Building Criminal Networks in Prison

Evidence from French cellmates.

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PRELIMINARY VERSION, PLEASE DO NOT CIRCULATE

Abstract

This paper examines the impact of prison connections on re-incarceration, using comprehensive data on prisoners' cell assignments in France from 2016 to 2022. It documents that having one additional cellmate with a drug-related conviction increases re-incarceration for drug crimes (+7.2% in the year after release) while encountering an extra cellmate with property crime convictions raises the probability of property crimes (+5.6%). The number of other cellmates has no effect, and other types of recidivism remain unaffected. Peers encountered in prison also affect where infractions eventually occur. Lastly, the influence of cellmates is more pronounced when they share similar characteristics.

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1 Introduction

Since prison became a proper sentence at the end of the 18th century, policymakers have feared that the expected virtues of work, training, and introspection were counterbalanced by socialisation in a criminal environment, transforming prisons into what is commonly referred to as schools of crime (Foucault (1975)). For this reason, contact among prisoners was avoided, and some penitentiary systems imposed strict silence rules[1]. However, those rules were gradually abandoned because of their adverse effects on prisoners and practical difficulties (Smith (2006)) and, nowadays, millions of inmates share small cells over extensive periods. The way and the extent to which this forced and highly intrusive cohabitation affects individuals and leads to the formation of strong criminal connections remains largely unknown.

This paper explores the effects of cellmates on re-incarceration after prison. It utilises administrative data that provides information on the specific cell number in which inmates were incarcerated at any given time between June 2016 and December 2022, together with prisons' registers, identifying inmates with unique IDs and offering detailed information about their convicted crimes (across approximately 2,000 categories), sociodemographic characteristics, and psychological evaluations. Those data are used to construct an individual-level dataset that documents inmates' characteristics upon entry, their experiences in prison, and their re-incarceration rates. Specifically, it records the number of cellmates with different traits: their crime types – property crimes, drug crimes, violence, or other crimes – or their region of residence before incarceration, as well as potential re-incarceration for these types of crimes or in these geographical areas. The final dataset comprises over 190,000 inmates incarcerated for two years or less between June 2016 and December 2019.

I first show that the numbers of cellmates of different types are not correlated with observables. This is consistent with the context of high pressure and the absence of control over the flows in which the penitentiary administration operates. In such a context, optimising the allocation — and then determining the *time* an inmate spends with cellmates of different types — is already difficult, but optimising the number of movements — and then determining the *number* of cellmates of different types encountered in prison — might be impossible.

Then, I document that, after controlling for individuals' characteristics upon entry, having an additional cellmate convicted for a drug crime is associated with a 7% higher probability of being re-incarcerated for a drug crime. The number of other cellmates does not significantly affect this behaviour. Similarly, having an additional cellmate convicted for a property crime is associated with a 3.5% increase in the likelihood of being re-incarcerated for a property crime. In contrast, other cellmates do not have a substantial impact. More-

[1]Silence is still imposed in Japan. In France, interdiction to talk was removed in the 70s Carlier (2009).

over, the probabilities of re-incarceration for violent crimes or other crimes are, at best, marginally affected by individuals encountered in cells.

I test the validity of those results by imposing restrictions on identifying variations. Controlling for the total number of cellmates – which could vary with unobservables like impulsivity – and the time spent with offenders of various types – which could be manipulated by the penitentiary administration – does not affect the results. Moreover, using an instrumental variable approach where the numbers of cellmates are instrumented with the number of cellmates' transfers for independent reasons (health, activities, etc.) led to similar results.

Cellmates do not only affect reincarceration for different types of crime but also the place where infractions are committed. Distinguishing among 12 administrative regions in metropolitan France, I show that the probability of being reincarcerated in a region significantly correlates with the number of cellmates from this area but not the number of other cellmates. Once again, geographical displacement is driven by property crimes and drug-related crimes.

The effects vary depending on the joint characteristics of the offenders sharing a cell. Notably, encountering an additional cellmate with a drug crime conviction from the same city massively increases the probability of committing a drug crime after release. Similarly, the effect is significantly more pronounced when offenders have similar nationalities or ages. Interestingly, offenders convicted of a drug crime do not react more strongly to the number of cellmates with drug crime convictions.

The fact that effects are larger when inmates share similar characteristics poses a problem of contradictory incentives. Indeed, I document that cellmates sharing similar characteristics are less likely to enter into conflict. Then, reducing re-incarceration may come at the cost of higher incidents in prison.

This research contributes to the literature on peer effects in prison. Pioneering work by Bayer et al. (2009) examines the impact of exposure to various types of crime at the prison level in Floridian's juvenile facilities. The authors identify a reinforcement effect, offenders being more likely to commit a specific type of crime if they had been more exposed to it and had engaged in similar behaviour in the past. Damm and Gorinas (2020) and Ouss (2011) observe comparable dynamics among young adults in Denmark and adults in France, respectively. Lastly, Stevenson (2017) uses juveniles incarcerated in Florida to document the importance of peers' backgrounds and attitudes. She finds evidence of social contagion, whereby individuals exposed to fellow inmates from unstable home environments were more prone to committing crimes following their release from prison.

Compared to the literature, this research uses interactions within cells to focus on the *numbers* of cellmates of various types rather than on *exposure* to different crimes. It permits the exploration of the effects of networks beyond the skill transfers or inspiration. It also overcomes the problem faced by literature on exposure at the prison level, where

being more exposed to crime A is mechanically associated with being less exposed to crime B. Moreover, the precision and unprecedentedly large volume of the data gives sufficient statistical power to investigate the heterogeneity of the effects.

More broadly, this paper contributes to the existing literature on peer effects on criminal behaviour — at the familial (Hjalmarsson and Lindquist (2012), Bhuller et al. (2018), Dobbie et al. (2018), Lochner (2007)), neighbourhood (Billings et al. (2019); Billings and Schnepel (2022)), or class (Billings and Hoekstra (2023)) levels — and to the study of the effect of prison conditions on crime (Chen and Shapiro (2007), Drago et al. (2011), Mastrobuoni and Terlizzese (2022), Tobón (2022)).

2 Context and data

2.1 French prisons

Context. With around 70,000 prisoners[2], France has an incarceration rate of 102 per 100,000 inhabitants, close to the EU average. 30% of them are in pre-trial detention. Inmates are distributed among 185 prisons. Three main types of establishments could be distinguished. Short-term facilities ("Maison d'arrêts") accommodate 68% of the prison population: all pre-trial inmates and prisoners serving less than two years (in theory). They are massively overcrowded, with an average occupation rate close to 140%. Around 32% of their cells accommodate one inmate, 52% two, 12% three, 2% four, and less than 2% five or more. Prisoners can access some activities and receive visits from families and friends up to three times a week. The rest of the time, between 18 and 22 hours a day, individuals are in their cells with doors locked. Prisoners serving longer sentences are incarcerated in "Centre de détention" or "Maison centrales" (26% and 2.5% of the population, respectively). They differ in their regimes — more liberal in the former, with open doors in the daytime — and populations — with inmates serving very long sentences in the latter.

Movements and cell allocation. The first type of movement comes from inmates entering or leaving prisons. Independent magistrates determine those flows. The penitentiary administration could not affect or delay them. Other movements are internal, from one cell to another. A large share of them is justified by the changes in inmates' *type* of the cell. Prisoners start in an "arrival" cell, where they spend around a week before moving to a "normal" one. After this initial movement, they could be transferred to "worker" cells, different types of medical cells, disciplinary cells, or cells associated with specific programs. Those movements are decided by a pluri-disciplinary commission (for work, health, or specific programs) or the disciplinary commission (disciplinary cell). They represent around 70% of the movements documented in the database (see below). Inmates could be transferred if there are tensions (12%) or conflicts (5%) in the cell or for prison management

[2]Reference number are for January 2019.

(13%).

Prison directors determine inmates' allocations in cells. By law, male and female, minor and major, remand and sentenced prisoners should be separated. On top of those official criteria, sociologists (Veaudor (2020)) document other criteria commonly used: age, religiosity, tobacco consumption, and origin. Interestingly, crime type is not identified as a relevant criterion.

2.2 Prison data

Data construction. Data has been provided by the French penitentiary administration. The raw data indicates the exact cell number where every inmate was incarcerated at any moment of their incarceration spell between June 2016 and December 2022. The reason for the transfer from one cell to another – prison management, fights in the cell, demand from the inmate, movement to get closer to work or activities, infrastructure problem – and the "type" of the cell – standard, arrival, medical, disciplinary, work – are indicated. Individuals are identified using a single ID, allowing for their re-incarceration to be calculated. In addition to the localisation of the individuals, the data contains inmates' socio-demographic information – age, sex, nationality, city of residence – the crime they have been convicted for – using a precise classification containing more than 1,500 entries – and the psychological evaluation realised at entry[3].

This information is aggregated to obtain a dataset containing one observation per individual. For each person, I measure the number of cellmates of different types and the aggregated time spent with individuals of those types. The main dimensions are the nature of the crime individuals have been convicted of, distinguishing among property crime, drug-related crime, violence, or other crimes, and the place where they lived before entering prison, distinguishing among 12 administrative regions.

The main outcome used in the paper is re-incarceration after one year for different crimes or in different places. To avoid right truncation and keep a homogenous dataset over time, the sample is restricted to offenders incarcerated between June 2016 and December 2019 for prison spells inferior to or equal to 2 years. Then, all offenders are released before December 2021 and could be followed for a year after release.

Descriptive statistics. After cleaning the data and removing offenders for whom one of the main variables is missing (prison or crime type), the final dataset contains 191,000 offenders. On average, inmates spent 212 days in prison, including 160 days sharing their cell with at least one other person. 30% of them were convicted for property crimes, 21% for drug-related crimes, and 25% for violent crimes. They had 8.23 cellmates: 2.47 convicted for a property crime, 1.7 for a drug crime, and 2.2 for a violent crime. Offenders were, on

[3]I use 13 variables from this evaluation. They document prior suicidal attempts, auto-mutilation, hospitalisation, aggressivity, depression, and addiction

average, 32 when they were incarcerated. They are mostly male (95%) and French, even if foreigners are over-represented (25% in the sample vs 7.7% in the general population). They concentrate several social problems with 29% of them being illiterate, 58% suffering from an addiction, and 19% having a psychiatric history. One year after their release, 18% of the sample had been re-incarcerated: 6% for a property crime, 3% for a drug-related crime, and 5% for a violent crime [4].

3 Identification

3.1 Hypotheses and baseline specification

This paper aims to measure the effect of criminal connections made in prison, focusing on contact in cells, on recidivism. The main hypothesis is that individuals who meet more cellmates will be more likely to commit a new crime. However, this effect is unlikely to be homogeneous. It is expected to vary along two dimensions: type and place. More precisely, I want to test the following hypothesis:

(i). **Crime type effect**: The likelihood of committing a crime of type c after prison is mostly affected by the number of cellmates convicted for crime type c encountered in prison. For example, the probability of recidivism with a drug crime is affected by the number of drug dealers met in prison and not (or less) by the number of property criminals.

(ii). **Differences among crime types**: The effect of cellmates convicted for crime of type c on recidivism for crime c is more important for crimes requiring a network, like drug crime, or skills, like property crime.

(iii). **Geographical effect**: The likelihood of committing a crime in place r after prison is mainly affected by the number of cellmates living in place r (before their incarceration) encountered in prison.

(iv). **Closeness effect**: Inmates are more likely to influence each other if they share common characteristics like origins, age, or place of living.

As mentioned, I will distinguish four crime types (property, drug, violence, other) and twelve regions. To simplify the exposition, the rest of this Section will present the strategy for measuring the crime-type effect. Specific problems arising when measuring the geographical effect will be presented in Section (5). The baseline models used to explore the first two assumptions are as follows:

$$ReInc^{c}_{i,p,t} = \alpha_0 + \sum_{m=1}^{g} \alpha_m NbPeer^{m}_{i,p,t} + X_i\beta + \gamma_p + \delta_t + \varepsilon_{ipt} \quad (1)$$

[4]The descriptive statistics of this population could be found in Table A.1.

where $ReInc^{c}_{i,p,t}$ is a dummy equal to one if individual i incarcerated in prison p at time t commits a new crime of type c — among g different categories — in the year following his release. $NbPeer^{m}_{i,p,t}$ is the number of cellmates of type m individual i met during his prison spell. $X_{i,p,t}$ is a set of control variables. γ_p and δ_t are prison and month-of-incarceration fixed effects.

Following hypothesis 1, I expect $\alpha_{m=c}$ to be significantly larger than $\alpha_{m\neq c}$ for any crime c. I also expect the latter to be close to zero. Following assumption 2, I expect $\alpha_{m=c}$ to be bigger when c stands for property crime or drug crime. In order to make this comparison, and as all crime types are not equally likely, I'll present coefficients divided by the mean of the outcome.

Controls always include three key groups of variables. First, regressions control for incarceration length fixed effects (720 dummies). This is important as the time served is mechanically correlated with the number of cellmates and with the original sentence, partly determined by recidivism risks. Second, I include crime fixed effects based on the detailed classification of the Ministry of Justice, which contains around 1,500 different codes. Including those fixed effects overcomes problems of sorting in cells based on crime. For example, if the penitentiary administration tends to avoid (or prefer) putting drug dealers together and if drug dealers mainly commit drug crimes after release, we would observe a negative (resp. positive) correlation between the number of cellmates convicted for drugs and the probability to commit this crime after release. To avoid that bias, I measure the effect of cellmates of type c on re-incarceration for crime c *conditional on the original crime*. Third, I control for gender, age fixed effects, and penal category (convict vs pre-trial incarceration). Indeed, as mentioned in section 1, those groups are supposed to be separated in prison. Except otherwise specified controls also include nationality fixed effects (170 codes), literacy, mental health status (13 variables), qualification, procedural variables (accelerated procedure), and past incarceration (overall, before 18).

3.2 Sources of variations and additional specifications

Equation 1 captures the correlation between the numbers of cellmates of different types and re-incarceration. The results may be biased if an unobserved characteristic z is correlated with both the number of cellmates of type c and the probability of committing a crime of type c. Note that this variable z could not be the type of crime as I extensively control for that in all regression.

Source of variations. To alleviate this concern, I measure the evolution of the effects when exploiting different sources of variations. In the baseline setting, variations in the number of cellmates of type c come from two sources. First, offenders vary in their *total number* of cellmates. For example, two individuals spending their prison time with drug dealers may meet with 2 or 3 different persons. Second, offenders vary in the *type* of

cellmates they encounter in prison. For example, two inmates meeting with two persons in prison may encounter two drug dealers or two property criminals.

Those dimensions do not vary at random. First, inmates could affect the number of times they change cells through their behaviour and their demands for activities or jobs. Second, and more importantly, the penitentiary administration tries to optimize cell allocation and could determine the characteristics of the individual(s) one shares time with.

It is possible to control for those two sources of variation. First, Equation (1) could be modified to flexibly control for the total number of cellmates. In this case, regressions will capture the *relative effect* of the number of cellmates of type c in comparison to a reference category (see top right panel of Figure A.1. Second, Equation 1 could be modified to control for the time spent with various types of peers. In this case, regressions will capture an effect at the *intensive margin*. Indeed, individuals who spend x days with offenders of type c could have met two, three, four... different cellmates but not zero (bottom left of Figure A.1).

Lastly, it is possible to control for both the total number of cellmates and the time spent with different types of cellmates (bottom right of Figure A.1). This most stringent specification relies, for example, on the comparison of two offenders, A and B, who both had three different cellmates and both spent 100 days with drug dealer(s) and 100 days with property criminal(s) but A meeting with two drug dealers and one robber while B meeting with one drug dealer and two robbers. In this case, the identification assumption is that the penitentiary administration does not dynamically optimize inmates' encounters in prison. This is likely the case in a context of high overcrowding, where flows are unknown and movements largely determined by prisoners' demands treated by pluri-disciplinary commissions and external circumstances.

Formally, those different strategies could be estimated with models of the form:

$$\begin{aligned} ReInc^{c}_{i,p,t} &= \alpha_0 + \sum_{m=1}^{g-1} \alpha_m NbPeer^{m}_{i,p,t} + X_i\beta + \gamma_p + \delta_t \\ &+ \underbrace{\nu_{NbCellmate}}_{(a)} + \underbrace{\sum_{n=1}^{g} \mu_n Time^{n}_{i,p,t}}_{(b)} + \varepsilon_{ipt} \end{aligned} \tag{2}$$

where $\nu_{NbCellmate}$ is a set of fixed effects for the number of cellmates and $\sum_{n=1}^{g} Time^{n}_{i,p,t}$ is a set of control for the time spent with cellmates of type n. Introducing the fixed effects indicated in (a) silence variations based on the total number of cellmates. Introducing the variables indicated in (b) silence variations based on the time spent with different types of peers.

