Specific vs general enforcement under political competition

Éric LANGLAIS*

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Abstract

Usually, the assignment of police powers to different public enforcers are defined both in terms of scale and scope according to institutional as well as organizational restraints. One of the implications is that depending on whether a public enforcer operates at a local level (as a city mayor) or at a national level (as a government), he is generally allowed to provide defined enforcement services, either of a general type or a specific type. On the other hand, the preferences of the public enforcer may be shaped by political influences, thus impacting the design of enforcement policies. Two main distortions may thus occur: the level of fines/enforcement measures may be too low or too high, as well as they may be roughly tailored to the severity of offenses. In this paper, we analyze here these distortions according to whether public authorities may specialize (governments) or not (majors) their enforcement measures, in a context of electoral competition. We find that in a political equilibrium, enforcement policies are mainly distorted for minor (severe) offenses when public enforcers are allowed to use general (resp. specific) enforcement measures. Moreover, the severity and/or frequency of punishment may not be monotonously increasing in the offenses gravity.

Keywords : law enforcement, deterrence, electoral competition.
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*EconomiX, UMR CNRS 7235 and University of Paris Ouest-Nanterre-La Défense, 200 Avenue de la République, 92001 Nanterre cedex, France. Email : Eric.Langlais@u-paris10.fr.
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1 Introduction

In most developed countries (USA, Canada, Europe, Japan, Australia) public enforcement of law is allocated between different agencies endowed with more or less specialized powers of police, and/or operating over a specific geographical areas (rural vs urban areas, cities and so on). Very often, the tasks of municipal police services under the control of Mayors are mainly focused on general protection of, and assistance to citizens (maintaining public order, safety and security), and the application of bylaws (parking, alcohol offenses, urban planning), all tasks for which Mayors have significant powers of police administration. They also provide general supports to other police services (recording of traffic violations, reporting of crimes). In contrast, national or state polices are under the control of the Government or State, and operate mostly in large cities and all over the jurisdictional territory. They are usually in charge of three main objectives (safety of persons and protection of property; judicial police; intelligence service and information). Depending on the specific activity/task and operating area, national police services may also be very specialized (protection of officials and institutions; immigration control; criminality and gangs; terrorism and external security). From this perspective, the institutional and political framework explain the organizational structure of police services, and provide strong supports to explain the separation between on the one hand, services police which receive general tasks of public order and limited power of investigation, and on the other hand, those to which a specific task but a high degree of empowerment are assigned. What are the consequences for the design of law enforcement policies, and first, for the tradeoff between the severity and the frequency of punishments? 

It is well known in the literature (see Shavell 1991, 1992) that the design of law enforcement policies, and mostly the trade-off fine/probability is sensible to the properties of the available enforcement technology. When enforcement is general, deterrence is maintained through the design of fines, and less than maximal fine are optimal; in contrast, when enforcement is mainly specific, maximal fine must be used associated with adjusted enforcement measures to reach optimal deterrence. However, such properties of enforcement technologies have been rarely motivated by the constraints coming from the institutional or political framework. Rather, the analysis of the design of law enforcement when the enforcer is not benevolent has been performed under the standard assumption that only marginal enforcement is feasible (Friedman 1999; Garoupa and Klerman 2002, Dittmann 2004; Wickelgren 2003). But how important is it to capture the characteristics of the public enforcer (mayor, drugs service, frauds administration and so on)? And how political pressures and political competition affect the design of enforcement policies in each case?

In this paper, our goal is twofold. First, we address a general issue, which

\footnote{In France, there exists a third police force, called National Gendarmerie, endowed with functions similar to the National Police but operating in rural areas.}

\footnote{We do not address here the issue of the coordination between those different agencies. Our main concern is the consequences for the use of fines and enforcement expenditures.}
is the design of law enforcement policies under the influence of the political market. Important departures from the benevolent enforcer framework have been considered up to now (see Garoupa and Klerman 2002, Dittmann 2004 for rent seeking governments; see Bowles 2000; Bowles and Garoupa 1997; Polinsky and Shavell 2001 for corrupted officials). In Wickelgren (2004), Friedman (1999), it is assumed that for constitutional reasons, the enforcer may be bounded to use of costly punishment - here for institutional reasons, the enforcer may be bounded to use either a general enforcement or a specific technology. Nevertheless, the general influences of the political market, beginning with those of the electoral competition has not been formally investigated.\(^3\)

Second, we have a more specific focus on the kind of distortions that may result of the specificities of enforcement technologies, as reflecting the legal/institutional constraints put on the activity of the public enforcer. As discussed previously, local enforcers such as mayors/town assembly have limited power of police, and provide general enforcement services (municipal police). At the national level, highly specialized police services and public agencies (for tax fraud, drugs, terrorism) afford specific enforcement services. We analyze the distortions in law enforcement policies appearing in a political equilibrium, according to whether public authorities may specialize (governments) or not (majors) their enforcement measures. We find that enforcement policies are mainly distorted for minor (severe) offenses when public enforcers are allowed to use general (resp. specific) enforcement measures. Moreover, the severity and/or frequency of punishment may not be monotonously increasing in the offenses gravity. In contrast, the intensity of sanctions or the level of enforcement measures are only piecewise increasing in the severity of offenses. More specifically, except for very minor and major offenses at the bottom and top of the range of offenses, it may happen in the range of intermediate offenses that a large offense is punished with a lighter sanction, or deterred with lower enforcement measures, than a less severe offense. This misalignment of deterrence policies to the severity of offenses is explained by the sensibility of the majority of citizens (voters) to some changes in the environment.

The paper is organized as follows. Section 2 introduces the general framework and recall the results obtained in the standard Beckerian approach. Section 3 analyzes the case where the public enforcer is motivated by election, introducing a simple model of Downsian electoral competition; we compare situations where enforcement measures are exogenously set (general enforcement) to cases where they are endogenously determined (specific enforcement). Section 4 deals with a more general case, combining general and marginal enforcement expenditures. This reflects that legislatures have a large power of police and justice and provide general as well as specific enforcement efforts. Section 5 concludes.

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\(^3\)Except in the empirical literature on political cycles, democracy and crime and so on; see Levitt 1997, Lin 2007, Meloni 2012.
2 Model and assumptions

Our framework elaborates on the model of law enforcement à la Becker\(^4\). We consider a population of risk neutral individuals/citizens, for which being law abiding yields a (legal) benefit equal to 0. The illegal activity allows an individual benefit \( b \in [0, +\infty) \). The (external) loss/harm to the rest of the society in case of crime is \( h \), whatever the private benefit for the criminal. Public authorities do not observe the type \( b \), but only know that it is distributed according to a law represented by a density \( g > 0 \) and a cumulative function \( G \) defined on \([0, +\infty)\), with the following assumption:

**Assumption 1.** \( \frac{1-G}{g} \) is decreasing.

The monetary sanction (penalty or fine) is denoted as \( f > 0 \). We assume that the management costs (associated with the monetary penalty) are negligible. We also assume that the maximal fine is the legal wealth of the population \( w \), i.e. \( f \in [0, w] \). In contrast, monitoring the criminal 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, conviction and punishment for an illegal behavior). As usually in the literature, we assume that this cost is financed through a lump sum tax \( t \) plus the expected fine levied on the fraction of the population which is seen as criminal (either for whom the harmful activity entails the harm, or is not deterred from committing the crime), such that the public budget constraint writes as:

\[
m(p) = t + (1 - G(b)) pf \tag{1}
\]

We will consider throughout the paper different technologies of enforcement:

**Assumption 2a.** \( p = p_0 > 0 \), with \( m(p_0) = m_0 > 0 \).

**Assumption 2b.** \( \forall p \in [0, 1], m' > 0, m'' > 0 \), and \( m'(1) \to \infty \).

According to assumption 2a, the probability \( p_0 \) may be understood as general enforcement measures represented by a fixed cost \( m_0 \). In contrast, assumption 2b implies that the opportunity of marginal expenditures in deterrence .\(^5\)

### 2.1 Citizens

We assume that the cost of a crime hurts citizens through a pure externality term affecting individuals’ utility level, with a very simple formulation: \( E = qh \), where \( q \in [0, 1] \) is the rate of crime. Denoting as \( \hat{b} \) the deterrence threshold, it is

\(^4\)See the surveys by Garoupa (1997) and Polinsky and Shavell (2000).

\(^5\)This assumption is wlog, for notational convenience, it is easy to tackle with, rather than assuming that the monitoring cost writes \( m(e) \), depending on the public effort \( e \), which also affects the probability of arrestation and conviction \( p(e) \), with \( p(0) = p_0 \).
direct that \( q = \int_{b}^{+\infty} dG(b) = (1 - G(\bar{b})) \). Thus the utility level of a law abiding individual (or "honest") is:

\[
    u_h = w - t - E = w - t - (1 - G(\bar{b})) h
\]

while for a non compliant citizen (or "criminal") it is:

\[
    u_c = u_h + b - pf
\]

Obviously, the distinction between a compliant and non compliant citizen is endogenous; a citizen decides to undertake the illegal activity if the benefit he receives from doing it is higher than the expected punishment, \( u_c > u_h \), implying it must be that \( b > pf = \bar{b} \).

