Rehabilitation and Recidivism: Evidence from an Open Prison*

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Abstract

We use quasi-random variation in the fraction of time served in the Italian "open prison" of Bollate to estimate the effect of rehabilitation efforts on recidivism. We deal with the endogeneity of rehabilitation assignments by focussing on those sources of variability in the length of exposure to rehabilitation efforts that are plausibly unrelated to recidivism. Our most stringent test restricts the analysis to inmates who, due to overcrowding in nearby prisons, are displaced to Bollate controlling for observed and unobserved measures of potential selection.

Spending one more year at the rehabilitating prison (and one less year at an ordinary one) reduces recidivism by between 10 and 15 percentage points (from a mean recidivism of about 40 percent). For the group of displaced inmates, which is shown to be negatively selected, the effects of rehabilitation efforts on recidivism are larger.

While we find evidence that over time Bollate inmates become more likely to work outside the prison, more than a single mechanism seem to underly these effects.

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1 Introduction

Over the last decades most developed countries have witnessed increasing rates of incarceration. The most well known case is the U.S., where more than 2.25 millions of the 310 millions residents are now behind bars, with a sevenfold increase in the incarceration rate since the early 70s; but incarceration rates are high and increasing in several other countries (in Europe the United Kingdom and Italy are notable examples).

This process risks however of feeding 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 two-thirds of released inmates are rearrested within three years.[1]

Indeed, a well-known result in criminology is that most crimes are committed by a relatively small number of repeat offenders (Wolfgang et al., 1972). Therefore, if societies were able to rehabilitate inmates and reduce recidivism, victimization as well as incarceration rates would be reduced, generating large societal benefits (in the U.S., the per-capita social cost of victimization are estimated to be between $3,000 and $6,000). Moreover, given the high costs of building and running prisons, this would have immediate economic benefits for public budgets.

Reducing recidivism is in many countries an explicit or implicit goal of the judicial system. For example, a recommendation of the Council of Europe (2006) stresses that " *the enforcement of custodial sentences and the treatment of prisoners necessitate ... prison conditions which do not infringe human dignity and which offer meaningful occupational activities and treatment programmes to inmates, thus preparing them for their reintegration into society.*" Also in the U.S. curbing recidivism is increasingly seen as an effective way of keeping in check the long-term costs of housing inmates: even Correction Corp. of America, the largest private prison firm, has recently announced a change in its business model, committing to "*play a leadership role in reducing recidivism*", as quoted

[1] See http://www.bjs.gov/index.cfm?ty=daa.

in a recent *Wall Street Journal* article.[2].

It is therefore somewhat surprising that so little is known about the effect of incarceration, and of the conditions in which incarceration takes place, on recidivism. A recent review by Nagin et al. (2009) concludes that "*rigorous investigations on the effect of incarceration on reoffending are in short supply. As imprisonment is used in contemporary democratic societies, the scientific jury is still out on its effect on reoffending.*" The lack of robust and reliable results is likely to confirm the widely held old view that "nothing works" when trying to rehabilitate inmates.

However, most of the studies reviewed in Nagin et al. (2009) focus on the impact on reoffending of receiving a custodial sentence or not, a rather crude measure of treatment. Only a few studies analyze the impact of a finer measure, the length of incarceration, and almost none take into account the conditions under which the sentence is served. Yet the latter are key, as the same sentence length might induce very different post-release behaviour depending on whether the prison conditions were harsh or mild or whether rehabilitation programs were present or not. Indeed, while on balance Nagin et al. (2009) find that incarceration has a null or mildly criminogenic effect, they also envisage the possibility that the effect can be preventative for some groups of prisoners, possibly depending on their prison experience. And it might well be that the two requirements embodied in the Council of Europe's recommendation–dignity of treatment and rehabilitation–are closely linked: prison conditions that respect the dignity of inmates could be conducive to rehabilitation.

In this paper we test the presence of such a link, thus providing new evidence on the impact of prison conditions on recidivism. We use quasi-experimental data from the *Bollate* prison, an Italian detention center inaugurated at the end of 2000 near the city of Milan. Bollate is the only pure "open prison" in Italy, and one of the few in the

[2]See,`http://online.wsj.com/articles/prison-firm-cca-seeks-to-reduce-number-of-repeat-offenders-`

World,[3] where cells are kept open during the day and prisoners are trusted to serve their sentences with minimal supervision: inmates are allowed to freely move across the prison with electronic badges, making it easier to reach the location where they either study or work.

Most of the Bollate inmates work or actively learn some job while they are incarcerated. Inmates can also go to school (up to secondary education), learn English and computer languages. They can train to become carpenters, electricians, cooks, welders, as well as work in or out of prison for several agricultural and service cooperatives. Bollate has even its own garden produce, as well as horses, and both are used for therapeutic reasons. Inmates elect their representatives and have a say on several aspect of their prison life (furniture, food, etc). When children are visiting their parents they can spend their time in dedicated play rooms that are nicely furnished and full of toys.

Treatment is thus made of a complex set of differential interventions and prison conditions. The appendix Figures 4 to 7 provide photographic evidence on the differential prison conditions between San Vittore (the prison of origin for about 70 percent of inmates) and Bollate, as well as evidence on the interventions we just listed. Additional information on the prison and a comparison with the conditions in other prisons will be provided in Section 2.

The 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*", and such specific training represents a European pilot study. Noticeably, the prison's operating cost per inmate is about 50 percent lower than in the rest of the country. The reason is that the prison administration managed to build a relationship with inmates that is based on trust and mutual responsibility. As a result prison violence is contained and fewer guards are needed, which keeps costs down.

[3]Open prisons are more common in Scandinavia countries and, to a lesser degree, in the United Kingdom. Famous examples are Bastoy (Norway), Suomenlinna Prison (Finland), Soebysoegaard (Denmark), HM Prison Prescoed (South Wales), HM Prison Castle Huntly (Scotland), HM Prison Ford (England).

It is hard to think of prison conditions that more closely approximate the idea set forth by the previously quoted Recommendation of the Council of Europe. It is therefore natural to ask whether they are effective in preparing inmates for their reintegration into society, or at the very least in reducing their recidivism.[4]

To answer this question we must confront a serious selection problem, as clearly prisoners sent to Bollate are not a random sample of prisoners, and we might expect the selection to negatively correlate with the unconditional propensity to recidivate. We deal with this issue by exploiting the *length* of the period spent in Bollate: the subjects of our analysis are *all* treated, but they differ for the *dose* of the treatment. This is not dissimilar to the standard analysis of the returns to education. The usefulness of such approach, in connection with recidivism, is noted and exploited by Di Tella and Schargrodsky (2013). Of course, we need to argue that the length itself varies in a near-random fashion. We will do this by progressively restricting the sources of variability in the length of the treatment.

First, we consider the *timing* of the selection into Bollate: due to arguably random delays in the various steps of the selection process (which will be explained in detail in Section 2) some inmates end up spending a smaller fraction of their overall sentence in Bollate. This generates a quasi-experimental random variation in the duration of the "Bollate treatment" (which we here define as the length of the residual sentence spent there) that allows to identify its causal effect on recidivism. Comparing conditional recidivism rates of inmates who spent different fractions of their total prison time in Bollate we find that, for a given total sentence (and controlling for many covariates), replacing one year in a traditional "closed cells" prison with one year in an "open cells" one reduces recidivism (over a three-year horizon) by more than 10 percentage points (with an average three-year recidivism of about 40 percent). If indeed the delays in the completion of the selection process are random, this measure of the effect of prison

[4]Though lack of recidivism does not necessarily imply rehabilitation, clearly a rampant recidivism implies that rehabilitation failed.

conditions on recidivism solves the selection problem, since among a group of prisoners who are all selected, the different "doses" of the treatment are (quasi) randomly assigned.

It might be argued, however, that the delays are not random, and we do find some (limited) evidence of correlation between some covariates, mainly the type of crimes committed, and the length of the residual sentence spent in Bollate. To overcome this potential difficulty we restrict the analysis to those prisoners who are *displaced* to Bollate because of overcrowding in nearby prisons. As the administration of Bollate prison cannot refuse to accept displaced inmates (as long as they have space left), the explicit selection process is sidestepped. True enough, the displaced prisoners usually remain at Bollate for a shorter period, and are not subject to the same qualitative treatment of the other inmates. Yet they experience there an environment radically different from those of other prisons, much more respectful of their dignity, and participate in some of the activities. At the same time, the length of the residual sentence that they end up spending in Bollate is mostly due to the occurrence of overcrowding in nearby prisons, an event which is arguably random. As before, we exploit the different "doses" of the treatment to identify its causal effect.

Interestingly, despite a potentially less motivated group of inmates (they did not apply to be in Bollate) and a qualitatively less intense treatment, the point estimate of the effect of the "Bollate treatment" on recidivism is in the case of displaced inmates a few percentage points more negative than for the other inmates. We conjecture that this counterintuitive result might reflect the fact that non-selected inmates tend to be more recidivating, and thus have more room for improving.

