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Public law enforcers and political competition*

Éric LANGLAIS† and Marie OBIDZINSKI‡

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Abstract

In this paper, we analyze how political competition affects the design of public law enforcement policies. Assuming that the cost of enforcement is linear, criminals'type is uniformally distributed, and society's wealth is large enough, the article arrives at two main conclusions: 1) electoral competition entails no loss of efficiency at equilibrium for both minor and major offenses (e.g. minor offenses are not enforced, while major ones are fully deterred); 2) different distortions arises at equilibrium for the intermediate offenses: enforcement expenditures for small offenses are lower than the optimal level, such that the issue of under-deterrence is exacerbated; in contrast, for larger offenses, enforcement measures are higher, and there is more deterrence than what efficiency requires. We show that these results also holds under more general assumptions (convex costs of enforcement, a general cdf of illegal benefits, a lower society's wealth), excepted that full deterrence of major offenses is not achievable.

Keywords : public law enforcement, deterrence, monetary sanctions, electoral competition.

JEL classification codes : D72, D73, H1, K14, K23, K4.

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1 Introduction

Political views are often at stake when the public law enforcer chooses the level of sanction, or the means given to the police. In real life, a public law enforcer might be a chief of police, a judge, a chief attorney, a regulator, a city mayor, etc. In many cases, a realistic view of the law enforcer is to consider that her/his decisions regarding the level of sanction and the means given to detection, apprehension and conviction are influenced by the political market, and as such, by citizens' preferences through the electoral competition.

Enforcement expenditures may increase under the threat of (re)election, an intuition which seems to be supported by data. A large body of empirical literature has indeed documented the influence of election on the probability of detection, apprehension and conviction. Levitt (1997) shows that the number of sworn officers significantly increases during election years (and remains stable meanwhile). Berdejó and Yuchtman (2012) present evidence that elected judges (in the State of Washington) tend to respond to political pressure by increasing the severity of their judgment: sentences are around 10% longer at the end of a judge's political cycle than at the beginning. Dyke (2007) shows that the district attorneys are less likely to dismiss cases in the election year. Prosecutors running for elections tend also to take more cases to trial rather than plea bargain (McCannon, 2013).

By contrast, some legal rules are weakly enforced, if ever. Examples are numerous. Many Parisian cyclists do not abide to traffic law. Many citizens throw their cigarettes butts on the street. The fines provided for by the law are respectively 90 euros (running red lights) and 68 euros (for throwing the cigarettes), but are scarcely applied. We can also think to illegal downloading, which is considered as largely under-deterred. Furthermore, up to the latest presidential elections, French citizens expected that the new president would award a large amnesty for infractions to speed limits, parking regulation, running red and so on. Makowsky and Stratmann (2009) shows that the probability of getting a ticket (rather than a warning) for excessive speed and the size of the fine is negatively affected by the fact to reside in the town (compare to live and vote out of the town). In other words, policemen tend to favor local constituents.

These observations question[1] the link between elections and public law enforcement policies. The purpose of our paper is to understand why and how deterrence policies might be affected when the law enforcer is elected as compared to the standard case of a benevolent dictator. Mainly, our purpose is to characterize the distortions in enforcement policies chosen by elected enforcers, both in terms of intensity/severity, and in terms of adequacy to the gravity of offenses (harm).

Our main results show that political competition entails no loss of efficiency

[1] By definition, empirical studies do not allow for normative conclusions. Some significant issues remains such as the relation between the level of enforcement expenditure under the influence of election and efficiency. Furthermore, these empirical papers focus on harmful crimes such as homicide, rather than dealing with a larger scope of crimes (such as regulatory crimes, parking fines and so on).

both at the top and the bottom of the distribution of offenses, at least to the extend that society's wealth is large enough and enforcement measures develops with constant marginal cost. For minor offenses, the outcome of the political market is the *laissez-faire* which is the optimal policy; to the opposite, major offenses are fully deterred in a political equilibrium, which prooves also to be efficient. More precisely, we show that when offenses entail an external harm to society which is lower (larger) than a threshold (that depends on the level of the marginal cost of enforcement measures), a benevolent enforcer and an elected enforcer will agree on the policy to enforce: for both, the best policy consists in no enforcement measures and zero deterrence (maximal enforcement measures, and full deterrence), since enforcement measures are financed by taxes and entail a marginal cost which is too high (small) when addressed to minor offenses. In contrast, for intermediate offenses (i.e. excuding the smallest and the largest), we show that electoral competition promotes inefficient enforcement policies since the preferences of the majority of voters depart from the preferences of the benevolent enforcer. The distortions that appear can be classified according to the size of the external harm, along two areas (let say: small and large). First, for small offenses for which the external harm is not negligible (compared to the marginal cost of enforcement) but limited, a "weak enforcement" equilibrium emerges from the electoral process: citizens vote for enforcement's expenditures which are lower than the optimal ones, and the proportion of undeterred offenders is larger. Second, for large offenses having a higher external harm, a "strong enforcement" equilibrium prevails where citizens vote for high enforcement's expenditures; in this case, the policy reaches a level of deterrence which is higher than the optimal one.

In this perspective, our paper addresses the important point of the enforcers motivations and objectives, an issue that has been rarely addressed in the literature stemming from Becker's (1968). A first exception is Friedman (1999), who argues that the public law enforcer is merely self interest (as any other agent), and observes that the literature about law enforcement considers criminals as highly sophisticated and rational individuals, while the State is usually considered as a simple "proxy" (benevolent automate) or "a wise, benevolent and wholly altruistic organization"[2]. However, as Friedman emphasized, societies do not generally choose the most efficient way to enforce law in practice. One explanation lays with the objectives of law enforcers; they wish to maximize their own rents rather than the social welfare, thus departing from the socially optimal solution of the literature. Therefore, Constitutions should impose costly punishment (such as prison) in order to avoid excessive punishment. In relation with the seminal work of Friedman, Garoupa and Klerman (2002)[3] analyze the issue of law enforcement and deterrence in the realm of the rent seeking model of government. They assume that the objective function of the enforcer is to maximize the revenues minus the harm to the government and the

[2] See Friedman, 1999, p. 262.

[3] See also Gradstein (1993), for an analysis of the impact of a rent seeking government for the provision of public goods. Dittman (2004) addresses the case where the government puts some weight on the residual budget of the prosecution policy.

cost of law enforcement.[4] Wickelgren (2003) also build from the point made by Friedman (1999) and justifies the use of costly forms of sanctions (prison rather than corporal punishments), in a model with two enforcing authorities acting sequentially. However, in Wickelgren's work both levels of the enforcement system share a similar objective, i.e. maximizing a (weighted) social welfare function.

Our paper discusses a point similar to Friedman (1999), Garoupa and Klerman (2002) and Wickelgren (2003), although it adopts an alternative view. Specifically, rather than assuming that the enforcer's preferences are exogenously fixed, we consider here a case where the objective function of the elected public law enforcer is endogenous, resulting of the electoral game. Our aim is to discuss in a simple framework whether/how political competition may (or not) promote the toughness of enforcement policies in the various domains of administrative law and penal law.

The paper is organized as follows. Section 2 sets the general framework and recall the results obtained in the standard beckerian approach relying on a benevolent planner in order to define our benchmark. Section 3 analyzes the case where the public enforcer is elected with a simple model of Downsian electoral competition. Section 4 shows how these results extend under more general assumptions (a lower level of society's wealth, convex costs of enforcement, a general cdf for illegal benefits). Section 5 concludes.