### 2.2 The benchmarks: benevolent enforcers

As a benchmark, we first focus on the enforcement strategy of the public authority when it is assumed to behave according to a perfectly benevolent planner. In this case, the sequence of moves between the public authority and the citizens is the usual one: after Nature moves (choosing the type of citizens, not observable for public authorities) at stage 0, the authority makes at stage 1 its announcement regarding the level of fine applied; at stage 2, citizens decide whether or not they abide the law; at stage 3, the law is enforced.

The benevolent planner uses a pure utilitarian criterion: the social welfare function is the weighted sum of \( u_h \) and \( u_c \) given the structure of the population, i.e. the weights are defined by the shares respectively of the honest and criminal populations. This results in the following social welfare function of a benevolent planner:

\[
    S = \int_{0}^{b} u_h dG(b) + \int_{b}^{+\infty} u_c dG(b) = w - t + \int_{b}^{+\infty} (b - pf - h) dG(b)
\]

and substituting with (1) yields:

\[
    S = \int_{0}^{+\infty} (b - h) dG(b) - m(p)
\]

which is the standard formulation considered in the literature. The first (integral) term of \( S \) corresponds 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 criminal when arrested is a mere transfer (the perceived probability of paying the fine, is equal to the perceived probability of collecting it). We assume that the benevolent enforcer considers two different constraints: one is the existence of a maximal fine, i.e. the personal wealth of a criminal: \( f \leq w \), which is usual in the literature.

The two next propositions recall important results of the literature.
Proposition 1 General enforcement measures. Let us denote as \( h_1 = p_0 w \). Under assumption 2a, the optimal enforcement policy \((p_0, f_u)\) may be one of the two following solutions: i) Assume \( h < h_1 \); then the optimal policy is \( f_u = h/p_0 \), and is associated with the first best deterrence level. ii) Assume \( h > h_1 \); then the optimal policy is \( f_u = w \), and is associated with under deterrence: \( p_0 w < h \).

The proof is omitted; this case with an exogenous probability is discussed in Polinsky and Shavell (2000) for instance, who show that \( f_u = \min \{ w, \frac{h}{p_0} \} \). To the extent that the cost of enforcement expenditures is sunk, perfect deterrence is reached with a punishment as light as possible. But when the external cost of wrongful acts is high enough, it becomes socially worth to use maximal fines.

Proposition 2 Specific enforcement measures. Let us denote as \( h_2 = \frac{m'(0)}{g(0)w} \). Under assumption 2b, the optimal enforcement policy \((p_u, f_u)\) may be one of the two following solutions: i) Assume \( h < h_2 \); then the optimal policy is laissez faire \((p_u = 0)\), and it is associated with zero deterrence. ii) Assume \( h > h_2 \); then the optimal policy is \( p_u > 0, f_u = w \), where the optimal probability \( p_u \) is the solution to:

\[
(h - p_u w) g(p_u w) w = m'(p_u)
\]

and is associated with under deterrence: \( p_u w < h \).

We also omit the proof, since proposition 2 reminds a well known result (Garoupa 1997; Polinsky and Shavell 2000): given the marginal cost of public enforcement, the optimal policy for the smallest offenses \((h < h_2)\) is the laissez faire. In contrast, for offenses severe enough \((h > h_2)\), the best policy consists in enforcement expenditures mixed with a maximal fine, and under deterrence occurs. In contrast to the former case, marginal enforcement expenditures (absent of a sunk cost) are socially valuable only when offenses are severe enough; otherwise, laissez faire is the optimal policy from the social standpoint.

3 Law enforcement and political competition

In this section, we introduce a simple model of electoral competition in the vein of the framework known as Downsian model (see Downs, 1957, Persson and Tabellini, 2000).

\(^{6}\)Note that any solution must also verify \( S \geq 0 \), meaning that \( m(p) \) must be small enough. Otherwise, even general enforcement expenditures may be too costly, in which case the optimal policy would be the laissez-faire. The same remark applies to proposition 2.

\(^{7}\)Obviously if \( m'(0) = 0 \) then \( h_2 = 0 \), and deterring wrongful acts is always optimal.
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.

An electoral program or platform consists in a level of enforcement measures, and a level of the monetary sanction. The objective of politician $i$ is to maximize the expected value of the rent $\alpha_i V$, which amounts to maximizing $\alpha_i$ 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$^8$; at stage 3, the elected candidate implements his policy$^9$ – it becomes a law; at stage 4, citizens choose to abide or not the law; at stage 5, law is enforced.

### 3.1 Equilibria under general enforcement

Under assumption 2a, electoral platforms $(p_0, f)$ consist in an exogenous probability and a fine. The general argument runs as follows (solving the game backward).

At stage 4, any policy $(p_0, f)$ will induce a screening of citizens between those abiding the law, and those who will not. This still results in a deterrence threshold at equilibrium equal to $\bar{b} = p_0 f$.

At stage 2, citizens vote for the policy that maximizes their expected utility, taking into account that in the future (by sequential rationality), either they will abide the law or not.

At stage 1, just notice that if an equilibrium exists, it must be a symmetrical equilibrium, i.e. both candidates announce the same programme$^{10}$. The reason is the next one. At stage 1, both candidates anticipate that, once the elections are held (i.e. considering any subgame beginning once a platform $(f, p)$ is implemented), the enforced law $(f, p)$ will split the population in two sub-groups:

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$^8$ Every citizen votes, anticipating their future behavior, i.e. whether they will behave as honest people or criminals.

$^9$ i.e., we assume that candidates commit to their own electoral platform – without specifying the reasons explaining neither why these platforms are credible announcements, nor how they become a law. These (obviously important) issues are beyond the scope of the paper.

$^{10}$ We will show that asymmetric equilibria do not exist, except for a specific value of $h$. 
citizens who abide the law, and citizens who commit a crime/offense. Secondly, a situation where the candidates announce a different platform \((f_1, p_1) \neq (f_2, p_2)\) cannot be an equilibrium, since either the distribution of voters satisfies \(n_1 > n_2\) and thus candidate 2 would change his platform, otherwise he looses the elections for sure; or on the contrary, the associated distribution satisfies \(n_1 < n_2\), and now candidate 1 has an incentive to make a different announcement. Thus, any equilibrium must be such that both candidates choose and announce the same programme, and have a 50% chances to win the elections. On the other hand, when an equilibrium exists, it consists either in the platform preferred by law abiding citizens, or the platform preferred by non compliant citizens.

In order to characterize this equilibrium, we first focus on the properties of citizens’ best decisions.

### 3.1.1 Citizens’ best decisions

Considering a citizen who anticipates to behave honestly, we define the preferred policy as: \((f_h, p_0) = \arg \max_f \{u_k \text{ under } (1)\}\). Substituting (1) in \(u_k\) leads to:

\[
u_h = w - m(p_0) + (1 - G(p_0 f))(p_0 f - h)
\]

The derivative of \(u_h\) with respect to \(f\) is:

\[
\frac{\partial u_h}{\partial f} = [(1 - G(p_0 f)) - g(p_0 f)(p_0 f - h)]p_0
\]

As a result, the enforcement policy preferred by law abiding citizens \((p_0, f_h)\) is as follows:

**Proposition 3** i) Assume \(h < h_1 = \left(\frac{1 - G}{g}\right)_{p_0 w}\); then \(f_h < w\), and is associated with over deterrence: \(p_0 f_h > h\). ii) Assume \(h_1 = \left(\frac{1 - G}{g}\right)_{p_0 w} < h\); then \(f_h = w\), and is associated with either over or under deterrence: \(p_0 w \geq h\).

**Proof.** Let us evaluate the derivative \(\frac{\partial u_h}{\partial f}\) at \(p_0 w\); we have:

\[
\left(\frac{\partial u_h}{\partial f}\right)_{p_0 w} = [(1 - G(p_0 w)) - g(p_0 w)(p_0 w - h)]p_0
\]

i) Thus, if \(1 - G(p_0 w) - g(p_0 w)(p_0 w - h) < 0 \iff h < p_0 w - \left(\frac{1 - G}{g}\right)_{p_0 w}\), then \(\left(\frac{\partial u_h}{\partial f}\right)_{p_0 w} < 0\) and it must be that \(f_h < w\) which satisfies \(\frac{\partial u_h}{\partial f} = 0\), or:

\[
1 - G(p_0 f_h) = g(p_0 f_h) (p_0 f_h - h)
\]

meaning that over deterrence exists \(p_0 f_h > h\).

\(^{11}\) Assumptions 1 and 2 are sufficient for that second order conditions hold (omitted).
ii) On the other hand, if $h > p_0 w - \left( \frac{1-G}{g} \right)_{|p_0 w}$, then $\left( \frac{\partial u_c}{\partial f} \right)_{|p_0 w} > 0$ and it must be that $f_h = w$; over as well as under deterrence may occur. 

