Increasing penalties for repeat offenders and “enhanced human capital” sanctions: an economic explanation

Abstract

A dynamic model of time allocation between labor and criminal activity is developed, assuming that these activities are substitutable. Our attention specially focuses on the long-term influence of sanctions due to changes in perspective on legal market. Two extensions are discussed to remove the undetermined impact of an increase in repression: heavier penalty for repeat offenders and “enhanced human capital” sanctions.

Keywords: Crime, Time allocation, Sanction.

JEL: J22, K14, K42.

1. Introduction

The idea that offenders respond to the costs and benefits of crime dates to the eighteenth century, following Beccaria and Bentham. Becker (1968) provided the first modern and mathematical treatment of the subject, giving a new impetus to the school of thoughts initiated in the 18th century. The main levers of criminal law are the probability of being caught and the severity of the sanction. It is widely accepted that the probability has an influence on crime level (Garoupa, 1999; Polinsky and Shavell, 2000). In this context, an increase in police forces has a negative influence on crime level (Marvell and Moody, 1996; Levitt, 1997). The impact of the severity of the sanction appears to be more undetermined1.

In case of imprisonment – the basecase of our paper - an increase in the severity of sanctions produces a decrease in crime level in the short term. Most works have studied the effect of incarceration rates on aggregate crime rates (Levitt, 1996; Levitt 2004). When we register a drop in crime rates following an increase in criminal sanctions, two explanations compete: incapacitation

Pyne (2012) proposes an interesting explanation for this difference, as the result of criminals having imperfect information on their criminal ability. We do not address this latter subject in the instant paper.
and deterrent effects. This paper focuses on the deterrent effect. For this latter effect, several studies have produced mixed empirical evidence (Kessler and Levitt, 1999; Levitt, 1998; Lee and McCrary, 2005; Helland and Tabarrok, 2007; Drago et al., 2009). This instant article is related to the economic literature explaining the limits of the deterrent effect of punishment severity (Ehrlich, 1973 for risk preferring; Block and Heineke, 1975 for “psychic costs”; Stigler, 1970 for marginal deterrence; Nussim and Tabbach, 2009 for avoidance activities).

Our work is placed within two important discussions. The first one is the long-term influence of penalty severity, as economists have produced little theoretical evidence on the effectiveness of incarceration in reducing crime. More precisely, we take into account changes in perspectives on legal market for past convicted. If the severity of the sanction often seems to prevent crime, we show that both stigma and human capital depletion may change such a result. Secondly, we propose clear economic explanations for two kind of policies: enhanced penalties for repeat offenders, on the one hand; “enhanced human capital” sanctions, ie sanctions allowing to avoid human capital depletion, on the other hand.

The first input of this paper is an analysis of the influence of penalty severity. The increase in severity of sanction creates a drop in long-term employability due to obsolescence of human capital or social stigma (Rasmussen, 1996). The fact that individuals may face lower wages than if they had not been convicted has been widely recognized. Several empirical studies have analyzed such effects. If Waldfogel (1994) find substantial and persistent decline in earnings (around 10%), Grogger (1995) and Kling (1999), on the other hand, find smaller declines. In our model, we introduce stigma and human capital depletion in the dynamic process of time allocation between legal and illegal activities.

