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ABSTRACT

Prison Conditions and Recidivism*

We use a unique data set on post-release behavior of former Italian inmates to estimate the effect of prison conditions on recidivism. By combining different sources of data we exploit variation in prison conditions measured by: 1) the extent of overcrowding at the prison level, 2) the number of deaths in the facility of detention during an inmate's stay and 3) the distance of the prison from the chief town of the province where the prison is located. By considering inmates who served their sentence in a jurisdiction different from the hometown in which they live after release, we can include province of residence fixed effects and account for the main source of unobserved heterogeneity correlated to prison conditions. We find that a harsher prison treatment does not reduce former inmates' criminal activity. The extent of overcrowding and the number of deaths do not decrease the probability to be re-arrested. Instead, we find evidence that the degree of isolation measured by distance from the prison of detention to the chief town of the province where the prison is located increases recidivism.

JEL Classification: K42, J18

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"IN GENERALE IL PESO DELLA PENA E LA CONSEGUENZA DI UN DELITTO DEV'ESSERE LA PIÙ EFFICACE PER GLI ALTRI E LA MENO DURA CHE SIA POSSIBILE PER CHI LA SOFFRE, PERCHÈ NON SI PUÒ CHIAMARE LEGITTIMA SOCIETÀ QUELLA DOVE NON SIA PRINCIPIO INFALLIBILE CHE GLI UOMINI SI SIAN VOLUTI ASSOGGETTARE AI MINORI MALI POSSIBILI." [1]

Cesare Beccaria, *Dei diritti e Delle Pene § XIX*

1. Introduction

In modern criminal justice systems, imprisonment is the most important form of sanction. In the last decade prison population has grown substantially in many countries. Figure 1 reports the trends in the growth rates of prison population from mid-nineties. Compared to the index year of 1995, the number of inmates per 100,000 residents increased by 2004 from 600 to 723 in the U.S., from 99 to 149 in the U.K. and from 87 to 96 in Italy. Given that an immediate consequence of the growth in prison population is a possible worsening of life conditions in prisons, a relevant issue is understanding how the conditions of incarceration affect the propensity to commit criminal acts. Two individuals convicted for one year of imprisonment may serve their sentence in two prisons characterized by different conditions and thus face different degrees of punishment. This means that the conditions of incarceration may have an impact on the *actual* sanctions determined by imprisonment and hence on the propensity to engage in future criminal activities. Moreover, the large majority of inmates are not condemned to a life sentence, which obviously means that sooner or later they will be released. Given this, it is important to understand how prison conditions affect a former inmate's probability of committing another crime. From a policy perspective, changing prison conditions could be relatively easier and less costly than other interventions (e.g. increasing incapacitation through sentences) that aim to reduce former inmates' post release criminal activity.

Only a few works use aggregate data to analyze the consequences of incarceration conditions on criminal behavior. 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. This result conforms to the deterrence hypothesis according to which a higher cost of crime deters prospective criminals from committing a criminal act (Becker, 1968). Bedard and Helland (2004) exploit the expansion of the female penal system capacity in the United States to study the deterrent effects of increasing the

[1] "The burden of a sanction and the consequences of a crime should be as effective as possible to deter the others and the least hard as possible for those suffering the sanctions, as we cannot call as legitimate a society in which it is not a shared principle the one stating that citizens want to subject themselves to the lightest possible pain."

distance of prisons from cities. They find that, on average, increasing this distance (assumed to coincide with a reduced number of inmate visits) tends to lower the female crime rate. Overall, evidence from previous research resorting to aggregate data suggests that harsher prison conditions deter individuals from committing criminal acts.

(*Figure 1 about here*)

The previously cited works share two main weaknesses. First, in testing how prison conditions affect crime rates, one cannot exclude the possibility that the measures of prison conditions are endogenous to crime rates. Second, these works do not clarify whether the singled out deterrent effect of punitiveness is induced by deterring potential criminals, by deterring former inmates, or both.[2] In this paper we focus on how prison conditions, measured by several indicators affect recidivism of former inmates. The results we obtain are not consistent with the evidence that worse prison conditions deter former inmates. Rather, we find that the degree of isolation, measured by distance of the prison from the chief town of the province where the prison is located, has a positive effect on recidivism. We argue that our results indicate that the deterrent effects of bad prison quality on crime found by previous papers are probably due to deterring potential criminals and not criminals already treated by imprisonment.