Law abiding citizens vote for a fine defined as $f = \min \{ w, f_h \}$, implying that less than maximal fine is preferred by law abiding individuals only when the external cost of crime is low enough: $h < h_1 - \left( \frac{1-G}{g} \right)_{|p_0 w}$ (and lower than the threshold considered by a benevolent enforcer). Finally, the problem of underdeterrence is mitigated compared to the optimum, since $p_0 f_h > h = p_0 f_u$.

Now considering a citizen who anticipates to be not compliant, let us denote the preferred policy as: $(f_c, p_0) = \arg \max f \{ u_c \text{ under } (1) \}$. Substituting (1) in $u_c$ yields:

$$u_c = w - m(p_0) + (1 - G(p_0 f)) (p_0 f - h) + b - p_0 f \quad (7)$$

The derivative of $u_c$ with respect to is:

$$\frac{\partial u_c}{\partial f} = [-G(p_0 f) - g(p_0 f)(p_0 f - h)] p_0 \quad (8)$$

The enforcement policy preferred by citizens not abiding law $(p_0, f_c)$ is now as follows:

**Proposition 4** i) Assume $h < h_1 + \left( \frac{G}{g} \right)_{|p_0 w}$: then $f_c < w$, and is associated with under deterrence: $p_0 f_c < h$. ii) Assume $h_1 + \left( \frac{G}{g} \right)_{|p_0 w} < h$; then $f_c = w$, and is associated with under deterrence: $p_0 w < h$.

**Proof.** Taking the derivative $\frac{\partial u_c}{\partial f}$ at $p_0 w$, we obtain:

$$\left( \frac{\partial u_c}{\partial f} \right)_{|p_0 w} = [-G(p_0 w) - g(p_0 w)(p_0 w - h)] p_0$$

i) Thus, if $-G(p_0 w) - g(p_0 w)(p_0 w - h) < 0$ $\iff$ $h < p_0 w + \left( \frac{G}{g} \right)_{|p_0 w}$, then $\left( \frac{\partial u_c}{\partial f} \right)_{|p_0 w} < 0$ and it must be that $f_c < w$ which satisfies $\frac{\partial u_c}{\partial f} = 0$, or:

$$G(p_0 f_c) = g(p_0 f_c) (h - p_0 f_c) \quad (9)$$

meaning that under deterrence exists: $p_0 f_c < h$.

ii) On the other hand, if $h > p_0 w + \left( \frac{G}{g} \right)_{|p_0 w}$, then $\left( \frac{\partial u_c}{\partial f} \right)_{|p_0 w} > 0$ and it must be that $f_c = w$; hence under deterrence occurs since $h > p_0 w + \left( \frac{G}{g} \right)_{|p_0 w} \Rightarrow h > p_0 w$. 

Citizens not complying with law vote for a fine $f = \min \{ w, f_c \}$. Less than maximal fine is preferred by individuals not abiding law only when the external
cost of crime is low enough: \( h < h_1 + \left( \frac{\alpha}{g} \right)_{p_0 w} \) (but larger than the threshold considered by a benevolent enforcer). Moreover, the problem of underdeterrence is more serious than at the optimum, since \( p_0 f_c < h = p_0 f_u \).

Note that \( f_h \geq f_u \geq f_c \), which is straightforward, since either \( f_u = w = f_h = f_c \), or by construction: \( p_0 f_h > p_0 f_u = h > p_0 f_c \).

### 3.1.2 Equilibrium

The characteristic features of the equilibrium depend on the range of offenses we focus on, given that \( h_1 - \left( \frac{1-G}{g} \right)_{p_0 w} < h_1 + \left( \frac{\alpha}{g} \right)_{p_0 w} \). The next proposition considers the case of small offenses in the sense \( h \in (0, h_1 - \left( \frac{1-G}{g} \right)_{p_0 w}) \):

**Proposition 5** Assume that \( h < h_1 - \left( \frac{1-G}{g} \right)_{p_0 w} \). There exists a threshold \( h \) such that: i) If \( h < h_g \), the unique equilibrium is such that both candidates announce the policy \( (p_0, f_c) \), associated with underdeterrence. ii) If \( h > h_g \), the unique equilibrium is such that both candidates announce the policy \( (p_0, f_h) \), associated with overdeterrence.

**Proof.** Assume that \( h < h_1 - \left( \frac{1-G}{g} \right)_{p_0 w} \). Let us denote as \( h_g \) the level of harm for which \( G(p_0 f_h) = 1 - G(p_0 f_c) \). Given that the RHS in (6) decreases in \( h \), whereas the RHS in (9) increases in \( h \), we obtain that \( h < h_g \) implies \( G(p_0 f_c) < 1 - G(p_0 f_h) \) which is equivalent to \( G(p_0 f_h) < 1 - G(p_0 f_c) \); and \( h > h_g \) implies \( G(p_0 f_c) > 1 - G(p_0 f_h) \) which is equivalent to \( G(p_0 f_h) > 1 - G(p_0 f_c) \).

The implications are straightforward:

i) Assume that \( h < h_g \): then the equilibrium cannot be associated with \( (p_0, f_h) \). If (let say) candidate 1 proposes \( (p_0, f_h) \), then candidate 2 will have an incentive to deviate: proposing \( (p_0, f_c) \) allows candidate 2 to increase his vote share. This is because voters preferring \( (p_0, f_c) \) (also including those who switch from "abiding" to "not abiding") satisfy \( u_c(f_c) \geq u_h(f_h) \) or equivalently:

\[
(1 - G(p_0 f_c)) (p_0 f_c - h) + b - p_0 f_c \geq (1 - G(p_0 f_h)) (p_0 f_h - h)
\]

\[
b \geq p_0 f_h - e
\]

where \( e = G(p_0 f_h) (p_0 f_h - h) + G(p_0 f_c) (h - p_0 f_c) > 0 \). As a result, candidate 2’s vote share will be \( 1 - G(p_0 f_h - e) \) (which is larger than \( 1 - G(p_0 f_h) \)), whereas candidate 1’s vote share will be \( G(p_0 f_h - e) \) (which is smaller than \( G(p_0 f_h) \)).

Hence, when \( h < h_g \), the equilibrium is associated with \( (p_0, f_c) \). Proposing \( (p_0, f_h) \) does not allow a candidate to increase his vote share (when the other

\[12\]It is important to note that when \( h = h_g \), multiple equilibria occur, both symmetrical and asymmetrical. We let these equilibria aside. The same remark applies to next propositions.
candidate proposes \((p_0, f_c)\); this is because voters preferring \((p_0, f_h)\) satisfy 
\(u_h(f_h) \geq u_c(f_c) \iff b \leq p_0f_h - e\) (and now, candidate 2’s vote share will be 
\(G(p_0f_h - e)\), while candidate 1’s vote share will be \(1 - G(p_0f_h - e)\)). Moreover 
\(h < h_{g0}\) implies that \(G(p_0f_h) < 1 - G(p_0f_c)\), and given that \(p_0f_c < p_0f_h\), we obtain 
\(G(p_0f_c) < G(p_0f_h) < 1 - G(p_0f_c)\), yielding that \(1 - G(p_0f_c) > \frac{1}{2}\). Hence the result.

ii) Assume now that \(h > h_{g0}\): then the equilibrium cannot be associated with 
\((p_0, f_c)\). If (let say) candidate 1 proposes \((p_0, f_c)\), then candidate 2 will have an 
incentive to deviate. Proposing \((p_0, f_h)\) allows candidate 2 to increase his vote 
share; this is because voters preferring \((p_0, f_h)\) (also including those who switch from 
"not abiding" to "abiding") satisfy \(u_h(f_h) \geq u_c(f_c)\) or equivalently:

\[
(1 - G(p_0f_h))(p_0f_h - h) \geq (1 - G(p_0f_c))(p_0f_c - h) + b - p_0f_c
\]

\[
b \leq p_0f_c + e'
\]

where \(e' = (1 - G(p_0f_h))(p_0f_h - h) + (1 - G(p_0f_c))(h - p_0f_c) > 0\). As a result, 
candidate 2’s vote share will be \(G(p_0f_c + e)\) (larger than \(G(p_0f_c)\)), whereas 
candidate 1’s vote share will be \(1 - G(p_0f_c + e')\) (smaller than \(1 - G(p_0f_c)\)). 

