Prison Conditions and Recidivism

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The authors examine the impact of prison conditions on future criminal behavior. The take over is based on a unique dataset on the post-release behavior of about twenty thousand Italian former prison inmates. The authors use variation in prison assignment as a means of identifying the effects of prison overcrowding, deaths in prison, and degree of isolation on the probability of reoffending. They do not find compelling-evidence of (specific) deterrent effects of experienced prison severity. The measures of prison severity do not reduce the probability of recidivism. Instead, all point estimates suggest that harsh prison conditions increase post-release criminal activity, though they are not always precisely estimated. (*JEL* K42, J18)

1. Introduction

In modern criminal justice systems, imprisonment is the most important form of sanction. The relevance of imprisonment as the main tool for the

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deterrence and incapacitation of criminals has increased in recent years, as the substantial growth in prison populations in most countries shows. For example, compared to the index year of 1990, by 2007 the number of inmates per 100,000 population had increased from 459 to 762 in the United States from 91 to 145 in the United Kingdom, and from 45 to 82 in Italy (Eurostat, 2009).

The empirical literature on crime and punishment has largely focused on the deterrent effects of imprisonment or sentence lengths.[1] In particular, this literature aims to identify whether and to what extent the threat of prison can deter individuals from committing criminal acts.[2] In these works, prison is taken as a uniform sanction. Nevertheless, if we open the black box, we find very different punitive situations in terms of overcrowding, health services, social activities for inmates and so on. Theoretically, prison conditions may affect the deterrent effects of imprisonment: For a given prison sentence, prison conditions may influence the propensity of individuals to engage in criminal activities. From a policy perspective, it is important to understand how prison conditions affect individuals' propensity to commit criminal acts. Indeed, changing prison conditions could be relatively easier and less costly than other interventions (e.g., increasing incapacitation through sentence length) that aim to reduce crime.

While the issue of the deterrent effects of prison treatment appears particularly important for both researchers and policy makers, the empirical evidence is notably scarce. Only a few recent works analyze the effects of prison conditions on criminal behavior. Katz, Levitt, and Shustorovich (2003) show that more punitive facilities have a small but statistically significant deterrent effect by using death rates among prisoners as a proxy for prison conditions. Exploiting aggregate data on crime rates, they find a decline in local crime rates where prison conditions, measured by death rates,

1. Some contributions in this field are as follows: Nagin (1978), Donohue and Siegelman (1998), Levitt (1998), Kessler and Levitt (1999), Lee and McCrary (2005), Helland and Tabarrok (2007), Drago, Galbiati, and Vertova (2009), and Hjalmarsson (2009).

2. More generally, this stream of literature is related to the extensive literature on crime and punishment started by Becker (1968). For surveys of empirical and theoretical works, see Garoupa (1997), Polinsky and Shavell (2000), Western, Kling, and Weiman (2001), Levitt and Miles (2007), and Bushway and Reuter (2008). Some recent contributions are: Levitt (2004), Di Tella and Dubra (2008), and Owens (2009). For models that embed Becker's paradigm in a dynamic equilibrium framework, see Imrohoroglu, Merlo, and Rupert (2004).

are harsher. Bedard and Helland (2004) exploit the expansion of female penal system capacity in the United States to study the deterrent effects of increasing the distance of prisons from cities. They find that, on average, increasing this distance (assumed to result in a reduced number of visits) tends to lower the female crime rate. These results conform to the deterrence hypothesis. However, from these studies it is not possible to understand if the deterrence effect is driven by the response of former inmates or by the reaction of criminals who have never received prison treatment (or both). Moreover, in the absence of a quasi-experimental design, it is not clear whether harsher prison conditions cause lower crime rates. Unlike previous studies, Chen and Shapiro (2007) use individual-level data to estimate the effect of prison conditions on recidivism rates. By exploiting a discontinuity in the assignment of federal prisoners to security levels, they provide evidence that serving a sentence in a higher security prison implies a higher post-release propensity to commit a crime.

In this paper, we undertake an empirical analysis of the effects of having received prison treatment. In particular, we test how prison conditions, measured by several indicators, affect the propensity of former inmates to recommit criminal acts. If we assume that incarceration leads criminals to update their beliefs about the consequences of punishment, we might expect that having experienced harsher punishment should reduce the propensity to recommit a crime. This is known as the specific deterrence hypothesis. On the other hand, harsher prison could also imply a higher level of recidivism as it may lead to greater human capital depreciation and worse labor outcomes for former inmates (Waldfogel, 1994). In general, harsher prisons may have criminogenic effects (Nagin, Cullen, and Jonson, 2009; Di Tella and Schargrodsky, 2010). Discriminating between the two alternatives is inherently an empirical question. To do this, we exploit a unique large dataset, reporting individual-level data on the recidivism of former inmates who were released as a result of the Collective Clemency Bill approved by the Italian Parliament in July 2006. This law, enacted to address the widespread overcrowding in Italian prisons, provided for an immediate three-year reduction in detention for all inmates who had committed a crime before May 2006. Upon approval of the bill, almost twenty-five thousand inmates were released from 198 Italian prisons on August 1, 2006.

Our analysis concerns two dimensions of prison conditions. First, prison harshness. We focus on two different features of prison severity: the extent of overcrowding and the number of deaths (from all causes) in prison during

the inmate's stay. Death rates and overcrowding are likely to be correlated with many aspects of unpleasantness of prison facilities, including space limitations, competition for resources, bad health, and bad health care conditions among others. Second, we consider the degree of isolation of prisoners from the rest of society. As a proxy for the degree of isolation, we use the distance from the prison of detention to the chief town of the province[3] in which the prison is located. Longer distances imply higher costs (in terms of transportation, organization, and motivation) for volunteer organizations to develop social activities, education, and job training for inmates. In addition, longer distances imply less attention from the local media concerning prison problems and events and fewer visits. This means that the greater the distance of a prison from the chief province town, the weaker the social ties in which prisoners are embedded (and thus the higher the degree of isolation from the rest of society). As a second proxy for prison isolation, we use the number of volunteers in a given prison, which is negatively correlated to prison distance.