Instrumental variable. In a robustness check, I adopt another approach based on cellmates' movements. In practice, the total number of peers varies with the time one spends in cells of various sizes, with the number of transfers to another cell, and with the number of times a cellmate is transferred. While the first two sources of variations may depend on an offender's own characteristics, the third one primarily depends on peers' characteristics and the date of their movements. Then, for each inmate, I measured the number of times one cellmate was transferred while they were sharing a cell, excluding movements justified by conflicts or demands, and used this variable to instrument $NbPeer^{m}_{i,p,t}$ in Equation 1. I run one regression per $m \in [1; g]$ and control for the other source of variations in the total number of peers by including fixed effects for the number of own movements and control for the time spent in a cell with 0, 1, 2, 3, or 4 persons or more.

4 Crime type effects

4.1 Main results

The effect of the number of peers of various types on reincarceration for various crimes is presented in Figure 1. It is divided into four panels, giving the results for four outcomes: reincarceration after one year for property crimes, drug crimes, violence, or other crimes. In each panel, I report the coefficients of the four variables of interest: the number of cellmates convicted for property crimes, drug crimes, violence, or other crimes. Different symbols and colours give coefficients from different specifications. In total, Figure (1) reports the results of 16 regressions (four specifications times four outcomes). Coefficients are presented in proportion of the mean to allow comparison of the magnitude from one outcome to another.

I start the analysis by comparing the correlation between the number of cellmates and *predicted* or *real* reincarceration following Equation 1 with a minimal number of controls [5]. Predictions are obtained by extracting the coefficients of regressions of the outcomes on all the observables at entry in prison: detailed description of the crime committed, socio-demographic characteristics, and the psychological evaluation at entry (see section 2.2). In practice, measuring the correlation between the number of cellmates and the predicted re-incarceration is similar to presenting balancing checks. It allows us to test if individuals more likely to recidivate for a certain type of crime are more likely to spend time with certain types of peers in prison. Results are presented with circles — red for the predicted reincarcerations, black for real ones — in Figure 1.

The correlations between the *predicted* probabilities of re-incarceration and the number of cellmates of various types are mostly small and non-significant. The only observable pattern is that reincarceration is correlated with the number of violent cellmates. However, this is true for all kinds of recidivism, and the effects are small in magnitude (at max 1.7% of the mean).

[5] I control for the time spent in prison, age, an aggregate measure of crime type, and prison fixed effects

On the contrary, *real* reincarceration is correlated with the number of cellmates . The probability of committing a property crime, a drug crime, or, to a lesser extent, a violent crime is correlated with the number of cellmates convicted for those crimes and not with the number of other cellmates. In particular, meeting with an additional cellmate convicted for a drug crime is associated with a 7.3% (0.22 pp) increase in the probability of being reincarcerated for that crime. Moreover, the numbers of other types of cellmates do not matter, and peers convicted for drug crimes do not affect another form of recidivism.

Results remain similar when models include the full set of controls for characteristics observed at entry (empty triangles): detailed description of the crime, socio-demographic variables, and psychological evaluation. More importantly, the effects are also similar when regressions follow Equation 2 and include fixed effects for the total number of cellmates and controls for the time spent with different types of peers (black triangles). In this last set of models, coefficients capture relative effects, and the number of "other" cellmates is taken as the reference group with coefficients set at zero.

Adding controls confirms the pattern observed when models only included a limited set of controls. Contrasts are reinforced. In the most restrictive specification, having one additional peer convicted for drugs is associated with an 8.3% (0.25 pp) increase in reincarceration for drugs one year after release. Similarly, an additional thief increases the probability of being reincarcerated for a property crime by 5.2% (.31pp). Interestingly, the correlation between the number of cellmates convicted for violence and the probability of being reincarcerated for that crime disappears with controls. The correlations between re-incarceration for other crimes and different types of cellmates remain small and non-significant.

Results presented in Figure 1 are consistent with hypotheses (i) and (ii) discussed above. A natural interpretation of the findings is that increasing criminal connections fosters criminal opportunities in areas where those connections are relevant: drug crimes benefit from having connections with drug-related criminals; property crimes benefit from having connections with property criminals; other connections are irrelevant. It is important to note that if meeting with more cellmates of a type also improves skills and decreases the probability of being arrested for a crime conditional on committing it, the estimates presented above represent lower bounds of the effects. An alternative interpretation of the results is that individuals who meet more criminals convicted for drugs or property crimes become more likely to be denounced if they commit those crimes. While this interpretation seems unlikely and hardly compatible with the entire set of results presented below, it could not be fully ruled out.

4.2 Additional results and robustness checks

Individual vs. in-group crimes Meeting with more cellmates might increase someone's criminal network but also improve criminal skills. To explore those potential mechanisms, I

use a subsample matching prison data with court data.[6]. In the latter, some crimes could be clearly identified as in-group crimes.[7] Then, I could distinguish between reincarcerations for in-group crimes and reincarcerations for other undetermined crimes (i.e. committed in-group or alone). While expanding criminal networks should affect the former more, improving skills should affect both similarly.

Interestingly, the pattern differs for drug crimes and property crimes (see Appendix Figure B.2). Indeed, an additional cellmate convicted for drugs affects the probability of being reincarcerated for a drug crime *in group* more (+8.4% vs. +4.5% alone), while peers convicted for property crimes affect *in-group* and *other* crimes similarly. This is consistent with the idea that drug crimes primarily require a network, while property crimes may require some skills.

Intensive margin Every additional cellmate may not have the same importance. For example, the first contact may be more important to create "vocations" or teach basic skills. On the contrary, if the effect is purely driven by network formation, every single peer might have the same effect. I explore this dimension by measuring the effect of having one, two, three, or four or more cellmates of each type.

Results indicate that the effects of cellmates convicted for property or drug crimes are linear (see Appendix Figure B.1). Meeting with two, three, or four plus peers has almost twice, three times, and four times the effect of meeting with one peer. This is consistent with what was observed in Figure (1), where adding controls for the time spent with various types of peers – resulting in an effect captured at the extensive margin – did not change the results.

Robustness checks I test for the robustness of the results in several ways. First, I measure the effects using different models. Appendix Figure B.3 presents the results when using the IV strategy based on cellmates' movements, while Appendix Figure B.4 reproduces the results using Cox competitive duration models. Second, I measure the effect with different samples and time horizons (Appendix Figure B.7). Third, I distinguish more crime types, isolating road-related crimes (Appendix Figure B.8) or the main severe crimes (Appendix Figure B.9). In all those exercises, results remain similar to the main results. On the contrary, randomly replacing cellmates with other inmates displaced the same week in the same prison leads to small and mostly insignificant results (see Appendix Figure B.10 summarizing 500 permutations).

Lastly, I measure the effect of cellmates when the penitentiary administration's ability

[6]This matching is only possible for around 60% of the sample. Indeed, there is no common identifier in the two datasets, and, in practice, I can only match individuals who did some pre-trial detention or were incarcerated directly after their trial

[7]Cases when two (or more) individuals are convicted on the same day in the same court for the same crime committed at the same date

to control cell allocation is particularly limited. It is the case when the overcrowding rate is high (see Appendix Figure B.5) or at the beginning of spells when prison workers' knowledge of inmates is limited to the information collected at entry and available in the dataset (Appendix Figure B.6). In both exercises, the effects are similar to those presented in the main results.

5 Geographical Effects

Individuals encountered in prison may not only affect the probability of committing a certain type of crime after release but also the place where this crime might be committed. In general, research finds that criminals mostly commit crimes close to where they live (Kirchmaier et al. (2021)). However, connections with criminals from other places may decrease travel costs and increase criminal opportunities in those areas.

5.1 Regional Effect

To measure the effect of cellmates on crime localization, I follow the structure of the preceding section but distinguish among geographical areas — where cellmates used to live before entering prison or where reincarcerations occurred[8] — instead of focusing on crime types. The analysis is mostly conducted at the regional level. After excluding Corsica and overseas territories, physically disconnected from French mainland, we are left with 12 administrative regions[9]. In addition to those 12 areas, I distinguish inmates' *home* i.e. the département (administrative sub-unit of a region) where they used to live or the départements where they have been incarcerated (if different).[10] Then, I consider 13 types of cellmates: cellmates from *home* and *non-home* cellmates from regions 1 to 12. For example, for an inmate living and incarcerated in département A in region 1, I count the number of cellmates coming from département A, the number of cellmates coming from region 1 excluding those from département A, and the number of cellmates coming from region 2... 12. Models measure the correlation between those 13 types of cellmates and reincarceration in regions 1 to 12. As I want to measure displacement, the probability of being reincarcerated in a region r excludes reincarcerations at *home*.[11]

Results are presented in Figure 2. Each sub-graph presents the correlation between the numbers of *home* cellmates or *non-home* cellmates from regions 1 to 12 and the probability of being reincarcerated in the region indicated in the header.

[8]Individuals' place of living before prison is precisely recorded for 81% of the inmates. The places of crimes are not recorded. They are proxied by the place of incarceration.

[9]Numeroted 1 to 12: Auvergne-Rhône-Alpes, Bourgogne-Franche-Comté, Bretagne, Centre-Val de Loire, Grand Est, Hauts-de-France, Île-de-France, Normandie, Nouvelle-Aquitaine, Occitanie, Pays de la Loire, Provence-Alpes-Côte d'Azur

[10]70.8% of cellmates are from *home* département, and 78% of reincarcerations happen there.

[11]In Appendix Figure C.1, I adopt a more radical approach and simply drop inmates coming from or incarcerated in a region r when measuring the effect of cellmates on reincarceration in r

Inmates are more likely to commit a crime in a region when they meet with individuals from that area. For ten regressions out of 12, the probability of being reincarcerated in region r is positively and significantly correlated with the number of cellmates coming from r. In those ten cases, the coefficient of interest is larger and usually significantly different from other coefficients. The effects are sizable, with eight coefficients representing more than 50% of the means. However, it is important to notice that baseline probabilities are small, and coefficients are not precisely estimated. It is also worth mentioning that the effects are mostly captured at the extensive margin: after excluding cellmates from home, less than 4% of inmates met with more than one cellmate from regions 1-6 or 8-12 (region 7 being the Parisian area).

5.2 Crime type and mobility

I now combine the approaches of the preceding sections to study geographical effects and crime-type effects of cellmates simultaneously. A natural way of doing it would be to measure if the number of cellmates convicted of crime c and coming from region r is correlated with the probability of being reincarcerated for a crime c in the region r. However, inmates are rarely reincarcerated outside their home region, and further dividing the outcomes makes it hard to detect any dynamics. To overcome this problem, I restrict the analysis to height outcomes: reincarceration at *home* or *outside home* for a property crime, a drug crime, a violence, or another crime. Following this logic, I distinguish height types of cellmates coming from *home* or *non-home* départements and originally convicted for property crimes, drug crimes, violence, or other crimes encountered in prison.

The results of the height models are presented in Table 1. They reflect and summarize the main findings from the preceding sections. First, the probability of being reincarcerated for a property crime or a drug crime is affected by the number of cellmates having experience with those crimes. The numbers of peers convicted for other types of crime are mostly irrelevant. Moreover, cellmates do not affect violence and other crimes. These results align with what was described in section 4. Second, the probability of committing a property or drug crime in an area a – *home* or *non-home* – is mostly affected by cellmates from this area. This is visible by comparing coefficients in red and in orange. The formers capture the correlation between the number of cellmates convicted for crime c in area a and reincarceration for the same crime at the same place. The laters capture the correlation between the number of cellmates convicted for crime c committed *outside* a and the same outcome. For example, an additional peer convicted for a drug crime at *home* increases reincarceration in the place for the same crime by 6.1% but has no effect on reincarceration elsewhere (+1.4%, non-significant). On the contrary, an additional cellmate convicted for drugs and coming from outside *home* has no effect on re-incarceration for drugs at *home* (+1.2%, non-significant) but seems to increase the likelihood of recidivism for drugs outside (+6.4%, non-significant).

6 Proximity Among Cellmates

The preceding sections document the effect of characteristics related to the nature or localisation of future crimes.In this section I explore how cellmates' proximity could modulate those dynamics.

6.1 Heterogeneity of the Crime Type Effect

The effect of cellmates' past experience on future crime may vary with the characteristics of the individuals along three dimensions. Firstly, different inmates might be more or less prone to be affected by their cellmates. This type of heterogeneity is explored in Appendix D. Young offenders seem to be more affected by their cellmates, while inmates with children seem to be less. Secondly, cellmates might be more or less influential depending on their characteristics. This is explored in Appendix E. Interestingly, offenders later benefiting from an early release — and likely considered by judges as having a low probability of reoffending — do not have a "bad" influence. The same is true for cellmates with children. On the contrary, cellmates with preceding incarceration seem to exert a more negative influence.

More interestingly, the effects of cellmates might depend on the joint characteristics of the inmates, i.e., on the characteristics of the interaction. This dimension is critical as it could help determine which allocation of inmates in cells should be preferred or avoided. In practice, I explore four main dimensions: geographical distance before incarceration, age difference, past criminal experience, and closeness of national origins. I focus on the effect of cellmates on reincarceration for drugs, the most affected outcome (see Appendix F for other outcomes).

I begin by measuring the effect of distance among cellmates. Inmates living close by might be more likely to interact after release, and they might benefit more from local knowledge or criminal networks. To test this hypothesis, I use the recorded address before entering prison.[12]. Panel A of Figure 3 presents the effects of cellmates who used to live in the same city (in red), in cities between 0 and 30 km (green), or in cities more than 30 km away (blue) on incarceration for drug crime[13] (see Figure F.1 for other outcomes). Having an additional cellmate coming from the same town and incarcerated for a drug-related crime increases the probability of being reincarcerated for drugs by up to 21% of the mean, an effect almost three times bigger than what we observed for the general case (in Figure (1)). The effect falls to 9.6% of the mean for cellmates living in a close but different city, and it disappears when they live more than 30 km away.

I then test the effect of cellmates by prior experience. On the one hand, individuals

[12]Home address before prison is recorded for around 80% of the inmates. The distance between cellmates could be calculated for around two-thirds of the interactions.

[13]Regressions also include the number of cellmates living at an unknown distance. Coefficients are not presented.

already convicted for a certain crime type have shown their willingness to commit this infraction and may particularly benefit from a larger network. This reinforcement mechanism has been identified in preceding research (Bayer et al. (2009), Ouss (2011)). On the other hand, individuals with no experience may take advantage of the first contacts to step into a new criminal activity. Panel B of Figure 3 presents the effect of cellmates on reincarceration for a drug crime for offenders previously incarcerated for a drug crime (in red) or for something else (in blue) (for further decomposition and other outcomes see Figure F.2). Results indicate that cellmates encountered in prison influence both individuals with prior experience and others.

The last two panels of Figure 3 explore the importance of socio-demographic proximity. The intuition is that inmates might create more durable ties if they share similar characteristics. Panel C presents the effect of cellmates younger (more than five years younger, in red), of similar age (less than five years difference, in green), or older (more than five years older, in blue) on reincarceration for a drug crime (see Figure F.3 for further decomposition and other outcomes). All the effect of cellmates convicted for drug crimes comes from peers about the same age. Similarly, Panel D indicates that inmates are mostly affected by cellmates having similar nationalities (for other outcomes, see Figure F.4).[14] Together, those results confirm that inmates sharing similar characteristics are more likely to influence each other.

6.2 Misaligned Incentives

If inmates' recidivism is mainly affected by cellmates sharing similar characteristics, a natural policy recommendation would be to avoid those matches in cells. However, the objective of minimizing recidivism *after prison* might enter into conflict with the penitentiary administration's objective of minimizing tensions and conflicts *inside prison*. Indeed, if individuals incarcerated with cellmates sharing similar characteristics are calmer and less likely to harm themselves or others, the administration may tend to privilege those matches.

To shed some light on these possibly incompatible objectives, I explore the effect of cellmates' characteristics on behaviour in prison. I build a dataset recording all interactions between inmates of the sample used in the preceding sections and other inmates, the moment they start and end, and the reason for the end. To do so, I clean the comments entered by prison guards on every movement to identify transfers motivated by conflicts or demands from one party. I also record if the cohabitation ended because one person had been transferred into a disciplinary cell. Then, I regress the reasons the cohabitation ended on the characteristics of the match: dummies equal to one if cellmates come from the same city, have similar ages, have nationalities from the same areas, and a set of crime

[14] I distinguish between French, other Europeans, North Africans, Other Africans, Asians, Americans, and Oceanians.

interactions (set of dummies equal to one if the two inmates are property criminals, one property criminal and one drug criminal, one property criminal and one violent criminal, etc). As most inmates have several cellmates, regressions include individual fixed effects to account for differences in "baseline" propensity to misbehave in prison. Regressions also include control for peers' characteristics: crime type, age, nationality, and city of residence before entering prison. Results are presented in Table 2.