To estimate the effect of prison conditions on recidivism, we use a large, unique data set, reporting individual level data on recidivism of former inmates that were released upon 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 22000 inmates were released from 198 Italian prisons on August, 1st 2006. A first important feature of our data set is that all these prisoners are released at the same moment and thus face equal crime opportunities. This is relevant for our empirical analysis because it eliminates the confounding element of time-varying unobservable characteristics that might be correlated to prison conditions. Nevertheless, in testing the effects of prison conditions on recidivism, we cannot rule out the existence of time invariant unobservable variables which could bias our estimates via correlation to prison conditions and to probability of recidivism. For example, prison quality might be worse in areas where former inmates have a lower opportunity cost of committing a crime. More

[2] By potential or prospective criminals we mean individuals who have never been imprisoned.

generally, prison quality might be correlated to omitted characteristics of the province where inmates live after release, leading to biased estimates of prison treatment on recidivism.

To address the endogeneity problems involved in estimating the effect of prison quality on recidivism, we exploit a unique feature of our data set. Many inmates spent their sentence in a jurisdiction different from their hometown for reasons ranging from overcrowding in the prison closest to their hometown to the Italian Prison Administration view of that facility as being incompatible with the inmate. We label these prisoners as "movers". As we shall discuss in more detail in the paper, the institutional features of assigning movers to prisons entail that assignment does not depend on individual characteristics that may explain recidivism and at the same time may be correlated to measures of prison conditions. As a consequence of restricting our sample only to movers, we can control for province of residence fixed effects and so account for any unobserved heterogeneity at the province level where these former inmates live. Considering that this is the main source of unobserved heterogeneity that might be correlated to prison conditions, we are thus able to minimize an important bias of our estimates.

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 (by 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, the degree of prisoners' isolation 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] where the prison is located. Longer distances imply higher costs (in terms of transportation, organization and motivation) for associations, groups, organizations of volunteers to develop social activities, education, and job training for inmates. This means that the longer is the distance of a prison from the province chief town, the weaker are the social ties in which prisoners are embedded (and thus a higher degree of isolation from the rest of society).

We do not find evidence supporting the idea that harsher prison conditions reduce recidivism. Although the variation in our measures of prison conditions is large, all specifications reveal an

[3] 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 are concentrated the main economic, social and administrative activities of the area (e.g. courts, health services, local head quarters of political parties, volunteer associations).

extremely small and statistically non significant effect of prison conditions on recidivism. This empirical evidence suggests that previous results on the effects of prison conditions on crime rates are probably due to general deterrent effects on prospective criminals. Indeed, worse prison conditions do not seem to deter individuals who have already been incarcerated.[4]

Instead, we find that prison location has an effect on recidivism. In particular, an increased distance of the detention facility from the chief town of the province increases the propensity to commit new crimes. We calculate that an increase of the distance of the prison of 10 km is associated to a 2.8 percent drop in the probability of recidivism. This means that prison isolation from the rest of the society tends to increase recidivism. Our results on distance indicate how the prison society osmosis affects crime. By isolating individuals from external social networks, prison has two opposite effects. On one side, by isolating from possible contacts with criminal networks, it is likely that prison isolation tends to reduce future criminal opportunities; on the other side, more isolation means also less opportunity to maintain positive social relations or human capital, thus increasing the post release returns from crime. Our results suggest that this second force tends to dominate and so condemns prison isolation to increasing recidivism. As long as imprisonment *is* essentially isolation from the rest of society, these results pose a provoking question about the effectiveness of imprisonment as a sanction at least for what concerns the deterrent effects of isolation for those already sanctioned. This result is particularly salient in light of findings of Chen and Shapiro (2007) who show that spending a sentence in higher security levels in U.S. prisons (which arguably correspond to higher degree of isolation) implies a significantly higher post release propensity to commit a crime. Chen and Shapiro (2007) use individual-level data to analyze how a higher security level in U.S. prisons affects recidivism. They provide credible estimates of the effect of harsh prison conditions on recidivism rates by exploiting a discontinuity in the assignment of federal prisoners to security levels. Hence, they estimate the effect of a single proxy for prison conditions (higher security level) for a particular subset of inmates (i.e. the most dangerous inmates). Our data allow us to employ a different identification strategy through which we can capture the effect of several indicators of prison conditions for a generality of inmates. This paper

[4] This might be surprising. If we assume that incarceration leads criminals to update their beliefs about the consequences of punishment, an implication of the basic crime model of Becker (1968) is that having experienced a more severe punishment should lead to a lower propensity to recommit a crime. Hence, to rationalize our results we should note that other forces can offset the deterrent effect of harsher prison conditions. In particular, harsher prison sentences may imply a higher human capital deployment and worse labour outcomes (Waldfogel, 1994). Moreover, harsher prison conditions may induce hostility toward society that leads to an increased likelihood of deviant behavior upon release (Murton, 1976).

also attempts to separate some channels through which prison conditions may affect recidivism. We conclude that, whereas harshness of prison conditions *per se* should not imply higher recidivism, the degree of isolation induces a sizable positive effect on the propensity to commit another crime. More in general our paper is related to the extensive literature on crime and punishment started from Becker (1968)[5] and in particular to a recent literature studying the effects of prison treatment (Chen and Shapiro, 2007; Kling, 2006; Kuziemko, 2007; Pintoff, 2006; Drago, Galbiati and Vertova, 2007).[6]