In order to identify the effects of prison conditions on recidivism, we exploit an exogenous source of variation provided by the process governing the assignment of inmates to prisons. Our identification is based on two groups of former inmates. The first is composed of inmates serving their sentence in a jurisdiction different from that of their hometown for reasons ranging from overcrowding in the closest prison to the Italian Prison Administration's view that a certain facility is incompatible with the inmate. We label these prisoners as "movers." The second group is composed of "stayers" (those serving their sentence in the same jurisdiction as their hometown) who reside in a province with more than one prison. As we shall discuss in more detail in the paper, the institutional procedures for assigning inmates to prisons entail that the assignment does not depend on individual characteristics that may explain recidivism but at the same time may be correlated to measures of prison conditions. Since about 90% of the sample is composed of these two groups of inmates, we can control for province of residence fixed effects and so account for any unobserved heterogeneity at the level of the province

3. Italy is organized administratively in territorial areas. In particular, there are twenty regions, and each region is composed of several provinces (the total number of provinces is 109). A province corresponds to a large area around a chief town in which the main economic, social, and administrative activities of the area (e.g., courts, health services, local headquarters of political parties, volunteer associations) are concentrated.

where these former inmates live. Considering that this is the main source of unobserved heterogeneity that might correlate with prison conditions, we are able to minimize an important possible bias. When we estimate the effect of the number of deaths in prison on individual recidivism, we are able to control for another potential source of bias. Because the number of facility deaths that occurred during each former inmate's period of imprisonment is an individual-level variable, we can also include prison fixed effects to control for any kind of nonrandom assignment of inmates to prisons.

Although it is to some extent a popular view that being tough on inmates can "rehabilitate" them, we do not find evidence supporting the idea that harsher prison conditions reduce recidivism. Our empirical analysis reveals that all four measures of harsh prison conditions increase recidivism. Although the point estimates are not precisely estimated, these results reject the hypothesis that harsh prison conditions strongly decrease former inmates' criminal activity. Interestingly, there is a substantial degree of heterogeneity driving these results. Italians, who represent about 60% of the total of former inmates in our sample, seem to react more to prison severity. Indeed, the number of deaths significantly increases recidivism for Italians. Former inmates with a relatively long original sentence (above the median in the whole sample) also respond to a higher number of deaths by increasing their post-release criminal activity. Taken together, these results suggest that worse prison conditions do not deter individuals who have previously been incarcerated.

This paper contributes to the literature by providing an empirical analysis on the policy-relevant issue of the effect of prison conditions on recidivism. Our dataset, based on the records of inmates released as a consequence of the Collective Clemency Bill, allows us to overcome obstacles hampering identification in the literature. First, it provides criminal data at the individual level, thus allowing us to overcome the typical identification problems connected with the use of aggregate crime rates. Unlike Chen and Shapiro (2007), previous works on prison conditions and recidivism relied on aggregate data. A second important feature of our dataset is that all these prisoners were released at the same moment pursuant to the Collective Clemency Bill and thus faced equal crime opportunities. This not only eliminates the confounding element of time-varying unobservable characteristics that might correlate with prison conditions but also creates plausible exogenous variation at the individual level in the number of deaths during an inmate's detention. While we cannot conclude that harsh prison conditions increase recidivism for all former

inmates in our sample, we can exclude strong deterrent effects of experienced prison severity on recidivism. These results cast doubts on the effectiveness of imprisonment as a sanction, at least as far as the deterrent effects of prison severity for those previously sanctioned are concerned. From a policy perspective, increasing prison severity does not seem an effective approach to reducing the post-release criminal activity of former inmates.

The paper proceeds as follows. In Section 2, we describe the prison assignment mechanism. In Section 3, we outline the empirical strategy. In the next section, we present the data. Section 5 presents the results. Finally, in Section 6 we make some concluding remarks.

2. Prison Assignment Mechanism

At the core of the empirical strategy are several features of the Italian prison system. Hence, before presenting the identification strategy and the data, it will be useful to outline the Italian prison system and the institutional procedure for governing the assignment of inmates to facilities. Unlike other countries, Italy does not have maximum-security prisons reserved for very dangerous criminals.[4] Inmates responsible for crimes related to the Mafia or terrorism are assigned to high security sections within a facility in strict isolation from other inmates. However, as data come from the Italian Collective Clemency Bill, we do not have these inmates in our data. Italian prisons are classified into two main types. The first type—"Casa Circondariale"—is for inmates waiting for their first judgment or serving sentences of less than five years. Most of the facilities in Italy are of this type. The second type—"Casa di Reclusione"—is for inmates with longer sentences. In practice, however, the initial dispositions, according to which inmates with a short sentence should be sent to the first type of facility, are often violated. The main reason for inmates waiting for their first judgment or with short sentences to be kept in a "Casa di Reclusione" prison is space availability problems. In addition, some "Case di Reclusione" have sections in which inmates awaiting first judgment or convicted of minor crimes serve their sentences.

4. These special facilities started to operate at the end of the 1970s and were closed recently. Maximum-security prisons were located in ancient prisons on small islands, and initially, they hosted Italian terrorists from the 1970s and then individuals convicted of serious crimes and associated with criminal organizations such as the Mafia.

For the assignment of inmates to facilities, the Italian law[5] indicates that *whenever possible*, assignment to facilities should follow a territorial criterion, namely that inmates should be assigned to facilities close to their town of residence and, in general, within the province of residence. If arrested and awaiting first judgment, prisoners can be assigned to a facility close to where they were arrested. After the final judgment, the territorial criterion applies. Nonetheless, often the provisions of the law are not applied. Indeed, an inmate can be assigned to a facility outside her province of residence if the Department of Prison Administration (DAP) envisages some kind of incompatibility. Possible reasons are as follows: a reasonable presumption that assignment to a facility inside the province of residence could be dangerous for the inmate and/or for other inmates in the facility; the particular needs of the detention facility (e.g., overcrowding or inaccessibility); or needs of the inmate, such as health care or study. When an inmate is assigned to a facility outside her province of residence but still in the same region, it is the regional directorate of the DAP that decides which facility the inmate will be assigned to. If for any reason the mover is assigned to a facility outside her region of residence, the destination is decided directly by the central directorate of the DAP.[6] In the empirical analysis, these inmates compose the group of "movers." We conducted several interviews with members of the inmates' rights association "Ristretti" and DAP officers[7] in order to understand in greater detail the decision-making process concerning movers. As a first step, we needed to know the variables that the decision maker (the DAP officer) uses to decide who becomes a mover and then how assignment to facilities works.