It might still be argued, however, that prisoners displaced to Bollate are not randomly chosen by the sending prison. On the one hand, other prisons might have an incentive to get rid as early as possible of their more dangerous inmates. On the other hand, being displaced to Bollate might be used as a reward for the best prisoners. While the

first behaviour would bias our estimates towards zero, and would therefore reinforce our conclusions, the second would bias the results away from zero.

To deal with this difficulty we exploit the variability in the residual sentence among inmates displaced to Bollate *at the same time and from the same prison*. This ensures that, whatever the selection process implemented by the sending prison, it is the same for all the displaced inmates. The variability of the residual sentence then results from the random date in which different inmates started serving their sentence (controlling for its total length). Therefore, the different "doses" of the Bollate treatment can be interpreted as randomly assigned to inmates otherwise identical.

Even if the selection process is the same, there remains a potential concern: the sending prison might select the displaced inmates taking into account not only their dangerousness, but also the length of their residual sentence, as the amount of troubles an inmate is expected to create is a function of both margins. If this were the case, the displaced inmates with a short residual sentence would be those who are particularly dangerous, thereby generating a negative correlation between residual sentence and recidivism independent from the effect of the treatment.

While there is no evidence that among the inmates displaced from a given prison at a given time residual sentence correlates with the other covariates in a way that would bias our results downwards, we develop a strategy to measure, for each inmate, the degree of selection.

To do this, we attach to each displaced inmate a score which is increasing in the number of times in which he could have been displaced in the past, from the same prison, and was not. By revealed preferences, this is a measure of the perceived dangerousness of the inmate: if the administration of the sending prison could have gotten rid of him earlier and chose not to, he must have been perceived as less dangerous than other inmates who were displaced earlier. We then check whether this score correlates with future

recidivism, adding it as an additional variable to the main regression, and the results do not change. While there is evidence that Bollate selects inmates with lower recidivism, such selection does not take place for displaced inmates. And, more importantly, there is also no evidence that the initial prisons of displaced inmates select them based on a combination of recidivism and residual sentence.

A point worth stressing is the larger effect of the "Bollate treatment" on the displaced inmates, relative to the actively selected prisoners. To be sure, the overall level of recidivism of displaced inmates is larger than for those actively selected into Bollate; yet the marginal reduction in their recidivism in response to the treatment is larger. Somewhat paradoxically, the selection into Bollate seems to pick those inmates that benefit less from being there (at least with the benefit measured in terms of reduced recidivism). To rephrase this conclusion in positive terms, it would seem that a less choosy selection into Bollate would generate more bang for the buck.

However, this has to be qualified by analyzing the potential mechanisms for such reduction in recidivism. Indeed, we find strong evidence that the "Bollate treatment" becomes more intense as time goes by, for both, displaced and selected inmates: inmates are more likely to be transferred to the labor section, which gives access to jobs outside of prison; they are also more likely to be allowed day releases. The growing intensity of the treatment is a plausible reason why more time spent in Bollate yields, other things equal, less recidivism.

In principle, however, the reduced recidivism might result from weaker negative peer effects: Bollate might use the selection to limit the arrival of "bad" peers. If this were the case, a less exacting selection process would undermine the effectiveness of the "Bollate treatment." We use data on the cell and the prison section to measure the effect on recidivism of being exposed to a larger group of displaced inmates during an inmate's stay. We find no evidence that such exposure increases recidivism, even when such exposure in

measured at a very fine level (cells).

Differently from the broad conclusion of the Nagin et al. (2009) survey, we find that, unlike the prisons of origin, the Bollate prison is not criminogenic. Provided that the time spent in prison is appropriately used to offer "*meaningful occupational activities and treatment programmes to inmates, thus preparing them for their reintegration into society*," recidivism can be reduced. The old view that, in term of rehabilitation, "nothing works," seems therefore incorrect. Given the widespread use of incarceration and the expansion of the prison system across most countries, identifying what works and implementing the right correctional policy will have a very large payoff.

Our work is related to a few economic studies analysing the effect of imprisonment on recidivism. Di Tella and Schargrodsky (2013) use ideological differences of randomly assigned judges to show that Argentinean inmates who spend part of their sentence under electronic monitoring, instead of prison, have lower recidivism. They also analyze the intensity of treatment in a way that resembles our study. Focussing on the group of electronically monitored inmates, where "*the problem of selection is less relevant*", they find that increasing the fraction of time spent under electronic monitoring (as opposed to ordinary imprisonment) reduces recidivism. Their results are consistent with our own. On the one hand, the larger is the fraction of time served under conditions more respectful of human dignity (as when allowed to be outside the prison under electronic monitoring), the lower is recidivism; this is clearly reminiscent of our "Bollate treatment." On the other, the larger the total time served in ordinary prisons, which in the Argentinean case are often degrading, the larger is recidivism; we find the same result when lengthening the time served in an ordinary prison (holding fixed the time spent at Bollate). Similar criminogenic effects of harsh prison time have been found by Chen and Shapiro (2007) and Drago et al. (2011).[5]

In Kuziemko (2013), instead, an exogenous one-year increase in prison length driven

[5]See also Gaes and Camp (2009).

by changes in Georgia's parole-board guidelines lowers three-year recidivism by a very large degree (-43 percent). Our results might provide an explanation for such opposite findings: prison time served in different prisons, with different rehabilitation programs, can lead to very different effects on recidivism. A longer prison time served might reduce or increase recidivism, depending on whether it takes place in a prison with rehabilitation programs, like Bollate or prisons in Georgia U.S., or in a much harsher one, like the other prisons in Lumbardy or prisons in Argentina.

The next Section provides additional information on Bollate and on the selection process, discusses our identification strategy and describes the data. Section 3 presents the results and a battery of robustness checks. Section 4 makes a first attempt at investigating the mechanism underlying our results. Section 5 concludes.

2 The Quasi-experiment

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

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 prisons known as *Case Circondariali*, near the place where they reside (or, temporarily, near the place where they committed the crime).[6]

Given that most incarcerations in the *Case Circondariali* tend to be short, these prisons invest very little effort in trying to rehabilitate the inmates. If convicted to a

[6]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*).

prison sentence of at least three years, the inmates are transferred to a different type of prison, known as *Casa di Reclusione*. The aim is a) to separate serious convicted offenders from the other ones, and b) to focus rehabilitative efforts on those inmates who spend a sufficiently long time in prison. In fact, due to overcrowding and 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). As we mentioned in the Introduction, Bollate was opened in late 2000, with the explicit goal of creating a rehabilitating prison, leaving ample room for a range of activities and establishing joint work/training programs with regional institutions and non governmental organizations. Differently from other prisons, security was not seen merely as a police concern but also educators, psychologists and even the inmates themselves were involved and given responsibilities.[7]

Table 1 presents the main characteristics of the prisons from which the Bollate prison draws most of its inmates. About 70 percent of inmates are transferred from the largest *Casa circondariale* in the Lumbardy region, San Vittore. The first striking difference between Bollate and all other prisons is that in the former all inmates are part of the "open cells policy". Badges allow them to move out of their cells for most of the day (10 to 12 hours), while the majority of inmates in the other prisons spend only around 4 hours outside their cells (which represents the minimum time required by law).

Bollate is also the youngest prison. San Vittore was built in 1879, following Bentham's panopticon design. Opera, the other major *Casa di Reclusione* 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

[7]Inmates were asked to sign a "Responsibility Pact", committing to a responsible behavior lest being transferred to a different prison.

capacity. 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 Lumbardy.

Apart from the open cell policy and the lack of overcrowding, Bollate is special for its rehabilitation efforts, and in particular for those targeted to the future entry into the labour market of inmates. In most prisons, a fraction of the inmates (between 12 and 30 percent) work for the prison administration, cleaning, cooking, etc. These jobs are hardly useful for their future job chances outside the prison.

At Bollate inmates have the opportunity to work for other employers than the prison administration, both inside and outside the prison. At a 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 the prison. 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 Lumbardy.

On top of this 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 at all the other prisons in Lumbardy combined.

Part of these differences though, are not just "supply" driven. Bollate inmates represent a selected group of inmates that might "demand" higher degrees of rehabilitation. In the next section we describe how the selection works.

2.2 The Treatment and the Identification Strategy

Inmates are selected into Bollate through two main channels. Either they apply to be sent there, or they are proposed by the administration of a different prison (usually in the same region) or by the Justice Department.[8] A third channel of access to Bollate,

[8]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.

which does not involve an explicit selection process, is provided by displacement of nearby overcrowded prisons; we will considered displaced inmates later.

2.2.1 The Explicit Selection

For each request/proposal, the regional administration office for Lumbardy of the Ministry of Justice (the "*Provveditorato Regionale di Milano*") assesses, together with the Bollate prison administration, whether the following criteria are satisfied. Inmates should, as a rule: have a residual sentence in the range 2 to 10 years; be in a good health status, and not be under methadone treatment; have a definitive sentence;[9] have shown propensity and active interest for rehabilitation programs (this is reflected in a positive assessment by a specialized team); have had a generally good behaviour in the previous prison; and, finally reside or have interests and relationships in the Lumbardy region.

