Punishment should fit the crime: an assessment of the French reform of minimum mandatory penalties

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Abstract We study the effects of minimum mandatory sentences when judges are at least minimally averse to error and/or follow some "penalty should fit the crime" heuristic. We apply our analysis to the 2007 reform of the French Penal Code. We show that the introduction of minimum mandatory sentences in this context may backfire inducing more crime in the long run. Judges may prefer to acquit a criminal than convicting him to a sentence reputed too high.

Keywords Law-and-economics · Crime · Punishment · Judge behavior

JEL Classification K42

1 Introduction

This paper focuses on the effects of the introduction of minimum mandatory sentences when judges have a certain degree of discretion and are at least minimally averse to error or behave according to "penalty should fit the crime" heuristic. Our analysis focuses on the judicial reforms introduced in the French system in 2007. We show that under certain reasonable conditions the introduction of minimum mandatory sentences could backfire and crime rates may rise in the long run as judges may prefer to incur in the cost of acquitting a guilty than convicting him to a sentence reputed too high.

The French Penal Code sets some maximal sentences and judges have been traditionally free to determine the sentence according to the circumstances, the self defense context, the irresponsibility of the defendant. The underlying principle is that the penalty should fit the personal characteristics that lead an individual to offend. The general principle inspiring the penal code is the re-education of the offender instead of retribution or general deterrence. For instance, in a case of a bicycle theft, the criminal code allows 3 years of imprisonment but the judge almost never applies such a sentence, even in case of recidivism. With the new system of minimum mandatory penalties, the judge is not anymore able to do so. The new system fixes and/or increases minimum mandatory sentences and reduces the freedom of judges to fit penalties to personal circumstances of the defendant by introducing a cost for judges that want to dis-apply the minimum mandatory sentence. The French system is characterized by the division of powers that endows judges with a large degree of discretion in applying sentences. In such a system, the objective function of the judiciary does not necessarily correspond to the objective function of the government. The introduction of a minimum mandatory penalty system may lead to a conflict of power that may imply higher crime in the long run.

Despite the main objective of the paper is the analysis of the French case, in general we contribute to a large stream of literature on the optimal size of sentences started by Becker (1968). The basic hypothesis inspiring this literature is that potential criminals respond to an increase in expected sanctions by reducing their engagement in criminal activity. Becker's main result shows that the optimal deterrent is often a uniformly high penalty. Later research by Andreoni (1991) shows that if the judicial system is built on the "reasonable doubt test" that inspires many modern judicial systems, as the penalty increases, the probability of conviction falls as a consequence of the judges response. As a consequence, uniformly maximal penalties may actually encourage crime rather than deter it. In a similar vein, Rasmusen (1995) examines situations in which the penalty is not a continuous function of the level of harm. Tonry (1996) claims that prosecutors perceive mandatory sentences as unduly harsh and they avoid them by charging offenses that are similar but do not trigger application of the mandatory sentence. Recently Demougin and Pallage (2003) focus on the response of courts to the introduction of sentencing guidelines. They assume that courts and society share the same objectives in terms of deterrence but they have different use of information on the cost of sentences and in particular they assume that the cost of implementing a sentence is an externality to courts. As a result Demougin and Pallage show that courts may be inclined to be more severe than the social optimum. Hence, a mix of relatively high minimum penalties and low maximum ones is shown to help align courts with societal goals. The model developed here differs from this last because, by making specific reference to the French case, we assume that judges and government objectives do not match in the short run. In other words, when mandatory minimum sentences are introduced a potential conflict of power between the government and judges wishing to maintain their independence and discretionary power emerges.

The paper develops as follows. Section 2 introduces the legal and institutional background related to minimum mandatory sentences and reviews the literature about the empirical evidence on the effects of mandatory sentences. Section 3 introduces and develops a model fitting the French case. The last section summarizes the results and concludes.

2 Legal and institutional background

2.1 Definition

Different systems have recurred to the introduction of various kinds of mandatory sentences. Before introducing the recent French reform, we summarize the different kinds of mandatory sentences most commonly used.