According to the information collected in our interviews, the decision maker decides that an inmate cannot be assigned to the facility closest to her hometown in two possible cases. At the moment of arrest or conviction, each inmate is provided with an inmate's dossier containing personal

5. See in particular the Decree of the President of the Republic, 230, 30 June 2000, and Law 354/1975 (Article 42).

6. Italian public administration is in general organized on a territorial basis. Central administrations operate at national level and then there are territorial administrations at region and province (within regions) levels.

7. We wish to thank Francesco Morelli (Ristretti) and Antonella Barone (Ministry of Justice) for providing us with precious information about the assignment process.

information and a summary of the judicial sentencing decision. On the basis of this dossier, the decision maker evaluates whether there is any incompatibility between the inmate and the facility closest to her hometown. It is worth noting that for first-time inmates, the dossier contains roughly the same characteristics that we have in our dataset (i.e., personal characteristics, sentence length, and sentence motivation, in our case the crime committed). More precisely, according to our interviews, the variables that we understand the officer to use for first-time inmates are sentence length, sex and nationality of the offender, and the type of crime committed. The second reason for incompatibility is that the closest facility has reached a maximum threshold of overcrowding. For each facility, this threshold depends on an evaluation by the prison administration and may vary according to local conditions at the facility level (e.g., in some facilities in periods of prison tension and violence, an overcrowding rate of 150% may be rated as being above the threshold level, whereas in other periods, this overcrowding rate may be considered below the threshold). Once an inmate is designated to be a mover, the decision process governing assignment to facilities follows a "space availability" criterion.[8] An inmate is assigned to one of the facilities that at the moment of assignment are less overcrowded or below the threshold level. Hence, for movers, the facility is determined according to the amount of space available in other facilities at the moment of arrest or conviction. If the moment of conviction is orthogonal to unobserved inmate characteristics, we can safely assume that characteristics of movers do not predict the quality of the facility assigned.[9] Similar observations can be made regarding the assignment of inmates who reside in a province with more than one prison and are not designated as movers. The process governing the assignment of these inmates ("stayers") is also based on a "space availability" criterion. At the moment of arrest, individuals are assigned to the prison with the least difficulty to receive inmates.

8. For example, in a recent interview, the regional director of DAP for the Bologna region declared that the facilities in the region are reaching a level of overcrowding that will require the transfer of inmates to regions where more space is available (see the daily newspaper: *Il Resto del Carlino* March 4, 2008, "Bologna: Provveditore; carceri piene? Trasferiamo i detenuti").

9. Kuziemko (2007) and Drago, Galbiati, and Vertova (2009) provide evidence supporting the idea that the moment of conviction is orthogonal to inmates' unobservable characteristics.

3. Empirical Model

In the literature, identifying the effect of quality of life in prison (overcrowding index and number of deaths) and of prison isolation (distance from the chief town and number of volunteers) on recidivism is difficult because inmate characteristics are likely to be correlated to prison conditions. It could be that prison quality is worse in areas where former inmates have a lower opportunity cost of committing a crime. For example, a higher overcrowding index may simply be the result of many arrests in a city in which the relative cost of committing crime is low. It could equally be possible that areas with lower crime intensity have prisons with bad quality conditions. In any case, the estimated impact of prison conditions on recidivism would be biased. In order to provide a credible estimate of the relationship between prison quality and recidivism, we must account for this unobserved heterogeneity.

In the empirical analysis, we use measures of prison conditions that vary at the prison level and a measure of prison conditions that varies within each prison at the individual level (the number of deaths). For the indicators of prison conditions that are individual invariant, the model that we estimate exploits the presence of prisoners serving their sentences in jurisdictions other than their hometown (the movers) and of those who serve their sentences in their province of residence in which more than one prison is present (the stayers). This allows us to include province of residence fixed effects absorbing any kind of heterogeneity at the province level that is correlated to prison conditions. For the measure varying at the individual level, we can also include prison fixed effects. The model that we estimate is:

$$y_{ijh} = \alpha + \beta_1 Z_{ij} + \sum \beta_k x_{i(k)} + \lambda_h + \gamma_j + \varepsilon_{ijh}, \qquad (1)$$

where i denotes the individual and j the prison where his sentence was served, h the province of residence, and Z the measure of prison conditions, and for most of the inmates, j is located in a province h other than the one where individual i lives after release (i.e., j is different from h) or for the same province h we have more than one prison j. The outcome we observe, y, is equal to 1 if the individual was rearrested during the interval of time considered (seven months) and 0 otherwise. The set of variables at the individual level, denoted by x, includes gender, marital status, education, the most recent crime, employment status before arrest, and sentence. The type of crime

and the sentence are the most important variables in terms of the dangerousness of the former inmate. We also include time served as an individual variable because it is, in general, different from the sentence (time served and sentence do not coincide since our data come from the Collective Clemency Bill, which provided for an immediate three-year reduction in detention for all inmates who had committed a crime before May 2, 2006).

Under the assumption that unobserved heterogeneity across movers and stayers living in a province with at least two prisons is uncorrelated with prison quality, when Z is individual invariant, the estimated β_1 captures the causal impact of our measure of prison quality on recidivism. In other words, to estimate the causal effect of prison conditions on recidivism, the assumption is that unobserved characteristics of inmates do not determine the assignment to harsher prisons. When the measure of prison condition varies at the individual level within each prison, we can relax this assumption since it is possible to include prison fixed effects γ_j that control for any possible nonrandom assignment of inmates into prisons. The measure of prison condition varying at the individual level is the number of deaths during the inmate's prison spell. The number of deaths occurring during the period of imprisonment is positively correlated with the inmate's prison spell. However, the inclusion of time served and sentence as additional regressors should avoid that for a given sentence the deaths variable will merely pick up the effects of more time served in the prison. Hence, identification of the coefficient on the number of deaths is obtained by exploiting variation in the number of deaths observed by former inmates who served different prison spells, conditional on their original sentence.[10]

4. Data

4.1. Individual Level Data

We perform our analysis of the effects of prison conditions on recidivism by means of a unique dataset constructed from various sources. First, individual-level variables of former inmate individual characteristics and

10. Once we control for sentence, whether one inmate served more time than another is due to the date of entry in prison, a variable that is as good as random. (We provided evidence consistent with this assumption in Drago, Galbiati, and Vertova (2009).)