Hence, when \(h > h_{g0}\), the equilibrium is associated with \((p_0, f_h)\). Proposing 
\((p_0, f_c)\) does not allow a candidate to increase his vote share (when the other 
proposes \((p_0, f_c)\)); this is because voters preferring \((p_0, f_c)\) satisfy 
\(u_c(f_c) \geq u_h(f_h) \iff b \geq p_0f_c + e\); moreover \(h > h_{g0}\) implies that \(G(p_0f_h) > 1 - G(p_0f_c)\), 
and given that \(p_0f_c < p_0f_h\), we have \(G(p_0f_h) > 1 - G(p_0f_c) > 1 - G(p_0f_c)\), yielding that \(G(p_0f_h) > \frac{1}{2}\). Hence the result. ■

The following proposition now consider intermediate levels of harm, in the sense that 
\(h \in (h_1 - \left(\frac{1 - G}{g}\right)_{p_0w}, h_1 + \left(\frac{G}{g}\right)_{p_0w})\):

\[\text{Proposition 6} \quad \text{Assume that } h_1 - \left(\frac{1 - G}{g}\right)_{p_0w} < h < h_1 + \left(\frac{G}{g}\right)_{p_0w} . \text{ There exists a threshold } h_{g1} \text{ such that: i) If } h < h_{g1}, \text{ the unique equilibrium is such that both candidates announce the policy } (p_0, f_c), \text{ associated with underdeterrence. ii) If } h > h_{g1}, \text{ the unique equilibrium is such that both candidates announce the optimal policy } (p_0, w), \text{ associated with either over or underdeterrence.} \]

\[\text{Proof.} \quad \text{Assume that } h_1 - \left(\frac{1 - G}{g}\right)_{p_0w} < h < h_1 + \left(\frac{G}{g}\right)_{p_0w} . \text{ Let us denote } h_{g1} \text{ the level of harm for which } G(p_0w) = 1 - G(p_0f_c). \text{ Since the RHS in (9) increases with } h, \text{ we obtain that } h < h_{g1} \text{ implies } G(p_0f_c) < 1 - G(p_0w) \text{ which is equivalent to } G(p_0w) < 1 - G(p_0f_c); \text{ and } h > h_{g1} \text{ implies } G(p_0f_c) > 1 - G(p_0w) \text{ which is equivalent to } G(p_0w) > 1 - G(p_0f_c). \]

i) Assume that \(h < h_{g1}\): then the equilibrium cannot be associated with 
\((p_0, w)\). If (let say) candidate 1 proposes \((p_0, w)\), then candidate 2 will have an 
incentive to deviate: proposing \((p_0, f_c)\) allows candidate 2 to increase his vote
share. This is because voters preferring \((p_0, f_c)\) (also including those who switch from "abiding" to "not abiding") satisfy \(u_c(f_c) \geq u_h(w)\) or equivalently:

\[
(1 - G(p_0, f_c)) (p_0 f_c - h) + b - p_0 f_c \geq (1 - G(p_0 w)) (p_0 w - h) \\
b \geq p_0 w - e
\]

where \(e = G(p_0 w) (p_0 w - h) + G(p_0, f_c) (h - p_0 f_c) > 0\). As a result, candidate 2's vote share will be \(1 - G(p_0 w - e)\) (which is larger than \(1 - G(p_0 w)\)), whereas candidate 1's vote share will be \(G(p_0 w - e)\) (which is smaller than \(G(p_0 w)\)).

Hence, when \(h < h_{g1}\), the equilibrium is associated with \((p_0, f_c)\). Proposing \((p_0, w)\) does not allow a candidate to increase his vote share; this is because voters preferring \((p_0, w)\) satisfy \(u_h(w) \leq u_c(f_c) \Leftrightarrow b \leq p_0 w - e\) (and now, candidate 2's vote share will be \(1 - G(p_0 w - e)\)). Moreover \(h < h_{g1}\) implies that \(G(p_0 w) < 1 - G(p_0, f_c)\), and given that \(p_0 f_c < p_0 w\), we obtain that \(G(p_0 f_c) < G(p_0 w) < 1 - G(p_0, f_c)\), yielding that \(1 - G(p_0 f_c) > \frac{1}{2}\). Hence the result.

ii) Assume now that \(h > h_{g1}\): then the equilibrium cannot be associated with \((p_0, f_c)\). If (let say) candidate 1 proposes \((p_0, f_c)\), then candidate 2 will have an incentive to deviate. Proposing \((p_0, w)\) allows candidate 2 to increase his vote share; this is because voters preferring \((p_0, w)\) (also including those who switch from "not abiding" to "abiding") satisfy \(u_h(w) \geq u_c(f_c)\) or equivalently:

\[
(1 - G(p_0 w)) (p_0 w - h) \geq (1 - G(p_0, f_c)) (p_0 f_c - h) + b - p_0 f_c \\
b \leq p_0 f_c + e'
\]

where \(e' = (1 - G(p_0 w)) (p_0 w - h) + (1 - G(p_0, f_c)) (h - p_0 f_c) > 0\). As a result, candidate 2's vote share will be \(G(p_0 f_c + e)\) (larger than \(G(p_0, f_c)\)), whereas candidate 1’s vote share will be \(1 - G(p_0 f_c + e')\) (smaller than \(1 - G(p_0, f_c)\)).

Hence, when \(h > h_{g1}\), the equilibrium is associated with \((p_0, w)\). Proposing \((p_0, f_c)\) does not allow a candidate to increase his vote share; this is because voters preferring \((p_0, f_c)\) satisfy \(u_c(f_c) \geq u_h(w) \Leftrightarrow b \leq p_0 f_c + e;\) moreover \(h > h_{g1}\) implies that \(G(p_0 w) > 1 - G(p_0, f_c)\), and given that \(p_0 f_c < p_0 w\), we have \(G(p_0 w) > 1 - G(p_0 f_c) > 1 - G(p_0 w)\), yielding that \(G(p_0 w) > \frac{1}{2}\). Hence the result. 

Finally, we now discuss the case of the most severe offenses, in the sense \(h > h_1 + \left(\frac{G}{g}\right)_{p_0 w}\):

**Proposition 7** Assume that \(h > h_1 + \left(\frac{G}{g}\right)_{p_0 w}\). The unique equilibrium is such that both candidates announce the optimal policy \((p_0, w)\), associated with underdeterrence.
Proof. When \( h > h_1 + \left( \frac{G}{g} \right) p_0 w \), the expected utility of all citizens (whether they abide or not law) is maximised for the maximal fine \( w \). Hence, any candidate announcing a fine lower than \( w \) will have no voter. The equilibrium consists in both candidates announcing the policy \((p_0, w)\). Underdeterrence holds by construction, since \( h > p_0 w \).

To sum up, two kinds of distortions may occur at the political equilibrium under general enforcement measures: the first one results of the level of sanctions, which may be irrelevant given the intensity of the offenses (fine too high or too low); the other one takes the form of a mismatch between the structure of sanctions and the hierarchy of offenses (maximal fine for a minor offense, or less than maximal for a more serious one). Figure 1 presents our findings in the case where \( h_{g1} > h_1 \), in comparison with the optimal policy \( f_u = \min \{w, h/p_0\} \):

---

**Figure 1 - General enforcement: underdeterrence of some major offenses**

In this situation, distortions exist both at the top and the bottom of the range of offenses. When enforcement measures are mainly sunk, our results illustrate that very serious offenses \( (h > h_{g1}) \) are efficiently deterred thanks to maximal fine; in contrast, inefficient policies are applied to intermediate as well as minor offenses. However, in a range close to the threshold \( h_1 \) for which the optimal policy shifts from less than maximal fine to the maximal penalty, there is underdeterrence at the political equilibrium since the fine is too low. Specifically for offenses larger than \( h_1 \) (but not too large: \( h_1 < h < h_{g1} \)), there is a misalignment of fines to offenses since the lower penalty \( f_e \) is used instead of the maximal fine that would be optimal. For the most minor offenses \( (h < h_1 - \left( \frac{1-G}{g} \right) p_0 w) \), the equilibrium policy may be associated with either a high sanction which may yield overdeterrence, or a low one which results in underdeterrence: in words, among the minor offenses, some are punished too harshly, and the least severe are punished too lightly.
Nevertheless, the case where \( h_{g1} > h_1 \) is not the unique possibility. The results in the case where \( h_{g1} < h_1 \) are illustrated in the following Figure 2, still in comparison with the optimal policy:

Figure 2 - General enforcement: overderdeterrence of some minor offenses

Now, no distortions exist at the top of the range of offenses: the most severe offenses \((h > h_1)\) from the point of view of a benevolent enforcer are also efficiently deterred in a political equilibrium since maximal fine arises; but distortions still occur for the most minor ones. The most noticeable point is specifically for offenses close to, but smaller than \( h_1 \) \((h_{g1} < h < h_1)\): whereas less than maximal fine would allow to reach efficient deterrence, the political equilibrium promotes the maximal penalty, and thus overdeterrence arises at equilibrium in this range.

By and large, with general enforcement measures, political competition yields two kinds of distortions. On the one hand, where less than maximal fine are optimal, a fine lower (aggravating the underdeterrence problem) as well as higher (improving deterrence, but with a risk of overdeterrence) than the optimal may be applied. On the other hand, there may exist a more dramatic misalignment of fines for minor offenses, in the sense that some of them may be sanctioned with a maximal fine, although it is not efficient. Finally, despite the sanction is piecewise increasing with harm, the same level of fine may be applied to different offenses (see the interval \( h_{g0} < h < h_1 \)).

3.2 Equilibria under specific enforcement\(^\text{13}\)

Under assumption 2b, electoral platforms \((p, f)\) consist in a probability and a fine; but \textit{laissez faire} \((p = 0)\) may occur at equilibrium. The argument runs as

\(^{13}\)This section generalizes with different respects Langlais and Obidzinski (2016).
follows (solving the game backward).

