

The Economics of Corporate Liability and Enforcement

Emmanuelle Auriol, Erling Hjelmeng og Tina Søreide

Prosjektet har mottatt midler fra det alminnelige prisreguleringsfondet.



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Emmanuelle Auriol[†] Erling Hjelmeng[‡] Tina Søreide[§]

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Abstract

Enforcing corporate liability, governments seek to deter crime, promote corporate compliance, and secure fair competition in markets, while in practice, they face difficult trade-offs between these aims. This paper analyzes optimal enforcement by combining approaches from the economic theory of crime and theories of industrial organization. Upon a review of 50 cases of corporate liability from five European countries, we find enforcement systems and practices are sub-optimal. The market consequences of different sorts of profit-motivated crime and the ensuing penalties for those detected are not sufficiently internalized in enforcement practices. The use of leniency for self-reporters is not combined with the predictability and magnitude needed to secure the deterrent effect of sanctions. Despite intensified international cooperation in crime control, current enforcement systems do not sufficiently internalize the consequences of crime that materialize outside their jurisdiction. Societies would benefit from stronger supra-national cooperation in regulation and enforcement of transnational corporate crime.

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[†]Toulouse School of Economics, emmanuelle.auriol@tse-fr.eu

[‡]University of Oslo, e.j.hjelmeng@jus.uio.no

[§]Norwegian School of Economics (NHH), tina.soreide@nhh.no

1 Introduction

Since the turn of the millennium, governments have sharpened regulations regarding corporate misconduct, including bribery, money laundering, and violation of competition law. A common declaration in official references to such regulations is that enforcement must be *effective, proportionate, and dissuasive*. Although this statement has broad acceptance, it is not clear what it means (Cafaggi and Iamiceli, 2017). With respect to sanctions, for example, it is unclear whether fines should be high enough to deter crime, kept within limits for the sake of protecting competition in markets, or structured to promote certain crime-preventive measures. An expansion in the use of leniency, that is, the practice of offering penalty reductions in return for certain corporate behaviors, such as self-reporting, does not resolve the matter. Typically, leniency is a component of enforcement practices that end cases of alleged misconduct without trial. Such non-trial enforcement practices are popular because they consume less time and fewer resources per case, offer more opportunity for enforcement agencies to demand an ethical business culture, and allow corporate defendants and their employees to move ahead without years of uncertainty around the outcome of their case. This form of enforcement might be considered effective unless the procedure is also associated with weaker law enforcement legitimacy, less predictable enforcement outcomes, higher risk of collusion between prosecutor and defendant, and poorer opportunity for victims who want to seek compensation – all reasonable concerns (Søreide and Makinwa, 2020).

Governments are not open about how they rank the many objectives behind enforcement of corporate liability and sanctioning, and for researchers as well as the general public, many questions remain unanswered. How well do current enforcement priorities align with what we know about the consequences of crime? How robust are enforcement systems against political influence if enforcement is becoming more flexible? What would be the consequence of such influence for different forms of crime? Could it make enforcement outcomes more exposed to influence from non-legal factors, such as the firm’s market position and whether the crime was committed domestically or abroad?

In response to the need for such insights, we investigate trade-offs between enforcement strategies, focusing in particular on the difficulty of imposing sanctions that deter corporate crime while at the same time avoiding harmful market consequences. There is no proper investigation of this trade-off in the literature: it is as if the economics of crime and theories of industrial organization¹ have evolved

¹A field of economics dealing with the strategic behavior of firms, regulatory policy, antitrust policy and market competition.

in separate spheres. What becomes clearer when combining the insights from these spheres, is that enforcement systems and practices - as they have evolved over the last decades - are inconsistent with the optimal system that would be chosen by a benevolent (uncaptured) government. Second, despite intensified international cooperation for more efficient law enforcement, current enforcement systems do not sufficiently internalize the consequences of crime that materialize elsewhere, that means abroad and far away from the law enforcement jurisdiction that pursues a case. Eventually, law enforcement may have a negative effect on competition in concentrated markets, which means, a benevolent government may have incentives to shield a firm from sanctions, i.e. soft treatment alone is not evidence that an enforcement system is captured by corporate interests. Suspicion of capture is still warranted when cases of corporate crime lead to no enforcement reaction or a negligible corporate penalty, while there are no legal consequences for the individuals responsible for crime.

Section 2 begins with a brief introduction to the regulation of corporate liability and points to relevant results in the literature on law and economics. In Section 3 we present an economic model for analysis of the above-mentioned questions. First, we describe corporate crime in a market context and explain why different sorts of profit-motivated crime, such as bribery, violation of anti-money-laundering (AML) regulations, and violation of competition law, have different consequences. Second, we investigate governments' incentives to control corporate crime in view of how the incumbent regime values producer surplus relative to consumer surplus (i.e., competition in markets). Third, we explore optimal sanctions under a given set of circumstances, and especially the use of leniency programs when Becker-style deterrence is not an option.² In Section 4 we turn to enforcement in practice. With an emphasis on European countries, we investigate the extent to which governments de facto are able to secure enforcement of corporate liability in line with the incentives described in Section 3. By reviewing practices in five countries – Germany, the Netherlands, Norway, Sweden, and the United Kingdom – we check whether enforcement patterns disclose tendencies to shield certain suppliers from severe sanctions. Limited data availability reduces the scope of empirical studies but it does provide important insights. In Section 5 we summarize results from Sections 3 and 4 and discuss policy implications. A conclusion follows.

²Becker (1968) postulated regulation of crime rates through adjustment in the probability of detection and the size of the penalty.

2 Regulation of corporate liability

Governments regulate and sanction corporate misconduct in different ways (Pieth and Ivory, 2011). With the expansion of corporate regulations in the 20th century, it became possible across the United States and Western Europe to hold firms criminally responsible for economic crime committed by their employees. The basis for enforcement was vicarious liability combined with some form of penalty reduction for crime-preventive efforts and self-reporting (Oded, 2013). Most countries criminalized corporate bribery in the late 1990s upon the implementation of international conventions such as the United Nations Convention against Corruption, the Organisation for Economic Co-operation and Development (OECD) Anti-Bribery Convention, and the Council of Europe’s Civil Law and Criminal Law Conventions on Corruption.³ Criminalization of failure to comply with anti-money-laundering regulations (as stipulated by the US Bank Secrecy Act of 1970) started with the US Money Laundering Control Act of 1986; thereafter, other OECD countries followed suit with a largely harmonized combination of criminal and non-criminal regulations, coordinated through the Financial Action Task Force (FATF).⁴ Competition in markets is regulated primarily as a non-criminal matter. Today, as a result of EU-cooperation, such regulations are largely harmonized across Europe and is substantially consistent with the even older regulations in the United States.⁵

Normally, criminalization is associated with stricter penalties, a risk of imprisonment for the involved individuals, and compensation for victims. For corporate offenders, it often means indirect consequences such as damages to be settled with business partners, debarment from procurement, exclusion from some investment funds, and reputational costs. For enforcement agencies, criminalization implies a higher burden of proof, which in many cases means de facto protection against penalties, especially for individuals who act on behalf of an organization.⁶ In practice, however, the distinction between criminal and non-criminal enforcement matters less than one might suppose. The regulatory development has gone in the direction of *functional equivalence*. In other words, corporations can be sanctioned in similar ways, regardless of how the jurisdiction in question combines criminal and non-criminal enforcement (Pieth et al., 2014:37-40).

³The United States criminalized corporate bribery earlier, in 1977, through the Foreign Corrupt Practices Act (FCPA), but enforcement of the act was weak until other countries enacted their own anti-bribery statutes (Garrett, 2020)

⁴See van Duyne et al., 2018 for detailed presentation and analysis of the FATF-initiated AML-regime.

⁵Government regulation of markets for the sake of preventing cartel cooperation started with the US Sherman Antitrust Act of 1890, which still provides a basis for corporate liability in cartel cases.

⁶Especially in cases that end with an out-of-court settlement with a corporate defendant, individuals typically are not charged, according to Garrett (2018), who bases this finding on US enforcement statistics.

The regulatory regimes for corporate liability have evolved in other ways, too, since the turn of the millennium. Around that time, governments started to recognize the shortcomings in enforcement vis-à-vis corporate offenders, who could easily hide their crimes behind international corporate structures and financial secrecy provisions. Too strict vicarious liability would only serve to strengthen firms' incentives to hide whatever crime they might have conducted, governments realized, and thus such attempts to secure deterrence could harm markets more than it protected them (Khanna, 2000; Arlen, 1994). Today, countries enforce corporate liability with some sort of evaluation of negligence, if not an assessment of guilt (OECD, 2016). This allows enforcement agencies to consider the reasonableness of the penalty in view of the corporation's actual responsibility for misconduct (Hjelmeng and Søreide, 2017). While the weight of these circumstances is indeed a question addressed by courts, court assessment of the material facts of a case is costly in complex cases of corporate wrongdoing. It is also a time-consuming process, and society in many cases will be better off if corporate defendants can go on with their business if they do so with stronger internal measures against corporate crime. This is why governments increasingly allow their law enforcers and corporate offenders to end cases with a *non-trial resolution*, that is, a negotiated settlement (OECD, 2019; Garrett, 2014). Governments defend the practice as a way to align two aims, that of promoting corporate compliance and that of deterring crime (Ivory and Søreide, 2020). Unless the conditions for such enforcement are clearer than what we see today, and the benchmark sanctions higher, there is a high risk that governments will achieve neither of these objectives (Garrett, 2014). For the sake of regulatory efficiency, some governments have started to describe what sort of compliance systems firms ought to have in place to merit lenient treatment under non-trial resolutions.⁷ Yet there is substantial uncertainty with respect to current regimes, and the level of informality in these processes is generally high. Settlement-based enforcement normally comes with broad discretion for prosecutors, limited transparency for the public, weak protection against double jeopardy, and criminal sanctions below the level of crime deterrence.⁸

The ambition to structure sanctions in a way that both promotes corporate compliance and deters crime resonates well with the aims addressed in the economic literature on corporate crime (Shavell, 2004, Ch 9 and 10). Enforcement may prevent crime if strict liability is combined with predictable penalty reductions for certain corporate behaviors (Arlen and Kraakman, 1997; Buccrossi

⁷The US Department of Justice, the French Anti-Corruption Agency (AFA), and the UK Serious Fraud Office all have provided guidelines on corporate crime preventive measures

⁸In addition, several authors criticize the cost-saving practice of encouraging firms to investigate their own offenses and provide evidence in order to cooperate with enforcement agencies Baer (2018), Lonati and Borlini (2020). For a survey of settlement-based enforcement in corporate bribery cases in 66 countries, see Makinwa and Søreide (2019).

and Spagnolo, 2006). In this context, economists typically consider the total impact of consequences, regardless of legal category (criminal or non-criminal), and take into account both direct and indirect consequences of the penalty, including those beyond the control of enforcement agencies. The crime-detering impact of enforcement hinges on a sufficiently broad definition of liability, a real risk of crime detection, the predictability of a penalty, and multiple consequences for employees (Polinsky and Shavell, 2000; Arlen, 2020). These criteria apply to settlement-based enforcement as well, yet the added flexibility weakens deterrence if offenders believe they can negotiate themselves out of a serious penalty. It also distorts justice if the difference between the offered sanction and the expected trial result becomes too large for alleged offenders to ever refuse an offered settlement and opt instead for court proceedings (Søreide and Vagle, 2020b).