- Mandatory sentences that do not allow discretion. This form of mandatory sentence is usually targeted to murder. For example, in Canada , first degree murder carries a mandatory sentence of life imprisonment with no possibility of parole until the offender has served at least 25 years in prison. Courts are neither allowed to impose shorter sentences nor a no-parole period longer than 25 years.
- Mandatory minimum sentences of imprisonment that do not allow court's discretion. Courts may impose a harsher sentence (up to the statutory maximum) but are not allowed to impose a sentence below the prescribed minimum. The US firearm mandatory minima represent an example of this form of mandatory sentence. In this case, when an offender is convicted, courts must impose a sentence of at least 4 years in custody.
- Mandatory sentences of custody allowing for court's discretion. In this case courts are allowed to impose shorter, or even non-custodial sentences in the occurrence of exceptional circumstances (the mandatory sentences for repeat serious offenders in England, Wales and South Africa are examples of this kind of mandatory sentence).

2.2 The French reform

In 2007, the French reform of criminal code introduces the following system of mandatory minimum sentences:

For delictuous acts, the following mandatory prisons sentences will be applied to repeated offenders:

* One year for delictuous acts punished by 3 years;
* Two years for delictuous acts punished by 5 years;
* Three years for delictuous acts punished by 7 years;
* Four years for delictuous acts punished by 10 years;

For criminal acts, the schedule of minimum sentences is the following:

* Five years for crimes punished of 15 years;

* Seven years for crimes punished by 20 years;
* Ten years for crimes punished by 30 years;
* Fifteen years for crimes punished by perpetuity;

Mandatory minimum sentences will apply to juvenile criminals. Until 2008, they were protected by the "excuse of minority". The reform does not modify this principle but the principle is abrogated for juvenile violent criminals older than 16 years.

The French mandatory sentences' system falls into the category allowing for some court's discretion to impose shorter sentences. The reason is that minimum mandatory sentences cannot be "automatic". The notion of automatic sentence is not compatible with the principle of the "individualization of the sanctions" included in the French Constitution. This means that the judge still has a room to define the extent of sentence. The judge has actually the possibility to fix sentences below mandatory minimum if he considers that the defendant presents "exceptional guarantees of insertion". Moreover, for delictual acts (but not for crimes), the judge could impose alternative sentences (fines, general interest work, electronic bracelet,...).

The main novelty of the reform is that the judge has to motivate the decision to reduce a sentence below the mandatory minimum. This is a "legal revolution" in the French system because the traditional philosophy was that the judge should motivate the privations of freedom and not the reverse. In practice, it means that it is difficult to impose sentences lower than the mandatory minimum.

According to French authorities this (r)evolution and harsher penalties are a necessary answer to rising crime rates. Implicitly, they seem to conform to the deterrence hypothesis according to which a higher cost of crime deters prospective criminals from committing a criminal act (Becker 1968). The Government resorts to the following reasoning circumvent criticism: judges can generally decide to suspended prison sentences. With the exception of repeated offenders committing more than three similar criminal acts, courts are not obliged to convict offenders to prison sentences (and they do not have to justify their decision to do so).

2.3 Sentencing in other countries

Mandatory sentences of imprisonment exist in many countries. During the 1990s, The use of mandatory penalties increased significantly. Since then, initiatives have been launched in a number of jurisdictions to amend the more punitive mandatory sentencing laws. The main mandatory sentences of imprisonment are applicable to adult offenders. A number of countries such as Australia have introduced mandatory sentences for juveniles but they have decided to abandon the system after a few years.

