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Does punishment of minor sexual offences deter rapes? Longitudinal evidence from France[#]

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Abstract: Using original French panel data, this paper investigates the relevance of the broken windows theory in case of an offence category featured by the absence of monetary benefits. Estimates from random and fixed effects models highlight the deterrent effect of sanctions for rapes and minor sexual offences. The enforcement activity of rapes is the most deterrent factor both for rapes and other sexual offences, compared with the rapes- and minor sexual offences-reducing impact of an increase in the enforcement activity for minor sexual offences. Our results cast doubt on the broken windows theory. From a normative perspective, it would be more efficient to deter the authors of rapes rather than those of less severe sexual offences.

JEL Classification: C32; K42

Keywords: Rapes; sexual offences; marginal deterrence; broken windows theory

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1. Introduction

Since the presentation of the first modern economic model of criminal behavior by Becker (1968), numerous efforts have been devoted to the application of empirical economic approaches to both the study of crime and the criminal justice system. A large literature has especially focused on the deterrent effect of punishment[1].

Ehrlich (1973, 1975) is often considered as the first economist to rely on econometric models to analyze the deterrent effect of criminal law enforcement, through the estimation of a murder supply function, which depends on economic and deterrence variables. Recent studies have attempted to understand why crime has fallen sharply during the 1990s in the United States. Donohue and Levitt (2001, 2003) suggest there is a strong causal link between legalized abortion and reductions in crime almost two decades later, when the cohorts exposed to legalized abortion reach their peak crime years. Following Levitt (2004), the other factors playing a critical role in crime reduction are the increasing number of policemen, the skyrocketing number of prisoners and the ebbing of the crack epidemic[2].

The broken windows theory developed by Wilson and Kelling (1982) has strongly influenced policing and law enforcement. According to this criminological theory, targeting minor disorder is expected to reduce occurrence of more serious crimes. For instance, some aspects of the broken windows theory have been adopted in the largest cities of the United States through a more aggressive enforcement of minor offences. However, little is known on the relevance of the broken windows theory; recent results from a randomized experiment cast doubt on the effectiveness of zero-tolerance policing (Harcourt and Ludwig, 2006).

In a recent empirical study conducted in Switzerland, Funk and Kugler (2003) have investigated the dynamic interrelationships between crimes of different severity, *i.e.*, larceny-theft, burglary and robbery. Using quarterly time series data covering the period from 1984 to 1998, the authors estimate a VAR model and reach the two following conclusions. On the one hand, "an evolution from mild offences to severe offences occurs independent of a varying degree of enforcement activity" (p. 295). On the other hand, an increase in the enforcement

[1] On recent developments on the theory of deterrence, see Polinsky and Shavell (2007) or Levitt and Miles (2006), who provide a recent overview of the economic contributions to the understanding of criminal activities.

[2] Levitt (2004) underlines that good economic conditions, aging population, innovative policing strategies over the recent years, gun control laws, laws allowing the carrying of concealed weapons and increased use of the death penalty have a deterrent, but limited effect on crime.

activity of mild offences not only reduces minor crimes, but also dynamically deters subsequent severe offences.

This finding, which supports the broken windows theory, holds in a setting where robbery increases the level of resources of the delinquents. Insofar as this kind of offence is likely to secure a long-term career in crime, the broken windows theory may be seen as an implication of the life-cycle theory. This explains why the punishment of minor offences is likely to have a preventive effect on more severe acts. Stigler (1970) has proven the exact opposite with his marginal deterrence theory: inflicting smaller punishments to less severe crimes is expected to generate incentives for individuals who cannot be fully deterred from committing less harmful crimes. In that case, the punishment of the most severe offences is likely to be the strongest deterrent factor of minor offences.

A question of interest is to know whether there may be differences between crimes bringing psychic gains and crimes bringing monetary gains. In this paper, we focus on the case of an offence category characterized by the absence of monetary benefits. Using original cross-section time series collected in France over the period 1988 to 1993 from 30 appeal court areas, we study the determinants of offences providing only psychic benefits to criminals: rapes and other sexual offences. We study whether the punishment of less severe sexual offences has a deterrent effect on the most severe offences (rapes), testing the broken windows theory against the marginal deterrence theory. We estimate both random and fixed effects regressions. Our main results indicate that the enforcement activity of rapes is the most deterrent factor both for rapes and for other sexual offences, compared with of rapes- and minor sexual offences-reducing impact of an increase in the enforcement activity for minor sexual offences.