2 Model and assumptions

We introduce here our basic framework, which elaborates on the model of law enforcement à la Becker[5]. Let us consider a population of risk neutral individuals, the size of the population being normalized to 1. Each individual considers the opportunity to engage in the legal activity (and earns 0), or to engage in the illegal activity which yields a benefit b that varies in the population. Public authorities do not observe the type b, but only know that benefits are distributed according to the uniform law on $[0, 1]$. The uniform distribution assumption makes easier the exposition of results.[6] The (external) loss/harm to the rest of the society in case of an offense is h, whatever the private benefit for the offender.

Monitoring the illegal activity entails a cost for public authorities, equal to $m(p)$, where for the sake of simplicity p is the probability of control (encompassing apprehension and conviction for an illegal behavior). The enforcement cost function writes as $m(p) = m.p$, with $m > 0 \ \forall p \in [0, 1]$. The paper highlight first this case with a constant marginal cost of enforcement, which has been often

[4] This issue of self-interest has been raised for judges' decision making notably by Epstein (1990) and Posner (1993). Examining the case of ordinary tenured judges, Posner (1993) examines the case where their utility is affected by income, leisure, and judicial voting.

[5] See the surveys by Garoupa (1997) and Polinsky and Shavell (2000).

[6] See the last section for a more general assumption.

exemplified in the literature (Garoupa 2001, Garoupa and Klerman 2002). We will discuss alternative assumptions in the last section of the paper.

Also, we assume that this enforcement cost is financed through a lump sum tax t plus the fine f levied on the detected (with probability p) offenders. The maximal fine is the legal wealth of the population w, i.e. $f \in [0, w]$. For the moment, we make the next assumption:

Assumption 1. $w > 1 > m$.

The management costs (associated with the monetary penalty), as usual in the literature, are assumed to be negligible. Throughout the paper, we will consider only balance-budget policies. The public budget constraint writes as:

$$m(p) = t + qpf \tag{1}$$

where q is the proportion of non abiding people. As usual in the literature, we will show that the proportion of offenders equals $q = \left(1 - \bar{b}\right)$, with $\bar{b}$ the deterrence threshold.

2.1 Offenders and law abiding citizens

We assume that an offense hurts citizens through a pure external term affecting individuals' utility level, defined as qh. Note that both the criminals and the honest people suffer from the externalities imposed by offenses.[7]

The population of citizens is distributed along the value of the potential illegal benefit $b \in [0, 1]$, but only those citizens who become offenders ("criminals") will effectively retain their b, whereas those who abide the law ("honest") will forgive their b. Let us denote the utility level of a risk neutral citizen b who considers the opportunity to become an offender, as:

$$u_c = w + b - t - pf - qh$$

whereas when he considers the opportunity to be law abiding, he obtains a utility level written as:

$$u_h = w - t - qh$$

Hence, if $u_c > u_h$ the citizen b becomes an offender, i.e. he decides to undertake the illegal activity if the illegal benefit he receives from doing it is higher than the expected punishment: $b \geq pf$; and if $u_c < u_h$, he is law abiding. As usual, the marginal offender $\bar{b} = pf$ is defined by $u_c = u_h$. Given that b is uniformly distributed on $[0, 1]$, we obtain that $q = 1 - \bar{b} = 1 - pf$.

[7] Examples of such offenses are numerous (see, for instance, Polinsky and Shavell, 1979): polluting the air (while non respecting a regulatory standard), speeding or double parking, car theft, throwing cigarettes butts, drug consumption, etc. Each of these offense imposes a cost to the rest of the society.

2.2 The benchmark: benevolent enforcer

Let us remind the choice made by a benevolent law enforcer: he determines both the level of fine f_u and the probability of detection p_u by maximizing the social welfare function S:

$$S = \int_0^{\bar{b}} u_h db + \int_{\bar{b}}^1 u_c db = w - t + \int_{\bar{b}}^1 (b - pf - h) db$$

and substituting with (1) yields:

$$S = w + \int_{pf}^1 (b - h) db - mp \tag{2}$$

which is the standard formulation considered in the literature. The first (integral) term of S correspond to the expected private benefit associated with the illegal activity. The last one is the cost of monitoring for public authorities. The fine paid by the offender when arrested is a mere transfer (the expected probability of paying the fine, is equal to the expected probability of collecting it).

We will denote the pair (p_u, f_u) as the optimal enforcement policy. Defining: $h_1 = \frac{m}{w}$ and $h_2 = h_1 + 1$, we have:

Proposition 1 *The optimal enforcement policy (p_u, f_u) may be one of the three following solutions: i) If $h < h_1$, then $p_u = 0$, i.e. no enforcement expenditures, and the policy is associated with zero deterrence. ii) If $h_1 < h < h_2$, then $p_u = (h - h_1)\frac{1}{w} > 0, f_u = w$, and the policy is associated with under deterrence. iii) If $h > h_2$, then $p_u = \frac{1}{w}, f_u = w$, and the policy associated with full deterrence.*

Proof. The derivatives of S with respect to f and p are given by:

$$\begin{aligned} \frac{\partial S}{\partial f} &= (h - pf)p \\ \frac{\partial S}{\partial p} &= (h - pf)f - m \end{aligned}$$

We have:

$$\left(\frac{\partial S}{\partial p}\right)_{|p=0} = hf - m$$

i) Thus, if $hw - m < 0 \Leftrightarrow h < \frac{m}{w}$, then $\left(\frac{\partial S}{\partial p}\right)_{|p=0} < 0$ and it must be that $p = 0$, and the choice of f is of no matter.

ii) On the other hand, if $hw - m > 0$, it is not optimal to choose $f = h/p < w$ since this would imply $\frac{\partial S}{\partial p} < 0$ for any $p > 0$. Hence, it must be that $f_u = w$. Note that for the optimal fine, we also have:

$$\left(\frac{\partial S}{\partial p}\right)_{|p=1/w} = (h-1)w - m$$

Thus, as long as $h < h_1+1$, there exists an interior solution where p_u satisfies $\frac{\partial S}{\partial p} = 0$ or:

$$(h - p_u w)w = m \tag{3}$$

implying $h - p_u w > 0$. Solving for p_u yields $p_u = (h - h_1)\frac{1}{w} > 0$.

iii) Finally, when $h > h_1 + 1$, $\left(\frac{\partial S}{\partial p}\right)_{|p=1/w} > 0$ such that the optimal policy is $(p_u = \frac{1}{w}, w)$, and full deterrence is achieved (since $p_u w = 1$). ■

Proposition 1 is depicted in the next graph:

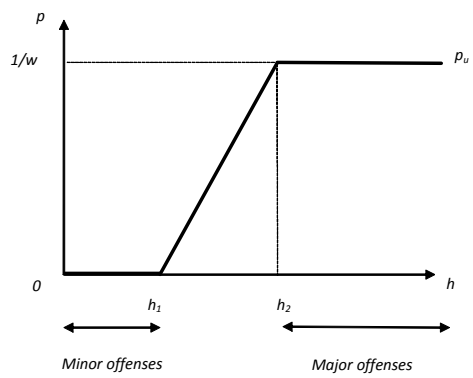

Figure 1: The optimal enforcement policy

It reminds us that the optimal enforcement policy for minor offenses ($h < h_1$) is the *laissez-faire*. In contrast, for intermediate offenses ($h_1 < h < h_2$), the best policy consists in enforcement expenditures mixed with a maximal fine, and under deterrence occurs. Finally, for the largest offenses ($h > h_2$), maximal enforcement measures allowing complete deterrence are optimal.[8]

3 Law enforcement under political competition

In this section, we depart from the usual assumption that the enforcer is benevolent. Instead, we assume that he is elected; for that purpose, we introduce a

[8] This last result reflects that the marginal cost of enforcement is constant. This case vanishes when one relaxes this assumption, assuming rather than $m'(p) > 0$, $m''(p) > 0$ with for example $m'(1) \to \infty$; as a result $p_u < 1$ for any $h > h_1$. See Garoupa (2001), and the last section of this paper.

simple model of electoral competition in the vein of the Downsian model (see Downs, 1957). Assume there exist two candidates $i = 1, 2$ representative of two political parties, competing for national (presidential or legislative) or local (municipal) elections. Competing for elections here is alike a rent seeking contest, where V, the exogenous rent obtained in case of victory is attached to holding offices, ministries and so on.