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

2. Data Sources and Description

We perform our analysis of the effects of prison conditions on recidivism by means of a unique data set built by resorting to various sources. First, individual level variables about former inmates' 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. 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 25716 individuals. For each individual the data provide information on whether or not the individual commit another crime within the period between release from prison and February, 28th

[5] For surveys of empirical and theoretical works: Bushway and Reuters (*forthcoming*) Levitt and Miles (2007) and Polinsky and Shavell (2000), Western, Kling and Weiman (2001), Garoupa (1997). Some recent contributions are: Di Tella and Dubra (*forthcoming*), Owens (2006), Evans and Owens (2007), Helland and Tabarrok (2007), 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).

[6] Pintoff (2006) capitalizes on discontinuities in punishment that arise in Washington State's juvenile sentencing guidelines to identify the effect of incarceration (but not of prison quality) on the post release criminal behaviour of juveniles. Kling (2006) uses a variety of research designs to estimate the effect of increases in incarceration length on the employment and earnings prospects of individuals, finding no significant effects. Kuziemko (2007) compares the parole system with a fixed-sentences regime by exploiting policy shocks and institutional features in Georgia and provides evidences that abolition of the parole system has increased both per-prisoner costs and recidivism. Finally, Drago et al. (2007) show that time spent in prison tends to lower a former inmate' response to post release expected

2007. The data set contains information concerning a large set 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, 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, data report inmates' age, level of education, marital status, nationality, province of residence, employment status before being sentenced to prison, and whether the individual had a final sentence (or was waiting for the first verdict or for the results of an appeal) 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), we have 198 prisons, the total number of Italian prisons. Data on the number of facility deaths that occurred during each former inmate's period of imprisonment were constructed by resorting to the report on "Deaths in Prison" by the Associazione Ristretti[7]. 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 entrance into the facility for those arrested after 1 January 2003) to July 2007 (the months of exit for all individuals in our sample). Note that this measure of deaths occurring in a prison is different form the measure used by Katz et al. (2003) who resort to aggregate data and use the total number of deaths (per 1000 inmates) occurred in a state's prisons. Unlike Katz et al. (2003), we can construct a measure of the number of deaths that occurred in a facility from the moment of entrance of each single individual in the data set (in particular, for those who entered starting from January 2003).[8] This measure is particularly useful 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.

Finally, we construct independently the measure of distance. We report the road distance between each facility and chief town of the province where the facility is located by calculating the distance

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

[8] It is worth noting that the measure of deaths we use in estimating our models is in per capita values (i.e. number of deaths over the total number of inmates in the facility, as of July 2007). We resort to the per capita measure to normalize the number of deaths for each prison population.

between the facility address and each town[9]. The result of the process is a unique data set including, for each of the almost 26,000 former inmates, a measure of recidivism, individual characteristics, and facility level information.

Table I reports descriptive statistics on the individual-level data both for the entire sample of released individuals and the for the sub sample of those who served a sentence in a facility outside their province of residence (the so-called movers). As will come clear in the next section we analyze the movers in order to address the main identification challenge of this paper, the likely endogeneity between criminal opportunities and prison conditions in a certain province. By restricting our analysis to the movers we are able to control for province of residence fixed effects, thus absorbing any kind of unobserved heterogeneity in the inmates' area of living. Even though possible differences between movers and non movers are not an issue for our identification strategy, it is worth noting that the observable characteristics are on average similar across the whole sample and the sub sample of movers. In particular, for both groups the recidivists constituted 11% of the final sample. Males make up 95% of the sample. The average age of former inmates is nearly 37; 34% of them were employed before being sentenced to prison, and married people were 29% of both samples. For measures of prison harshness, we observe that the average overcrowding rate (number of inmates in the facility of detention for each 100 places available) faced by former inmates in our sample was about 150. Each former inmate had seen 1.26 (1.01 if mover) people dying in his/her facility during the period of detention. The average facility/jurisdiction chief-town distance is 15.5 Km (18.74 Km for the movers). The final sample we use is made by 13160 individuals distributed between almost 200 different residential facilities.

(*Table I about here*)

3. Empirical Analysis

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

The available measures of life quality in prison are the overcrowding index and deaths per capita in prison. For the first measure, the model we estimate can be written as

[9] We use the road distance as calculated us by the internet map site www.viamichelin.com. This allows us to calculate the distance to any facility address from the chief town city center coordinates (the web-site automatically calculates the coordinates of the city center).

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

where *i* denotes the individual and *j* the prison where the individual's 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, state of judgment, the most recent crime, employment status before arrest and sentence. The types of crime and the sentence are the most important variables accounting for the dangerouness of the former inmate. We include also the time served as 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 that provided an immediate three-year reduction in detention for all inmates who had committed a crime before 2 May, 2006).