The remainder of our paper is organized as follows. In the next Section, we briefly review the literature related to the broken windows theory. Our data are described in Section 3 and we present the econometric procedure in Section 4. We discuss the results and the relevance of the broken windows theory in Section 5. Section 6 concludes.

2. Background on the broken windows theory

The broken windows theory was developed in an influential contribution of Wilson and Kelling (1982). The authors focused on the consequences of the ‘Safe and Clean Neighborhood

Program' launched in the State of New Jersey during the mid-1970s. One of measure of this program consisted in using foot patrols as a way of cutting crime.

Results from a controlled experiment suggest that these foot patrols have no direct effect on crime rated, but the neighborhood has become more secure. Emphasis is thus made not only on violent and criminal individuals, but also on more disorderly people (Zimbardo, 1969)[3]. As pointed out in Wilson and Kelling (1982, p. 31), crime and disorder are strongly interrelated: "Social psychologists and police officers tend to agree that if a window in a building is broken and is left unrepaired, all the rest of the windows will soon be broken. This is as true in nice neighborhood as in run-down ones". So, the main idea behind the broken windows theory is that targeting less severe forms of disorder may temper bad criminal behaviors.

In the US, more aggressive laws against minor misdemeanor have been adopted in the largest cities, in particular New York, Chicago and Los Angeles. These public policy choices could suggest that the reducing effect of broken windows policing in crime is indeed effective. However, there is no supporting fact to the claim that broken-windows policing significantly reduced crime during the 1990s in the US (Eck and Maguire, 2000). More recent findings, described in Kelling and Sousa (2001) and Corman and Mocan (2005), suggest that in New York, the large increase in misdemeanor arrest rates is responsible for the significant city's drop in crime.

Since misdemeanor arrests usually do not result in imprisonment, this suggests that deterrence is an appropriate explanation of the causal link between a generalized program of intensive enforcement and the fall in more serious crime. However, Harcourt and Ludwig (2006) propose a very different interpretation, called the Newton's Law of Crime. They show that the pattern of crime strongly changes across New York precincts during the 1990s: "those precincts that received the most intensive broken windows policing during the 1990s are the ones that experienced the largest increases in crime during the city's crack epidemic of the mid- to late-1980s". So, the jurisdictions with the largest rise in criminal rates during the latter period simply experience the largest fall after, which is consistent with the statistical concept of mean reversion. Furthermore, drawing on the Moving To Opportunity experiment, Harcourt and Ludwig (2006)

[3] Zimbardo (1969), a psychologist, was the first to present evidence consistent with the broken windows theory, with an experiment. Two identical cars without any license plate were abandoned in two different locations, respectively in the Bronx (New York) and in Palo Alto (California). The car was almost immediately attacked in the first place. In Palo Alto, the public destruction of the car begins only one week after abandon, once the car was personally damaged by Zimbardo.

present additional evidence that moving people to communities with less disorder does not change their criminal behavior[4].

At first sight, the broken windows theory stands in contrast with the idea of marginal deterrence developed in Stigler (1970). The threat of punishment is expected to influence the behavior of individuals who are about to commit a crime. The deterrent effect of punishment is affected by the extent to which the threat of punishment is indeed realized, by the celerity with which punishment is delivered and of course by the level of pain imposed. The increase in marginal utility when committing a crime will be compared with the risk of punishment. When the punishment is large, this clearly reduces the expected utility for the offender. However, "marginal decisions are made here as in the remainder of life, and the marginal deterrence of heavy punishments could be very small or even negative" (Stigler, 1970, p. 57).

So, the difference between the broken windows theory and the marginal deterrence theory may be summarized in the following way. According to the former, the punishment of minor offences should have a preventive effect on more harmful acts, while the punishment of the most severe offences should have a strong deterrent impact on minor offences according to the latter. A question of interest is to know whether there may be differences between crimes bringing psychic gains and crimes bringing monetary gains.