The objective of politician i is to maximize the expected value of the rent $\alpha_i V$, where α_i is the probability that he wins the elections. To this end, candidate i proposes to electors an electoral platform (f_i, p_i). We consider the (simple) majority rule for voting. All citizens are electors and do participate: each voter simply votes for the candidate whose platform allows him to reach the highest utility level, and if he is indifferent, he tosses a coin to decide for whom he votes.

The electoral competition game between the candidates and the citizens/voters is as follows: after Nature moves at stage 0 (choosing the type of citizens, not observable for politicians), the electoral competition begins at stage 1, which is a simultaneous move (non cooperative) game between the candidates, where they both choose and announce their platforms (f_1, p_1), (f_2, p_2), both satisfying the balanced budget constraint (1); at stage 2, elections take place, and citizens simultaneously choose between the two candidates[9]; at stage 3, the elected candidate implements his policy[10] – it becomes a law; at stage 4, citizens choose to abide or not the law; at stage 5, law is enforced.

In the next paragraphs, we solve for the equilibrium. To this aim, we specifically highlight two main stages: stage 2, where citizens vote (3.1), and stage 1 where candidates choose their policies (3.2).

3.1 Analysis of citizens' best policies

Solving backward, it comes that at stage 4, any policy (p, f) that is implemented after the elections will induce a screening of citizens between those who abide the law, and those who do not. The analysis of paragraph 2.2 still holds, and it is straightforward that the deterrence threshold at equilibrium is $\bar{b} = pf$.

At stage 2, each citizen depending on his type b consistently takes into account that in the future, either he will comply or not to the law, and vote for his preferred policy which maximizes his utility over the whole game.

3.1.1 Best decision of a citizen who will comply

For a citizen who anticipates he will comply to the law, the policy he votes for at stage 2 is: $(f_h, p_h) = \arg\max_{(f,p)} \{u_h \ under \ (1)\}$. Substituting (1) in u_h leads to:

[9] Citizens are dynamically consistent players here. Each citizen votes, anticipating his future behavior, i.e. whether he will behave as honest people or criminals.

[10] i.e., we assume that candidates commit to their own electoral platform – without specifying the reasons explaining neither why those platforms are credible announcements, nor how they become a law. These (obviously important) issues are beyond the scope of the paper.

$$u_h = w - m.p + (1 - pf)(pf - h)$$

We obtain:

Proposition 2 *Law abiding citizens vote for a policy (p_h, f_h) which is one of the following solutions: i) If $h < h_2$, then $p_h = (1 + h - h_1)\frac{1}{2w} < 1, f_h = w$. ii) If $h > h_2$, then $p_h = \frac{1}{w}, f_h = w$.*

Proof. The derivatives of u_h with respect to f and p are:

$$\begin{aligned} \frac{\partial u_h}{\partial f} &= (1 + h - 2pf)\,p \\ \frac{\partial u_h}{\partial p} &= (1 + h - 2pf)f - m \end{aligned}$$

We have:

$$\left(\frac{\partial u_h}{\partial p}\right)_{|p=0} = (1 + h)f - m$$

Note that at $f = w$, $\left(\frac{\partial u_h}{\partial p}\right)_{|p=0}$ cannot be negative under assumption 1.[11] Furthermore, it is not rational for an individual to choose $f < w$ (i.e. such that $\frac{\partial u_h}{\partial f} = 0$) since this would imply that $\frac{\partial u_h}{\partial p} = -m < 0$ for any $p > 0$. Thus, for the maximal fine $f_h = w$, we obtain:

$$\left(\frac{\partial u_h}{\partial p}\right)_{|p=1/w} = (h - 1)w - m$$

and as long as $h < h_2$, p_h is the solution to $\frac{\partial u_h}{\partial p} = 0$, or:

$$1 + h - 2p_h w = \frac{m}{w} \tag{4}$$

which implies $h - p_h w \gtrless 0$. Solving for p_h yields $p_h = (1 + h - h_1)\frac{1}{2w} > 0$.

On the other hand, when $h > h_2$, $\left(\frac{\partial u_h}{\partial p}\right)_{p=1/w} > 0$ meaning that the best policy is $(p_h = \frac{1}{w}, w)$ and full deterrence is achieved (since $p_h w = 1$). ■

Note that compliant citizens prefer a positive probability of detection and conviction $p_h > 0$, even for minor offenses that wouldn't be worth to deter from the point of view of efficiency (i.e. for $h < h_1$, $p_u = 0$). On the other hand, for larger offenses, they prefer enforcement measures higher as well as lower than the optimal ones. More precisely, one can show that:

[11] Assuming that $w < m$, would imply that $\left(\frac{\partial u_h}{\partial p}\right)_{|p=0} > 0$ only for $h > \frac{m}{w} - 1$. However, this new threshold is not relevant for the equilibrium analysis.

Proposition 3 *Law abiding citizens vote for a policy with enforcement measures that are never lower than the optimal ones.*

Proof. Straightforward from the comparison of p_h and p_u, since: i) if $h < h_2$, then $p_h > p_u$; ii) if $h > h_2$, then $p_h = \frac{1}{w} = p_u$. ■

The results of propositions 2 and 3 are represented in the next graph:

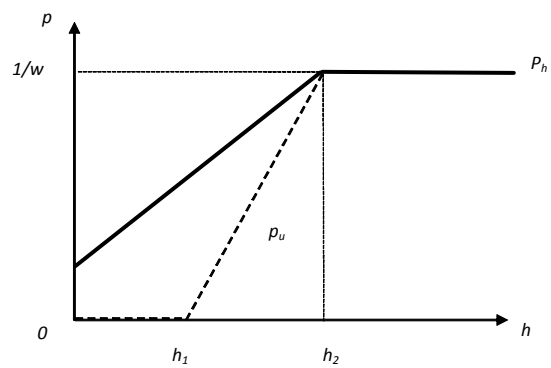

Figure 2: The best enforcement policy of law abiding citizens

The basic force explaining these results is a rent seeking argument[12]: to what extent the best policy preferred by law abiding people is mainly financed thanks to the fines levied on non compliant citizens? The argument runs as follows.

A benevolent government would not find efficient to enforce all offenses, excepted when the social benefit (in terms of avoiding the external cost) retained from doing so is larger than the cost borne in apprehending and convicting offenders. Thus, minor offenses ($h < h_1$) representing a social harm small enough compared to the marginal cost of enforcement are not enforced and not deterred by a benevolent government. In contrast, under political competition, citizens who expect to be law abiding demand that any offense (the size being small or large) be enforced in proportion to the social harm they inflict to

[12] Garoupa and Klerman (2002) have analyzed the the enforcement policy for a rent-seeking government, and found it displays over enforcement of some minor offenses combined with under enforcement of some major offenses, compared to the optimal policy. However, note that proposition 2 does not give the *equilibrium* policy, but characterizes only the best response function of abiding citizens. Our equilibrium analysis (propositions 5,6,7) will show that, although electoral competition is consistent with the existence of rent-seeking behaviors (by both candidates and voters), the properties of the equilibrium are very different than those found by Garoupa and Klerman.

society. The reason is that although all citizens do pay taxes, only those who do not comply the law are facing the burden of fines. Thus for "honest" citizens, enforcing the minor offenses yields a private benefit (net of the external cost of offenses) with two components: the higher rate to which the fine is collected, on the one hand, and on the other hand the lower tax pressure required to finance the policy. In other words, the cost of enforcement measures associated with a small but positive probability of control required by honest citizens to deter minor offenses is very easy to finance, thanks to a low tax and a large rate to which the fine be paid. Indeed, for compliant individuals the expected sanction is neither a cost, nor a mere social transfer, and the policy is financed mainly by the population of the non compliant people (i.e. less tax, more expected fine).

