Prison Conditions and Recidivism

Francesco Drago ,

University of Naple Parthenope CSEF and IZA

Roberto Galbiati,

CNRS EconomiX and Cepremap

Pietro Vertova,

University of Bergamo and University Bocconi

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ABSTRACT

This paper examines the impact of prison conditions on future criminal behaviour. The analysis is based on a unique dataset on the post-release behaviour of 25,000 Italian former prison inmates. We use an exogenous 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 re-offending. We don't find compelling evidence of (specific) deterrent effects of prison severity. The measures of prison severity do not affect negatively 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.

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 deterrence and incapacitation of criminals has increased in recent years, as the substantial growth in prison populations in most countries shows. Figure 1 reports the trends in the growth rates of prison populations since the mid-nineties for a group of countries. Compared to the index year of 1995, by 2004 the number of inmates per 100,000 population had increased from 600 to 723 in the U.S., from 99 to 149 in the U.K. and from 87 to 96 in Italy.

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 at identifying 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 of prisons, we find very different punitive situations in terms of overcrowding, health services, social activities for inmates and so on. Theoretically, prison conditions may greatly affect the deterrent effects of

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[1] Some contributions in this field are: Nagin (1978), Donohue and Siegelman (1998), Levitt (1998), Kessler and Levitt (1999), Pintoff (2006), Lee and McCrary (2005), Drago, Galbiati and Vertova (2009), Helland and Tabarrok (2007), Kling (2006),

[2] More in general, 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 Bushway and Reuters (*forthcoming*) Levitt and Miles (2007), Polinsky and Shavell (2000), Western, Kling and Weiman (2001), and Garoupa (1997). Some recent contributions are: Di Tella and Dubra (*forthcoming*), Owens (forthcoming), and Levitt (2004). For models that embed Becker's paradigm in a dynamic equilibrium framework see Imrohologlu, Merlo and Rupert (2004) and Gallipoli and Fella (2006).

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 behaviour. Katz, Levitt, and Shustorovich (2003), using death rates among prisoners as a proxy for prison conditions, show that more punitive facilities have a small but statistically significant deterrent effect. Exploiting aggregate data on crime rates, they find a decline in local crime rates where prison conditions measured by death rates 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 coincide with 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 deterrent effect is driven by the response of formers inmates or by the reaction of criminals who had never received a prison treatment (or both). Moreover, it is not clear if harsher prison conditions cause lower crime rates in the absence of a quasi-experimental design. 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.[3]

In this paper we undertake a broad empirical analysis of the effects of having received a prison treatment. In particular we test how prison conditions, measured by several indicators, affect the propensity of former inmates to re-commit 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 higher recidivism as they may lead to a higher human capital deployment and worse labour outcomes for former inmates (Waldfogel, 1994). Discriminating between the two alternatives is inherently an empirical question. We exploit a unique large data set, 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 situation of 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 25,000 inmates were released from 198 Italian prisons on August 1st 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,

[3] Kuziemko (2007) analyzes a specific feature of the prison system, i.e. the parole system as opposed to the fixed-sentences regime. She provides evidence that the abolition of the parole system in Georgia has increased both per prisoner costs and recidivism. She also finds that a longer time spell served in prison reduces post-release criminal activity.

competition for resources, bad health and bad health-care conditions among others. Second, 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[4] 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 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 are 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 one is composed of those inmates serving their sentence in a jurisdiction different from 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 on "stayers" (those serving their sentence in the same jurisdiction of their hometown) who reside in a province with more than one prison. As we shall discuss in more detail in the paper, the institutional features of assigning these inmates to prisons entail that such an assignment does

[4] Italy is administratively organized in territorial areas. In particular, there are 20 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.

not depend on individual characteristics that may explain recidivism, but at the same time may be correlated to measures of prison conditions. Since about 70 percent 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 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 controlling for any kind of non-random assignment of inmates into prison.

Although being tough on inmates to "rehabilitate" them is to some extent a popular view, we do not find evidence supporting the idea that harsher prison conditions reduce recidivism. The empirical analysis reveals that all the four measures of harsh prison conditions increase recidivism. Although the point estimates are not precisely estimated, these results reject strong negative effects of harsh prison conditions on former inmates' criminal activity. Interestingly, there is a substantial degree of heterogeneity driving these results. Italians, who represent about the 60 percent of the total of former inmates in our sample, seem to react more to prison severity. We find that number of deaths (from all causes) in prison during the inmate's stay and the extent of overcrowding have a strong and positive impact on recidivism. Former inmates with a relatively short original sentence (below 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 already been incarcerated.