The empirical challenge when estimating the effects of life quality in prison on recidivism is addressing 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 be equally 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 credible estimate of the relationship between prison quality and recidivism, we must account for this unobserved heterogeneity.

The idea behind our solution to address the endogeneity of the prison quality measure is to exploit a feature of the Italian prison system. As mentioned previously, many prisoners serve their sentence in other than hometown jurisdictions. We call these inmates by "movers". Denote *h* the province where a mover lives after release. The equation that we can estimate only on movers 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 accounts for differences across provinces that drive criminal behavior after release. Notice that without information on the movers, we could not have included fixed effects at the province level. Instead, in model (2), we have that for individual *i*, prison *j* is always located in a province other than the one where individual *i* lives after release. 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 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 in detail this identifying assumption.

When we focus on the recidivism effects of the other proxy for prison quality (deaths), we still exploit the presence of the "movers" but need not assume that unobserved heterogeneity across movers is uncorrelated with prison quality. 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:

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

Prison fixed effects control for any possible non random assignment of movers to harsher prisons. Some clarifications regarding model (3) are necessary. The number of deaths that occur during the period of imprisonment is clearly 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 be picking 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. Hence, controlling for sentence and time served, inmates within each prison differ in the number of deaths seen for reasons that are unlikely to be correlated to unobservables.

The last issue analyzed in this paper is how isolation affects recidivism. The aim of imprisonment is to isolate condemned individuals from the rest of society for a certain period of time with the purpose both of incapacitating and then of re-educating these individuals to social life. Since prison essentially *means* isolation from society, testing how the degree of prison isolation affects recidivism is a particularly important issue. As a proxy for the degree of prison isolation we use the distance of prison from the closest province chief town. We believe that this variable captures the degree of isolation of prisoners for this reason: ceteris paribus, the more distant is a prison facility from the chief town, the higher are the costs for associations, groups of volunteers, and civil right

[10] As mentioned above in the regressions we use the number of deaths per capita. Results are robust to measures of deaths seen by each inmate in absolute value.

organizations to access to prisons developing social activities, education, and job training for inmates.[11] The basic idea behind this assumption is that, 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. For the interpretation of the results it is important to know whether more distant prisons are associated to 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 does not seem 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 to worse life conditions.

Estimating the effects of prison location on recidivism may present problems of endogeneity similar to those already discussed for the overcrowding index. It is possible that, in areas with higher opportunities to commit another crime, prisons have been built more distant from the province chief 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, as before we restrict our sample to the "movers", those inmates who served their sentence in a jurisdiction other than their hometown. Hence we estimate model (2) by including prison distance from the chief town as a key control variable.

3.2. Evidence on the Identifying Assumption

The key assumption for the identification of model (2) is that, conditioning on the region of residence, the assignment of movers does not depend on individual characteristics that explain recidivism and are correlated to prison quality (we don't need this assumption when estimating model (3) because the inclusion of prison fixed effects controls for any possible non random assignment of movers). There are arguments and evidence supporting the identifying assumption. The Italian law[12] on this issue indicates that *whenever possible*, assignment to facilities should follow a territorial criterion, namely, 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

[11] In Italy there is a strong tradition of associations organizing activities in prison facilities, with an important contribution given by volunteers.
[12] See in particular the Decree of the President of the Republic, 230, 30 June 2000, and the Law 354/1975 (Article 42).

judgment, the territorial criterion applies. Nonetheless, the provisions of the law are often 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; 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 DAP that decides in 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 by the central directorate of the DAP.[13] We conducted several interviews with members of the inmates' rights association "Ristretti" and DAP officers[14] to understand more in detail the decision process concerning movers. As a first step, we need 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 judiciary decision about her sentence. On the basis of this dossier the decision-maker evaluates if there is any reason of incompatibility of the inmate with the facility closest to her home-town. It is worth noting that for inmates at their first experience with the prison system the dossier roughly contains the same characteristics we have in our data set (i.e. personal characteristics, sentence length and sentence motivation, in our case the crime committed). The second reason of incompatibility is that the closest facility has reached a maximum threshold of overcrowding. For each facility such a 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 above such a threshold level, whereas in other periods this overcrowding rate may be considered below the threshold). Once an inmate is designated as a mover, the decision process governing assignment to

[13] Italian public administration is in general organized on territorial basis. Central administrations are on the top 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.

facilities follows a "space availability" criterion.[15] 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 on the level of available space at the moment of arrest or conviction of other facilities. 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 of assignment.[16]