Although some exceptions to these criteria are allowed, and some of them have been interpreted at times in a somewhat looser way, they provide a fairly accurate description of the requirements to be a "regular" Bollate prisoner (these requirements do not apply for prisoners displaced to Bollate; we will have more to say about this later).

Once the assessment is completed, either the same regional office or a Department within the Ministry (the "*Dipartimento dell'Amministrazione Penitenziaria*" decree the transfer of the inmate. Crucially for our analysis, the *time it takes* for the whole procedure to be completed, and therefore the residual sentence upon arrival at Bollate, can vary for a host of factors:

1. the initial request/proposal can be incomplete, and additional documents need to be obtained;

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

2. some of the criteria might not be fully satisfied,or the people assessing them might not be fully convinced that they are satisfied, and the request/proposal is put on hold until they are;

3. there can be delays with which an inmate who satisfies the criteria submits the request or is identified by the administration of the current prison as eligible for the proposal;

4. whenever the inmate is considered a good prisoner worthwhile retaining, the administration of the prison of origin might potentially delay the process;

5. an inmate might be already involved in some activities or rehabilitation processes that is best not to interrupt;

6. the various administrative offices involved in the procedure can take different time to process the information and to reach a judgment, due to random variation of the backlog of other administrative tasks or of their efficiency;

7. whenever the conditions for the application of preemptive imprisonment ("*custodia cautelare*") apply, an inmate might have already served part of his/her sentence before the latter becomes definitive, depending on the number of appeals and on the speed with which they are settled. Since in principle Bollate only accepts inmates with a definitive sentence, any given sentence length can be associated with different lengths of the residual sentence;

While some of these factors impart near-random variability to the timing of arrival to Bollate, in some instances it might be argued that the length of the delay itself reflects some selection. For example, for factors 1, 2 and 3 it could be argued that "better" inmates (more educated, with better labour skill, better behaviour, etc.) are more likely to be identified earlier and in a clearer cut way, so they would end up in Bollate earlier; as

to factors 4 and 5, conversely, it could be argued that "better" inmates are more likely to be retained for longer by the prison of origin, so they would end up in Bollate later. Factor 6 is arguably fully exogenous. A point worth stressing relates to factor 7. Conditional on the crime committed and on the criminal history, the speed with which a a given sentence becomes definitive often depends on the working efficiency of judges. As shown in Coviello et al. (2011) different judges can have very different levels of productivity.[10] Since judges are randomly assigned to cases, these differences lead to random variation of the timing of arrival to Bollate.

Unfortunately, it is impossible with the data at our disposal to weigh the importance of the different delays.

However, we have a range of variables that characterize the selection mechanism of inmates (whether they applied or were proposed, where they were spending their previous prison time) and their previous criminal history, which are arguably a good proxy of the information set available to the people involved in the selection process. Our identification assumption when using the entire sample of inmates, and not just the displaced ones, is that conditional on such variables as well as on the total sentence length the time it takes for the process to be completed – which translates into the residual sentence to be spent in Bollate when transferred – is as good as random. Later we are going to test whether the residual sentence, conditional on the total prison time, is correlated with any of the observables (see the randomization Table 3).

For about 2/3 of inmates the residual sentence upon arrival at Bollate represents the actual sentence spent there, as they are never transferred again before their final prison release. An inmate might however be tranferred to another prison ahead of time if he/she misbehaves, or the treatment appears to be of little use. An alternative possibility is that the inmate's behaviour is so promising that he/she is given an early release (through non-

[10]The judges in their data are also based in Milan, but deal with labor controversies. The judge with the lowest productivity would on average take 400 days to finish a trial, while the fasted ones would take less than half that time.

custodial sentences). Clearly, both 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 effect. It might differ from the average treatment effect as the actual prison time, possibly shorter, is potentially endogenous. Despite this drawback, it could be considered a more 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 cleaner, because it is more clearly exogenous, but overstates the measure of the administered treatment due to non-compliance.[11] We consider the intention to treat as our preferred measure of the treatment, but we will also present results for the actual time spent in Bollate, instrumenting it with the potential one.

2.2.2 The Displaced Inmates

As mentioned, not all inmates in Bollate go through the admission procedure we have just described. Some inmates are sent there because nearby prisons are overcrowded and Bollate has spare capacity (which is very frequent). The Bollate administration has no control on which or when inmates are displaced there. Since almost all displacements originate from prisons within the same Lumbardy region, the "*Provveditorato Regionale di Milano*" collects the requests from the prisons having too many inmates, relative to their capacity, and distributes them in nearby prisons with spare capacity. For a number of years the inmates displaced to Bollate did not need to satisfy the requirements that we described before; only recently (post 2008) a looser version of the screening process has been introduced also for displaced inmates, but given that our sample stops in 2009

[11] In studies where compliance cannot be observed, the intention to treat provides a sobering but perhaps more realistic assessment of the effects of the treatment, as a certain share of non-compliance is part and parcel of the treatment. In our case, in which any difference between the intention to treat and the actual treatment is under the control of the prison administration, perhaps the latter is in principle the most appropriate measure.

almost all the displaced inmates that we consider belong to the pre-screening period.

This implies that the delays affecting the explicit selection process (factors 1, 2, 3 above), which are more likely to imply that "better" inmates are selected earlier (increasing their residual sentence in Bollate), are shut down. These are for us the most worrying kind of delays, since speeding up the arrival of the most promising inmates, or delaying the arrival of the least promising ones, would generate a negative correlation between the residual sentence length and future recidivism, even in the absence of a real treatment effect. Thus, focussing on displaced inmates strengthen our identification strategy. Moreover, given that the displaced inmates are much more likely to be a random sample of the whole population of inmates, it provides an interesting comparison group to the inmates selected into Bollate, and one for which the external validity of our results is arguably stronger.

Focussing on displaced inmates, we are left with residual sentences that vary because, conditional on total sentence length, there is random variation in the time of arrest and conviction (similar to factor 7 above) and in the time when a given prison becomes overcrowded and a transfer takes place; moreover, an additional source of variability (admittedly, a limited one) is provided by possible delays in the administrative process matching the requests by overcrowded prisons with the available places in nearby prisons with spare capacity, similar to factor 6 above. In passing, these sources of variability resemble the conditional exogeneity assumption used by Drago et al. (2009) and by Kuziemko (2013). In both studies the difference between the actual and the recommended sentence is not due to the timing of overcrowding at a specific prison facility, but rather due to the timing of a mass release.

We cannot rule out, however, that the prison of origin still cherry-picks the inmates to be displaced. Thus, some elements of selection might be present even when restricting the analysis to displaced inmates. A plausible conjecture, which is unofficially confirmed

by prison operators and administrators, is that more trouble-making prisoners are more likely to be displaced (this point is akin to factors 4 and 5 above). If this were the case, in a sample that includes subsequent waves of displaced inmates from the same prison, more trouble-making prisoners would be displaced earlier, and would mechanically tend to have longer residual sentences. This would be a source of bias in our estimates, though one biasing the estimated effect of the treatment towards zero. If instead the less trouble-making prisoners were to be preferentially selected for displacement – as one could argue if the transfer to Bollate were to be used as a reward for good behaviour – we would observe the opposite bias.

Indeed, the evidence seems to support the first possibility: our sample of displaced inmates seems to be be negatively selected, as is apparent from their recidivism rates (Table 2), that is the likelihood that a released prisoner is rearrested within three years from the end of his custodial and non-custodial (e.g. home detention, monitored liberty, etc.) sentence.[12] The difference in recidivism between actively selected and displaced inmates is 12.1 percentage points (27.8 against 39.7 percent), and is significant at the 1 percent level.

2.2.3 A Revealed Preference Measure of Selection

Yet, whatever the direction of the bias, we can try to eliminate it by focussing on those inmates who were displaced *at the same time and from the same prison*: in this way, we would get rid of the mechanical link between the residual sentence and the timing of displacement, and we would be left only with the variability arising from the random variation in the time of arrest and conviction, conditional on total sentence length.

Intuitively, we identify the effect of the "Bollate treatment" by comparing the future recidivism of inmates who were displaced to Bollate at the same time, from the same

[12]Since the sample comprises inmates released between 2000 and 2009 and the data stop in 2013 the three year period is never truncated.

prison, where they were serving the same sentence, but who had started serving it at different random times in the past, so that they are left with randomly different residual sentences to be served at Bollate and are therefore treated with randomly different "doses".

A bias might still be present, however, if the selection of the displaced inmates were to be based directly on their residual sentence. This might be the case if the sending prison wanted to get rid of those inmates who were expected to generate the largest amount of trouble, which in turn is given by the product of their "instantaneous troublesomeness" and the length of their presence in the sending prison, if not displaced. Under this hypothesis, the inmates with a short residual sentence would be displaced only if their "instantaneous troublesomeness" were particularly high, thereby generating a negative correlation between residual sentence and recidivism independent from the effect of the treatment.