This paper contributes to the literature by providing an empirical analysis on a policy relevant issue on 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 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 negative effects of prison severity on recidivism. These results pose a provoking question about the effectiveness of imprisonment as a sanction, at least as far as the deterrent effects of prison severity for those already sanctioned are concerned. From a policy perspective, increasing prison severity does not seem an effective approach to reduce the post-release criminal activity of former inmates.

The paper proceeds as follows. In section 2 we describe our dataset and in section 3 we report the identification strategy. Section 4 presents the results. Finally, in section 5 we make some concluding remarks.

(*Figure 1 about here*)

2. Data Sources and Description

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 recidivism are drawn from an internal database that the Italian

Department of Prison Administration (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 1 August and 28 February 2007. This law, enacted to address the widespread situation of overcrowding in Italian prisons, provided for an immediate three-year reduction in detention for all inmates who had committed a crime before 2 May 2006[5]. 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 28th 2007. Most of the individuals re-entering prison by this date were caught by police while they were committing a criminal act and were subject to pre-trial detention, i.e. they had not already been processed through the justice system when they re-entered 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). The Appendix provides a description of the crimes included in the different categories. Moreover, 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 have received the first verdict for former crimes at the date of release. Since data on subsequent convictions are not available, we use a subsequent criminal charge and imprisonment as the measure for recidivism.

For data on prison quality, 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 in each residential facility that occurred during each

[5] See Drago et al. (2009) and Barbarino and Mastrobuoni (2007) for a detailed description of the institutional environment.

former inmate's period of imprisonment were constructed by referring to the report on "Deaths in Prison" from the Associazione Ristretti.[6] 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 1 January 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 et al. (2003), who resort to aggregate data and use the total number of deaths (per 1000 inmates) occurring in a state's prison system. Unlike Katz et al. (2003), we can construct a measure of the number of deaths that occurred in a facility from the moment of entry for each single individual in the data set (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 behaviour 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 at the moment of entry can have (which the inclusion of prison fixed effects control 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 facility and chief town of the province where the facility

[6] *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).

is located by calculating the distance between the facility address and each town.[7] For each prison we count the number of volunteers as reported by the facility administration.[8] 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 part of religious, political and civil rights organizations which have access to prisons to give moral assistance to inmates and to develop educational, recreational and job training programs.[9] 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 of the almost 26,000 former inmates, a measure of recidivism, individual characteristics, and facility-level information.

We exclude individuals for whom the original sentence is missing and we consider only individuals released in August 2006 (81 percent of the sample). Thus we have a homogeneous sample along both the date of release and the length of window we observe. Table I reports descriptive statistics on the individual-level data both for the entire sample of individuals (column 1) released. The sample is manly composed of males (95,4 percent). The average original sentence and the time served are 39 and 24,47 months, respectively, and the average recidivism in the 7-month period is

[7] 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 city centre coordinates (the web-site automatically calculates the coordinates of the city centre).

[8] Data on volunteers has 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).

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

0.115. The overcrowding index is 150 and there is a substantial variation in this index. Each inmate had seen 1.31 deaths on average during his detention. By normalizing this number for prison population for each facility, this number is 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. As we discuss in the next section, while we use the entire sample in the regression analysis, the identification of the effects of prison conditions on recidivism is based on two groups of inmates. In columns 2-3 we report summary statistics on these two groups. The first group is composed of former inmates who served their sentence in a facility outside their province of residence (these inmates are labelled as "movers" and summary statistics is 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). The presence of these inmates makes it possible to control for province of residence fixed effects, thus absorbing any kind of unobserved heterogeneity in the inmates' residence area. While differences between the entire sample and the two sub-samples 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 I about here*)

3. Empirical Analysis

3.1. Identifying the Effects of Quality of Life and Isolation in Prison

The available measures of quality of life in prison are the overcrowding index and number of deaths. For the first measure we estimate the following model:

$$y_{ij} = \beta_1 overcrowdingindex_j + \sum \beta_k x_{i(k)} + \varepsilon_{ij}, \quad (1)$$

where *i* denotes the individual and *j* the prison where his sentence was served. The outcome we observed, *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 2 May, 2006).

The empirical challenge in estimating the effects of quality of life in prison on recidivism is that of addressing the potential problems of endogeneity in quality measures. 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 measures. In any case, the estimated coefficient β_1 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.