Inmates coming from the same city or having similar national origins are less likely to be in conflict (Column 1 Table 2). On the contrary, the risk slightly increases when they are about the same age. Crime types seem largely irrelevant, and no crime combination is particularly associated with higher or lower conflicts. The probability that cohabitation ends because one person is sanctioned is low (1.7% of the cases)[15]. It is increasing when inmates come from the same city or have similar ages (Column 2 Table (2)). The effect on conflicts dominates the effect on sanctions, and the overall risk that cohabitation ends with a problem decreases when individuals have similar origins – either where they lived before prison or their nationality – and increases when they are about the same age.

Taken together, those results indicate that social objectives – limiting recidivism after prison – and penitentiary administration's objectives – minimizing problems in prison – may indeed clash.

7 Conclusion

This paper analyzes uniquely rich information on prisoners' cell assignments in France and documents that the probability of being re-incarcerated is indeed affected by cellmates' number and characteristics. Recidivism for drug crimes and, to a lesser extent, property crimes is correlated with the number of individuals having experience in those crimes encountered in cells. Cellmates also influence the likelihood of committing crimes in regions where they come from. Those effects are contingent on cellmates' similarities.

These findings carry significant policy implications, advocating in favour of individual confinement. When individual confinement is unfeasible, minimizing the frequency of movements and maintaining stable cell assignments emerges as a socially beneficial approach. However, drawing recommendations for specific profiles that should be matched in cells presents a challenge. While incarcerating individuals with shared characteristics may increase recidivism, it also reduces conflicts in jail. Determining the optimal allocation remains a question for future research.

[15]Sanctions rarely end cohabitations because inmates usually reintegrate their prior cell when they have served their time in isolation.

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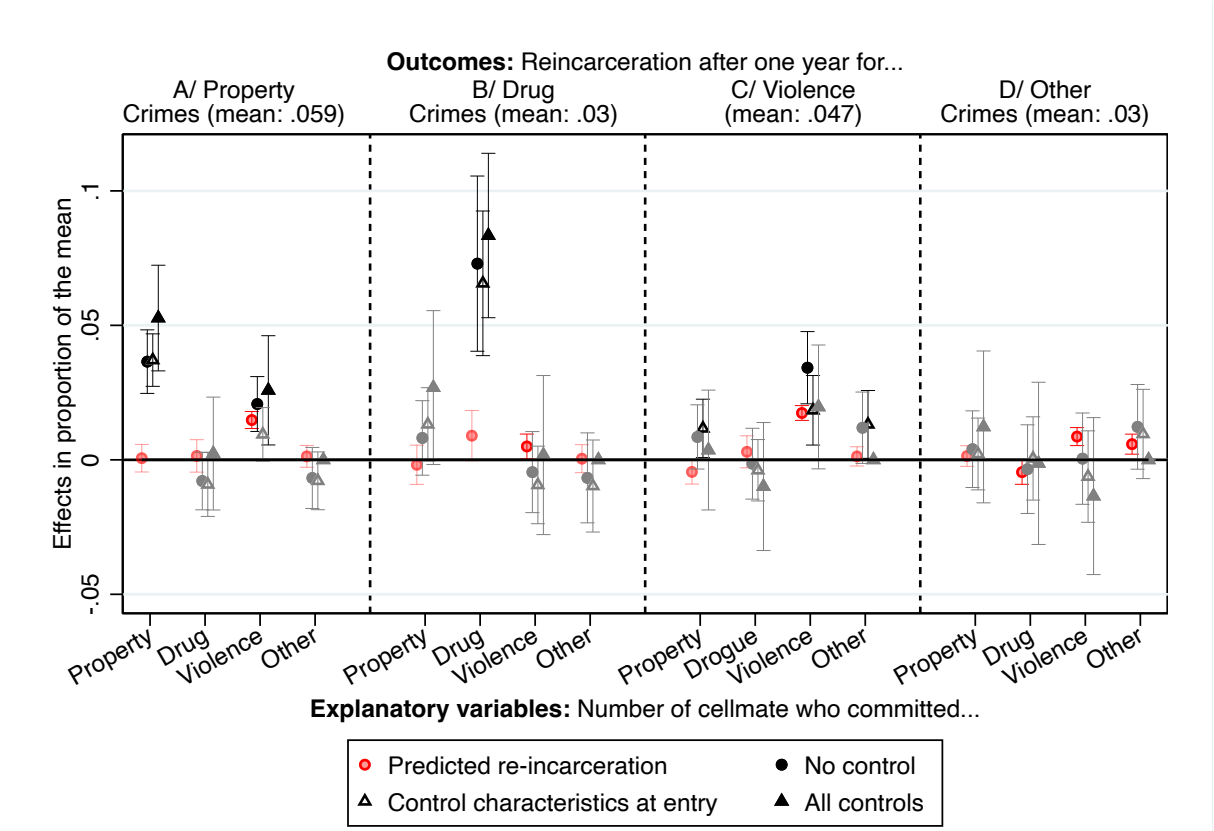
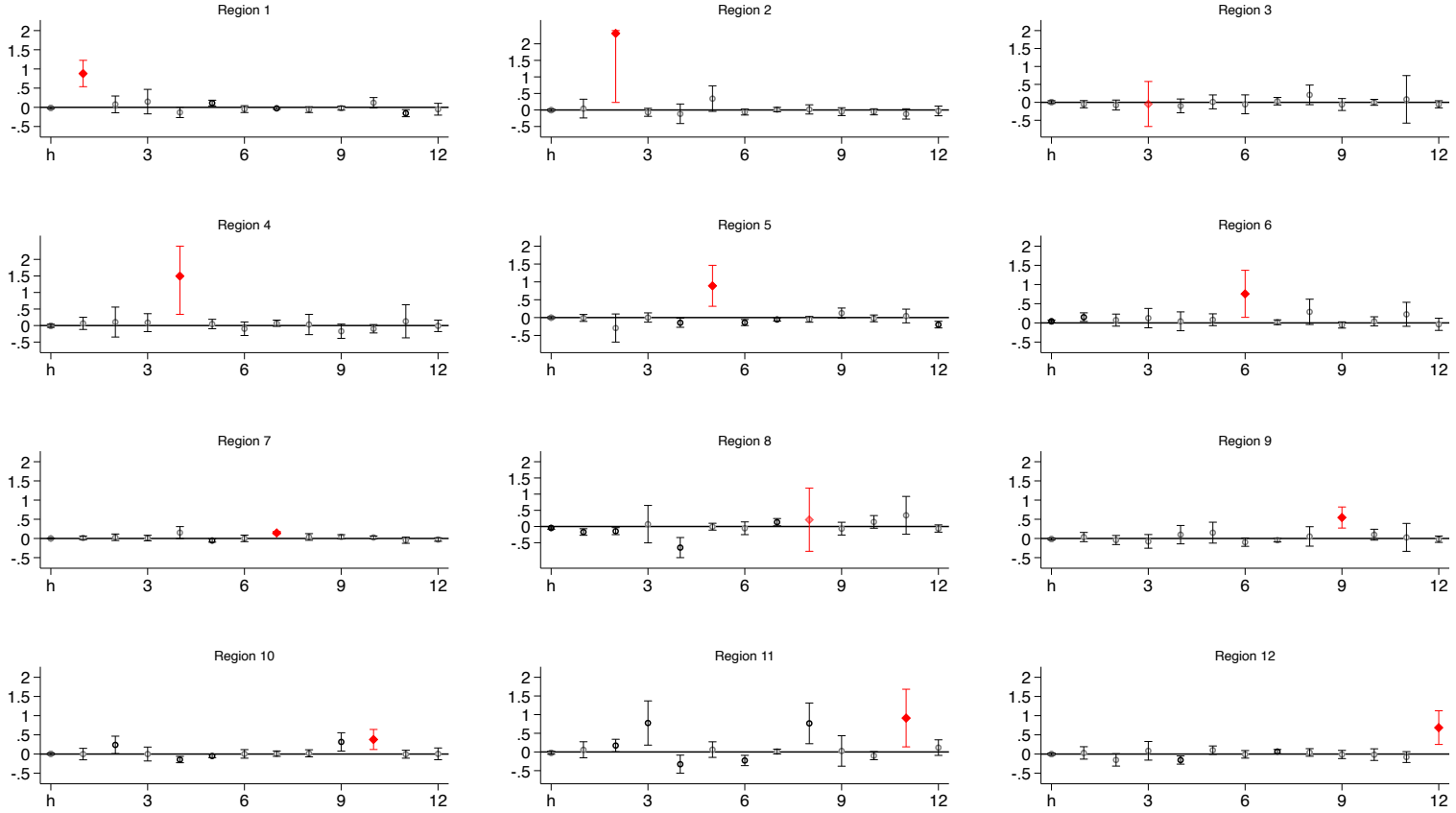
TABLES AND FIGURES

Figure 1: *Effect of the number of cellmates of different types on re-incarceration for different crimes*



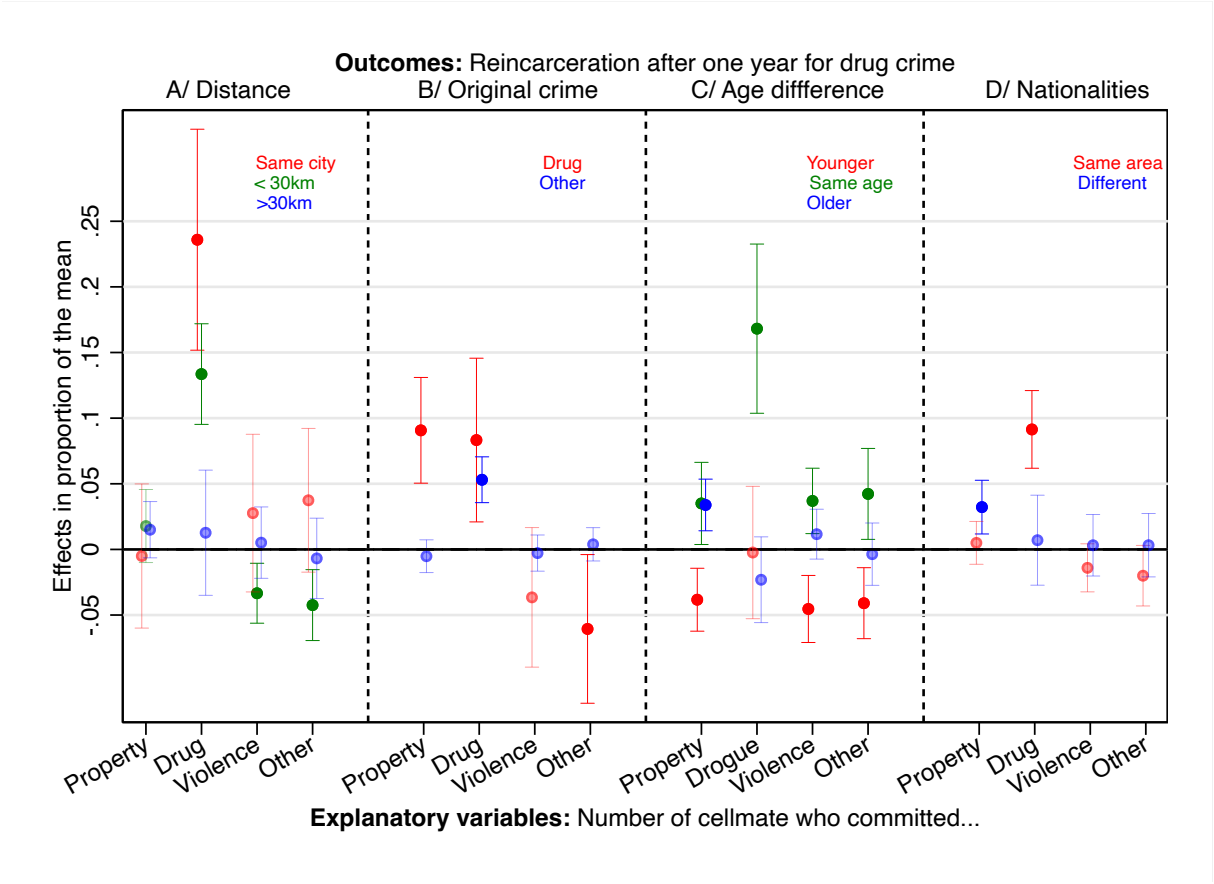
Notes: This Figure presents the correlations between the numbers of cellmates convicted for the types of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header (Panels A to D). Coefficients come from four sets of equations. The first set (red circles) measures the effect of various types of cellmates on *predicted* re-incarceration. The second set ((black circles) measures the effect of cellmates on *real* re-incarceration. In those two sets of equations, only a limited number of controls are included: fixed effects for prison, time in prison, aggregated crime, and age at entry. The third set of results (empty black triangles) presents the same results with the full set of control for characteristics at entry following Equation (1). Lastly, the fourth set of results (plain black circles) presents the results when controlling for characteristics at entry, total number of cellmates and time with different types of cellmates following Equation 2. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure 2: *Effect of the number of cellmates from different regions on re-incarceration by region*



Notes: This Figure presents the correlations between the number of cellmates who used to leave in *home* region (h on the x-axis) or administrative region 1-12 before incarceration and re-incarceration after 1 year in the region indicated in the header. Each sub-graph presents the results from one regression that includes baseline controls for characteristics observed at the entry into prison. Effects are presented in proportions of the means. Bars present 95% confidence intervals (cap at 2.4). Standard errors are clustered at the prison level.

Figure 3: *Effect of the number of cellmates of different types on re-incarceration for drug-related crimes*



Notes: This Figure presents the correlations between the numbers of cellmates with various characteristics and re-incarceration after 1 year for drug-related crimes. There are four panels (indicated in the header from A to D) presenting the results for different decompositions of the number of cellmates. Panel A distinguishes 12 types of cellmates: those convicted for property crimes, drug crimes, violence or other crimes and leaving, before incarceration, in the same city (coefficients in red), in cities less than 30 km (green) or more than 30 km (blue) far from one's city of residence. Panel B presents the effect of different types of cellmates on inmates convicted for drug crimes (in red) or other crimes (in blue). Panel C distinguishes 12 types of cellmates: those convicted for property crimes, drug crimes, violence or other crimes that are younger(in red), around the same age (less than five years difference, in green) or older (in blue). Lastly, Panel D distinguishes 8 types of cellmates: those convicted for property crimes, drug crimes, violence or other crimes and having nationalities from similar or different areas. Six geographical areas are defined: France, other European countries, North Africa, the rest of Africa, Asia, America, and Oceania. Regressions include the full set of controls for characteristics at entry following Equation (1). Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Table 1: Correlation the number of cellmates with various characteristics and re-incarceration in home départements or outside home épartements for different types of crime

	Outcome: re-incarceration after 1 year for...							
	Property		Drug		Violence		Other	
	Home	Non Home	Home	Non Home	Home	Non Home	Home	Non Home
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Nb cellmates:								
Property crime-Home	**0.021****	*0.008*	0.009	-0.001	0.010	0.014	-0.015	-0.015
Property crime-Non Home	*0.032****	**0.071*****	0.009	-0.008	0.007	-0.008	0.015	-0.019
Drug-Home	-0.015	0.0	**0.061*****	*0.014*	0.014	0.003	0.002	-0.028
Drug-Non Home	-0.019	0.004	*0.012*	**0.064**	0.008	-0.037	0.018	0.025
Violence-Home	-0.014	0.033**	0.017	0.010	**-0.007**	*-0.037*	-0.003	-0.004
Violence-Non Home	0.023	0.033	-0.022	0.036	*0.003*	**0.015**	-0.017	0.036
Other-Home	0.01	0.007	-0.001	0.019	0.017	0.021	**0.001**	*0.007*
Other-Non Home	-0.01	-0.036	-0.006	-0.006	0.025	0.019	*0.001*	**0.043**
Observations	187,352	187,352	187,352	187,352	187,352	187,352	187,352	187,352
Mean outcome	0.030	0.0090	0.014	0.0042	0.023	0.0046	0.024	0.0053

Notes: This table presents the correlations between the numbers of cellmates convicted for different types of crime and originating from different places on re-incarceration after 1 year for the type of crime indicated in the header. Columns present the results from a single regression following Equation (1). Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Table 2: Correlation between cellmates' characteristics and the reasons why their cohabitation ends

	(1) Demand/Conflict	(2) Sanction	(3) Problem
Same city	-0.021*** (0.0015)	0.0020*** (0.00058)	-0.019*** (0.0016)
Same age	0.0054*** (0.00087)	0.0021*** (0.00032)	0.0075*** (0.00090)
Same origin	-0.011*** (0.0015)	-0.000092 (0.00056)	-0.011*** (0.0016)
Property/Property	-0.0014 (0.015)	0.0015 (0.0056)	0.00012 (0.016)
Property/Drug	-0.018 (0.016)	0.0039 (0.0059)	-0.014 (0.016)
Property/Violence	-0.0080 (0.015)	-0.0017 (0.0056)	-0.0097 (0.016)
Drug/Property	0.0055 (0.015)	0.0027 (0.0057)	0.0082 (0.016)
Drug/Drug	-0.022 (0.016)	0.0036 (0.0059)	-0.019 (0.016)
Drug/Violence	-0.011 (0.015)	-0.0011 (0.0056)	-0.012 (0.016)
Violence/Property	0.0057 (0.015)	0.0025 (0.0056)	0.0082 (0.016)
Violence/Drug	-0.0097 (0.016)	0.0048 (0.0059)	-0.0049 (0.016)
Violence/Violence	-0.015 (0.015)	0.00028 (0.0056)	-0.015 (0.016)
Other/Property	0.0011 (0.015)	0.0018 (0.0057)	0.0030 (0.016)
Other/Drug	-0.019 (0.016)	0.0024 (0.0059)	-0.016 (0.017)
Other/Violence	-0.014 (0.015)	-0.0016 (0.0056)	-0.015 (0.016)
Peer's characteristics	Yes	Yes	Yes
Individual fe	Yes	Yes	Yes
Observations	1,017,597	1,017,597	1,017,597
Mean outcome	0.17	0.019	0.19

Notes: This table presents the correlations between peers' characteristics and the reason for the end of cohabitation in cells: conflicts or demands from one of the peers, transfer of one peer in a disciplinary cell, or any of those. The sample is composed of all interactions between inmates of the main sample — i.e. inmates incarcerated before December 2019 and spending less than 2 years in prison — and other inmates (from the main sample or not). For example, an inmate having height different cellmates over his incarceration spell will appear height times in the database. Regressions include individual fixed effects and controls for peers' characteristics (crime, age, city of origin, nationality).