We know less about how enforcement of corporate liability ought to take into account factors such as the perpetrators' market situation, the nature of the crime, and political priorities. A lack of clarity regarding enforcement practices and sanction principles suggests that the barriers against undue influence on enforcement outcomes might be too weak. We need to understand why such influence might happen in relation to different forms of crime, the consequences for markets, and the consequences for optimal regulation. The next section presents a theoretical analysis of these concerns.

3 Theoretical analysis

We focus on an economic sector with $N \geq 1$ active firms. Assuming these firms produce collectively a quantity Q , the net consumer surplus is denoted $S(Q)$. Let q_i denote the production by firm i and $Q_{-i} = Q - q_i$. The firm's $i = 1, \dots, N$ profit is denoted $\pi_i(q_i, Q_{-i})$. The government aims to maximize the objective function:

$$W(N) = S(Q) + \lambda \sum_{i=1}^N \pi_i(q_i, Q_{-i}) \quad (1)$$

where $\lambda \geq 1$ is the weight the government puts on firms' profit compared to net consumer surplus. This weight can be the result of capture by the industry in question. More generally, it can reflect macroeconomic concerns, such as employment and taxation, that tilt political objectives toward the industry. An uncaptured government might set $\lambda = 1$ so as to maximize the net surplus from trade.

3.1 Modeling corporate crime

In what follows we focus on three types of corporate crime: corruption, collusion, and violation of AML regulations. We are interested in national governments' incentives to fight these crimes and the tools they can use to do so. To illustrate the trade-off and coordination problems they face, we consider three simple generic models of crime. We present these cases in a stylized manner with specific assumptions. However, the results discussed below are quite general and do not depend on the specifics of the examples.

3.1.1 Corruption in Public Purchases: Bribery

In this section we assume that a commodity or service of fixed size Q is to be purchased on behalf of the government/people by public tender. The commodity will be paid for using taxpayers' money. We assume that $S(Q)$ is large so that the net social surplus (1) associated with the public acquisition is always positive (i.e., it is always worth procuring the commodity).

There are $N(\geq 1)$ firms in the economy that can produce the good. To produce a quantity $q_i \geq 0$ the firm $i = 1, \dots, N$ faces the cost $C_i(q_i) = c_i q_i$ where c_i is random. The c_i s are independently and identically distributed. To keep the exposition simple, and to obtain closed-form solutions, we assume that c_i s are uniformly distributed in $[0, 1]$. However, the results are robust to other distributions.

Since the firms' cost parameters are independently and identically distributed, it is optimal under asymmetry of information to organize a second-price auction (Myerson 1981).⁹ The firms estimate their actual costs when they prepare their bids. The expected transfer paid for the commodity with such a competitive bidding procedure is $t(N) = \frac{2Q}{N+1}$ while the rent expected by a producer $i = 1, \dots, N$ when being one of N bidders is $\pi(N) = \frac{Q}{N(N+1)}$ (see Auriol and Soreide, 2017).¹⁰ It implies that the net expected social welfare in (1) is: $W(N) = S(Q) - \frac{2Q}{N+1} + \lambda \frac{Q}{N+1}$. By contrast, if corruption occurs, and if one firm manages to capture the public purchaser so that it implements sole sourcing instead of a fair competitive procedure (see Auriol, 2006), the acquisition cost is equal to the monopoly price $t(1) = Q$, and the firm's net expected profit is $\pi(1) = \frac{Q}{2}$.¹¹ The principal's surplus

⁹Each firm submits independently a price above which it accepts to serve the market. The contract goes to the firm with the lowest bid, but the price it receives in exchange for the production is the second-lowest bid. In this form of auction it is a dominant strategy for each producer to announce its true marginal cost.

¹⁰Auriol and Soreide (2017) explore the market effects of debarment as a sanction for corruption in an infinite-horizon repeated procurement game. Debarment is found to make little difference in markets with high competition, while in markets with low competition it may deter corruption as long as firms value public procurement contracts in the future and there is an appreciable risk that the corruption will be detected.

¹¹The bribe payment is not included in the profit expression because its size or form typically makes it irrelevant. If it takes the form of an illegal transfer to a decision-making official, the amount only has to matter to this individual's

is $W(1) = S(Q) - Q + \lambda \frac{Q}{2}$. The firm's rent from bribing the public purchaser to win the contract is therefore

$$\Delta\pi^b(N) = \pi(1) - \pi(N) = Q \frac{N(N+1) - 2}{2N(N+1)} > 0 \quad \forall N \geq 2. \quad (2)$$

This rent enters negatively in the social loss function:

$$L^b(N) = W(N) - W(1) = \left(\frac{2-\lambda}{2} \right) \frac{N-1}{N+1} Q. \quad (3)$$

The loss from bribe, $L^b(N)$, is strictly positive if and only if λ , the weight placed on the corporate sector relative to the consumer surplus, is lower than 2. It is also easy to check that the loss $L^b(N)$ increases and is concave with N if and only if $\lambda < 2$. Indeed, when the number of bidders is large, they will collectively bid more aggressively; this reduces the final purchase cost, thereby increasing consumers'/taxpayers' net surplus. If the government cares enough about consumers/users (i.e., if $\lambda < 2$), it will value this social benefit. The loss varies between $L^b(2) = \left(\frac{2-\lambda}{2}\right) \frac{Q}{3}$ when $N = 2$ and $L^b(N) = \left(\frac{2-\lambda}{2}\right) Q$ when $N \rightarrow +\infty$. Finally, the loss increases with Q , the size of the market. This is intuitive. When the market is small, it is not essential to secure a low unit price, as the total bill will be low anyway. By contrast, when the quantity to be procured is very large, it is crucial to obtain the lowest possible per-unit price. Any increase in the unit price paid for the commodity translates into large surcharge for taxpayers. Finally, if $\lambda > 2$, the "loss" is actually a gain: when the government is captured by the corporate sector, it favors monopoly distortion and rent over consumer surplus.

3.1.2 Collusion in Markets: Violation of Competition Law

We focus next on the possibility that firms might collude to raise price and industry profit. The consumer's inverse demand function is $P(Q) = a - Q$ so that the net consumer surplus is $S(Q) = \int_0^Q P(x)dx - P(Q)Q = \frac{Q^2}{2}$. The linear assumption is only made to ease the exposition; it is not crucial for the results. The firms, which face the same marginal cost $c > 0$, compete in Cournot fashion. Since they are symmetric we focus on symmetric equilibrium. Each firm produces a quantity $q = \frac{a-c}{N+1}$ so that the total production in the absence of collusion is $Q(N) = (a-c) \frac{N}{N+1}$. The total quantity varies between the monopoly quantity $Q(1) = \frac{a-c}{2}$ when $N = 1$ and the perfect competition quantity $Q(N) \rightarrow (a-c)$ when $N \rightarrow +\infty$. Accordingly, when $N = 1$ the price is equal to the monopoly price $p^m = \frac{a+c}{2}$ and it converges toward the perfect competition price $p^* = c$ when $N \rightarrow +\infty$.

personal economy; such a bribe would typically be small compared to other figures in the corporation's calculations. If the bribe is made as a political donation, it will be larger but is often subject to tax exemption.

This implies that the total rent of the sector is $\sum_{i=1}^N \pi_i(N) = N \left(\frac{a-c}{N+1} \right)^2$ and the net consumer surplus is $S(N) = \left(\frac{N}{N+1} \right)^2 \frac{(a-c)^2}{2}$. Substituting these values in (1) yields $W(N) = \frac{(a-c)^2}{2} \frac{N(N+2\lambda)}{(N+1)^2}$. When collusion occurs the firms collectively behave as a monopolist, so that the government's objective function becomes $W(1) = \frac{(a-c)^2}{2} \frac{1+2\lambda}{4}$. We deduce that the loss from collusion can be expressed as:

$$L^c(N) = W(N) - W(1) = \left(1 - 2\lambda + 2 \frac{N+1}{N-1} \right) \left(\frac{N-1}{N+1} \right)^2 \frac{(a-c)^2}{8}. \quad (4)$$

It can now be confirmed that $W(N) > W(1)$ if and only if $\lambda < \frac{1}{2} + \frac{N+1}{N-1}$, which implies that the "loss" is always positive if $\lambda \leq \frac{3}{2} < \frac{3N+1}{2(N-1)} \forall N > 1$. Here again, if the government is captured by the corporate sector it might prefer to favor firms' rent over consumer surplus. In this case the "loss" is negative (i.e., it is valued as a gain by the government). Indeed the aggregated corporate rent from collusion is equal to $\Delta\pi^c(N) = \pi(1) - \sum_{i=1}^N \pi_i(N)$.

$$\Delta\pi^c(N) = \left(\frac{a-c}{2} \right)^2 \left(\frac{N-1}{N+1} \right)^2 > 0 \quad \forall N \geq 2 \quad (5)$$

and it enters negatively in the loss function (4).

By contrast, if the government values consumer surplus enough (e.g., as much as it values corporate sector rents), then the loss of collusion is positive and increasing with N , the number of active producers in the sector. Indeed, the loss $L^c(N)$ increases with N if and only if $\lambda \leq \frac{N}{N-1}$. Moreover, it is concave in N if and only if $\lambda \leq \frac{2N-1}{2(N-2)}$ when $N > 2$. It is, for instance, concave when $\lambda = 1$. Finally, as in the corruption case, the harm caused by collusion increases with $(a-c)^2$, which measures the market size (i.e., $Q = a-c$ is the optimal quantity under perfect competition). Collusion in a small market is far less damaging than collusion in a large one.

3.1.3 Money Laundering: Violation of AML Regulations

Banks failure to comply with AML regulations, which means money laundering can occur, is a different offence compared to corruption in public procurement or collusion in markets because this offence does not directly impact the surplus of the banks' customers. If anything, it makes a bank more profitable so that it can offer good deals to its normal customers. Moreover, the social loss related to money laundering is quite external to the sector itself and is often diffuse at the international level, as the main impact of money laundering is to facilitate organized crime, global financial criminality, terrorism financing, and tax evasion.