The idea behind our solution to the problem of the endogeneity of the prison quality measure is to exploit some features of the Italian prison system. As mentioned previously, many prisoners serve their sentence in jurisdictions other than their hometown and there are also many inmates who serve

their sentence in their province of residence in which more than one prison is present. Denote the province where an inmate lives after release as *h*. The equation that we can estimate is:

$$y_{ijh} = \beta_1 overcrowdingindex_j + \sum \beta_k x_{i(k)} + \lambda_h + \varepsilon_{ijh}, \quad (2)$$

where λ_h are province fixed effects that account for differences across provinces that drive criminal behaviour after release. In model (2), for most of the sample we have that either *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 that for the same province *h* we have more than one prison *j*. In this way we absorb any kind of unobserved heterogeneity of this province that would lead coefficient β_1 to be biased. Under the assumption that unobserved heterogeneity across movers and stayers living in a province with at least two prisons is uncorrelated with prison quality, the estimated β_1 captures the causal impact of our measure of prison quality on recidivism. In section 3.2 we discuss this identifying assumption in detail.

When we focus on the recidivism effects of the other proxy for prison quality (deaths), we still exploit the presence of inmates for whom $j \neq h$ and for whom for each *h* we have different *j*, but need not assume that assignment of these inmates to prison is as good as random, conditional on observable characteristics. The reason for this is straightforward: since the number of deaths per capita[10] varies at the individual level within each prison, we can also include prison fixed effects in the regressions as:

$$y_{ijh} = \beta_1 deaths_{ij} + \sum \beta_k x_{i(k)} + \lambda_h + \alpha_j + \varepsilon_{ijh}. \quad (3)$$

[10] In the regressions we use the number of deaths per capita (i.e. the number of deaths per each inmate over the number of prisoners in a given facility as of December 2005). We resort to the per capita measure to normalize the number of deaths for each prison population.

Prison fixed effects control for any possible non-random assignment of inmates to harsher prisons. Some clarifications regarding model (3) are necessary. The number of deaths occurring during the period of imprisonment is positively correlated with the inmate's prison spell. However, by including time served and sentence as additional regressors in (3), for a given sentence the deaths variable will not merely pick up the effects of more time served in the prison. 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). Hence, conditional on the original sentence, inmates within each prison differ in the number of deaths seen and time served for reasons that are unlikely to be correlated to unobservables. Controlling for prison original sentence and time served, the identification of the parameter β_1 is obtained by exploiting variation in the number of deaths observed by former inmates who served different prison spells.

The last issue analyzed in this paper is how isolation affects recidivism. The aim of imprisonment is to isolate convicted individuals from the rest of society for a certain period of time with the purpose both of incapacitating and of re-educating them to social life. Since prison essentially *means* isolation from society, testing how the degree of prison isolation affects recidivism is an important issue. As a proxy for the degree of prison isolation we use two measures. First, the distance of the prison from the closest chief province town. We believe that this variable captures the degree of isolation of prisoners for this reason: 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.[11] Since both the population density and the density of associations are higher in chief

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

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 centre of the chief town. Greater distance should also be correlated with fewer visits. For the interpretation of the results it is important to know whether more distant prisons are associated with more amenities (e.g. more distant prisons might have been built more recently). In this case distance would capture good prison conditions rather than isolation. Although casual evidence suggests that this is not the case, we do not have data to address this concern. However, we observe that the raw correlation between our measure of distance and deaths is positive (0.1016), suggesting that more distant prisons are associated with worse living conditions. The other variable we use to proxy prison isolation is the number of volunteers per capita. This measure is negatively correlated with the measure of distance (the raw correlation is -0.2027). Overall, the distance measure may capture a number of aspects of prison isolation, while the number of volunteers indicates one particular feature of prison isolation.

Estimating the effects of prison isolation captured by prison location and number of volunteers on recidivism may present problems of endogeneity similar to those already discussed in relation to the overcrowding index. For example, in areas with higher opportunities to commit another crime, prisons might have been built further from the chief province town in order to minimize the social ties of inmates. Or it may be that, in areas with high crime intensity, prisons have been built closer to the chief town in order to minimize the costs of imprisonment. In order to address these potential problems of unobserved heterogeneity, we include province of residence fixed effects. Hence we estimate model (2) by including prison distance and number of volunteers from the chief town as key control variables.

3.2. Evidence on the Identifying Assumption

The key assumption for the identification of model (2) is that the assignment of movers and of stayers living in a province with more than one prison does not depend on individual characteristics that explain recidivism and are correlated to prison quality (this assumption is not necessary when estimating model (3) because the inclusion of prison fixed effects controls for any possible non-random assignment of movers). 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 a stayer, his destination does not depend on prison conditions, conditional on observable characteristics.

