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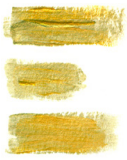

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Harsh or Humane? Detention Conditions and Recidivism

by
Giovanni Mastrobuoni
(University of Essex)
Daniele Terlizzese
(EIEF and Bank of Italy)

Harsh or Humane? Detention Conditions and Recidivism *

Giovanni Mastrobuoni† and Daniele Terlizzese‡

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Abstract

The question of how prison conditions affect recidivism is very important. In designing a prison system, one would want to know the answer. There are two prevailing prison regimes, harsh and humane. We estimate the effect on recidivism of replacing time served in a harsh, closed-cell prison with time served in a humane, open-cell one, mimicking an experiment where the time spent in the open-cell prison as opposed to the closed-cell one is randomly assigned. We deal with the endogenous assignment of inmates to different prison regimes using variation that is driven by nearby prisons' overcrowding. Switching regimes for a year, which represent 60 percent of the average sentence, reduces recidivism by around 6 percentage points, or 15 percent, which is a large effect compared to most other interventions aimed at reducing recidivism. The effects are largest for inmates with very low levels of education and are weak for hardened criminals. More than a single mechanism underlies these effects.

Keywords: Crime, Prison Conditions, Deterrence, Rehabilitation, Open Prison
JEL Codes: K14, K42

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†Collegio Carlo Alberto, Torino, and University of Essex, giovanni.mastrobuoni@carloalberto.org
‡EIEF and Bank of Italy, daniele.terlizzese@eief.it

1 Introduction

Over recent decades most developed countries have witnessed high and often increasing rates of incarceration. In the United States, at the end of 2015, almost one per cent of the adult population was behind bars, with a sevenfold increase in the incarceration rate since the early 70s (**?**). Over the last 15 years the total prison population has gone up by almost 20 percent, more than the corresponding growth rate of the world population, in spite of strong counteractive forces (see Table 8 in **?**).[1]

This process risks, however, to feed on itself, as a large fraction of those who are sent to prison are repeat offenders. In the U.S. State prisons, for example, about 40 percent of released inmates are re-incarcerated within three years.[2]

Therefore, if societies were able to reduce recidivism, victimization and incarceration rates would be reduced as well, generating large economic and social benefits (see **?**). Prison conditions represent a natural starting place. In designing an optimal prison system, one would want to know the which conditions minimize subsequent recidivism, along with the answer to two other questions: relative cost, and deterrent effects.

Yet, surprisingly little is known about how to design prisons that minimize re-incarceration. And so different approaches have been followed, in different countries and at different times. Up until the late 60's, the approach to criminal justice in the United States focussed on rehabilitation, envisaging prison conditions preparing inmates for their successful re-entry into society.[3] Then, at the beginning of the 70's, with the intellectual backing of the work by Robert **?**, the media, politicians and the public opinion converged on the idea that "nothing works" when trying to rehabilitate prisoners. Hence, the U.S. went down a different road, emphasizing the "tough-on-crime" policies, the importance of incapacitation and of deterring inmates through the experience of harsh prison conditions.

[1] For example, criminal participation should decrease with population aging.

[2] Re-incarceration rates are lower than re-arrest rates, as not all arrestees are incarcerated. In this paper we measure recidivism as the occurrence of re-incarceration of a released prisoner within three years from the end of his prison sentence. Since our sample comprises inmates released between 2000 and 2009 and we can follow them until 2013, the three year period is never truncated.

[3] The President's Commission on Law Enforcement and Administration of Justice in its report "The Challenge of Crime in a Free Society" (published in 1967) recommended that " *the model institution would resemble as much as possible a normal residential setting. Rooms, for example, would have doors rather than bars. Inmates would eat at small tables in an informal atmosphere. There would be classrooms, recreation facilities, day rooms, and perhaps a shop and library.*"

According to this view, prison life should isolate inmates not just from the outside world: movements inside the prison should be regulated, and inmates would often spend a large part of the day inside their cell. Discipline should be harsh and every movement inside the prison walls should be regulated and monitored.

At about the same time, in some European countries, and notably in the Scandinavian ones, "open" prisons were built with the idea that the punishment for criminal behaviour amounts to no more than the limitation of freedom. Within the prison walls life should be as normal as possible; inmates spend about 12 hours a day outside their prison cell, and can work, study, have hobbies, keep their personal relationships, in an environment that allows for movement around the prison premises with little supervision; self-responsibility is emphasized.[4]

Recently, attention on the potential benefits of a rehabilitative approach has been on the rise, also in the U.S.. Rehabilitation is increasingly seen as an effective way of keeping the long-term costs of housing inmates in check.[5] Scholarly papers (e.g., **??**) as well as the general press (e.g., **???**) have brought the spotlight on the "Scandinavian model" of open prisons.

It is difficult, however, to directly extrapolate from the experiences of the latter. One obstacle is size: most of the existing open prisons house less than 100 inmates, and even the largest do not usually exceed 350 (**?**), while in the United States the average number of inmates at maximum-security prisons is around 1,300.

Another obstacle is cost: for example, spending on the Halden open prison in Norway runs to more than 93,000 dollars per inmate per year, compared with just 31,000 dollars for prisoners in the United States.[6]

A third obstacle is, of course, the selection problem, as inmates who are sent to the open prisons are not a random sample of the population of inmates, and any naive comparison of recidivism rates

[4] A fact sheet on criminal services in Norway reads: "*The punishment is the restriction of liberty; no other rights have been removed... During the serving of a sentence, life inside will resemble life outside as much as possible... You need a reason to deny a sentenced offender his rights, not to grant them.*"

[5] Correction Corp. of America, the largest private prison firm, has announced a change in its business model, committing to "*play a leadership role in reducing recidivism... planning to expand the company's prison rehabilitation programs*". Quoted in a *Wall Street Journal* article (See WSJ, September 12, 2014: "*Prison Firm CCA seeks to reduce the number of repeat offenders*").

[6] The U.S. value has been estimated by the Vera Institute of Justice, a nonprofit research and advocacy organization.

with inmates sent to closed prisons would not have a causal interpretation. Moreover, ethical considerations prevent researchers from randomly assigning inmates to different prison regimes. To the best of our knowledge, there is no rigorous study of the causal effect on recidivism of detention conditions which approximate as much as possible a *normal life*, within the boundaries posed by the restriction on freedom. In these circumstances, the treatment is a complex amalgam and inmates can choose in which initiatives to participate. But then, the causal evidence from the (few and far between) rehabilitation programs in the U.S., which usually have a coercive nature and a well defined and narrow focus, is of limited use in predicting what would happen if the "Scandinavian model" – which we succinctly characterize as offering humane prison conditions – were to be exported to countries with larger prison facilities, for example the United States, the United Kingdom or Italy.

The main contribution of our paper is to fill this gap in a quasi-experimental setting. We use data from the largest *open* prison in Italy, and one of the largest detention centers in Europe, the *Bollate* prison, inaugurated at the end of 2000 near the city of Milan.[7] Bollate shares most of the features that characterize the "Scandinavian model", but is *large* (about 1000 inmates) and *costs no more* – if anything, less – than a traditional *closed* prison in the same country. To solve the selection problem, we look at the intensive margin of the treatment – the *length* of the period spent in the open prison, conditional on the total sentence length – and exploit a variation in such margin that is as good as random (which we test).

Specifically, we focus on a subset of inmates who did not go through the standardized selection process into Bollate and were displaced there due to overcrowding of the prison in which they were serving their sentence (we will often refer to them as "displaced inmates", while we will call "selected inmates" those transferred to Bollate after the screening process).[8]

What is key for our purpose is that neither Bollate nor the sending prisons get to choose the inmates to be displaced or the time of displacement. The Regional branch of the Prison Administration (RPA) irregularly grants the overcrowded prisons in the Region permission to displace, towards one of the

[7] Bollate prison featured in 2003 in the New York Times article "*Italian inmates receive training in a Cisco computer program: Behind bars but learning to network*".

[8] See Section 2.2.1 for more information on the screening process. The usefulness of focussing on the intensive margin of the treatment in connection with recidivism is noted and exploited by **?**.

(few) undercrowded prisons, a given (variable) number of inmates. Each of the sending prisons then displaces that given number of inmates working its way down a list of displaceable inmates, on a "conveyor belt," first-in-first-out basis. Each inmate present in the sending prison enters that list, in chronological order, as soon as he receives his first conviction.[9]

Hence, controlling for the delay with which the conviction is meted out, the prison of origin and the total sentence length, we compare the recidivism of inmates who were serving the *same total sentence* in the *same prison* and became displaceable to Bollate after the *same length of time* since their incarceration, but whose residual sentences to be served there – which represent our measure of the treatment – differ in length because of *i*) differences in the number of inmates already in the list at the moment each inmate became eligible for displacement and *ii*) differences in the number and size of displacement opportunities granted by the RPA while waiting to be transferred. Both differences are plausibly uncorrelated with the inmates' idiosyncratic propensity to recidivate.

The focus on displaced inmates offers two further advantages. Compared to selected inmates, they have shorter sentences and typically spend less time in Bollate. Hence, they get less involved in those aspects of the treatment more explicitly targeted to rehabilitation – for example, they are rarely given the opportunity to work outside the prison walls. This means that their experience is more telling of the effect on recidivism of prison conditions that punish criminal behaviour with no more than the limitation of freedom, i.e. prison conditions that embody the "Scandinavian model." Moreover, since displaced inmates do not go through any selection process, the external validity of our results is likely to be stronger.[10]

To briefly preview our results, we find that the opportunity to serve a given total sentence replacing one year in a traditional closed prison with one year in an open one reduces recidivism (over a three-year period) by about 6 percentage points (against an average three-year recidivism of about 40 percent).[11] The opportunity to serve time in Bollate might not be fully realized: the potential time

[9] Displaced inmates are all male, as there are no overcrowded female prisons.

[10] It is interesting to report that our idea of focusing the analysis on displaced inmates initially met the skepticism of Bollate's management. Ex-ante, they were concerned that the shorter time served at Bollate and the lower involvement in rehabilitation initiatives would result in no discernible effect on recidivism.

[11] Equivalently, we estimate at about -6 percentage points the difference between the effect on recidivism of serving the sentence in an open and in a closed prison.

may exceed the actual one whenever inmates are later transferred from Bollate to other prisons, typically as a result of disciplinary measures, or when they are granted an early release (through home detention, monitored liberty or other forms of non-custodial sentence). Given that both possibilities are endogenous, we only exploit the variability of the potential time served in Bollate. We find that these intention-to-treat effects differ across different categories of inmates: the reduction of recidivism is higher for inmates who did not have previous convictions and who are less educated. Hence, the treatment seems most effective when administered early enough on those people who are less well equipped to deal with the challenges of a non criminal life. There is also evidence that inmates with the highest risk of recidivating, who tend to recidivate within a short period of time, do not respond much to the treatment.

We repeat a similar analysis on the sample of inmates explicitly selected to Bollate. Although in this case we are less confident that we identify the causal effect of the treatment – if the most promising inmates are more quickly transferred to Bollate, our estimate would overstate the causal effect – it is nevertheless interesting that the size of the estimated effect is roughly equal in the two samples: given the likely upward bias in the estimate for the selected inmates, it seems safe to conclude that the effect of the treatment for the displaced inmates is at least as large as that for the selected ones.

It is not easy to reach neat conclusions on the mechanisms underlying the reduction in recidivism, since the treatment is an amalgam of factors – a different idea of punishment, rehabilitation opportunities, productive use of time, freedom of movement inside the prison walls, self-responsibility, trust – and we have no detailed information on how these change with the length of time served in prison.[12] We do find that the longer inmates stay in Bollate, the more they are likely to be given access to jobs outside of prison, and to be allowed day releases. This suggests that offering opportunities to work and facilitating the entry (or re-entry) into the labor market is an important driver of our results.

However, compared to selected inmates, displaced ones are less likely to be given access to work opportunities while in prison, and the likelihood of being given such access does not increase much with the passage of time. Also, since they usually remain at Bollate for a shorter period, they are

[12] Given our focus on the intensive margin of the treatment, we would need to observe the time variability of the various components of the treatment to parse out their relative importance.

less involved in the activities more explicitly aimed at rehabilitation. Yet, as already mentioned, we find that the treatment is at least as effective in reducing their recidivism. We interpret this as indirect evidence that the other aspects of the treatment are also likely to play a role. Indeed, displaced inmates experience an environment which is radically different from that of other prisons: a threefold increase in the time spent outside their cell (from 4 to up to 12 hours), a shift from meticulous external control on their daily life to self-responsibility, from constrained idleness inside the cell to productive use of time.[13] Our conjecture is that the longer displaced inmates face these differences, the more they produce a psychological turnaround that positively affect the post release behavior.[14]

The reduced recidivism might also result from weaker deleterious peer effects: indeed, Bollate might use the selection to limit the arrival of "bad" peers. If so, the possibility to scale up the Bollate experience would be curtailed, since a less exacting selection process would undermine the effectiveness of the treatment. We use data on the cell and the cell bock to measure the effect on recidivism of being exposed to a larger group of "worse" inmates during an inmate's stay. We find no evidence that such exposure increases recidivism.