By the same token, it is easy to understand that for intermediate offenses ($h_1 < h < h_2$) which would be worth to deter from a social point of view, law abiding citizens require a policy entailing more enforcement expenditures and reaching a higher level of deterrence than would be required by efficiency. The private benefits they retain is still larger than the social benefit (the fine is a mere transfer for the benevolent enforcer, having no benefit and no cost) associated with their deterrence. In this area of intermediate values for the external harm, a medium size for the probability of control represents a reasonable enforcement cost, which is still easy to finance with taxes and a high rate of recovering the fine.

But for major offenses ($h > h_2$), law abiding citizens will choose enforcement expenditures which are the optimal ones.

3.1.2 Best decision of a citizen who will not comply

For a citizen who anticipates he will not abide the law, let us denote the stage 2 preferred policy as: $(f_c, p_c) = \arg\max_{(f,p)} \{u_c \textit{ under } (1)\}$. Substituting (1) in u_c yields:

$$u_c = w + b - m(p) - pf + (1 - pf)(pf - h)$$

Let us define $h_3 = h_1 + 2$. We have now:

Proposition 4 *Not complying citizens vote for a policy (p_c, f_c) which may be one of the following solutions: i) If $h < h_1$, then $p_c = 0$. ii) But if $h_1 < h < h_3$, then $p_c = (h - h_1)\frac{1}{2w}, f_c = w$. iii) If $h > h_3$, then $p_c = \frac{1}{w}, f_c = w$.*

Proof. We have:

$$\begin{aligned} \frac{\partial u_c}{\partial f} &= (h - 2pf)p \\ \frac{\partial u_c}{\partial p} &= (h - 2pf)f - m \end{aligned}$$

We obtain:

$$\left(\frac{\partial u_c}{\partial p}\right)_{|p=0} = hf - m$$

Thus, if $hw - m < 0 \Leftrightarrow h < h_1$, then $\left(\frac{\partial u_c}{\partial p}\right)_{|p=0} < 0$ and it must be that $p = 0$. On the other hand, if $h > h_1$, then it is not rational to choose $f \neq w$ (such that $\frac{\partial u_c}{\partial f} = 0$), since this would also imply that $\frac{\partial u_c}{\partial p} = -m'(p) < 0$ for any $p > 0$. Thus it must be that $f_c = w$, implying that:

$$\left(\frac{\partial u_c}{\partial p}\right)_{|p=1/w} = (h-2)w - m$$

As long as $h < h_3$, p_c is defined as the solution to $\frac{\partial u_c}{\partial p} = 0$, or:

$$h - 2p_c w = \frac{m}{w} \tag{5}$$

Solving for p_c yields $p_c = (h - h_1)\frac{1}{2w} > 0$, such that $h - p_c w > 0$.

Finally, when $h > h_3$, $\left(\frac{\partial u_c}{\partial p}\right)_{p=1/w} > 0$, the best policy is $p_c = \frac{1}{w}$, and full deterrence is achieved. ■

The results of propositions 2 and 3 are represented in the next graph:

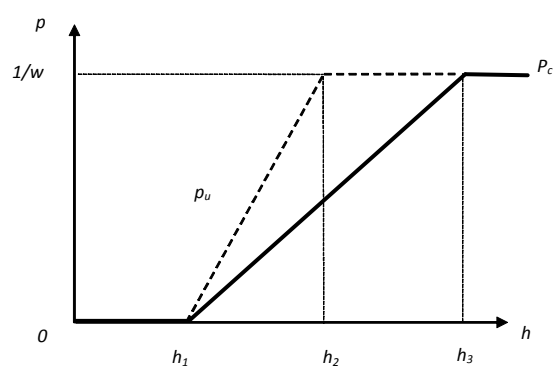

Figure 3: The best enforcement policy of not complying citizens

Notice that for minor offenses ($h \leq h_1$), non compliant citizens prefer the *laissez-faire* which is the efficient policy in this area. Moreover, for the largest offenses ($h > h_3$), they also prefer full deterrence which is still efficient. But for intermediate levels of harm ($h_1 < h < h_3$), offenders always prefer a level of

enforcement expenditures lower than the efficient one (since $p_c = \frac{p_u}{2}$). The underlying intuition is that – in contrast both to the law abiding citizens for whom the fine paid by criminals is a benefit – offenders have to consider the additional cost (over the tax) represented by the fines they pay, when choosing their best policy. As the level of enforcement measures is raised, the probability of getting caught and fined increases, and the burden of the policy is mainly borne by the population of offenders rather than the whole population of taxpayers.

Finally, a straightforward result is also that the deterrence level is at least as high in an equilibrium where (p_h, f_h) is chosen, as compared to an equilibrium where (p_c, f_c) arises, since: $p_h \geq p_c$.

3.2 Equilibria

Now, we turn to the stage of electoral competition, where candidates announce their policy, and characterize the (subgame perfect) equilibrium.

At stage 1, candidates propose a policy for which the number of voters is maximized, anticipating that when implemented, this policy will induce a screening of citizens. We show in the next propositions that the political equilibrium that emerges depends on the size of the external cost of offense h we consider. We start with the range of minor offenses ($h < h_1$).

Proposition 5 *Assume that $h < h_1$. The unique equilibrium is such that both candidates announce the laissez-faire policy: $p_c = 0$.*[13]

Proof. We have to compare the proportion of citizens voting for the policy (p_h, w), which is $p_h w = \frac{1}{2}(1 + h - h_1)$, to the proportion voting for $(p_c = 0, f)$ given by: $1 - p_c f = 1$. The result is straightforward since $p_h w < \frac{1}{2}$ on the domain where $h < h_1$. ■

In words, electoral competition creates no distortion in the area of minor offenses, where the external cost to society is small enough: the equilibrium policy emerging from elections is the optimal policy that a benevolent enforcer would choose, with no enforcement expenditure and zero deterrence.

Let us consider now the case of larger offenses (but less than major offenses: $h < h_2$).

Proposition 6 *Assume that $h_1 < h < h_2$. The equilibrium may be one of the following: i) If $h < h_1 + \frac{1}{2}$, then both candidates announce the policy $(p_c = (h - h_1)\frac{1}{2w}, w)$. ii) If $h_1 + \frac{1}{2} < h < h_2$, then both candidates announce the policy $(p_h = (1 + h - h_1)\frac{1}{2w}, w)$.*

[13] Note that at equilibrium, each candidate wins with probability $\frac{1}{2}$ (this remark applies to all propositions).