There are both arguments and evidence in support of the identifying assumption. The Italian law[12] on this issue 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 waiting for first judgment, prisoners can be assigned to a facility close to where they were arrested. After 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: 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 to which facility she will be assigned. If for any reason the mover is assigned to a facility outside her region of residence, the destination is decided directly

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

by the central directorate of the DAP.[13] We conducted several interviews with members of the inmates' rights association "Ristretti" and DAP officers[14] in order to understand in greater detail the decision 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 the 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 home-town in two possible cases. At the moment of the arrest or conviction each inmate is provided with an inmate's dossier containing personal information and a summary of the judicial decision about her sentence. On the basis of this dossier the decision-maker evaluates whether there is any incompatibility between the inmate and the facility closest to her home-town. It is worth noting that for inmates at their first experience of the prison system 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). The second reason for incompatibility is that the closest facility has reached a maximum threshold of overcrowding. For each facility this threshold depends on the prison administration evaluation 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 percent may be evaluated as being above the threshold level, whereas in other periods this overcrowding rate may be considered below the

[13] Italian public administration is in general organized on a territorial basis. Central administrations operate at national level and then there are territorial administration at the levels of regions and provinces (within regions).

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

threshold).[15] Once an inmate is designated as a mover, the decision process governing assignment to facilities follows a "space availability" criterion.[16] 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 level of available space of other facilities at the moment of arrest or conviction. If the moment of conviction is orthogonal to inmates' unobserved characteristics, we can safely assume that movers' characteristics do not predict the quality of the facility assigned.[17] The process governing the assignment of "stayers" who reside in a province with more than one prison is also based on a "space availability" criterion. At the moment of arrest, individuals are assigned to the prison having fewer problems to receive inmates.

We examine whether data support the hypothesis the assignment of inmates to a facility of higher or lower quality does not depend on unobservables influencing the likelihood of recidivism. 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. This can be done by estimating regressions of three measures of prison condition on individual observable characteristics and then by running an F-test on the coefficients of the

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[15] Although it is not an issue for the analysis, this implies that overcrowding is not always systematically lower in the facilities to which the inmates move.

[16] 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 4th 2008, "Bologna: Provveditore; carceri piene? Trasferiamo i detenuti").

[17] There are other papers supporting the idea that inmates' unobservable characteristics are orthogonal to the moment of conviction. See Drago, Galbiati and Vertova (2009) and Kuziemko (2007).

inmates' observables. For example, if there is selection on unobservables, we should also expect variables describing the degree of dangerousness (type of crime and sentence) to predict prison harshness. On the contrary, a non significant F-test at conventional levels suggests no significant relationship between (all) individual characteristics and the quality of the facility of assignment. This does not prove random assignment, since the assumption requires there be no correlation between prison quality and both observable and unobservable mover characteristics. However, if selection on observables is similar to selection on unobservables, then a lack of a strong relationship between prison quality and observable characteristics indicates empirical support for the identification strategy. In symbols, we test the following models:

$$overcrowdingindex_{ij} = \sum \beta_k x_{i(k)} + \lambda_h + \varepsilon_{ij},$$

$$prisondist_{ij} = \sum \beta_k x_{i(k)} + \lambda_h + \varepsilon_{ij},$$

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

Here *j* and *i* stand for the facility-level and individual-level indexes and λ_h is province of residence fixed effects. Standard errors are clustered at the prison level as in the regression analysis. 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-statistics of 1.96 for prison distance suggests that there might be some type of non-random assignment of inmates to more distant prisons, it 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 sometime negative.

There is another piece of evidence which supports the identifying assumption. As we can see from Table 1, individuals in columns 2-3 are different from whole sample (column 1) in some individual variables. For example, by regressing a dummy equal to one 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 uses for determining 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 for movers.

4. 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 1 August 2006 and 28 February 2007 the individual was rearrested, and zero otherwise. All specifications include individual variables: age, sentence, education, employment status and marital status before the first conviction, nationality, gender and time served. Standard errors are adjusted for clustering at the prison level to allow any arbitrary autocorrelation of the errors in each prison.[18] In presenting the results we also report some differential effects. Specifically, we report the coefficients on the measures of prison conditions for

[18] 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.

foreign and Italians inmates and for former inmates with an original sentence above and below the median.

4.1 Prison harshness

We start by discussing results for the effects of the overcrowding index on recidivism. Taking the overcrowding index as the indicator of quality of life in prison, in Table II we present estimates of variations on equation (2). In column 1 we include only the overcrowding index in the regression, in column 2 we include as additional covariates only individual variables. The coefficient on the overcrowding index is positive and associated with large standard errors. In the next two columns we include the type of crime and the province of residence fixed effects. The coefficient is still negative and statistically not significant at conventional levels. It reveals a very small effect on recidivism (an increase in 10 percentage points in the overcrowding index implies a reduction of 0.0003 in the probability of being re-arrested). 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). Columns 5-6 reveal that there is some heterogeneity in the effect of overcrowding. In column 5, we observe that for Italians the positive correlation between recidivism and overcrowding is statistically significant at conventional levels. In this case a 10 percent increase in the overcrowding index implies a reduction of 0.0016 in the probability of recidivism. From columns 7-8 we do not observe a different effect for inmates with an original sentence below and above the median.