A comprehensive survey of even a number of representative countries is beyond the scope of our paper. However, it is worth making some observation. First, there is no evidence that mandatory minimum sentences have

been adopted as a response to rising crime rates. In most cases mandatory sentences of custody have been part of the sentencing framework for many years, and generally focus on exceptional crimes such as murder. Second, when minimum sentences of imprisonment exist, courts are provided with discretion to sentence below the minimum when mitigating circumstances exist. For example, Swedish criminal law allows courts to sentence below the statutory minimum and to impose less severe punishment than imprisonment when mitigating circumstances are present. It is worth noting that the current sentencing principles were introduced into the Swedish Penal Code in 1989 with the aim of increasing the predictability and consistency of penal decision-making. The law sets "penalty scales" with maximum and minimum sentences specified individually in relation to each crime. A number of aggravating and mitigating circumstances are provided. These arrangements are comparable to the "judicial discretion" clauses that can be identified in several common law countries such as South Africa.

Third, after a period in which a number of countries (in particular common law ones) enacted mandatory sentencing legislation, several jurisdictions are now either repealing or amending these punitive laws. The effects of these amendments include the following:

- elimination of mandatory minimum sentencing for certain controlled substance violations;
- creation of provisions that permit courts to consider important mitigating factors; and
- revision of the quantities of drug that trigger certain sentences.

As noted by some commentators, this movement towards a more flexible, judge-determined sentencing scheme seems to be the result of several factors with including:

- a shift in public opinion away from supporting strict mandatory minimum sentencing;
- the impact of Advocacy groups such as Families Against Mandatory Minimums Foundation (FAMM);
- growing public disenchantment with the "War on Drugs" that initially triggered many of the most punitive mandatory sentencing laws;
- media coverage of "three-strikes" cases in which offenders whose "third strike" consisted of a less serious felony and stories of offenders receiving lengthy prison terms for offences such as stealing a bicycle from a garage have undermined public support for this kind of sentencing;
- growing concern among criminal justice professionals that mandatory sentences have played an important role in keeping prison populations from declining, even in an era of falling crime rates.

Even is the US, the Supreme Court ruled that guidelines used in sentencing federal criminals are advisory, rather than mandatory.[1] Considering this

[1] See the 2005 decision in United States v. Booker.

trend, it is interesting to analyze the French reform. One can understand the importance of the reform by referring to declarations of many French judges about its consequences.[2] It is apparent that the functioning of the judicial system will depend *in fine* on judges' attitudes toward the reform.

2.4 Evidence on the effects of mandatory minimum sentences

Before introducing our theoretical model it is worth reviewing the literature on existing evidence about the effects of mandatory minimum sentences. The evidence about the effects of mandatory minimum is scarce and to the best of our knowledge existing studies resort only to US data, hence we do not have direct evidence on the effects of these policies in Europe. The relevant empirical question in this case is how prosecutors or judges respond to an introduction of a mandatory minimum statute. As Levitt and Miles (2004) point out we cannot predict a priori the sign of the prosecutors' response. If prosecutors maximize the sum of expected sentences in their case loads as assumed by Landes (1974), mandatory minimums should raise the length of the average sentence. But if prosecutor use their discretion to circumvent the statutory requirements, as we predict in our model or as it has been maintained by some legal scholars (Tonry 1996), we may not observe a raise in average sentences.

Existing empirical studies of prosecutorial behavior suggest that prosecutors exercise considerable discretion while evidence on whether prosecutors maximize expected sentence lengths is mixed.

Kessler and Piehl (1998) focus on the effect of California's Proposition 8, a law passed in 1982 that required mandatory minimum sentences for certain violent offenses. To understand the effect of the reform on average sentences, they compared trial outcomes before and after the passage of the law among three groups of defendants: those convicted for crimes subject to the mandatory minimum; those convicted for crimes factually similar but not subject to the mandatory minimum; and those convicted for crimes factually different and not subject to the mandatory minimum. The results of the study show that for some offences subject to the mandatory minimum like robberies average sentences rose by 50% following the reform. The average sentence offenses