1.1 Relationship with the literature

A number of studies have analyzed the effect of imprisonment on recidivism, but there is no consensus in the literature on the sign of the effect, let alone its magnitude. **?** is the only quasi-experimental study that, to the best of our knowledge, uses data from Scandinavian prisons to address this issue.[15] Exploiting differences in the sanctioning preferences of randomly assigned judges,[16] the authors find

[13]It has been argued that the removal of all causes for grievance except the restriction of freedom results in a psychological pressure that gets more powerful with the passage of time."*Every emotional discomfort, every moment of remorse that you might try to cover with resentment of the system, everything you try to grip onto to crawl away from personal responsibility slides back into the pit of the self. (...)The message everywhere you look and walk is the same.You did this to yourself. (...) One has to wonder if 10 years in such a glass funnel, directing all shame, anger and recrimination back onto oneself is not a morally harsher sentence than twice that time inside a 24-hour war zone where some of the most powerful warriors wear state uniforms.*" Quoted from: The Atlantic, September 17, 2014: Why Scandinavian Prisons Are Superior.

[14]While Bollate is new, well kept and not overcrowded, the other prisons are old, often dilapidated and severely overcrowded. The length of exposure to these differences is a contributing factor to our conjectured psychological turnaround.

[15]**?** studies a somewhat related issue, the effect of incarceration length on labor market outcomes, using data from Danish prisons (he focuses on short sentences, between one and two months). Sentencing conditions and imprisonment lengths in Scandinavian prisons have been extensively studied in the criminology and sociology literature.

[16]Starting with **?**, most researchers have used the random assignment of judges to estimate the effect of incarceration and incarceration length on inmate's outcomes.

that spending more time in prison, some of which invest heavily in trying to rehabilitate inmates, lowers recidivism. Yet, as judges do not govern whether individuals end up in an "open" prison, their analysis is silent about the causal effect of such treatments. **?** uses a regression discontinuity design, exploiting changes in Georgia's parole-board guidelines, to show that an extra year in prison coupled with incentives to participate in rehabilitation efforts leads to large reductions in recidivism. **?** uses a similar setup, exploiting discontinuities in Washington State's juvenile sentencing guidelines, and finds that, compared to a fine or probation, incarceration reduces juvenile recidivism. **?** show that juveniles are highly responsive to small cognitive behavioral therapies. One randomized control trial of such therapies, carried out in the Cook County Juvenile Temporary Detention Center, signals large reductions in recidivism.

Other papers find opposite effects. **?** exploiting the random assignment of judges who differ in their punitiveness (similar to **?**) show that Argentinean inmates who spend a larger fraction of their sentence under electronic monitoring, instead of ordinary imprisonment, have *lower* recidivism. **?** use the same identification strategy to focus on the effect of juvenile incarcerations on recidivism. The labor market prospects of incarcerated juveniles, who would otherwise be at school, might suffer more than those of adults; juveniles might also be more susceptible to criminal peer effects. While data limitations do not allow them to measure recidivism effects at the intensive margin (short vs. long incarcerations), they find compelling evidence that juvenile incarceration increases recidivism as an adult and reduces the likelihood of high school graduation. Our data does not contain juveniles, yet we are going to analyze whether the results differ by age or experience with the criminal justice system. Using a regression discontinuity design **?** measure similar criminogenic effects when offenders are sentenced to spending time in Texan prisons, places known for their harsh discipline, rather than be put on probation.[17]

If the effect of the treatment on recidivism has the same sign at both the extensive and intensive margins, our results suggest a way to interpret these opposite findings. Prison time served by inmates in facilities with a radically different prison life and with different rehabilitation programs may lead to

[17]Criminogenic effects of prison time have been found by **?** and **?**, while **?**, exploiting once again random assignment of judges, find that recidivism does not respond to incarceration.

different recidivism behavior: it might reduce or increase recidivism, depending on whether it takes place in open prisons, like Bollate or prisons in Scandinavia, or in a harsher one, like typical Italian prisons, or prisons in Argentina and Texas.

We are not the first to stress that prison conditions can have an impact on inmates' behavior: **?**, proxying prison conditions with the death rate inside the prison, find a deterrence effect of harsher conditions, but they focus on aggregate crime rates rater than on recidivism of individual inmates; **?** find, consistently with our results, that harsher prison conditions increase recidivism, but they look at the extensive margin of the treatment and have statistically weak results due to a small sample problem; **?** studies the effects on time served and recidivism of private prison contracting; she finds no effect on recidivism, but the mapping between private vs. public prisons and prison conditions is not clear.

Our paper is the first to address in a rigorous way the causal effect of what we have called humane prison condition. Differently from the broad conclusion of the **?** survey, which finds that incarceration has a null or mildly criminogenic effect, our analysis shows that humane prison conditions reduce recidivism.

As a background to our analysis it is also worth mentioning **?**, who provide an insightful counterfactual analysis of the U.S. incarceration rates between 1980 and 2005. Their findings show that most of the observed growth is driven by increased admission rates into prison (as opposed to changes in release probabilities and in the average time served). While their study cannot distinguish first-time prisoners from recidivists, the increase in the admission rate of inmates on parole, who represent a subset of all recidivists, explains about 20 percent of the growth in the U.S. prison population between 1980 and 2005.[18]

The rest of the paper is organized as follows. Section 2 provides additional information on Bollate and on the selection process, describes the data and discusses our identification strategy. Section 3 presents the results and a battery of robustness checks. Section 4 investigates potential mechanisms underlying our results. Section 5 concludes.

[18]Both, **?** and **?** show that the growth in admissions is mainly driven by changes in criminal justice policy towards more punitive sentencing rather than changes in criminal behavior.

2 The Quasi-experiment

To better understand the nature of the "Bollate treatment" and the sources of variability that will allow us to identify its causal effect it is useful to start with a little background on the working of the Italian judicial and prison system and on the Bollate prison.

2.1 The Bollate Prison

Inmates convicted to a prison sentence of less than three years and inmates waiting for their definitive sentence are typically incarcerated in jails (*Case Circondariali*), near the place where they reside, or, temporarily, near the place where they committed the crime.[19] Given that most incarcerations in the *Case Circondariali* tend to be short term, these detention centers invest very little effort in trying to rehabilitate the inmates. If convicted of a prison sentence of at least three years, the inmates are transferred to a prison, known as *Casa di Reclusione*.

The aim, in principle, is a) to separate offenders convicted of serious crimes from the other ones, and b) to focus rehabilitative efforts on those inmates who spend a sufficiently long time in prison. In practice, due to severe overcrowding and chronic lack of resources, the rehabilitative efforts in most *Case di Reclusione* are often rather limited.

We focus on inmates who spent at least part of their sentence in the "*Casa di Reclusione* Bollate" (near Milan; we will henceforth refer to this prison simply as Bollate). Bollate was opened at the end of 2000 with the explicit goal of creating an open prison with a rehabilitation program, leaving ample room for a range of activities and establishing joint work/training programs with regional institutions, firms, and non governmental organizations.

It is one of the few, and certainly the largest, pure "open" prison in Italy (as mentioned above, they are more common in Scandinavian countries and, to a lesser degree, in the United Kingdom).[20] Bollate prison cells are kept open during the day, and prisoners are trusted to serve their sentences with

[19] Individuals can be incarcerated before trial if caught in the act of committing an offence (*flagranza di reato*) or whenever there is a significant risk that they either pollute the evidence, recommit the same crime, or escape the judgment (upon decision of a special court, *Giudice per le indagini preliminari*).

[20] Some examples are Halden Fengsel, Suomenlinna Prison (Finland), Soebysoegaard (Denmark), HM Prison Prescoed (South Wales), HM Prison Castle Huntly (Scotland), HM Prison Ford (England).

minimal supervision: inmates are allowed to move freely around the prison with electronic badges, making it easier to reach the location where they either study or work. Inmates can go to school, among other things, to learn English or computer languages. They can train to become carpenters, electricians, cooks, welders, etc., as well as work in or out of prison for several agricultural and service cooperatives. For some inmates even prison walls are "open," as they are given the opportunity to work outside during day releases.[21]

Bollate has its own garden produce and has recently inaugurated a restaurant open to the public. Inmates elect their representatives and, within a given budget, have a say on several aspect of their prison life (furniture, food, etc). When children are visiting, they can spend their time in dedicated play rooms that are nicely furnished and full of toys, and spouses are guaranteed some intimacy. Security is not merely seen as a police concern but also educators, psychologists and even the inmates themselves are involved and given responsibilities. Inmates are asked to sign a "Responsibility Pact," committing to responsible behavior lest they be transferred to a different prison. In such an environment, and possibly also thanks to the threat of transfer to an ordinary prison, violence is contained and fewer guards are needed, which keeps costs down.

Summing up, Bollate offers its inmates several opportunities to develop their human and social capital and to experience self-responsibility, within the limits posed by the restraints on freedom.[22]

Table 1 documents several features of Bollate and of the prisons from which Bollate draws most of its inmates (almost 70 percent of inmates in Bollate are transferred from the largest *Casa circondariale* in the Lombardy region, San Vittore).

The first striking difference between Bollate and all other prisons is that inmates are free to move within the prison walls for most of the day (10 to 12 hours), while inmates in most other prisons spend only around 4 hours outside their cells (which is the minimum time required by law). These differences in the time spent idle inside the cell can also be observed in prisons located in other countries. According to a recent survey carried out in the UK, in open prisons 54 percent of inmates

[21] Of the 9,318 inmates who have spent some time in Bollate between 2000 and 2009 four evaded prison during such day release, while one inmate managed to evade Bollate from the inside.

[22] The appendix Figures A2 to A4 provide photographic evidence on the prison conditions at Bollate and at the initial prisons.

can move freely inside the prison for 10 or more hours (**?**). In ordinary closed-cell UK prisons inmates spend most of their time inside their cell.[23]

Bollate is also the youngest prison. San Vittore was built in 1879, following Bentham's panopticon design. Opera, the other major *Casa di Reclusione* in the region, was built in 1980. These older prisons tend to be overcrowded: in 2009, at San Vittore, the ratio of inmates over official capacity was 142 percent, at Opera it was 128 percent (similar conditions are observed in all the other years of our sample). Bollate, instead, is always below its capacity. Table 1 suggests that this contributes to better prison life, keeping suicides and attempted suicides, self-inflicted injuries, and hunger strikes at the lowest level compared to all the other prisons in Lombardy (we will test in Section 3.3 whether overcrowding is driving our results).

Apart from the open cell policy and the lack of overcrowding, Bollate is special for its rehabilitation efforts, and in particular for those targeted at improving inmates' future labour market prospects. In most prisons, a small fraction of inmates (between 12 and 30 percent) work for the prison administration in menial jobs (cleaning, cooking,...), which may not improve much their future employability. In Bollate, inmates have the opportunity to work for employers other than the prison administration, both inside and outside the prison, and to learn skills which will be useful in the labour market. At any given point in time, about 30 percent of inmates are actively working for pay, either for employers that open a production line inside Bollate or for employers outside of the prison walls. The fraction of inmates with similar arrangements is just 0.5 percent at San Vittore, 6.5 percent at Opera, and is never larger than 6.6 percent at other prisons in Lombardy.

Inmates in Bollate are more likely to be at school or at the university. For example, in 2009, in Bollate, 8 inmates were enrolled at a university, against the 7 inmates in all the other prisons in Lombardy combined. While one might think that all these efforts come with a hefty price tag, a remarkable feature of Bollate is that its running costs are much lower than the average prison in Italy. Appendix Table A1 shows, for two recent years, that the per-inmate daily cost of Bollate is about 65 euros, while the average for the whole country is about 115 euros.

[23]The UK **?**, concerned about these numbers, recommends that inmates are given at least 10 hours of yard time. The report highlights also a series of studies on the behavioral issues that tend to emerge when inmates spend the whole day inside their cells.

The difference is mainly due to the lower wage bill for guards and administrators, driven by their lower number compared to the number of inmates (wages of prison staff do not vary across prisons). In 2009, in Bollate, 470 prison guards and administrative staff dealt with 1032 inmates, a ratio of less than one guard every two inmates. Nationwide such ratio was close to 2/3.

Overall, Bollate is clearly a much more pleasant place to serve time compared to most other options. The effect of this on recidivism is an empirical question, as in theory there are forces working in opposite direction: on the one hand, it lowers the disutility of prison;[24] on the other, by offering the prospect of a profitable re-entry in the society, it increases the opportunity cost of crime (see **?**); moreover, as we will argue below, experiencing self-responsibility and humane prison conditions might in itself influence the inmates' future behavior. Before turning to the empirical test of the effect on recidivism, it is important to discuss how inmates get transferred to Bollate.

2.2 Selection to Bollate

As a rule, inmates present at Bollate are selected through a screening process from a pool that includes both, those who apply to be sent there and those who are proposed by the administration of a different prison (usually in the same region) or by the Justice Department.[25] A third channel of access to Bollate, quantitatively more important in the first few years since the prison's opening, is provided by displacement of inmates from nearby overcrowded prisons. These displaced inmates do not go through the screening process, and will be the focus of our analysis. Yet, it is useful to first review the process through which the selected inmates arrive at Bollate.

2.2.1 The Selected Inmates

The Regional branch of the Prison Administration for Lombardy (the "*Provveditorato Regionale di Milano*", RPA), together with the prison administration of Bollate, assesses each transfer application

[24] Recidivating inmates are usually not readmitted into Bollate. Hence, for rational and forward looking inmates specific deterrence should not fall. However, it seems safe not to assume that all inmates are fully rational and forward looking and so the possibility of a negative effect on deterrence should not be discounted.

[25] A small number of inmates give up themselves directly to the Bollate prison, which we treat as if they applied to be sent to Bollate.

to determine whether a number of criteria are satisfied. Broadly speaking, inmates should: have a residual sentence in the range of 2 to 10 years (the upper limit has later been removed); be in good health, and not be under methadone treatment; have a definitive sentence;[26] have shown propensity and active interest for rehabilitation programs (this is reflected in a positive assessment by a specialized team, that drafts a psychological profile of each applying inmate); have had generally good behaviour in the previous prison(s); and, finally, reside or have interests and relationships in the Lombardy region. Once the assessment is completed and the various criteria deemed satisfied, the transfer of the inmate to Bollate is finalized.