(*Table II about here*)

We now present the results using prison deaths per capita as the indicator of the quality of life in prison (see Table III).

(*Table III about here*)

In columns 1-3, not controlling for province of residence and prison fixed effects, the effect of the number of deaths on recidivism is positive. The specification in column 4 "soaks up" most variation in the data by including province of residence fixed effects and prison fixed effects. By including prison fixed effects we absorb any kind of unobserved heterogeneity at the prison level and control for any potential non-random assignment of prisoners to prisons. We can include prison fixed effects because the key variable differs for each mover even at the prison level (it depends on how many deaths occurred during the prison spell (see the discussion of model (3) in section 3.2). The coefficient on deaths per capita is still positive but it is not precisely estimated (the t-*statistic* is 1.11). Overall, from this analysis we do not find compelling evidence that harsh prison conditions reduce recidivism.[19] Instead, when we split the sample between Italian and foreign inmates, we observe a strong and statistically significant relationship between number of deaths and recidivism for Italians. The coefficient of 1.0562 suggests that for a prison with 100 inmates, an additional death of an inmate should reduced the probability of recidivism of about 0.0015 (1.3 percent). This

[19] 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 1 January 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.

result is in line with the previous one on overcrowding and it also indicates that a lack a precision in the previous estimates (columns 1-4) is not due to the fact that the high-frequency variation of this variable is not informative about harsh prison conditions. The results on Italians instead suggest the number of deaths can be an important component of an inmate's detention for future recidivism. However, we have to acknowledge that a lack of deterrence for the whole sample might be simply due to the short time period of 7 months. While there are not obvious reasons to believe that in the long run results would change, it should be clear that is hard to draw any strong conclusions about long-run effects.[20]

4.2 Prison isolation

Table IV presents the results for the number of volunteers (per capita) on recidivism. From columns 1-3 we observe a negative impact of volunteers on recidivism, but imprecisely estimated. In column 4, the inclusion of province of residence fixed effects improves the precision, although we cannot conclude that the effect is statistically different from zero at conventional level. From columns 5-8, we only find evidence that for Italians the effect of volunteers seems somehow larger. Table V presents the results of prison location on recidivism. The point estimates reveal that a longer distance is positively associated to recidivism. However, the lack of precision in the estimates does not allow drawing any conclusive indication of prison distance but that prison isolation measured by this distance measure does not seem to have a strong negative effect on recidivism.

(*Table IV and Table V about here*)

[20] We address a similar issue in Drago, Galbiati and Vertova (2009) in which we offer evidence consistent with the fact that the deterrence effects of prison sentences should not change in the long-run. Indeed, the averages in the main observable characteristics of those recidivating after 17 months are very similar to the averages of those re-entering prison in the 7-month period.

5. 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 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 between prison and chief province town and number of volunteers). Our research strategy relies on a unique dataset reporting individual level characteristics and behaviour of more than 25,000 former Italian inmates. Our data give us the possibility to control for main sources of heterogeneity in the assignment to prison facilities. Contrary to the specific deterrent hypothesis according to which harsher prison conditions should reduce recidivism, we do not find compelling evidence that a higher degree of prison harshness or isolation contribute to reduce the propensity to engage into criminal activities. Taken together our results on the specific deterrent effect of prison conditions, support the view expressed by by Katz et al. (2003) about the small 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*" (Katz et al., p. 340).

References

Barbarino, A. And Mastrobuoni, G. 2007. The Incapacitation Effect of Incarceration: Evidence from Several Italian Collective Pardons. Carlo Alberto Notebook, Working Paper no. 55

Becker, G. 1968. Crime and Punishment: An Economic Approach. *Journal of Political Economy*. 76 (2): 169-217.

Bedard, K. and E. Helland. 2004. The Location of Women's Prisons and the Deterrence Effect of "Harder" Time. *International Review of Law and Economics* 24: 147-167.

Bushway, S. and P. Reuter. Forthcoming. Economists' Contribution to the Study of Crime and the Criminal Justice System. *Crime and Justice: A Review of Research.*

Chen, K.M. and J.M. Shapiro. 2007. Does Prison Harden Inmates? *American Law and Economics Review* 9: 1-29.

Di Tella, R. and J. Dubra. Forthcoming. Crime and Punishment in the 'American Dream'. *Journal of Public Economics.*

Donohue, J.J. and P. Siegelman. 1998. Allocating Resources Among Prisons and Social Programs In the Battle Against Crime. *Journal of Legal Studies* 27 (1): 1-43.