[2]For instance, Serge Portelli, vice-president of the Court of Appeal in Paris (Nouvelle Observateur 2008): "La dangerosité du projet se trouve confirmée, té moignant d'une justice aveugle. Le monde judiciaire dans sa globalité est mal à l'aise devant cette loi: plus qu'une réticence, c'est parfois une hostilité. La loi existe, donc on l'applique, mais elle est tellement injuste que tous les acteurs judiciaires essaient de limiter son application. On se retrouve avec des peines totalement disproportionnées par rapport à la gravité des actes. Cette loi devra être abrog ée le plus rapidement possible. Même le gouvernement actuel sera obligé de revoir sa copie devant ses conséquences catastrophiques, à la fois sur la prison et sur la délinquance. L'opinion pourrait peut-être accepter une loi qui serait injuste mais efficace. Mais celle-ci est à la fois injuste et contre-productive. D'ici un an ou moins, il serait intéressant d'établir un bilan de l'évolution de la criminalité, et sans chiffres truqués. On se rendra compte que c'est une loi idéologique, qui ne permet aucune baisse de la dé linquance en général, ni de la récidive en particulier".

factually similar to those subject to mandatory minimum, for example grand larceny, rose slightly. The average sentence for factually different offenses not subject to the mandatory minimum, like drug possession, fell slightly. Kessler and Piehl interpreted their results as evidence that prosecutorial discretion is not as unfettered as often alleged and that when prosecutors exercise their discretion, they do so to increase rather than decrease sentences.

Bjerk (2005) reports evidence in favour of the wider exercise of the judicial discretion hypothesis. He studies sentencing outcomes in several states following the passage of three-strikes laws. He uses difference-in-difference estimates and finds that when a defendant was arrested on a felony charge that would trigger application of the third strike enhancement, prosecutors were roughly twice as likely to charge a misdemeanor instead. Bjerk also shows that accounting for such behavior is important, as the failure to do so can lead to overstating the effects of these laws on average sentencing by almost 30%.

3 A simple model of judge behavior

In this section, we set up a simple model of judges' behavior in the case they apply some punishment should fit the crime heuristic.

3.1 Assumptions

We consider a trial in a criminal case. The process of a criminal trial starts when an individual is arrested.[3] At a following stage, he is charged and a trial starts. After both the prosecutor and the charged criminal have presented their cases, the judge has to take a decision.

In doing so, the judge doesn't just have to decide whether the defendant is more likely to be guilty or innocent. There must be enough evidence of guilt, or in other words, like in the Andreoni (1991) case, the defendant must be guilty beyond any reasonable doubt. In the French system, this principle translates into a quasi-standard referring to the "intimate conviction".[4] What is a reasonable doubt is a related to subjective beliefs and preferences of the judge.

To capture these ideas, we impose some requirements regarding the preferences of the judge. We assume that the judge evaluates the "seriousness" of the case before him, which we will denote by h^*. This evaluation should be understood as reflecting judge's personal values (Of course, it is a important question to know whether the judge's personal evaluation conflicts or not with social values. We will not discuss this point in this paper.). For the sake of simplicity, h^* is measured as a period of imprisonment.

[3] We assume that the probability of detection of criminal acts is fixed.

[4] We prefer to use the expression quasi-standard because the French system does not refer to an explicit standard of proof.

Moreover, the judge is also able to appreciate the degree of culpability of the defendant. So, he has a personal judgment about the probability that the accused is really guilty. We denote by p this probability.

Given these evaluations, the judge has to take a decision that can be defined in the following way. First, the judge decides whether to convict or acquit. Second, in case of conviction, he has to establish the level of punishment. In the paper, we denote by h the number of incarceration years that are decided by the court. Note that, in our model, acquittal is formally equivalent to set $h = 0$.

In practice, h could be different from h^*, either because the judge decides it, or because the legal system imposes constraints about the kind and or level of sanction. In the first case, the judge could prefer to reduce the sentence h to face the risk of a wrong decision. The second case stands for the existence of mandatory sentences. We will consider a cost[5] for the judge to impose a sanction h to an individual who committed a crime implying a "just" punishment of h^*. The cost is defined as $(h - h^*)^2$.

Considering this cost, there are four possible states of the world, as depicted in Table 1.