ONLINE APPENDIX

A Data and Identification strategy

Figure A.1: *Origins of the variations in the number of cellmates*

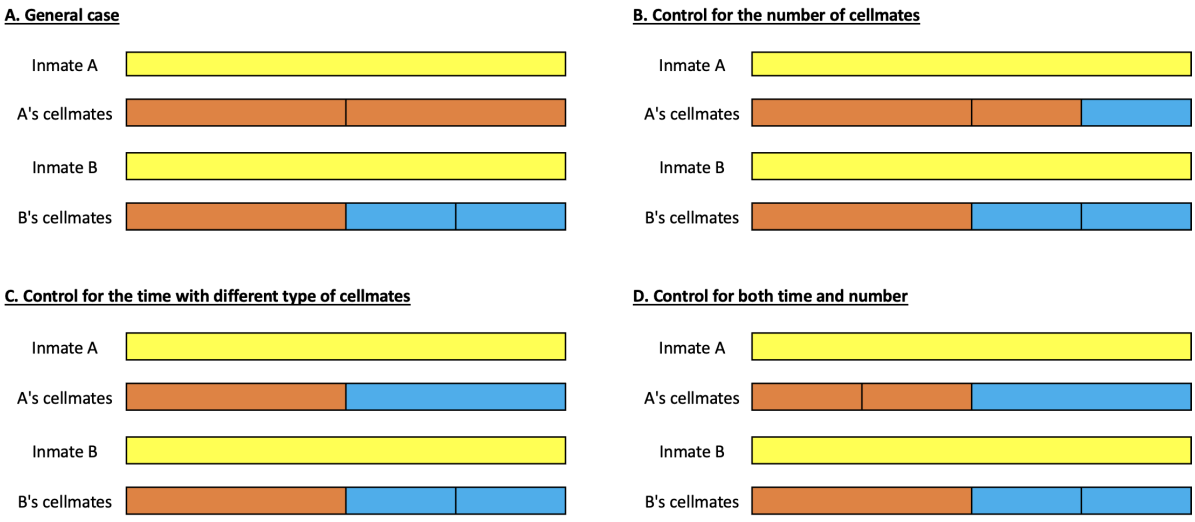
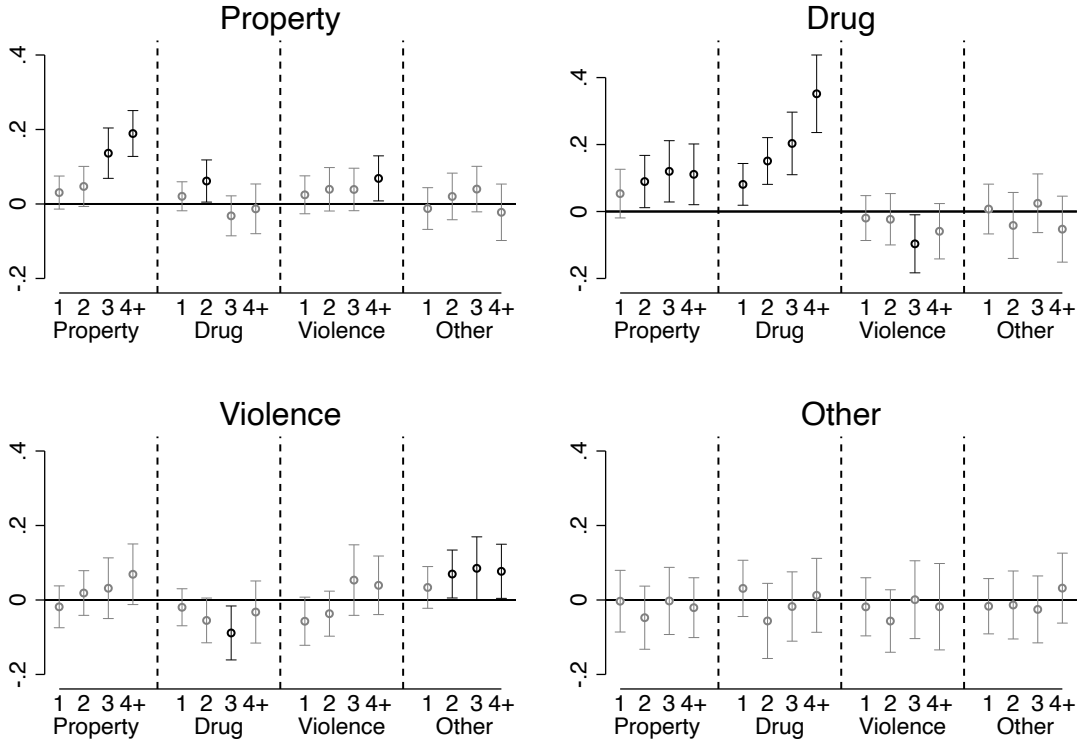


Table A.1: Descriptive statistics for main study sample

	Mean	Sd
Duration:		
Time in prison	212.73	164.01
Time with cellmates	159.82	131.95
Crime type:		
Property	0.3	0.46
Drug	0.21	0.41
Violence	0.25	0.44
Other	0.23	0.42
Re-incarceration after 1y:		
All	0.17	0.38
Property	0.06	0.24
Drug	0.03	0.17
Violence	0.05	0.21
Nb of cellmates:		
All	8.23	6.09
Property	2.47	2.36
Drug	1.7	2
Violences	2.22	2.3
Other	1.84	1.96
Socio-demo:		
Age	32.44	10.78
Female	0.04	0.21
French	0.75	0.43
Illiterate	.29	.45
Addict	0.58	0.49
Psy pb	0.19	0.39
Observations	191,037	

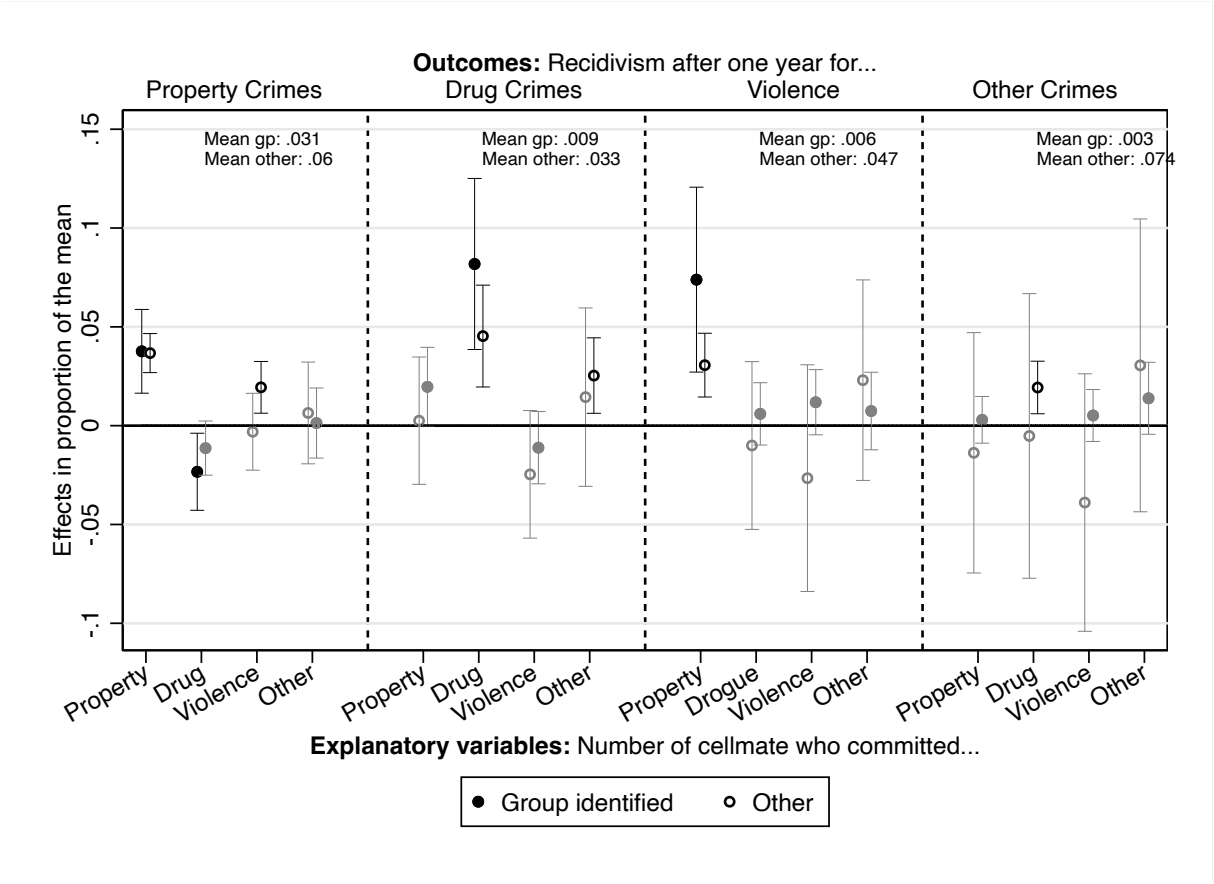
B Additional results and robustness checks

Figure B.1: *Effect of the number of cellmates of different types on re-incarceration for different crimes, intensive margin*



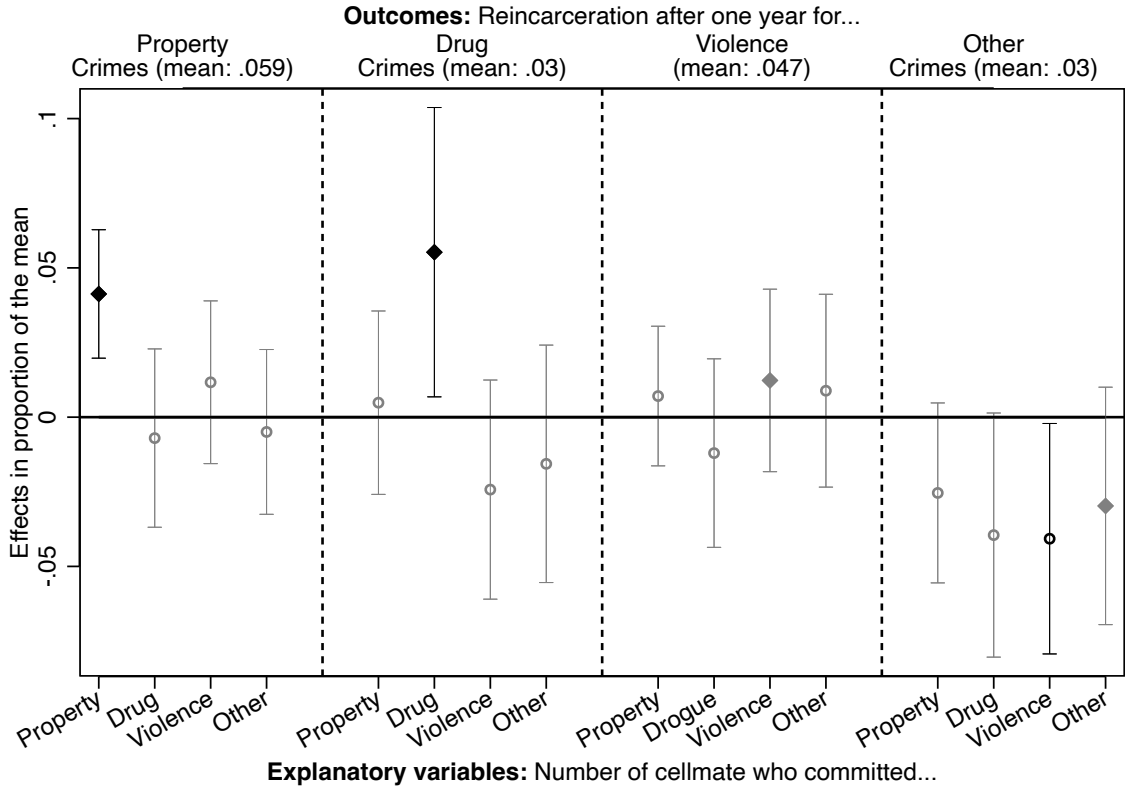
Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for a crime of the type indicated in the header. Each sub-graph presents the results from one regression that includes baseline controls and controls for characteristics observed at entry into prison. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure B.2: *Effect of the number of cellmates of different types on re-incarceration for crimes identified as in-group crimes or other crimes*



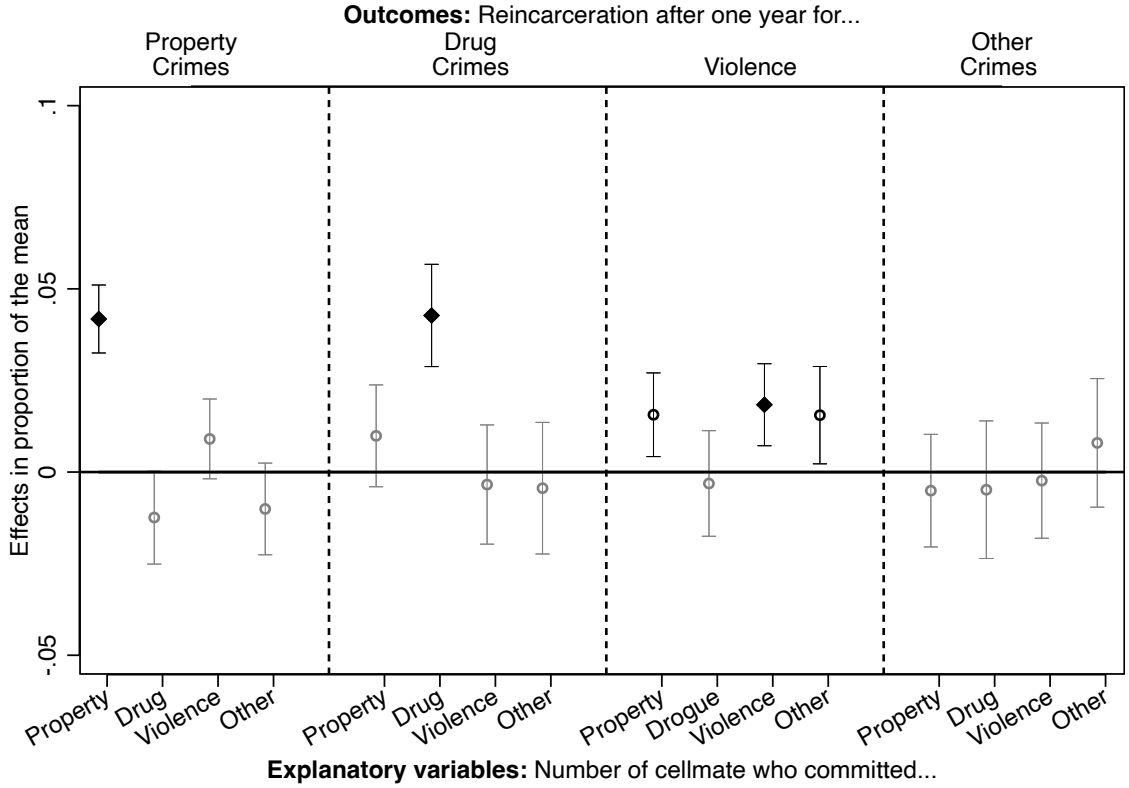
Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and recidivism after 1 year for the type of crime indicated in the header. Coefficients from two sets of four regressions (one per type of recidivism) following Equation (1) are presented. The first set (empty circles) measures the effect of various types of cellmates on recidivism for a crime committed alone. The second set (plain black circles) measures the effect of cellmates on recidivism for an in-group crime. Regressions include baseline controls and controls for characteristics at entry. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure B.3: *Effect of the number of cellmates of different types on re-incarceration for different crimes, IV results*