Drago, F., R. Galbiati and P. Vertova. 2009. The Deterrent Effects of Prison: Evidence from a Natural Experiment. *Journal of Political Economy* 117(2): 257-280.

Fella, G. and G. Gallipoli. 2006. Education and Crime over the Life Cycle. Unpublished manuscript. University College of London.

Garoupa, N. 1997. The Theory of Optimal Law Enforcement, *Journal of Economic Surveys* 11(3): 267-95.

Helland, E. and A. Tabarrok. 2007. Does Three Strikes Deter: A Non-Parametric Investigation. *Journal of Human Resources* 42: 309-330.

Imrohoroglu, A., A. M. Merlo and P. Rupert, P. 2004. What Accounts for the Decline in Crime?. *International Economic Review* 45: 707-729.

Katz. L, S. D. Levitt and E. Shustorovich. 2003. Prison Conditions, Capital Punishment, and Deterrence. *American Law and Economic Review* 5(2): 318-343.

Kessler, D. P. and S. D. Levitt. 1999. Using Sentence Enhancements to Distinguish between Deterrence and Incapacitation. *Journal of Law and Economics* 17(1): 343-363.

Kling, J.R. 2006. Incarceration Length, Employment and Earnings. *American Economic Review* 96 (3): 863-876.

Kuziemko, I. 2007. Going Off Parole: How the Elimination of Discretionary Prison Release Affects the Social Cost of Crime. *NBER Working Paper 13380*.

Levitt, S.D. 1998. Why Do Increased Arrest Rates Appear to Reduce Crime: Deterrence, Incapacitation, or Measurement Error?. *Economic Inquiry* 36: 353-372.

Levitt, S.D. 2004. Understanding Why Crime Fell in the 1990s. Four Factors that Explain the Decline and Six that Do Not. *Journal of Economic Perspectives* 18(1): 163-190.

Levitt, S.D. and T. J. Miles. 2007. Empirical Study of Criminal Punishment. In Polinsky, M.A. and S. Shavell (eds). *The Handbook of Law and Economics*, vol 1. North-Holland.

Nagin D. 1978. Crime Rates, Sanction Levels and Constraints on Prison Population. *Law and Society Review* 12 (3): 341-366.

Owens, E.G. Forthcoming. More Time Less Crime? Estimating the Incapacitative Effect of Sentence Enhancements. *Journal of Law and Economics*.

Pintoff, R. 2006. Juvenile Jails: A Path to Straight and Narrow or Hardened Criminality? Unpublished manuscript. University of Maryland.

Polinsky, A. M. and S. Shavell. 2000. The Economic Theory of Public Enforcement of Law. *Journal of Economic Literature* 38: 45–76.

Waldfogel, J. 1994. The Effect of Criminal Conviction on Income and the Trust Reposed on Workmen. *Journal of Human Resources* 29: 62-81.

Western, B., J.R. Kling and D.F. Weiman. 2001. The Labor Market Consequences of Incarceration. *Crime and Delinquency* 47(3): 410-427.

Appendix: Types of Crime Included as Control Variables and their Definition

Drug offences: In this category are included all the 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: In this category are included: theft, larceny, robbery, bag-snatching and in general all the offences regulated by Book II Section XIII of the Italian Penal Code.

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

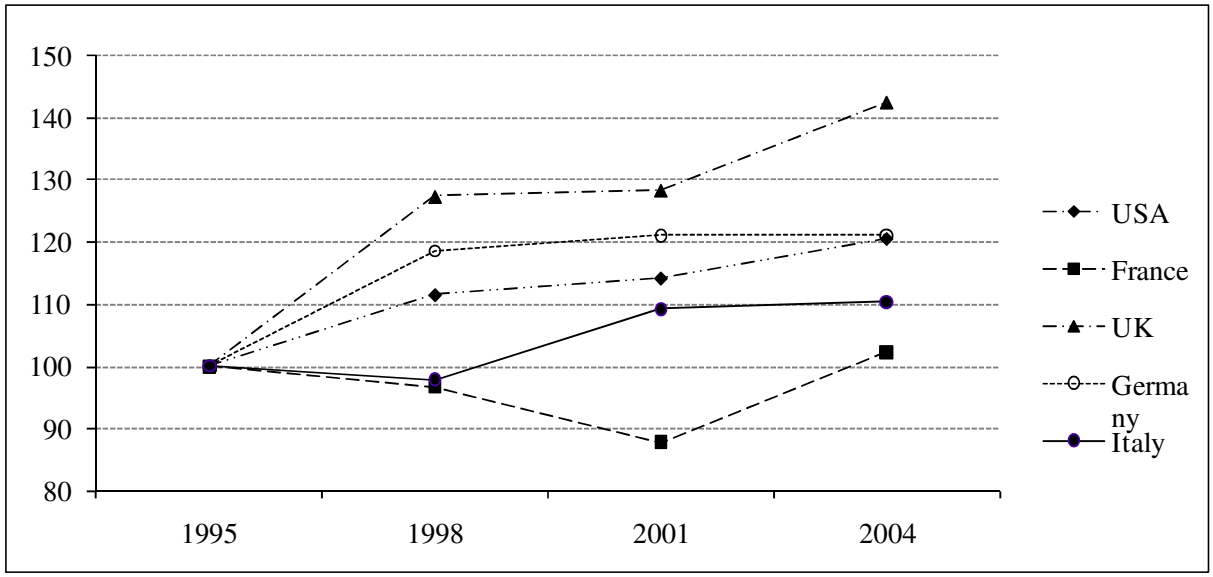
Gun Law: In this category are included all the violations of the law on using and carrying guns and other arms (Law 110/75 and subsequent modifications and amendments).