Indeed, some criminals cannot reach their objective without behaving violently. Rapes or some types of murders like those committed in order to take one's revenge are good examples. The existence of these kinds of specific offences raises interesting questions. Do more severe punishments inflicted to the authors of the most "severe" crimes generate incentives to potential offenders not to commit any crime at all? For rapists or potential rapists who are not deterred by more severe sentences, should increased legal sanctions of "minor" sexual crimes have an effect on their behavior? We aim at answering these questions in our empirical analysis.

3. Data

For our empirical analysis, we rely on original longitudinal data collected in France from 1988 to 1993 (6 years). The data set includes detailed information about sexual offences and convictions observed in the different appeal court areas. There are 30 court areas in France,

[4] The impact of neighborhood effects on criminal behavior through the Moving To Opportunity experiment are further investigated in Kling et al. (2005).

presented in Figure 1, so the dataset is made of 180 observations. Let us briefly describe the treatment of sexual attacks in the French penal system.

Insert Figure 1 here

As in other developed countries, offences are categorized on the basis of the harms they generate. A distinction is made between two types of sexual offences: rapes and other sexual offences. First, rapes belong to the most harmful category, the "*crimes*"[5]. Murders and some assaults and battery are included in this category. Second, other sexual offences include indecent assaults, engaging minors in indecent acts and other offences against public decency; they are defined as "*délits*".

These two offences lead to different sanctions. The authors of *crimes* are judged in a Court of Assizes ("*cour d'assises*"). They are severely punished and incur longer prison sentences than the delinquents who are authors of *délits*. The latter are judged in a magistrate's court; they face a prison sentence whose length depends on the seriousness of their offence. They also may incur either a fine or other kinds of sentences, like a substitution penalty or an educational program.

Descriptive statistics of the variables of the sample are shown in Table 1.

Insert Table 1 here

First, we have two measures of sexual offences: $RAPE_{it}$ is the rate of rapes per 1000 inhabitants in region i (a court area in our context) during year t; OSO_{it} is the rate of other sexual offences per 1000 inhabitants. These two outcomes are expected to be influenced by enforcement activities. Concerning rapes, enforcement activities are measured through the probability of conviction for rapes (C_{it}^{RAPE}) and the conditional probability of a prison term for rapes (P_{it}^{RAPE}). The variable C_{it}^{RAPE} is the number of convictions for rapes divided by the number of offences in this category of crime, and P_{it}^{RAPE} is the number of prison sentences for rapes divided by the number of convictions for rapes[6]. The average prison sentence for rapists in region i at time t is denoted by S_{it}^{RAPE}.

[5] In the French penal code, a rape is defined as an act of sexual penetration committed on others by violence, constraint or surprise (art. 222-23).

[6] Unfortunately, the resources of the police and justice services data are not available, nor the clearance rate data, regardless of the offence category.

We have similar information for other sexual offences. The enforcement activity of minor sexual offences is measured through the conviction rate C_{it}^{OSO}, which is the number of convictions for minor sexual offences divided by the number of minor sexual offences, and the conditional probability of being sentenced to prison P_{it}^{OSO}. We also have information about the conditional probability of receiving a fine for other sexual offences F_{it}^{OSO} and the conditional probability of another decision for sexual offences D_{it}^{OSO} (either a substitution penalty or an educational measure).

We also include the following control variables in our empirical analysis. First, we denote by DU_{it} the first difference of the log of the unemployment rate, *i.e.*, $DU_{it} = \ln U_{it} - \ln U_{it-1}$ with U_{it} the level of unemployment. This covariate may be considered as a proxy for socio-economic conditions[7]. Secondly, we include an explanatory variable related to the population of each appeal court area. We rely on a measure of density $RPOP_{it}$ defined as the ratio between the population size of the appeal court area i at time t and the total population size living in France at time t.

According to Table 1, the rate of rapes (per 1000 inhabitants) amounts to 0.75%, while the rate of other sexual offences is about 7 times higher (5.37%). As shown in Figure 2, we observe an increasing profile over time for the two types of offences. The rate of rapes ranges from 5.8% in 1988 to 8.9% in 1993, *i.e.*, an increase of 53.4%. The rise in the rate of other sexual offences is also substantial (+32.1%, ranging from 47.6% in 1988 to 62.9% in 1993).