recidivism are drawn from an internal database that the Italian DAP maintains on offenders under its care. We were granted access to the DAP database records on all the individuals released pursuant to the collective pardon law between August 1, 2006 and February 28, 2007. This law, enacted to address the widespread overcrowding in Italian prisons, provided for an immediate three-year reduction in detention for all inmates who had committed a crime before May 2, 2006.[11] This feature of the data is particularly useful for our analysis because all the subjects in our sample are analyzed in the same time span, thus avoiding any possible correlation between time and prison quality. The full sample includes 25,814 individuals. For each individual, the data provide information on whether or not the individual committed another crime in the period between release and February 28, 2007. Most of the individuals reentering prison by this date were caught by police while they were committing a criminal act and were subject to pretrial detention, that is, they had not already been processed through the justice system when they reentered prison. The dataset contains information concerning a large number of variables at the individual and facility level. For each individual, information is reported on: the facility where the sentence was served, the official length of the sentence, the actual time served in the facility, and the kind of crime committed (i.e., the last crime committed in the individual's criminal history). Moreover, for most of the inmates, the data also report inmates' age, level of education, marital status, nationality, province of residence, employment status before being sentenced to prison, and whether the individual has received the first verdict for previous crimes at the date of release. The Appendix provides a more detailed description of the variables included in the dataset and of crimes included in the different crime categories. Since data on subsequent convictions are not available, we use a subsequent criminal charge and imprisonment as the measure for recidivism.

4.2. Data on Prison Quality

Data on prison quality refer to two dimensions of life in prison. First, prison harshness measured by an overcrowding prison index and an in-prison death

11. See Barbarino and Mastrobuoni (2007) and Drago, Galbiati, and Vertova (2009) for a detailed description of the institutional environment.

rate. Second, prison isolation measured by the number of volunteers operating in a prison and the distance between each facility and chief town of the province where the facility is located. For data on prison harshness, the rate of overcrowding at the facility level is directly provided by the DAP database facility. Excluding judiciary mental hospitals from our sample (98 inmates), it covers 198 prisons. Data on the number of deaths that occurred in each residential facility during each former inmate's period of imprisonment were constructed by referring to the report on "Deaths in Prison" from the Associazione Ristretti.[12] For each inmate, we count the number of deaths that occurred in the facility of detention from 2003 (or, alternatively, from an inmate's moment of entry into the facility for those arrested after January 1, 2003) to July 2006 (the last month spent in prison for all the individuals in our sample). Note that this measure of deaths occurring in a prison is different from the measure used by Katz, Levitt, and Shustorovich (2003), who resort to aggregate data and use the total number of deaths (per thousand inmates) occurring in a state's prison system. Unlike Katz, Levitt, and Shustorovich (2003), we can construct a measure of the number of deaths that occurred in a facility from the moment of entry for each individual in the dataset (in particular, for those who entered starting from January 2003). This measure is particularly useful for evaluating the effect of prison conditions on post-release criminal behavior as it captures the specific conditions faced by each individual during the time served in a facility. For the same original sentence length, this variable depends on the moment of entry into prison. It is reasonable to believe that inmates perceive the degree of prison harshness at the moment of entry and this may matter for future recidivism. Therefore, it should be clear that for a given perception of prison harshness that inmates receive at the moment of entry (which the inclusion of prison fixed effects controls for), the high-frequency variation of this variable captures the effect of having seen an additional death in prison.

Finally, we independently construct the measure of distance and volunteer presence in the facilities. We report the road distance between each

12. *Associazione Ristretti* is an association for inmates' rights. The report *morti in carcere* on deaths in prison has been conducted annually by directly collecting news about deaths in the Italian prison system. It reports monthly information about each death at facility level. (The report is downloadable from the website: www.ristretti.it.)

facility and chief town of the province, where the facility is located by calculating the distance in kilometers between the facility address and each town.[13] The measure of distance should capture the degree of prison isolation. *Ceteris paribus*, the more distant a prison facility from the chief town is, the higher the costs are for associations, groups of volunteers, and civil rights organizations to access the prison to develop social activities, education, and job training for inmates.[14] Since both the population density and the density of associations are higher in chief towns, offering a certain social activity in a prison more distant from the town implies higher costs of transportation, organization, and motivation of volunteers. Greater distances also imply less attention by the local media to prison problems and events. More generally, the degree of osmosis between prison and the rest of society is higher in facilities located near the center of the chief town. As for the volunteers, for the facilities for which this information is available, we count the number of volunteers as reported by the facility administration.[15] We construct an index of volunteer density by dividing the number of volunteers by the number of inmates present in the facility at the end of 2005. These volunteers are members of religious, political, and civil rights organizations that have access to prisons to give moral assistance to inmates and to develop educational, recreational, and job training programs.[16] It is important to stress that these programs are not initiated or promoted by the prison administration but are the outcome of the voluntary action of associations. The result of the process is a unique dataset including for each inmate a measure of recidivism, individual characteristics, and facility-level information.

13. We use the road distance as calculated by the Internet map site www.viamichelin.com. This allows us to calculate the distance to any facility address from the chief town or city center coordinates (the website automatically calculates the coordinates of the town or city center).

14. In Italy, there is a strong tradition of associations organizing activities in prison facilities, with an important contribution made by volunteers.

15. Data on volunteers have been provided by the association FIVOL (*Fondazione Italiana Volontariato*—www.fivol.it), while data on the number of inmates in each facility are provided by the Associazione Antigone and published in the report "Dentro il Carcere," Carocci, Rome (2006).

16. Unfortunately, we are not able to distinguish between the different kinds of programs and assistance offered to inmates.