In the absence of money laundering, the social surplus is as defined in (1) with $Q(N)$ resulting from the fair competition between the banks.¹² But if money laundering occurs in the country, without loss of generality, by convention in bank 1, then the social surplus becomes: $W^l(N) = W(N) + \lambda\Delta\pi_1^l - \alpha M^l$ where $\Delta\pi_1^l$ is the increase in firm 1 rent due to money laundering and αM^l is the fraction $\alpha \in [0, 1]$ of the total world negative externality M^l generated by the criminal activity at the origin of the dirty money that is imposed on country 1. We focus on crimes such that $M^l > \Delta\pi_1^l$: the benefit of the bank to laundering dirty money is lower than the global negative externality it creates.

In countries where financial secrecy appears to be an essential element of the private sector's business model (i.e., in tax havens), the offenders are typically laundering money for crimes committed outside the country's borders. Their society does not suffer directly, at least not more than other countries, from the terrorism, organized crime, or financial criminality that money laundering favors. In other words, in many countries where criminal money is laundered and secrecy is exploited to facilitate tax evasion by foreigners, citizens do not experience the negative externalities of the crime. For the most part, these countries are quiet, affluent, peaceful places.¹³ Concretely, this means that for many of the countries where AML offenses happen, $\alpha \ll \frac{\Delta\pi_1^l}{M^l}$ so that the "loss" L^l from this specific corporate crime is often in fact a gain (i.e., it is negative unless λ is very small):

$$L^l(N) = W(N) - W^l(N) = \alpha M^l - \lambda\Delta\pi_1^l. \quad (6)$$

However, if the crime plays out domestically – for example, if a German bank assists its rich clients in a scheme for evading German taxes or helps German criminals launder their criminal proceeds – the country bears the whole cost of the criminal activity. Hence, $\alpha = 1$ (e.g., domestic tax evasion), and in this case the government will fully internalize the cost of this crime. It will have an incentive to fight it, unless the government is captured by the corporate sector (i.e., unless $\lambda > (M^l/\Delta\pi_1^l)$).

3.2 National government incentives to fight corporate crimes

In this section we examine the optimal prevention measures and punishment mechanisms that a government should put in place to fight corporate crime. For this discussion we assume a benevolent

¹²For instance, if they enjoy some market power and play Cournot, in the linear demand case studied above it yields $Q(N) = (a - c)\frac{N}{N+1}$ and $W(N) = \frac{(a-c)^2}{2} \frac{N(N+2\lambda)}{(N+1)^2}$.

¹³According to the International Monetary Fund, the eight major pass-through economies are the Netherlands, Luxembourg, Hong Kong SAR, the British Virgin Islands, Bermuda, the Cayman Islands, Ireland, and Singapore. They host more than 85 percent of the world's investment in special-purpose entities, which are often set up for tax reasons (see Damgaard et al., 2018; countries listed in the order as presented in the report).

government, one that is not captured by industry and that aims to maximize net consumer (user) surplus. The results are easily obtained from the previous analysis by setting $\lambda = 1$.¹⁴ A benevolent government's incentive to fight corporate crimes is proportional to the national social loss caused by these crimes. We distinguish between two sets of circumstances, one in which the crimes are confined nationally and another in which the crimes generate negative international externalities.

3.2.1 Domestic corporate crimes

When a corporate crime is committed domestically and does not generate international externalities, a benevolent government will fully internalize it. This category of domestic crime does not include money laundering, which typically generates negative international externalities. For other crimes, such as collusion and corruption, a benevolent government has incentives to fight them when they occur at home. The effort to combat these crimes is justified up to the point where the cost of doing so becomes larger than the loss $q^j(N)L^j(N)$ that the crimes are expected to generate, where $q^j(N)$ is the probability that crime $j = b, c, l$ occurs. On the one hand, the preceding analysis reveals that the loss $L^j(N)$ increases in N . Stalling competition is more damaging for consumers when markets are not concentrated. In very concentrated markets, firms have market power anyway, and even when their prices are regulated, they enjoy some rents. So when they collude or make corrupt deals the loss for consumers is, all else being equal, smaller.¹⁵ On the other hand, these crimes are more likely to occur in concentrated markets than in more competitive ones. This is especially true of collusion, where coordination and enforcement become more difficult as the number of conspirators increases.¹⁶ If offences are carried out more easily under circumstances of few competitors, it means that in general $q^j(N)$ should be decreasing in N . Therefore the net effect of an increase in N on the expected social loss is ambiguous. In what follows we show how these conflicting forces interact. We drop the index $j = b, c, l$ in the proposition, as the result is the same for the three types of crimes, and doing so makes the exposition simpler.

Proposition 1. *Assume that $q(N) \in [0, 1]$, the probability that the corporate crime goes undetected, is strictly decreasing and log-concave in $N \geq 1$ with $q(1) = 1$ and $\lim_{N \rightarrow +\infty} q(N) = 0$. Assume that $L(N) \geq 0$, the social loss generated by the corporate crime, is strictly increasing and log-concave in*

¹⁴Indeed, it is easy to see from (1) that when $\lambda = 1$, the government objective function is the net consumer surplus $\int_0^Q P(x)dx - C(Q)$.

¹⁵Clearly, crime carried out for anti-competitive purposes could be the very reason why a market is (already) concentrated. In such circumstances a benevolent government should investigate and impose controls to ensure that the market is sufficiently open to entry.

¹⁶See for instance [Motta, 2004](#) and [Combe and Monnier, 2010](#) for empirical evidence on cartel size in the EU.

N , with $L(1) = 0$ and $\lim_{N \rightarrow +\infty} L(N) = \bar{L} > 0$. It exists $N^* > 1$ so that the expected social loss from corporate crime, $q(N)L(N)$, is increasing for $N \leq N^*$ and decreasing for $N > N^*$.

Proof. See appendix 7.1 □

Both examples of losses defined in (3) and (4) are log-concave (in fact they are both concave when $\lambda = 1$, which is stronger than log-concave). Now if the probability of the crime going undetected $q(N)$ is also log-concave, then the expected social loss from corporate crime, $q(N)L(N)$, is first increasing and then decreasing, and therefore is maximal for some finite value of N . For instance, if in a collusive agreement with N firms there is a chance $p \in (0, 1)$ that each firm is a whistleblower, then $q(N) = (1 - p)^N = \exp(N \log(1 - p))$, which is log-concave. More generally, all functions such that $q(N) = \exp(-\rho N)$ with $\rho > 0$ are log-concave, and the result of proposition 1 holds. In this case the value of N^* is such that $\frac{L'(N)}{L(N)} = \rho$. Substituting the value from (3) yields that $N^* = \sqrt{\frac{2}{\rho} + 1}$. Similarly, substituting the value from (4) yields that N^* is such that $N^3 + 3N^2 - N - 3 - \frac{8}{\rho} = 0$. For $\rho \rightarrow +\infty$, $N^* = 1$, for $\rho = 0.5$ $N^* \simeq 2$, for $\rho = 0.1$ $N^* \simeq 3.62$.

In other words, under general assumptions, the expected social loss from corporate crime, $q(N)L(N)$, reaches its maximum for some value $N^* > 1$. Moreover, it increases with Q , the size of the market, since $L(N)$ increases with the market size. This implies that governments need sanctions guidelines that allow law enforcers to take the market situation into account in cases of corporate crime. A benevolent government that wishes to fight domestic corporate crime ideally should tailor its efforts to the specific sector under consideration. In particular, it should focus more on oligopolistic sectors where concentration is relatively high, where collusion and corruption are real threats, and where the market size is large enough that anti-competitive practices will substantially harm consumers/taxpayers. This pragmatic case-by-case approach is optimal in cases where the government is benevolent.

3.2.2 International externalities of corporate crimes

We next consider corporate crimes that generate negative externalities in foreign countries – money laundering and corruption to win public contracts abroad being two cases in point. With money laundering, when $\lambda = 1$ then (6) becomes $L^l(N) = W(N) - W^l(N) = \alpha M^l - \Delta \pi_1^l$. When α is small, this is negative: in other words, the increase in profit for the banks is larger than the direct negative externality borne by the country hosting them. It is therefore not surprising that tax havens are not doing much to fight money laundering, as this specific crime generates a positive dividend for them

(i.e., α is close to 0). This is a typical free-riding problem insofar as the loss is spread across several jurisdictions while the benefit accrues to one country. It implies that unless there is a coordinated international intervention to fight money laundering, with economic sanctions large enough to make it socially unprofitable in tax havens, it will continue unabated.

More generally, when negative externalities occur outside a country, while the extra criminal profits reaped by corporate offenders increase the country's gross domestic product, a benevolent government will have very few incentives to control the problem. From this country's perspective, there is only a fiscal cost to be paid in this fight for integrity, and no direct benefit to be reaped. For instance, if a firm that behaves honestly at home pays bribes in a foreign country to win a procurement contract, or colludes with other firms to share export markets, the home government in the country where the firm is headquartered will have few incentives to fight these extraterritorial crimes. Committing resources to investigate and punish the extraterritorial criminal behavior will hurt domestic producers and taxpayers while benefiting foreign societies and competitors. Unless there is strong international solidarity in the society, punishing these firms harshly for their crime is unlikely to be popular among voters, who are both employees and taxpayers.

To be more specific, if the crime occurs in another country, a government under domestic political pressure – particularly one that will soon face voters in an election – will put a weight of 0 on the interests of foreign consumers/taxpayers. It is easy to show that in this case in (3) and in (4) that $\lim_{\lambda \rightarrow +\infty} (L^j(N)/\lambda) = -\Delta\pi^j(N)$ defined in (2) and in (5) respectively for $j = b, c$. When the government does not care about consumer surplus at all, because those consumers are in a foreign country, then the "loss" from corporate crimes is a gain. It generates new taxes and employment at home, while the harm (to taxpayers or consumers) is abroad. We therefore predict lax enforcement of punishment for corporate crimes that only hurt consumers and taxpayers in another country.

These are cases where internationally coordinated actions are required to internalize the negative externalities generated by international corporate crimes. As illustrated by the tense discussions around taxation of multinationals and remedies to curb their fiscal "optimization" practices, this is not an easy task. However, in some specific contexts such as the European Union (EU), the existence of supra-national authorities such as antitrust bodies might help coordinate sanctions against those crimes that harm all while benefiting only a few. Large economies, such as the European Union or the United States, can impose sanctions that are large enough to curb the incentives of countries benefiting from the crimes. They have the power to make these countries internalize the negative

externalities they impose on others. For example, the EU’s listing of non-cooperative tax jurisdictions has triggered changes in countries known to offer financial secrecy and has promoted fair taxation.¹⁷ Similarly, the United States is in a stronger position than most to issue threats to other countries and impose sanctions on international corporations. They have for instance forced Switzerland to enhance financial transparency and cooperate in investigation of tax matters (see [Church, 2016](#)).