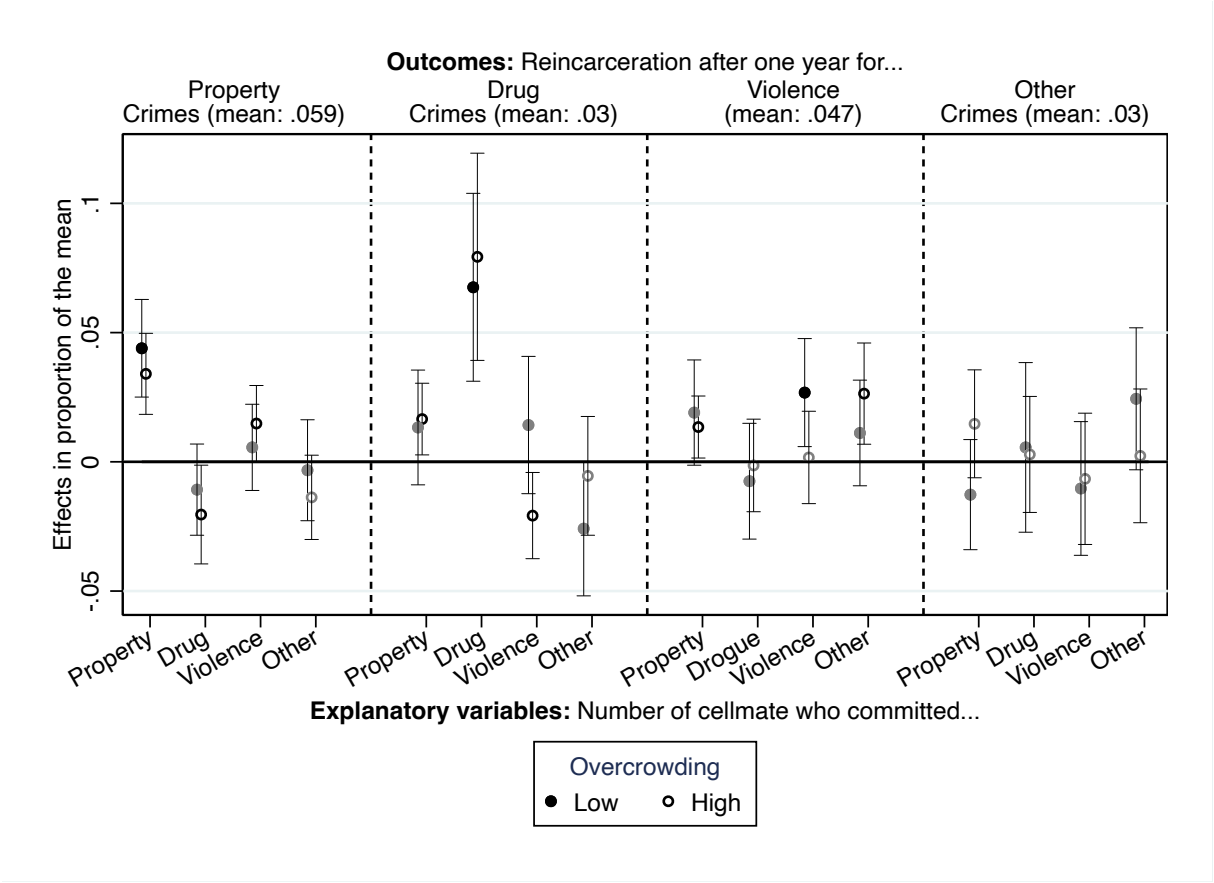
Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. Each coefficient comes from a different 2SLS regression where the relevant number of cellmates is instrumented with the number of cellmates transferred while sharing the cell (excluding transfers due to conflicts or demands). Regressions include baseline controls and controls for characteristics at entry, number of own movements, and time in cells with 2, 3, 4, or 5+ cellmates. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure B.4: *Effect of the number of cellmates of different types on re-incarceration for different crimes, Cox duration models*



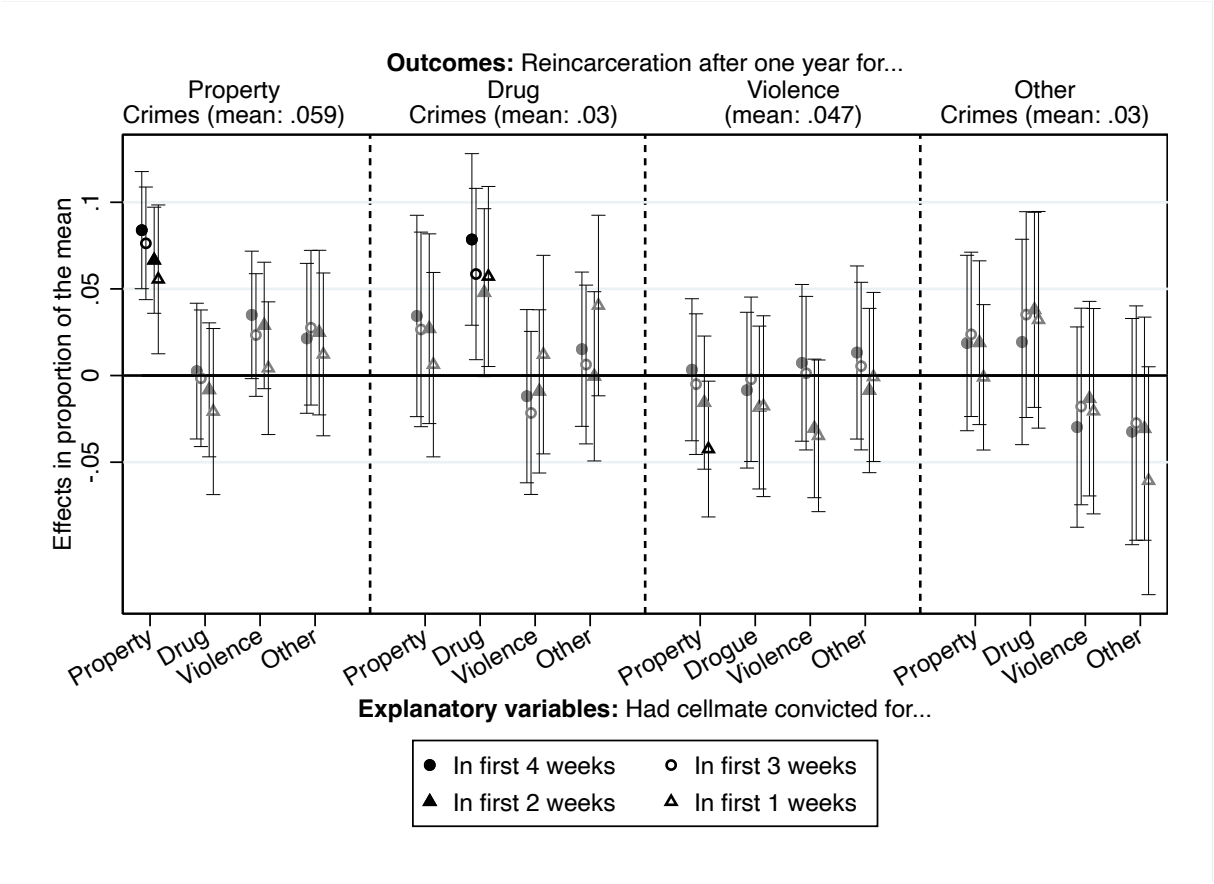
Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. Effects are measured using Cox competitive duration models, and being reincarcerated for a type of crime is considered as a right truncation when measuring the probability of being reincarcerated for other types of crime. Models include baseline controls and controls for characteristics at entry. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure B.5: *Effect of the number of cellmates of different types on re-incarceration for different crimes, difference between individuals incarcerated in prisons with high vs. low overcrowding rates*



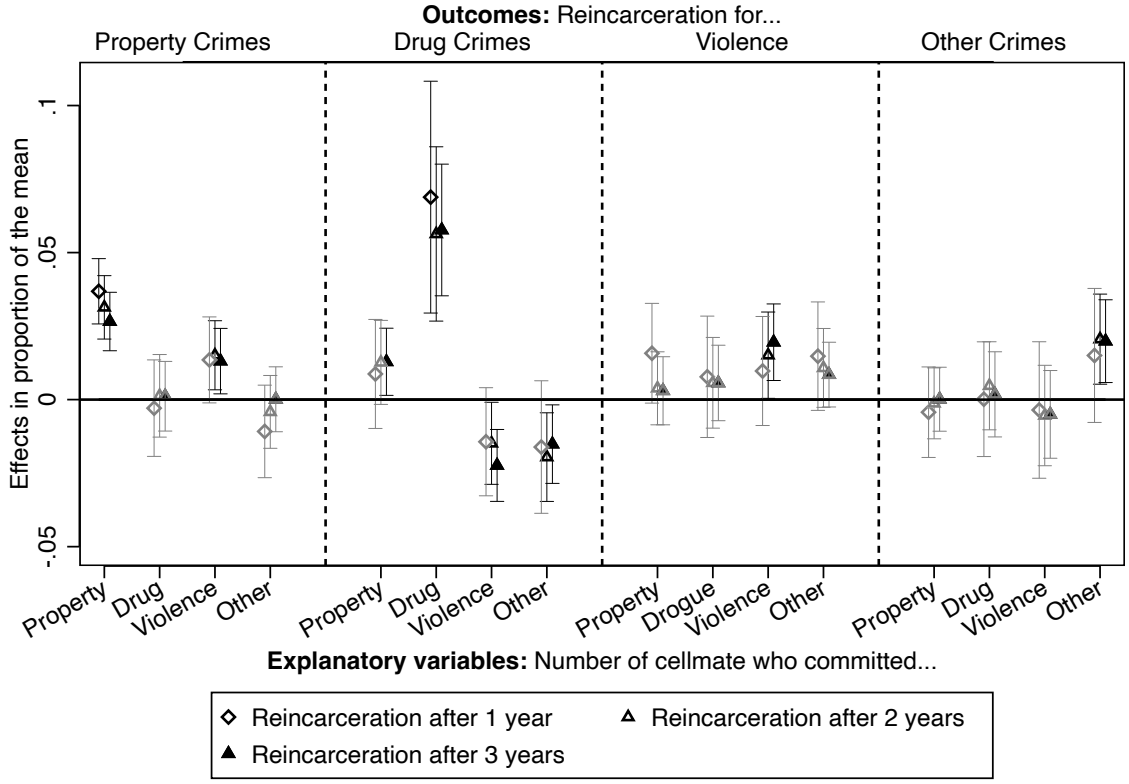
Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. The numbers of cellmates of different types are interacted with dummies for low (i.e. below the median) and high (above) overcrowding rates. Each panel present the result of a unique regression including baseline controls and controls for characteristics at entry. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure B.6: *Effect of encountering cellmates of different types in the first 4, 3, 2, or 1 weeks of incarceration spell on re-incarceration for different crimes*



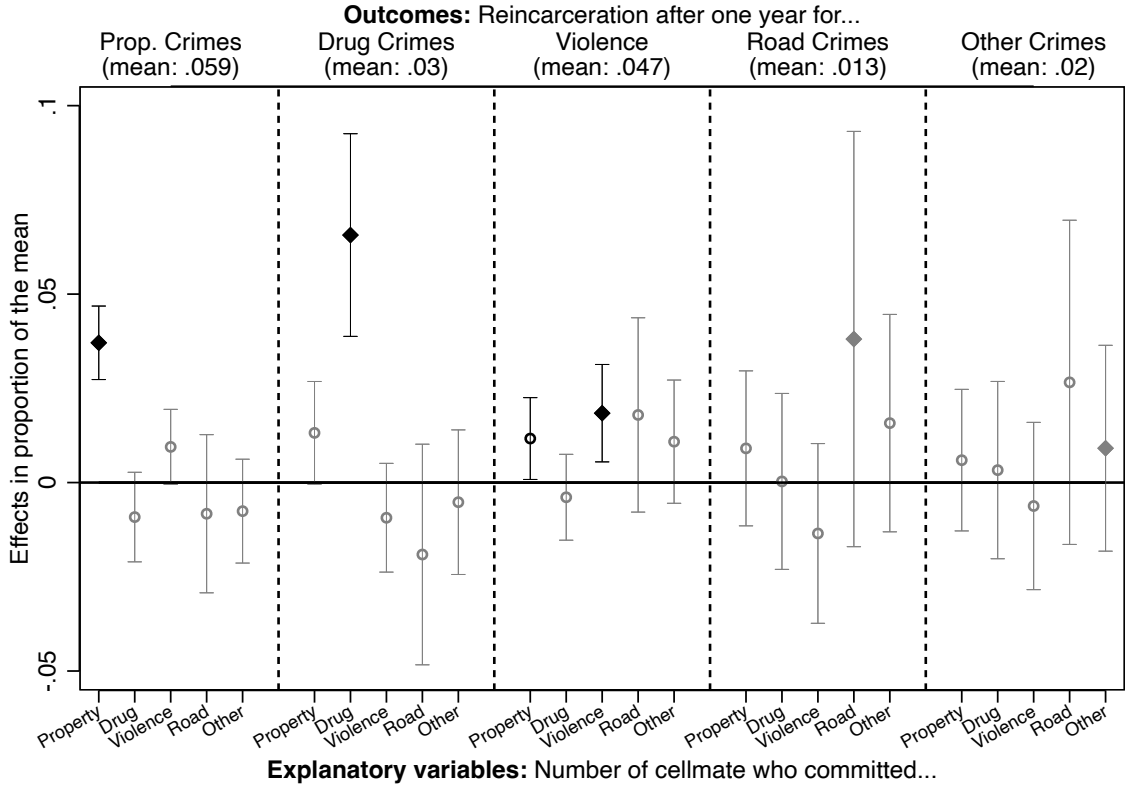
Notes: This Figure presents the effect of having at least one cellmate in a certain type period convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. There are four sets of regressions measuring the effect of cellmates encountered in the first four (plain circle), three (empty circles), two (plain triangles), one (empty triangles) weeks afetr entering in prison. Regressions include baseline controls and controls for characteristics at entry. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure B.7: *Effect of the number of cellmates of different types on re-incarceration for different crimes, variation in sample and time window*