4.3. Descriptive Statistics

In the empirical analysis, we exclude individuals for whom the original sentence is missing, and we consider only individuals released in August 2006 (81% of the sample). Thus, we have a homogeneous sample along both the date of release and the length of window we observe. Table 1 reports descriptive statistics on the individual-level data for the entire sample of individuals (column 1) released. The sample is mainly composed of males (95.4%). The average original sentence and the time served are 39 and 24.47 months, respectively, and the average recidivism in the seven-month period is 0.115. Most of inmates have been convicted for property crimes including thefts and robberies (about 40% of the sample) and for violation of the law regulating the use and selling of drugs (about 40% of the sample). Unfortunately, we cannot distinguish drug dealers from users in our sample. Inmates convicted for violent crimes (including murders and assaults) are about 10% of the sample. The missing crime category refers to a few other categories each accounting for less than 0.5% of the total number of inmates in the sample. In panels 1–4 in Figure 1 we report the histograms for each of the four measures of prison conditions. The average overcrowding index is 150 and there is substantial variation in this index. Each inmate had seen 1.31 deaths on average during his detention. Normalizing this number for the prison population of each facility gives 0.0045. The average distance of the prison from the jurisdiction chief town is 15.99 km, and the average number of volunteers operating in the facility is 0.14 in per capita terms. In columns 2–3 of Table 1, we report summary statistics on the two groups of inmates on which we obtain identification of the effect of prison conditions on recidivism. The first group is composed of former inmates who served their sentence in a facility outside their province of residence (these inmates are labeled “movers” and summary statistics are reported in column 2). The second group is composed of those who served their sentence in a prison located in their province of residence in which more than one prison is present (summary statistics in column 3). While differences between the entire sample and the two subsamples are not an issue for identification, it is worth noting that most of the observable characteristics are similar. A notable exception is that in column 2 movers have a longer original sentence, whereas in column 3, the original sentence is shorter compared to column 1.

Table 1. Individual Characteristics

	Whole Sample (1) Mean (SD)	Movers (2) Mean (SD)	Stayers in Province with more than One Prison (3) Mean (SD)
Original sentence (in months)	38.982 (32.58)	42.896 (34.15)	35.287 (30.35)
Time served (in months)	24.471 (29.34)	27.869 (31.01)	21.287 (27.15)
Recidivism	0.115 (0.319)	0.119 (0.324)	0.116 (0.320)
Overcrowding (number of prisoners for hundred available places in the detention facility)	150.17 (40.89)	148.46 (41.65)	149.37 (40.63)
Average number of deaths occurred during detention in the same facility for (each inmate)	1.318 (2.493)	1.007 (1.901)	1.890 (3.234)
Distance from jurisdiction chief-town in km	15.993 (21.46)	19.143 (24.64)	14.680 (17.91)
Number of volunteers per capita	0.141 (0.156)	0.137 (0.154)	0.112 (0.104)
Age on exit	38.764 (10.53)	38.351 (10.59)	39.401 (10.69)
Percentage of males	0.954 (0.209)	0.951 (0.215)	0.952 (0.213)
Share of Italians	0.621 (0.485)	0.559 (0.496)	0.712 (0.452)
Married	0.284 (0.451)	0.282 (0.450)	0.293 (0.455)
Area of residence			
North	0.425 (0.494)	0.424 (0.424)	0.356 (0.356)
Center	0.185 (0.388)	0.161 (0.367)	0.229 (0.420)
South	0.378 (0.488)	0.392 (0.485)	0.414 (0.492)
Education			
Compulsory	0.901 (0.296)	0.889 (0.300)	0.909 (0.286)
High school	0.079 (0.270)	0.081 (0.273)	0.073 (0.260)
College (degree or equivalent)	0.009 (0.096)	0.010 (0.099)	0.009 (0.097)
Permanently employed	0.339 (0.473)	0.337 (0.472)	0.334 (0.471)
First judgment taken	0.998 (0.442)	0.999 (0.446)	0.999 (0.439)
Kind of offense			
Drug offenses	0.404 (0.490)	0.425 (0.494)	0.379 (0.485)
Crime against property	0.412 (0.492)	0.399 (0.489)	0.438 (0.496)
Crimes against public safety	0.005 (0.004)	0.004 (0.003)	0.005 (0.005)
Gun law	0.012 (0.109)	0.010 (0.104)	0.013 (0.115)
Immigration bill	0.029 (0.168)	0.028 (0.156)	0.023 (0.150)
Violent crimes	0.099 (0.292)	0.092 (0.289)	0.089 (0.284)
Number of observations	20,950	11,097	7,779

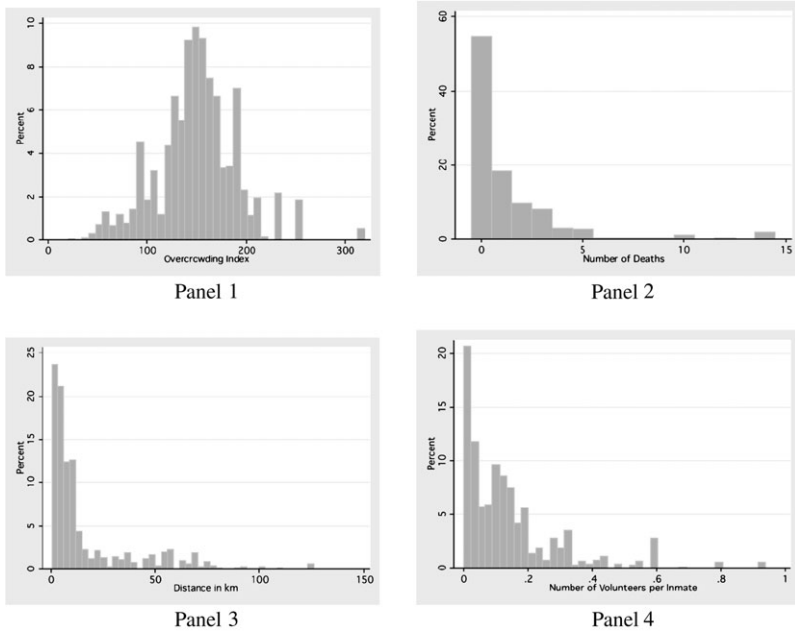


Figure 1. Distributions of the Measures of Prison Conditions.

4.4. Evidence on the Identifying Assumption

The assumption for the identification of Equation (1) is that the assignment of movers and of stayers living in a province with more than one prison does not depend on individual unobserved characteristics that explain recidivism and are correlated to prison quality. (This assumption is not necessary when the measure of prison conditions is the number of deaths because this varies over time and prison fixed effects controlling for any possible nonrandom assignment can be included.) Note that it is not necessary that being a mover or stayer living in a province with more than one prison is uncorrelated with prison conditions, but rather that once an inmate is designated as a mover or stayer, his destination does not depend on prison conditions.