3.3 Deterrence of crime through optimal sanctions: leniency programs and precautionary measures

In this section we examine the optimal structure of the sanctions that a government should inflict on firms to curb corporate crimes (i.e., crimes that benefit the firm by increasing its profits). Taking the perspective of the firm, we focus on its gain/loss from crime. The firm has an absolute advantage in monitoring insider crime compared to the government, which is external to the corporate structure. The firm has two types of tools it can use to monitor crime committed by its employees. First of all, it can invest ex-ante $K \geq 0$ in preventive measures that will make the detection of crime easier for all parties (e.g., double-checking/endorsing of sensitive information and clearance procedures, digitization to safeguard all actions and corporate information exchanges, procedures to facilitate whistleblowing, etc). The firm can also invest $m \geq 0$ to monitor employees on a daily basis. The probability that the firm will discover a corporate crime when one has been committed, $p^f(m/K) \in [0, 1]$, is increasing and concave in $m \geq 0$ for all $K \geq 0$. We assume that precautionary measures ease the monitoring of crimes $p^f(m/K_1) > p^f(m/K_2)$ when $K_1 > K_2 \geq 0$ and $m > 0$. Finally, $p^f(0/K) = 0$ for all $K \geq 0$. In other words, the firm must invest in some monitoring if it aims to detect corporate crime.

The government can also detect crimes. However, it is far less efficient than the firm in this task because it is external to the firm’s operations. Let $p^g(m/K) \in [0, 1]$ be the probability that the government finds out that a corporate crime has been committed in the firm when such a crime has in fact occurred. We have $p^g(m/K) < p^f(m/K)$, $\forall m > 0$. As for the firm, preventive actions make crime detection easier: $p^g(m/K_1) > p^g(m/K_2)$ when $K_1 > K_2 \geq 0$ and $m > 0$.

If the firm discovers that a corporate crime has occurred, it can report it to the public authorities in exchange for a reduced fine. It can also hide it from the authorities to avoid a fine. However, if the government finds out about the crime on its own, it will conduct a thorough investigation that will reveal whether the firm was aware of the problem and covered it up, or not. If it turns out

¹⁷For details, see press release on "Fair Taxation: EU publishes [list of non-cooperative tax jurisdictions](#)."

that the firm staged a cover-up, the sanctions will be harsher. We show next that this differentiated treatment of offenses, depending on whether or not the firm reports them and tries to limit future offenses by investing in monitoring and preventive actions, can help reduce the occurrence of corporate crime. To be more specific, let $F > 0$ be the base fine – that is, the fine in cases where the firm did not report the crime but there is also no evidence that it tried to cover it up. Let $F^h \geq 0$ be the fine in cases where there is evidence that the firm found out about the crime and hid it. Finally, let $F^r \geq 0$ be the fine in cases where the firm "spontaneously" reported the crime to the authorities. This implies that if a corporate crime is committed, then the expected profit from it will be: $E\pi^c = (1 - p^f(m/K))(1 - p^g(m^g/K))\pi^c(N) + p^g(m^g/K)(1 - p^f(m/K))(\pi^c(N) - F) + p^f(m/K)\left[\mathbb{1}_{\{r\}}(\pi^c(N) - F^r) + \mathbb{1}_{\{h\}}((1 - p^g(m^g/K))\pi^c(N) + p^g(m^g/K)(\pi^c(N) - F^h))\right]$, where $\mathbb{1}_{\{r\}}$ is equal to 1 if the firm reports the crime and 0 if it does not, and $\mathbb{1}_{\{h\}}$ equals 1 if the firm hides the crime and 0 if it does not. It simplifies to:

$$E\pi^c = \pi^c(N) - (1 - p^f(m/K))\left(p^g(m^g/K)F\right) - p^f(m/K)\left(\mathbb{1}_{\{r\}}F^r + \mathbb{1}_{\{h\}}p^g(m^g/K)F^h\right) \quad (7)$$

The standard Beckerian model of crime deterrence is obtained simply by setting $K = m = 0$ so that $p^f(m/K) = 0$. In this case (7) becomes $E\pi^c = \pi^c(N) - p^g(m^g)F$, so that crime is deterred if and only if $E\pi^c \leq \pi(N)$, where $\pi(N)$ is the firm's profit when it behaves honestly. We deduce that to deter crime the fine must be set so that $F \geq \frac{\pi^c(N) - \pi(N)}{p^g(m^g)}$. Since monitoring is costly for the government, it is optimal to set m^g as close as possible to 0 so that the punishment F goes to infinity. The problem with this solution is that it fails to capture limited liability and bankruptcy constraints. Yet the firm will never pay the infinite penalty, and therefore the expected loss from corporate crime is not large enough to prevent the crime when $p^g(m^g)$ is very small. Taking into account that in practice $F \leq \bar{F}$, we deduce that the government needs to detect the corporate crime with at least probability $p^g(m^g/K) \geq \frac{\pi^c(N) - \pi(N)}{\bar{F}}$. In many cases the government will be unable to meet this deterrence condition, since governments are typically rather inefficient when it comes to monitoring firms.

We next study how a more sophisticated approach to sanctions, one that provides incentives to firms to cooperate with law enforcers, can improve the detection of crimes. Yet such an approach will not necessarily be sufficient to prevent the crimes from taking place.

First of all, it is easy to show that a firm has no incentive to invest in monitoring if $p^g(m^g/K) = 0$.

Indeed (7) becomes $E\pi^c = \pi^c(N) - p^f(m/K)\mathbb{1}_{\{r\}}F^r$, which is decreasing in m and K . At the optimum the firm chooses $m = K = 0$ and never reports any crime. In other words, the firm will never monitor crime if the government is not monitoring it. Government monitoring is thus an essential public good in the fight against corporate crimes. The firms need to be aware that government is monitoring them, by encouraging or rewarding whistleblowers, for example. Moreover, once a crime is uncovered, the government needs to investigate the firm thoroughly to find out what management knew about the crime and what, if anything, it did to prevent it. In general, interim monitoring and ex-post enquiries about crime are easier and less costly when preventive measures are in place (i.e., when K is larger). The next Proposition summarizes the results from the preceding discussion.

Proposition 2. *Firms will always cooperate with the authorities and report crimes if:*

$$p^g(m^g/K)F^h \geq F^r \geq 0. \quad (8)$$

Moreover, to deter them from committing corporate crime, the sanctions scheme should be structured so that

$$\pi^c(N) - \pi(N) \leq (1 - p^f(m/K))p^g(m^g/K)F + p^f(m/K)F^r \quad (9)$$

Proposition 2 shows that it is always possible for authorities to induce firms to cooperate when they discover crime in their operations. Indeed, whatever the maximum value of the fine \bar{F} that can be imposed on the firm when it has covered up the crime, the government can always decide to fix $F^r < p^g(m^g/K)\bar{F}$. In collusion cases the firm that self-reports its offense first can even get full immunity (i.e., a fine $F^r = 0$) and on top of that a competitive advantage if its competitors are sanctioned. This means that the self-reporting corporation benefits in term of future profitability. The firm is stronger in the market after reporting the crime, while its competitors are weaker.¹⁸ Concentration might therefore rise following such an asymmetric treatment of the guilty firms. We will discuss later whether this correlation between higher concentration and sanctions related to collusion holds in the EU. When it comes to other crimes such as corruption or money laundering, there is not such a big asymmetry in consequences for the involved partners. The reduced penalty for those who self-report is still a punishment for the guilty firm, which gains no competitive advantage vis-a-vis its competitors.

¹⁸For the self-reporting firm there is no guarantee that any competitor will be sanctioned, and governments sometimes also offer benefits for the second and third cartel members who want to self-report.

As is clear from the discussion of competition offenses, the fact that a firm has an incentive to report its crime does not mean that it is deterred from committing it. Indeed the firm always has an incentive to commit the crime unless (9) holds. Everything else being equal (i.e., for a given p^g and p^f), this condition is not going to improve upon the standard Beckerian deterrence condition as $p^g(m^g/K)\bar{F} \geq (1 - p^f(m/K))p^g(m^g/K)F + p^f(m/K)F^r$ since $F^r \leq p^g(m^g/K)\bar{F}$ by (8) and $F \leq \bar{F}$. The maximum deterrence occurs when $F^r = p^g(m^g/K)\bar{F} < F = F^h = \bar{F}$. Substituting these values in (9) yields the Beckerian constrained solution: $p^g(m^g/K) \geq \frac{\pi^c(N) - \pi(N)}{\bar{F}}$. Whether firms self-report crimes or not, the probability of detection by the government must be large enough to deter them from committing corporate crime.

If the government wants to increase the deterrence effect of the sanction it might try to relax the constraint (8), as a larger F^r implies an easier way to meet (9). Toward this end it might require the firm to take precautionary measures to ensure transparency and induce employees to report crime to the authorities. For instance, the government might impose a minimum level of K , either to warrant leniency in case of crime self-reporting or simply as a mandatory legal requirement. Not investing adequately in crime prevention and monitoring will be treated ex-post as corporate negligence and crime condonation. It will lead to harsher sanctions, possibly including criminal prosecution against individuals. Typically the investment in crime prevention must be ex-post verifiable. Prevention involves a set of ex-ante and interim measures, which should be easily checked ex-post.

If the probability that a crime $j = b, c, l$ goes undetected, $q^j(N/K)$, is dependent on K , the optimal level of prevention measures solves:

$$\min_K \{L^j(N)q^j(N/K) + NK\} \quad j = b, c, l \quad (10)$$

Under our assumptions the first-order condition is also sufficient. We deduce that the optimal investment in prevention measures K^{j*} for $j = b, c, l$, is such that

$$L^j(N) \frac{\partial q^j(N/K)}{\partial K} = N \quad (11)$$

At the optimum, the marginal benefit of increasing K in terms of crime reduction should be equal to the marginal cost of increasing it, which is N , the number of firms active in the sector that would all have to bear the cost K .

3.4 Summary of insights

We have attempted to explain when enforcement will deter corporate crime in light of governments' incentives to control (or ignore) profit-generating misconduct. The size of corporate profit depends on the features of the crime and the offender's market position, as do the harmful consequences of the corporate behavior. The analysis allows us to make the following predictions.

- Corporate offenses whose consequences materialize in another country will often be tacitly condoned by elected officials. If these offenses are investigated and charged at all, we predict that enforcement actions will lead to mild sanctions.
- This free-riding problem and the inconsistency of sanctions calls for barriers to prevent political interference in law enforcement. It suggests that supra-national enforcement may be more efficient than national enforcement in cases of international crime.
- As illustrated by the analysis and the function of leniency programs, it is easier for enforcement agencies to uncover crime than to impose sanctions that will effectively deter it.
- The reliance on leniency in competition cases, including highly asymmetric sanctions, is efficient for revealing crimes but might have a potentially perverse effect on competition.