Insert Figure 2 here

Concerning sanctions, the probability of conviction is much higher for rapes than for other sexual offences, respectively 19% instead of 12%. The same pattern holds for the conditional probability of a prison term. The rate is about four times higher for rapes, this sanction being quasi-certain (99.7%). Among the different sanctions associated with the other sexual offences, the most frequent ones are a prison term (24.7%) and a fine (14.6%). Other decisions for other sexual offences are less frequent (6.4%).

[7] Because men commit a large majority of sexual offences, the variation in male unemployment rate would undoubtedly be a more relevant independent variable, but this information is not available at the level of aggregation sought.

4. Empirical analysis

The aim of our econometric analysis is to know whether an increase in the enforcement activity of minor sexual offences has a reducing impact or not on the number of rapes. Turning to a logarithmic specification, we estimate the following equation:

$$\begin{aligned}\ln(RAPE_{it}) = {} & \alpha_1 \cdot \ln C_{it}^{RAPE} + \alpha_2 \cdot \ln P_{it}^{RAPE} + \alpha_3 \cdot \ln S_{it}^{RAPE} + \\ & \beta_1 \cdot \ln C_{it}^{OSO} + \beta_2 \cdot \ln P_{it}^{OSO} + \beta_3 \cdot \ln F_{it}^{OSO} + \beta_4 \cdot \ln D_{it}^{OSO} + \\ & \gamma_1 \cdot DU_{it} + \gamma_2 \cdot \ln RPOP_{it} + \kappa_i + \varepsilon_{it}\end{aligned} \quad (1)$$

where ε_{it} is a random perturbation such that $\varepsilon_{it} \sim N(0;\sigma_\varepsilon^2)$ and κ_i is an error term specific to each appeal court area. The coefficients β_1, β_2, β_3 and β_4 will shed light on the correlation between enforcement activities of other sexual offences and rapes. Since the dependent variable is continuous in (1), we turn to a linear model to estimate the various α, β and γ.

Since we have panel data, we control for unobserved heterogeneity in (1) through the use of random and fixed effects models. When the different κ_i are uncorrelated to the selected explanatory variables, the appropriate specification is a random effects model which is estimated by Generalized Least Squares. Conversely, if the specific components κ_i are correlated with the covariates, then the correct specification is a fixed effects model and the linear regression includes a set of appeal court area dummies as additional covariates. We perform a Hausman's specification test to assess the relevance of both models.

With respect to our question of interest, a difficulty is that the probability of conviction for rapes may be endogenous in (1). Recalling that unobserved heterogeneity is controlled for in (1), through the inclusion of fixed effects, endogeneity is likely to arise because of simultaneity issues. The different sanctions that are implemented in case of other sexual offences should be themselves influenced by the occurrence of these offences. This comment has two implications. On the one hand, the number of sexual attacks observed in the past should matter, but there are not enough years in the survey to account for these dynamic aspects[8]. On the other hand, the use of the various sanctions related to other sexual offences should be endogenous in (1), which concerns both $\ln C_{it}^{OSO}$, $\ln P_{it}^{OSO}$, $\ln F_{it}^{OSO}$ and $\ln D_{it}^{OSO}$. In what follows, we restrict our attention to

[8] A more appropriate specification would be to include the lagged rate of rapes in the rape equations, and the same should be done for other sexual offences.

the potential endogeneity of the conviction rate $\ln C_{it}^{OSO}$. This endogenous covariate is expressed as:

$$\ln C_{it}^{OSO} = \phi \cdot OSO_{it} + X_{it}' \cdot \Psi + \zeta_{it} \quad (2)$$

where the rate of other sexual offences OSO_{it} is an instrument insofar as an increase in offences triggers a change in the enforcement activity, X_{it} includes all exogenous regressors introduced in (1), ϕ and Ψ are coefficients to estimate, and ζ_{it} a random perturbation normally distributed[9].