We examine whether the data support the hypotheses that the assignment of movers 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 region of residence, the administrative level at which assignment decisions are taken) there is a significant relationship between the observable characteristics of movers and the index of overcrowding of the facility of destination and prison distance from the chief town. This can be done by estimating regressions of these two measures on observable characteristics of movers and then by running an F-test on the coefficients of the 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 movers' characteristics. However, if selection on observables is similar to selection on unobservables, then the lack of a significant relationship between prison quality and observable characteristics indicates empirical support for the identification strategy. In symbols, we test the following models:

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

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

Here j and i stand for the facility level and individual level indexes and the γ_n are region of residence fixed effects that account for differences across regional DAP directorates that drive the

[15] For example in a recent interview the director of 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 to transfer 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")

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

assignment to facilities.[17] 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 1.22 (p=0.22) when we regress the overcrowding index, and of 1.34 (p=0.13) when we regress prison distance. Hence, at conventional level, we cannot reject the joint null hypothesis that all the coefficients on individual observables are equal to 0.

As we can see from Table 1, movers are different from non movers in some individual variables. By regressing a dummy equal to one if an inmate is a mover on all the observables, we have that some individual variables are strong predictors for being a mover (in particular the length of the sentence and being non Italian have a positive effect on the probability to be a mover, whereas age has a negative effect; the R-squared in this regression is 0.16). It seems plausible to assume that if 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 matter for the assignment. The fact that length of the sentence and some other variables predict the mover status but not the prison quality measures lends further support to our hypothesis of no correlation between individual determinants of recidivism and the probability of being assigned 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, juridical status, 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.

We start by discussing results on the effects of overcrowding index on recidivism. Taking the overcrowding index as the indicator of quality of life in prison, in Table II we present empirical estimates of variations on equation (2) for movers only. In column 1 we include as additional covariates only individual variables. The coefficient on overcrowding index is negative and

[17] We include region fixed effects instead of providence fixed effects (which are included in model (2)) because the institutional decision process is governed at the regional level (as mentioned in the introduction, Italy is divided in twenty regions and each region is composed of several provinces).

associated with large standard errors (t-*statistics* equal to -0.85). It reveals a very small effect on recidivism. Even taking the lower bound extreme of the 95% confidence interval, we have that an increase of 1 percentage point in the overcrowding index implies a reduction of 0.0002 in the probability of being re-arrested. 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 decreases in absolute value after inclusion of type of crime and fixed effects. Overall, we obtain a small and not statistically significant effect of overcrowding. We try to obtain more precise estimated effects of the overcrowding index on recidivism by excluding from the regressions: potential outliers, the most populated prisons, and then least populated prisons in absolute values. However, neither the size nor the precision of the estimated effects improves (results not reported).

(*Table II about here*)

We now present the results using prison deaths per capita as indicator of the quality of life in prison (see Table III). In column 1 the results are including only individual variables as additional covariates. We now have a positive coefficient on deaths per capita but it is not precisely estimated (t-*statistic*, adjusted for clustering, equal to 0.87). In the next column we include also the type of crime. From column 1 and 2 we do not find evidence that harsher prison conditions lead to a higher probability of recidivism. Column 3 reports results from specification that includes province of residence fixed effects; the results obtained are similar. This suggests that finding no evidence of a negative impact of deaths per capita rates on recidivism is not due to the omission of heterogeneity at the province level.

(*Table III about here*)

To explore whether prison unobserved heterogeneity might be a reason for the positive coefficient, in column 4 we present results from the specification that "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 into 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 of the former inmates (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 0.61). Overall, from this analysis we do not find compelling evidence that harsh prison conditions reduce recidivism.

Finally, we discuss our results on the effects of prison location on recidivism. Column 1 of Table IV presents results including only individual variables as additional covariates. We find a positive and highly statistically significant coefficient on distance from the province chief town. In column 2 we report the results of the regression including also the type of crime committed and in column 3 we include also province of residence fixed effects. Results are similar: the coefficient on distance is still positive and highly statistically significant. It is interesting to note that the coefficient is essentially unchanged by the inclusion of more controls. Our data suggest that prison location has an effect on recidivism. In particular, the distance of the facility of detention from the province chief town increases the probability of committing another crime. The estimated effect is not small: given that in our sample the probability of returning to crime is 0.11, the results suggest that an increase of the distance of the prison of 10 km leads to a 2.8 percent drop in the probability of recidivism. We experimented with different robustness checks by including in the regression 4, 5, and 6 dummy for distance (e.g., first dummy equal to one if distance is lower than 5 km, second dummy equal to 1 if distance is between 5 and 20 km and so on). The results are robust and indicate a statistically significant effect. From the last column of Table IV we observe that the effect of distance is not explained by the number of deaths and overcrowding (i.e. the coefficient on distance is essentially unchanged by the inclusion of these variables). This supports the idea that the effect of distance on recidivism is not due to prison harshness *per se*, but rather to isolation. Longer distance implies less accessibility for volunteers and for religious and civil rights associations that wish to visit the facilities. If a higher degree of accessibility (i.e., a higher degree of osmosis between prison and the rest of society) increases the opportunities to maintain or increase human capital for inmates, then a higher isolation and higher cost of reaching the facilities implied by greater distance may negatively affect the post release legal opportunities of inmates, thus increasing their propensity to commit another crime.