From this and given that the judge's evaluation of the probability of the defendant's guilt is p, the expected cost of the judge is:

$C(h) = p(h - h^*)^2 + (1 - p)h^2$, when he fixes a sentence equal to h;

$A = ph^{*2}$, in case of acquittal (i.e. $h = 0$).

3.2 The decision of the judge

Here, we consider the decision of the judge in the absence of mandatory minimum sentences before considering the effects of a reform that imposes such a rule.

3.2.1 The judge is free

The decision tree presents two different stages. First, the judge determines h to minimize his conviction cost, $C(h)$. Second, he has to compare $C(h)$ and A, to decide to convict or acquit.

Following, the first order condition to minimize the conviction cost is given by:

$$C'(h) = 2\left(h - ph^*\right) = 0.$$

Therefore, the judge minimizes his conviction cost if (as $C(h)$ is convex):

$$h = ph^*.$$

[5] In a way, it means that courts are assumed to get an extra-disutility in case of legal mistake, for instance from convicting an innocent.

Table 1 Cost of sanctioning for the judge

The accused \ The judge	... convicts to h	... acquits ($h = 0$)
... is guilty	$(h - h^*)^2$	h^{*2}
... is innocent	h^2	0

As expected, the sentence is increasing in the degree of culpability and in the seriousness of the case, as evaluated by the judge.

At the second stage, as A corresponds to the special case of $C(h)$ when $h = 0$, it follows from our result above that the judge will never acquit, excepted when $p = 0$ ou $h^* = 0$. In other words, the judge always uses his discretionary power to adapt sentences to individual circumstances.

Proposition 1 *When the judge evaluates the defendant's probability of guilt equal to p, and the seriousness of the case equal to h*, he convicts him to a sentence* $h = ph^*$.

3.2.2 The judge applies a mandatory minimum sentence

Suppose now that the law introduces a mandatory minimum sentence, which we will denote by s. Then, the judge is not free any more to establish the punishment level. Precisely, he can only decide either to acquit the defendant or to convict him to a sentence $h \geq s$. As we show below, the direct effect of the mandatory sentence is an increase of the conviction cost, C. As a result, the probability to acquit is higher.

Considering the decision tree, at the stage 1, remember that the judge minimizes his cost for $h = ph^*$. However, when $ph^* < s$, the optimal punishment is not feasible and the judge must decide $h = s$.

At the stage 2, two situations are possible.

If $s \leq ph^*$, the results are the same as before. Hence, the judge convicts the defendant to $h = ph^*$.

On the contrary, if $s > ph^*$, the judge has to compare the cost of conviction with the cost of acquittal. The cost of conviction is (with $h = s$)

$$\begin{aligned} C(s) &= p(s - h^*)^2 + (1 - p)s^2 \\ &= s\left(s - 2ph^*\right) + ph^{*2} \end{aligned}$$

Comparing with the cost of acquittal $A = ph^{*2}$, we observe that the acquittal cost is less than the conviction cost if, and only if:

$$ph^* < s/2.$$

Hence, the judge prefers to acquit when $ph^* < s/2$ and to convict to $h = s$ when $ph^* \geq s/2$.

The proposition below summarizes our results.

Proposition 2 *In the presence of a mandatory minimum sentence s, the judge: a) acquits all individuals such that* $ph^* < s/2$*, to avoid them the mandatory punishment; b) convicts all individuals such that* $s/2 \leq ph^* < s$*, and the punishment is the mandatory minimum sentence, i.e. higher than the punishment he should had decided himself (i.e.* $h = ph^*$*); c) convicts all individuals such that* $s < ph^*$*, and the punishment is* $h = ph^*$.

The introduction of a mandatory minimum sentence may have different consequences. On the one hand, criminal cases for which the judge has conflicting evidences (i.e. p is small) and/or which he sees as not too serious (i.e. h^* is small) cease to be punished. On the other hand, criminal cases for which the judge has more convincing proofs (i.e. p is intermediate) and which he judges sees as more serious (i.e. h^* is intermediate) are more severely punished.