As discussed in Section 2, the process governing prison assignment supports the identifying assumption: The assignment to a facility is determined according to the amount of space available in other facilities at the moment of arrest or conviction, which suggests that unobservable inmates' characteristics and prison conditions are not correlated. It is possible to provide an

indirect test of this hypothesis. Specifically, we test whether (conditioning on the province of residence) there is a significant relationship between the observable characteristics of former inmates and the proxy for prison conditions.[17] If selection on observables is similar to selection on unobservables, a lack of a strong relationship between prison quality and observable characteristics indicates empirical support for the identification strategy, suggesting a zero correlation between unobservables and prison quality. More precisely, this test can be performed by estimating regressions for three measures of prison conditions on individual observable characteristics and then by running an *F*-test on the coefficients of the inmates' observables. In symbols, we test the following models:

$$\text{overcrowding index}_{ij} = \alpha + \sum \beta_k x_{i(k)} + \lambda_h + \varepsilon_{ij}, \tag{2}$$

$$\text{prisondist}_{ij} = \alpha + \sum \beta_k x_{i(k)} + \lambda_h + \varepsilon_{ij}, \tag{3}$$

$$\text{volunteers (percapita)}_{ij} = \alpha + \sum \beta_k x_{i(k)} + \lambda_h + \varepsilon_{ij}. \tag{4}$$

Here *j* and *i* stand for the facility-level and individual-level indexes, and λ_h is the province of residence fixed effects. Standard errors are clustered at the prison level as in the regression analysis in the next sections. When we run these regressions, the test of the joint null hypothesis that the coefficients β_k on observables at the individual level are all equal to 0 gives an *F*-statistic of 1.29 when we regress the overcrowding index, 1.96 when we regress prison distance, and of 1.14 when we regress the number of volunteers per capita. While an *F*-statistic of 1.96 for prison distance suggests that there might be some type of nonrandom assignment of inmates to more distant prisons, it

17. After prison conviction, the dossier upon which the DAP decides the final destination of first-time inmates contains roughly the same characteristics that we have in our dataset (i.e., personal characteristics, sentence length, and sentence motivation, in our case the crime committed). Therefore, if the process of assignment involves inmate characteristics, by controlling for these, we still would obtain consistent estimates of prison conditions on recidivism, and this balancing test on observables would not be very informative. Unfortunately, we do not have the complete criminal history of inmates, and we cannot discriminate between first-time and repeat offenders.

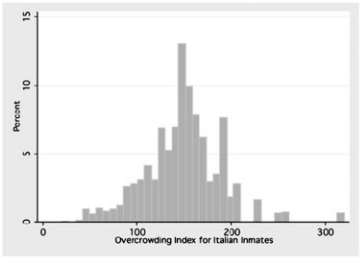
is comforting that taken together these results do not point to a systematic selection of less or more dangerous inmates to harsher prisons. Indeed, the correlation between the measures of harsh prison conditions and some key individual variables correlated to inmates' dangerousness (e.g., age, original sentence, and type of crime) is sometimes positive and sometimes negative.[18]

5. Results

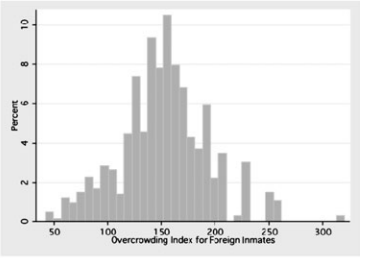
Given the large number of fixed effects included in our models, we rely on linear probability models. Our dependent variable is 1 if between August 1, 2006 and February 28, 2007, the individual was rearrested, and 0 otherwise. The individual variables included in the specifications are age, sentence, time served, education, employment status and marital status before the first conviction, nationality, and gender. Standard errors are adjusted for clustering at the prison level to allow any arbitrary autocorrelation of the errors in each prison.[19] In presenting the results, we also report some differential effects. Specifically, we report the coefficients on the measures of prison conditions for foreign and Italian inmates and for former inmates with an original sentence above and below the median. Since we find some heterogeneity in the response to prison conditions between Italian and foreign inmates, Figures 2 reports the same histograms reported in Figure 1 for for Italian and foreign inmates, respectively.

18. There is another piece of evidence that supports the identifying assumption. As we can see from Table 1, individuals in columns 2–3 are different from the whole sample (column 1) in some individual variables. For example, by regressing a dummy equal to 1, if an inmate is a mover on all the observables, we find that some individual variables are strong predictors for being a mover (in particular, sentence length and being non-Italian have a positive effect on the probability of being a mover, whereas age has a negative effect). It seems plausible to assume that if the assignment of movers to prisons is not as good as random, in the assignment process, the decision maker should use at least some of the information he actually possesses to determine who becomes a mover. For example, one should expect that if assignment is not random, sentence length should play a role in assignment. The fact that length of sentence and some other variables predict mover status but not prison quality measures provides further support to our hypothesis that there is no correlation between the individual determinants of recidivism and assignment to a better or worse quality prison.

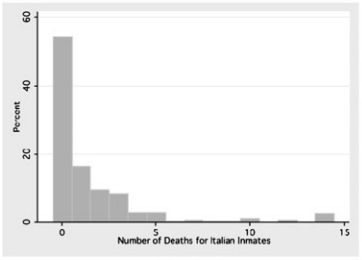
19. While clustering at the prison level seems to be more appropriate in this context, we also tried to cluster standard errors at the province of residence level but this did not alter the basic results.



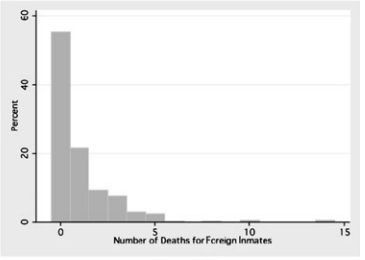
Panel 1a



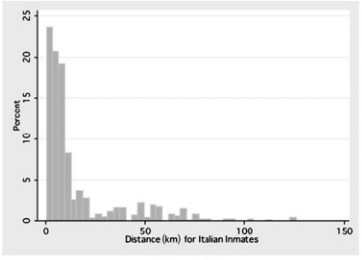
Panel 1b



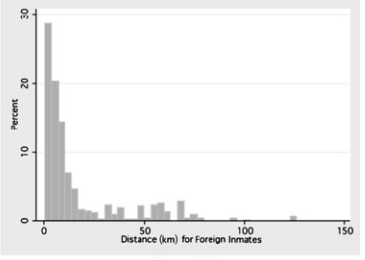
Panel 2a



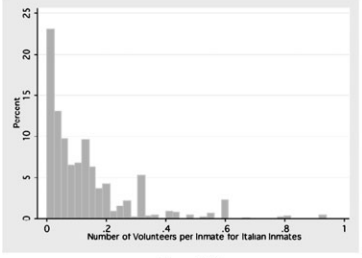
Panel 2b



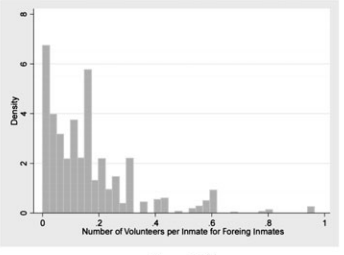
Panel 3a



Panel 3b



Panel 4a



Panel 4b

Figure 2. Distributions of the Measures of Prison Conditions for Italian and Foreign Inmates.