(*Table IV about here*)

Overall, controlling for an important source of unobserved heterogeneity, we find that harsher prison conditions measured by the extent of overcrowding and the number of deaths do not reduce recidivism, whereas prison isolation is associated to higher post-release criminal behavior. To

gauge the impact of controlling for heterogeneity at the province level, we observe that from the previous tables, the estimated standard errors of the key variable (and other individual variables) are generally smaller when we include province of residence fixed effects. Although the inclusion of about 100 dummy in the regression should lead to an increase of the standard errors, we observe the opposite finding. This suggests that the there are several effects on recidivism that vary at the province level and that this is potentially an important source of heterogeneity to condition on. This is particularly true for the specification in which we estimate the effect of the distance from the prison of detention to the chief-town of the province where the prison is located. Indeed, by running a regression for the whole sample (movers and non-movers) without fixed effects we obtain a smaller coefficient on distance that is only marginally statistically different from zero (results not reported).

Finally, a potential issue is whether all the results for movers can be generalized to all individuals in our sample. Although differences in observables between movers and non-movers are not large, movers are not a random sample. The main aspect in which movers differ from the rest of the sample is the average sentence, with movers having, on average, a longer sentence (see Table 1). Since sentence reflects the degree of dangerousness of inmates, it could be possible that our results are driven by a subset of movers with very long sentences, whose post-release behavior is not affected by a harsher treatment in prison. To explore this possibility, in the previous specifications we include an interaction term between sentence and the key variable that proxy for prison conditions. If the interaction term is not statistically different from zero, we can conclude that heterogeneity in sentence across movers is not driving the results presented above. As Table 5 shows, the coefficient on the interaction term is always associated to large standard errors. We do not find convincing evidence that movers with longer sentences respond differently to previous harsher prison treatment.

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 harsheness (proxied by prison overcrowding and death rates in prison) and prison isolation (proxied by the distance between prison and province chief-town). Our results suggest that harsher prison conditions do not exert any significant effect on former inmates post release propensity to commit new crimes. However, higher prison distance from chief towns and hence higher degrees of isolation positively affect post release crime. Given that former studies like Katz et. al (2003) and

Bedard and Helland (2004) show that harsher prison conditions are associated to lower crime rates, it is worth asking what kind of implications we should draw from our results. Because our study is the first of its type to exploit individual-level data from outside the U.S., it is difficult to make quantitative comparisons between our results and other studies relying on U.S. data. Nonetheless, we can observe that our findings help to clarify some former results in the literature. Chen and Shapiro (2007) show that the general deterrent effect found by Katz et. al (2003) could be outweighed by the positive impact on recidivism implied by higher security levels in the U.S.. Our results suggest that the effect found by Chen and Shapiro could arguably be induced by the higher degree of isolation being related to the higher security levels, whereas harshness of prison conditions *per se* should not imply higher recidivism. Nonetheless we cannot conclude that policy makers should ignore the effects of harsher prison conditions, or, even worse, that harsher prison conditions are desirable because they seem to have a general deterrent effect. As shown by Katz et al. (2003), the aggregate impact of changing prison conditions on crime rates appears to be small: "*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). Our results confirm this view and suggest that we should more carefully consider the limits of incarceration as a means of redeeming people.

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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, 9 October 1990, 309 and subsequent modifications and amendments).

Crimes against property. In this category are included theft, larceny, robbery, bag-snatching and all the offences regulated by Book II, Section XIII, of the Italian Penal Code.

Crimes against public administrations. In this category are included crimes against the public interest and administration, regulated by Book II, Section II 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 under this category are included in Book II, Section VI, of the Italian Penal Code.

Violation of 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).