3.2.3 The judge must justify not to apply the mandatory sentence

According to the French reform, the judge is not obliged to apply the mandatory sentence, but instead, he must justify formally the reasons why he chooses a sentence below the mandatory sentence.

According to the French government, this means that the reform cannot be "bad" since, if he decides not to apply the mandatory sentence, the judge can recover his freedom in judicial decision making. We explain below why this may not be correct.

To model the French case, we suppose that the judge incurs an additional cost to provide a formal report in the case he fixes a sentence below the mandatory minimum. Let K denote this cost. This cost presents two components. On the one hand, the production of a report means more effort from the judge himself. Moreover, it can be the case that the evaluation of the judge is partly based on subjective impressions, which, by definition, would be difficult to justify. In this case, a report either will not be possible, or it will need deeper investigations and expertise. On the other hand, if we assume that the judge operates under a binding time constraint, if he has to provide a report, he will have less time to devote to other cases. This could lead, *in fine*, to more judgment errors elsewhere. Under this interpretation, the cost would be the opportunity cost of judge's time.

Now, assuming that the judge decides to avoid the mandatory sentence and to write a formal report to explain his decision, he recovers the ability to decide the sentence. Hence, he will decide $h = ph^*$ and his cost will be :

$$C\left(ph^*\right) + K = p\left(1 - p\right)h^{*2} + K$$

Of course, this case needs only to be compared to the cases where the mandatory sentence is binding, that is, when $ph^* < s$ (Otherwise, the judge can decide $h = ph^*$ without expending K).

Let us first compare $C(ph^*) + K$ with A, which corresponds to the situation where the judge acquits. In this case:

$$C\left(ph^*\right) + K - A = p(1-p)\left(h^*\right)^2 + K - ph^{*2}$$
$$= K - \left(ph^*\right)^2$$

Hence, the judge prefers the acquittal if $C(ph^*) + K - A > 0$, i.e., if the seriousness of the case and the conviction of the judge are not too high:

$$ph^* < k$$

where we denote $k = \sqrt{K}$.

Let us now compare $C(ph^*) + K$ with $C(s)$, which corresponds to the situation where the judge convicts and the punishment is the mandatory one. We get:

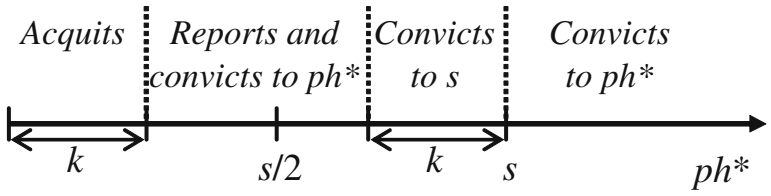
$$C(s) - C\left(ph^*\right) - K = s\left(s - 2ph^*\right) + ph^{*2} - p(1-p)h^{*2} - K$$
$$= \left(s - ph^*\right)^2 - K$$

From this, the judge prefers to justify his choice of $h = ph^* < s$ in a formal report if $C(s) - C(ph^*) - K > 0$, i.e., if the optimal sentence and the mandatory sentence is not too large

$$ph^* < s - k$$

Proposition 3 *If the law allows the judge to justify his choice to dis-apply the mandatory minimum sentence, the judge: a) acquits all individuals such that $ph^* < k$; b) convicts all individuals such that $k \leq ph^* < s - k$, and justifies his choice of $h = ph^*$ in a report; c) convicts all individuals such that $s - k \leq ph^* < s$, and the punishment is the mandatory minimum sentence; d) convicts all individuals such that $s < ph^*$, and the punishment is $h = ph^*$.*

The following figure summarizes the different cases.



4 Normative discussion on mandatory minimum sentences

We investigate here the normative properties of the use of mandatory sentences, by using the standard model of law enforcement.

Define:

b = gain of a criminal;
d = social cost of a criminal act;
q = probability of detection;
e_1 = the probability that an individual who should be liable is mistakenly found not liable (a Type I error);
e_2 = the probability that an individual who should not be liable is mistakenly found liable (a Type II error).