Our informal discussions with prison administrators do not lend much credence to such an hypothesis. Moreover, the residual sentence of displaced inmates is on average rather short, and is therefore a margin somewhat unlikely to be really relevant. Still, we tried to control for the possibility that the selection of the inmates to be displaced were based on their residual sentence in two ways. First, we computed a randomization table to test whether the residual sentence is orthogonal to observable characteristics of the displaced inmates, and thus presumably also to unobservable ones. Secondly, we used a revealed preference argument. For each inmate we can reconstruct how many times he could have been displaced from a given prison but was not. If the hypothesis we are trying to test were true, any inmate who could have been displaced and was not would be revealed to be preferred, by prison administrators, to an inmate who was indeed displaced earlier. Conditional on the sentence served in the prison of origin, such count represents therefore a measure of selection that is directly linked to the choice of the administrators of the prisons of origin, which can be added as an additional control to the recidivism

regressions.

2.3 The Data and the Randomization Tests

2.3.1 Prison Records and Sample Selection

We worked in close cooperation with the "*Dipartimento dell'Amministrazione Penitenziaria*" of the Italian Ministry of Justice, its regional administration office for Lumbardy, the "*Provveditorato Regionale di Milano*" and the administration of the Bollate prison. The administrative data was extracted on February 15, 2013.

We were granted access to a large amount of information on inmates who spent some prison time in Bollate between 2001, the opening year, and 2013, the closing date of our analysis. The information includes in particular the entire history of past incarcerations and of incarcerations following their release from Bollate (if occurring before 2013). Starting in 2006 we can also measure transitions inside the Bollate prison across different sections, which will allow us to provide direct evidence about the treatment mechanisms (as different sections correspond to different activities inside and outside the prison).

As mentioned, we restrict our sample to Italian (57 percent of inmates are foreigners), male (less than 30 inmates are female), inmates that are not sex offenders. We excluded foreigners because of the difficulty of 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 excluded the 8 percent of inmates who are sex offenders because they are subject to specific incarceration rules.

There are many possible definitions of recidivism. From a legal viewpoint, recidivism occurs when a release after a definitive conviction [13] is followed by another definitive conviction. We will maintain the first requirement and weaken the second, by considering as

[13]Inmates who by the time of dismissal had a definitive conviction are 90 percent of the total number of inmates. Restricting to a definitive conviction before the release avoids that a rearrest is due to the final conviction for the same crime

recidivist any inmate who, having served a definitive conviction, is rearrested within three years from the end of his custodial and non-custodial (e.g. home detention, monitored liberty, etc.) sentence. We are not requiring that the last imprisonment corresponds to a definitive conviction because the latter would force us to keep a very long window of observation after the inmate release, given the three levels of appeal in the Italian judicial system. Implicitly, we therefore prefer false positives (a rearrested inmate who is later acquitted) to false negatives (a rearrested inmate who is definitively convicted only past the three year window). Given that conviction rates for rearrested criminals tend to be high, the likelihood of false negatives is likely to be negligible, and unrelated to the residual sentence in Bollate.

Having chosen a three year measure of recidivism, this forces us to restrict our analysis on inmates released up to 2009.

In the end we have, for each (Italian, male, not sex-offender, serving a definitive sentence) inmate who spent some time in Bollate between 2001 and 2009 (about 2300 people) 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 date of a possible new incarceration after Bollate (and up to February 2013). We have information on a number of characteristics of the inmates as well as on the crimes for which they had been imprisoned. We also have some information on the selection process into Bollate, as we can distinguish the prisoners displaced there due to overcrowding of nearby prisons, 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).

Unfortunately, for 12 percent of the sample we were unable, even looking for their folders, to reconstruct why they ended up in Bollate.

2.3.2 Summary Statistics and Randomization Tests

Our main measure of the "Bollate treatment" is the length of the residual sentence to be spent in Bollate (we will always condition on the total sentence served). Figure 1 shows the distribution of the ratio between the residual and the total sentence, namely the fraction of the total sentence served at Bollate. The left panel is for the entire sample, the right one for the sample of displaced inmates. Transfers are more likely to happen at the beginning of an inmate's incarceration, which skews the distribution to the left, and this is true even when focussing on displaced inmates.

The average sentence and average residual sentence served at Bollate by entry reason are shown in Table 2. Inmates displaced to Bollate have an average total "served" sentence (1.268 years, or 15 months) that is lower than the three years minimum sentence that inmates typically need to be at Bollate. Thus their average residual sentence upon arrival is also low (9 months), 6 months shorter on average than that of the selected inmates.

One third of the times the actual sentence served in Bollate is shorter than the potential one (this is true also for displaced inmates). This happens either because inmates are transferred to other prisons or because they are given non-custodial sentences at the end of their stay in Bollate. The different entry reasons is associated with different treatment strategies. Table 2 show that only a handful of displaced inmates finish their incarceration in Section 5 – the section from which inmates spend daytime working outside the Bollate prison – while for the other inmates the proportion v aries from 10 to 25 percentage points. Recidivism patterns are also strikingly different. Inmates selected to be sent at Bollate have on average a recidivism rate much lower, by 12 percentage points, than inmates displaced there. Among the selected inmates, those who applied to be transferred and those transferred by the Justice department and the Central Government (other entry reasons) have the lowest recidivism rates.

The summary statistics for all the additional variables that describe the inmates and

their crimes and that are later used as regression controls are shown in Table 3 (for the entire sample, inclusive of the displaced inmates, on the left panel and for the sample of only the displaced inmates on the right one). We already described the recidivism patterns. The second variable in Table 3, *Art. 4 bis* (*Divieto di concessione dei benefici e accertamento della pericolosit sociale dei condannati per taluni delitti*), restricts the applicability of prison benefits (day releases, outside work, non-custodial sentences) for a series of crimes (e.g. terrorism, organized crime, slavery, sex trade, kidnapping with extortion, etc.). Twelve percent of all inmates are subject to such restrictions, while the fraction goes down to 6 percent for displaced inmates. On average an inmate is 38 years old, single (60 percent), not addicted to drugs (70 percent), with a secondary schooling degree (50 percent), and with an unknown employment status. He has an average of 3.3 previous incarceration spells, has committed either a theft (30 and 33 percent for the full sample and the displaced one), a drug-related crime (29 and 22 percent), or a robbery (24 and 19 percent).

Next to the mean and the standard deviation we show the coefficients on the residual sentence in regressions where the dependent variables are, one at the time, those listed in the first columns. The purpose is to formally check the quasi-random nature of our treatment, by comparing the expected value of each covariate conditional on different levels of the residual sentence. Each regression also control for the total years spent in prison. 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, tend to be older, etc. We can only hope to verify the quasi-random assignment of the residual sentence once we condition on the total sentence.

Ideally, we would not want any of the coefficients in these regressions to be statistically significant, with the obvious exception of that associated with the first variable (recidivism). Indeed, most are not, but there are some observable characteristics that

are different for inmates with different potential treatment levels. In particular, inmates whose residual sentence in Bollate is higher are more likely to have secondary schooling, and show a few significant differences in the types of crimes committed. While of course we will control for these (and other) variables in our main regressions, this casts some doubts on the random nature of the residual sentence assignment. For this reason, we will restrict our sample of analysis in the attempt to isolate the variability of the residual sentence that can more confidently be judged as random.

However, we will later show that, when assessing the effect of the treatment on recidivism, whether or not we control for these differences (e.g. we also control for a full set of age fixed effects) makes little difference. This is reassuring, as it implies that even if there were some selection at work in the treatment assignment, it does not seem to be very predictive of recidivism.

The coefficients on the right panel of Table 3 represent the randomization check for the displaced sample, with (columns 9 and 10) and without (columns 7 and 8) controls for prison of origin times week of transfer fixed effects. Controlling for these fixed effects we are essentially comparing inmates who were displaced at the same time and from the same prison. Hence, we are treating each overcrowding event as a separate experiment where the selection process , if present, is common to all transferred inmates. Almost all the coefficients are now statistically insignificant. The few that remain significant consistently suggest, if anything, a negative selection: displaced inmates with longer residual sentences are more likely to be "worse": more likely to be drug addicts and not being able to describe their employment condition, less likely to be employed. This kind of selection, if present, would impart a bias towards zero to our estimates of the effect of the treatment on recidivism.

Overall, recidivism is the only variable that is consistently associated with residual sentences. This represents a first indication that the two might indeed be causally linked

to each other.

3 Results

3.1 Main Results

We estimate the intention to treat effect with a linear probability model by ordinary least squares (later we will see that probit regressions lead to similar results). Standard errors are always clustered by Bollate prison section and week of exit, thus allowing inmates that might have interacted in prison and are released around the same time to have correlated residuals.