In such a context, there is an adverse change in the arbitrage process between legal and illegal activities. Thus, if we analyze several periods, the impact of the severity of the sanction on crime levels appears to be complex and little theoretical evidence has been produced on the link between the dynamics of choice and the long-term influence of sanctions. More precisely, one can wonder whether stigma and human capital obsolescence can be considered as part of an efficient policy (Rasmusen, 1996; Furuya, 2002; Funk, 2004). Indeed, the formal punishment that a convicted criminal is confronted with, is only a part of the whole penalty. Stigma and human capital depletion are also part of the sanction. This wage-cut on labor market creates a negative-incentive effects on crime before the occurrence of any conviction. At the same time, changes in legal perspectives for past convicted individuals can reinforce criminal paths and total effect when severity increases is undetermined and depends on the value of the parameters.
The second input of this paper is to propose clear explanations for enhanced penalties for repeat offenders as well as enhanced human capital sanctions - development of alternative sanctions to imprisonment, education and paid employment in prison... Indeed, if the first practice is common and rooted in our civil and criminal codes - "three-strikes-and-you're out" in California, act on minimum sentences in France, it has long been difficult for economists to justify such a distinction and existing economic literature generally offers mixed results regarding punishment of repeat offenders. The few existing works have not explicitly analyzed the role of changes of perspectives on legal market to justify escalating penalties (Polinsky and Rubinfeld, 1991; Burnovsky and Safra, 1994; Polinsky and Shavell, 1998; Chu et al., 2000; Emons, 2003; Emons, 2007; Miceli and Bucci, 2005; Funk, 2004). Emons (2007) proposes explanations based on the fact that individual’s choice is always history dependent (always or never committing crime). Such assumptions are not included in Emons (2003), so that stronger penalties for repeat offenders are not economically justified. Chu et al. (2000) derive a partial result, by comparing increasing penalty schemes and uniform ones, in case of conviction errors, based on the idea that the probability of erroneously convicting repeat offenders is lower than that of convicting first-time offenders. Polinsky and Shavell (1998) as well as Burnovsky and Safra (1994) do not produce necessarily the empirically verified practice of punishing repeat offenders more severely. Polinsky and Rubinfeld (1991) is based on numerous conditions for justifying increasing penalty scheme in case of fines (whereas we address the case of imprisonment).

Miceli and Bucci (2005) offer explanation for rising penalties based on the existence of stigma on legal market suffered by convicted criminals. They prove that increasing penalties are part of an optimal enforcement policy. But their model supposes to include irrational people who commit crime regardless of the severity of punishments and apply to a restrictive set of circumstances – crimes that should definitively be deterred. Finally, Funk (2004) also models the impact of stigma on the decision to commit crime or to seek legal employment. But, she focuses on the role of stigma as part of an efficient policy and proposes an explanation for increasing penalties as a solution to guarantee stigma effectiveness. Our work differs from the two precedent papers in three respects.

First, as stated above, if the instant paper also deals with diminished employment opportunities, our purpose is not to address stigma specifically, but to understand the long-term influence of sanctions by taking into account the fact that the severity of sanction and changes on legal market are interrelated. Secondly, changes in legal market perspectives are supposed to be due to stigma but also to human capital obsolescence. This later cause is at the heart of the relation between the length of the sanction and changes in legal
market perspectives. Thirdly, if we identify and formalize a source which can produce enhanced penalties for repeat offenders, as in the two precedent papers, we also propose enhanced human capital sanctions as solutions to manage the ambiguity of penalty severity.

2. The model

We develop a model of time allocation in which two periods are distinguished: youth, when the individual usually starts working; more mature age when the agent can have already been the subject of consistent indictment sentences. A two-periods model is used for simplicity. A more realistic framework would use an overlapping generations framework. We focus on risk neutral individuals seeking to maximize total earnings on two independent markets of employment: one for legal activities and one for illegal activities. We consider as Ehrlich (1973) that legal and illegal activities are substitutable and not complementary. Obviously this assumption is a simplification of reality since illegal earnings may appear outside as inside of a given legal working framework. The problem facing a potential criminal is how to allocate a fixed amount of working time (normalized to 1) to these different sources of income. Returns in either market are assumed to be linearly dependent on working time as well as wages, but the risks of illegal activity is increasing with time devoted to this market. We suppose that the wage of a representative individual is lower if this agent has already been convicted. Finally, the actualization rate – and its differences among individuals – is not addressed.

2.1. A decision model for the potential offender

Let’s see the arbitration process of a given agent between legal and illegal markets during the two periods. \( t_1 \) and \( t_2 \) correspond to the time allocated to illegal activity during the two distinct periods. For simplicity the duration of each period is standardized to one. These times can be zero or one for each individual, with corner solutions in order to have no negative values.