At stage 4, any policy \((p, f)\) will induce a screening of citizens between those abiding the law, and those who will not. This still results in a deterrence threshold at equilibrium equal to \(b = pf\).

At stage 2, citizens vote for their preferred policy, taking into account that in the future, either they will abide the law or not (by sequential rationality).

At stage 1, just notice that if an equilibrium exists, it must be a symmetrical equilibrium, i.e. both candidates announce the same programme. The reason is the next one. At stage 1, both candidates anticipate that, once the elections are held (i.e. considering any subgame beginning once a platform \((f, p)\) is implemented), the enforced law \((f, p)\) will split the population in two sub-groups: citizens who abide the law, and citizens who commit a crime/offense. Secondly, a situation where the candidates announce a different platform \((f_1, p_1) \neq (f_2, p_2)\) cannot be an equilibrium, since either the distribution of voters satisfies \(n_1 > n_2\) and thus candidate 2 would change his platform, otherwise he looses the elections for sure; or on the contrary, the associated distribution satisfies \(n_1 < n_2\), and now candidate 1 has an incentive to make a different announcement. Thus, any equilibrium must be such that both candidates choose and announce the same programme, and have a 50\% chances to win the elections. On the other hand, when an equilibrium exists, it consists either in the platform preferred by law abiding citizens, or the platform preferred by non compliant citizens.

In order to characterize this equilibrium, once more we first focus on the properties of citizens’ best decisions.

### 3.2.1 Citizens’ best decisions

Considering a citizen who anticipates to behave honestly, we define the preferred policy as: \((f_h, p_h) = \arg \max_{(f, p)} \{u_h \text{ under } (1)\}\). Substituting (1) in \(u_h\) leads to:

\[
    u_h = w - m(p) + (1 - G(pf))(pf - h) \tag{10}
\]

The derivatives of \(u_h\) with respect to \(f\) and \(p\) are:\(^{14}\)

\[
    \frac{\partial u_h}{\partial f} = [(1 - G(pf)) - g(pf)(pf - h)]p \tag{11}
\]

\[
    \frac{\partial u_h}{\partial p} = [(1 - G(pf)) - g(pf)(pf - h)]f - m'(p) \tag{12}
\]

The enforcement policy preferred by law abiding citizens \((p_h, f_h)\) may be one of the two following solutions:

---

\(^{14}\) Assumptions 1 and 2 are sufficient for that second order conditions hold (omitted).
Proposition 8  i) Assume \( h < h_2 - \frac{1}{g(0)} \); then \( p_h = 0 \), and is associated with zero deterrence.  ii) Assume \( h > h_2 - \frac{1}{g(0)} \); then \( p_h > 0 \), \( f_h = w \), and the policy is associated with either over or under deterrence: \( p_h w \gtrless h \).

Proof. Using (10), we have now at \( p = 0 \):

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

i) Thus, if \( (1 + g(0)h)w - m'(0) < 0 \iff h < \frac{m'(0)}{\arg g(0)} - \frac{1}{g(0)} \), 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 \( h > \frac{m'(0)}{\arg g(0)} - \frac{1}{g(0)} \), then it is not rational to choose \( f \neq w \) such that \( \left. \frac{\partial u_h}{\partial f} \right|_{p_h,w} = 0 \). 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:

\[
(h - p_hw)g(p_hw) + (1 - G(p_hw))w = m'(p_h)
\]

which implies \( h - p_hw \gtrless 0 \).

Law abiding citizens vote for \emph{laissez faire} when the external cost of crime is lower than the threshold considered by a benevolent enforcer \( (h < h_2 - \left( \frac{1}{g} \right)_{p_0,w}) \). Otherwise, they vote for a platform \( (p_h, w) \) where \( p_h > p_u \).

Now considering a citizen who anticipates to be not compliant, let us denote the preferred policy as: \( (f_c, p_c) = \arg\max_{(f,p)} \{ u_c \text{ under (1)} \} \). Substituting (1) in \( u_c \) yields:

\[
u_c = w - m(p) + (1 - G(pf)) (pf - h) + b - pf
\]

The derivatives of \( u_c \) with respect to \( f \) and \( p \) (still when marginal enforcement expenditures are available) are:

\[
\frac{\partial u_c}{\partial f} = [-G(pf) - g(pf)(pf - h)] p \quad (15)
\]

\[
\frac{\partial u_c}{\partial p} = [-G(pf) - g(pf)(pf - h)] f - m'(p) \quad (16)
\]

The enforcement policy preferred by not compliant citizens \( (p_c, f_c) \) may be one of the two following solutions:

Proposition 9 Assume \( h < h_2 \); i) then \( p_c = 0 \) and is associated with zero deterrence.  ii) Assume \( h > h_2 \); then \( p_c > 0 \), \( f_c = w \), and the policy is associated with under deterrence: \( p_c w \lesssim h \).
Proof. Using (13), we obtain at \( p = 0 \):

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

i) Thus, if \( g(0)hw - m'(0) < 0 \iff h < \frac{m'(0)}{w g(0)} \), then \( \left. \frac{\partial u_c}{\partial p} \right|_{p=0} < 0 \) and it must be that \( p = 0 \).

ii) On the other hand, if \( h > h_2 \), 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:

\[
(h - p_c)g(p_c)w - G(p_c)w = m'(p_c)
\]

such that \( h - p_c w > 0 \). ■

Citizens not abiding law vote the laissez faire when the external cost of crime is low enough, as a benevolent enforcer; otherwise, they vote for a platform \((p_c, w)\) where \( p_c < p_u \), such that underdeterrence would occur at equilibrium if \( p_c \) was implemented.

Note once more that \( p_h \geq p_u \geq p_c \). This is straightforward, since either \( p_u = 0 = p_h = p_c \), or according to the first order conditions: \( p_h > p_u > p_c \).

3.2.2 Equilibrium

The characteristic features of the equilibrium depend on the range of offenses we focus on, given that \( h_2 - \frac{1}{g(0)} < h_2 \). The next proposition considers the case of small offenses in the sense \( h < h_2 \):

**Proposition 10** Assume that \( h < h_2 \). Under electoral competition, the unique equilibrium is such that both candidates announce the optimal policy, which is laissez faire \((p_u = 0)\).

**Proof.** Remark that when \( h < h_2 - \frac{1}{g(0)} \), all citizens (whether they abide or not the law) maximize their expected utility at \( p = 0 \). Thus the equilibrium cannot exist except when both candidates announce \( p = 0 \): any deviation by a candidate (proposing a slight increase in \( p \)) will lead to loose all the voter for him.

On the other hand, consider that when \( h_2 - \frac{1}{g(0)} < h < h_2 \), the expected utility of law abiding citizens is maximum at \((p_h > 0, w)\) where \( p_h \) is given by (13), while for not compliant citizens the expected utility is still maximized at \( p_c = 0 \). Assume that candidate 1 (for example) proposes \((p_h > 0, w)\). If candidate 2 deviates and proposes the policy \( p_c = 0 \), then his voters are those satisfying \( u_c(0) > u_h(p_h) \), or:
\begin{align*}
  b - h - m(0) &> (1 - G(p_h w)) (p_h w - h) - m(p_h) \\
  b &> p_h w - \epsilon
\end{align*}

where \( \epsilon = G(p_h w) (p_h w - h) + m(p_h) - m(0) \). Let us show that \( \epsilon > 0 \). Note that when \((p_h > 0, w)\) is associated with over deterrence \((p_h w - h > 0)\), the result is straightforward. In contrast when \((p_h > 0, w)\) is associated with under deterrence \((p_h w - h < 0)\), by the first order condition (13) we have:

\[ m'(p) > g(pw)w(h - pw) \]

and integrating yields:

\[
\int_0^{p_h} m'(p) dp > \int_0^{p_h} g(pw)w(h - pw) dp \\
\frac{m(p_h) - m(0)}{0} > [G(pw)(h - pw)]^{p_h}_0 + w \int_0^{p_h} G(pw) dp
\]

and thus \( m(p_h) - m(0) > G(p_h w) (h - p_h w) \) implying that \( \epsilon > 0 \). As a result, candidate 2’s vote share is \( 1 - G(p_h w - \epsilon) > 1 - G(p_h w) \), while the candidate 1’s vote share is \( G(p_h w - \epsilon) < G(p_h w) \). Hence the result.

In contrast, when a candidate proposes the policy \( p_c = 0 \), the other has no incentives to deviate for \((p_h > 0, w)\), since the number of voters for the former is 1. Hence the result.

The next proposition considers the case of large offenses \( h > h_2 \):

**Proposition 11** Assume that \( h > h_2 \). Under electoral competition, there exists a threshold \( h_s \) such that: i) If \( h < h_s \), the unique equilibrium is such that both candidates announce the policy \((p_c, w)\), associated with underdeterrence. ii) If \( h > h_s \), the unique equilibrium is such that both candidates announce the policy \((p_h, w)\), associated with either over or underdeterrence.