It is assumed that a government's incentives to control corporate crime depends on how it values corporate profits, taking the harmful consequences of the crime into account. Intuitively, this net benefit depends on the geographic distribution of both criminal profits and harmful consequences. When the consequences materialize domestically, the government's effort to control crime depends on how much it values the interests of consumers versus those of producers – that is, on the extent of benevolence. Benevolent governments will aim to control corporate crime and will prioritize circumstances where the risk of market concentration is high; they will also prioritize large markets, where the consequences of misconduct are more serious. When the consequences play out abroad, a government (benevolent or not) has few incentives to control the crime.¹⁹ Providing an immediate advantage to home-country consumers, employers, voters, and taxpayers will likely outweigh the longer-term benefit associated with integrity in international markets. In such circumstances, efficient enforcement depends on international cooperation and supra-national enforcement authority.

¹⁹For the sake of mutual legal assistance, a government may see a benefit in contributing to international investigations, as it may get something in return for investigating foreign firms whose crimes materialize in its domain. This indirect mechanism is not part of our analysis.

With respect to the forms of enforcement, the analysis shows it is impossible to induce firms to adequately monitor their own business practice for the sake of detecting crime unless there is a risk of detection by a government agency and an ensuing sanction. While governments are unable to impose penalties high enough to deter the most profitable forms of crime, they always have an opportunity to encourage offenders to cooperate with enforcement agencies by offering a predictable and substantial penalty reduction for corporations that self-report their offenses. In addition, a firm will not invest in monitoring for the purpose of detecting profit-motivated crime within its organization unless the probability of crime detection by the government is large enough. Firm's investment in monitoring for crime detection depends on government enforcement, and therefore, leniency for self-reporting is a complement to self-initiated investigation and not a substitute for it.

4 Enforcement in practice

Let us now consider the extent to which governments have the regulatory leeway to influence enforcement practices in line with the incentives outlined above, and whether they appear to make use of that leeway. For this exercise we consider different sources of information, as no single source provides all the data we need. Detailed facts about enforcement cases are generally shielded from public scrutiny, including from researchers. Evaluating public enforcement of corporate liability is made even more difficult by the use of non-trial resolutions, for which documentation is far more limited than for court proceedings, and where the calculation of the sanction is often poorly justified if it is described at all.

For our case studies we selected five countries: Germany, the Netherlands, Norway, Sweden, and the United Kingdom. We conducted a search of their legal databases as well as other publicly available databases, supplemented by a general internet search using search engines. Further information was gathered by contacting relevant authorities in the five jurisdictions, with follow-up phone calls as well as formal applications for access to decisions for the purpose of research. This investigation, carried out between June and November 2019, yielded a total of 50 non-criminal and criminal corporate liability cases, including 20 competition law cases, 19 bribery cases, and 11 AML cases. We studied this information, along with complementary data, in order to explore the empirical side of our theory's implications.²⁰

For the three areas of corporate liability that we investigated – corruption, money laundering, and

²⁰Apart from a sub-study where we investigate the market impact of sanctions, we do not make use of EU competition law cases from the European Commission when comparing enforcement practices in national jurisdictions.

violations of competition law (some places referred to antitrust) – European countries have similar regulations, as described in Section 2, and this applies to our case countries as well.²¹ Nonetheless, European jurisdictions differ in important ways with respect to both regulatory details and enforcement practice. Considering our five cases, the UK is a common law country, with a stronger plea bargain tradition than the other four countries. Germany is a federation with slightly different practices across its 16 federal states, while criminal law is exclusively a matter of national regulation and enforcement. Sweden and Germany have yet to introduce corporate criminal liability, although enforcement of non-criminal corporate liability is functionally equivalent, as described in Section 2. Although such aspects matter for regulatory performance, we simplify our presentation by focusing on specific features of enforcement as they are reflected in the research material and as they compare to the Section 3 results.

Considering the 50 cases and the five jurisdictions, we investigate the size of penalties, in terms of whether they appear to reach a level that might deter similar crime in the future (Part 4.1); the extent of leniency for those who self-report (4.2); and the extent of discretion on the part of enforcement agents (4.3). We also look at whether access to information varies across jurisdictions and if enforcement practices appear predictable. To discern whether governments seem to exploit their systems' flexibility for the sake of shielding certain firms from sanctions, we study the size of sanctions relative to each firm's market position (4.4). Also, we consider whether sanctions seem to vary systematically with geographic location of the misconduct. In a sub-study of competition law cases at the EU-level, for which more facts are available compared to the other two sorts of offences, we investigate the market consequences of a sanction (4.5). The 50 cases and the results of the sub-study are listed in the Appendix.

4.1 Crime deterrence

For sanctions to make a crime unrewarding, the penalty level divided by the risk of detection (expressed as a variable below 1) must exceed the gain from the crime. Clearly, the offenders in the 50 cases considered were not deterred by the risk of a sanction. From the outset, however, we do not know if the reason was a miscalculated risk of detection, an anticipated sanction level below what it would take to make the crime unrewarding, an assumption that if detected, one can negotiate oneself out of the problem by accepting a non-trial resolution, or simply, too little information about enforcement

²¹Norway is not an EU member, but as a party to the European Economic Area (EEA) Agreement it is required to comply with relevant EU legislation on a similar basis as Member States of the EU.

to make such calculations. Therefore, we want to know if the sanctions in the cases considered held a level high enough to deter similar crime in the future. In practice this is difficult to know because the variables are hard to estimate. The detection rate is impossible to quantify correctly unless we know the actual amount of crime incidents. Moreover, the burden of a penalty is not expressed by the size of the fine alone; it also includes the enforcement process, the payment of damages, the indirect consequences of the case, and any charges brought against employees and business partners. Not all these facts are known, and those that are available are not necessarily shared with the public, not even for research. In this context, therefore, we have only attempted to determine whether the fine is of a magnitude that *might* deter the sort of crime for which it is imposed. This calculation depends on available information that allows estimation of the gains from the crime, and what we consider reasonable expectations about the detection rate.

In 26 of the 50 cases, it is impossible to estimate the level of the final sanction. For the other 24 cases, we have a rough estimate of the gain from crime and the financial size of the corporate fine. Considering these figures, we calculate what the detection rate must have been for the penalty to deter crime. For example, in a cartel case from 2012 against Virgin Atlantic Airlines (VAA) and British Airways (BA), VAA reported the offense, and upon leniency received no penalty. Here the sanction principle applied is consistent with the aim of having the firms cooperating with the authorities (as expressed in Section 3.3 proposition 2) because VAA was rewarded fully for self-reporting. Meanwhile, BA received a fine of £58.5 million, and the enforcement agency estimated that BA had a £29 million gain from the offense. For the penalty imposed on BA to deter crime, however, the detection rate must have been nearly 50 percent, which we consider unrealistically high. Therefore, we conclude that the fine was too low for the penalty to deter cartel cooperation. In a similar manner, and with an assumption that any detection rate above 25 percent is unrealistic, we find that the fines might be high enough to deter crime in seven of the cases and too low in 17 of the cases,³

Among the cases where the offender was given a relatively low fine, twelve are bribery cases (Rolls Royce, XYZ/Sarclad, Siemens, Airbus, MAN Ferrostaal, DB Schenker, Ballast Nedam, VimpelCom, Telia, SBM Offshore, Standard Bank (2015-case), and Yara); four are AML cases (ING Groep, Santander, DNB, and Sædberg); and two are competition law cases (Asphalt and the above-mentioned airline price-fixing case). Cases where the penalty might be high enough to deter the offense include three competition law cases (Dutch Railways, TeliaSonera, and the case against Ragn-Sells AB and Bilfrakt Bothnia AB), two bribery cases (Smith & Ouzman and Standard Bank 2015-case), and two

AML cases (Santander and Deutsche Bank). Yet the estimated gain is very uncertain in the AML cases. Hence, this material indicates that penalties are often below the level necessary for deterrence in bribery and AML-cases, and appear more likely to reach the level of deterrence in competition law cases. One explanation might be the more explicit regulation of the calculation of sanctions in competition law cases, a matter we will return to below.

4.2 Predictability of sanctions and leniency

An enforcement system's ability to deter future crime requires a certain ex-ante predictability of sanctions. Potential offenders ought to know what actions are subject to criminal liability and how the liability is enforced. Likewise, for leniency to spur crime detection as described in Section 3, it must be possible for self-reporters to rely on the enforcement agency to reduce the penalty in return for cooperation. Based on the information we collected about country enforcement systems, we placed countries on a 1-5 scale along these two dimensions, as shown in Table 1, where the country scores are also broken down by type of offence (bribery, AML, antitrust). The scores are the result of our systematic assessment of the regulations and enforcement practices in the 50 cases reviewed.

On the left-hand side of Table 1, the country scores reflect the extent to which facts about corporate misconduct and sanctions are available to the public and presented in a manner that makes it possible to assess the proportionality between penalty and corporate misconduct. The harder it is to learn the facts, the higher the score. In countries that score 1, the public has complete access to information about the crime and the sanction, while in those that score 5, it is not even possible for researchers to apply for access to such basic information.

The right-hand side of the table presents our scores on the ease with which offenders can predict the sanction reduction (i.e., leniency) they will receive if they self-report and cooperate with law enforcement agencies. Clear guidelines made public and demonstrated application of stated principles in cases earns a score of 1. The score increases the closer we get to a situation where firms have no clear information about the use of sanction reductions upon self-reporting and there is no systematic use of leniency demonstrated in the case material.

Hence, Table 1 illustrates variation across the five countries in the extent of access to information about enforcement practices and the clarity with which law enforcers offer leniency to those who self-report.

On each of the two dimensions, we find sanction predictability to be greater in competition law

Table 1: Sanction predictability

Country	Facts available			Predictable leniency		
	Bribery	AML	Antitrust	Bribery	AML	Antitrust
Germany	4	5	2	4	5	2
Netherlands	4	3	1	3	3	2
Norway	4	2	2	4	4	2
Sweden	3	2	2	4	4	2
United Kingdom	3	2	1	3	2	1

Note: The results on each of the two dimensions of sanction predictability are presented along a 1-5 scale, where a lower score reflects clearer consistency with deterrence.

cases than in corruption or AML cases. Information about sanctions is more available to the public in antitrust cases, and the benefits offered to firms that self-report are more predictable. In this respect, enforcement of competition rules seems better aligned with economic ideas of incentives to report crime and deterrence than enforcement of anti-bribery laws and AML regulations. One likely explanation is the presence of a European supra-national enforcement agency (the Directorate-General for Competition, or DG Comp) and the systematic cooperation between competition agencies within the European Competition Network (ECN). In addition, the rules and conditions for leniency are spelled out much more clearly in legal instruments, bringing about harmonization as well as predictability across jurisdictions.²²

4.3 Discretionary authority in the enforcement of corporate liability

Whether governments are able to shield some corporate offenders from sanctions, without appearing to do so at the expense of consumer surplus and rule of law, depends on the *flexibility* with which they can enforce the given regulations. Enforcement flexibility in turn depends on several factors, such as the content of regulations, the relevant agencies’ de facto and de jure independence, and the jurisdiction’s legal tradition. When it comes to corporate liability, the otherwise substantial difference between criminal regulation and non-criminal/administrative regulation is less pronounced. This is because of the above-mentioned practice of functional equivalence, the use of fines as the main penalty, and an increasing consideration of compliance-based defense. Therefore, for our purpose, we can compare systems regardless of the criminal/non-criminal distinction.