We proceed in the same way to measure the role of enforcement activities related to rapes on other sexual offences. Specifically, we estimate the following equation:

$$\begin{aligned} \ln(OSO_{it}) = {} & \alpha'_1 \cdot \ln C_{it}^{RAPE} + \alpha'_2 \cdot \ln P_{it}^{RAPE} + \alpha'_3 \cdot \ln S_{it}^{RAPE} + \\ & \beta'_1 \cdot \ln C_{it}^{OSO} + \beta'_2 \cdot \ln P_{it}^{OSO} + \beta'_3 \cdot \ln F_{it}^{OSO} + \beta'_4 \cdot \ln D_{it}^{OSO} + \\ & \gamma'_1 \cdot DU_{it} + \gamma'_2 \cdot \ln RPOP_{it} + \kappa_i + \varepsilon_{it} \end{aligned} \quad (3)$$

The reducing-impact of enforcement activities with respect to rapes on the rate of other sexual offences will be given by the various α'. We again include fixed effects to control for unobserved heterogeneity. Furthermore, we treat the rate of conviction for rapes as endogenous:

$$\ln C_{it}^{RAPE} = \phi' \cdot RAPE_{it} + X_{it}' \cdot \Psi' + \zeta_{it} \quad (4)$$

where the rate of rapes is an instrument. We use both the 2SLS random-effects specification described in Balestra and Varadharajan-Krishnakumar (1987) and the 2SLS within estimator to estimate the recursive models, respectively given by (1) and (2) and by (3) and (4).

5. Results and discussion

The random and fixed effects estimates of equations (1) and (3) with exogenous enforcement activities are reported in Table 2. The Hausman test suggests the adoption of a random effect specification for the rape equation and of a fixed effect representation in the other sexual offence equation. This means that the unobserved court area components are correlated with the set of regressors that explain other sexual offences.

Insert Table 2 here

A first finding is the positive relationship between unemployment rate variation and both rapes and minor sexual offences. Recalling that these offences do not allow their authors to grow

[9] We have also considered the log of the rate of other sexual offences as an instrument (instead of *OSO*). We find similar results with both specifications.

rich, but do exclusively bring psychological benefits, one cannot interpret this result in terms of falling opportunity costs of crime encouraging even more offences (Cantor and Land, 1985). Also, since unemployment is a proxy for the business cycle, we cannot say that of the three effects linking business cycles to crime, the motivation effect (*i.e.*, the incitation to commit crime) dominates (Becker, 1968).

To explain the sexual offences-unemployment relationship, one could consider that an unemployed person is more likely to be stigmatized as "a social failure", "a second-class citizen" or "inferior" (Goffman, 1963, Kelvin and Jarret, 1985). As a result of this stigma on unemployment, tindividuals become more often self-conscious and they will suffer from discouragement, anxiety and frustration. Thus, the unemployed are more likely to be exposed to the lure of criminal subcultures because of their lack of involvement in conventional and familial activities (Gottfredson and Hirschi, 1990).

Another result from the estimated equations is that the density of population positively affects the rape rate. Glaeser and Sacerdote (1999) explain this pattern by higher returns of crime, lower probabilities of arrest and conviction, and density of female-headed households. Conversely, the density of population has a negative and significant effect on the rate of other sexual offences. According to the fixed effects estimates reported in Table 2, an increase of 1% of the population of court areas is associated with a 0.235% decrease in the *OSO* rate. An explanation could be that minor sexual offenders perceive the risk of conviction as higher when population is more concentrated.

Let us now focus on the deterrence effect of penalties. In conformity with the economic theory of crime, in the rapes equation, we get negative signs for the conviction and imprisonment rates related to rapes, as well as the average prison sentence for rapists (see Table 2). We also find a negative correlation between rapes and both the probability of being sentenced to prison and the probability of receiving a fine because of other sexual offences. In the same way, we note that the probability of a prison term for rapes and the conviction rate related to *OSO* reduces the rate of other minor sexual offences. Another result is that the conditional probability of receiving a fine for other sexual offences has a negative and significant effect on rapes. The correlation is also negative, albeit not significant, in the *OSO* equation[10].