**Proof.** When \( h > h_2 \), let us denote \( h_s \) the level of harm for which \( G(p_h w) = 1 - G(p_c w) \). Since the RHS in (13) increases with \( h \), while the RHS in (17) decreases with \( h \), we obtain that \( h < h_s \) implies \( G(p_c w) < 1 - G(p_h w) \) which is equivalent to \( G(p_h w) < 1 - G(p_c w) \); and \( h > h_s \) implies \( G(p_c w) > 1 - G(p_h w) \) which is equivalent to \( G(p_h w) > 1 - G(p_c w) \).

i) Assume that \( h < h_s \); then the equilibrium cannot be associated with \((p_h, w)\). If (let say) candidate 1 proposes \((p_h, w)\), then candidate 2 will have an incentive to deviate: proposing \((p_c, w)\) allows candidate 2 to increase his vote share. This is because voters preferring \((p_c, w)\) (also including those who switch from "abiding" to "not abiding") satisfy \( u_c(p_c) > u_h(p_h) \) or equivalently:
we have following stages:

where \( \epsilon' = G(p_h w)(p_h w - h) + G(p_c w)(h - p_c w) + m(p_h) - m(p_c) \). In order to show that \( \epsilon' > 0 \), note first that when \( p_h > 0, w \) is associated with over deterrence \( (p_h w - h > 0) \), the result is straightforward. In contrast when \( p_h > 0, w \) is associated with under deterrence \( (p_h w - h < 0) \), let us consider the following stages:

- using the same argument as for proposition 7, it is easy to see that by (13) we have \( m(p_h) - m(0) > G(p_h w)(h - p_h w) + w \int_0^{p_h} G(pw) dp \);
- moreover, using (17) we have now:

\[
g(pw)w(h - pw) > m'(p)
\]

and integrating yields:

\[
\int_0^{p_c} g(pw)w(h - pw)dp > \int_0^{p_c} m'(p)dp
\]

\[
(G(pw)(h - pw))_{p_c}^{p_h} + w \int_0^{p_c} G(pw)dp > m(p_c) - m(0)
\]

\[
G(p_c w)(h - p_c w) + w \int_0^{p_c} G(pw)dp > m(p_c) - m(0)
\]

Summing over the LHS on the one hand, and on the other hand RHS of both inequalities, we obtain:

\[
G(p_c w)(h - p_c w) + w \int_0^{p_c} G(pw)dp + m(p_h) - m(0)
\]

Rearranging, it comes that:

\[
\epsilon' > w \int_0^{p_h} G(pw)dp
\]

implying that \( \epsilon' > 0 \). As a result, candidate 2’s vote share will be \( 1 - G(p_h w - \epsilon') \) (which is larger than \( 1 - G(p_h w) \)), whereas candidate 1’s vote share will be \( G(p_h w - \epsilon') \) (which is smaller than \( G(p_h w) \)).

Hence, when \( h < h_s \), the equilibrium is associated with \( (p_c, w) \). Proposing \( (p_h, w) \) does not allow a candidate to increase his vote share (when the other candidate proposes \( (p_c, w) \)); this is because voters preferring \( (p_h, w) \) satisfy \( u_h(p_h) > u_c(p_h) \Leftrightarrow b < p_h w - \epsilon' \) (and now, the deviation gives a vote share equal to \( G(p_h w - \epsilon') \), while the other candidate obtain \( 1 - G(p_h w - \epsilon') \)). Moreover \( h < h_s \) implies that \( G(p_h w) < 1 - G(p_c w) \), and given that \( p_c w < p_h w \),
we have that \( G(p_c,w) < G(p_h,w) < 1 - G(p_c,w) \), yielding that \( 1 - G(p_c,w) > \frac{1}{2} \). Hence the result.

ii) Assume now that \( h > h_s \): then the equilibrium cannot be associated with \((p_c,w)\). If (let say) candidate 1 proposes \((p_c,w)\), then candidate 2 will have an incentive to deviate. Proposing \((p_h,w)\) allows candidate 2 to increase his vote share; this is because voters preferring \((p_h, w)\) (also including those who switch from "not abiding" to "abiding") satisfy \( u_h(p_h) > u_c(p_c) \) or equivalently:

\[
(1 - G(p_h,w)) (p_h,w - h) - m(p_h) > (1 - G(p_c,w)) (p_c,w - h) + b - p_c,w - m(p_c)
\]

\[
b < p_c,w + \epsilon''
\]

where \( \epsilon'' = (1 - G(p_h,w)) (p_h,w - h) + (1 - G(p_c,w)) (h - p_c,w) + m(p_c) - m(p_h) \).

Let us show that \( \epsilon'' \geq 0 \). Note that the first order condition (17) may be also written as:

\[
(h - p_c,w) g(p_c,w)w + (1 - G(p_c,w))w = w + m'(p_c)
\]

Hence, (13) and (18) together imply that:

\[
(h - pw) g(pw)w + (1 - G(pw))w \geq m'(p)
\]

Integrating this inequality, and then rearranging gives:

\[
\int_{p_c}^{p_h} (h - pw) g(pw)wdp + \int_{p_c}^{p_h} (1 - G(pw))wdp \geq \int_{p_c}^{p_h} m'(p)dp
\]

\[
(1 - G(p_h,w)) (p_h,w - h) + (1 - G(p_c,w)) (h - p_c,w) \geq m(p_h) - m(p_c)
\]

which is equivalent to \( \epsilon'' \geq 0 \).

As a result, candidate 2’s vote share will be \( 1 - G(p_c,w + \epsilon'') \) (smaller than \( 1 - G(p_c,w) \)), whereas candidate 1’s vote share will be \( G(p_c,w + \epsilon'') \) (larger than \( G(p_c,w) \)).

Hence, when \( h > h_s \), the equilibrium is associated with \((p_h,w)\). Proposing \((p_c,w)\) does not allow a candidate to increase his vote share; this is because voters preferring \((p_c,w)\) satisfy \( u_c(p_c) > u_h(p_h) \iff b > p_c,w + \epsilon'' \); moreover \( h > h_s \) implies that \( G(p_h,w) > 1 - G(p_c,w) \), and given that \( p_c,w < p_h,w \), we have \( G(p_h,w) > 1 - G(p_c,w) > 1 - G(p_h,w) \), yielding that \( G(p_h,w) > \frac{1}{2} \). Hence the result. ☐

Figure 3 sum up the different results, and compare to the optimal policy \( p_o \):

**Figure 3 - Specific enforcement:**

| both distortions for major offenses |
When enforcement measures mainly consist in marginal expenditures, things are in a sense more clearcut than in the former case. No distortion occurs in the range of the most minor offenses: the political equilibrium leads to the *laissez faire*, which is the optimal policy on this range of offenses \((h < h_2)\). For more severe offenses (on the appropriate range from the point of view of a benevolent planner: \(h > h_2\)), deterrence is attained thanks to maximal fine, but enforcement measures may be too low (equilibrium with weak enforcement for \(h < h_s\)) or too high (equilibrium with strong enforcement for \(h > h_s\)); but the sanction strictly increases with offense.\(^{15}\) In the case of low enforcement expenditures, the problem underdeterrence is worse than at the optimum. Our analysis symmetrically predicts that with high expenditures, a higher level of deterrence is reached which may correspond to a case with overdeterrence.

4 Enforcement under mixed technologies

In this section, we will consider the following technology of enforcement, encompassing the two former cases:

**Assumption 2c.** \(\forall p \in [p_0, 1], m' > 0, m'' \geq 0, m(p_0) = m_0 > 0\) and \(m'(1) \to \infty\).

In a sense, basic enforcement measures are sunk and allow to attain a minimal level of deterrence. But marginal expenditures are available in order to improve deterrence.\(^{15}\)

\(^{15}\)Note that this result is the opposite to Garoupa and Klerman (2004) who consider a rent seeking enforcer, and Rouillon (2010) who analyzes the case where the benevolent enforcer faces a marginal cost for public funds. Moreover, both papers find a continuous rule for enforcement expenditures.
4.1 Optimal policies for benevolent enforcers

The next proposition describes the choice of a benevolent enforcer, for which the technology introduces in assumption 2c is available.

**Proposition 12** Let us denote as \( h_1 + \frac{m'(p_0)}{w(p_0)} \). Under assumption 2c, the optimal enforcement policy \((p_u, f_u)\) may be one of the three following solutions:  

i) Assume \( h < h_1 \); then the optimal policy is \( p_u = p_0, f_u = h/p_0 \), and is associated with the first best deterrence level. ii) Assume \( h_1 < h < h_3 \); then the optimal policy is \( p_u = p_0, f_u = w \), and is associated with under deterrence. iii) Assume \( h > h_3 \); then the optimal policy is \( p_u > p_0, f_u = w \), and is associated with under deterrence: \( p_u w < h \).