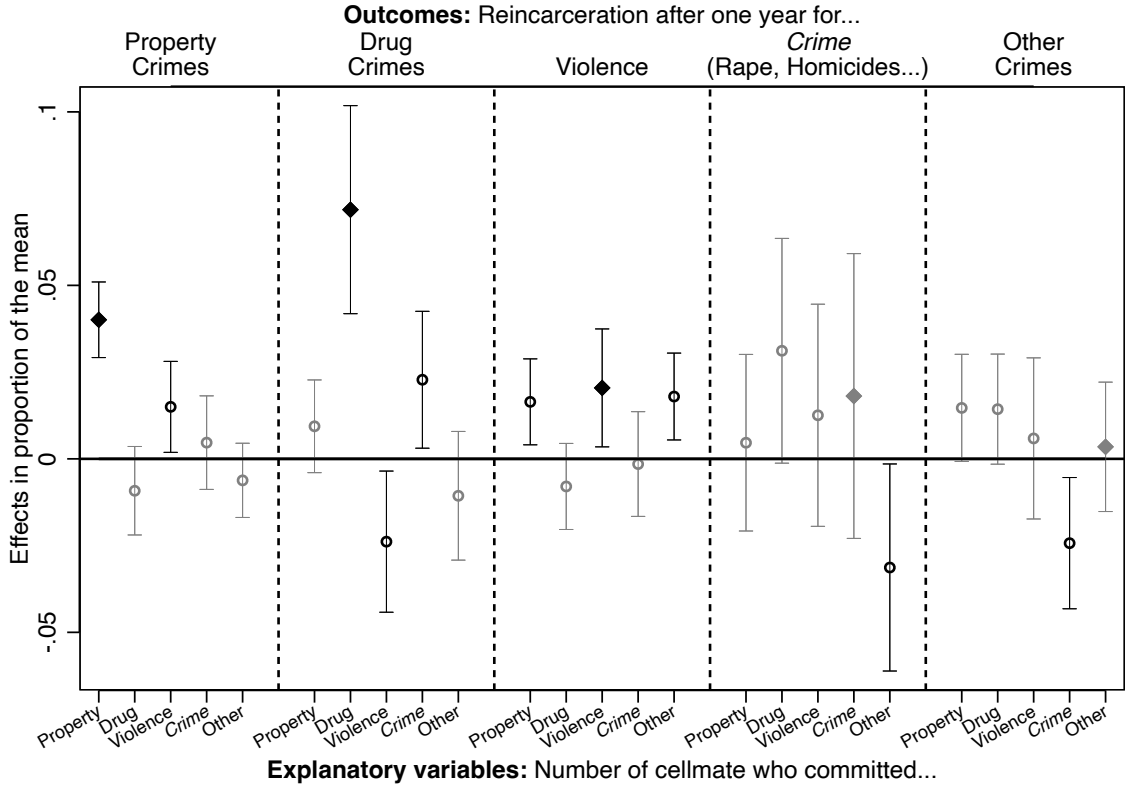
Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. There are three sets of regressions measuring the effect of cellmates on reincarceration after one (plain diamonds), two (empty triangles), or three (plain triangles) years. The sample is restricted to offenders incarcerated for a year or less. In the last series, the sample is further restricted to offenders incarcerated before December 2018. Regressions include baseline controls and controls for characteristics at entry. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure B.8: *Effect of the number of cellmates of different types on re-incarceration for different crimes, isolating road-related crimes*



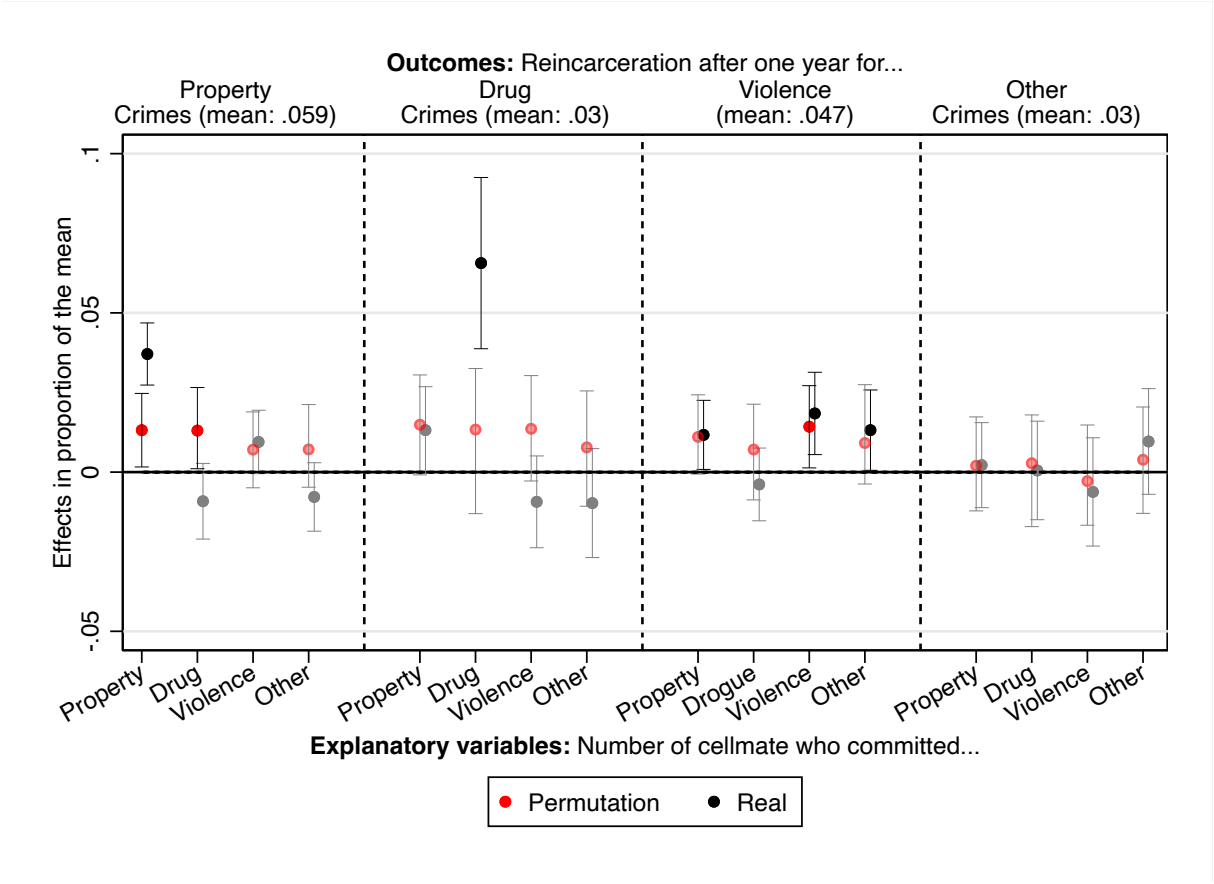
Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. Regressions include baseline controls and controls for characteristics at entry. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure B.9: *Effect of the number of cellmates of different types on re-incarceration for different crimes, isolating most severe crimes*



Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. Regressions include baseline controls and controls for characteristics at entry. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

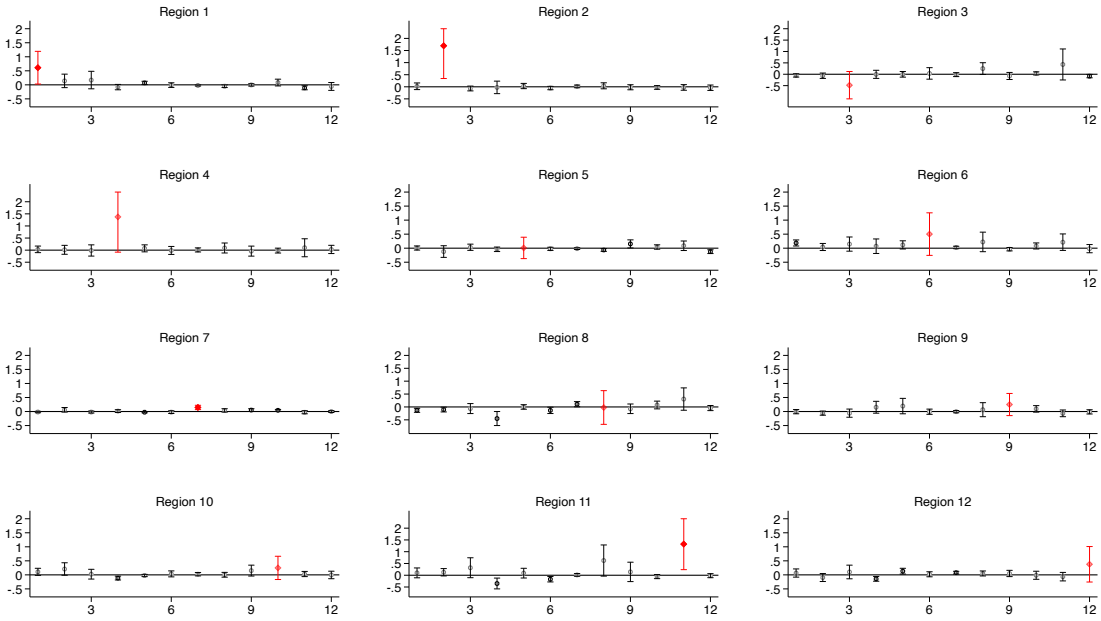
Figure B.10: *Effect of the number of cellmates of different types on re-incarceration for different crimes, permutation exercise*



Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. Estimates for "permutations" are based on 500 permutations exercises. Each time, individuals' numbers of cellmates of different types are calculated based on random re-allocation of inmates moving the same week in the same prison. Regressions include baseline controls and controls for characteristics at entry. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

C Geographical effects

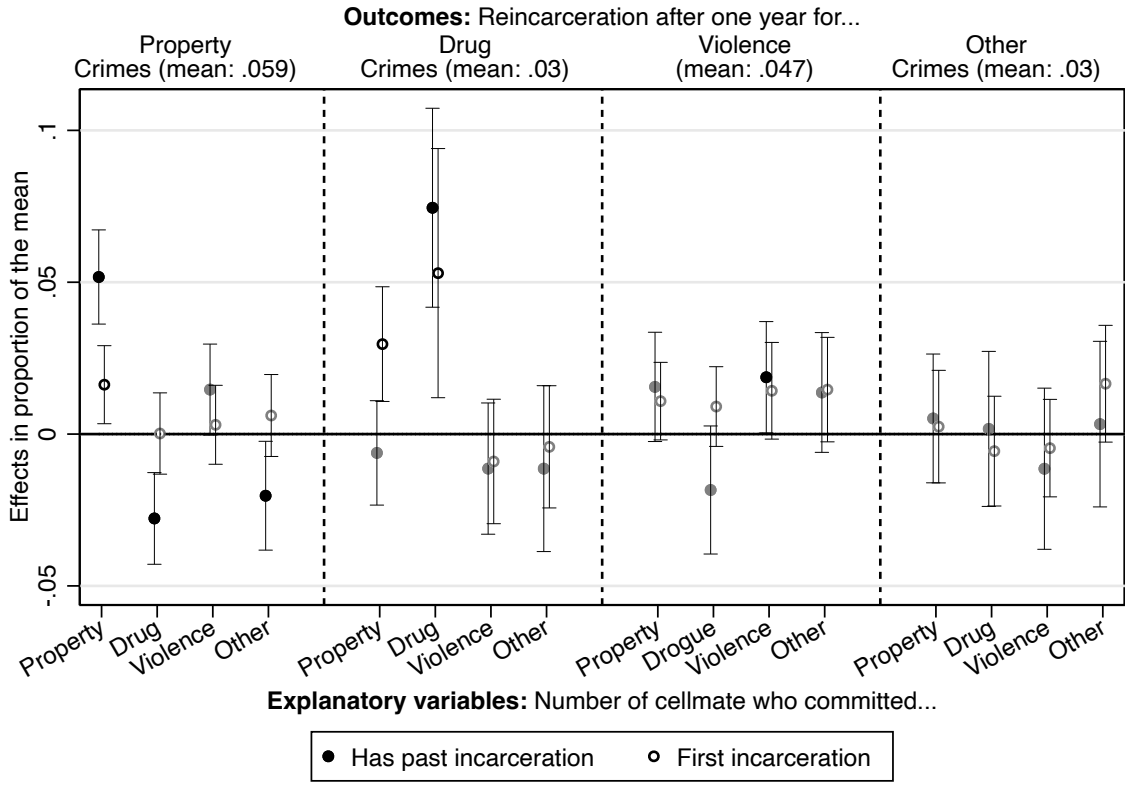
Figure C.1: *Effect of the number of cellmates from different regions re-incarceration after 1 year by region*



Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year in the region indicated in the header. Each sub-graph presents the results from one regression that includes baseline controls for characteristics observed at the entry into prison. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

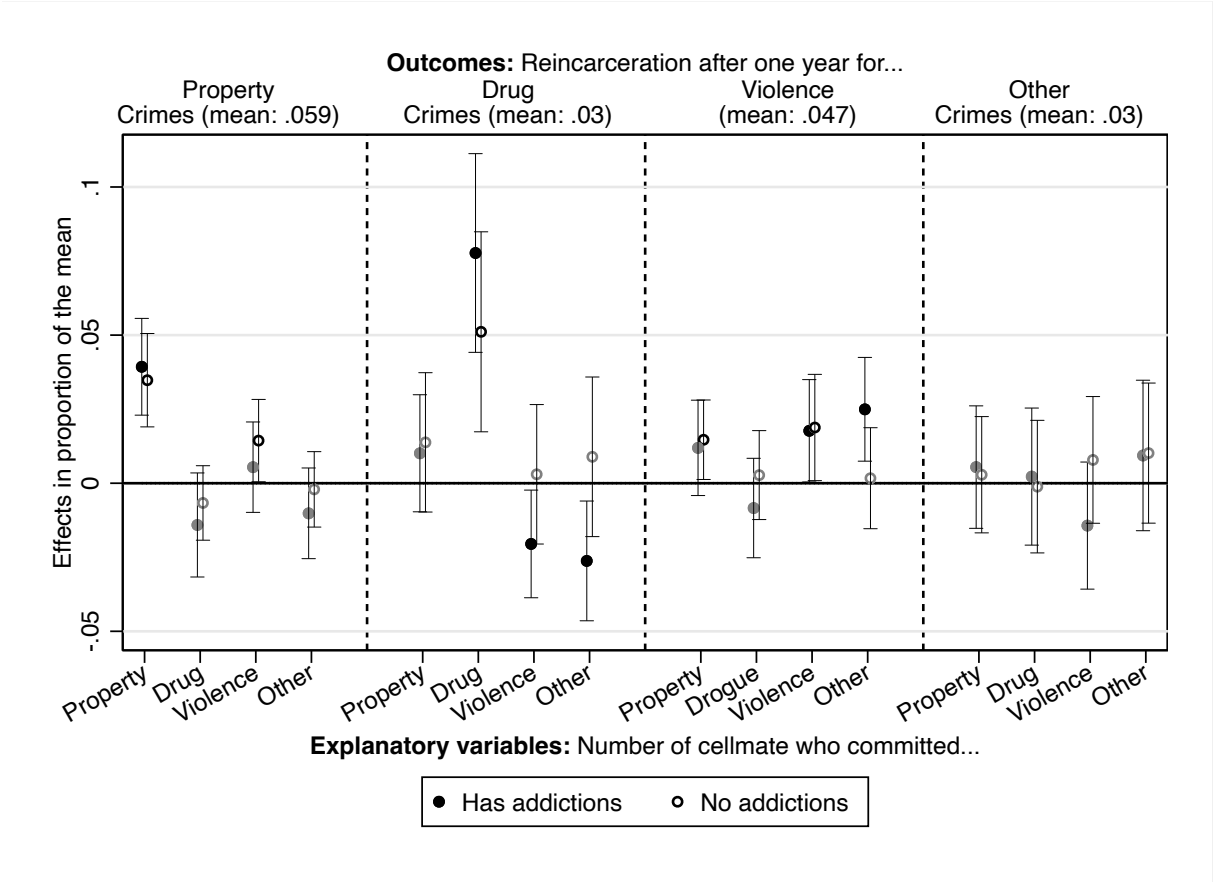
D Heterogeneity among inmates

Figure D.1: *Effect of the number of cellmates of different types on re-incarceration for different crimes, by past incarceration*