Immigration bill: In this category are included all the 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: In this category are included: assault, homicide and in general all the offences regulated by Book II Section XII of the Italian Penal Code.

Figures and Tables

FIGURE 1: Trends in Prison Population Rates



Notes: 100 index 1995. The number of inmates per 100,000 inhabitants in the 1995 was: 600 for the U.S., 89 for France, 99 for the U.K., 81 for Germany, 87 for Italy. Data Source: International Center for Prison Studies, King's College London

TABLE I

INDIVIDUAL CHARACTERISTICS

		Whole Sample (1)	Movers (2)	Stayers in a Province with more than one Prison (3)
		Mean	*Mean*	*Mean*
Original Sentence (In months)		38.982	42.896	35.287
		(0.225)	(0.324)	(0.344)
Time Served (in months)		24.471	27.869	21.287
		(0.201)	(0.294)	(0.307)
Recidivism		0.115	0.119	0.116
		(0.002)	(0.003)	(0.003)
Overcrowding (number of prisoners for 100 available places		150.17	148.46	149.37
in the detention facility)		(0.282)	(0.395)	(0.460)
Average number of deaths occurred during detention in the		1.318	1.007	1.890
same facility (for each inmate)		(0.017)	(0.018)	(0.036)
Distance from jurisdiction chief-town		15.993	19.143	14.680
Number of volunteers per capita		0.141	0.137	0.112
		(0.001)	(0.001)	(0.001)
		(0.149)	(0.237)	(0.204)
Age on Exit		38.764	38.351	39.401
		(0.069)	(0.099)	(0.121)
Percentage of Males		0.954	0.951	0.952
		(0.001)	(0.002)	(0.002)
Share of Italians		0.621	0.559	0.712
		(0.003)	(0.005)	(0.005)
Married		0.284	0.282	0.293
		(0.003)	(0.005)	(0.004)
Area of Residence				
	North	0.425	0.424	0.356
		(0.003)	(0.005)	(0.005)
	Center	0.185	0.161	0.229
		(0.003)	(0.003)	(0.005)
	South	0.378	0.392	0.414
		(0.003)	(0.005)	(0.005)
Education				
	Compulsory	0.901	0.899	0.909
		(0.003)	(0.004)	(0.004)
	Highschool	0.079	0.081	0.073
		(0.002)	(0.003)	(0.003)
	College (Degree or equivalent)	0.009	0.010	0.009
		(0.001)	(0.001)	(0.001)
Permanently Employed		0.339	0.337	0.334
		(0.005)	(0.007)	(0.008)
First Judgement Taken		0.998	0.999	0.999
		(0.001)	(0.001)	(0.001)
Kind of Offence				
	Drugs offences	0.404	0.425	0.379
		(0.003)	(0.005)	(0.005)
	Crime against property	0.412	0.399	0.438
		(0.003)	(0.005)	(0.005)
	Crimes against Public Safety	0.005	0.004	0.005
		(0.000)	(0.001)	(0.001)
	Gun Law	0.012	0.010	0.013
		(0.001)	(0.001)	(0.001)
	Immigration bill	0.029	0.028	0.023
		(0.001)	(0.002)	(0.001)
	Violent crimes	0.094	0.092	0.089
		(0.002)	(0.003)	(0.003)
Number of Observations		20950	11097	7779

Note.— Standard errors are in parentheses.