For individual i, transferred in week $\tilde{t}$ from prison j, and released at time t, recidivism is a function of the total sentence (TOT_SENT), potential time spent at Bollate (POT_BOL_SEN), as well as other controls (X):[14]

$$RECID_{i,j,t} = \beta_1 TOT\_SENT_{i,j,t} + \beta_2 POT\_BOL\_SEN_{i,j,t} + \gamma' X_{i,j,t} + \epsilon_{i,j,t},$$

where

$$\epsilon_{i,j,t} = \begin{cases} \alpha_{j,\tilde{t}} + \varepsilon_{i,j,t}, & \text{if displaced;} \\ \alpha_j + \delta_t + \varepsilon_{i,j,t}, & \text{otherwise;} \end{cases}$$

When estimating the average treatment effect we run a two-stage least squares regressions (2SLS), using the potential time spent at Bollate as an instrument for the actual time.

Table 4 shows both kind of regressions for the whole sample and table 5 does the same distinguishing between the sample of displaced inmates and the sample of those actively selected. Time served at Bollate (both potential and actual) is measured in years (days divided by 365). Looking first at the whole sample, and focussing on the intention

[14] Later we are going to test for non-linear effects.

to treat, one extra (potential) year at Bollate (and therefore one less year spent at a "normal" prison, given that the regression controls for the total length of the sentence) reduces recidivism by 5.2 percentage points when controlling only for the total time served in prison (as in the previous randomization table), and by 5.6 percentage points when controlling also for the possible causes of entry and for all the additional variables listed in the summary statistics table (see Table 3). In addition, we also control for year times quarter of release, to capture labor market conditions inmates face when they exit prison, and prison of origin fixed effects, to control for differential treatments there. The reduction in recidivism is highly statistically significant and sizeable. In relative terms, one more year at Bollate, as opposed to any of the prisons of origin, reduces recidivism by 16 percent of the average recidivism rate.

The sign of the other covariates is in line with expectations. A previous history of recidivism, proxied by the number of previous incarcerations, is highly predictive of future recidivism. Interestingly, the total time spent in prison (irrespective of whether it is Bollate or another prison) increases recidivism, even though the effect is statistically significant only when other controls are present. This criminogenic effect of prison time at ordinary prisons is in line with the results reported by Nagin et al. (2009). Our result show, however, that merely looking at the time spent in prison can be highly misleading. The way in which the prison time is spent is of crucial importance, and a good use of that time actually reduces recidivism. The causes of entry into Bollate that reflect a conscious choice (by the inmates and by the officials assessing the requests) are highly significant and are associated with a sizeable reduction in recidivism, confirming that the selection process is effective in screening inmates with a lower recidivism potential. Finally, 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

little affected by the inclusions of the controls (if anything, the point estimate is somewhat larger).

The IV regression gives similar results. The effect of the treatment, when measured by the actual time spent in Bollate, is about 10 percentage points when only the total sentence length is controlled for, and 9.5 percentage points when also all the other controls are included. 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 on the length of the first is always close to 50 percent, with a t-statistic of about 15, and an F-statistic of about 200. A visual representation of the first stage is shown in Figure 2. 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 inmates is either transferred to other prisons or is given alternative sentences, and these are clearly endogenous outcomes.

The result for the sample of displaced inmates suggests that selection is unlikely to explain these large treatment effects. Table 5 shows that for displaced inmates the estimated intention to treat effects (Columns 2 to 4) and average treatment effects (Columns 6 to 8) are not only highly significant , but even larger than for the selected inmates (Columns 1 and 5, respectively).

The difference between the columns 2 and 3 (and between columns 7 and 7) reflects the inclusion of some variables controlling for the possibility that the prisons of origin select inmates to be displaced based on their dangerousness or on their residual sentence. In particular, a set of prison of origin times week of release fixed effects makes sure that we are comparing inmates that have been displaced from the same institution around the same time, and thus are subject, if anything, to the same selection criteria. This controls for the potential bias induced by a selection of the inmates to be displaced based on their dangerousness or trouble-making potential (be it positive or negative). In this way we are left comparing inmates whose only difference is the moment in which they started serving

their original sentence. It should be noted that controlling for the week of transfer we cannot anymore control for the quarter of exit, since these two variables would implicitly fix the residual time spent at Bollate. This is why the quarterly unemployment rate in Northern Italy and the quarterly youth unemployment rate are added as a proxy for the labor market conditions inmates face when released.

As mentioned, one residual concern could be that the selection of displaced inmates, while being common, is based on the residual sentence itself. We appease this concern by using a revealed preference measure of selection. For each inmate, we count the number of displacement events that took place during his stay at the prison of origin; these are events in which he could have been displaced and yet he was not. The larger their number, the lower must have been the urge of getting rid of him perceived by the prison administrators, as revealed by their own choices (assuming that there was any such urge). In Figure 3 we provide visual evidence of the absence of correlation between the number of times inmates are not selected and recidivism. While this is reassuring,there might still be a correlation conditional on all other covariates.

Yet, in Columns 4 and 8 we find no evidence that more dangerous or trouble-making inmates are displaced sooner (or later): the coefficient on the revealed preference index is not statistically different from zero, and its inclusion among the controls does not change the estimate of the effect of the treatment.

Summing up, even controlling for just the total time served, as shown in Table 3, the intention to treat effect on displaced inmates is 6.8 percentage points, or 17 percent relative to their average recidivism rate (40 percent). Adding a large number of controls increases the estimate by just 1 percentage point. In particular, while displaced inmates tend to be more dangerous (more prone to recidivism) we find no evidence that they were selected on the basis of their residual sentence length. The variability of the latter, therefore, can be taken as a near-random variability that identifies the causal effect of the

treatment length.

3.2 Robustness Checks

In Table 6 we run several robustness checks for all inmates (conditional on the cause of entry), and for the displaced ones. All regressions control for the usual set of variables, including prison of origin and year times quarter of exit fixed effects. For brevity we focus on the intention to treat (first set of columns) and on the average treatment effects (second set of columns).

The baseline intention to treat effects were 5.6 percent for the entire sample (Table 4) and 7.7 percent for the displaced sample (Table 5). The first two rows of Table 6 show that excluding the few inmates that have one definitive conviction but also an ongoing trial at the time of release does not alter the results.[15] The second set of regressions shows that the intention to treat is only slightly lower when we exclude the 652 inmates who have shown some addiction to drugs, showing that the rehabilitation effects are not driven by such inmates. Despite the much smaller sample size, focussing on recent years also does not alter the results. Shortening the horizon within which we measure recidivism from 3 to 2 year lowers the treatment effects, indicating that long term effects might be larger than short term ones.

The results are also robust to using a probit model instead of a linear model (next two rows). Adding demeaned squared terms for the total time served and the time served in Bollate makes little difference for the overall sample, while for the displaced sample it lowers the size and the significance of the reported coefficients (last two rows). Yet the corresponding joint tests of significance can all be rejected at the 5 percent level.

[15]These inmates might end up in prison again when their ongoing trial is settled with a definitive sentence. Their new incarceration, therefore, would reflect an older crime.

4 The Mechanism

Our results show that spending more time at Bollate, and correspondingly less time at 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 mechanism.

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. The Table 7 reports, for various subgroups of inmates having or not having a certain characteristic in the total sample and in the sample of displaced ones, the intention to treat effect and the (instrumented) average treatment effect. The first four rows in the Table (rows 1 to 4) refers to inmates who have or have not committed economically motivated crimes.

The intention to treat effects are -5.7 and -8 percent, significantly different from zero, for the subset of the total sample of inmates and of the sample of displaced ones, respectively, who have committed economically motivated crimes (e.g., theft, burglary, robbery, drug dealing, fraud), while they are close to zero for those in prison due to non-economically motivated and mostly violent crimes. This suggests that inmates who were committing crimes for a living are more likely to respond favorably to the Bollate rehabilitation efforts.

The second set of results (rows 5 to 8), shows that the treatment response is consid-

erably larger (in absolute terms) among inmates who are at the first prison experience, especially relative to their lower recidivism. For example, average treatment effects for "rookies" displaced inmates are equal to -17 percentage points, while their average recidivism is just 26.4 percent. Yet, even inmates who have been in prison before are responding positively to the treatments. This suggests that rehabilitation efforts are most successful when applied earlier in the criminal career.

The third set of results (rows 9 to 12) show that the effects tend to be larger (in absolute terms) for inmates who have a family, in particular when we consider displaced inmates. Though we do not have information about the presence of children, these results are consistent with a positive role in reducing recidivism being played by the presence of better visiting facilities for children and partners at Bollate, compared to other prisons. Rehabilitation efforts seem to be more fruitful, therefore, when they interact with family relationships.

Looking separately at inmates who have, or have not, at least secondary education, the fourth set of results (rows 13 to 16), shows that the treatment is more effective for inmates with lower levels of education. This points at 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.

The final set of regressions (rows 17 to 20) considers separately inmates who are, or are not, prohibited from accessing alternative sanctions by a previous judge order. There is no evidence that the effect of the treatment is significantly different across these two groups.

According to most of the measures of prison conditions shown in Table 1, the San Vittore prison stands out as probably the harshest prison in Lumbardy, which makes the comparison with the conditions at Bollate starkest. For this reason we might conjecture that the effect of the "Bollate treatment" be larger for inmates that are transferred from

the San Vittore prison. Table 8 shows that the treatment effects are indeed larger (in absolute terms) when looking at inmates displaced from San Vittore, but such differences are not statistically different from zero (given that only 12 percent of the displaced inmates are transferred from a prison that is not San Vittore, the statistical power to detect treatment differences across prisons is limited).