[10] The risk of another decision (either substitution penalty or educational measure) does not exert a statistically significant effect in the *OSO* equation, even if it shows the expected sign

Surprisingly, the sentence-length coefficient is positive in the rapes equation (at the 10% level). According to Mustard (2003), this ambiguous result can be due to the fact that sentencing data contain measurement errors biasing the results towards zero. Indeed, sentence length does not measure time served, insofar as early release and parole reduce it. In other words, the time served in prison is usually overestimated. Moreover, Mustard (2003) shows that the sentence length is correlated with offenders' criminal histories, more precisely the rate of repeat offenders, which cannot be controlled for at the aggregate level of this analysis. This finding also suggests that sexual offenders are not risk averse utility maximizing criminals and that they respond more to changes in the probability of punishment than to a change in the severity of punishment.

So far, we have neglected the potential endogeneity of the conviction rates. In Table 3, we present our IV random and fixed effects estimates. Our results are twofold. First, an increase of 1% in the probability of conviction for rapes is associated with a 0.335% fall in the rate of other sexual offences with the IV random effects estimates (and 0.25% with the fixed effects specification). Secondly, the probability of conviction for other sexual offences has now a significantly, negative effect on the rate of rapes (with a decrease comprised between 0.659 and 0.734%). It thus matters to control for endogeneity bias as these conviction variables were not statistically significant in our previous estimates, although they had the correct sign.

Insert Table 3 here

Our results shed light on the possible relevance of the broken windows theory. Let us first note that in all estimated equation, we get a negative relationship between the various *OSO* deterrence variables and rapes. Nevertheless, in the IV regressions, only the probability of conviction and the conditional probability have a significant influence. On *a priori* grounds, this pattern is not inconsistent with the broken windows theory: punishing less severe offences leads to a decrease in the occurrence of more severe offences. Although the relationship is less robust, it is interesting to note that sexual offenders seem reactive to specific monetary sanctions, while they are often assumed not to intentionally commit their act (and thus are supposed to be nondeterrable).

Another result from the French data is that in the rapes regression, the "crossed-effect" of conviction is much lower than that of the conditional risk of prison for rapes, respectively -0.724 instead of -4.101 according to the IV random effect estimates. Undoubtedly, this finding does not provide support to the broken windows theory. According to our estimates, the conditional risk of

prison for rapes appears to be the most influential deterrent factor of rapes among the various conditional risks of sanction variables. Conversely, an increase in the enforcement activity for minor sexual offences has a smaller (but significant) influence on the most harmful sexual offences.

This conclusion is corroborated by the fact that the conviction rate for rapes and especially the condition probability of imprisonment for rapes have the strongest deterrent effects in the other sexual offences equations. The coefficients are respectively equal to -0.335 and -2.748 in the IV random effects regression, while the deterrent effect of the conviction rate for minor sexual offences is lower (-0.205). The sign of the sentence length for rapes is also negative, but not significant at conventional levels. Taken all together in consideration, our results suggest that the marginal deterrence theory is certainly much more relevant than the broken windows theory to explain the behavior of sexual offenders.

6. Concluding remarks

Our study of rapes and other sexual offences using French panel data leads to the two following conclusions. First, the economic model of crime seems validated when considering sexual offences. Secondly, the enforcement activity of rapes is the most deterrent factor both of rapes and other sexual offences, compared with the rapes- and minor sexual offences-reducing impact of an increase in the enforcement activity for minor sexual offences. Hence, our results tend to cast doubt on the predictions of the broken windows theory in the case of an offence category featured by the absence of monetary benefits.

From a normative perspective, our results suggest that it would be more efficient to deter the authors of rapes rather than those of less severe sexual offences. Such policies are indeed expected to generate positive externalities since they should provoke a more important decrease in the rate of other sexual offences, as suggested by the marginal deterrence theory. A final comment deals with possible extensions of our study. Because of data availability, we have focused on the 1988-1993 period. Given the recent changes in policing in France, it would be useful to further analyze the trends in the various forms of offences since the 2000s. We leave this issue for future research.

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Figure 1. The 30 French metropolitan appeal court areas.