Proof. Consider the domain of offenses $h_1 < h < h_2$. It is easy to verify that the proportion of citizens voting for (p_h, w) satisfies now $p_h w = \frac{1}{2}(1 + h - h_1) > \frac{1}{2}$ since $h > h_1$. On the other hand, the proportion voting for (p_c, w) is $1 - p_c w = 1 - \frac{1}{2}(h - h_1)$ and satisfies $1 - p_c w > \frac{1}{2}$ as long as $h < h_2$, or $1 - p_c w < \frac{1}{2}$ as long as $h > h_2$. Thus in the range $h_1 < h < h_2$: either $p_h w > 1 - p_c w$ and thus both candidates maximize their chances to win the election soon as they propose (p_h, w); or $p_h w < 1 - p_c w$ and thus both candidates maximize their chances to win the election when they propose (p_c, w).[14] Note that substituting for p_h and p_c, the condition $p_h w < 1 - p_c w$ writes equivalently as $h < h_1 + \frac{1}{2}$, and vice versa ($p_h w > 1 - p_c w \Longleftrightarrow h > h_1 + \frac{1}{2}$). Moreover, it is easy to verify that $(p_u = \frac{1}{w}(h - h_1), w)$ is not an equilibrium, since:

- on the range $\frac{m}{w} + \frac{1}{2} < h < h_2$, $(p_u = \frac{1}{w}(h - h_1), w)$ does not destroy (p_h, w), since: $p_u w = h - h_1 < p_h w = \frac{1}{2}(1 + h - h_1) \Leftrightarrow h < h_2$, which holds;

- on the range $h < \frac{m}{w} + \frac{1}{2}$, $(p_u = \frac{1}{w}(h - h_1), w)$ does not destroy (p_c, w), $p_u w = h - h_1 < 1 - p_c w = 1 - \frac{1}{2}(h - h_1) \Leftrightarrow h < h_1 + \frac{2}{3}$, which also holds. ■

In the case of illegal acts for which society suffers from external costs with intermediate values, $(h_1 < h < h_2)$, we find that political competition may lead to a weak or strong enforcement equilibrium. For moderate levels of harm $(h < h_1 + \frac{1}{2})$, the maximal fine is associated with enforcement's expenditures which are lower than the optimal ones $(p_c < p_u)$ under a "weak enforcement equilibrium". This means that where the weak enforcement prevails, the electoral competition leads to less deterrence than at the optimum. In contrast, enforcement expenditures are higher than the efficient level, when the "strong enforcement equilibrium" emerges $(h_1 + \frac{1}{2} < h < h_2)$, and a higher level of deterrence is obtained.

Last, we come to the range of major offenses.

Proposition 7 *Assume that $h > h_2$. The unique equilibrium is such that both candidates announce the policy $(p = \frac{1}{w}, w)$.*

Proof. When $h > h_2$, the proportion of citizens voting for $(p_h = \frac{1}{w}, w)$ is 1. On the other hand, as long as $h < h_3$, the proportion voting for $(p_c = \frac{1}{2w}(h - h_1), w)$ is $1 - p_c w < \frac{1}{2}$; while for $h > h_3$, the proportion voting for $(p_c = \frac{1}{w}, w)$ is 0; hence the result. ■

Figure 4 shows the optimal probability of detection (p_u), the probability preferred by law abiding citizens (p_h) and the probability proffered by not compliant citizens (p_c), as a function of h. Finally, the bold lines represents the probability of detection emerging at the voting equilibrium.

[14] It is obvious that when $p_h w = 1 - p_c w$, both candidates maximize their chances to win the election when they propose either (w, p_h) or (w, p_c) indifferently. We let aside this kind of situation for the moment, but we will discuss the occurrence of multiple and asymmetric equilibria later on.

For minor offenses (below h_1), there is no deterrence at equilibrium as shown in proposition 5. This result is efficient, since $p_u = 0$ for all $h < h_1$. The intuition is that the harm is so small relative to the marginal cost of enforcement that it is not worth spending some money on deterrence. To the opposite, the major offenses (above h_2) are always and fully deterred, the rational being the reverse.

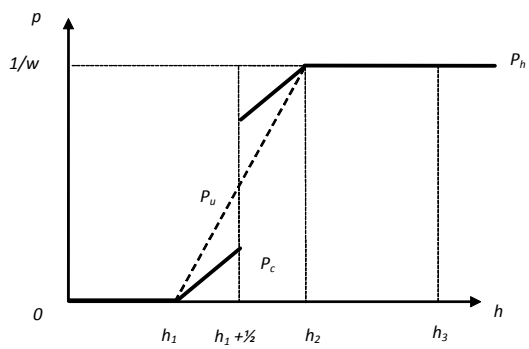

Figure 4: The equilibrium enforcement policy

For intermediate offenses (between h_1 and h_2), the characteristics of the equilibrium may be of two opposites kinds. The first one occurs for moderately harmful acts (between h_1 and $h_1+\frac{1}{2}$), where the "weak enforcement" equilibrium prevails as shown in proposition 6; there is less deterrence than at optimum, such that the issue of under-deterrence is aggravated. A majority of citizens decide to not abide the law. Then, enforcement expenditures are lower than the social welfare maximizing one, and the proportion of offenders exceeds the social welfare maximizing one.

The second kind, associated with more deterrence than at optimum, occurs in the range of more harmful acts (between $h_1 + \frac{1}{2}$ and h_2) where the "strong enforcement" equilibrium emerges; the resulting probability of detection is higher than the social welfare maximizing. In such a case, a majority decides to abide the law. Enforcement expenditures are higher than the efficient level, and consequently the proportion of offenders is lower than what would require efficiency.

To sum up, electoral competition in our set up yields zero distortion both at the top (major offenses) and the bottom (minor offenses) of the distribution of social harms. Distortions only occur in the range of intermediate harms, and typically correspond to under (over) enforcement of small (large) offenses.[15]

[15] The enforcement strategy choosen by a rent-seeking government in Garoupa and Klerman (2002) is roughly speaking the opposite: over enforcement of some minor offenses combined with under enforcement of some major offenses; moreover, it displays some distortions both at the top and the bottom of the distribution of offenses.

Note that the comparative statics of the model are very simple, and depend mainly on the marginal cost of enforcement's expenditures relatively to society's wealth ($\frac{m}{w}$). All else equal, the lower $\frac{m}{w}$: (1) the higher p_h and p_c, (2) the higher (smaller) the number of voters for p_h (p_c). On the other hand, a change in $\frac{m}{w}$ also modifies the thresholds of harms associated with the different equilibria: as $\frac{m}{w}$ decreases, then h_1, $h_1 + 1/2$ and h_2 shift to the left. This means that some of the (initially) minor offenses are now deterred with a positive probability, while some of the (initially) major offenses become under-deterred. Similarly, in the range of intermediate offenses, some of the low offenses being initially under-deterred, become now over-deterred and so on.

4 Extensions

We consider here some simple developments of our analysis. An important discussion is related to assumption 1. In a sense we have assumed that citizens were rich enough, i.e. their personal wealth were larger than the highest illegal benefit ($w > 1$). A straightforward implication of such an assumption is that it allows full deterrence of major offenses (those requiring maximal enforcement expenditures, $p = \frac{1}{w}$). Relaxing this assumption, it is easy to verify that full deterrence is never obtained (see paragraph 4.1). On the other hand, the mix of the uniform distribution for the illegal benefit, and of a constant marginal cost for enforcement expenditures, have the main expositional interest to allow us to fully characterize the equilibria. We will relax both in paragraph 4.2.

4.1 Enforcement, wealth, and political competition

Let us substitute assumption 1 with the next one:

Assumption 2. $1 > w > \frac{3}{4} > m$.

