Corruption Perception Index)	R (Cost of AML regulation or the actual probability of being discovered)
Korea. North	0.5	10.40527286	0,049494
Somalia	0.5	10.75998094	0,051098
South Sudan	0.5	13.33333333	0,062582
Afghanistan	0.25	14.41900607	0,033674
Iraq	0.5	17.39118222	0,080171
Sudan	0.25	18.47473614	0,042382
Haiti	0.01	18.51422721	0,001699
Chad	0.75	18.90921795	0,129893
Angola	0.75	19.32696396	0,132523
Guinea Bissau	0.01	19.51615071	0,001783
Myanmar	0.25	19.72607786	0,045009
Democratic Republic of the Congo	0.75	20.40602402	0,139275
Libya	0.5	20.43662143	0,092977
Burundi	0.5	20.45374	0,093048
Venezuela	0.75	20.53196321	0,140059
Yemen	0.5	20.64781183	0,093853
Cambodia	0.5	20.72182786	0,094159
Bangladesh	0.75	22.00638857	0,149177
Tajikistan	0.5	22.03189071	0,099556
Central African Republic	0.5	22.59202	0,101846
Syria	0.75	22.67497825	0,153276
Nigeria	0.75	22.87476286	0,154497
Guinea	0.01	23.11572036	0,00208
Cameroon	0.75	23.30437393	0,157114
Eritrea	0.5	23.44903384	0,105329
Paraguay	0.5	23.72760101	0,106456
Kenya	0.01	23.76553214	0,002132
Zimbabwe	0.5	23.9392025	0,10731
Laos	0.25	24.72426214	0,055234
Uganda	0.01	25.1906775	0,002247
Ukraine	0.75	25.85602679	0,172476
Sierra Leone	0.25	26.27193357	0,058317
Iran	0.25	26.64623786	0,059057
Pakistan	0.5	26.90525626	0,119135
Nepal	0.5	26.96237402	0,11936
Cote d'Ivoire	0.75	27.58346571	0,1827
Mozambique	0.25	27.81909442	0,061361
Madagascar	0.5	27.91325914	0,123091

Table 2 continued

COUNTRY	AML (Probability of the crime being discovered)	CPI (Corruption Perception Index)	R (Cost of AML regulation or the actual probability of being discovered)
Lebanon	0.25	28.45300857	0,062598
Gambia	0.5	28.64947159	0,125960617
Indonesia	0.75	28.72421786	0,189376575
Bolivia	0.5	29.45115393	0,129066702
Tanzania	0.5	29.768045	0,13028922
Ethiopia	0.01	29.78117029	0,002606795
Niger	0.75	29.81461357	0,195702877
Mali	0.25	30.42150056	0,066400332
Philippines	0.75	31.12296393	0,203223992
Liberia	0.25	31.6454244	0,068735478
Algeria	0.75	31.87544754	0,207515798
Egypt	0.75	32.70078107	0,212194975
Zambia	0.5	33.10544464	0,142985705
Mexico	0.98	33.34673393	0,282026892
India	0.75	34.39253107	0,221695995
Sri Lanka	0.5	35.30473086	0,151179654
Panama	0.5	35.58203851	0,152203366
Colombia	0.75	35.90952643	0,230114443
Burkina Faso	0.25	36.03308857	0,076931995
Sao Tome and Principe	0.98	36.04347186	0,301648195
Vanuatu	0.5	38.579686	0,163137677
Lesotho	0.25	38.79721786	0,081960958
Romania	0.98	38.86148071	0,321740569
Bulgaria	0.98	39.43891643	0,325807341
Turkey	0.75	40.8953075	0,25713521
Croatia	0.98	42.99668764	0,350498271
Greece	0.98	43.13891679	0,351472532
Saudi Arabia	0.75	43.31004587	0,269880209
Tunisia	0.75	43.84260679	0,272662147
Slovakia	0.98	45.31129179	0,366233921
Italy	0.98	46.75246893	0,375905562
Latvia	0.98	47.60510714	0,381582939
Czech Republic	0.98	49.20288714	0,392134134
Hungary	0.98	50.26980286	0,399116916
Korea. South	0.98	51.19871214	0,405156251
Poland	0.98	51.63657786	0,40799022
Lithuania	0.98	52.40855685	0,412966731
Malta	0.98	57.94171857	0,4479148
Slovenia	0.98	60.3457917	0,462719235
Spain	0.98	62.80808791	0,47765392
Portugal	0.98	63.1777175	0,479876333
Israel	0.75	63.18102857	0,367267509
Estonia	0.98	65.16200393	0,491721492
France	0.98	69.71609429	0,51837766
Chile	0.98	70.61209143	0,523537868
Belgium	0.98	72.28122536	0,533078853