Clearly, these criteria involve a good deal of positive selection: inmates are explicitly screened to identify those who would be more receptive of the rehabilitation efforts, and it is therefore highly likely that their intrinsic propensity to recidivate be lower than that of the average inmate. Therefore, a naive comparison between their recidivism and that of the average inmate would almost surely overstate the causal effect on recidivism of serving the sentence in an open prison.

Focussing on the intensive margin of the treatment – the length of the residual sentence upon arrival to Bollate – might help to sidestep the selection problem. The time it takes for the screening procedure to be completed and therefore, given the total sentence, the length of the residual sentence upon arrival to Bollate, can vary for a host of factors (incomplete requests, bureaucratic delays in handling applications, number and speed of appeal trials...). The variability imparted by these factors might in principle be exploited to tease out the causal effect of the treatment on recidivism. However, the length of the delay itself might reflect some selection. For example, "better" inmates (more educated, with better labour skill, better behaviour, etc.) might be identified more quickly, so they would end up in Bollate earlier; or, conversely, "better" inmates might be retained for longer by the prison of origin, so they would end up in Bollate later.

Unfortunately, we are not able to weigh the importance of the different delays, and we cannot control for all the variables that belong to the information set relevant for the selection process of

[26]The Italian judicial system allows for up to two courts of appeal. Depending on whether or not a given sentence is resisted, and up to which degree of appeal, the time which elapses before the sentence becomes definitive can vary by several years. Although in principle a convict should not go to prison before the sentence is definitive, there can be a number of reasons why he/she is incarcerated before the final appeal is decided.

inmates (we only know whether they applied or were proposed, where they were spending their previous prison time and their previous criminal history). For this reason, we will focus on a different source of variability in the residual sentence to identify the causal effect of the treatment.

2.2.2 The Displaced Inmates

As mentioned, not all inmates that are present in Bollate go through the screening process. During the period that we considered, the (Lombardy) RPA frequently granted overcrowded prisons in the Lombardy region permission to displace some of their inmates towards nearby prisons that had spare room. This occurred whenever overcrowding became particularly severe and there were enough empty cells in a nearby prison. Bollate, which opened in late 2000 with an availability of about 1000 prison beds, was often on the receiving end of these transfers (Figure 1 shows the size and timing of such episodes). Importantly, neither the management of Bollate nor that of the sending prison had control on which or when inmates were displaced there.[27] In Section 2.4 we will describe in detail how displacements occur.

2.3 The Data

2.3.1 Prison Records and Sample Selection

We worked with the Prison Administration ("*Dipartimento dell'Amministrazione Penitenziaria*") of the Italian Ministry of Justice, its regional administration office for Lombardy and the administration of the Bollate prison, to link different administrative records collected up until February 2013.

We were granted access to a large amount of information on inmates who spent some prison time in Bollate between December 2000, the opening month, and February 2013, the closing date of our analysis. The information includes the entire history of incarcerations, dating as far back as 1971, and of incarcerations following their release from Bollate (if occurring before 2013).

[27] Up until 2008, the inmates displaced to Bollate did not need to satisfy the requirements that we described before; only after 2008 a looser version of the screening process has been introduced also for displaced inmates, but given that our sample stops in 2009 almost all the displaced inmates that we consider belong to the pre-screening period. One of the robustness regressions shows that our results do not change when excluding inmates who entered Bollate after 2008.

We restrict our sample to Italian (57 percent of inmates are foreigners), male (less than 30 inmates are female), non sex offenders. We exclude foreigners because of the difficulty in measuring recidivism for foreign offenders, who most of the time are illegal immigrants without any paperwork and are therefore able to hide their identity or leave the country after dismissal from prison. We also exclude 8 percent of inmates who are sex offenders, as they are subject to very specific incarceration rules. We focus on inmates who have served a definitive sentence.[28]

We measure recidivism through re-incarceration within three years from the end of the inmate's custodial term (though we also look at other time windows).[29] The choice of a three year measure of recidivism forces us to restrict the analysis on inmates released up to 2009.

In the end our sample includes each inmate who spent some time in Bollate between the end of 2000 and 2009, was released (from Bollate or from some other prison) at the latest by 2009 and is Italian, male, non sex-offender: in total we have 2308 people. For each of them we have a complete prison history, with the number and the dates of previous prison spells (if any), the dates of the period spent in Bollate, the length of the total sentence corresponding to the crime for which they spent time in Bollate, the date of a possible new incarceration after Bollate (and up to February 2013), whether the release from the last prison was followed by a non-custodial sentence (e.g. home detention, monitored liberty, parole, etc.) or by liberty. We have information on a number of characteristics of the inmates as well as on the crimes for which they have been imprisoned.

We also have some information on the selection process to Bollate, as we can distinguish the prisoners displaced there due to overcrowding of nearby prisons (i.e. not selected), those transferred for "treatment" reasons, those assigned there when their request has been approved, those assigned there by the Justice Department without mentioning "treatment", and those transferred for other reasons (mainly transfers from the Central Government or arrests by Bollate officers). This kind of information is missing for 12 percent of the sample (later we are going to test whether the results are robust to adding this group to the displaced one).

[28] 90 percent of inmates receive a definitive conviction before release. We restrict the analysis to these inmates, avoiding that a re-incarceration happens for the same crime.

[29] Re-incarceration rates tend to be slightly higher than reconviction rates, though less than one percent of Bollate inmates get released due to an acquittal.

For the inmates displaced to Bollate from nearby overcrowded prisons we also know whether they were incarcerated after receiving a conviction and the date in which they were convicted, whenever the conviction occurred after their incarceration.

Figure 2 shows the distribution of the fraction of the total sentence potentially served in Bollate. The left panel is for the sample of selected inmates,[30] the right one is for the sample of displaced inmates. In both cases, transfers are more likely to happen at the beginning of an inmate's incarceration, which skews the two distributions to the left.

The comparison between displaced inmates and selected ones is informative about the typical selection mechanism that takes place in open prisons. Table 2 shows the average recidivism, potential and actual time served in Bollate, and total sentence length, for groups of inmates identified by different reasons for entry: displaced from nearby prisons due to overcrowding (1552 inmates), actively selected into Bollate (475, further distinguished according to the different reasons for entry mentioned above), and inmates for which the information on entry reason is missing (281). For each group the table also reports the fraction who ended up in the cell block 5, where inmates working outside the prison are housed.[31]

Inmates displaced to Bollate have on average a total sentence length (1.440 years, or 17 months) considerably shorter than the average sentence length of selected inmates (3.563 years, or 43 months); their average (potential) residual sentence upon arrival at Bollate is about 10 months (0.852 years) and is about 8 months shorter than that of the selected inmates. These differences reflect the fact that selected inmates are required to have sentences long enough for rehabilitation interventions to have sufficient duration, while no such requirement is imposed on displaced inmates.

For both groups, the actual sentence length served in Bollate is on average about 80 percent of the potential one (the two measures coincide for about 2/3 of inmates). This happens because inmates might be transferred to other prisons or be given early release (transforming their prison sentence into a non-custodial one) before the end of their prison time.

Displaced inmates, as we just noted, have shorter sentences. Moreover, in the first few years since

[30] We include in this group the inmates for whom the information on the entry reason is missing

[31] We only observe the cell block in which inmates were at the moment in which they were released from Bollate.

its opening Bollate had considerable spare capacity and was often on the receiving end of displacements, which implies that many displaced inmates entered early into Bollate. For both these reasons, since we select our sample by requiring that inmates have been released at the latest by 2009, we end up oversampling displaced inmates over selected ones. If we were to drop this requirement, the displaced would represent about 60 percent of all Bollate inmates (cumulated over the years). Since their inflow depends on prison overcrowding, the fraction of displaced inmates who entered Bollate drops after the 2006 collective pardon (which corresponds to the peak of overcrowding). The pardon led to the sudden release of about one third of the prison population (see **??**), and the fraction of displaced inmates entering Bollate drops from 75 percent in 2006 to 60 percent in 2007, 2008 and 2009, 44 percent in 2010, and 24 percent in 2011.

Only a handful of displaced inmates finish their incarceration in cell block 5, while for the selected inmates the proportion is on average 14 percent (and can be as high as 25 percent for some subgroups). Consistently with the screening process which the selected inmates went through, their recidivism rate is on average much lower than that of displaced inmates (by 11.6 percentage points).[32] Among the selected inmates, those who applied to be transferred and those transferred by the Justice department have the lowest recidivism rates. The group of inmates whose entry reason is unknown is difficult to characterize: they show recidivism rates similar to those of the displaced inmates, total and potential residual sentence length similar to those of selected inmates, actual residual sentence length similar to those of displaced inmates. In the following we will group them together with the selected inmates, so as to keep the sample of displaced inmates as cleanly defined as possible.[33] Other differences between the two groups of inmates are shown in Table 3.

Displaced inmates are on average younger[34] and are less likely to have a stable relationship, are less educated, more likely to be drug addicted; their criminal profile is more skewed towards petty

[32]Clearly, the recidivism rate is an endogenous outcome, and cannot be used to establish the presence (and sign) of selection. The latter is the straightforward result of an explicit screening process, aimed at identifying inmates more responsive to rehabilitation interventions.

[33]As already mentioned, in one of the robustness checks we are going to group them together with the displaced inmates.

[34]The average age is considerably larger than in the United States, though is roughly in line with the average age of inmates in Italian prisons, which is close to 42 (**?**).

crimes, as is the case with the typical inmate in Italian prisons.[35] All these differences are statistically highly significant.

2.4 The Identification Strategy

We assume that the recidivism probability of inmate i, R_i, is a (linear) function of the total sentence length (regardless of the type of prison), of the prison conditions, as measured by the times served in the open (O) and in the traditional, closed prisons (C), of a vector of covariates capturing the characteristics of inmate i and his previous prison history, and of an unobserved error, capturing the idiosyncratic propensity to recidivate of inmate i:

$$R_i = \alpha_0 + \alpha_1 S_i + \alpha_2 S_i^O + \alpha_3 S_i^C + \gamma' X_i + \varepsilon_i, \tag{1}$$

where S_i is the total sentence length, S_i^O and S_i^C are the parts of the total sentence served in the open cell prison of Bollate and in a traditional, closed cell prison, respectively, X_i is a vector of covariates and ε_i is the unobservable propensity to recidivate. We allow for a direct role of total time in prison because the time away from the family and the social network, the chance to mature and grow older, while having no opportunity to commit crime, are all factors that might affect the inmate's future behavior. Our main interest is on the effect of prison conditions, and in particular of the residual sentence (potentially) spent in Bollate S_i^O (our measure of the treatment intensity) as opposed to the one spent in a traditional closed prison S_i^C; in theory, besides the length of time spent in each of the two prison regime, also the sequence in which the two regimes are experienced might matter. In our sample, however, it never happens that the time spent in Bollate precedes the time spent in the closed prisons, so we will not consider this possibility.

Since $S_i = S_i^O + S_i^C$, we cannot estimate separately α_1, α_2 and α_3. We therefore rewrite the model

[35] Recall that one of the criteria in the screening process is a sufficiently long sentence, which is obviously correlated with the severity of the crime. The selection is therefore meant to identify, *among serious criminals*, those more likely to respond positively to the rehabilitation interventions.The difference in the criminal profiles of the two groups is consistent with the difference observed for the variable *Art. 4 bis*. The latter identifies the cases where the applicability of prison benefits (day releases, outside work, non-custodial sentences) is restricted. This occurs for a series of serious crimes (e.g. terrorism, organized crime, slavery, sex trade, kidnapping with extortion, etc.). 20 percent of selected inmates are subject to such restrictions, while the fraction goes down to 7 percent for displaced inmates.

as

$$R_i = \beta_0 + \beta_1 S_i^O + \beta_2 S_i + \gamma' X_i + \varepsilon_i, \tag{2}$$

where $\beta_1 = \alpha_2 - \alpha_3$ and $\beta_2 = \alpha_1 + \alpha_3$. The equation makes clear that our coefficient of interest, β_1, reflects the difference between the effect on recidivism of the time served in the open cell and in the closed cell prison. Equivalently, β_1 captures the effect on recidivism of increasing in equation (1) S_i^O by one year and simultaneously reducing S_i^C by one year, leaving S_i unchanged.

The estimated coefficient β_1 would have a causal interpretation under an assumption of conditional independence:[36]

$$S_i^O \perp \varepsilon_i | S_i, X_i. \tag{CIA}$$

We will argue that, given the institutional features governing the displacement of inmates from overcrowded prisons, with an appropriate choice of the vector of covariates X_i, condition (CIA) is likely to hold in the sample of displaced inmates.[37]

Recall that all the inmates in overcrowded prisons become potentially displaceable as soon as they receive a conviction.[38] At that moment they enter a (prison-specific) list, chronologically ordered. Whenever an overcrowded prison is granted by the Regional Prison Administration the permission to displace to Bollate (say) n inmates, it will simply pick the first n in the list, following a first-in-first-out rule (with possible exceptions due to the composition of the displacement opportunities, better explained below). For a given sentence length, S_i, the amount of time inmate i will (potentially) spend in Bollate, S_i^O, is larger the sooner he gets displaced there. In turn, other things equal, the latter occurs: (a) the sooner inmate i in prison j receives his first conviction; (b) the fewer inmates there are at that moment ahead of him on the list of displaceable inmates formed at prison j; (c) the larger (in number and/or in size) the opportunities to displace inmates towards Bollate granted to prison j by the (Lombardy) RPA from the moment in which inmate i entered the list.