4.2 Direct Evidence of the Mechanism

In Section 2.1 we highlighted that spending prison time at Bollate as opposed to San Vittore or any other prison in Lumbardy can be a very different experience. This is the result of several differences between Bollate, on the one hand, and other prisons, on the other. The first, and perhaps the most striking, is that at 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 transferred 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. 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 (work, education, the interior design of their prison, etc.)in exchange of peaceful behavior (and cheaper supervision).

Compared to the "panopticon-style" of prison life that is the norm in most prisons in the world, these humanizing prison conditions are indeed a momentous change, and it is reasonable to conjecture both, that they can influence the inmates' recidivism, and that such influence is increasing in the duration of their stay at Bollate. This however cannot be empirically tested, since those conditions equally apply to all Bollate inmates as soon as they are transferred there.

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 Section 5. And once they are in Section 5, Bollate keeps track of the day releases.[16] For each inmate (not just the ones that were released) we computed a dummy equal to one if an inmate has ever been transferred to Section 5. For selected inmates (left columns), the likelihood to be transferred during an incarceration is 27 percent. For displaced inmates is only 7.8 percent.

Regressing this dummy on the potential years served at Bollate, as well as the usual controls, we get that each potential year increases the likelihood to be transferred to Section 5 by 8 percentage points (30 percent) for the selected inmates, and by 2 percentage points (25 percent) for the displaced ones (though for the displaced inmates the coefficient is not significantly different from zero). Regressing the dummy on the actual years spent at Bollate (instrumented with the potential ones) shows that an additional year increases the chances of transfer by 18 percentage points for the selected inmates, and by 7.5 percentage points (again without reaching statistical significance) for the displaced ones.

The fraction of days spent in day releases (typically corresponding to work outside Bollate) can be used in a similar manner to understand the mechanisms. During their entire stay, selected inmates can spend on average 1.44 percent of their days outside of prison; displaced inmates only 0.24 percent. Yet, an additional potential year in Bollate increases such fraction by 1.43 percentage points (almost 100 percent) for the selected inmates, and by 0.21 percentage points (87 percent) for the displaced ones. Both intention to treat effects are significantly different from zero, and the same is true for the average treatment effects, which are more than twice as large.

It obviously stands to reason that having the possibility to work outside, while being in prison, is an important ingredient of rehabilitation, and is therefore a driver of the estimated effects of the treatment. It is moreover consistent with the finding that the

[16]Since 2006 Bollate keeps track of all transfers across the different Sections in Bollate.

largest changes in recidivism are for economically motivated crimes.

At the same time, the larger effects found for the displaced inmates, who are less exposed to outside work, suggest that other mechanisms might be important as well: as mentioned before, freedom of movement, responsibility, conditions respectful of human dignity, productive use of time, all these might positively affect the post release behavior of inmates.

4.3 Negative Spillovers

One additional mechanism that might be at play is provided by peer effects.[17] By selecting "better" inmates Bollate might in fact simply minimize negative peer influences. Since more time spent at Bollate is equivalent to spending more time with more positively selected inmates, this could explain our results.

We try to test whether this is a relevant mechanism underlying our results by using the presence of displaced peers. The idea is that displaced inmates are negatively selected (as shown in Section 2.2.2), and therefore, the higher the presence of displaced inmates among ones' peers, the less effective a mechanism based on the influence of positively selected inmates should be. We measure the presence of displaced peers by computing the fraction of "prisoner days" spent together with displaced inmates: at Bollate (first measure); in the final prison Section (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 also more precise.

In Table 10 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. Given the result that the effect of the treatment is larger for displaced inmates as compared

[17]See Chen and Shapiro (2007) and Bayer et al. (2009)) for evidence on peer effects in prison.

to the actively selected ones, this suggests that a less exacting selection process would generate a larger marginal effect on recidivism.

5 Conclusions

This paper has shown that, when trying to reduce recidivism, *something works*: following the recommendation of the Council of Europe (2006), that is offering *prison conditions which do not infringe human dignity and which offer meaningful occupational activities and treatment programmes to inmates, thus preparing them for their reintegration into society*, seems effective in curtailing recidivism. Conversely, traditional prison conditions seem to be criminogenic. This is good news for those countries (Italy being a notable example) whose laws, often neglected, mandate prison conditions in line with the Council of Europe recommendation: by doing the "right thing" they would also reap the economic and social benefits of a fall in recidivism. It should provide instead cause for thought to those countries that primarily rely on the deterrence provided by harsh prison conditions, as their policy might backfire due to increased recidivism.

More work needs to be done to understand the mechanisms underlying our results. We find evidence that one such mechanism involves offering inmates, while in prison, opportunities to work outside, thus making it easier their entry into the labour market when released. 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 prisons'administrators.

We also find evidence that even for inmates who are not involved in work outside being exposed to prison conditions that emphasize responsibility and guarantee freedom of movement, conditions respectful of human dignity, productive use of time, are effective in reducing recidivism. Policies to that effect seem easier to implement, and are almost

surely cost effective.

Finally, we do not find robust evidence that peer effects are an important driver of our results. This suggests that scaling up the experience of Bollate, even by weakening somewhat the selection criteria, and adopting similar standards in other prisons, might not risk to undermine the positive results so far observed.

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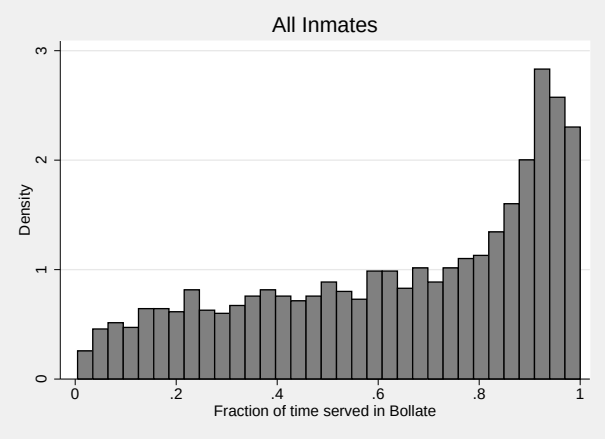

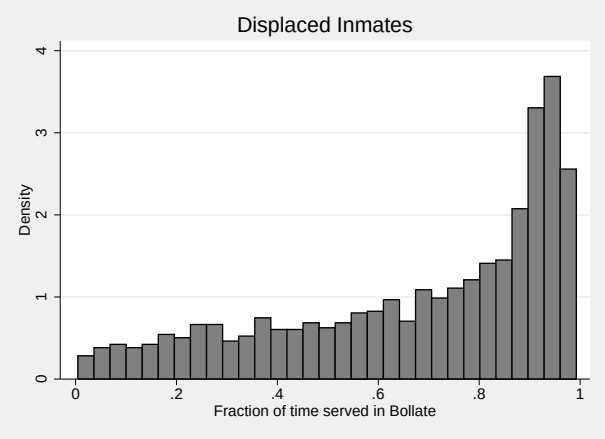

Figure 1: Histogram of the Fraction of Time Spent in the Bollate Prison

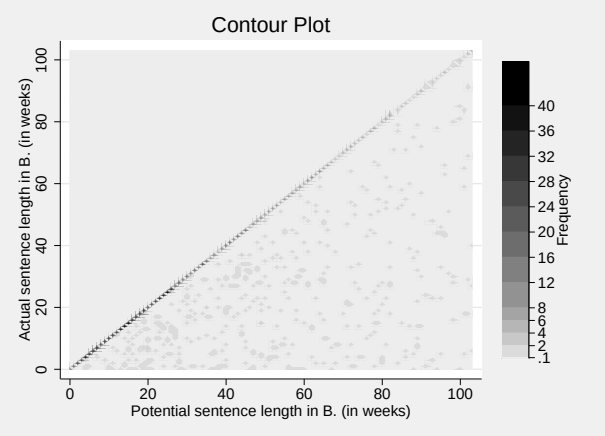

Figure 2: First Stage Relationship

Notes: Actual time in Bollate against potential time expressed in semesters to highlight the distribution (truncated at 100 weeks). For about 2/3 of inmates the two durations coincide.

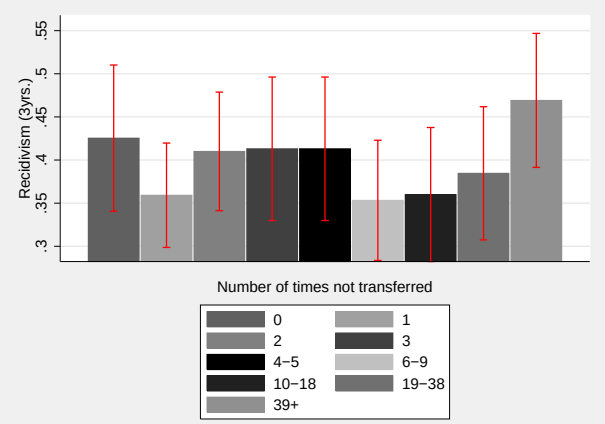

Figure 3: Revealed Choice Measure for Displaced Inmates

Notes: Vertical lines indicate 95 percent confidence intervals.