In such a case, we have to introduce new thresholds for the external cost of crime (see appendix 1):

$$\hat{h}_2 = h_1 + w; \quad \hat{h}_3 = h_1 + 2w; \quad h_4 = h_1 + 2w - 1$$

It is straightforward to verify that $1 > w > m$ implies: $h_4 < \hat{h}_2 < \hat{h}_3$, while $w > \frac{3}{4}$ gives: $h_1 < h_1 + \frac{1}{2} < h_4 < h_1 + 1 < \hat{h}_3$. As a result,[16] proposition 5 still holds, while propositions 6 and 7 are substituted with the next one:

[16] The analysis of the optimal policy is changed in two ways, compared to proposition 1: in part ii) h_2 is replaced with $\hat{h}_2$; in part iii), $p_u = 1$ and partial deterrence occurs; see appendix 1.

Proposition 8 *A/ Assume that $h_1 < h < h_4$, the equilibrium may be one of the following: i) If $h_1 < h < h_1 + \frac{1}{2}$, then both candidates announce the policy $(p_c = (h - h_1)\frac{1}{2w}, w)$. ii) If $h_1 + \frac{1}{2} < h < h_4$, then both candidates announce the policy $(p_h = (1 + h - h_1)\frac{1}{2w}, w)$.*

B/ Assume $h > h_4$, the unique equilibrium is such that both candidates announce the policy $(p = 1, w)$ and incomplet deterrence occurs.

Proof. See appendix 1. ■

Thus this case where $1 > w > \frac{3}{4}$ is qualitatively very similar to the former one, the exception being that some of the larger offenses (but not the major, i.e. only for $h_4 < h < h_2$) are drastically deterred with maximal enforcement expenditures, although incomplet deterrence occurs.

To end up, it is straightforward to verify that when $w < \frac{1}{2}$, we obtain $h_4 < h_1$, and thus the equilibrium is as follows:

Proposition 9 *i) If $h < h_1$, both candidates announce the policy $(p_c = 0, w)$. ii) If $h_1 < h < \hat{h}_3$, both candidates announce the policy $(p_c = (h - h_1)\frac{1}{2w}, w)$. iii) If $h > \hat{h}_3$, both candidates announce the policy $(p = 1, w)$ and incomplet deterrence occurs.*

The reason is that when $w < \frac{1}{2}$ the number of citizens voting for (p_h, w) (whether we have $p_h = (1 + h - h_1)\frac{1}{2w}$ or $p_h = 1$) satisfies $p_h w < \frac{1}{2}$ since $h_4 < h_1$, while the number voting for $(p_c = (h - h_1)\frac{1}{2w}, w)$ satisfies $1 - p_c w \geq 1 - w > \frac{1}{2}$.

4.2 More general distributions and technologies

Let us assume that b is distributed according to a general, continuous law represented by a density $g > 0$ at any b and a cumulative function G defined on $[0, 1]$. Wlog, we will assume that $\frac{1-G}{g}$ is decreasing on $[0, 1]$. Regarding the monitoring costs associated with the control of illegal activities, we will assume the following conditions hold: $\forall p \in [0, 1]$, $m' > 0$, $m'' > 0$, and $m'(1) \to \infty$. This mean that the enforcement activity runs with decreasing returns to scale. Our main results are summarized in the final proposition:

Proposition 10 *Assume that b follows a continuous probability distribution represented by a density $g > 0$ at any b and a cumulative function G defined on $[0, 1]$, and that $\forall p \in [0, 1]$, $m' > 0$, $m'' > 0$, with $m'(1) \to \infty$. The political equilibrium may be one of the following solutions: i) If $h < \frac{m'(0)}{wg(0)}$, then both candidates propose the laissez-faire policy, $(p_c = 0)$. ii) If $h > \frac{m'(0)}{wg(0)}$, there exists*

a threshold $\hat{h} > \frac{m'(0)}{wg(0)}$ *such that both candidates propose the policy* $(p_c < 1, w)$ *if* $\frac{m'(0)}{wg(0)} < h < \hat{h}$*; in contrast, both candidates propose the policy* $(p_h < 1, w)$ *if* $\hat{h} < h$*.*

Proof. See appendix 2. ■

In appendix 2, we also show that the optimal enforcement expenditures are characterized as follows: for $h < \frac{m'(0)}{wg(0)}$, then $p_u = 0$; but, for $h > \frac{m'(0)}{wg(0)}$ then $p_u < 1$ and is larger than the ones for which offenders vote, but lower than those chosen by law abiding citizens: $p_c < p_u < p_h$. In words, in a strong (weak) enforcement equilibrium, there are more (less) deterrence than at the optimum.

5 Concluding remarks

The central issue of our paper is the relationships between law enforcers' objectives and the public enforcement of law. Our analysis is based on the assumption that citizens vote before deciding whether or not to abide the law. Depending on the level of harmfulness of the act and the marginal cost of enforcement, either a "strong" or a "weak" law enforcement equilibrium can emerge. When the "strong enforcement" equilibrium emerges, the preferences of offenders (and thus, crime benefits) are no longer taken into account - in a sense, criminals' preferences are not representative of social preferences, the majority of citizens that emerges in a political equilibrium being law abiding. But, it cannot be ignored that a "weak enforcement" equilibrium might also emerge, in which the criminals' preferences become representative of social preferences.

The paper contributes to the debate concerning the limits of the beckerian approach, and mainly the early criticisms that focused on the inclusion of crime benefits in the social welfare function (Lewin and Trumbull, 1990, Dau-Schmidt, 1990). According to Lewin and Trumbull (1990), including criminal benefits in the social welfare function lowers the deterrence threshold. Dau-Schmidt (1990) also argues that it is morally shocking to include criminal benefits in the social welfare function. Our paper re-conciliates in a way the two positions, by establishing a clear distinction between what is socially optimal (the beckerian approach) and what should emerge from a political process (deterrence under election). We show that what emerges from the political process does not maximize social welfare (the social welfare is lower under democracy than in the implausible utilitarian social planner).

Our paper also provides an argument to explain casual observations regarding existing similarities or to the contrary differences, between countries relative

to citizens' attitude and public policies orientation in the area of crime deterrence. On the one hand, the issue of criminality became a main concern in electoral campaigns for more than a decade in most European countries; on the other hand, there is an ongoing debate about the non criminalization/legalization of some offenses, such as drug consumption (except in relation with international traffics and criminal networks) or illegal downloading. In the first case, the growing place of crime deterrence in electoral campaigns can be seen as a consequence of the election strategies of the politicians, anticipating the "strong enforcement" equilibrium for major crimes. In the second case, some offenses such as illegal downloading might be considered as involving minor harm relatively to their private benefits (the evaluation of those depending on cultures).

The intriguing empirical result of Lin (2007) is partly explain by our paper. Lin (2007) attempted to verify empirically whether differences arise in criminal law enforcement policies (in particular fighting minor and major crimes) according to the level and quality of democracy. Using an index of political liberty from the comparative freedom survey to distinguish "low democracies" from "high democracies", he shows that countries characterized by a higher level of democracy tend to punish major crimes relatively more severely as compared to countries with a lower level of democracy, the reverse being true for minor crimes. More precisely, the deterrence of homicides is quite strong[17] and the homicide rate lower in high democracy by comparison with low democracy. On the contrary, it seems that democracy has a negative impact on less serious crimes such as burglary, robbery, car theft. However, no explanation of such an empirical result has been yet provided. When the harm generated by an offense is small (large) relative to the marginal cost of enforcement, a "weak (strong) enforcement" equilibrium should emerged, provided that the offenders (respectively, honest citizens) represent the majority. It is possible that the harm generated by car theft is quite low relative to the marginal cost of detecting, apprehending and convicting the offenders, therefore leading to a relatively weak enforcement. The reverse being true for homicide.