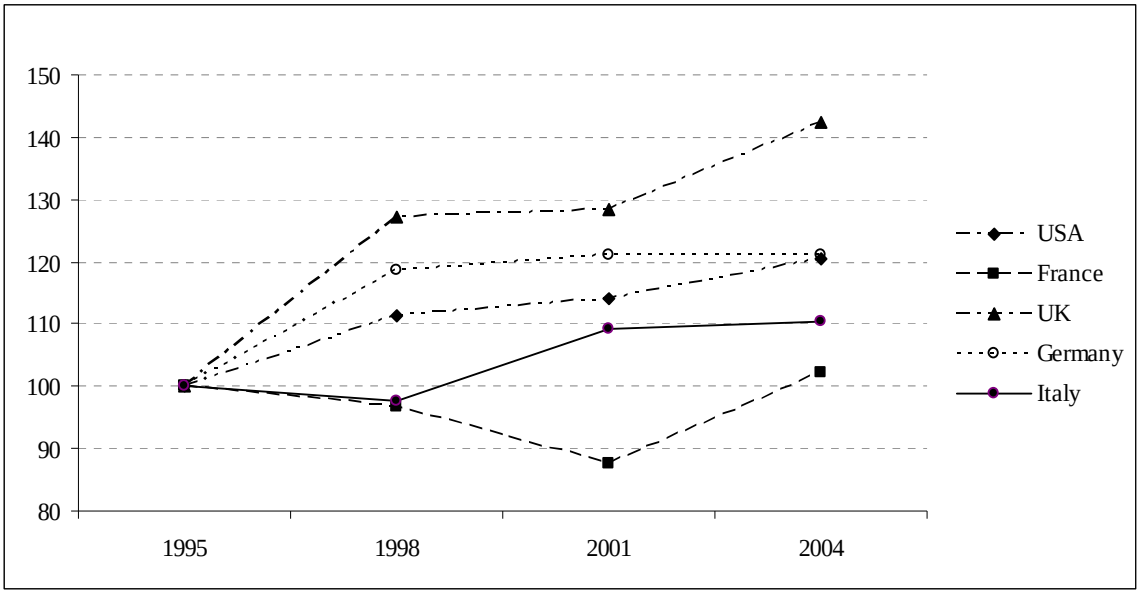
Immigration law. In this category are included all the violations of the law on the regulation of immigrations and the juridical status of foreign citizens (legislation of 25 July 1998, 286 and subsequent amendments and modifications).

Various crimes against persons. In this category are included assault, homicide, and all offences regulated by Book II, Section XII, of the Italian Penal Code.

Corruption and crimes against justice administrations. In this category are included crimes against the correct functioning of the justice administration and police and, in general, all crimes regulated by Book II, Section III, of the Italian Penal Code.

Tables and Figures

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: Descriptive Statistics

		Full Sample		Recidivists	
Number of observations		25,716		2,792	
Individual characteristics					
		Mean	*Standard deviation*	*Mean*	*Standard deviation*
Recidivism		0.11	0.31		
Age on exit		36.68	10.07	34.30	8.67
Length of sentence		41.91	35.19	37.42	30.95
Distance from jurisdiction chief-town		15.45	20.92	16.09	22.10
Overcrowding (number of prisoners for 100 available places in the detention facility)		151.37	40.94	150.64	42.64
Average number of deaths occurred during detention in the same facility (for each inmate)		1.26	2.44	1.30	2.54
		Frequency		*Frequency*	
Gender					
	Male	0.95		0.02	
	Female	0.05		0.98	
Nationality					
	Italian	0.62		0.63	
	Non-Italian	0.38		0.37	
Marital status					
	Married	0.29		0.19	
	Unmarried	0.57		0.67	
	Other	0.14		0.14	
Education					
	Illiterate	0.03		0.04	
	Primary	0.30		0.33	
	Junior High	0.53		0.53	
	High School	0.06		0.06	
	College (degree or equivalent)	0.01		0.01	
	Other	0.07		0.03	
Employment					
	Permanently employed	0.34		0.24	
	Unemployed	0.47		0.59	
	Other	0.19		0.17	
State of judgement					
	Final judgment taken	0.70		0.64	
	Mixed	0.19		0.24	
	Appellant	0.06		0.07	
	Other	0.05		0.05	
Kind of offense					
	Drug offenses	0.41		0.37	
	Crimes against property	0.40		0.49	
	Crimes against public admininstration	0.02		0.02	
	Violation of gun law	0.01		0.01	
	Immigration bill	0.03		0.02	
	Various crimes against persons	0.07		0.05	
	Other	0.06		0.04	

TABLE I.(continues): Descriptive Statistics

		Movers		Recidivists	
Number of observations		13,160		1,491	
Individual characteristics					
		Mean	*Standard deviation*	*Mean*	*Standard deviation*
Recidivism		0.11	0.32		
Age on exit		36.15	9.81	34.16	8.70
Length of sentence		46.28	37.19	40.52	32.58
Distance from jurisdiction chief-town		18.74	24.26	20.33	26.05
Overcrowding (number of prisoners for 100 available places in the detention facility)		149.82	42.18	147.70	43.69
Average number of deaths occured during detention in the same facility (for each inmate)		1.01	1.91	0.95	1.85
		Frequency		*Frequency*	
Gender					
	Male	0.95		0.02	
	Female	0.50		0.98	
Nationality					
	Italian	0.56		0.56	
	Non-Italian	0.44		0.44	
Marital status					
	Married	0.29		0.20	
	Unmarried	0.59		0.69	
	Other	0.12		0.11	
Education					
	Illiterate	0.03		0.02	
	Primary	0.30		0.35	
	Junior High	0.51		0.50	
	High School	0.06		0.04	
	College (degree or equivalent)	0.01		0.01	
	Other	0.09		0.08	
Employment					
	Permanently employed	0.34		0.27	
	Unemployed	0.48		0.59	
	Other	0.18		0.14	
State of judgement					
	Final judgment taken	0.69		0.64	
	Mixed	0.20		0.24	
	Appellant	0.03		0.03	
	Other	0.08		0.09	
Kind of offense					
	Drug offenses	0.43		0.40	
	Crimes against property	0.39		0.46	
	Crimes against public admininstration	0.02		0.02	
	Violation of gun law	0.01		0.01	
	Immigration bill	0.03		0.02	
	Various crimes against persons	0.08		0.05	
	Other	0.04		0.04	