5.1. The Effect of Mortality in Prison

We start by discussing the results using prison deaths per capita as the indicator of the quality of life in prison (see Table 2). This indicator varies at the individual level within each prison. Because the impact on recidivism of the number of deaths may depend on the length of stay, we scale out of the death rate measure the variation in time served. Hence, in the regression, we use the number of deaths per capita normalized for the length of stay.

In column 1, not controlling for province of residence and prison fixed effects, the number of deaths significantly increases recidivism. The specification in column 2 "soaks up" most variation in the data by including province of residence fixed effects and prison fixed effects. The coefficient on deaths per capita is still positive but it is estimated with less precision (the *t*-statistic is 1.22). A 1 standard deviation increase in the number of deaths per capita (0.0088) increases the probability of recidivism of 0.005 percentage points (4.2%). In column 3, we report the coefficient on the number of deaths per capita not normalized for the length of stay in prison, and the coefficient is still positive. Overall, from this analysis, we do not find compelling evidence that harsh prison conditions reduce recidivism.[20] When we split the sample between Italian and foreign inmates, we observe a stronger and statistically significant relationship between number of deaths and recidivism for Italians but not for foreigners (columns 4–5). From Figure 2, it appears that this heterogeneity is not related to different exposure to prison conditions of Italian and foreign inmates. Finally, inmates with higher original sentences are more responsive to harsh prison conditions measured by deaths (columns 6–7).

To have an idea of the quantitative relevance of the effects we find, it is useful to compare these results with those of Katz, Levitt, and Shustorovich (2003) (hereafter KLS). This comparison should be taken cautiously as it is difficult to generalize results from different contexts, such as the United States and Italy. Using death rates among prisoners as a proxy for prison conditions,

20. Note that for each inmate we have the number of deaths that occurred in the facility of detention from 2003 (or, alternatively, from an inmate's moment of entrance into the facility for those arrested after January 1, 2003) to July 2006. In a given facility, this measure is the same for all the former inmates with long sentences that started before 2003. In the prison fixed-effects specification, identification of the coefficient on the number of deaths is obtained by using information on inmates with sentences that started after 2003. Results are essentially unchanged when we restrict the sample to only these inmates.

Table 2. Number of Deaths and Recidivism

	(1) Whole Sample	(2) Whole Sample	(3) Whole Sample	(4) Italians	(5) Foreign	(6) Sentence Above the Median	(7) Sentence Below the Median
Number of deaths per capita normalized for the length of stay	0.00407 (1.61)	0.00499 (1.22)		0.00892 (1.91)	−0.00081 (−0.08)	0.01294 (2.08)	0.00344 (0.46)
Number of deaths per capita (not normalized for the length of stay)			0.42312 (1.11)				
Province of residence fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Prison fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.021	0.027	0.027	0.03	0.02	0.057	0.058
Observations	19,287	19,287	19,316	12,117	7,170	9,837	9,450

Notes: Robust *t*-statistics in parenthesis. All specifications include province of residence and prison fixed effects. Individual variables include original sentence, time served, education levels, and age at the date of release, a dummy indicating marital status, nationality, and employment condition before imprisonment, and type of crime. Standard errors are clustered at the prison level.

KLS show that harsher prison conditions are associated with lower local crime rates. The estimated effects, however, are small. The elasticity of the murder rate to the prison death rate per thousand prisoners is between −0.005 and −0.048. For property crimes, the elasticity ranges from −0.05 to −0.17, and for violent crimes it is significantly lower. These elasticities may not incorporate the post-release response of former inmates to harsher prison conditions. In fact, they are calculated by regressing crime rates on contemporary prison conditions and reveal that harsh prison conditions have a general deterrent effect on the non-incarcerated. As far as our results are concerned, if we now consider the point estimate from column 2, the implied elasticity of annual recidivism rate (0.20) to the prison death rate per thousand inmates is about 0.024. If we consider the upper limit of the confidence interval of the estimated effect, this elasticity is about 0.064, whereas if we consider the lower limit, the elasticity is negative and close to 0. For a relevant group of individuals (i.e., Italian inmates), the effect is precisely estimated and the result is almost the double of what appears in column 2. Thus, our estimates suggest that former inmates may have a response to harsher prison conditions which is of the opposite sign with respect to the non-incarcerated. Some of our estimates are comparable to some of the effects estimated by KLS at least for the murder rate and violent crimes. However, in general our estimates do not seem to be large enough to outweigh the effects estimated by KLS. In fact, KLS provide some specifications in which they include the in-prison death rate with several lags. They find that the lagged values of harsh prison conditions reduce crime rates, where the lagged values of in-prison death rates should capture both a general deterrent effect (on the whole population) and a specific deterrent effect of prison harshness (on former inmates).

Finally, it is worth noting that a lack of deterrence for the whole sample might be simply due to the short time period of seven months. While there are not any obvious reasons to believe that in the long run the results would change, it should be clear that it is hard to draw any strong conclusions about long-run effects.[21]

21. We address a similar issue in Drago, Galbiati, and Vertova (2009) in which we offer evidence consistent with the fact that the deterrent effects of prison sentences should not change in the long run. Indeed, the averages of the main observable characteristics of those relapsing after seventeen months are very similar to the averages of those reentering prison in the seven-month period.

5.2. The Effect of Overcrowding and Prison Isolation

In Table 3, we present the results of the remaining measures of prison conditions. Unlike deaths per capita, these do not vary at the individual level and, therefore, it is not possible to include prison fixed effects. In all columns, we present the most complete specification with individual-level control variables and province of residence fixed effects. From column 1, the coefficient on the overcrowding index is positive but imprecisely estimated. It reveals a very small effect on recidivism. (An increase of 1 percentage point in the overcrowding index implies an increase of 0.00003 in the probability of being rearrested.) We try to obtain more precise estimates of the effects of the overcrowding index on recidivism by excluding from the regressions potential outliers: the most populated prisons and then the least populated prisons in absolute values. However, neither the size nor the precision of the estimated effects improves (results not reported). Overall, as the overcrowding index should reflect prison harshness, these results are consistent with the previous ones on death rates.