A limitation of the model is the assumption regarding the commitment of elected law enforcers to enforce their electoral platform. Here, we deal with pre-election politics, and assume that electoral promises are binding and enforceable. A significant extension would be to study the case where politicians could decide not to implement the announced policy despite reelection concerns.[18] We also abstract from the existence of lobbying activities that yield other kinds of imperfections on the political market. We leave for future research the analysis of public enforcement when partisan pressures exist, which will allow to study the effects of different assumptions departing from the one of a benevolent enforcer.

To complete the picture, two extensions might develop. First, the interplay of the voting model with social norms (Acemoglu, Jackson 2015) can be worth been investigated. For instance, some moral or social reasons can impede people

[17] According to multiple criteria: average prison length, average clearance rates.

[18] For example, up to the latest presidential elections, French citizens could anticipate that the new president would award a large amnesty for infractions to speed limits, parking regulation, running red and so on.

to do illegal acts, even if law is in practice not enforced (for instance, illegal downloading or throwing cigarettes butts in France). Second, another significant extension of the paper might be to consider the case of error. McCannon (2013) shows that, in addition of taking more case to trial (rather than plea bargain) during reelection campaign, prosecutors face a decreased probability of having the conviction being upheld by the appellate court. An interesting point would be investigate the relation between election and accuracy in conviction.

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APPENDIX 1

Benevolent enforcers. When $w < 1$, the analysis of the optimal policy is changed as follows (given that $f = w$ is still optimal); we have:

$$\begin{aligned}\left(\frac{\partial S}{\partial p}\right)_{|p=0} &= hw - m \\ \left(\frac{\partial S}{\partial p}\right)_{|p=1} &= (h-w)w - m\end{aligned}$$

Thus, $h < h_1$ implies $p_u = 0$. Moreover, as long as $h_1 < h < h_1 + w \equiv \hat{h}_2$, the solution corresponds to a p_u satisfying $\frac{\partial S}{\partial p} = 0$ or:

$$(h - p_u w)w = m$$

implying under deterrence: $h - p_u w > 0$. Solving for p_u yields $p_u = (h - h_1)\frac{1}{w} > 0$.

In contrast, when $h > \hat{h}_2$, the optimal policy is $(p_u = 1, w)$, and incomplet deterrence occurs $(p_u w < 1)$.

Law abiding citizens. When $w < 1$, the analysis of the best policy chosen by law abiding people changes as follows (given that $f = w$ is still optimal); we have:

Proof.

$$\left(\frac{\partial u_h}{\partial p}\right)_{|p=1} = (1 + h - 2w)w - m$$

■

Thus, as long as $(1 + h - 2w)w < m \Leftrightarrow h < \frac{m}{w} + 2w - 1 \equiv h_4$, p_h is the solution to $\frac{\partial u_h}{\partial p} = 0$, or:

$$1 + h - 2p_h w = \frac{m}{w}$$

Solving for p_h yields $p_h = (1 + h - h_1)\frac{1}{2w} > 0$, which implies $h - p_h w \gtrless 0$. On the other hand, If $h > h_4$, then $\left(\frac{\partial u_h}{\partial p}\right)_{|p=1} > 0$ which implies $p_h = 1$.

Not abiding people. When $w < 1$, the analysis of the best policy chosen by people not abiding law changes as follows (given that $f = w$ is still optimal); we have:

$$\begin{aligned}\left(\frac{\partial u_c}{\partial p}\right)_{|p=0} &= hw - m \\ \left(\frac{\partial u_c}{\partial p}\right)_{|p=1} &= (h - 2w)w - m\end{aligned}$$

Thus, $h < h_1$ implies $p_c = 0$. Moreover, as long as $h_1 < h < \hat{h}_3 \equiv \frac{m}{w} + 2w$, p_c is defined as the solution to $\frac{\partial u_c}{\partial p} = 0$, or:

$$h - 2p_c w = \frac{m}{w} \tag{6}$$

Solving for p_c yields $p_c = (h - h_1)\frac{1}{2w} > 0$, such that $h - p_c w > 0$. But If $h > \hat{h}_3$, then $\left(\frac{\partial u_c}{\partial p}\right)_{|p=1} > 0$ and $p_c = 1$.

It is straightforward to verify that assuming $1 > w > \frac{3}{4}(> m)$ implies: $h_1 < h_1 + \frac{1}{2} < h_4 < \hat{h}_2 < h_1 + 1 < \hat{h}_3$.

Proof of proposition 9. First note that for $h < h_1$, there exists a proportion $p_h w = \frac{1}{2}(1 + h - h_1) < \frac{1}{2}$ of voters for (p_h, w) and a proportion $1 - p_c w = 1$ of voters for $(p_c = 0, w)$. Hence, for $h < h_1$, the equilibrium is such that both candidates announce $(p_c = 0, w)$ (i.e. proposition 5 still holds).

i) Let us consider the domain of offenses $h_1 < h < h_1 + 1$.

- On the one hand, the proportion of law abiding citizens voting for $(p_h < 1, w)$ is $p_h w = \frac{1}{2}(1 + h - h_1) > \frac{1}{2}$ (when $h < h_4$); or the proportion of law abiding citizens voting for $(p_h = 1, w)$ is $p_h w = w > \frac{1}{2}$ (when $h > h_4$).

- On the other hand, the proportion of offenders voting for $(p_c < 1, w)$ is $1 - p_c w = 1 - \frac{1}{2}(h - h_1)$ and satisfies $1 - p_c w > \frac{1}{2}$ as long as $h < h_1 + 1$.

Thus it can be verified that:

a) when $h_1 < h < h_4 (< h_1 + 1)$: the condition $p_h w = \frac{1}{2}(1 + h - h_1) < 1 - p_c w = 1 - \frac{1}{2}(h - h_1)$ still writes equivalently as $h < \frac{m}{w} + \frac{1}{2}$, and vice versa ($p_h w > 1 - p_c w \Longleftrightarrow h > \frac{m}{w} + \frac{1}{2}$). This shows that the equilibrium is such that both candidates announce: i) $(p_c < 1, w)$ if $h_1 < h < h_1 + \frac{1}{2}$; or ii) $(p_h < 1, w)$ if $h < h_1 + \frac{1}{2} < h < h_4$.

b) when $h_4 < h < h_1 + 1$: the condition $p_h w = w > 1 - p_c w = 1 - \frac{1}{2}(h - h_1)$ is equivalent to $h > h_1 + 2(1 - w)$; this is always true, given that $h > h_4 > h_1 + 2(1 - w)$ where $h_4 > h_1 + 2(1 - w) \Leftrightarrow w > \frac{3}{4}$. This implies that when $h_4 < h < h_1 + 1$, the equilibrium is such that both canidates announce $(p_h = 1, w)$.

ii) When $h > h_1 + 1$, the proportion of citizens voting for $(p_h = 1, w)$ is $w > \frac{1}{2}$. On the other hand, when $h < \hat{h}_3$ the proportion voting for $(p_c = \frac{1}{2w}(h - h_1), w)$ is $1 - p_c w < \frac{1}{2}$; while for $h > \hat{h}_3$, the proportion voting for $(p_c = 1, w)$ is $1 - w < \frac{1}{2}$. Hence, when $h > h_1 + 1$, the equilibrium is such that both candidates announce $(p_h = 1, w)$.

APPENDIX 2

In this appendix, we extend our main results to more general environments. Let us assume that b is distributed according to a general, continuous law represented by a density $g > 0$ at any b and a cumulative function G defined on $[0, 1]$. Wlog, we will assume that $\frac{1-G}{g}$ is decreasing on $[0, 1]$. Regarding the monitoring costs associated with the control of illegal activities, we will assume the following conditions hold: $\forall p \in [0, 1]$, $m' > 0$, $m'' > 0$, and $m'(1) \to \infty$.