Table 1: Recidivism and Treatment Intensity by Entry Reason

Admission prison	N	Fraction	Type	Open Hours	Establ.	Capacity	Inmates	Overcrowd.	Suicides	Self-inf. inj.	Hunger str.	Prison Work	Indep. Work
Milano San Vittore	1584	68.4%	Mainly closed c.	4	1879	1127	1596	42%	1.3%	9.6%	7.3%	17.5%	0.5%
Milano Opera	130	5.6%	Closed cells	4	1980	973	1246	28%	0.2%	0.8%	7.4%	28.3%	6.5%
Monza	114	4.9%	Closed cells	4	1992	741	775	5%	0.5%	5.9%	3.0%	22.7%	6.6%
Busto Arsizio	66	2.8%	Closed cells	4	1982	297	425	43%	0.0%	3.3%	5.4%	23.3%	0.0%
Como	65	2.8%	Closed cells	5.5	1980	606	546	-10%	0.7%	3.1%	3.8%	14.5%	1.8%
Bergamo	29	1.3%	Closed cells	4	1978	511	497	-3%	2.0%	13.9%	5.4%	12.7%	4.0%
Varese	13	0.6%	Closed cells	5	1886	99	135	36%	0.7%	4.4%	6.7%	12.6%	5.9%
Others	317	13.7%	Closed cells	by law min. 4h									
Milano Bollate	**-**	**-**	Open cells	10 or 12	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

	Recidivades (3 yrs.)	Released from Section 5	Potential Time in Bollate	Actual Time in Bollate	Total Time Served	Nobs.
Transferred to be treated	0.316	0.148	1.492	1.200	3.727	196
Applied to be treated	0.246	0.106	1.467	1.164	3.529	199
Transferred by the Justice Dep.	0.254	0.254	1.311	0.906	3.015	63
Other entry reasons	0.286	0.190	2.050	1.444	3.614	21
Total selected sample	0.278	0.146	1.482	1.157	3.546	479
Transferred due to overcrowding	0.397	0.024	0.853	0.685	1.441	1558
Entry cause unknown	0.416	0.046	2.240	0.793	4.045	281

Table 3: Summary Statistics and Randomization

	Whole sample, N=2,318				*Displaced sample, N=1,390*					
	Statistics		Coefficient on potential years served		Statistics		Coefficient on potential years served		Coefficient on potential years served	
Dependent vars.:	mean	sd	beta	se	mean	sd	beta	se	beta	se
Recidivist	0.37	0.48	-0.052***	(0.012)	0.40	0.49	-0.075***	(0.019)	-0.070**	(0.029)
Art. 4 BIS	0.12	0.32	-0.004	(0.010)	0.06	0.24	0.019	(0.018)	0.016	(0.022)
Age	38.12	10.81	0.422	(0.281)	37.53	10.64	0.702	(0.523)	1.117	(0.695)
Drug addiction	0.28	0.45	0.014	(0.014)	0.29	0.45	0.032	(0.022)	0.037**	(0.018)
Total number of incarcerations	3.34	2.73	-0.072	(0.065)	3.47	2.77	-0.037	(0.132)	0.014	(0.194)
In a relationship	0.29	0.45	0.003	(0.011)	0.26	0.44	0.007	(0.023)	-0.011	(0.031)
Separated or divorced	0.09	0.29	0.011	(0.007)	0.09	0.29	0.021	(0.014)	0.030	(0.020)
College degree	0.07	0.25	0.007	(0.006)	0.05	0.22	0.005	(0.010)	-0.004	(0.015)
Secondary schooling	0.52	0.50	0.038***	(0.011)	0.51	0.50	0.013	(0.025)	-0.014	(0.033)
Primary schooling	0.19	0.39	-0.014	(0.013)	0.17	0.38	-0.017	(0.022)	-0.021	(0.028)
Unknown education	0.00	0.02	-0.000	(0.000)	0.00	0.03	-0.000	(0.000)	-0.000	(0.000)
Employed	0.11	0.32	0.000	(0.010)	0.06	0.24	-0.053***	(0.015)	-0.039**	(0.017)
Unemployed	0.08	0.28	-0.010	(0.008)	0.06	0.24	-0.006	(0.014)	-0.003	(0.014)
Employment unknown	0.79	0.41	0.009	(0.013)	0.86	0.35	0.065***	(0.022)	0.043**	(0.020)
Homicide	0.03	0.18	-0.023***	(0.007)	0.01	0.10	-0.025*	(0.013)	-0.020	(0.018)
Assault	0.15	0.36	0.016	(0.010)	0.12	0.33	0.012	(0.020)	-0.008	(0.026)
Sex-related crime	0.01	0.11	0.005	(0.004)	0.00	0.03	-0.002	(0.002)	-0.001	(0.001)
Theft	0.30	0.46	-0.006	(0.012)	0.33	0.47	-0.013	(0.025)	0.024	(0.031)
Robbery	0.24	0.43	0.013	(0.012)	0.19	0.39	0.003	(0.024)	-0.026	(0.030)
Extortion	0.05	0.22	0.007	(0.008)	0.03	0.17	0.008	(0.011)	0.017	(0.014)
Possession of stolen goods	0.21	0.41	0.047***	(0.012)	0.14	0.35	0.040*	(0.022)	0.040	(0.030)
Drug-related crime	0.29	0.45	0.056***	(0.014)	0.22	0.42	0.033	(0.026)	0.001	(0.030)
Other crime	0.17	0.38	-0.026***	(0.007)	0.22	0.41	-0.022	(0.015)	-0.019	(0.023)

Notes: The "Statistics" columns show the mean and the standard deviation of the variables listed across the different rows. Each of these variables is used as a dependent variable in regressions where the right-hand-side variables are the potential years spent in Bollate (shown in the Table) and the total time served. The last set of randomization tests (the last two columns) control for weeks of entry times prison of origin fixed effects.

Table 4: Recidivism and Treatment Intensity

	(1)	(2)	(3)	(4)
	Recidivates (0/1)			
	Reduced Form		Instrumental Var.	
Potential years served in Bollate	-0.052***	-0.056***		
	(0.012)	(0.012)		
Actual years served in Bollate			-0.102***	-0.095***
			(0.023)	(0.020)
Total time served	0.006	0.024***	0.008	0.025***
	(0.005)	(0.007)	(0.006)	(0.007)
Transferred to be treated		-0.074		0.009
		(0.050)		(0.050)
Applied to be treated		-0.112**		-0.033
		(0.048)		(0.047)
Transferred due to overcrowding		-0.069*		-0.001
		(0.038)		(0.039)
Transferred by the Justice Dep.		-0.211***		-0.145**
		(0.065)		(0.066)
Art. 4 BIS		0.052		0.065
		(0.044)		(0.043)
Drug addiction		0.081***		0.094***
		(0.027)		(0.026)
Total number of incarcerations		0.047***		0.048***
		(0.004)		(0.004)
Other Xs	No	Yes	No	Yes
First stage F-stat			222.0	313.5
Observations	2,318	2,318	2,318	2,318
R-squared	0.011	0.229	-	-

Notes: Potential years served in Bollate and total years served are expressed as days over 365. The other Xs are four educational dummies, three previous employment dummies, 9 crime dummies, 37 age dummies, prison of origin and year times quarter of exit dummies. Clustered standard errors (by prison section and week of release) in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 5: Recidivism and Treatment Intensity by Type of Entry

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Recidivates (0/1)							
	Reduced Form				Instrumental Variables			
	Selected	Displaced			Selected	Displaced		
Potential years served in Bollate	-0.035	-0.068***	-0.060**	-0.077***				
	(0.025)	(0.018)	(0.024)	(0.029)				
Actual years served in Bollate					-0.054**	-0.109***	-0.097***	-0.125***
					(0.027)	(0.029)	(0.034)	(0.043)
Total time served	0.018*	0.033***	0.021	0.033*	0.018**	0.037***	0.024*	0.036*
	(0.010)	(0.012)	(0.015)	(0.020)	(0.008)	(0.013)	(0.014)	(0.019)
Art. 4 BIS	0.096	-0.003	-0.016	0.001	0.095	-0.007	-0.019	-0.003
	(0.070)	(0.050)	(0.065)	(0.069)	(0.059)	(0.050)	(0.055)	(0.059)
Drug addiction	-0.058	0.146***	0.147***	0.149***	-0.060	0.153***	0.157***	0.162***
	(0.060)	(0.035)	(0.043)	(0.043)	(0.050)	(0.034)	(0.037)	(0.038)
Total number of incarcerations	0.041***	0.050***	0.051***	0.051***	0.039***	0.051***	0.051***	0.051***
	(0.011)	(0.005)	(0.006)	(0.006)	(0.010)	(0.005)	(0.005)	(0.005)
Unemployment rate in Northern Italy			-0.085	-0.082			-0.107*	-0.108*
			(0.074)	(0.074)			(0.064)	(0.065)
Youth unemployment rate			0.030	0.028			0.026	0.023
			(0.019)	(0.020)			(0.017)	(0.017)
Number of times not selected				-0.001				-0.001
				(0.001)				(0.001)
OtherXs and prison FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week or release by prison FE			Yes	Yes			Yes	Yes
First stage F-stat					187.5	187.2	144.3	112.4
Observations	479	1558	1558	1507	479	1558	1558	1507
R-squared	0.418	0.241	0.411	0.408	0.424	0.223	0.401	0.394