Table 2 continued

COUNTRY	AML (Probability of the crime being discovered)	CPI (Corruption Perception Index)	R (Cost of AML regulation or the actual probability of being discovered)
Japan	0.98	72.47889286	0,534202573
USA	0.98	74.0841725	0,543281357
Ireland	0.98	74.29858536	0,544487683
Austria	0.98	76.53103679	0,556960008
Germany	0.98	79.19505143	0,571638598
United Kingdom	0.98	81.09824429	0,581992071
Australia	0.98	83.23005571	0,593460889
Luxembourg	0.98	83.60965357	0,595489014
Iceland	0.98	84.99072393	0,602832766
Canada	0.98	85.0258775	0,603019011
Netherlands	0.98	85.81946321	0,607213264
Norway	0.98	86.46066214	0,610589091
Switzerland	0.98	87.03631214	0,613609931
Sweden	0.98	89.92803143	0,628645524
Finland	0.98	91.7514025	0,638008964
New Zealand	0.98	92.16524321	0,640121732
Denmark	0.98	92.67574286	0,642721717

Table 3. Corruption as percentage of world GDP at current prices

Year	IMF World GDP current prices (USD bn)	Corruption Percentage of GDP
1991	24332.276	0.0076
1992	25162.839	0.0078
1993	25852.931	0.0082
1994	27798.719	0.0081
1995	30998.224	0.008
1996	31854.506	0.0079
1997	31782.089	0.0081
1998	31641.788	0.0083
1999	32756.857	0.0083
2000	33837.413	0.0084
2001	33588.236	0.0085
2002	34714.823	0.0085
2003	38975.762	0.0086
2004	43870.534	0.0088
2005	47540.811	0.0088
2006	51488.837	0.0089
2007	58113.183	0.009
2008	63749.08	0.0092
2009	60385.529	0.0092
2010	66011.216	0.0091
2011	73229.764	0.0092
2012	74619.087	0.0094
2013	76749.85	0.0095
2014	78832.477	0.0097

2015	74601.677	0.0099
2016	75652.62	0.0101
2017	80050.964	0.0103

IV. CONCLUSION

Are money laundering and corruption birds of a feather that flock together? The answer to this question depends on the relevance – country by country and time by time – of the three channels that intertwine the two phenomena: trigger effects, multiplier effects, and accelerator effects. In this paper, we presented a dynamic model to derive an answer, and then offered a method to estimate the overall relationship between corruption and money laundering in 101 countries in the period from 1990 to 2040.

We simulated the growth in criminal wealth, which depends on the initial revenue collected through corruption and the effectiveness of AML activities. The latter, in turn, can be influenced by the presence of corrupt professionals and/or public officials. Given these assumptions, we estimated both the annual and the cumulative penetration of the legal economy achieved by criminals who are involved in corruption through money-laundering activities. We showed that money-laundering activities enable criminals to disguise their criminal proceeds in the legal market at an amount equal to a multiplier of the corresponding illegal capital. For 2040, this multiplier ranges from a maximum of 68.78 for Chad to a minimum of 22.9 for Denmark. This corresponds to legal capital derived from criminal activities of nearly USD 53 billion and USD 17.51 billion, respectively. These amounts are approximately equal to the 2018 GDPs of Slovenia and Mali, respectively, at current prices.

The estimation of the relationships between corruption and money laundering is crucial for highlighting the importance of effective counteractions to both phenomena. More specifically, greater transparency in the standard, two-layer hierarchy of AML architectures means less probability of corruption among financial intermediaries and other professionals who are required to monitor economic and financial transactions and report those deemed suspicious. Such transparency should also reduce corruption among the public officials in charge of analysing such reports. Less corruption in AML activities, in turn, should trigger a lower accelerator effect, which increases costs for criminals and reduces the multiplier effect.

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