**Proof.** Under both general and specific enforcement measures, the derivatives of \( S \) with respect to \( f \) and \( p \) are given by:

\[
\frac{\partial S}{\partial f} = g(pf)(h - pf)p \\
\frac{\partial S}{\partial p} = g(pf)(h - pf)f - m'(p)
\]

Let us evaluate both \( \frac{\partial S}{\partial f} \) and \( \frac{\partial S}{\partial p} \) at \( p_0 w \); we have:

\[
\left( \frac{\partial S}{\partial f} \right)_{p_0 w} = g(p_0 w)(h - p_0 w)p_0 \\
\left( \frac{\partial S}{\partial p} \right)_{p_0 w} = g(p_0 w)(h - p_0 w)w - m'(p_0)
\]

i) Thus, if \( h - p_0 w < 0 \), then \( \left( \frac{\partial S}{\partial f} \right)_{p_0 w} < 0 \) and it must be that \( f < w \); but this is not consistent with a \( p > p_0 \), since then: \( \left( \frac{\partial S}{\partial f} \right)_{p_0 w} < 0 \). Thus, if \( h - p_0 w < 0 \) the solution is \( p_u = p_0 \) and \( f_u < w \) which satisfies: \( \frac{\partial S}{\partial f} = 0 \Leftrightarrow f_u = h/p_0 \).

ii) and iii) On the other hand, if \( h - p_0 w > 0 \), then \( \left( \frac{\partial S}{\partial f} \right)_{p_0 w} > 0 \) and it must be that \( f_u = w \). Hence, a solution with marginal expenditures in deterrence \( p_u > p_0 \) requires that \( \left( \frac{\partial S}{\partial p} \right)_{p_0 w} > 0 \), or: \( g(p_0 w)(h - p_0 w)w > m'(p_0) \Leftrightarrow h > p_0 w + \frac{m'(p_0)}{w(p_0)} \). If this holds, \( p_u \) is defined by (3) such that \( h - p_u w > 0 \). Otherwise, \( h < p_0 w + \frac{m'(p_0)}{w(p_0)} \) implies \( p_u = p_0 \), such that over as well as under deterrence may occur. 

The results are depicted in figures 4 and 5 (curves in full line). Proposition 8 establishes that the optimal enforcement policy for the smallest offenses \( h < h_1 \)
requires general enforcement expenditures \((p_0)\) associated with a fine less than maximal; since general enforcement measures are sunk but marginal deterrence are too expensive, perfect deterrence is just maintained thanks to sanctions. In contrast, for the most severe offenses \((h > h_3)\), the maximal fine should be applied and supplemented with marginal enforcement expenditures \((p_u > p_0)\) given their low marginal cost compared to the severity of offenses; nevertheless under deterrence is only achievable. Finally, intermediate offenses do not worth that society bears the cost of marginal enforcement, but the best policy combines general enforcement expenditures with a maximal penalty, and under deterrence occurs.

4.2 Political equilibria

Under assumption 2c, we have three possibilities for law abiding citizens (see lemma 3 in appendix):

- for the most minor offenses \((h < h_1 - \left(\frac{1-G}{g}\right)_{p_0,w})\), they vote for a platform \((p_0, f_h)\) with a level of fine associated to the exogenous probability \(p_0\) that satisfies (6); overdeterrence would occur if this fine was applied.

- for the most severe offenses \((h > h_3 - \left(\frac{1-G}{g}\right)_{p_0,w})\), they vote for a platform \((p_h, w)\) with a level of enforcement expenditures coupled with maximal fine \(w\) that satisfies (13); thus over as well as under deterrence would occur if this fine was applied.

- finally for intermediate offenses \((h_1 - \left(\frac{1-G}{g}\right)_{p_0,w} < h < h_3 - \left(\frac{1-G}{g}\right)_{p_0,w})\), they are better off with platform \((p_0, w)\) associating general enforcement measures and a maximal fine; thus over as well as under deterrence would occur if this fine was applied, meaning also that on some subinterval, efficient deterrence could be reached.

Similarly, we also show in the appendix (see lemma 1 in appendix) that three possibilities exist for citizens who are not law abiding:

- for the most minor offenses \((h < h_1 + \left(\frac{G}{g}\right)_{p_0,w})\), they vote for platform \(a (p_0, f_h)\) with a level of fine associated to the exogenous probability \(p_0\) that satisfies (9); hence, underdeterrence would occur.

- for the most severe offenses \((h > h_3 + \left(\frac{G}{g}\right)_{p_0,w})\), they vote for platforms \((p_c, w)\) with a level of enforcement expenditures coupled with maximal fine \(w\) that satisfies (17); hence, underdeterrence would occur.

- for intermediate offenses \((h_1 + \left(\frac{G}{g}\right)_{p_0,w} < h < h_3 + \left(\frac{G}{g}\right)_{p_0,w})\), they are better off with platform \((p_0, w)\) associating general enforcement measures and a maximal fine; hence, underdeterrence would occur.

The next proposition shows how the preferences of both kinds of citizens combine at equilibrium.
Proposition 13 General and specific enforcement measures (assumption 2c).\textsuperscript{16}

When \( h < h_1 - \left( \frac{1-G}{g} \right)_{p_0w} \). Under electoral competition, there exists a threshold \( h_{gs0} \) such that: i) If \( h < h_{gs0} \), the unique equilibrium is such that both candidates announce the policy \((p_0, f_c)\), and underdeterrence occurs. The associated rate of crime is \( q = 1 - G(p_0, f_c) \). ii) If \( h > h_{gs0} \), the unique equilibrium is such that both candidates announce the policy \((p_0, f_h)\), and overdeterrence occurs.

When \( h_1 - \left( \frac{1-G}{g} \right)_{p_0w} < h < h_3 - \left( \frac{1-G}{g} \right)_{p_0w} \). Under electoral competition, there exists a threshold \( h_{gs1} \) such that: i) If \( h < h_{gs1} \), the unique equilibrium is such that both candidates announce the policy \((p_0, f_c)\), and underdeterrence occurs. ii) If \( h > h_{gs1} \), the unique equilibrium is such that both candidates announce the policy \((p_0, w)\), and overdeterrence occurs. The associated rate of crime is \( q = 1 - G(p_0, f_c) \).

When \( h_3 - \left( \frac{1-G}{g} \right)_{p_0w} < h < h_1 + \left( \frac{G}{g} \right)_{p_0w} \). Under electoral competition, there exists a threshold \( h_{gs2} \) such that: i) If \( h < h_{gs2} \), the unique equilibrium is such that both candidates announce the policy \((p_0, f_c)\), and overdeterrence occurs. ii) If \( h > h_{gs2} \), the unique equilibrium is such that both candidates announce the policy \((p_0, w)\), and underdeterrence may occur.

When \( h_1 + \left( \frac{G}{g} \right)_{p_0w} < h < h_3 + \left( \frac{G}{g} \right)_{p_0w} \). Under electoral competition, there exists a threshold \( h_{gs3} \) such that: i) If \( h < h_{gs3} \), the unique equilibrium is such that both candidates announce the policy \((p_0, w)\), and underdeterrence occurs. ii) If \( h > h_{gs3} \), the unique equilibrium is such that both candidates announce the policy \((p_h, w)\), and overdeterrence may occur.

When \( h > h_3 + \left( \frac{G}{g} \right)_{p_0w} \). Under electoral competition, there exists a threshold \( h_{gs4} \) such that: i) If \( h < h_{gs4} \), the unique equilibrium is such that both candidates announce the policy \((p_0, w)\), and underdeterrence occurs. ii) If \( h > h_{gs4} \), the unique equilibrium is such that both candidates announce the policy \((p_h, w)\), and overdeterrence may occur.

\textbf{Proof.} The proofs are similar to the formers, and are not reproduced here. \(\blacksquare\)

Graphs 4 and 5 depict our results. We obviously can note the same kinds of distortions observed previously both at the bottom (\( h < h_1 \)) and very top (\( h > h_{gs3} \)) of the distribution of offenses. Some of the minor offenses may be overdeterred with an inefficient, maximal fine (Figure 4: zone A when \( h_{gs1} < h_1 \)), or in contrast underdeterred, with an inefficient low fine (Figure

\textsuperscript{16}We assume that \( m' (p_0) < w \), implying that \( \frac{m' (p_0)}{w q (p_0w)} - \frac{1}{g (p_0w)} < 0 \), and thus the various thresholds of \( h \) verify:

\[
h_1 - \left( \frac{1-G}{g} \right)_{p_0w} < h_3 - \left( \frac{1-G}{g} \right)_{p_0w} < h_1 + \left( \frac{G}{g} \right)_{p_0w} < h_3 + \left( \frac{G}{g} \right)_{p_0w}
\]

Intuitively, it makes sense to assume that the marginal cost associated with the first euro invested in marginal enforcement is less than what citizens can pay to.
5: zone A when \( h_{sg1} > h_1 \). For the most severe offenses (\( h > h_{sg3} \)), some may be underdeterred with marginal enforcement measures lower than the optimal ones, while others are overdeterred with enforcement expenditures higher than the optimal ones. Thus our comments will be more specifically focused on subintervals of intermediate offenses, where remarkable distortions appear. First, let us consider areas such as C, D and E in the neighborhood of \( h_3 \) which is the threshold at which a benevolent enforcer which switches from general enforcement to marginal enforcement (with a maximal fine for each).