What is more important is the extent to which enforcement agencies can conclude cases without a trial, turning instead to a settlement, formally referred to as a *non-trial resolution*. Among the five

²²See, for example, the [Model Leniency Programme](#) adopted by the ECN.

jurisdictions, the UK has the most explicit regulations for the use of non-trial resolutions, and it is the only jurisdiction that requires judicial review of such enforcement actions. In light of its regulations, UK prosecutors do not appear to have broad discretion. However, in some of the cases reviewed, such as the Rolls Royce bribery case and the XYZ/Sarclad case, the enforcement processes have spurred debates about too-soft treatment of firms that might be considered strategically important by the government. This was so also in the case against BAE Systems, a British defense producer (which is not part of the 50 cases in our review). Then Prime Minister Tony Blair, despite clear evidence of crime, stopped investigation of corruption in December 2006, claiming that enforcement of anti-bribery law in this case went against the public interest by undermining British jobs and contracts abroad.

In these three examples, no individual was charged with a crime, and the fines for serious corruption were low compared to the alleged gains. But there is regulatory space for flexible enforcement in other countries too. The Netherlands allows its enforcement agencies broad discretion, including in the use of non-trial resolutions, and often appears lenient with corporate offenders (Makinwa, 2014). Germany and Sweden, on the other hand, have no criminal liability for corporate offenders, though they appear strict on criminal law in general. In corporate liability cases, the lack of regulations might give those governments more leeway to interfere in enforcement processes. Similarly, Norway has no stipulated principles for non-trial resolutions and no judicial review of such enforcement actions. Taking into account governments incentives, as found in Section 3, such leeway might be counter-productive with respect to maximization of consumer surplus.

What can we conclude, then, about the discretionary authority of law enforcers? A recent survey of regulatory regimes for non-trial resolutions in corporate bribery cases, conducted by the International Bar Association, provides data for 66 countries. These data were used to construct a Prosecutor Discretion Index (Søreide and Vagle, 2020a). Scores on this index for our five case countries are shown in Table 2. This index indicates the position of criminal law enforcement agencies, which is normally responsible for pursuing corporate bribery and AML cases, and not, non-criminal regulation, like competition law cases. According to the survey results, prosecutors' discretionary authority is higher in the Netherlands than in the other four countries, and lower in the UK, which regulations are the most formalized and explicit.

The scores presented in Table 2 apply to enforcement in corporate bribery cases. When it comes to competition law, we observe far more consistency in enforcement practices across the five case

Table 2: Prosecutor discretionary authority in corporate bribery cases across the case countries

Country	Prosecutor Discretion Index	Opportunity to skip the case	De jure bargaining freedoms	De facto bargaining freedoms	Ex-post monitoring
Netherlands	3.50	4.0	4.0	4.0	2.0
Norway	2.75	4.0	1.0	2.0	4.0
Germany	2.25	1.0	1.0	3.0	4.0
Sweden	2.25	2.0	1.0	2.0	4.0
England & Wales	1.75	1.0	1.0	3.0	2.0

Note: The Prosecutor Discretionary Index (Søreide and Vagle 2020a), shown in the data column on the far left, presents the arithmetical average of the scores in the other four columns. The lower the score, the less flexibility there is for prosecutors who enforce corporate liability by means of non-trial resolutions.

countries, regardless of enforcement mode, as reflected by the low scores for antitrust in Table 1. The enforcement procedure and outcome are more predictable because independent specialized agencies have operated much longer, with a clear aim of encouraging offenders to self-report, and therefore they have made it easier for outsiders to understand what to expect. Moreover, both detailed rules and overriding principles have been spelled out clearly in the legal instruments and in case law. For the sake of predictability, there is limited discretion with regard to negotiated settlements in cartel cases; either a firm will meet the conditions for leniency, or it can accept a cartel settlement under a procedure adopted in 2008 (with a maximum reduction in the fine of 10 percent).²³

Our results are consistent with the fact that prohibitions on bribery and money laundering are subject to the more traditional regimes of criminal law, and such rules are not subject to enforcement at the EU level. Competition law, by contrast, implies that EU Member States are required to introduce legal instruments similar to the powers of the European Commission in their legal orders. This applies to leniency programs and cartel settlement procedures, among others.

4.4 Offenders' market position and the geographic location of crime

While it is difficult to compare penalties across cases, given the many dimensions on which cases differ, it is possible to check if there are systematic differences across cases, depending on where the consequences of crime materialized, and it is possible to compare the relationship between a penalty and the offender's market position across cases. In this sub-section we first address the importance of market position, and thereafter, discuss geographic location of consequences. The results are all

²³See Commission Regulation No. 622/2008. There is more flexibility with regard to commitments under Regulation No. 1/2003, Article 9, where the European Commission has power to make commitments offered by firms legally binding. However, that procedure is not applicable in cases where the Commission intends to impose a fine.

summarized in Table 3.

The ratio between a penalty and the offender’s market position may indicate the extent to which a government (or its law enforcement agency) uses the discretionary authority it does have – by law, or simply through lack of regulation or lack of transparency – for the purpose of shielding powerful firms from the consequences of a sanction. If such biased enforcement happens, we would expect to find relatively low penalties even for serious crimes in concentrated markets, and a systematically different ratio for powerful firms compared to those that are exposed to tougher competition.

Identifying the patterns is not straightforward, even for the cases where we have the law enforcement facts needed to calculate the aforementioned ratio. Estimates of market concentration are often uncertain because they require identification of a market, and this is complicated for multinationals that operate across industries. Furthermore, the crime is more likely in concentrated markets, as predicted in Section 3, and thus might lead to systematically higher expected losses, and therefore *higher* sanctions. And if the sanction appears to be low, it could be a result of the offender’s self-reporting, consistent with a strategy for crime detection; the reason is not necessarily political protection from sanctions.

For this study, we reviewed the 50 cases of corporate liability mentioned above, namely, 20 competition law cases, 19 bribery cases, and 11 money laundering cases across five countries, and found that we can estimate the ratio between penalty and market position for 26 of them. For the assessment of concentration, we use the Herfindahl-Hirschman index score when such information is available, and otherwise, the concentration ratio (Alexeev and Song, 2013, Cavalleri et al., 2019). For each case, we estimated the mark-up ratio for the specific offenders, as a modified Lerner index, and checked for relevant remarks from market analysts and government. Based on this scant material, Table 3 shows in the upper-right quadrant of the matrix those offenders that both operated in concentrated markets and received a relatively low penalty. The letters *b*, *l* and *c* refer to the sort of offence, i.e. bribery, laundering (AML) and competition law, while the letters *a* and *h* in the parentheses behind the shortened case-name refer to geographical location of consequences, i.e. abroad and home.

Considering this assessment of cases, there are some emerging patterns. In this material, there are more cases of corporate liability in concentrated markets than in markets where firms are exposed to tougher competition. The cases where the penalty is clearly below a deterrent level outnumbers the cases where the penalty might be at a level high enough to deter future crime. Regarding sectors, banks appear to be more severely sanctioned than other types of businesses, while defense producers

Table 3: Market concentration and severity of penalty

	High penalty	Low penalty
Concentrated	Ragn-Sells and Bilfrakt (<i>c, h</i>) Deutsche Bank (<i>l, a</i>) Standard Bank 2015 (<i>b, a</i>) Dutch Railways (<i>c, h</i>) TeliaSonera (<i>c, h</i>) Santander (<i>l, ?</i>)	British Airways (<i>c, ?</i>) Rolls Royce (<i>b, a</i>) XYZ/Sarclad (<i>b, a</i>) Airbus (<i>b, a</i>) MAN Ferrostaal (<i>b, a</i>) ING Groep (<i>l, a</i>) Yara (<i>b, a</i>) VimpelCom (<i>b, a</i>) Telia (<i>b, a</i>) DNB (<i>l, ?</i>) Koppang (<i>l, h</i>)
Not concentrated	Smith & Ouzman (<i>b, a</i>) SBM Offshore (<i>b, a</i>) Ragn-Sells AB and Bilfrakt (<i>c, h</i>) Svenska Förpacknings (<i>c, h</i>)	Siemens (<i>b, a</i>) DB Schenker (<i>b, a</i>) SBM Offshore (<i>b, a</i>) Ballast Nedam (<i>b, a</i>) Sædberg and Hodne (<i>l, h</i>)

and telecom operators have received low penalties. As far as variation across countries, the ratio between low and possibly deterrent penalties shows Sweden (0/3) and the UK (3/3) are the more likely to impose severe sanctions, while Germany (5/0), the Netherlands (5/0) and Norway (4/1) are the most inclined to impose low penalties.

As predicted by the theory, crimes for which the consequences materialize abroad, especially bribery cases, are sanctioned less severely than the other categories of offenses, for which this material shows high sanctions to be more common. Among the 17 cases playing out abroad, only one case resulted in a penalty that might have been high enough to deter future crime, 12 of them resulted in a low penalty, and for four of the cases it is impossible to tell. In the cases where the consequences harmed the domestic market, 50 percent of offenders received a tough penalty (three out of the six cases where the ratio could be verified).

Hence, if there is a tendency to shield powerful firms from heavy sanctions, it happens more frequently when they are liable for bribery in a foreign market than when they are implicated in cartel cooperation or AML violation, regardless of market concentration.²⁴

²⁴As we are interested in a jurisdiction's inclination to impose sanctions that deter crime, we have not included any additional sanctions imposed by other jurisdictions in the same case. This is relevant in several cases where, for example, firms are subject to coordinated settlements. Therefore, the total corporate penalties in a given case might be higher than what is described.

4.5 The impact of sanctions on competition in markets

A problem for governments that are accountable and want to sanction offenders fairly is the risk that the sanction itself may have harmful market consequences. This concern may help explain why governments sometimes seem to shield corporate offenders from sanctions. To understand whether the sanctions themselves make a difference in markets, we did a separate study of antitrust cases at the EU-level. Information about (de facto) sanction principles is far more available for cartel cases than for criminal cases because the European Commission provides detailed information about all its cases.

Reviewing all antitrust and cartel cases in the period from 1 January 2010 to 10 March 2020, we found 89 cases that resulted in a formal decision. In addition to investigating market concentration, we studied the frequency of mergers in markets after a sanction. In 73 of the cases that resulted in a sanction, the offenders operated in a clearly distinguished sector (with a unique NACE code), and that fact allowed us to consider systematic variation across sectors. Considering 3,363 merger and acquisition (M&A) cases,²⁵ we first found that the average number of M&As is 14 in the sectors where an offender is fined for anti-competitive behavior (with a median of 8), while it is 8.1 in other sectors (with a median of 4). This finding suggested a pattern across sectors of M&A cases being far more common (nearly double) in sectors where one or more firms have been sanctioned for anti-competitive behavior, compared to other sectors.²⁶ To investigate the strength of the pattern we run linear regressions, as explained in the Appendix, which confirmed a significant difference in the rate of M&A between industry groups with and without a sanction. By conducting a linear regression with the sanction and the sectors as explanatory variables, we observe that on average, the yearly M&A rate is 2.12 times higher (95% CI: 1.66 to 2.74) when a sanction has been imposed.