Columns 2–3 present the results on prison isolation measured by the distance from the prison of detention to the chief town of the province in which the prison is located and by the per capita number of volunteers. The point estimate on prison location reveals that a greater distance is positively associated with recidivism. The lack of precision in the estimates does not allow us to draw any conclusive result concerning prison distance, but prison isolation measured by distance does not seem to have a strong deterrent effect on recidivism. From column 3, we observe that increasing numbers of volunteers reduces recidivism, but this effect is also imprecisely estimated. The results are essentially unchanged when we include all three measures (overcrowding index, distance, and volunteers) in column 4 and when we add also the death measure in column 5. Splitting the sample between Italians and foreign inmates and between inmates with low and original sentences confirm the previous findings in Table 2 that for the Italians and inmates with high original sentences, harsher prison conditions increase recidivism.

6. Concluding Remarks

In this paper, we have investigated the effects of prison conditions on post-release recidivism among former Italian inmates. We have studied the

Table 3. Overcrowding, Prison Location, and Volunteers on Recidivism

	(1) Whole Sample	(2) Whole Sample	(3) Whole Sample	(4) Whole Sample	(5) Whole Sample	(6) Italians	(7) Foreign	(8) Sentence Above the Median	(9) Sentence Below the Median
Prison overcrowding index	0.00003 (0.33)			0.00002 (0.20)	0.00002 (0.25)	0.00014 (1.21)	−0.00011 (−1.10)	−0.00005 (−0.62)	0.00010 (0.67)
Distance from the chief town in km		0.00008 (0.67)		0.00005 (0.33)	0.00004 (0.24)	−0.00007 (−0.0.40)	0.00020 (1.02)	0.00006 (0.43)	0.00000 (0.01)
Number of volunteers per capita			−0.0.1921 (−1.21)	−0.01879 (−1.07)	−0.0124 (−0.45)	−0.0.2871 (−1.49)	−0.00909 (−0.29)	−0.03410 (−1.37)	−0.00919 (−0.29)
Number of deaths per capita normalized for the length of stay					0.00459 (1.63)	0.00597 (1.61)	0.00269 (0.52)	0.00525 (1.56)	0.00475 (0.91)
R^2	0.032	0.030	0.032	0.031	0.032	0.040	0.036	0.040	0.034
Observations	19303	18886	17084	16724	16700	10512	6188	8503	8197

Notes: Robust *t*-statistics in parenthesis. All specifications include province of residence fixed effects. Individual variables include original sentence, time served, education levels, age at the date of release, a dummy indicating marital status, employment condition before imprisonment, and type of crime. Standard errors are clustered at the prison level.

effects of two main dimensions of prison conditions: prison harshness (proxied by prison overcrowding and number of deaths in prison) and prison isolation (proxied by the distance of the chief provincial town from the prison and by the number of volunteers). Our research strategy relies on a unique dataset reporting the individual-level characteristics and behavior of more than twenty-five thousand former Italian inmates. Our data give us the possibility of controlling for the main sources of heterogeneity in assignment to particular prisons. Contrary to the specific deterrent hypothesis, according to which harsher prison conditions should reduce recidivism, we do not find compelling evidence that higher degrees of prison harshness or isolation contribute to reducing the propensity to re-engage in criminal activities. Overall, prison harshness, measured by overcrowding and numbers of deaths in prison, exacerbates recidivism. These results are in line with Chen and Shapiro (2007), who, using different data on a different country, do not find evidence consistent with the specific deterrence hypothesis. It is important to remark that the results in this paper do not rule out the possibility that harsh prison conditions have a general deterrent effect on criminals who have never received prison treatment, an issue that we cannot address with our design. Taken together, however, our results on the specific deterrent effect of prison conditions support the view expressed by Katz, Levitt, and Shustorovich (2003, p. 340) on the limited aggregate impact of changing prison conditions on crime rates: "Given the limited efficiency gains implied by these estimates, the moral and ethical considerations surrounding these issues would appear to dominate any economic arguments. In a society predicated on civil liberties, the social costs of degrading living conditions in prisons beyond their current state are likely to overwhelm any marginal reductions in crime."

Appendix

DESCRIPTION OF THE VARIABLES INCLUDED IN THE INDIVIDUAL-LEVEL DATASET

Original sentence (in months): this is the original sentence to which the inmate was convicted before being released pursuant to the Collective Clemency.

Time served (in months): this is the time served in prison before being released pursuant to the Collective Clemency bill.

Married: this is a dummy equal to 1 if the inmate was married before the last conviction and 0 otherwise. Education

Education Compulsory: this is a dummy equal to 1 if the inmate completed the compulsory school period. For Italians, this is equal to the junior high school degree and 0 otherwise.

Education Highschool: this is a dummy equal to 1 if the inmate obtained a high school degree and 0 otherwise.

Education College degree: this is a dummy equal to 1 if the inmate completed or obtained a college degree or equivalent (e.g., the so-called *laurea breve* in the Italian system) and 0 otherwise.

Permanently employed: this is a dummy equal to 1 if the inmate had a full time contract of employment before being convicted and 0 otherwise.

First judgment taken: this is a dummy equal to 1 if the inmate has been convicted at least in the first instance. It is 0 if the inmate is still waiting for the first judgment when he is released pursuant to the Collective Clemency.

Drug offenses: all violations of the law on the use and selling of drugs (Decree of the President of the Republic October 9th 1990, 309, and subsequent modifications and amendments).

Crimes against property: theft, larceny, robbery, bag snatching, and in general all the offenses regulated by Book II Section XIII of the Italian Penal Code.

Crimes against public safety: all crimes related to possible danger to the safety of people, things, public utilities, and buildings. All the crimes in this category are included in Book II Section VI of the Italian Penal Code.

Gun law: all violations of the law on using and carrying guns and other arms (Law 110/75 and subsequent modifications and amendments).

Immigration bill: all violations of the law on the regulation of immigration and the juridical status of foreign citizens (Law July, 25th 1998 n.286 and subsequent amendments and modifications).

Violent crimes: assault, homicide, and in general all the offenses regulated by Book II Section XII of the Italian Penal Code.

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