[36] In a linear model the simple conditional uncorrelatedness would suffice.

[37] If the link between ε_i and the conditioning variables were non linear, condition (CIA) might not be enough. In a robustness check we will control for the conditioning variables in a flexible way (through a rich set of fixed effects).

[38] As mentioned, in Italy inmates might be incarcerated before receiving a conviction.

Condition (b) is clearly uncorrelated with inmate i's propensity to recidivate.

The same holds for condition (c). However, inmates of different age groups, and inmates addicted to alcohol or drugs, sleep at Bollate in different, dedicated cell blocks (inmates who sleep in different cell blocks will nevertheless meet while performing different activities). Prison j might thus not always be able to pick the first n in its chronological list. For example, when Bollate's spare capacity in the cell block dedicated to, say, young inmates (less than 30 years old) is smaller than the number of young inmates among the first n in the list of the displaceable inmates, some of those with the lower ranking in the list would be skipped and replaced by inmates with rank lower than n but not young.

Since we do not observe the detailed breakdown of the available places in Bollate into different cell blocks, we might detect some deviations from the first-in-first-out rule, correlated with inmate's age or addiction. These exceptions are relatively rare and can be seen in Figure 3, which compares, for the inmates eventually displaced to Bollate, the predicted order of displacement based on the date of conviction with the actual one; the correlation between the two orderings is close to 1.[39] Since we observe the age of displaced inmates and whether they are addicted to alcohol or drugs, we can include these variables in the vector of covariates X_i and therefore condition the correlation between recidivism and treatment intensity on such observables.[40]

The third factor determining the timing of an inmate's transfer to Bollate is the speed with which, after the incarceration, his conviction was meted out (condition (a)). This speed might be correlated with his propensity to recidivate. However, since we observe for each displaced inmate the date of conviction, we can compute the delay between incarceration and first sentence and simply condition on it. Table 3 shows that the time from incarceration to the first sentence is fairly short (slightly longer than one month on average).[41]

Controlling for such delay, total sentence length, age and addiction, the only sources of variability

[39] The predicted order of transfers is simply the chronological order of the inmates' conviction dates, given the number of prison of origin-specific displacements. We will see that the results are robust to conditioning on the sporadic difference between the predicted and the actual ranking of displacement.

[40] There is some flexibility in the definition of young, so we simply include age fixed effects. We use age at exit fixed effects, though very similar results are obtained when including age at transfer fixed effects. We cannot include both, as together they would be collinear with the time spent in Bollate.

[41] For about half of the displaced inmates such time is zero, as they are incarcerated at the time of their first sentence.

of the potential residual sentence to be spent in Bollate would then be differences in the number and dimension of displacement opportunities towards Bollate granted by the RPA to the prison of origin at different moments and differences in the backlog of displaceable inmates at the time of inclusion in the list. This residual variability is likely to be as good as random (in Section 2.4.1 we will present a formal test).

In passing, our approach is reminiscent of the conditional independence assumption used by **?**, who exploit the variability in the length of the residual sentence; in their case the variability is due to the timing of a mass release, in ours to the timing of displacement opportunities granted by the RPA and to other exogenous factors.

We will also estimate equation (2) on the sample of inmates actively selected to Bollate. In this case, we will exploit the variability in the timing of transfer to Bollate arising from differences in the speed with which the request to be transferred to Bollate was submitted (either by the inmate himself, or by the prison of origin) and in the length of time it took to screen the applications of inmates and grant their request. If our vector of controls X_i were to include all the variables observed by the people involved in the selection process, then we could conclude that condition (CIA) holds.

If, however, the people doing the screening had access to a larger information set, we would not be able to rule out the possibility that the transfer to Bollate occurs earlier for inmates with lower ε_i (for example, it might be that less problematic inmates are more quickly identified), thus inducing a negative correlation between ε_i and S_i^O, which would spuriously magnify the (negative) effect of the treatment and would challenge the causal interpretation of the results. For this reason we use the estimates on the sample of selected inmates only to help interpret the results for the displaced inmates and to identify the mechanism underlying those results.

Before moving to the randomisation tests, it is worth pausing to consider whether the potential residual sentence is an appropriate measure of the treatment. Indeed, for about 2/3 of the displaced inmates the potential residual sentence upon arrival at Bollate also represents the actual sentence spent there, as they are never transferred again before their final prison release. An inmate might however be transferred to another prison ahead of time if he misbehaves, or if the treatment appears to be of little use, or he might be granted early release via a non-custodial sentence. Clearly, these possibilities

are the result of the inmate's behaviour, so the actual time spent in Bollate suffers from endogeneity.

The effect of the residual sentence upon arrival at Bollate, therefore, has the nature of an intention to treat. It might differ from the average treatment effect as the actual prison time, possibly shorter, is endogenous. Despite this drawback, the actual prison time could be considered another appropriate measure of the treatment, since the residual sentence upon arrival might overstate the effective "dose" of the treatment received. This is a standard problem in policy evaluation studies: the intention to treat is more policy relevant, as compliance cannot be relied upon, but overstates the measure of the administered treatment due to non-compliance. We will present results for both measures of the treatment, using the potential time spent in Bollate as an instrument for the actual time.

2.4.1 Randomization and Balance Tests

Table 4 presents a test of the random assignment of our main measure of the treatment (potential residual sentence spent in Bollate). The aim is to test the ability of observables to predict the intention to treat. We control for the total sentence length, the delay in receiving the sentence, and the variable "age," as these are mechanically linked to the time spent in Bollate.[42]

Columns 1 and 2 show that for the sample of displaced inmates the observed covariates are jointly unable to predict the intention to treat (the F test for the joint significance of all the covariates has a tail probability of 27 percent). Even taken one by one, only the coefficient on the fraud dummy is significantly different from zero, and only at the 10 percent level.

In Columns 3 and 4 we repeat the exercise without controlling for the time from incarceration to first sentence and for age. The tail probability of the F test is in fact even higher (34 percent), suggesting that the variability imparted by the delays in meting out the conviction or by the constraints due to the composition of available cells in Bollate is not generating selection. While in our baseline regression we remain cautious and exploit only the variability among inmates with equal conviction delay, age and addiction, we will show that our results are essentially unchanged when not imposing

[42]The discussion in Section 2.4 would suggest conditioning also on the variable "drug addiction"; conservatively, Table 4 includes this variables among the covariates whose significance gets tested, but the results would be unchanged had we conditioned also on "drug addiction".

such restrictions.[43]

The test for the random assignment of the treatment fails, instead, when we consider the sample of selected inmates (this is true also if we exclude from the selected those whose entry reason is unknown[44]). Several covariates are statistically significant, and the F test of their joint insignificance has a tail probability of only 0.1 percent. This was expected, since the delays in the selection process – which is the variability we exploit when we consider the selected sample – are potentially correlated with the inmates' individual characteristics, and we are unable to control for all the information available to the people doing the selection. For this reason, in the remainder of the analysis we focus on the sample of displaced inmates, showing the results for the sample of selected inmates only by way of comparison.

An alternative way to test for random assignment of the treatment is presented in Table 5. We first construct a measure of recidivism risk by regressing recidivism on all the pre-treatment characteristics listed in the upper part of Table 4, together with age fixed effects and (possibly) prison of origin and year by month of transfer to Bollate fixed effects. We thus exclude from this regression total sentence length, time from incarceration to first sentence and potential time spent in Bollate .[45] Next, we regress this measure of predicted recidivism on potential time spent in Bollate, total sentence length and time from incarceration to first sentence. A negative and significant coefficient on potential time spent in Bollate would mean that low risk inmates – as predicted on the basis of pre-treatment characteristics – tend to spend more time in Bollate, and would thus falsify the random assignment of the treatment. Table 5 shows that potential time spent in Bollate is uncorrelated with predicted recidivism (the point estimate is not significantly different from 0 and, if anything, is slightly positive).

[43] We will always control for the total sentence length. This is key, since residual and total sentences are strongly positively correlated. Without conditioning on the total sentence, inmates with longer residual sentences are associated with more serious crimes.

[44] For brevity we do not show these results, which are available upon request.

[45] The R-squared in this first regression is around 20 percent.

3 Results

3.1 Non-parametric Evidence

The information on the exact time of re-incarceration allows us to construct non-parametric Kaplan-Meier cumulative failure (recidivism) functions to compare displaced inmates who spent different fractions of their sentence in Bollate. As in the rest of the analysis inmates are followed for three years after the end of their prison time.

Figure 4 plots failure functions for two groups of inmates, depending on whether they served less or more than 50 per cent of their total sentence in Bollate (to compute these ratios we always use the potential time spent in Bollate, to avoid any endogenous interruption of the Bollate treatment). It is important to control for the total sentence length, since Bollate opened at the end of 2000 and, by construction, longer sentences will be negatively correlated with the fraction of time spent in Bollate. For this reason we produce separate plots, for inmates with total sentence that are above and below 1.5 years (a figure which is close to the median and the mean). In both cases, the differences in recidivism up to a year after release are negligible. This likely captures inmates whose unobserved "propensity to recidivate" is strong enough to be unaffected by treatment efforts and quick to materialize. The inmates who do not recidivate for at least a year seem to be more responsive to the Bollate treatment. After the first year, the cumulative differences in recidivism start growing, reaching about 10 percentage points at the end of the recidivism window.

The differences between the failure functions are more striking when the total sentence is above 1.5 years, meaning that the more treated inmates spend at least 9 months in Bollate. In relative terms these are massive differences.

Next we use regression models to better control for total sentence length, for additional regressors, as well as to assess the statistical significance of these differences.

3.2 Main Results

We estimate the intention to treat effect by ordinary least squares with a linear probability model (later we will show that probit models as well as hazard models lead to similar results). The unobserved errors are allowed to be correlated among inmates who were released during the same week and spent their final prison time in Bollate in the same cell block (there are 5 cell blocks). This is in line with the findings of **?** and **?** who find evidence of peer effects among inmates who have spent prison time together and who have been released at the same time. Alternatively, in the Online appendix Table A3, we use a spatial lag error model that allows errors to be correlated among inmates whose detention in one of the cell blocks has overlapped, even if their release has happened at different times. Finally, one could argue that Bollate inmates form relationships when they arrive, no matter the cellblock. This would also be a clustering that mimics the variation of our instrument. All methods to compute the standard errors deliver similar results, and in the rest of the analysis we use the first one.

When estimating the (local) average treatment effect, we run instead two-stage least squares regressions (2SLS), using the potential time served in Bollate as an instrument for the actual time served. A visual representation of the first stage is shown in Figure 5. For about 2/3 of inmates actual and potential days spent in Bollate coincide (they correspond to points on the 45 degree line in the figure). The rest of the inmates are transferred to other prisons before the end of their prison spell or are granted an early release (monitored liberty, home detention...). These are clearly endogenous outcomes. While the exogenous variability of potential time served in Bollate makes it a good instrument, a caveat is in order in interpreting the results of the 2SLS regressions, since the local average treatment effects are driven by the compliers, and these might be those who respond more strongly to the improved prison conditions.

The top panel in Table 6 shows the reduced form (intention to treat) regressions while the bottom panel show the 2SLS results. All measures of time served are in years (days divided by 365).

Consider first the intention to treat regressions (the top panel). In the first column, to provide a benchmark, we estimate the effect of the treatment in the simplest possible specification, controlling only for total sentence length. One extra (potential) year in Bollate (and therefore, given the total

sentence, one less year spent in an ordinary prison) reduces recidivism by 7.3 percentage points (with a significance level of less than 1 percent).[46]

Following the argument presented in Section 2.4, in Column 2 we include also the time from incarceration to first sentence,[47] drug addiction and age at exit fixed effects as controls.[48] The estimated intention to treat effect is slightly reduced, to 6.3pp, still highly significant. This confirms that the variability associated with the delay in receiving the conviction and with the capacity constraints in Bollate is unlikely to selectively affect recidivism. In Column 3 we further add the other covariates listed in the upper panel of Table 4 (capturing demographics and the criminal history), prison of origin and year by month of transfer to Bollate fixed effects, exploiting both the variability within prisons and within month of transfer. The estimated intention to treat effect is unchanged and still highly significant. Finally, in Column 4, we also add the interaction between the year by month of transfer to Bollate fixed effects with the prison of origin fixed effect, to use only the variability among inmates who were displaced at the same time from the same prison. The estimated intention to treat effect is almost unchanged.[49]

It is worth noting that in all specifications the time from incarceration to the first sentence, meaning the delay in receiving the sentence, does not predict recidivism.

Moving now to the 2SLS results (bottom panel), the average treatment effects are about 4 percentage points larger than the corresponding intention to treat effects. The larger effect is expected, as the residual sentence upon arrival overestimates the length of the actual prison stay: in the first stage regression the coefficient is always close to 60 percent, with a t-statistic of about 15, and an F-statistic of about 200.

Taking Column 3 as our preferred specification, an extra year spent in Bollate, as opposed to any of the prisons of origin, reduces recidivism by 10.4 percentage points, i.e. by about 27 percent of the average recidivism rate (39.6 percent).

[46] An equivalent interpretation of the estimated coefficient is that the effect on recidivism of serving one year in an open prison is 7.3 percentage points smaller than the effect of serving the same time in a closed one.

[47] Adding the time to the first sentence we lose 15 observations, for which this information, which had to be hand collected from the judicial files, could not be found.

[48] Results would be unchanged had we controlled for age at transfer fixed effects (results are available upon request).

[49] In columns 3 and 4 the observations for which the fixed effects perfectly predict the outcome are dropped, in order to get correct standard errors.