First Period

During the first period the agent has not been convicted. The legal activity has constant returns. Illegal activity is remunerated and risky. The expected monetary value earned in first period can be written as follows for a risk neutral individual:

\[
\text{\text{expected monetary value}} = (1 - \text{probability of conviction}) \times \text{legal activity} + \text{probability of conviction} \times \text{illegal activity}.
\]

For dynamic model with actualization rates and optimal deterrence over several periods, see Davis (1988).
\[ V(t_1) = s_0 (1 - t_1) + It_1 - \pi ft_1^2 \]

\( I \) denotes the productivity of criminal activity, i.e., the income derived per unit of time dedicated to illegal activity (possibly including psychological costs). \( \pi \) represents the probability of being caught per unit of time dedicated to illegal activities (we assume linear relation between time devoted to illegal activity and the probability of being caught). It is consistent to assume that the probability of being caught increases with the involvement in crime. One could assume that their chances of getting caught could decrease marginally with \( t \) if offenders become better at crime as they spend more time at it, or increase marginally due to information accumulation by authorities. Here, we assume linearity. Finally, \( f \) is the intensity of the penalty imposed on a criminal per unit of time dedicated to crime (we assume linear relation between time devoted to illegal activity and the intensity of the sanction). It is also consistent to assume that punishment will be heavier that involvement in illegal activities is important (even if all the crimes are not known by the court). The quadratic form allows inner solutions, consistent with Ehrlich’s (1973) empirical observation that offenders often devote time to both activities. In fact, the two linearities are not crucial for the results if probability depends on time spent on illegal activities. For example, a decreasing marginal probability due to acquired criminal skills, with a constant penalty allows to obtain the main effects. Finally, \( s_0 \) is the wage earned by unit of time dedicated to legal activity. Here again, the linear relation between time devoted to legal activity and total earnings appears to be consistent.

Second period

The first period has an impact on the second one through the following mechanism: someone who has been sentenced to a criminal punishment (typically a prison sentence) has a lower wage on legal market. He can be perceived as less productive – or more dangerous (stigma effect); the real ability is able to have decreased over time behind bars (human capital depletion effect). Formally, the wage by unit of time on legal market can be written:

- \( s_0 \), if the individual has not been convicted
- \( s(f) \), if the individual has already been sentenced. \( s(f) \) is considered as a decreasing function. Indeed, we suppose that changes in legal perspectives are due both to stigma and human capital obsolescence associated with time behind bars. If stigma can be a binary process (an employer stigmatizes someone if and only if he has been convicted), human capital depreciation depends crucially on the length of the sanction, i.e., on \( f \).
For $t_2$ dedicated to illegal activity, the expected monetary value earned by a risk neutral individual can be written as follows$^3$.

If the individual has not been convicted:

$$V_n(t_2) = s_0(1 - t_2) + I t_2 - \pi_2 t_2^2$$

If the individual has already been sentenced:

$$V_c(t_2) = s f(1 - t_2) + I t_2 - \pi_2 t_2^2$$

2.2. Resolution of the program

In case of a rational and risk neutral agent maximizing the expected monetary value over the two periods, the optimization program consists to choose the durations $t_1$ and $t_2$.

Second period

If the agent has not been sentenced during the first period, the first order condition gives us a unique interior solution $^4$:

$$t_{2n}^* = \frac{I - s_0}{2\pi f}$$

In case of interior solution, we can write the expected monetary value earned after maximizing revenue:

$$V(t_{2n}^*) = \frac{(I - s_0)^2}{4\pi f} + s_0$$

$^3$ Marginal probability of conviction in the second period is supposed to be the same for all individuals. We do not account for the possibility that previously convicted criminals might be caught with a higher probability due to supervision, neither for the possibility of an increase in criminal ability and a lower probability to be caught. More generally, avoidance abilities and detection probabilities are not supposed to be heterogeneous among individuals so that the sanction does not take such parameters into account as in Bebchuk and Kaplow (1993) or Friehe (2008).