The accused \ The judge	... has evidence	... has no evidence
... is guilty	$1 - e_1$	e_1
... is innocent	e_2	$1 - e_2$

Below, we assume that $1 - e_1 > e_2$, so that the probability that a guilty person will be found liable exceeds the probability that an innocent person will be found liable.

If an individual is arrested and is charged, we assume that the judge observes all information (i.e., b, d, q, e_1 and e_2). Therefore, using the Bayes' theorem, he can evaluate that the accused individual is guilty with a probability:

$$p = \phi(1 - e_1)/(\phi(1 - e_1) + (1 - \phi)e_2),$$

where ϕ is meant to reflect the judge's prior probability that the accused is guilty.[6]

Moreover, he can use all available information to estimate the degree of seriousness of the case. Without a loss of generality:

$$h^* = f(b, d, q, e_1, e_2, \theta),$$

where the parameter θ reflects the subjectivity of the judge.

The determination of the function $f(.)$ is an empirical matter and is beyond the scope of the present paper. However, borrowing from the literature (i.e. Polinsky and Shavell 1994), we can propose the following specifications:

$h^* = d$: the judge seeks compensatory punishment;

[6]The literature is generally silent about how the judge forms his prior. In France, as in many countries, the law stipulates that the accused person should benefit a presumption of innocence. This implies that the parameter ϕ should be small. On the other hand, the judges certainly pay attention to information and statistics about criminals' behaviors and/or police efficiency in detecting and arresting people. Consider the following example given by Polinsky and Shavell (2000) : "Suppose police randomly monitor drivers by stopping them and administering a blood alcohol test. The test might understate the amount of alcohol in the driver's blood and result in a Type I error, or might overstate the amount and lead to a Type II error." Assume further that the judge knows from statistical data that x % of the population regularly drive drunk. Then, the judge can evaluate that ϕ = x %, since people are randomly monitored. However, if the person is arrested after speeding and/or after having caused an accident, assuming a correlation between alcohol and these facts, this could induce a higher prior $\phi >$ x %.

$h^* = b$: the judge seeks reimbursement of illegal gains;
$h^* = d/(q(1-e_1-e_2))$: the judge seeks optimal deterrence through punitive damages, in order to compensate the low probability of detection by an higher punishment ("exemplarité", in french).

Below, we will denote $q' = q(1-e_1-e_2)$, in order to simplify our notations.

For the sake of simplicity, we assume that, in a world where judicial errors never occur, both the legislator and the judge share the same background objective. In accordance with the normative literature in law and economics, we will assume further that they both wish to deter harmful activities. Then, the judge's evaluation of a case (b, d, q, e_1, e_2) will be $h^* = d/q'$. However, as we argued above, the judge is also concerned with the problem of judicial errors (cf. Proposition 1). Therefore, he will set the (optimal) punishment $h = h^*$, only if $p = 1$. In all other cases, due to his aversion with respect to judicial errors, the judge will decide a punishment $h = ph^* < h^*$. Hence, assuming that the legislator disregards judicial errors (This assumption is made for simplicity. It would be sufficient to assume that the legislator is less concerned with judicial errors than the judge), their objectives diverge finally.

From this, we admit the following assumption below.

Condition 4 *When no judicial errors occurs (i.e.* $p = 1$*, or, equivalently,* $e_2 = 0$*), the legislator and the judge share the same objective, which is the deterrence of harmful activities; therefore,* $h^* = d/q'$*. The judge dislikes judicial errors, as formalized in Propositions 1 and 2. However, the legislator disregards judicial errors.*

If the judge issues a sentence $h = ph^*$, individuals will be deterred if:

$$b - q(1-e_1)h \leq -qe_2h$$
$$\Leftrightarrow b \leq pd$$

As optimal deterrence is obtained when all harmful acts such that $b \leq d$, the judge's aversion toward judicial risks induces underdeterrence whenever $p < 1$.