While this result confirms the initial finding, the analysis has some weaknesses. It was not possible to make comparisons of categories drawn from the same data set. On one hand we have data on all the M&A cases submitted to the EU Commission, and on the other hand, we have all the cases of antitrust sanctions by the EU Commission. Hence, the data does not allow for conclusions with respect to the causality between a specific M&A case and a specific sanction. Besides, many M&A cases have been assigned several NACE codes, which means that the sum of M&A cases in the analysis is higher than the actual amount of M&A cases, which means, some NACE codes may be over-represented.

²⁵This material is limited to cases notified to the EU Commission under the European Merger Regulation.

²⁶We are indebted to Wouter P. J. Wils (King's College London/European Commission) who suggested we might want to check this pattern.

Despite these aspects, the analysis confirms a higher M&A frequency in sectors where firms have been subject to anti-trust sanctions. The observation might be a result of market structure, since markets prone to cartelization might be more inviting to horizontal mergers as well. For example, we observe that the fined sectors contain a higher number of cases related to network utility sectors, such as production and trade of electricity and gas, industries that are already more concentrated by nature, akin to their natural monopoly characteristics. There appears to be a clear over-representation of high-concentration markets in the sectors where firms have been sanctioned, and the likelihood of M&A cases taking place after a sanction might be much higher where markets are concentrated. In these settings, a heavy sanction, with a negative impact on profitability, makes mergers even more attractive than in other markets. Of course, competition authorities may intervene against M&As that are harmful to competition, but the standard for intervening under, for instance, the EU Merger Regulation – “a significant impediment of effective competition”²⁷ – implies that mergers may inflict a loss on the society long before the threshold for intervention is met. It would be sensible for governments to take such concerns into account when they impose sanctions on corporate offenders; however, under the current state of law, a reduction in the level of fines in order to prevent future M&As in the market would not be permissible.²⁸

5 Discussion

This research combines theoretical analysis with a review of cases and enforcement practices in five countries and for three areas of crime control. Our results disclose room for improvement with respect to government priorities in crime control, their sanction principles, and organization of law enforcement institutions.

Specifically, the results suggest that governments should consider whether their investigative priorities with respect to profit-motivated crime sufficiently target the offenses with the most harmful impacts on society. The consequences of corporate misconduct are always more serious for large markets, especially when the crime distorts competition in markets. The narrow mandate of European competition authorities excludes many forms of profit-motivated crime (Auriol et al., 2017), and therefore the risk of serious market consequences ought to steer priorities for criminal law enforcers and financial oversight bodies as well.

²⁷Regulation No 139/2004 Article 2(3).

²⁸See the EU Commission’s guidelines on the level of fines in cartel cases.

The research discloses significant variation in governments' leeway to enforce corporate liability inconsistently as well as their inclination to impose sanctions for the sake of deterring crime. While there are cross-country variations of several sorts, the differences are more pronounced across the crime-specific enforcement regimes. Compared to corporate bribery cases and AML violations, enforcement in competition law cases is more predictable, more transparent, and more harmonized across countries, and the relevant enforcement agencies are better able to structure sanctions for the sake of inducing offenders to self-report their offenses.

To the extent that there is a government inclination to shield corporate offenders from sanctions, it is expressed most clearly in corporate bribery cases. In these cases, as in the AML cases, facts about the corporate offenses are far less available, and despite variation across countries, the use of leniency appears more arbitrary, than in competition law cases. We associate this result with the supra-national character of antitrust regulation and enforcement. When it comes to AML regulations and corporate bribery rules, these too are highly harmonized, with enforcement supposed to happen independently, and a certain degree of cooperation between the agencies involved in enforcement. However, for these offences, the supra-national character of regulation and enforcement is weaker, and this fact may explain the categorical differences in de facto regulations across the forms of offences.

The research investigates the relationship between sanctions and markets in two different ways: the relevance of whether the crime happened within the jurisdiction of the enforcement case and whether market concentration matters for the sanction in question. With respect to the geographic location of the consequences of crime, we found a larger number of low penalties in cases where the harmful consequences materialized abroad, which is the case in foreign bribery cases and in a share of AML cases. While this could be a coincidence, the cases reviewed do not negate the concern that corporations whose crime is committed are shielded from severe penalties, and in that respect, the results of the review supports the theoretical predictions.

When it comes to market concentration, we wondered how a government's inclination to shield certain corporate offenders might reflect its true trade-off between producer surplus and consumer surplus. Reviewing a large number of competition law cases decided by the European Commission, we found a systematically higher incidence of mergers in markets where corporations have been sanctioned for cartel cooperation. This suggests that there is a serious risk that a penalty for anti-competitive behavior will make the market in question more concentrated. However, considering the 50 main cases in this research, we checked to see whether corporate offenders in concentrated markets appear

to receive systematically lower penalties, and could not identify any such pattern.

More generally, our study shows that governments can do better when it comes to transparency about their enforcement principles and practices. We have explained why there are both legitimate and unacceptable reasons for governments to shield a corporation from severe sanctions. Unless the legitimate reasons, such as harmful consequences for markets, are reflected in transparent enforcement practice, the public will easily suspect more nefarious reasons for protecting a corporation, such as crony capitalism. Across our selection of cases, we find that sanction predictability and transparency are higher when governments cooperate closely with each other in law enforcement, when there are elements of supra-national authority, and when the offense is regulated by a separate legal instrument. Such features of enforcement reduce the risk that governments will act less forcefully against offenses whose consequences materialize abroad. Hence, the results of our analysis and review show why accountable governments ought to accept international oversight and enforcement for international cases.

In that respect, the European Union's supra-national regulation for competition in markets is a success. For efficient enforcement of profit-motivated crime, however, Europe might have benefited from the presence of an authority like the Federal Bureau of Investigation (FBI) in the United States. In spring 2020 several movements in such direction took place. The European Union established the European Public Prosecutor's Office, an independent EU body with competence to investigate and prosecute crimes that harm EU finances, including at the level of Member States. Europol launched a new European Financial and Economic Crime Centre that will enhance the operational support provided to EU Member States and EU bodies in the fields of financial and economic crime and strengthen financial investigations. In the same period, the European Commission published an ambitious and multifaceted action plan for AML regulation and enforcement. While these initiatives are promising, the development of efficient enforcement mechanisms has been too slow, in large part because governments want to keep control of their criminal law regulations. This barrier to efficient enforcement of corporate misconduct suggests that such offenses ought to be regulated in non-criminal ways, in addition to whatever criminal prosecutions countries may choose to pursue.²⁹

²⁹Rui and Søreide, 2019 explain the benefits of a two-track enforcement system for corporate bribery cases.

6 Conclusion

Internationally, and especially across OECD countries, we are witnessing rapid evolution in the regulation of corporate liability and sanction practices. In this article we investigate the relationship between the nature of a corporate offense, the offender's market position, and political priorities, and clarify why and how governments must take such aspects into account in their efforts to efficiently control corporate crime. Our analysis combines classic results in law and economics with insights from theories on industrial organization and places enforcement challenges in a political economy context. On this basis, we explain why regulation and enforcement are often sub-optimal. Sanctions are not structured optimally, governments are not open about their enforcement practices, and in some circumstances governments prefer to shield corporations from sanctions. There are variations across countries and forms of corporate misconduct, and we find enforcement practice more efficient when it is subject to supra-national regulation and enforcement.

7 Appendix

7.1 Proof of Proposition 1

Note first that under our assumptions $q(1)L(1) = 0$ and $\lim_{N \rightarrow +\infty} q(N)L(N) = 0$. Moreover, $(q(N)L(N))' = q'(N)L(N) + q(N)L'(N)$ so that $(q(N)L(N))' \geq 0$ if and only if $\frac{L'(N)}{L(N)} \geq \frac{-q'(N)}{q(N)}$. It can now be confirmed that under our assumptions of log-concavity the LHS of the inequality is decreasing in N , while the RHS is increasing in N . Now we have $(q(N)L(N))'_{|N=1} = L'(1) > 0$ and $\lim_{N \rightarrow +\infty} (q(N)L(N))' = \bar{L} \lim_{N \rightarrow +\infty} q'(N) < 0$. This implies that the decreasing function $\frac{L'(N)}{L(N)}$ and the increasing function $\frac{-q'(N)}{q(N)}$ cross once and only once at $N^* > 1$ defined so that $\frac{L'(N)}{L(N)} = \frac{-q'(N)}{q(N)}$. QED

7.2 Case material

Table 4 presents an overview of the cases considered for this research. All three categories of offenses are listed for all countries in the study, apart from Germany, where facts about AML cases could not be retrieved. Each case is listed with the name of the offender (if the perpetrator's identity is known) or commonly used keywords, plus the year, industry, market concentration (as estimated), the

penalty, whether the penalty might deter crime or not, and whether the harms from the crime were felt in the corporation's home country or abroad. The listed penalty includes the total agreed amount reached through trial or settlement, including fine payment, disgorgement, asset recovery, and in some cases compensation. The amount does not include additional fine payments to other countries, such as the United States, which are relevant in several of the cases. The parentheses (m/n) in the penalty column indicate total penalty for m out of n corporate offenders involved. The letters d.m. stands for 'details missing'.