$^4$ The corner solutions are $t_{2n}^* = 0$ or $t_{2n}^* = 1$. These two cases correspond to limit cases in which the agent dedicates time exclusively to legal or illegal markets.
If the individual has been sentenced, we have also a unique interior solution (the same corner solutions apply):

\[ t_{2c}^* = \frac{I - s(f)}{2\pi f} > t_{2n}^* \]

Then, we can write the expected monetary value earned after maximizing revenue:

\[ V(t_{2c}^*) = \frac{(I - s(f))^2}{4\pi f} + s(f) \]

As earnings on legal market is inferior in case of past conviction, we have necessarily:

\[ V(t_{2c}^*) \leq V(t_{2n}^*) \]

Comparing the two situations, it is obvious that conviction changes behaviors, with more time dedicated to illegal activities. This is consistent, since the expected gain on legal market is weaker for convicted individuals, making illegal market more attractive. The more the decrease of earnings on legal market, the more the difference between expected value in the convicted and not convicted cases. We analyze later the key influence played by the severity of the penalty on crime levels.

**First period**

In the first period, the agent maximizes the expected monetary value earned over the two periods:

\[ V = V(t_1) + (1 - \pi t_1) V(t_{2c}^*) + \pi t_1 V(t_{2n}^*) \]

Thus, we have a unique interior solution (the same corner solutions apply):

\[ t_1^* = \frac{I - s_0 + \pi (V(t_{2c}^*) - V(t_{2n}^*))}{2\pi f} \leq t_{2n}^* \]

**3. Results and discussion**
If the two periods are of equal importance, total time allocated to crime by a representative agent is proportional to \( T^* \), which can be written as follows:

\[
T^* = t_1^* + \pi t_2^* + \left(1 - \pi t_1^*\right) t_{2n}^*
\]

It is necessary to examine how this value depends on the different parameters. Broadly speaking, the agent allocates time to crime up to the point where marginal gain of crime equals marginal loss. The later is both due to the expected sanction and opportunity loss on legal market. In this context, the influence of several parameters is not ambiguous. Obviously, the productivity \( I \) of criminal activity, has a positive impact on crime levels. On the other side, the influence of the basic legal wage \( s_0 \) is clearly negative, both for total time dedicated to crime and for each period, which is consistent with the idea that opportunity cost increases with the basic legal wage. Last but not least, marginal loss due to crime increases with the probability of being apprehended and convicted by unit of time devoted to crime. The impact of the severity of punishment is more complex.

3.1. The undetermined impact of an increase in sanctions

Two effects can be distinguished. The first one is classic and due to dissuasion. The second one is due to a change in perspective on the legal market for someone who has already been convicted – we have \( s(f) \) as a decreasing function. To understand the combination of these two effects, we must analyze how it impacts each period.

The simplest impact is for someone who has not been convicted. Indeed, there is a pure dissuasion effect and, unambiguously:

\[
\frac{\partial t_{2n}^*}{\partial f} < 0
\]

During the first period, we observe that the time devoted to crime is inferior to the second period one, whatever the conviction profile of the agent. Indeed, the perspective of future changes on the legal market of convicted is anticipated and increases the dissuasion effect. The more the difference between \( V(t_{2c}^*) \) and \( V(t_{2n}^*) \), the more this second dissuasion effect. It is possible to calculate it as follows:
\[ \frac{\partial t_1^*}{\partial s} = \frac{1}{2f} \left[ 1 - \frac{I-s}{2\pi f} \right] \]

As we suppose interior solution, we have:

\[ t_{2c}^* = \frac{I-s}{2\pi f} \leq 1 \]

So that:

\[ \frac{\partial t_1^*}{\partial s} \geq 0 \]

As \( s \) is a decreasing function, we know that an increase in \( f \) has two kinds of dissuasion effect on the first period:

- The first one is a classical one, due to sanction itself;
- The second one is due to the fear of changes in the legal market perspectives and reinforces the role of sanction. Unambiguously, we have:

\[ \frac{\partial t_1^*}{\partial f} < 0 \]

For the second period, in case of past conviction, time devoted to crime is superior to the non-convicted case. An increase in \( f \) has two opposite effects:

- The first one is a classical one, due to sanction itself;
- The second one is due to changes in the legal market perspectives and contradicts the basic role of sanction. Indeed, we can show:

\[ \frac{\partial t_{2c}^*}{\partial s} = \frac{-1}{2\pi f} < 0 \]

As \( s \) is a decreasing function, an increase in \( f \) includes a second effect which reinforces, through changes on legal market perspectives (a decrease of \( s \)) criminal path. The total effect between these two contradicting effects appears to be undetermined if we do not know the values of the parameters:

\[ \frac{\partial t_{2c}^*}{\partial f} = \frac{1}{2\pi f^2} \left[ -fs'(f) - (I-s(f)) \right] \]
Finally, an increase in $f$ has globally a dissuasion effect for convicted individuals if and only if:

$$-fs'(f) \leq I - s(f)$$

The condition given above consists in a comparison between:

- The relative productivity of illegal activities, $I - s(f)$
- The local change in legal market perspectives due to stigma or human capital depletion

For high relative productivity of illegal activities – or low criminal reinforcing effect – an increase in sanction is globally dissuasive for convicted agents (first effect dominates). But, for low relative productivity of illegal activities – or high criminal reinforcing effect – an increase in sanction induces globally an increase in crime investment for convicted agents (second effect dominates).

The dissuasion condition can also be written as follows:

$$-s'(f) \leq \frac{I - s(f)}{f} = 2\pi t_{2c}^*$$

If crime level for convicted agents is already high, an increase in sanction through imprisonment for example is globally dissuasive (first effect dominates). But, for low investment in crime, an increase in sanction induces globally an increase in crime for convicted agents, due to changes of perspectives on legal market (second effect dominates). In this latter case, the impact on $T^*$ for a representative agent is also undetermined as long as we do not know the numerical parameters of the model.

Such kind of result contradicts most of literature on deterrence by severity, despite several attempts to shed light on its limits (Ehrlich, 1973; Block and Heineke, 1975; Stigler, 1970; Nussim and Tabbach, 2007). Nevertheless, it appears to be quite intuitive: if the fear of loss on legal market is clearly part of the sanction during the first period (Rasmusen, 1996; Furuya, 2002; Funk, 2004), the same mechanism reinforces the convicted offenders in a criminal path. In view of these opposed effects, as stigma and human capital depletion increase with the severity of the sanction, it is unclear whether such an increase causes a decrease or an increase in total expected illegal time. These findings are consistent with empirical evidence found in part of the literature, especially for young offenders (Lipsey, 1995; Prior and Paris, 2005). In this context, stigma and human capital obsolescence are not
necessary part of a deterrence policy. The global effect depends on the relative magnitude of productivity in illegal activities and changes in legal market perspectives. As the intensity of the latter is widely discussed (Waldfogel, 1994; Grogger, 1995; Kling, 1999), the total impact of an increase in sanctions is difficult to determine.

But, average penalty is only one of the key issues. The modulation and application of the sanction, most notably by taking into account the criminal career, appears very important. Thus, it is necessary to analyze more carefully how to remove the undetermined impact of an increase in sanctions. Two kinds of proposal are more specifically examined and modeled. Firstly, the possibility to differentiate the sanction between recidivists and first time offenders. Secondly, to break the correlation between the sanction severity and changes in perspectives on legal market (education programs, paid employment in prison, alternative sentences…). We call this latter kind of alternatives “enhanced human capital” sanctions.