TABLE II

Prison overcrowding index and recidivism

	1	2	3	4	5	6	7	8
	Whole Sample	Whole Sample	Whole Sample	Whole Sample	Italians	Foreign	Sentence Above the Median	Sentence Below the Median
Prison overcrowding index	-0.00002	0.00002	0.00003	0.00003	0.00016	-0.00015	-0.00004	0.00010
	(-0.22)	(0.25)	(0.34)	(0.33)	(1.77)	(-1.46)	(-0.52)	(0.88)
Individual characteristics	NO	YES	YES	YES	YES	YES	YES	YES
Type of crime	NO	NO	YES	YES	YES	YES	YES	YES
Province residence fixed effects	NO	NO	NO	YES	YES	YES	YES	YES
R-squared	0.000	0.018	0.021	0.024	0.029	0.019	0.027	0.018
Observations	20950	19303	19303	19303	12136	7167	9859	9444

Note.— OLS estimates are reported. The dependent variable is equal to one if the individual returned to prison after release and zero otherwise. Standard errors are clusterd at the prison level, t-statistics are reported in parentheses. Individual variables include education levels, age at the date of release, a dummy indicating marital status, nationality and employment condition before imprisonment.

Table III

Number of deaths and recidivism

	1	2	3	4	5	6	7	8
	Whole Sample	Whole Sample	Whole Sample	Whole Sample	Italians	Foreign	Sentence Above the Median	Sentence Below the Median
Number of deaths per capita	0.1070	0.3225	0.2698	0.4231	1.0562	-1.1460	0.9166	0.3562
	(0.49)	(1.72)	(1.44)	(1.11)	(2.87)	(-1.04)	(1.77)	(0.22)
Individual characteristics	NO	YES	YES	YES	YES	YES	YES	YES
Type of crime	NO	NO	YES	YES	YES	YES	YES	YES
Province residence fixed effects	NO	NO	NO	YES	YES	YES	YES	YES
Prison fixed effects	YES	NO	NO	YES	YES	YES	YES	YES
R-squared	0.000	0.018	0.021	0.027	0.03	0.02	0.057	0.058
Observations	20950	19316	19316	19316	12145	7171	9866	9450

Note.— OLS estimates are reported. The dependent variable is equal to one if the individual returned to prison after release and zero otherwise. Standard errors are clusterd at the prison level, t-statistics are reported in parentheses. Individual variables include education levels, age at the date of release, a dummy indicating marital status, nationality and employment condition before imprisonment.

TABLE IV

Number of volunteers and recidivism

	1	2	3	4	5	6	6	8
	Whole Sample	Whole Sample	Whole Sample	Whole Sample	Italians	Foreign	Sentence Above the Median	Sentence Below the Median
Number of volunteers per capita	-0.0075	-0.0131	-0.0187	-0.0192	-0.0215	-0.0124	-0.0268	-0.0105
	(-0.36)	(-0.80)	(-0.72)	(-1.21)	(-1.15)	(-0.45)	(-1.08)	(-0.36)
Individual characteristics	NO	YES	YES	YES	YES	YES	YES	YES
Type of crime	NO	NO	YES	YES	YES	YES	YES	YES
Province residence fixed effects	NO	NO	NO	YES	YES	YES	YES	YES
R-squared	0.000	0.019	0.023	0.025	0.03	0.019	0.027	0.02
Observations	18427	17084	17084	17084	10762	6322	8701	8383

Note.— OLS estimates are reported. The dependent variable is equal to one if the individual returned to prison after release and zero otherwise. Standard errors are clusterd at the prison level, t-statistics are reported in parentheses. Individual variables include education levels, age at the date of release, a dummy indicating marital status, nationality and employment condition before imprisonment.

TABLE V

Prison distance and recidivism

	1	2	3	4	5	6	7	8
	Whole Sample	Whole Sample	Whole Sample	Whole Sample	Italians	Foreign	Sentence Above the Median	Sentence Below the Median
Distance from the chief town	0.00013	0.00012	0.00011	0.00008	-0.00002	0.00020	0.00006	0.00011
	(1.02)	(1.02)	(0.95)	(0.67)	(0.12)	(1.13)	(0.46)	(0.58)
Individual characteristics	NO	YES	YES	YES	YES	YES	YES	YES
Type of crime	NO	NO	YES	YES	YES	YES	YES	YES
Province residence fixed effects	NO	NO	NO	YES	YES	YES	YES	YES
R-squared	0.000	0.018	0.021	0.024	0.029	0.019	0.027	0.019
Observations	20493	18886	18886	18886	11888	6998	9645	9241

Note.— OLS estimates are reported. The dependent variable is equal to one if the individual returned to prison after release and zero otherwise. Standard errors are clusterd at the prison level, t-statistics are reported in parentheses. Individual variables include education levels, age at the date of release, a dummy indicating marital status, nationality and employment condition before imprisonment.