Figure 4 - General and specific enforcement: misalignment of fines or enforcement measures

Zone D (when \( h_{sg2} < h_3 \)) in Figure 4 illustrates that at the political equilibrium there may exist overdeterrence of some intermediate offenses (as viewed by a benevolent enforcer) since marginal enforcement is applied whereas general enforcement would be efficient; at the same time, zone C shows there is underdeterrence of others, since an inefficient and less than maximal fine is used. In contrast, Figure 5 shows in zone D (when \( h_{sg2} > h_3 \)) that is there exist underdeterrence of some intermediate offenses since now general enforcement coupled with less than maximal fine are used, whereas marginal enforcement and maximal fine would be optimal.

Figure 5 - General and specific enforcement: misalignment of fines and enforcement measures
Furthermore, comparing zones E and F (both in Figure 4 and 5) corresponding to some subset of major offenses, one can observe that the political equilibrium switches from a situation with high marginal enforcement measures (larger than the optimal ones, maybe with overdeterrence) to one where higher offenses are punished with lower general enforcement expenditures (with under-deterrence).

Note however that in the zone B, efficient deterrence is attained with general enforcement and maximal fine.

5 Concluding remarks

The central issue of our paper is the relationships between public law enforcers’ incentives, and political competition, when the technology of enforcement is either general or specific.

Our characterization of the possible political equilibria leads us to identify the equilibrium level of enforcement expenditures for different intervals/values of the social harm associated with offenses: this reflects that the composition of the majority of citizens is finely tuned by the combination of different parameters of our model – small variations of each change the identity of the majority of voters, and thus may have reverse effects on the characteristics of the equilibria, depending on the value of the social harm. This may lead to paradoxical results and at least mainly original, as compared to the optimal policy we have recalled just before. For the most part, the novelty appears for values of the external cost of crime which are not too extreme (thus, ignoring the smallest and highest ones).

A first result we emphasize here is that in a political equilibrium, for the intermediate values of $h$, the more severe offenses may be punished more leniently
(with a smaller fine, less than the maximal) than the less severe ones (punished with the maximal fine), depending on the composition of the majority. Second, by the same token, intermediate offenses could be strongly fought by authorities (thanks to marginal deterrence expenditures plus maximal fine) than other ones of comparable gravity (through general enforcement expenditures, associated with a fine less than maximal one).

References

Langlais E. and Obidzinski M. (2016), Law enforcement with a democratic government.


Wickelgren AL, 2003, Justifying Imprisonment: On the Optimality of exces-
Lemma 1. General and specific enforcement measures (assumption 2c).

A/ The enforcement policy preferred by law abiding citizens \((p_h, f_h)\) may be one of the three following solutions: i) Assume \(h < h_1 - \left(\frac{1-G}{g}\right)_{p_0w} \); then the policy is \(p_h = p_0, f_h < w\), and is associated with over deterrence: \(p_0f_h > h\). ii) Assume \(h_1 - \left(\frac{1-G}{g}\right)_{p_0w} < h < h_2 - \left(\frac{1-G}{g}\right)_{p_0w} \); then the policy is \(p_h = p_0, f_h = w\), and is associated with either over or under deterrence: \(p_0w \gtrless h\). iii) Assume \(h > h_2 - \left(\frac{1-G}{g}\right)_{p_0w} \); then the policy is \(p_h > p_0, f_h = w\), and is associated with either over or under deterrence: \(p_hw \gtrless h\).

B/ The enforcement policy preferred by citizens not abiding law \((p_c, f_c)\) may be one of the three following solutions: i) Assume \(h < h_1 + \left(\frac{G}{g}\right)_{p_0w} \); then the policy is \(p_c = p_0, f_c < w\), and is associated with under deterrence: \(p_0f_c < h\). ii) Assume \(h_1 + \left(\frac{G}{g}\right)_{p_0w} < h < h_2 + \left(\frac{G}{g}\right)_{p_0w} \); then the policy is \(p_c = p_0, f_c = w\), and is associated with under deterrence: \(p_0w < h\). iii) Assume \(h > h_2 + \left(\frac{G}{g}\right)_{p_0w} \); then the policy is \(p_c > p_0, f_c = w\), and is associated with under deterrence: \(p_cw < h\).

C/ The expected sanction chosen by law abiding citizens is higher than the one chosen by not compliant citizens.

Proof. A/ Let us evaluate the derivatives of \(u_h\) at \(p_0w\); we have:

\[
\left(\frac{\partial u_h}{\partial f}\right)_{p_0w} = \left(1 - G(p_0w)\right) - g(p_0w)(p_0w - h) \; p_0 \\
\left(\frac{\partial u_h}{\partial p}\right)_{p_0w} = \left(1 - G(p_0w)\right) - g(p_0w)(p_0w - h) \; w - m'(p_0)
\]

i) Thus, if \(1 - G(p_0w) - g(p_0w)(p_0w - h) < 0 \iff h < p_0w - \left(\frac{1-G}{g}\right)_{p_0w} \), then \(\left(\frac{\partial u_h}{\partial f}\right)_{p_0w} < 0\) and it must be that \(f < w\); but this is not consistent with a \(p > p_0\), since we have then: \(\left(\frac{\partial u_h}{\partial p}\right)_{p_0w} < 0\). Thus, if \(h < p_0w - \left(\frac{1-G}{g}\right)_{p_0w}\) the solution is \(p_h = p_0\) and \(f_h < w\) which satisfies \(\frac{\partial u_h}{\partial f} = 0\), or:

\[
\left(\frac{1-G}{g}\right)_{p_0f_h} = p_0f_h - h
\]

meaning that over deterrence exists \(p_0f_h > h\).
ii) and iii) On the other hand, if \( h > p_0w - \left( \frac{1-G}{g} \right)_{|p_0w} \), then \( \left( \frac{\partial u_c}{\partial f} \right)_{|p_0w} > 0 \) and it must be that \( f_h = w \). Hence, a solution with marginal expenditures in deterrence \( p_h > p_0 \) requires that \( \left( \frac{\partial u_c}{\partial p} \right)_{|p_0w} > 0 \), or: \([ (1-G(p_0w)) - g(p_0w)(p_0w - h) ] w > m'(p_0) \). If this holds, \( p_h \) is defined by:

\[
\left( \frac{1-G}{g} \right)_{|p_h,w} = (p_hw - h) + \frac{m'(p_h)}{g(p_hw)w} \tag{F}
\]

such that \( h - p_hw \geq 0 \). Otherwise, \( p_h = p_0 \).

B/ Taking the derivatives of \( u_c \) at \( p_0w \), we obtain:

\[
\left( \frac{\partial u_c}{\partial f} \right)_{|p_0w} = -G(p_0w) - g(p_0w)(p_0w - h) \right]_{p_0w},
\]

\[
\left( \frac{\partial u_c}{\partial p} \right)_{|p_0w} = [-G(p_0w) - g(p_0w)(p_0w - h)] w - m'(p_0)
\]

i) Thus, if \(-G(p_0w) - g(p_0w)(p_0w - h) < 0 \iff h < p_0w + \left( \frac{G}{g} \right)_{|p_0w} \), then \( \left( \frac{\partial u_c}{\partial f} \right)_{|p_0w} < 0 \) and it must be that \( f < w \); but this is not consistent with a \( p > p_0 \), since we have then: \( \left( \frac{\partial u_c}{\partial p} \right)_{|p_0w} < 0 \). Thus, if \( h < p_0w + \left( \frac{G}{g} \right)_{|p_0w} \), the solution is \( p_c = p_0 \) and \( f_c < w \) which satisfies \( \frac{\partial u_c}{\partial f} = 0 \), or:

\[
\left( \frac{G}{g} \right)_{|p_0,f_c} = h - p_0f_c \tag{G}
\]

meaning that under deterrence exists: \( p_0f_c < h \).

ii) and iii) On the other hand, if \( h > p_0w + \left( \frac{G}{g} \right)_{|p_0w} \), then \( \left( \frac{\partial u_c}{\partial p} \right)_{|p_0w} > 0 \) and it must be that \( f_c = w \). Hence, a solution with marginal expenditures in deterrence \( p_h > p_0 \) requires that \( \left( \frac{\partial u_c}{\partial p} \right)_{|p_0w} > 0 \), or: \([ g(p_0w)(h - p_0w) - G(p_0w) ] w > m'(p_0) \). If this holds, \( p_c \) is defined by:

\[
\left( \frac{1-G}{g} \right)_{|p_c,w} = (p_cw - h) + \frac{w + m'(p_c)}{g(p_cw)w} \tag{H}
\]

which is equivalent to \( h - p_cw = \left( \frac{G}{g} \right)_{|p_c,w} + \frac{m'(p_c)}{g(p_cw)w} \), such that \( h - p_cw > 0 \). Otherwise, \( p_c = p_0 \).

C/ Straightforward since either i) \( p_h \geq p_c \), or ii) \( f_h \geq f_c \).