The sign of the other covariates (shown in the Appendix Table A2) is in line with expectations. In particular, a previous history of recidivism, proxied by the number of previous incarcerations, is highly predictive of future recidivism.

Interestingly, the total sentence length increases recidivism, even though the effect is not statistically significant. Different forces would drive this coefficient to be positive, for example, building criminal capital (**?**), or unobserved criminal attitude that is observed to the judge, while specific deterrence would lead to a negative coefficient (see **?** for a review of the literature on specific deterrence). Our result show, however, that any inference on the effect of sentence length on recidivism must take into account the way in which the prison time is spent.

Drug addiction significantly increases recidivism, a well known result. We also control for marital status, three education dummies, three employment dummies, and nine crime dummies. As mentioned, the estimated effect of the treatment is virtually unaffected by the inclusions of these controls. This, together with the rise in the R-squared, suggests that controlling for unobserved selection would be unlikely to turn the results around.(see **??**)

Table 7 presents the result of a similar analysis conducted on the inmates explicitly selected to Bollate. The first two columns include also inmates for whom the cause of entry is unknown while the following two columns restrict the analysis only to inmates who are known to have been screened. Since we do not have all the information used in the screening process, for the selected inmates we are less confident to be able to identify the causal effect of the treatment. Indeed, we expect the causal effect to be smaller than the estimated coefficient, since the latter also reflects the likely positive selection which takes place during the screening process and for which we cannot control. It is therefore interesting to note that the estimated effect of the treatment is roughly of the same size as that found for the displaced inmates. Taking into account the likely downward bias of the estimate for the selected inmates, it seems safe to conclude that the causal effect of the treatment for the displaced inmates is, in absolute terms, at least as large as that for the selected inmates.

3.3 Robustness Checks

In Table 8 we run several robustness checks (we focus on the displaced inmates). All regressions control for the set of variables included in our preferred specification (Column 3 of Table 6), including prison of origin and year times month of displacement fixed effects. For the sake of space we only report the intention to treat effects (those estimated through 2SLS are larger across the board, but paint a very similar picture). Since we are controlling for the time of displacement, we cannot also control for the time of exit, since jointly the two variables are collinear with the potential time spent in Bollate.

In order to control for the labor market conditions inmates face at the time of release, in Column 1 we control for the quarterly unemployment rate in Northern Italy and the quarterly youth unemployment rate. The estimated intention to treat effects is almost unchanged (-6.5pp against -6.3pp).

In Column 2 we test whether overcrowding explains our results. We collected data on prison capacity and prison population on the universe of Italian prisons (such data are available starting from 2003, so we loose two years of data). Overcrowding rates, measured as the ratio between prison population and prison capacity, are added as additional controls, also interacted with time spent in the prison of origin. If the reduction in recidivism were driven by the avoidance of time spent in overcrowded prisons we would expect the coefficient on "Potential years served at Bollate" to change, which is not the case.

In columns 3, 4 and 5 we change the sample composition. In column 3 we add inmates with unknown entry reasons to the displaced, which reduces the absolute value of the coefficient by about 1pp. In Column 4 we exclude the few inmates who have one definitive conviction but also an ongoing trial at the time of release (for which they might have to face some time in prison). The (absolute value of the) estimated intention to treat effect is slightly smaller (-5.6 percentage points). The baseline results are roughly unchanged when we restrict to inmates who were transferred up until 2008, the year after which Bollate was allowed to provide some feedback about inmates who were supposed to be displaced (Column 5). The results are also robust to using different functional forms. In Columns 6 and 7 we use a probit model (linear and non-linear, respectively), instead of the linear probability

one. This increases the (absolute value of the) marginal effects, from 6.3 to about 9 percentage points. In the Appendix Table A4 we also show that a semi-parametric hazard model delivers similar results.

In Column 1 of Table 9 we control for the sporadic difference between the predicted and the actual order of transfer shown earlier in Figure 3. We argued that the difference, that is driven by the availability of prison beds in different prison sections, was as good as random. And we do find that the coefficient on time served in Bollate is basically unchanged (it drops from -6.3 percent to -6.2 percent) and that the coefficient on the order difference is not statistically different from 0.

In the following columns we address another potential identification issue. We control for total sentence length and delay in receiving the sentence in a flexible way, by including fixed effects corresponding to the length in quarters or months of the conditioning variables, to take care of the possibility that the relation between them and the unobserved propensity to recidivate is non-linear. The regressions presented in Columns 1 and 2 only exploit the variability among inmates whose total sentence length has the same number of quarters or months (respectively); the regression in Column 3 further controls in a flexible way for the time from incarceration to first sentence. Adding these more flexible controls leaves the results almost unchanged.

4 The Mechanism

Our results show that spending more time in Bollate, and correspondingly less time in one of the other traditional prisons, reduces recidivism by a statistically significant and economically meaningful amount. What is not clear is the mechanism underlying this effect: is it merely the passing of time, leading to a larger dose of the same treatment? Or is the passing of time just the gateway for qualitative differences in the treatment, which are the true causes of the observed effect on recidivism? While we will not be able to conclusively answer these questions, in this Section we will make a first attempt at identifying the underlying mechanisms.

4.1 Heterogeneity of the Effects

We can learn something about the mechanisms by trying to identify the circumstances in which the treatment is most effective. We will therefore explore whether the effects across different groups of inmates are heterogeneous by simply interacting the time spent in Bollate (actual or potential) as well as the total sentence length with various observable characteristics. These are all coded as dummies: whether the crime committed is economically motivated, whether it is the first incarceration, whether the inmate is in a relationship, whether the inmate's educational attainment is above secondary education, whether his age is below median, whether he is subject to a judge order which prohibits accessing alternative sanctions (Art. 4 bis). We also include the interaction with the measure of recidivism risk (predicted on the basis of observables) used in Table 5, and in particular we consider whether such a measure is above the median or above the third quartile.

As before, the top panel of Table 10 measures intention to treat effects while the bottom one measures local average treatment effects.

We find evidence of heterogeneous effects for inmates at their first incarceration, inmates with low levels of education and inmates with high recidivism risk.

For inmates who are at their first incarceration the benefit of spending more time in Bollate, in terms of reduced recidivism, is roughly twice as large compared to inmates with previous incarceration spells. The benefit for inmates with education above secondary level, instead, is considerably smaller than for inmates with lower levels of education, and it disappears for inmates with high recidivism risk.

In particular, intention to treat effects for "rookie" displaced inmates are equal to -10.2 percentage points, while their average recidivism is just 26.2 percent (Column 4). This suggests that rehabilitation efforts are most successful when applied earlier in the criminal career, but it should be noted that even inmates who have been in prison before are responding positively to the treatment.

Column 6 shows that the treatment is more effective for inmates with lower levels of education, as the effect is considerably reduced (from 10 to 3 percentage points, measured with the intention to treat) for inmates with education above the secondary level. This points to a greater effectiveness of

rehabilitation efforts on those inmates who are less well equipped to cope with the challenges of a non-criminal life and who would be more likely to struggle once released.

Column 2 shows that for inmates with observables corresponding to a predicted recidivism in the top quartile of the distribution the effect of the treatment is approximately nil. This result would be consistent with the non-parametric evidence presented in Section 3.1 if these high risk offenders were also the ones recidivating soon after release. This is indeed the case. Recidivism risk is strongly negatively correlated (-33% (t-stat=10.1)) with the time it takes recidivating inmates to be back in prison.

All other interaction terms are not statistically different from zero.

4.2 Direct and Indirect Evidence on the Mechanism

In Section 2.1 we highlighted that spending prison time in Bollate as opposed to San Vittore or any other prison in Lombardy can be very different. The first, and perhaps the most striking difference, is that in Bollate inmates spend two to three times more hours outside their cells. The significance of this difference becomes even more salient when we consider that, as shown in Table 1, San Vittore, Opera, Monza, and Busto Arsizio – the prisons from which more than 80 percent of displaced inmates come – are regularly overcrowded, which translates into more inmates per cell and thus less space than the 9 square meters (100 square feet) each inmate is supposed to have under normal circumstances. Bollate's facilities are newer and well kept, while the other prisons' buildings are old and in need of refurbishing. Another important difference is the "Responsibility Pact" that inmates sign when entering Bollate. They are offered the opportunity to actively participate in their rehabilitation program and partially determine the conditions of their time in prison (work, education, the interior design of their cell, the organization of common spaces, etc.) in exchange for good behavior (which in turn has the added benefit of making a cheaper supervision viable).

Compared to the "panopticon-style" of prison life that is the norm in most prisons in the world, these humane prison conditions (freedom of movement within the prison walls, responsibility, productive use of time, respect of all basic human rights) are indeed a momentous change, and it is

reasonable to conjecture not only that they can influence the inmates' recidivism, but also that such influence is increasing in the duration of their stay in Bollate, as it takes time for them to take hold in the psychology of inmates used to being treated harshly and to being denied self-determination. The increasing effectiveness of these conditions, however, cannot be empirically tested, since they start to apply to all Bollate inmates as soon as they are transferred there, and we have no measures of their increasing intensity.

There is however one important aspect of the treatment that is unevenly assigned and is measurable: work outside of the Bollate prison. Inmates who work outside of Bollate are transferred to cell block 5, and once they are there Bollate keeps track of the day releases. Using this margin of variation we can provide direct evidence of one aspect of the mechanism underlying our result, and indirect evidence on the role of humane prison conditions.

In Table 11 we regress the fraction of days spent in day releases (typically corresponding to work outside Bollate) on the potential time served in Bollate, as well as the usual controls. Each additional potential year in Bollate increases the fraction by 0.767 percentage points (53 percent of the average)[50] for the selected inmates, and by 0.229 percentage points (95 percent of the average) for the displaced ones (the coefficient for the selected inmates is not significantly different from zero).[51] These results therefore offer supporting and direct evidence that the probability to work outside, while being in prison, increases with the intensity of the treatment, and thus identify one likely, and admittedly not surprising, mechanism underlying our rehabilitation result.

The differential intensity with which additional time spent in Bollate translates into the probability to work outside for displaced and selected inmates also offers indirect, supporting evidence for the role of humane prison conditions mentioned above. Indeed, we found that the treatment effect for the displaced inmates is at least as large as that for the selected inmates. Since the former are less likely to be exposed to outside work, even as their stay in Bollate lengthens, their strong response to the treatment suggests that the other aspect characterizing prison life in Bollate, namely the humane prison conditions, is also important and increases in importance as time goes by.

[50] During their entire stay, selected inmates spend on average 1.45 percent of their days outside of prison; displaced inmates only 0.24 percent.

[51] Since we do not require inmates to have been released, the sample size is slightly larger.

4.3 Negative Spillovers

One additional mechanism that might be at play is provided by peer effects.[52] In principle, the inmates transferred to Bollate go through a screening process, described in Section 2.2.1, aimed at identifying those more likely to react positively to the rehabilitation efforts. By selecting these "better" inmates Bollate might in fact simply minimize negative peer influences. Since more time spent in Bollate is equivalent to spending more time with positively selected inmates, this could explain our results.

We test whether this is a relevant mechanism underlying our results by using the presence of displaced peers. Differently from selected inmates, displaced ones do not go through the screening process. Therefore, if peer effects were driving our results we would expect that a higher presence of displaced peers would weaken the effect of the treatment. We measure the presence of displaced peers by computing the fraction of "prisoner days" spent together with displaced inmates: in Bollate (first measure); in the final cell block (second measure); in the final cell (third measure). While the last two measures might be endogenous (Bollate might redistribute displaced inmates to reduce negative peer effects), they are arguably more precise.

In Table 12 we control for such exposure to displaced inmates, and also interact it with the potential time served in Bollate. Overall there is no evidence that the effect on recidivism is significantly affected by the exposure to potentially "worse" peers. This suggests that scaling up the Bollate experience, even through a less exacting selection process, would not be self defeating and would generate a larger overall effect on recidivism.

5 Conclusions

The questions of whether and how different prison conditions affect recidivism are very important ones in designing a prison system, along with questions about the relative costs of providing different prison conditions and about their effects on general deterrence. This paper offers a clear and robust affirmative answer to the "whether", some tentative answers to the "how" , and briefly touches on the cost issue. It remains silent on the question of general deterrence, as the latter concerns the ex-ante

[52] See **?** and **?**) for evidence on peer effects in prison.

impact of the threat of punishment on the public at large, while we only deal with inmates who have already experienced some form of punishment.

On the "whether" question, we showed that offering humane prison conditions, with meaningful occupational activities, aimed at improving inmates' reintegration into society, is effective in curtailing recidivism. At the same time, we do find evidence that rehabilitation has limited effects on inmates with the highest risk of recidivating, meaning that some targeting might be beneficial. Since these inmates are the first ones recidivating, there is also little evidence of treatment effects when the period of analysis is shorter than a year. For this reason it is important to measure recidivism over a sufficiently long period of time.

More data, particularly on the post release earnings and opportunities, would be needed to fully understand the mechanisms underlying our results, i.e. to answer the "how" question. We find evidence that one such mechanism involves offering inmates, while in prison, opportunities to work outside, thus making their entry into the labour market when released easier. Offering such opportunities might be difficult, however, particularly when there is substantial slack in the labour market. Therefore, policies aimed at reducing recidivism by "making prison work," while sensible and effective, might be hard to implement and are largely outside the control of prison administrators.

We also find evidence that, even for inmates who are scarcely involved in outside work, prison conditions emphasizing responsibility and respect of basic human rights are effective in reducing recidivism. Policies to that effect seem easier to implement, and are almost surely cost effective.

Indeed, we showed that the running costs of a prison offering humane conditions need not be larger, and are in fact considerably smaller, than those of a traditional closed prison, thanks to the fewer guards needed, in turn a positive pay-off of the emphasis on inmates' self-responsibility.