Table 4: The case material

Violation	Case	Industry/market	Market	Penalty	Deterrence	Location
United Kingdom						
Competition	British Airways (2012)	Air transport	Concentrated	EUR 65.6 million	No	Uncertain
Competition	Galvanised steel tanks (2016)	Water storage local market	d.m.	d.m.		Home
AML	Standard Bank (2014)	Banking industry global market	Concentrated	EUR 8.52 million		Abroad
AML	Deutsche Bank (2017)	Banking industry global market	Concentrated	EUR 182.7 million	Yes	Abroad
AML	Standard Chartered Bank (2019)	Banking industry global market	Concentrated	EUR 114.6 million	d.m.	Abroad
Corruption	Standard Bank (2015)	Banking industry global market	Concentrated	EUR 29.6 million	Yes	Abroad
Corruption	Rolls Royce case (2017)	Aerospace industry, energy industry	Concentrated	EUR 752.1 million	No	Abroad
Corruption	Smith & Ozuzman Ltd. (2014)	Security printing market	Competitive	EUR 2.5 million	Yes	Abroad
Corruption	XYZ/Sarelad case (2016)	Technology for steel production	Concentrated	EUR 7.3 million	No	Abroad
Competition	Beer price fixing (2015-2016)	Beer production	d.m.	EUR 112 million (11/11)		Home
Germany						
Competition	Candy price fixing (2015)	Candy retail	Concentrated	EUR 60 million (7/7)	d.m.	Home
Competition	Asphalt manufacture price fixing (2018)	Asphalt manufacturing	d.m.		No	Home
Competition	SodaStream abuse of dominant position (2015)	Soda maker market	d.m.	EUR 225,000	d.m.	Home
Competition	ZEG bicycle wholesaler (2018)	Bicycle wholesale	Concentrated	EUR 13.4 million	d.m.	Home
Corruption	Siemens resolution (2008)	Electronics and appliances	Competitive	EUR 1.45 billion	No	Abroad
Corruption	Airbus Defence and Space GmbH (2018)	Aerospace industry	Concentrated	EUR 81 million	No	Abroad
Corruption	MAN Ferrostaal (2011)	Oil and gas plant construction	d.m.	EUR 10 million	No	Abroad
Corruption	DB Schenker (2016)	Logistics market	Competitive	EUR 2 million	No	Abroad
Corruption	No identity Case Bav 2011/2	Industrial/unknown	d.m.	EUR 35 million	d.m.	Abroad
Corruption	Atlas Elektronik (2017)	Arms production	d.m.	EUR 48 million	d.m.	Abroad
The Netherlands						
Competition	Concrete cartel case (2015)	Concrete garage manufacturing	Concentrated	EUR 306,500 (1/2)	d.m.	Home
Competition	Vinegar cartel (2015)	Natural vinegar manufacturing	d.m.	EUR 1.8 million (1/2)	d.m.	Home
Competition	Dutch Railways NS (2017)	Railway operations	Concentrated	EUR 40.95 million (+ contract lost)	d.m.	Home
Competition	Forklift truck batteries	Forklift truck battery import	Concentrated	EUR 17.5 million (7/7)	d.m.	Home
AML	ING Groep NV (2018)	Banking industry	Concentrated	EUR 775 million	No	Abroad
AML	No identity (2018)	Banking industry	d.m.	EUR 40,000	d.m.	Uncertain
Corruption	Ballast Nedam case (2012)	Construction and engineering	Competitive	EUR 17.5 million	No	Abroad
Corruption	Telia case (2017)	Telecom market	Concentrated	EUR 274 million	No	Abroad
Corruption	VimpelCom case (2016)	Telecom market	Concentrated	EUR 397.5 million	No	Abroad
Corruption	SBM Offshore case (2014)	Offshore oil drilling equipment	Competitive	EUR 217.8 million	No	Abroad
Sweden						
Competition	Svenska Förpacknings- och Tidningsinsamlingen AB (2018)	Waste management	Competitive	EUR 1.9 million	Yes	Home
Competition	Ragn-Sells AB and Bilfrakt Bothnia AB (2016)	Waste management	Concentrated	EUR 0.43 million (2/2)	Yes	Home
Competition	Däckia/Euromaster (2014)	Tires and tire service	d.m.	EUR 0.24 million (2/2)	d.m.	Home
Competition	TeliaSonera case (2013)	Telecom market	Concentrated	EUR 3.4 million	Yes	Home
Competition	Scandorama AB and Ötvenmarks Holiday AB (2012)	Tourism	d.m.	EUR 1.06 million (2/2)	d.m.	Home
Competition	Asphalt cartel (2009)	Asphalt paving	Concentrated	EUR 26.6 million (5/5)	d.m.	Home
AML	Nordea decision (2015)	Banking industry	Concentrated	EUR 4.8 million	d.m.	d.m.
AML	Handelsbanken decision (2015)	Banking industry	Concentrated	EUR 3.3 million	d.m.	d.m.
Corruption	Bravur and Dynamic Sailing (2016)	Construction industry Sailboat manufacturing	NA	EUR 0.3 million (2/2)	d.m.	Home
Corruption	KEWB (2018)	Street maintenance	NA	EUR 28,836	d.m.	Home
Norway						
Competition	Gran & Ekran (2012)	Contracting industry	d.m.	EUR 0.2 million	d.m.	Home
Competition	Telenor case (2018)	Telecom market	Concentrated	EUR 73 million	d.m.	Home
Competition	El-proffen case (2017)	Electrical services	d.m.	EUR 0.1 million (6/6)	d.m.	Home
AML	Santander (2019)	Banking industry	Concentrated	EUR 0.8 million	Yes	d.m.
AML	DNB case (2019)	Real estate market (commercial)	Concentrated	EUR 27,783	No	d.m.
AML	Koppang Landbruks- og Næringsmegling AS (2019)	Real estate market (agricultural)	Concentrated	EUR 18,522	No	Home
AML	Sædberg & Hodne AS (2019)	Real estate market (commercial)	Competitive	EUR 18,522	No	Home
Corruption	Peab/Vanverk-saken (2008)	Construction industry	Competitive	EUR 0.3 million	d.m.	Home
Corruption	Yara (2014)	Fertilizer	Concentrated	EUR 27.3 million	No	Abroad
Corruption	Store Norske (2011)	Shipping	Concentrated	EUR 0.4 million	d.m.	Abroad

7.3 The Section 4.5 analysis: sanctions and M&As

The purpose of this sub-analysis is to assess the effect of the anti-trust sanctions from the EU Commission on the rate of mergers and acquisitions (M&A) within the European Union. The analysis is based on data retrieved from the EU Commission database: anti-trust sanction cases and M&A cases from 01/01/2010 to 03/10/2020. The analysis shows there is a significant difference in the rate of M&A between groups with and without a sanction. Upon regression analysis, we find that on average, the yearly M&A rate is multiplied by 2.12 (95% CI: 1.66 to 2.74) when a sanction has been enforced, yet there is substantial variation across sectors.

Reaching this result, M&A cases were grouped by their NACE codes, corresponding to a specific sub-sector (denoted with capitalized letters below), so that each NACE code represents an observation. 'Cases' is the number of M&A cases in each NACE. 'Time' is the duration in years between the date of the first sanction (or 01/01/2010 if there is no sanction) and the end of the period (which is the date of the last M&A case, on the 03/10/2020). 'Sanction' is a dummy variable indicating whether there has been a sanction or not in the corresponding NACE. The observations fit the negative binomial distribution, which is a discrete probability distribution that models the number of failures in a sequence of independent and identically distributed Bernoulli trials before a specified (non-random) number of successes occurs. To test whether the distribution of observations between the group with sanctions and without is significantly different, we used a Mann–Whitney U test, also called Wilcoxon test. This was done to test the median values between the group with sanctions and the group without.³⁰ The test yielded a statistical value of 17004. The location shift is equal to -1.999 within a 95% confidence interval (-3.999979 - -1.231777e-06) with a p-value of 0.024 (<0.05). Therefore the alternative hypothesis "true location shift is not equal to 0" is verified. Thanks to the p-value we can assert that there is a significant difference between the groups with and without sanctions.

Several linear regressions were run to assess the effect of a sanction on the M&A rate. First, we used the sanction as an explanatory variable, with the date of the sanction as a control. Secondly, we used the global sectors (A to S) as an additional explanatory variable (sector). Thirdly, we did a regression similar to the second, now with a different grouping of sectors, in order to check variation across sectors (sectors with few observations were grouped together). Eventually, a fourth regression gave the interaction between the grouped sector and the sanction. The regression with 'sector' as

³⁰A parametric test would not suit the data since the model is not following a Normal distribution but a Negative binomial distribution. The Mann–Whitney U test uses the ranks to compare the two groups.

a predictor variable (all sectors) is favored by the likelihood ratio test, and these are the results we show here.³¹ The table below shows that the effects of Sanction and Sector are both highly significant (p-value \leq 0,001).

Table 5: Likelihood ratio tests of Negative Binomial Models

Model	(1)	(2)	(3)	(4)
Theta	0.9751574	1.2709476	1.0968403	1. 97897
Resid. df	641	623	635	629
2 x log-lik.	-4113.699	-3941.044	-4036.944	-4017.984

An alternative parametrization of the regression is presented for a more meaningful interpretation of the coefficients of the model (deviation from the mean, specified by “contr.sum”). The table below shows that the effects of Sanction and Sector are both highly significant (p-value less than 0,001).

Table 6: Analysis of Deviance Table (Type III tests)

Variable	LR Chisq	Df	Pr(>Chisq)
Sector	224.729	19	< 2.2e-16 ***
Sanction	38.319	1	6.009e-10 ***

The effect of Sanction and Sectors are detailed below. The Variable Sector is analyzed with “contr.sum” contrasts, the coefficients are thus interpreted as deviation from the mean effect, and the results show that the annual rate of M&A in sectors A, C, K, L, N, P, R, S deviate significantly from the overall mean.

³¹More details of this sub-analysis can be provided upon request.

Table 7: Coefficients regression with all sectors as main effect

Variable	Estimate	Std. Error	z value	Pr(> z)
SectorA	-1.57525	0.24405	-6.455	1.08e-10 ***
SectorB	-0.13138	0.24478	-0.537	0.591467
SectorC	-0.46788	0.06331	-7.390	1.47e-13 ***
SectorD	0.74602	0.27850	2.679	0.007391 **
SectorE	-0.62313	0.27300	-2.283	0.022460 *
SectorF	-0.40826	0.20610	-1.981	0.047599 *
SectorG	-0.20576	0.09805	-2.099	0.035854 *
SectorH	0.36605	0.17280	2.118	0.034152 *
SectorI	-0.00863	0.29763	-0.029	0.976867
SectorJ	0.08230	0.15338	0.537	0.591586
SectorK	0.68347	0.17743	3.852	0.000117 ***
SectorL	1.34240	0.34068	3.940	8.14e-05 ***
SectorM	-0.55240	0.20861	-2.648	0.008096 **
SectorN	-0.57079	0.16112	-3.543	0.000396 ***
SectorO	-1.51023	0.55481	-2.722	0.006487 **
SectorP	-1.91570	0.49219	-3.892	9.93e-05 ***
SectorQ	-0.32111	0.27657	-1.161	0.245626
SectorR	-1.16651	0.30352	-3.843	0.000121 ***
SectorS	-2.13715	0.47231	-4.525	6.04e-06 ***
SanctionY	0.75156	0.12796	5.873	4.28e-09 ***
Theta			1.2709	
Std. Err.			0.0782	
2 x log-likelihood			-3941.0440	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

In result of this analysis we find the M&A yearly event rate is multiplied by 2.12 (95% CI: 1.66 to 2.74) when a sanction occurred. The effect is highly significant even after adjusting for the effect of sector. However, the data applied include M&A cases submitted to the EU Commission, on one hand, and antitrust sanctions by the EU Commission, on the other. We have not demonstrated causal connection between sanctions and M&As, and M&As can occur for a range of other reasons than an antitrust sanction. Nonetheless, the result does not reject a hypothesis that sanctions may lead to more concentration in markets.

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