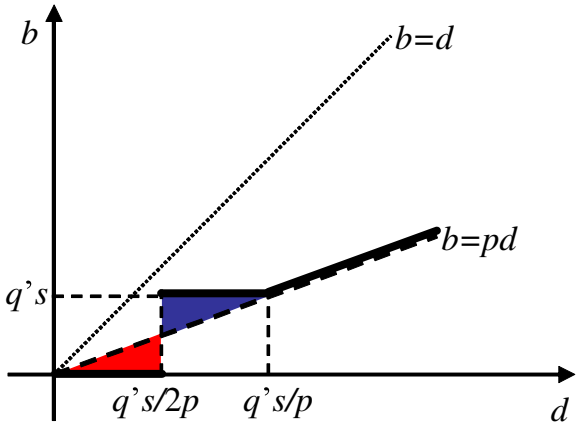
Now, consider the introduction of a given minimum mandatory sentence s. From Proposition 2, the judge applies the following decisions:

a) He acquits all cases such that $ph^* < s/2$. Thus (remembering that $h^* = d/q'$), all individuals such that $d < q's/2p$ will never be convicted. As a result, they will always engage in the harmful activity.
b) He convicts to $h = s$ all cases such that $s/2 \leq ph^* < s$. Hence, all individuals such that $q's/2p \leq d < q's/p$ will be punished $h = s$ if they are accused. An individual in this interval will be deterred if:

$$b - q(1-e_1)h \leq -qe_2h$$
$$\Leftrightarrow b \leq q's$$

c) He convicts to $h = ph^*$ all cases such that $s \leq ph^*$. This corresponds to individuals such that $q's/p \leq d$. We know from above that these individuals will be deterred if $b \leq pd$.

Our results are illustrated in the following figure.



We obtain optimal deterrence when all individuals below the line $b = d$ are deterred.

When no minimum mandatory sentence applies, the judge's aversion toward judicial errors implies that only individuals below the line $b = pd$ are deterred. So, assuming that $p < 1$ (i.e. judicial errors occurs), some underdeterrence results.

When the law introduces a minimum mandatory sentence s, the judge's decision induces deterrence of all individuals below the thick line of the figure. Hence, compared with the situation where no mandatory sentence is implemented, there is less deterrence when $d < q's/2p$ (as the judge acquits these individuals), more deterrence when $q's/2p \leq d < q's/p$ (as the judge convicts these individuals to s, which is larger than his decision), and unchanged deterrence when $q's/p \leq d$ (as the mandatory sentence is not binding for those individuals). The gain from the introduction of a minimum mandatory sentence will depend on the relative mass of individuals in the area in red (which corresponds to a loss of social welfare), with respect to the mass of individuals in the area in blue (which corresponds to a gain of social welfare).

We can also show that if p is close to 1, the use of a minimum mandatory sentence can only produce a social cost. Indeed, in such a case, most part of the area in blue of the figure is above the line $b = d$. Therefore, this results mainly to overdeterrence of those individuals.

5 Discussion and conclusion

We analyze the judicial reforms introduced in the French system in 2007. We show that higher penalties could backfire and lead to higher crime rates if

judges try to keep their judicial discretion when the government imposes minimum mandatory penalties. The consequence is that a consistent government should impose to judges to be more restrictive, but this is obviously an abuse of power that would violate the principle of separation of powers. Our model focuses on the effects of the introduction of minimum mandatory sentences when judges maintain a certain degree of discretion and have some "penalty should fit the crime" heuristic. Our main conclusion is that under certain reasonable conditions the introduction of minimum mandatory sentences could backfire favoring a rise in crime rates in the long run. The underlying intuition is that the judge could prefer to incur in the cost of acquitting a guilty than convicting him to a sentence reputed to be too high. The paper also shows that the possibility introduced by the French reform for the judge to escape the enforcement of the mandatory sentence by justifying his decision is not necessarily efficient. Moreover, the incentives to elucidate a case in a minimum mandatory sentences context are dependent on the value of the information received by the judge.

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