Finally, we do not find robust evidence that peer effects drive of our results. This should appease one possible concern about scaling up the experience of Bollate (by weakening somewhat the selection criteria), since worsening the ex-ante average quality of the selected inmates seems not to undermine the positive effects on recidivism. However, we do not know to what extent the behavioral changes caused by the Bollate treatment hinge on the threat of being kicked out of Bollate and sent back to a harsh, closed prison. If this were the case, expanding the number of open prisons

might weaken that threat.[53] More generally, the impact of expanding the number of humane prisons on general deterrence has to be carefully considered, to make sure that the reduction in recidivism were not offset by an increase in the number of first time offenders, due to a lower expected cost of punishment.[54] More experimentation is needed to assess these possible general equilibrium effects.

[53] Unless, as it is now the case, a new access to an open prison were prevented to a recidivating inmate.
[54] See however footnote 13.

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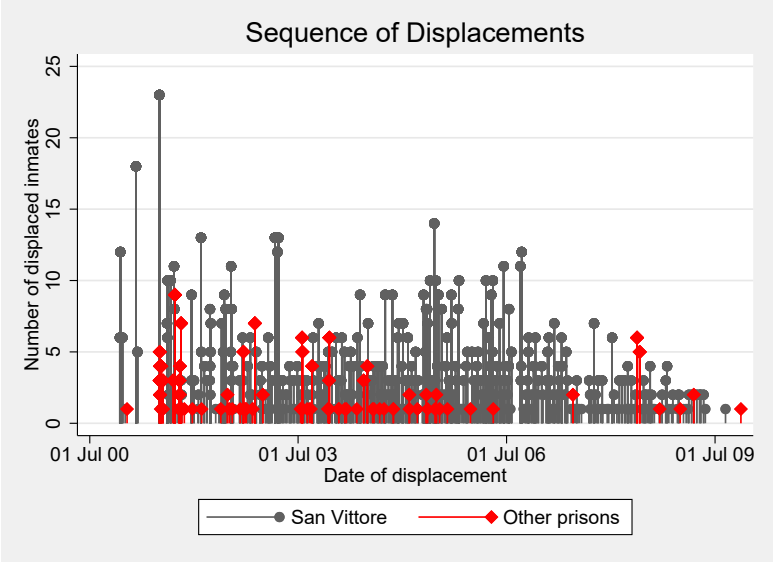

Figure 1: Sequence of Displacements

Notes: This figure plots the daily number of displaced inmates for the San Vittore prison and for all the other prisons.

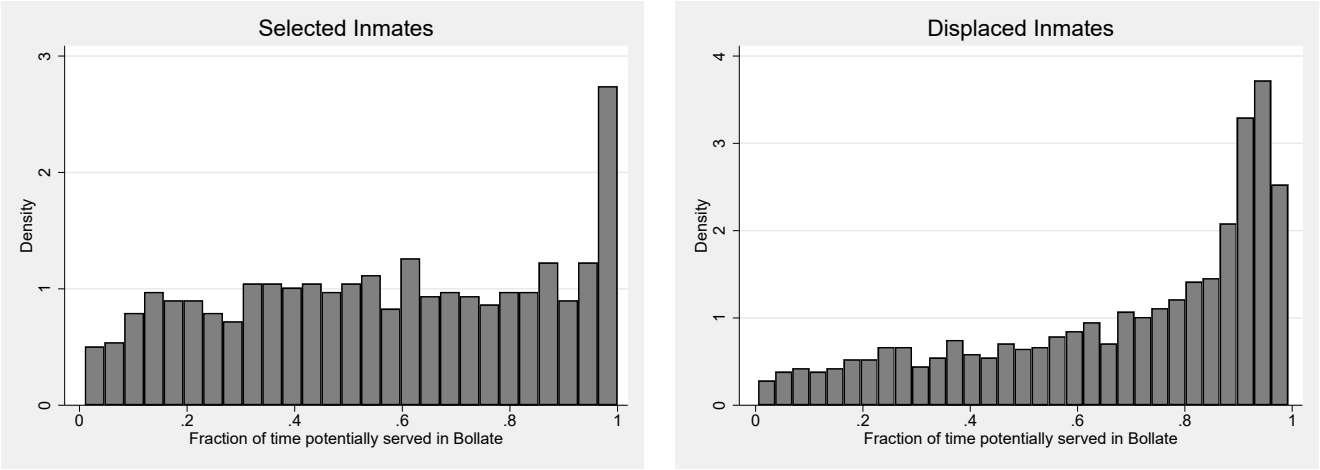

Figure 2: Histogram of the Fraction of Time Potentially Served in the Bollate Prison

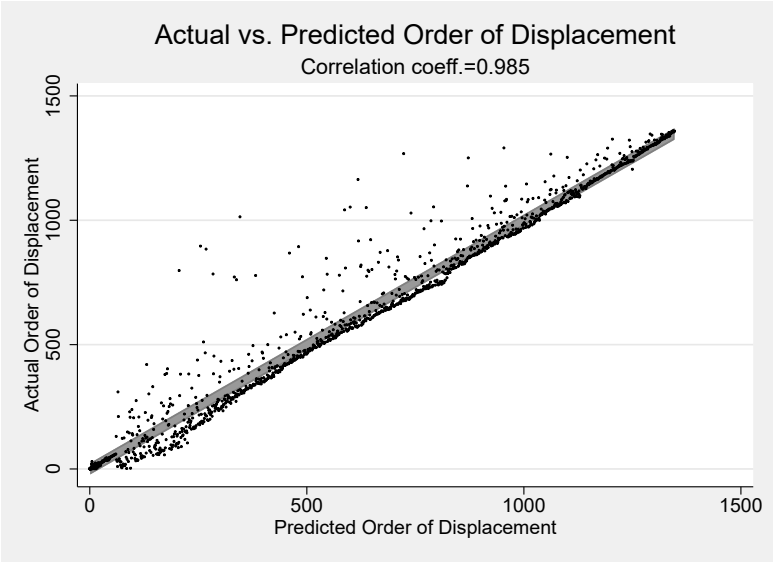

Figure 3: Actual vs. Predicted Order of Displacement

Notes: The actual order of displacement is based on the date inmates are transferred, the predicted order is based on the date the inmates are first convicted.

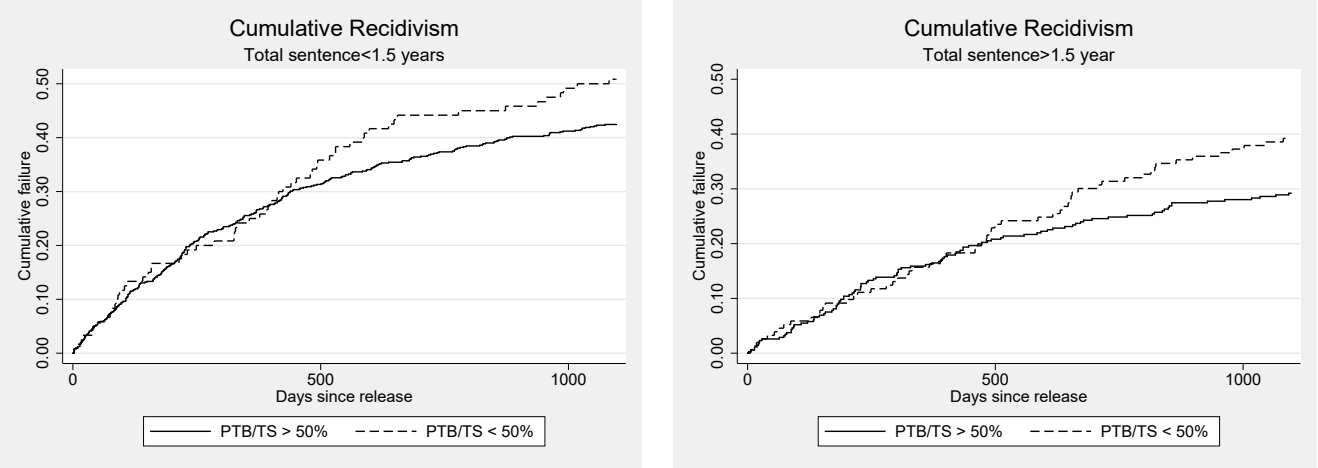

Figure 4: Kaplan-Meier Cumulative Failure (Recidivism) Functions

Notes: PTB and TS stand for Potential Time in Bollate and Total Sentence. Failure (recidivism) is truncated at 3 years, or 1095 days.

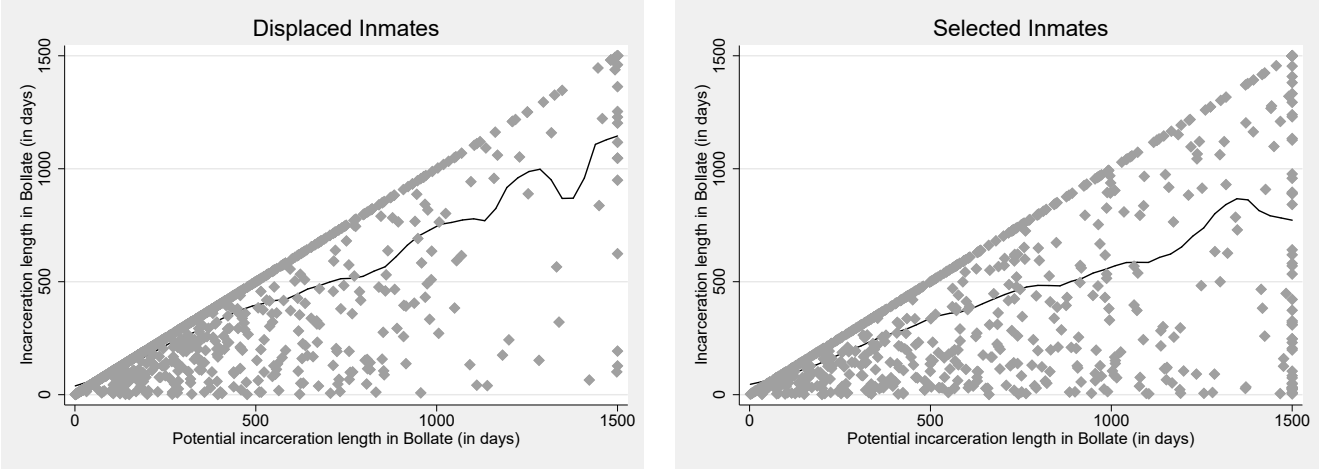

Figure 5: First Stage Relationship

Notes: Actual against potential time spent in Bollate (truncated at 1500 days). The line indicates a local linear regression. For about 2/3 of inmates the two durations coincide.

Table 1: Prison conditions in different prisons (2009)

Admission prison	Type	Hours	Established	Capacity	Inmates	Overcrowding rate	Suicides	Self-inflicted Injuries	Hunger strikes	Prison Work	Independent Work
Milano San Vittore	Mixed	8-21 vs. 4h	1879	1127	1596	42%	1.3%	9.6%	7.3%	17.5%	0.5%
Milano	Closed cells	9-11,18-19	1980	973	1246	28%	0.2%	0.8%	7.4%	28.3%	6.5%
Monza	Closed cells	9-11,13-15	1992	741	775	5%	0.5%	5.9%	3.0%	22.7%	6.6%
Busto Arsizio	Closed cells	9-11, 13-15	1982	297	425	43%	0.0%	3.3%	5.4%	23.3%	0.0%
Como	Closed cells	9-11, 13-15, 16.30-18	1980	606	546	-10%	0.7%	3.1%	3.8%	14.5%	1.8%
Bergamo	Closed cells	9-11, 13-15	1978	511	497	-3%	2.0%	13.9%	5.4%	12.7%	4.0%
Varese	Closed cells	8.45-11.30, 13.30-15.45	1886	99	135	36%	0.7%	4.4%	6.7%	12.6%	5.9%
Others	Closed cells	by law min. 4h									
Milano Bollate	Open cells	9-19, 8-20	2000	1311	1032	-21%	0.0%	0.7%	2.3%	22.6%	27.2%

Notes: Suicides and attempted suicides, self-inflicted injuries, inmates in hunger strikes, prison work, and independent work are measured in 2009 and per-inmate, dividing by the number of inmates at the end of 2009.

Table 2: Recidivism and Treatment Intensity by Entry Reason

	Recidivism (3 yrs.)	Released from Cell block 5	Potential Time in Bollate	Actual Time in Bollate	Total Sentence	Nobs.
Transferred to be treated	0.316	0.148	1.493	1.201	3.729	196
Applied to be treated	0.246	0.106	1.468	1.166	3.530	199
Transferred by the Justice Dep.	0.254	0.254	1.312	0.908	3.017	63
Other entry reasons	0.353	0.000	2.145	1.777	4.078	17
Total selected sample	**0.280**	**0.139**	**1.482**	**1.168**	**3.563**	**475**
Entry cause unknown	0.416	0.046	2.242	0.795	4.047	281
Selected and unknown	**0.331**	**0.104**	**1.764**	**1.029**	**3.743**	**756**
Displaced	**0.396**	**0.024**	**0.852**	**0.683**	**1.440**	**1,552**

Notes: "Recidivism" and "Released from Cell block 5 " are measured as the fraction of inmates for which the corresponding condition applies; "Potential Time", "Actual Time" and "Total Sentence" are measured in years.