Notes: The additional Xs are all those included in Column 2 of Table 4. Clustered standard errors (by prison section and week of release) in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 6: Robustness Regressions

Robustness regressions:	Sample:	Potential time in Bollate		Actual time served in Bollate		Obs.	Mean dep. variable
Inmates without ongoing trials	all	-0.059***	(0.012)	-0.096***	(0.020)	2035	0.356
	displaced	-0.073***	(0.018)	-0.112***	(0.028)	1393	0.380
Inmates without drug addictions	all	-0.052***	(0.014)	-0.094***	(0.024)	1666	0.346
	displaced	-0.066***	(0.020)	-0.108***	(0.031)	1092	0.354
Inmates released after 2006	all	-0.051***	(0.015)	-0.086***	(0.024)	1146	0.362
	displaced	-0.089***	(0.026)	-0.153***	(0.044)	696	0.408
Two-year recidivism	all	-0.037***	(0.012)	-0.064***	(0.020)	2318	0.322
	displaced	-0.046***	(0.017)	-0.074***	(0.026)	1558	0.340
Probit	all	-0.210***	(0.043)	-0.352***	(0.069)	2268	0.374
	displaced	-0.243***	(0.061)	-0.407***	(0.100)	1546	0.397
With in addition a demeaned squared terms of time (Total and Bollate)	all	-0.073***	(0.018)	-0.100***	(0.031)	2318	0.374
	displaced	-0.052*	(0.028)	-0.066	(0.043)	1558	0.397

Notes: All regressions control for the additional Xs used in Column 2 of Table 4. The probit results are estimated by maximum likelihood. The corresponding marginal effects at the average for the reduced form regressions are -0.0670 and -0.0742, while for the 2SLS they are -0.108, and -0.125. The coefficients on the squared terms 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 prison section and week of release) in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Heterogeneity of the Effects

	Heterogeneity split:		Sample:	Potential time in Bollate		Actual time served in Bollate		Obs.	Mean dep. variable
(1)	Committed economically motivated crimes	Yes	all	-0.057***	(0.013)	-0.098***	(0.023)	1872	0.395
(2)			displaced	-0.080***	(0.020)	-0.132***	(0.034)	1236	0.419
(3)		No	all	-0.036	(0.039)	-0.052	(0.049)	446	0.287
(4)			displaced	-0.013	(0.052)	-0.016	(0.055)	322	0.311
(5)	In prison for their first time	Yes	all	-0.072***	(0.022)	-0.131***	(0.036)	609	0.230
(6)			displaced	-0.112***	(0.037)	-0.174***	(0.051)	402	0.264
(7)		No	all	-0.057***	(0.016)	-0.095***	(0.025)	1709	0.426
(8)			displaced	-0.066***	(0.024)	-0.106***	(0.039)	1156	0.443
(9)	In a relationship at the time of arrest	Yes	all	-0.048*	(0.025)	-0.092**	(0.043)	663	0.320
(10)			displaced	-0.105**	(0.046)	-0.201**	(0.082)	408	0.343
(11)		No	all	-0.064***	(0.015)	-0.109***	(0.024)	1655	0.396
(12)			displaced	-0.065***	(0.021)	-0.099***	(0.033)	1150	0.416
(13)	Secondary education and above at the time of arrest	Yes	all	-0.037**	(0.016)	-0.066**	(0.027)	1364	0.365
(14)			displaced	-0.031	(0.024)	-0.048	(0.035)	876	0.398
(15)		No	all	-0.096***	(0.021)	-0.161***	(0.038)	954	0.388
(16)			displaced	-0.123***	(0.029)	-0.209***	(0.053)	682	0.394
(17)	Subject to ART. 4 BIS (no alternative sanctions)	Yes	all	-0.090**	(0.039)	-0.131***	(0.044)	271	0.373
(18)			displaced	-0.081	(0.085)	-0.133*	(0.078)	112	0.402
(19)		No	all	-0.052***	(0.014)	-0.090***	(0.023)	2047	0.375
(20)			displaced	-0.066***	(0.020)	-0.103***	(0.030)	1446	0.396

Notes: All regressions control for the additional Xs used in Column 2 of Table 4. Clustered standard errors (by prison section and week of release) in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Heterogeneity of the Effects by Prison of Origin

	(1)	(2)	(3)	(4)
	Recidivates (0/1)			
Potential years served in Bollate (PYB)	-0.066***	-0.079***		
	(0.017)	(0.020)		
PYB × Not transferred from San Vittore	0.023	0.053		
	(0.023)	(0.042)		
Actual years served in Bollate (AYB)			-0.130***	-0.132***
			(0.034)	(0.034)
AYB × Not transferred from San Vittore			0.070	0.097
			(0.045)	(0.062)
Total years served (TYS)	0.033***	0.033**	0.037***	0.038***
	(0.010)	(0.013)	(0.011)	(0.015)
TYS × Not transferred from San Vittore	-0.015	-0.004	-0.021*	-0.010
	(0.011)	(0.020)	(0.012)	(0.022)
Not transferred from San Vittore	-0.024	-0.057	-0.034	-0.066
	(0.042)	(0.062)	(0.044)	(0.060)
Observations	2,318	1,558	2,318	1,558
R-squared	0.202	0.225	0.186	0.205
First stage F-stat			68.91	66.32

Notes: All regressions control for the additional Xs used in Column 2 of Table 4. Clustered standard errors (by prison section and week of release) in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Mechanism: Evidence of Treatment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Transferred to Section 5 (×100)				Fraction of Days Spent Working Outside (×100)			
Sample	Selected	Displaced	Selected	Displaced	Selected	Displaced	Selected	Displaced
	Reduced Form		2SLS		Reduced Form		2SLS	
Potential years served in Bollate	8.090***	2.061			1.428*	0.209*		
	(1.990)	(2.478)			(0.800)	(0.114)		
Actual years served in Bollate			17.931***	7.580			3.519*	0.425*
			(3.945)	(8.214)			(1.895)	(0.230)
Total years served	1.967**	1.187	1.721**	0.609	-0.400	0.097	-0.435	0.074
	(0.929)	(1.826)	(0.789)	(2.244)	(0.450)	(0.074)	(0.437)	(0.081)
Observations	595	661	595	661	1307	1914	1307	1914
Mean dep. var.	26.89	7.867	26.89	7.867	1.440	0.242	1.440	0.242
R-squared	0.370	0.208	0.389	0.265	0.227	0.143	0.204	0.104
First stage F-stat			62.91	22.38			95.48	164.5

Notes: All regressions control for the additional regressors used in Column 2 of Table 4, including the prison of origin, and year times quarter fixed effects. Clustered standard errors (by prison section and week of release) in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Mechanism: Peers or Treatment?

	(1)	(2)	(3)	(4)	(5)	(6)
	Recidivates (0/1)					
Sample:	*Full*	*Displaced*	*Full*	*Displaced*	*Full*	*Displaced*
Peers measured using the:	*Whole prison*		*Section*		*Individual cell*	
Potential time served in Bollate	-0.068***	-0.076***	-0.062***	-0.072***	-0.061***	-0.075***
	(0.014)	(0.022)	(0.014)	(0.023)	(0.014)	(0.023)
Fraction of displaced peers	-0.038	-0.191	0.019	-0.106	-0.022	-0.114*
	(0.147)	(0.225)	(0.066)	(0.086)	(0.048)	(0.060)
Potential time served in Bollate	-0.057	0.000	-0.026	0.034	0.002	0.027
× Fraction of displaced peers	(0.055)	(0.087)	(0.046)	(0.060)	(0.031)	(0.052)
Total time served	0.024***	0.017	0.024***	0.018	0.023***	0.015
	(0.007)	(0.012)	(0.007)	(0.012)	(0.008)	(0.012)
OtherXs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,318	1,390	2,318	1,390	2,124	1,305
R-squared	0.230	0.237	0.229	0.238	0.235	0.245

Notes: All regressions control for the additional regressors used in Column 2 of Table 4, including the prison of origin, and year times quarter fixed effects. The squared terms are evaluated net of the mean. Clustered standard errors (by prison section and week of release) in parentheses: *** p<0.01, ** p<0.05, * p<0.1

A Photographic Evidence

Figure 4: Pictures taken in San Vittore

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

Figure 5: 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 6: 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 7: 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.