In this case, a benevolent enforcer (Garoupa 2001), would choose $p_u = 0$ for any $h < h_1 = \frac{m'(0)}{wg(0)}$; otherwise, the optimal policy is $(p_u, f_u = w)$ where $p_u < 1$ (given that $m'(1) \to \infty$) is the solution to:

$$h - p_u w = \frac{m'(p_u)}{wg(p_u w)} \tag{7}$$

with $h - p_u w > 0$.

The analysis of the electoral game is now developed with these new assumptions.

At stage 4, any policy (p, f) will induce a screening of citizens between those who abide the law, and those who become criminals. Using the analysis of paragraph 2.1, it is straightforward that the deterrence threshold at equilibrium is $\bar{b} = pf$.

At stage 2, a citizen who anticipates to behave honestly at stage 4 votes for a policy $(f_h, p_h) = \arg\max_{(f,p)} \{u_h \ \ under\ (1)\}$. Substituting (1) in u_h leads to:

$$u_h = w - m(p) + (1 - G(pf))(pf - h)$$

The derivatives of u_h with respect to f and p are given by:

$$\begin{aligned}\frac{\partial u_h}{\partial f} &= [(1-G(pf)) - g(pf)(pf-h)]\,p \\ \frac{\partial u_h}{\partial p} &= [(1-G(pf)) - g(pf)(pf-h)]\,f - m'(p)\end{aligned}$$

and we have:

$$\left(\frac{\partial u_h}{\partial p}\right)_{|p=0} = (1+g(0)h)f - m'(0)$$

i) Thus, if $(1+g(0)h)w - m'(0) < 0 \Leftrightarrow h < \frac{m'(0)}{wg(0)} - \frac{1}{g(0)}$, then $\left(\frac{\partial u_h}{\partial p}\right)_{|p=0} < 0$ and the solution is $p_h = 0$ whatever f is. ii) On the other hand, if $h > \frac{m'(0)}{wg(0)} - \frac{1}{g(0)}$, then it is not rational to choose $f \neq w$ such that $\frac{\partial u_h}{\partial f} = 0$ since this would imply that $\frac{\partial u_h}{\partial p} = -m'(p)$. Thus, $f_h = w$ such that $\left(\frac{\partial u_h}{\partial f}\right)_{|p_h w} > 0$, and p_h is defined according to:

$$h - p_h w + \left(\frac{1-G}{g}\right)_{|p_h w} = \frac{m'(p_h)}{g(p_h w)w} \tag{8}$$

which implies $h - p_h w \gtreqless 0$. To sum up, we have :

Lemma A. The policy preferred by honest citizens (p_h, f_h) may be one of the two following solutions: i) Assume $h < h_1 - \frac{1}{g(0)}$; then the policy is $p_h = 0$, and is associated with zero deterrence. ii) Assume $h > h_1 - \frac{1}{g(0)}$; then the policy is $p_h > 0, f_h = w$, and is associated with either over or under deterrence: $p_h w \gtreqless h$.

On the other hand, a citizen who anticipates to become a criminal at stage 4 votes for a policy $(f_c, p_c) = \arg\max_{(f,p)} \{u_c \textit{ under } (1)\}$. Substituting (1) in u_c yields:

$$u_c = w + b - m(p) - pf + (1-G(pf))\,(pf-h)$$

We have now:

$$\begin{aligned}\frac{\partial u_c}{\partial f} &= [-G(pf) - g(pf)(pf-h)]\,p \\ \frac{\partial u_c}{\partial p} &= [-G(pf) - g(pf)(pf-h)]\,f - m'(p)\end{aligned}$$

and thus we obtain:

$$\left(\frac{\partial u_c}{\partial p}\right)_{|0} = g(0)(h)f - m'(0)$$

i) Thus, if $g(0)hw - m'(0) < 0 \Leftrightarrow h < \frac{m'(0)}{wg(0)}$, then $\left(\frac{\partial u_c}{\partial p}\right)_{|0} < 0$ and it must be that $p = 0$. ii) On the other hand, if $h > h_1$, then it is not rational to choose $f \neq w$ such that $\frac{\partial u_c}{\partial f} = 0$, since this would also imply that $\frac{\partial u_c}{\partial p} = -m'(p) < 0$; thus it must be that $f_c = w$ satisfying $\left(\frac{\partial u_c}{\partial f}\right)_{|p_c w} > 0$, and p_c is defined by:

$$h - p_c w - \left(\frac{G}{g}\right)_{|p_c w} = \frac{m'(p_c)}{g(p_c w)w} \tag{9}$$

such that $h - p_c w > 0$. To summarize:

Lemma B. The policy preferred by criminals (p_c, f_c) may be one of the two following solutions: i) Assume $h < h_1$; then the policy is $p_c = 0$ and is associated with zero deterrence. ii) Assume $h > h_1$; then the policy is $p_c > 0, f_c = w$, and is associated with under deterrence: $p_c w < h$.

Equilibrium. Now, we turn to the initial stage of the game. We first consider the equilibrium associated with a small external cost, i.e. $h < h_1$.

Once more, it is easy to show that the unique equilibrium is such that both candidates announce the laissez-faire policy: $p_c = 0$. To see this, note first that when $h < h_1 - \frac{1}{g(0)}$, both honest citizens and criminals prefer the laissez-faire. Hence, an equilibrium cannot exist except when both candidates announce $p = 0$. Assume now that $h_1 - \frac{1}{g(0)} < h < h_1$; we have to compare the proportion of citizens voting for (p_h, w): $G(p_h w)$, to the proportion voting for $(p_c = 0, f)$: $1 - G(p_c f) = 1$. The result is straightforward.

Consider now that the external cost is large, i.e. $h > h_1$. Let us compare the proportion of citizens voting for (p_h, w): $G(p_h w)$, to the proportion voting for (p_c, w): $1 - G(p_c w)$. Either: $G(p_h w) > 1 - G(p_c w)$ and thus both candidates maximize their chances to win the election soon as they propose (w, p_h); or: $G(p_h w) < 1 - G(p_c w)$ and thus both candidates maximize their chances to win the election when they propose (w, p_c). Note that using (8) and (9), we can write equivalently:

$$1 - G(p_h w) = \frac{m'(p_h)}{w} - (h - p_h w)\, g(p_h w) \tag{10}$$

$$G(p_c w) = -\frac{m'(p_c)}{w} + (h - p_c w)\, g(p_c w) \tag{11}$$

Define $\hat{h}$ as the value of the external harm for which $1 - G(p_h w) = G(p_c w)$ is verified. Then for any $h < \hat{h}$, $1 - G(p_h w) > G(p_c w) \Leftrightarrow 1 - G(p_c w) > G(p_h w)$ since the RHS in (10) decreases in h, and the RHS in (11) increases in h; as a result, the unique equilibrium is such that both candidates announce the policy (p_c, w). ii) In contrast if $h > \hat{h}$, then the unique equilibrium is such that both candidates announce the policy (p_h, w).

Finally, using (7), (8) and (9) which define as an interior solution respectively p_u, p_h, p_c, it can be verify that $p_c < p_u < p_h$. By second order condition, each

LHS term is decreasing in p, while each RHS is increasing in p. The result is straightforward given that $h - pw - \left(\frac{G}{g}\right)_{|pw} < h - pw < h - pw + \left(\frac{1-G}{g}\right)_{|pw}$.