Table 3: Summary Statistics

	Selected/Unknown (I)		Displaced Inmates (II)		II-I	
	mean	sd	mean	sd	mean	se
Recidivism (3 yrs.)	0.331	0.471	0.396	0.489	0.065	0.023***
Potential years served in Bollate	1.764	1.400	0.852	0.885	-0.913	0.058***
Total sentence	3.743	3.284	1.440	1.707	-2.303	0.117***
Drug addiction	0.242	0.429	0.298	0.457	0.056	0.025**
Art. 4 bis	0.206	0.405	0.072	0.259	-0.134	0.017***
Total number of incarcerations	3.187	2.708	3.417	2.738	0.230	0.135*
In a relationship	0.336	0.473	0.262	0.440	-0.074	0.020***
Separated or divorced	0.099	0.299	0.089	0.285	-0.010	0.014
College degree	0.097	0.296	0.052	0.221	-0.045	0.012***
Secondary schooling	0.544	0.498	0.510	0.500	-0.033	0.024
Primary schooling	0.220	0.414	0.178	0.382	-0.042	0.019**
Homicide	0.083	0.277	0.014	0.118	-0.069	0.011***
Fraud	0.104	0.306	0.057	0.233	-0.047	0.013***
Threat of violence	0.114	0.318	0.040	0.196	-0.074	0.012***
Drug-related crime	0.380	0.486	0.243	0.429	-0.137	0.025***
Assault	0.139	0.346	0.110	0.313	-0.029	0.014**
Theft	0.427	0.495	0.429	0.495	0.002	0.023
Robbery	0.370	0.483	0.219	0.414	-0.151	0.020***
Crimes against the State	0.284	0.451	0.227	0.419	-0.058	0.022***
Crimes against the Public Health	0.405	0.491	0.253	0.435	-0.152	0.025***
Other crimes	0.074	0.262	0.121	0.326	0.047	0.013***
Age at exit	41.218	11.280	38.311	10.730	-2.907	0.556***
Time from incarceration to first sentence			0.103	0.261		

Notes: Selected inmates include 281 inmates whose reason of entry is unknown. The type of crime dummies are not exclusive, so they need not sum to 1. The standard errors in the last column are clustered by cell block and week of release, for a total of 392 clusters: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 4: Randomization Test

	(1)	(2)	(3)	(4)	(5)	(6)
	Displaced Inmates				Selected Inmates	
	Potential years served		**Potential years served**		**Potential years served**	
	coef	se	coef	se	coef	se
Art. 4 bis	0.040	0.046	0.046	0.049	0.030	0.124
Total number of incarcerations	0.164	0.111	0.053	0.113	-0.069	0.119
In a relationship	-0.005	0.005	-0.002	0.006	-0.030*	0.016
Separated or divorced	-0.030	0.038	-0.018	0.040	-0.203*	0.108
College degree	0.046	0.062	0.061	0.065	-0.172	0.167
Secondary schooling	0.004	0.066	-0.001	0.071	0.349*	0.184
Primary schooling	0.012	0.038	0.033	0.040	0.332**	0.133
Homicide	-0.006	0.052	0.005	0.057	0.117	0.180
Fraud	-0.713*	0.399	-0.659*	0.358	-0.295	0.253
Threat of violence	0.060	0.066	0.119*	0.064	0.214	0.159
Drug-related crime	0.118	0.134	0.108	0.133	0.021	0.147
Assault	0.290	0.185	0.231	0.185	-0.004	0.234
Theft	0.047	0.056	0.088	0.056	0.289**	0.146
Robbery	0.067	0.054	0.084	0.051	0.221**	0.089
Crimes against the State	0.076	0.060	0.067	0.062	0.077	0.101
Crimes against the Public Health	0.046	0.043	0.046	0.044	-0.087	0.085
Other crimes	-0.128	0.190	-0.049	0.188	0.233	0.235
Drug addiction	0.053	0.067	0.080	0.064	0.015	0.165
Time from incarceration to first sentence	-0.815***	0.203				
Total sentence	0.429***	0.045	0.360***	0.031	0.235***	0.023
Age fixed effects	√				√	
Observations	1,537		1,552		756	
R-squared	0.586		0.555		0.434	
F-statistic for joint test	1.189		1.113		2.402	
p-value	**0.267**		**0.336**		**0.00125**	

Notes: Selected inmates include 281 inmates whose entry reason is unknown. Columns 1, 3 and 5 show the coefficients of a regression where "Potential time spent in Bollate" is regressed on the listed variables. The F-test at the bottom excludes the variables which are expected, a priori, to affect the timing of transfer to Bollate (these are the variables below the continuous line; including or not drug addiction among them does not alter the results). Clustered standard errors (by cell block and week of release, for a total of 392 clusters) in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Balancing Test based on Predicted Recidivism

	(1)	(2)	(3)	(4)
	Recidivism index			
	Index 1	Index 2	Index 1	Index 2
Potential years served in Bollate	0.004	-0.000	0.005	0.004
	(0.008)	(0.008)	(0.008)	(0.008)
Total years served	-0.006	-0.003	0.001	0.001
	(0.004)	(0.004)	(0.004)	(0.004)
Time from incarceration to first sentence	-0.027*	-0.032*	-0.052***	-0.054***
	(0.016)	(0.017)	(0.016)	(0.016)
Age fixed effects	√	√	√	√
Prison Fixed effects			√	√
Year/Month fixed effects			√	√
Observations	1,537	1,530	1,526	1,526
R-squared	0.403	0.379	0.486	0.512

Notes: We construct a measure of predicted recidivism risk by regressing recidivism on all observable characteristics listed in the upper part of Table 4 plus age fixed effects (denoted Index 1, in Columns 1 and 3) and prison fixed effects (denoted Index 2 in Columns 2 and 4). Potential time spent in Bollate, total sentence length and time from incarceration to first sentence are, therefore, excluded from this first step. The table presents the second step regression, in which predicted recidivism is regressed on potential time spent in Bollate, total sentence length and time from incarceration to first sentence. Clustered standard errors (by cell block and week of release, for a total of 392 clusters) in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 6: Effect of the Bollate Treatment for Displaced Inmates (dependent variable: inmate recidivates within 3 years (0/1))

	(1)	(2)	(3)	(4)
	Panel A: Reduced Form Model			
Potential years served at Bollate	-0.073***	-0.063***	-0.063***	-0.061***
	(0.019)	(0.020)	(0.021)	(0.023)
Total sentence	0.014	0.015	0.025	0.022
	(0.012)	(0.014)	(0.017)	(0.018)
Drug addiction		0.117***	0.154***	0.146***
		(0.030)	(0.039)	(0.042)
Time from incarceration to first sentence		0.011	0.045	0.052
		(0.053)	(0.055)	(0.064)
Observations	1,552	1,537	1,526	1,493
R-squared	0.011	0.093	0.255	0.264
	Panel B: 2SLS Model			
Actual years served at Bollate	-0.119***	-0.102***	-0.104***	-0.099**
	(0.034)	(0.035)	(0.037)	(0.041)
Total sentence	0.020	0.019	0.028	0.024
	(0.014)	(0.015)	(0.018)	(0.019)
Drug addiction		0.114***	0.163***	0.153***
		(0.031)	(0.040)	(0.042)
Time from incarceration to first sentence		0.015	0.053	0.062
		(0.055)	(0.056)	(0.065)
Age at exit FE		√	√	√
Other Xs			√	√
Prison FE			√	√
Year/Month FE			√	√
Prison × Year/Month FE				√
Observations	1,552	1,537	1,526	1,493
R-squared	-0.014	0.072	0.241	0.251
First stage F-stat	189.1	206	212.7	192.3

Notes: The average recidivism is 39.5 percent. A flag on the variables in the bottom part of the Table signals inclusion in both, reduced form and 2SLS. The additional Xs (including the fixed effects) are all those included in the upper panel of Table 4. Clustered standard errors (by cell block and week of release, for a total of 392 clusters) in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 7: Effect of the Bollate Treatment for Selected Inmates (dependent variable: inmate recidivates within 3 years (0/1))

Sample:	(1)	(2)	(3)	(4)
	Selected and unknowns		Selected inmates	
	Panel A: Reduced Form Model			
Potential years served at Bollate	-0.043***	-0.052***	-0.073***	-0.049*
	(0.015)	(0.019)	(0.019)	(0.028)
Total sentence	0.007	0.024***	0.012*	0.027**
	(0.007)	(0.009)	(0.007)	(0.014)
Applied to be treated	-0.146***	-0.097*	-0.076	-0.100
	(0.039)	(0.058)	(0.050)	(0.074)
Transferred by the Justice Dep.	-0.141***	-0.191***	-0.074	-0.107
	(0.051)	(0.060)	(0.056)	(0.079)
R-squared	0.027	0.377	0.034	0.492
	Panel B: 2SLS Model			
Actual years served at Bollate	-0.094***	-0.128**	-0.099***	-0.070*
	(0.032)	(0.051)	(0.025)	(0.039)
Total sentence	0.008	0.025***	0.012*	0.027**
	(0.007)	(0.009)	(0.007)	(0.014)
Applied to be treated	-0.108***	-0.043	-0.078	-0.107
	(0.040)	(0.058)	(0.049)	(0.075)
Transferred by the Justice Dep.	-0.121**	-0.157**	-0.090	-0.119
	(0.051)	(0.063)	(0.057)	(0.083)
Other Xs		√		√
Prison FE		√		√
Year/Month FE		√		√
Age at exit FE		√		√
Observations	756	722	475	441
R-squared	0.028	0.354	0.026	0.489
First stage F-stat	117.4	69.13	281.5	146.7

Notes: The average recidivism is 28 percent for selected inmates, 33.1 when also inmates with unknown entry reason are included. A flag on the variables in the bottom part of the Table signals inclusion in both, reduced form and 2SLS. The additional Xs (including the fixed effects) are those included in Column 3 of Table 6. Clustered standard errors (by cell block and week of release, for a total of 339 clusters) in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 8: Robustness Regressions for Displaced Inmates (dependent variable: inmate recidivates within 3 years (0/1))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Additional controls			Sample selection		Functional form of time served in Bollate: Probit	
	Labor market conditions	Overcrowding	Adding the unknows	No ongoing trials	Year of entry $\leq$ 2008	Linear	Cubic
Potential years served at Bollate	-0.065***	-0.063**	-0.055***	-0.056**	-0.062***	-0.089***	-0.095***
	(0.021)	(0.032)	(0.016)	(0.025)	(0.021)	(0.026)	(0.036)
Total sentence	0.025	0.026	0.027***	0.018	0.024	0.030	0.030
	(0.017)	(0.019)	(0.010)	(0.019)	(0.017)	(0.019)	(0.019)
Time from incarceration to first sentence	0.044	0.011		0.019	0.042	0.063	0.064
	(0.055)	(0.052)		(0.069)	(0.055)	(0.066)	(0.065)
Unemployment rate in Northern Italy	-0.041						
	(0.057)						
Youth unemployment rate	0.016						
	(0.015)						
Overcrowding in prison of origin		-0.181					
		(0.120)					
Overcrowding (demeaned) $\times$		0.014					
Yrs. served in prison of origin		(0.021)					
Observations	1,526	1,070	1,812	1,374	1,507	1,519	1,519
R-squared	0.256	0.280	0.241	0.260	0.256		
Mean dep. variable	0.396	0.414	0.399	0.379	0.379	0.396	0.396

Notes: All regressions control for the additional covariates included in Column 3 of Table 6. Overcrowding rates are available from 2003 onwards. In column 3 we add inmates whose entry reason is unknown to the displaced inmates. The probit results represents marginal effects computed at mean values, and are estimated by maximum likelihood. The coefficients on the squared and cubic term for potential or actual time spent in Bollate are precisely estimated to be close to zero and all the corresponding joint tests of significance can be rejected at less than the 5 percent level. Clustered standard errors (by cell block and week of release, for a total of 392 clusters) in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Regressions with Additional Identification Conditions

	(1)	(2)	(3)	(4)
	Recidivates within 3 years			
Potential years served in Bollate	-0.062**	-0.064**	-0.069*	-0.074**
	(0.025)	(0.028)	(0.036)	(0.037)
Total years served	0.023			
	(0.018)			
Time from incarceration to first sentence		0.069	0.075	
		(0.082)	(0.099)	
Rank in the Delay of Displacement	-0.000			
	(0.002)			
Total sentence FE (trimesters)		√		
Total sentence FE (months)			√	√
Time from incarceration to first sentence FE (months)				√
Observations	1,493	1,484	1,461	1,355
R-squared	0.265	0.276	0.293	0.361

Notes: All regressions control for The additional Xs (including the fixed effects) used in Column 3 of Table 6. Clustered standard errors (by prison section and week of release) in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Heterogeneity of the Effects for Displaced Inmates (dependent variable: inmate recidivates within 3 years (0/1))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Displaced inmate recidivates within 3 years (0/1)							
	Panel A: Reduced Form Model							
	Above median risk index	Above 75th perc.	Economic crimes	First incarceration	In a relationship	Above secondary school	Below median age	Art. 4 bis
Interacted with:								
Potential years served in Bollate	-0.080***	-0.081***	-0.064*	-0.046**	-0.056**	-0.103***	-0.086***	-0.058***
	(0.020)	(0.019)	(0.039)	(0.022)	(0.023)	(0.026)	(0.023)	(0.019)
Interaction	0.044	0.092*	0.001	-0.056*	-0.023	0.073**	0.049	0.004
	(0.036)	(0.047)	(0.043)	(0.033)	(0.037)	(0.034)	(0.034)	(0.036)
R-squared	0.194	0.197	0.195	0.195	0.194	0.196	0.195	0.197
	Panel B: 2SLS							
Actual years served in Bollate	-0.129***	-0.138***	-0.085*	-0.074**	-0.087**	-0.180***	-0.135***	-0.089***
	(0.034)	(0.033)	(0.048)	(0.037)	(0.037)	(0.055)	(0.039)	(0.032)
Interaction	0.070	0.147**	-0.021	-0.088	-0.059	0.133**	0.075	-0.019
	(0.060)	(0.064)	(0.059)	(0.057)	(0.070)	(0.064)	(0.058)	(0.084)
Observations	1,537	1,537	1,537	1,537	1,537	1,537	1,537	1,537
R-squared	0.178	0.177	0.178	0.176	0.177	0.177	0.178	0.183
First stage F-stat	57.56	89.31	91.63	85.97	38.70	32.31	69.94	6.006