TABLE II: Results on the Effects of Prison Overcrowding

Independent variable	1	2	3
Prison overcrowding index	-0.00007	-0.00006	-0.00005
	(-0.85)	(-0.79)	(-0.59)
Individual characteristics	YES	YES	YES
Type of crime	NO	YES	YES
Province fixed effects	NO	NO	YES
R-squared	0.018	0.022	0.032
Observations	11,334	11,334	11,334

Notes: Entries refer to a linear probability model; the dependent variable is a binary variable assuming value 1 if the inmate has been re-arrested after release and 0 otherwise. The prison overcrowding index is the number of inmates in each prison for 100 officially available places. Individual variables include: sentence length, time spent in prison, education, age at date of release, marital status and nationality dummies, judicial status and employment condition before imprisonnent. *t*-statistics (in parenthesis) adjusted for clustering at the prison level .

TABLE III: Results on the Effects of Deaths in Prison

Independent variable	1	2	3	4
Number of deaths in the facility (per capita)	0.22	0.18	0.09	0.28
	(0.87)	(0.75)	(0.33)	(0.61)
Individual characteristics	YES	YES	YES	YES
Type of crime	NO	YES	YES	YES
Province fixed effects	NO	NO	YES	YES
Prison fixed effects	NO	NO	NO	YES
R-squared	0.018	0.021	0.035	0.053
Observations	11,346	11,346	11,346	11,334

Notes: Entries refer to a linear probability model, the dependent variable is a binary variable assuming value 1 if the inmate has been re-arrested after the release and 0 otherwise. The number of deaths per capita is the number of deaths ocurred since the inmate's entrance in the facility over the total number of inmates in the same facility. Individual variables include sentence length, time spent in prison, education, age at date of release, marital status and nationality dummies, judicial status, and employment condition before imprisonnent. *t*-statistics (in parenthesis)

TABLE IV: Results on the Effects of Distance between the Facility and Province Chief Town

Independent Variable	1	2	3	4
Distance	0.0003	0.0003	0.0003	0.0003
	(2.61)	(2.64)	(2.77)	(2.65)
Prison overcrowding index	-	-	-	-0.00005
				(-0.65)
Number of deaths in the facility (per capita)	-	-	-	0.0493
				(0.17)
Individual characteristics	YES	YES	YES	YES
Type of crime	NO	YES	YES	YES
Province fixed effects	NO	NO	YES	YES
R-squared	0.019	0.022	0.037	0.037
Observations	11,022	11,022	11,022	11,022

Notes: Entries refer to a linear probability model; the dependent variable is a binary variable assuming value 1 if the inmate has been re-arrested after the release and 0 otherwise. Distance expressed as road distance (in km) between the facility the chief-town of the province where the prison is located. Individual variables include sentence length, time spent in prison, education, age at date of release, marital status, and nationality dummies, judicial status and employment condition before imprisonnent. *t*-statistics (in parenthesis) adjusted for clustering at the prison level.

Table V: Measures of prison conditions interacted with individual sentence

	1	2	3
overcrowding rate	-0.0001	-	-
	(-0.73)		
overcrowding rate x sentence	0	-	-
	(0.51)		
number of deaths in the facility (per capita)	-	0.4626	-
		(0.72)	
number of deaths in the facility (per capita) x sentence	-	-0.0022	-
		(-0.48)	
distance	-	-	0.003
			(2.77)
distance x sentence	-	-	-0.0012
			(-0.45)
Province of residence fixed effects	YES	YES	YES
Prison fixed effects	NO	YES	NO
R-squared	0.035	0.053	0.037
Observations	11,346	11,346	11,022

Notes: Entries refer to a linear probability model; the dependent variable is a binary variable assuming value 1 if the inmate has been re-arrested after the release and 0 otherwise. Individual variables include sentence length, time spent in prison, education, age at date of release, marital status, and nationality dummies, judicial status and employment condition before imprisonnent. *t*-statistics (in parenthesis) adjusted for clustering at the prison level.