3.2. Increasing penalties for repeat offenders: an economic explanation

In this section, we assume a differentiated penalty between first time and repeat offenders. As seen above, this practice is common, rooted in our civil and criminal codes, but the existing works have not explicitly analyzed the potential role of changes of perspectives on legal market. From our point of view, it is indeed a key explanatory factor.

Formally, call \( f_1 \) and \( f_2 \) the penalties respectively applied to first time and repeat offenders per unit of time dedicated to crime, it is possible to find for the second period:

\[
t_{2n}^* = \frac{I - s_0}{2\pi f_1}
\]

\[
t_{2c}^* = \frac{I - s(f_1)}{2\pi f_2}
\]

And, for the first period :

\[
t_1^* = \frac{I - s_0 + \pi \left( V\left(t_{2c}^*\right) - V\left(t_{2n}^*\right)\right)}{2\pi f_1}
\]

With :
\[ V(t_{2n}^*) = \frac{(I - s_0)^2}{4\pi f_1} + s_0 \]

\[ V(t_{2c}^*) = \frac{(I - s(f_1))^2}{4\pi f_2} + s(f_1) \]

For someone who has not been convicted, there is a pure dissuasion effect, and unambiguously:

\[ \frac{\partial t_{2n}^*}{\partial f_1} < 0 \]

During the first period, it is possible to calculate:

\[ \frac{\partial t_1^*}{\partial s} = \frac{1}{2f_1} \left[ 1 - \frac{I - s}{2\pi f_2} \right] \geq 0 \]

And, unambiguously:

\[ \frac{\partial t_1^*}{\partial f_1} < 0 \]

For a convicted individual:

\[ \frac{\partial t_{2c}^*}{\partial s} = -\frac{1}{2\pi f_2} < 0 \]

And:

\[ \frac{\partial t_{2c}^*}{\partial f_1} = \frac{-s'(f_1)}{2\pi f_2} > 0 \]

Therefore, with the differentiation of penalties between first time and repeat offenders, it is possible to write:

\[ \lim_{{f_2 \to +\infty}} \frac{\partial (t_{2c}^*)}{\partial s} = \lim_{{f_2 \to +\infty}} \frac{-1}{2\pi f_2} = 0 \]
Thus, the severity of the penalty is able to reduce the strengthening of criminal paths. The impact of $s$ during the first period is as follows:

$$\lim_{f_2 \to +\infty} \frac{\partial t_1^*}{\partial s} = \lim_{f_2 \to +\infty} \frac{1}{2f_1} \left[ 1 - \frac{I - s}{2\pi f_2} \right] = \frac{1}{2f_1} \geq 0$$

And:

$$\frac{\partial t_{2n}^*}{\partial s} = 0$$

By continuity of these functions, it is then possible to find $f_2$ so that

$$\forall f_2 > \bar{f}_2 :$$

$$\frac{\partial T^*}{\partial s} > 0$$

With:

$$T^* = t_1^* + \pi t_1^* t_2^* + (1 - \pi t_1^*) t_{2n}^*$$

As $s$ is a decreasing function, we know that an increase in $f_1$ would have two kinds of dissuasion effect on total crime devoted to crime:

- The first one is a classical one, due to sanction itself;
- The second one, due to changes in the legal market perspectives, reinforces the role of sanction if the sanction to repeat offenders is above a given threshold. Unambiguously, we would have in this context:

$$\frac{\partial T^*}{\partial f_1} < 0$$

Therefore, the threat of strong enough punishment for repeat offenders mitigates the potential negative effect of stigma and human capital depletion for ex convicts reinforced in criminal paths. Thus, the impact of severity in first period seems no longer ambiguous as far as the severity in second period is above a given threshold. This constitutes a clear explanation for enhanced penalties for repeat offenders. One can object that this kind of solution is highly questionable since it raises the issue of the subsistence of former
detainees (remaining stigmatized on legal market). That is why we examine and model below another kind of solution to remove the undetermined impact of an increase in sanction severity.