Notes: The risk index is the predicted recidivism used in Table 5, Index 1 (results using Index 2 are almost identical). All regressions control for the additional covariates included in Column 3 of Table 6. Clustered standard errors (by cell block and week of release, for a total of 392 clusters) in parentheses: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 11: Mechanism: work opportunities (dependent variable: fraction of days spent working outside ($\times 100$))

Sample	(1) Selected	(2) Displaced	(3) Selected	(4) Displaced
	Reduced Form		2SLS	
Potential years served at Bollate	0.767	0.229**		
	(0.545)	(0.102)		
Actual years served at Bollate			1.432	0.412**
			(1.084)	(0.198)
Total sentence	-0.679	0.096	-0.698	0.077
	(0.674)	(0.075)	(0.687)	(0.083)
Observations	1,236	1,892	1,236	1,892
R-squared	0.173	0.224	0.165	0.193
Mean dep. var.	1.448	0.242	1.448	0.242
First stage F-stat			17.84	196.8

Notes: All regressions control for the additional covariates included in Column 3 of Table 6. Clustered standard errors (by cell block and week of release, for a total of 392 clusters) in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 12: Mechanism: Peers or Treatment? (Displaced inmates) (dependent variable: inmate recidivates within 3 years (0/1))

	(1)	(2)	(3)
	Displaced inmate recidivates within 3 years (0/1)		
Peers measured using the:	*Whole prison*	*Section*	*Individual cell*
Potential time served in Bollate	-0.060***	-0.061***	-0.054**
	(0.019)	(0.020)	(0.021)
Fraction of displaced peers	-0.173	-0.122*	-0.112**
	(0.110)	(0.069)	(0.053)
Potential time served in Bollate	0.062	0.042	0.043
$\times$ Fraction of displaced peers	(0.073)	(0.055)	(0.049)
Total sentence	0.021	0.020	0.008
	(0.015)	(0.015)	(0.017)
OtherXs	Yes	Yes	Yes
Observations	1,537	1,537	1,440
R-squared	0.195	0.196	0.199

Notes: The Other Xs are all the additional covariates included in Column 3 of Table 6. Clustered standard errors (by cell block and week of release, for a total of 392 clusters) in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Online Appendix

A Appendix Tables

Table A1: Running costs for Bollate and the average prison

	Year 2012			Year 2013		
	Bollate		Whole country	Bollate		Whole country
Budget item	Total cost	Cost per inmate	Cost per inmate	Total cost	Cost per inmate	Cost per inmate
Goods and services	3,798,587	9.17	10.57	2,814,203.63	6.75	8.89
Labor costs	20,316,848	49.04	92.02	20,732,849	49.70	90.88
Inmate living, assistance, rehabilitation, and transport costs	2,927,871	7.07	8.56	2,856,439	6.85	9.37
Investments	44,159	0.11	3.75	51,063	0.12	7.37
Total:	27,087,465	65.39	115.21	26,454,555	63.41	116.87

Notes: The costs per inmate are per day in prison. To increase the comparability between the costs for Bollate and for the average prison we excluded from the latter a (rough) estimate of the central administration costs.

A.1 Spatial Lag Error Model for the Standard Errors

In the main text errors were clustered by week of exit and cell block. In this Section, to assess the robustness of that modelling choice, we model the errors as following a spatial structure (i.e. we use a spatial lag model). In particular, we allows the errors of inmates who spent at least one day together in the same cell block to be correlated with each other:

$$R_i = \beta_0 + \beta_1 D_i + \beta_2 S_i + \gamma' X_i + \lambda W \varepsilon_i + \varepsilon_i, \tag{A1}$$

where W is an adjacency matrix whose element $(i,\ j)$ is positive when inmates i and j have spent at least one day in the cell block , and equal to zero otherwise. The adjacency matrix can be specified in a dichotomous or in a standardized way. The value of the $(i,\ j)$ entry will be 1 in the former case, so that the composite error term is allowed to depend on the *sum* of all the peers' errors. With the standardized version the adjacency matrix the value of the $(i,\ j)$ entry is normalized, so that the rows sum up to one. In this case the composite error term is allowed to depend on the peers' *average* errors.

Table A2: Complete Regression Table of the Effect of the Bollate Treatment for Displaced Inmates (dependent variable: inmate recidivates within 3 years (0/1))

	(1)	(2)	(3)	(4)
	Displaced inmate recidivates within 3 years (0/1)			
Potential years served in Bollate	-0.073***	-0.063***	-0.063***	-0.061***
	(0.019)	(0.020)	(0.021)	(0.023)
Total sentence	0.014	0.015	0.025	0.022
	(0.012)	(0.014)	(0.017)	(0.018)
Drug addiction		0.117***	0.154***	0.146***
		(0.030)	(0.039)	(0.042)
Time from incarceration to first sentence		0.011	0.045	0.052
		(0.053)	(0.055)	(0.064)
Art. 4 bis			-0.038	-0.025
			(0.052)	(0.054)
Total number of incarcerations			0.053***	0.053***
			(0.005)	(0.005)
In a relationship			0.015	0.012
			(0.029)	(0.030)
Separated or divorced			0.033	0.038
			(0.045)	(0.047)
College degree			-0.011	-0.010
			(0.062)	(0.062)
Secondary schooling			-0.018	-0.015
			(0.034)	(0.035)
Primary schooling			-0.021	-0.022
			(0.040)	(0.041)
Homicide			-0.085	-0.098
			(0.094)	(0.100)
Fraud			-0.020	-0.019
			(0.056)	(0.059)
Threat of violence			0.088	0.083
			(0.059)	(0.063)
Drug-related crime			0.218**	0.218**
			(0.101)	(0.104)
Assault			0.017	0.013
			(0.043)	(0.044)
Theft			0.087***	0.097***
			(0.028)	(0.030)
Robbery			0.028	0.037
			(0.039)	(0.040)
Crimes against the State			0.007	0.006
			(0.031)	(0.031)
Crimes against the Public Health			-0.207**	-0.199**
			(0.097)	(0.100)
Other crime			0.033	0.038
			(0.044)	(0.044)
Age at exit FE		√	√	√
Observations	1,552	1,537	1,526	1,493
R-squared	0.011	0.093	0.255	0.264

Notes: Potential time served in Bollate and total sentence are expressed as days over 365. Clustered standard errors (by cell block and week of release, for a total of 392 clusters) in parentheses: *** p<0.01, ** p<0.05, * p<0.1

While the spatial lag model seems supported by the data (the loading λ is statistically significant), the standard errors are almost identical to the clustered standard errors used in the man text.

Table A3: Recidivism and Treatment Intensity with "Spatially" Lagged Errors (Displaced inmates) (dependent variable: inmate recidivates within 3 years (0/1))

	(1)	(2)	(3)	(4)
Adjacency matrix:	Dichotomic		Standartized	
Potential years served in Bollate	-0.073***	-0.066***	-0.074***	-0.066***
	(0.019)	(0.019)	(0.019)	(0.019)
Total sentence	0.013	0.024*	0.015	0.023
	(0.011)	(0.014)	(0.011)	(0.014)
lambda	0.437***	0.487***	0.410***	0.486***
	(0.017)	(0.003)	(0.030)	(0.003)
Other Xs		√		√
Observations	1,537	1,537	1,537	1,537
log-likelihood	-1072	-903.5	-1071	-894

Notes: The Other Xs are all the additional covariates included in Column 3 of Table 6. "Spatially" lagged standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1. The distance matrix allows inmates who have potentially interacted in prison for at least one day to have correlated errors.

Table A4: Logit Hazard Model (dependent variable: inmate recidivates within 3 years (0/1))

	(1)	(2)
	Recidivates	
Potential years served in Bollate	-0.295***	-0.296***
	(0.091)	(0.091)
Total sentence	-0.005	-0.004
	(0.062)	(0.062)
Time from incarceration to first sentence	0.001	0.001
	(0.001)	(0.001)
Quartic in time	√	
Time fixed effects		√
Observations	32,023	31,312
Number of individuals	1172	1172
pseudo-R2	0.0555	0.0596

Notes: We construct monthly panel data and use a logit hazard model (inmates are followed up to when they recidivate or 3 years past release, whatever comes first. All regressions control for the additional covariates included in Column 3 of Table 6. Clustered standard errors (by cell block and week of release, for a total of 392 clusters) in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

B Photographic Evidence

Figure A1: Pictures taken in San Vittore

Notes: All these pictures, showing the prison cells in San Vittore, have been found on the Internet.

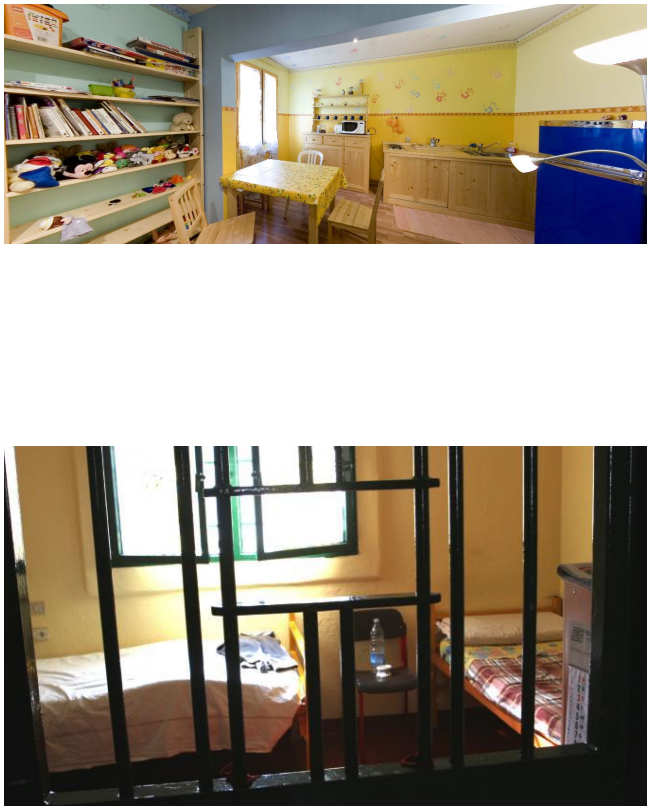

Figure A2: Pictures taken in Bollate

Notes: The pictures have been taken from `http://www.carcerebollate.it/`. From left to right and top to bottom they show the visitors' center for children, a cell and a corridor.

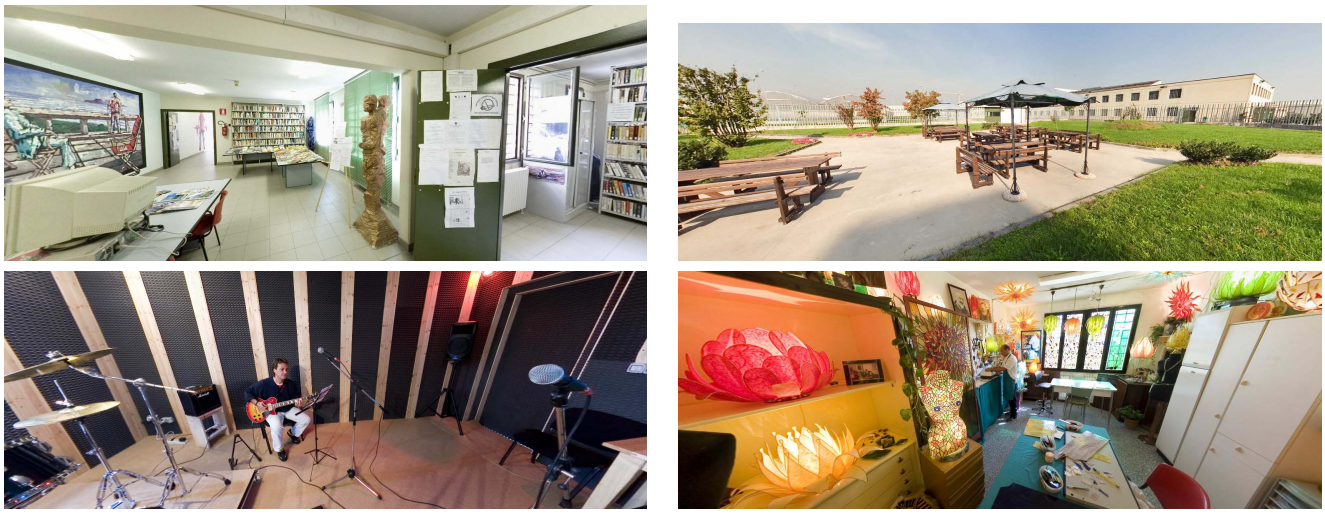

Figure A3: Pictures taken in Bollate

Notes: Most pictures have been taken from `http://www.carcerebollate.it/`. From left to right and top to bottom they show the horses, the library, the garden, the music sound room, and the glass laboratory.

Figure A4: Pictures taken in Bollate

Notes: Most pictures have been taken from `http://www.carcerebollate.it/`. From left to right and top to bottom they show the school, the carpentry, the computer laboratory, the kitchen, the garden produce, and the cell phone laboratory.