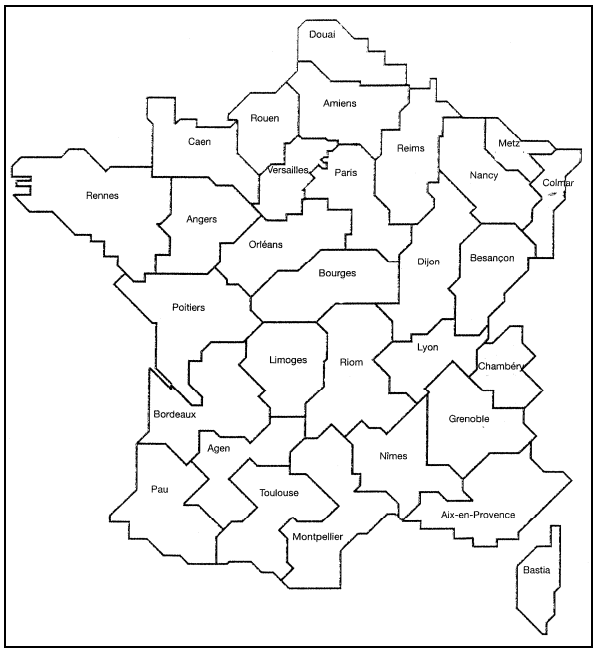

Figure 2. Changes in rates of rapes and other sexual offences 1988-1993

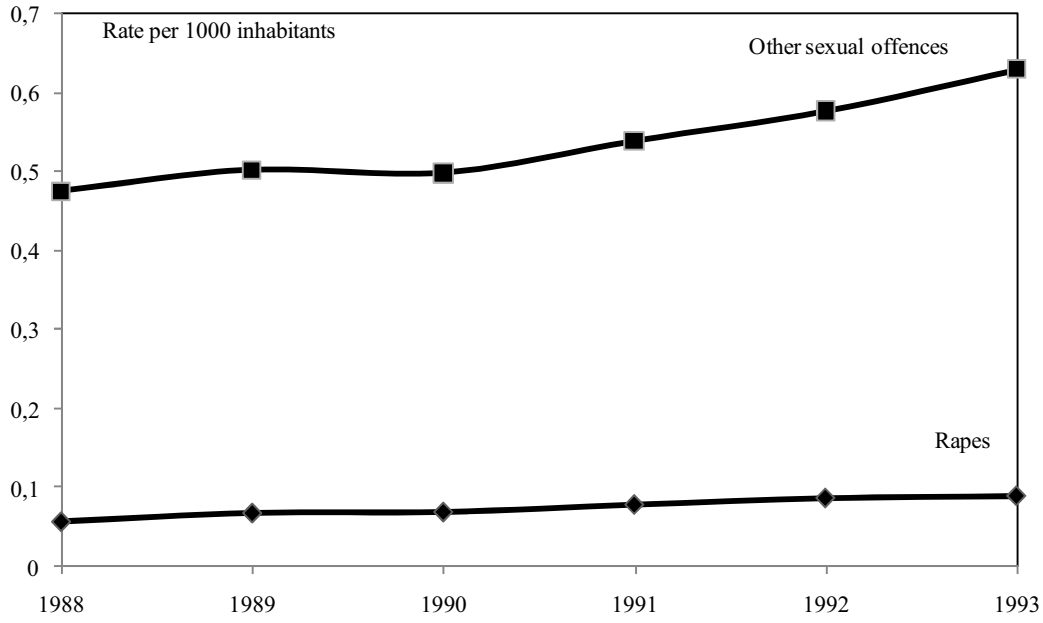

Table 1. Descriptive statistics of the sample (N=180)

Variables	Definition	Mean	s.d.
Crime			
RAPE	Rate of rapes per 1000 inhabitants	0.075	0.026
OSO	Rate of other sexual offences, per 1000 inhabitants	0.537	0.141
Sanctions			
C^{RAPE}	Probability of conviction for rapes	0.190	0.091
P^{RAPE}	Conditional probability of a prison term for rapes	0.997	0.016
S^{RAPE}	Average length of the prison term for rapes	97.750	22.833
C^{OSO}	Probability of conviction for other sexual offences	0.120	0.038
P^{OSO}	Conditional probability of imprisonment for other sexual offences	0.247	0.085
F^{OSO}	Conditional probability of a fine for other sexual offences	0.146	0.104
D^{OSO}	Conditional probability of an other decision for other sexual offences	0.064	0.041
Other covariates			
DU	Difference in unemployment rates	0.028	(0.084)
RPOP	Population size of the appeal court area divided by total population size living in France	3.333	(2.468)