### 3.3. Enhanced human capital sanctions: an economic explanation

As we know, the depletion of legal opportunities due to past conviction depends - most of time - on the severity of the sanction. \( s(f) \) is considered as a decreasing function. Indeed, we suppose that changes in legal perspectives are due both to stigma and human capital obsolescence associated with time behind bars. If stigma can be a binary process (an employer stigmatizes someone if and only if he has been convicted), human capital depreciation depends crucially on the length of the sanction, ie on \( f \).

One option to alleviate the ambiguous effect of severity is to break the correlation between the severity of the sanction and the depletion of legal opportunities: developing education or paid employment in prison; developing alternative sanctions… It is possible to formalize this kind of proposal, assuming that \( s(f) \) is no longer decreasing with \( f \), but can be written:

\[
s(f) = \alpha s_0, \quad \text{with } \alpha < 1
\]

In this context:

\[
s'(f) = 0
\]

And the condition stated above is unambiguously verified:

\[
-fs'(f) \leq I - s(f) = I - \alpha s_0
\]

Thus, an increase in \( f \) has globally a dissuasion effect, both for convicted and non-convicted individuals. Even if stigma induces an instantaneous fall in legal opportunities, education or paid employment in prison can compensate human capital depreciation, generally varying with \( f \). Obviously, alternative sanctions to imprisonment are also able to prevent such depreciation, which largely occurs behind bars. As Pyne (2010) showed, the juvenile justice system characteristics – more lenient than the adult one and with higher expenditures by inmate – are efficient responses to the fact that incarceration reduces human capital acquisition by juveniles. In the instant paper, we argue that imprisonment has also an influence on the evolution of human capital for adults and we give a rationale for enhanced human capital penalties.
Unlike the first solution to remove the undetermined impact of penalty severity, the second one allows to provide a decent standard of living for former convicted. Enhanced human capital sanctions, including alternative sanctions, education or paid employment in prison are of prime interest but little empirical evidence has been produced to measure their efficiency as such programs are not really developed in most of countries. Nevertheless, several empirical examples can be given to illustrate the theoretical evidence given above. First, the role of prison conditions can be analyzed: it appears that harsher prison conditions do not reduce criminal activity (Chen and Shapiro, 2007; Drago et al., 2011). Then, empirical evidence has shown the crucial role played by the probation (Fabel and Meier, 2002) as well as the parole systems (Kuziemko, 2007). With Community Services, both stigma and human capital depletion do not increase with the length of the sanction as the penalty itself is based on time dedicated to legal activity. Therefore, there is a change in arbitration process between legal and illegal activities. Restorative Justice - Referral orders in Great Britain or Halt Scheme in Netherlands - aims at bringing stakeholders together in order to reach an agreement, which also modify stigma or human capital depletion. If such kind of enhanced human capital sanctions seem to be encouraging (Van Hees, 1999; Maxwell and Morris, 2006), future research is needed to understand how these alternatives compare in terms of human capital and stigma with regard to future incentives to commit crime.

**Conclusion**

The optimal design of the law enforcement policy supposes an understanding of criminal behavior over time. The purpose of this article is to propose theoretical keys based on a dynamic model of time allocation between legal work and criminal activity. Thanks to this model, the undetermined impact of an increase in penalty severity is highlighted. In this context, stigma and human capital depletion are not necessary part of a deterrence policy. Two extensions are discussed: heavier penalty for repeat offenders and enhanced human capital sanctions. Several extensions to this work would deserve to be conducted. First, more works need to be done to understand the role of sanctions and changes in perspectives on legal market when legal and illegal activities can be substitutes as well as complementary. Our assumption is indeed a simplification as illegal earnings may appear outside as inside a legal working framework. Then, the individual relation to time could be considered in a model including several periods, as actualization rates appear to be crucial in dynamic criminal choice. Finally, it would be really interesting to test whether such theoretical work – and most notably the two kinds of methods which are presented - can be verified on a country panel with different penalty schemes.
Bibliography