Table 2. Random and fixed effects estimates of rapes and other sexual offences

Variables	$\ln(RAPE_{it})$		$\ln(OSO_{it})$	
	Random effects	Fixed effects	Random effects	Fixed effects
$\ln C^{RAPE}_{it}$	-0.233***	-0.230***	-0.035	-0.024
	(5.95)	(5.79)	(1.15)	(0.81)
$\ln P^{RAPE}_{it}$	-2.414**	-2.032*	-3.257***	-2.925***
	(2.39)	(1.96)	(4.16)	(3.76)
$\ln S^{RAPE}_{it}$	0.164*	0.122	0.051	0.036
	(1.89)	(1.32)	(0.75)	(0.51)
$\ln C^{OSO}_{it}$	-0.091	-0.065	-0.334***	-0.337***
	(1.32)	(0.89)	(6.19)	(6.16)
$\ln P^{OSO}_{it}$	-0.102*	-0.017	-0.133***	-0.078
	(1.69)	(0.26)	(2.81)	(1.61)
$\ln F^{OSO}_{it}$	-0.082**	-0.089***	-0.023	-0.034
	(2.57)	(2.72)	(0.94)	(1.36)
$\ln D^{OSO}_{it}$	-0.041	-0.019	-0.015	0.001
	(1.61)	(0.74)	(0.74)	(0.04)
DU_{it}	1.130***	1.087***	0.510***	0.454***
	(6.62)	(6.33)	(3.85)	(3.51)
$RPOP_{it}$	0.063***	-0.158	0.049***	-0.235**
	(4.30)	(1.21)	(3.94)	(2.38)
Hausman test: Chi²; prob.	6.94;0.634		18.03;0.035**	
R^2 within	0.510	0.530	0.494	0.535
R^2 total	0.520	0.084	0.442	0.100

Note: Significance levels are respectively 1% (***), 5% (**) and 10% (*).

Table 3. IV random and fixed effects estimates of rapes and other sexual offences

Variables	$\ln(RAPE_{it})$		$\ln(OSO_{it})$	
	Random effects	Fixed effects	Random effects	Fixed effects
$\ln C^{RAPE}_{it}$	-0.141***	-0.150***	***-0.335******	***-0.250******
	(2.65)	(2.69)	***(4.19)***	***(3.41)***
$\ln P^{RAPE}_{it}$	-4.101***	-3.484**	-2.748***	-2.478**
	(3.18)	(2.52)	(2.72)	(2.55)
$\ln S^{RAPE}_{it}$	0.210*	0.185	-0.102	-0.088
	(1.89)	(1.56)	(1.07)	(0.96)
$\ln C^{OSO}_{it}$	***-0.734******	***-0.659******	-0.204***	-0.235***
	(3.82)	***(3.35)***	(2.67)	(3.21)
$\ln P^{OSO}_{it}$	-0.062	-0.044	-0.205***	-0.140**
	(0.80)	(0.53)	(3.14)	(2.23)
$\ln F^{OSO}_{it}$	-0.074*	-0.079*	-0.061*	-0.058*
	(1.87)	(1.87)	(1.85)	(1.85)
$\ln D^{OSO}_{it}$	-0.020	-0.013	-0.013	0.000
	(0.64)	(0.40)	(0.50)	(0.01)
DU_{it}	0.434	0.490*	0.816***	0.698***
	(1.62)	(1.75)	(4.41)	(4.02)
$RPOP_{it}$	0.040	-0.174	0.033	-0.231*
	(0.58)	(1.04)	(1.62)	(1.89)
R^2 within	0.319	0.237	0.283	0.288
R^2 total	0.313	0.079	0.343	0.084

Note: Significance levels are respectively 1% (***), 5% (**) and 10% (*). Endogeneneity-corrected estimates are in bold and italic.