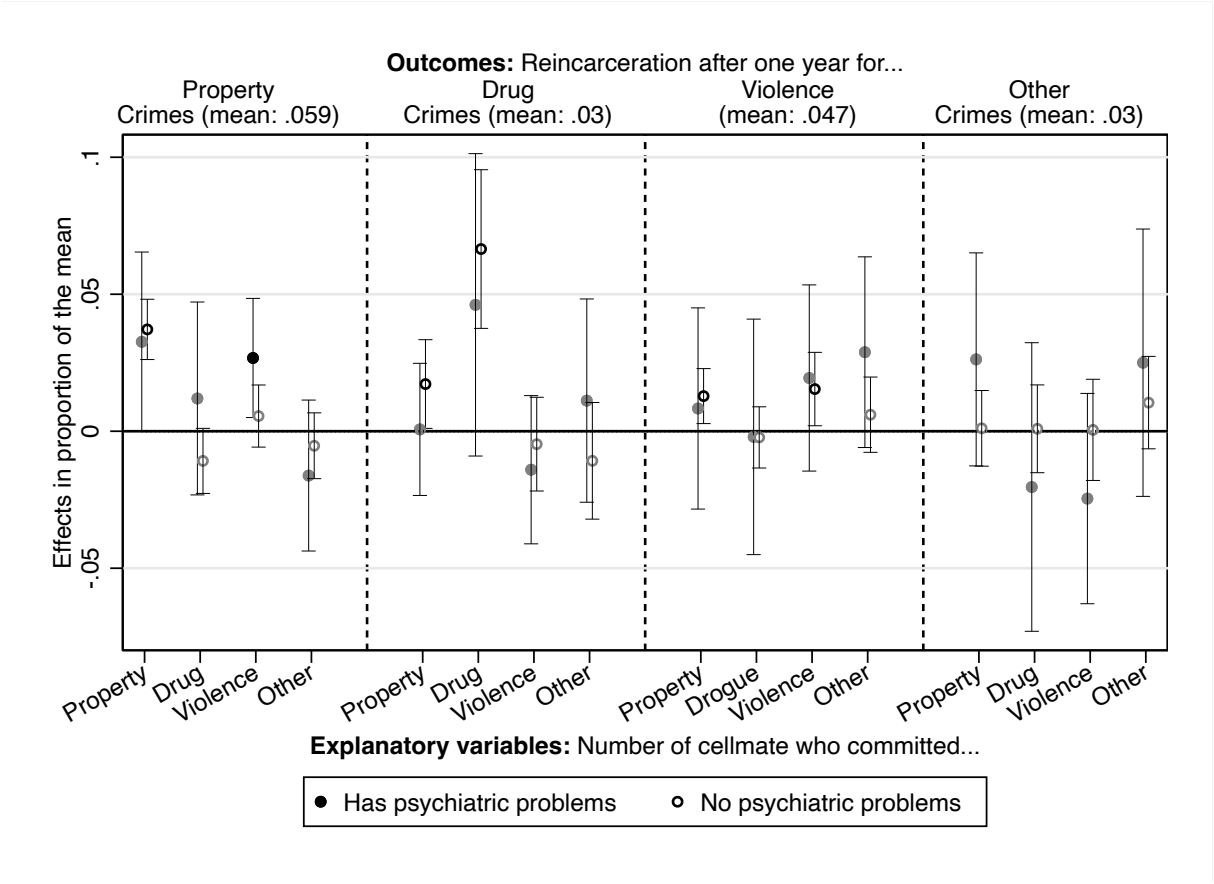
Notes:

Figure D.2: *Effect of the number of cellmates of different types on re-incarceration for different crimes, inmates suffering from addictions or not*



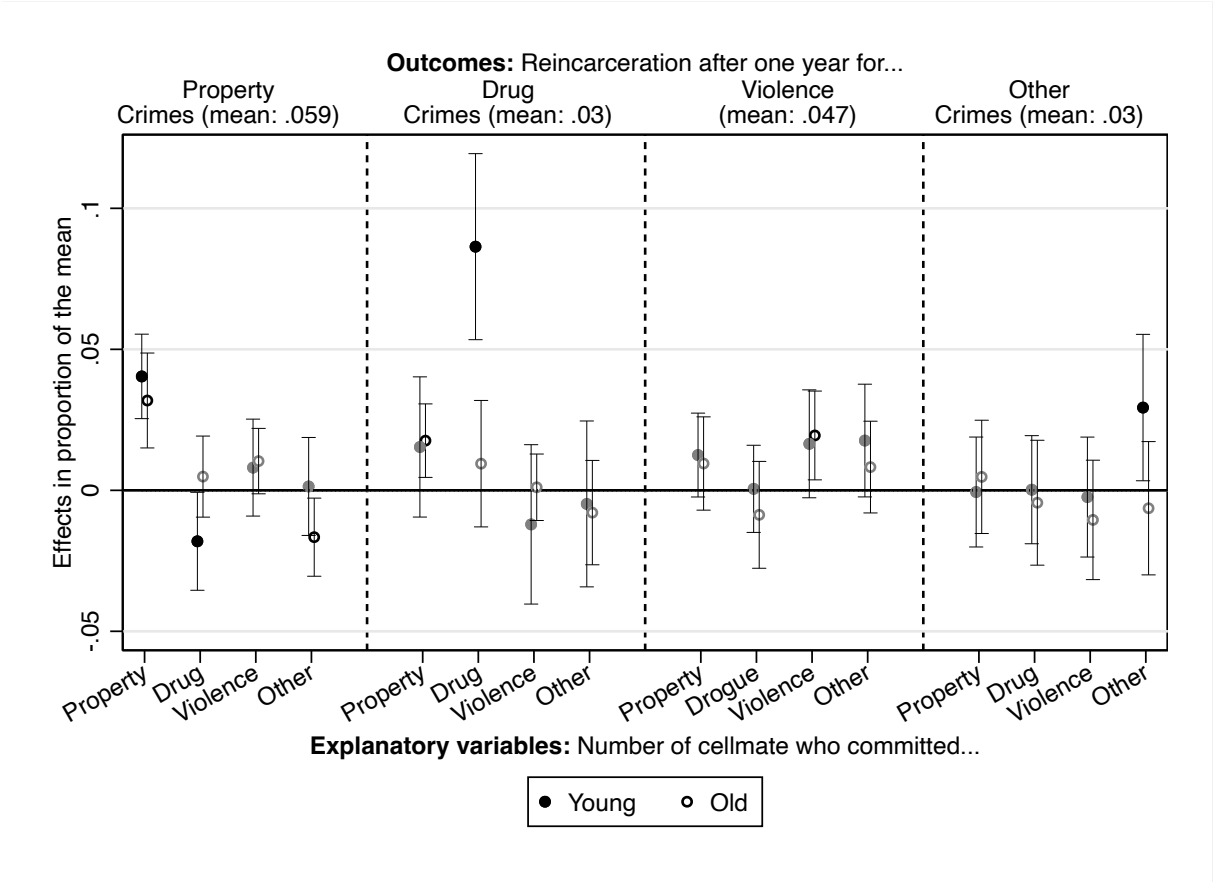
Notes:

Figure D.3: *Effect of the number of cellmates of different types on re-incarceration for different crimes, inmates having past mental health issues or not*



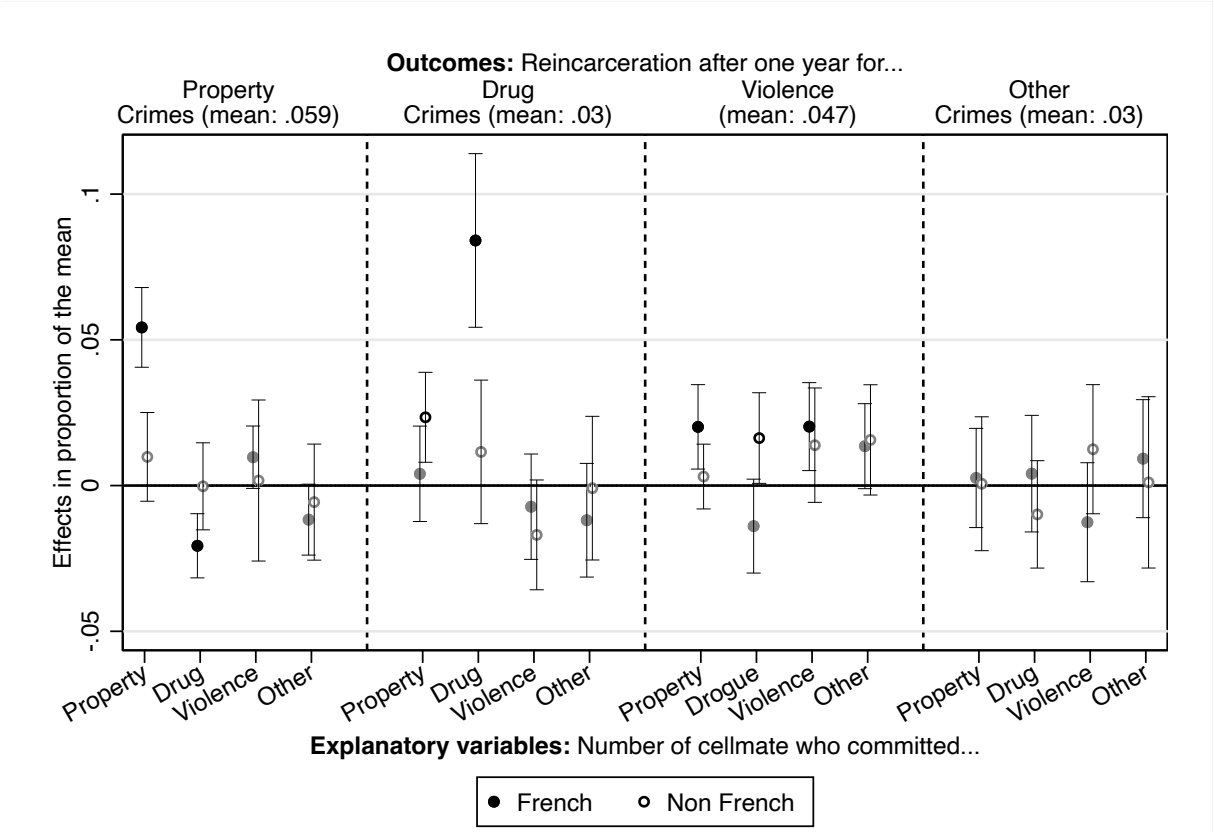
Notes:

Figure D.4: *Effect of the number of cellmates of different types on re-incarceration for different crimes, by age*



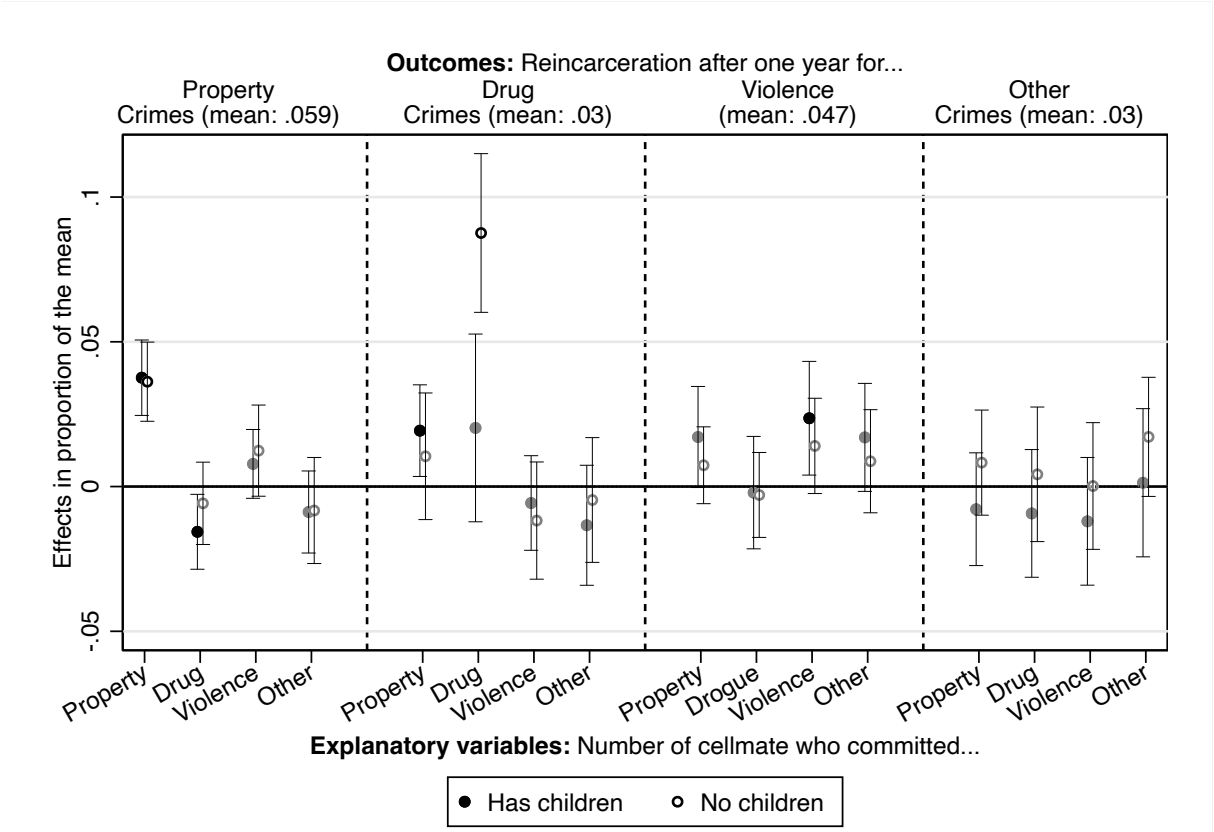
Notes:

Figure D.5: *Effect of the number of cellmates of different types on re-incarceration for different crimes, French vs. non-French*



Notes:

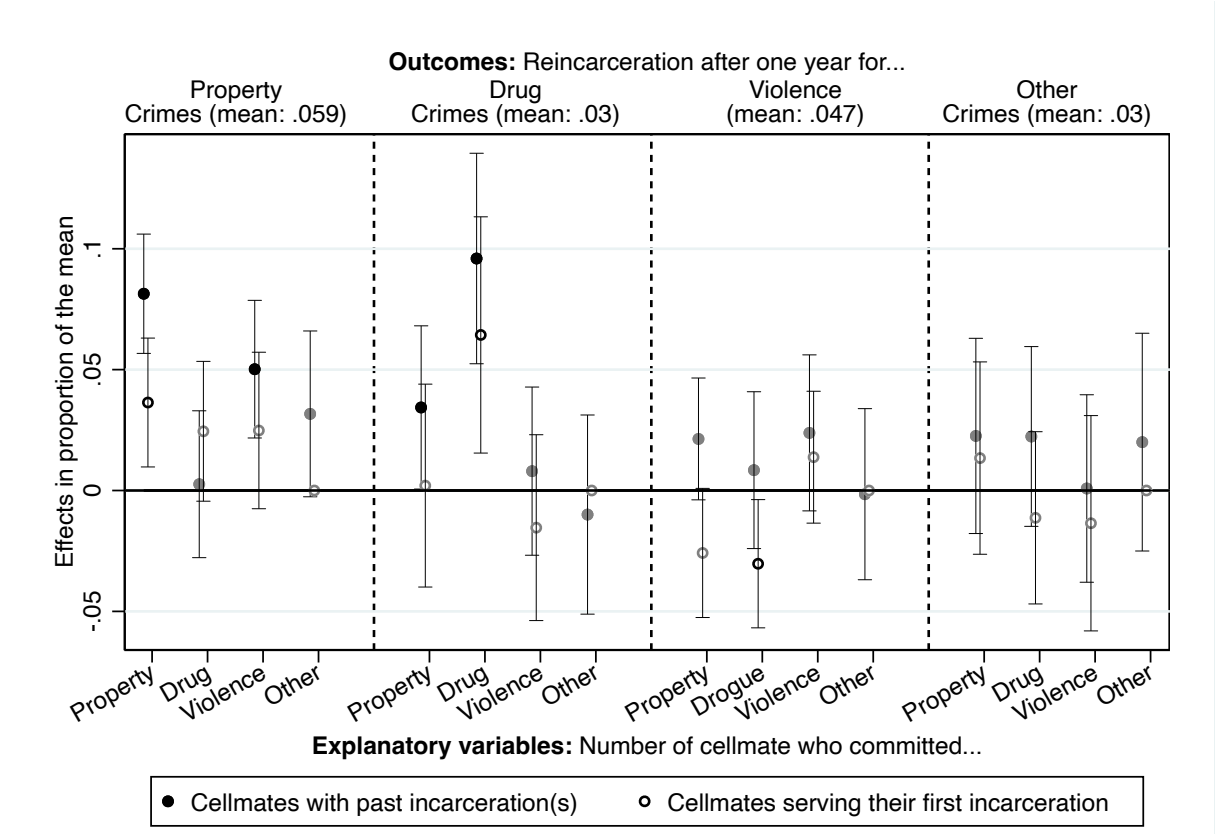
Figure D.6: *Effect of the number of cellmates of different types on re-incarceration for different crimes, inmates having children or not*



Notes:

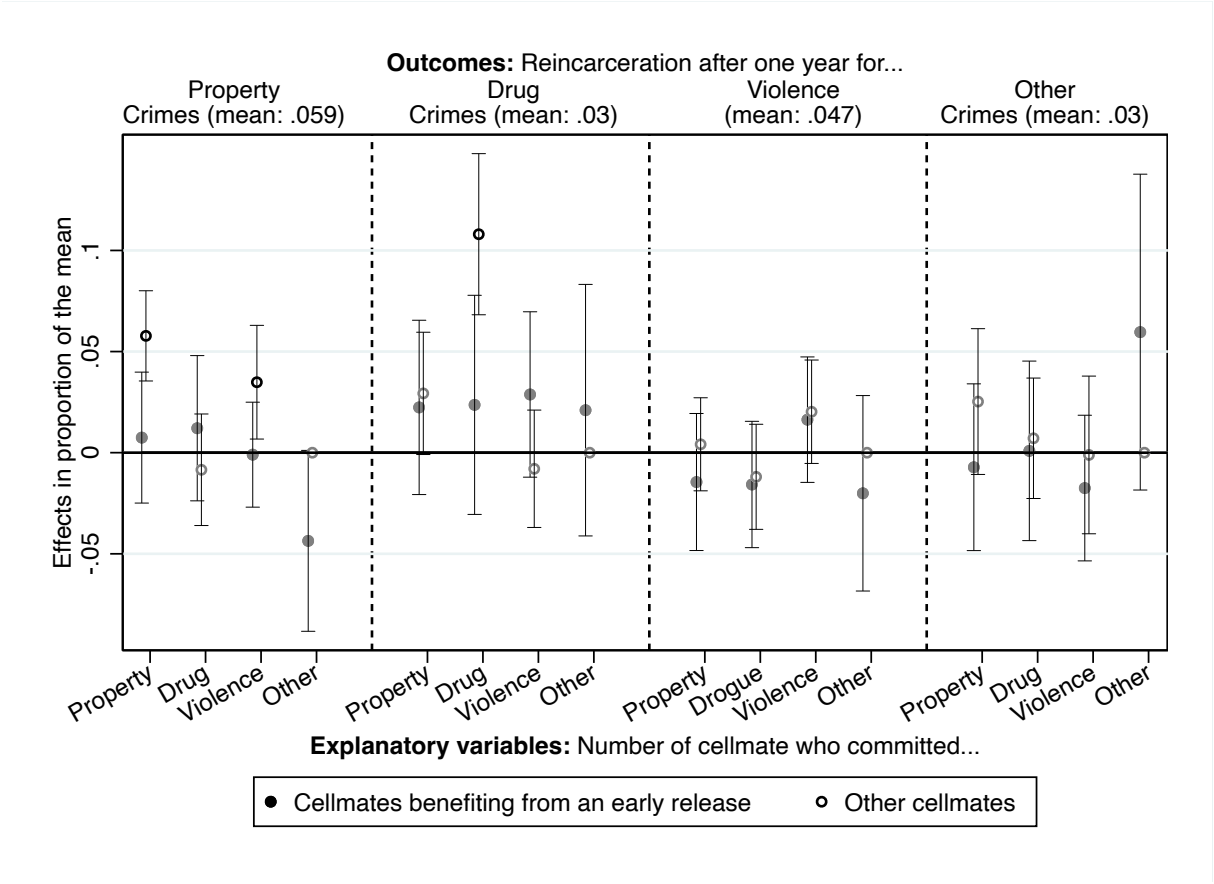
E Heterogeneity among cellmates

Figure E.1: *Effect of the number of cellmates with or without past incarceration on re-incarceration for different crimes*



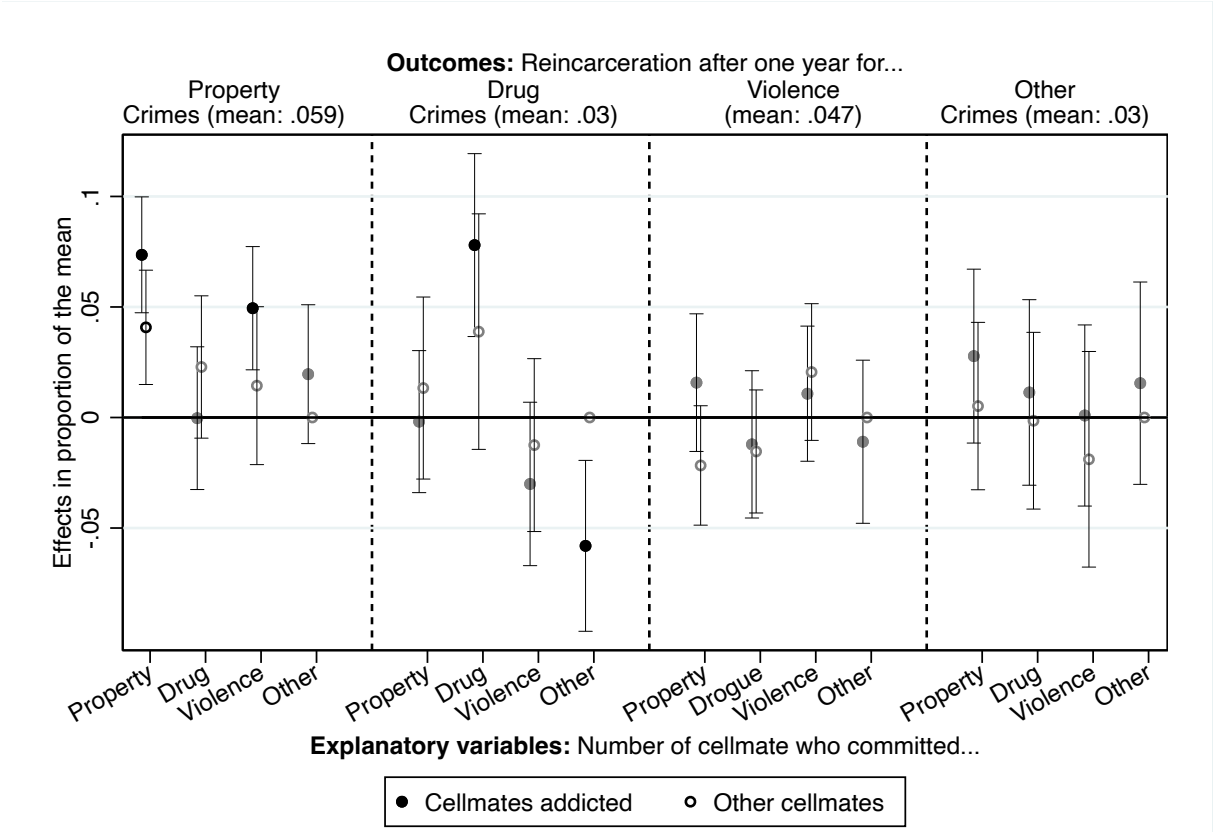
Notes:

Figure E.2: *Effect of the number of cellmates benefiting from an early release or not on re-incarceration for different crimes*



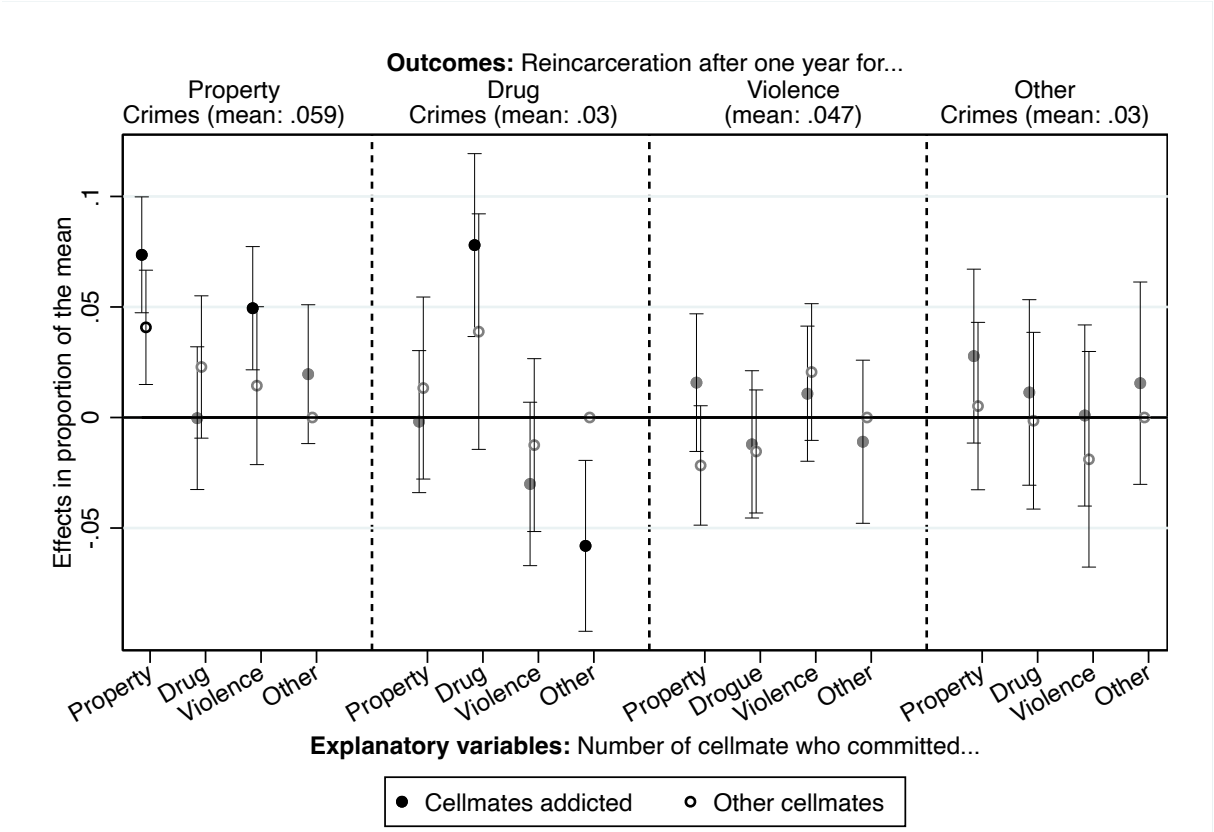
Notes:

Figure E.3: *Effect of the number of cellmates with addiction problems or not on re-incarceration for different crimes*



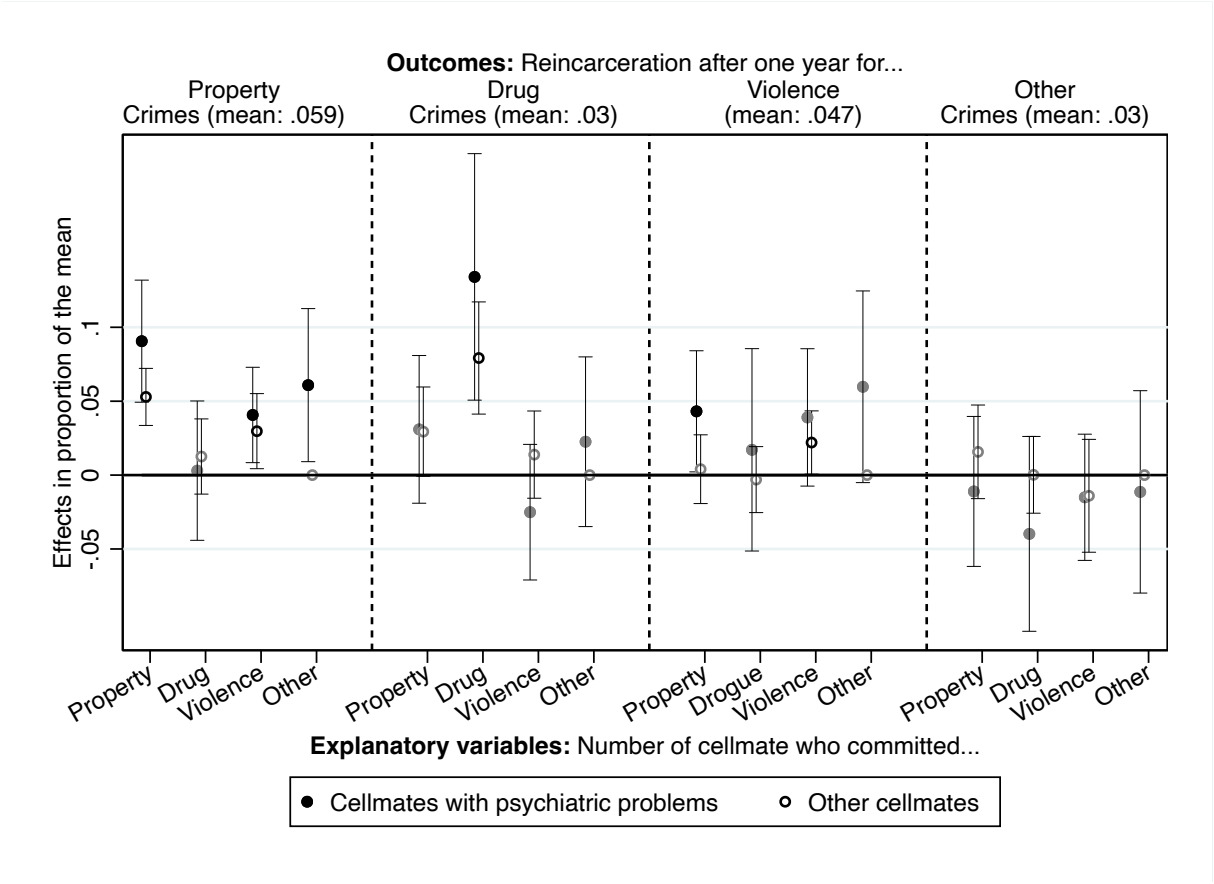
Notes:

Figure E.4: *Effect of the number of cellmates with addiction problems or not on re-incarceration for different crimes*



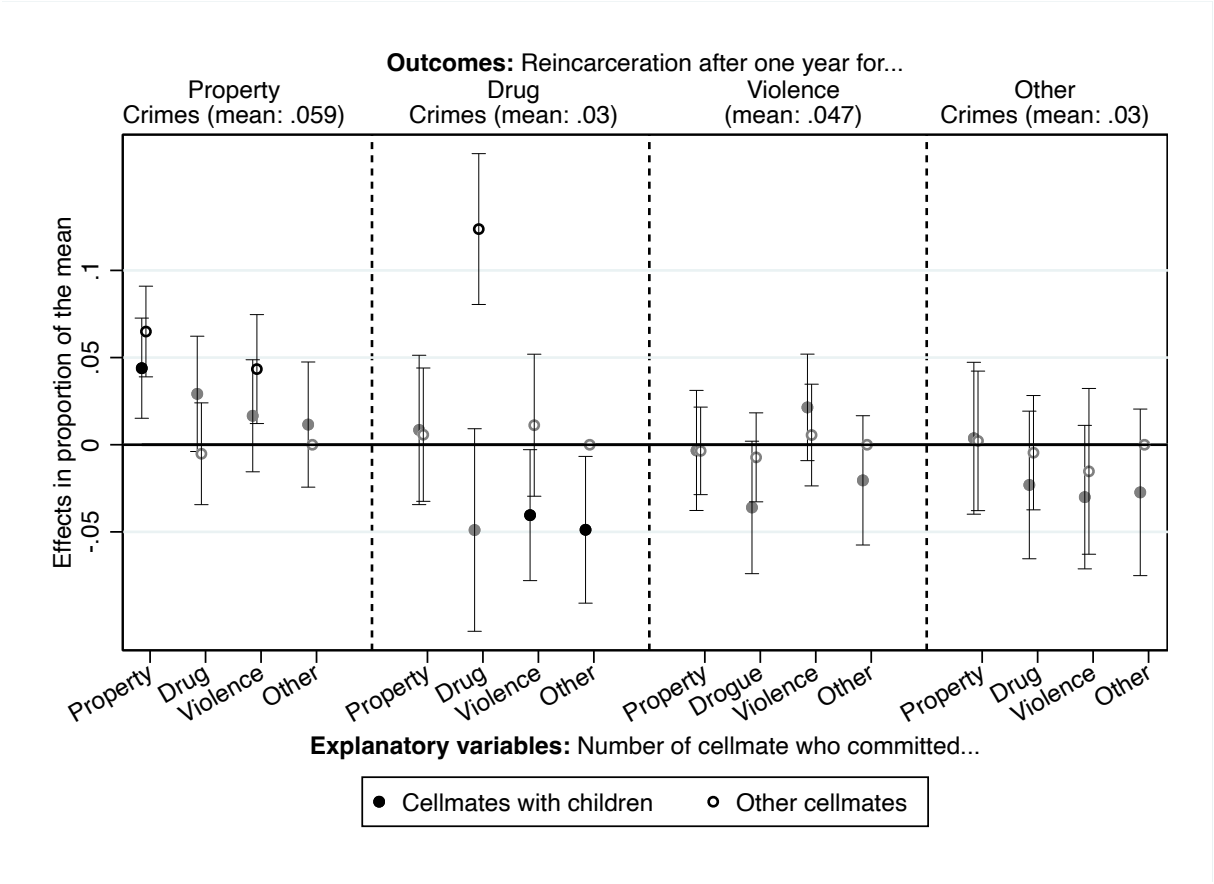
Notes:

Figure E.5: *Effect of the number of cellmates with past mental health issues or not on re-incarceration for different crimes*



Notes:

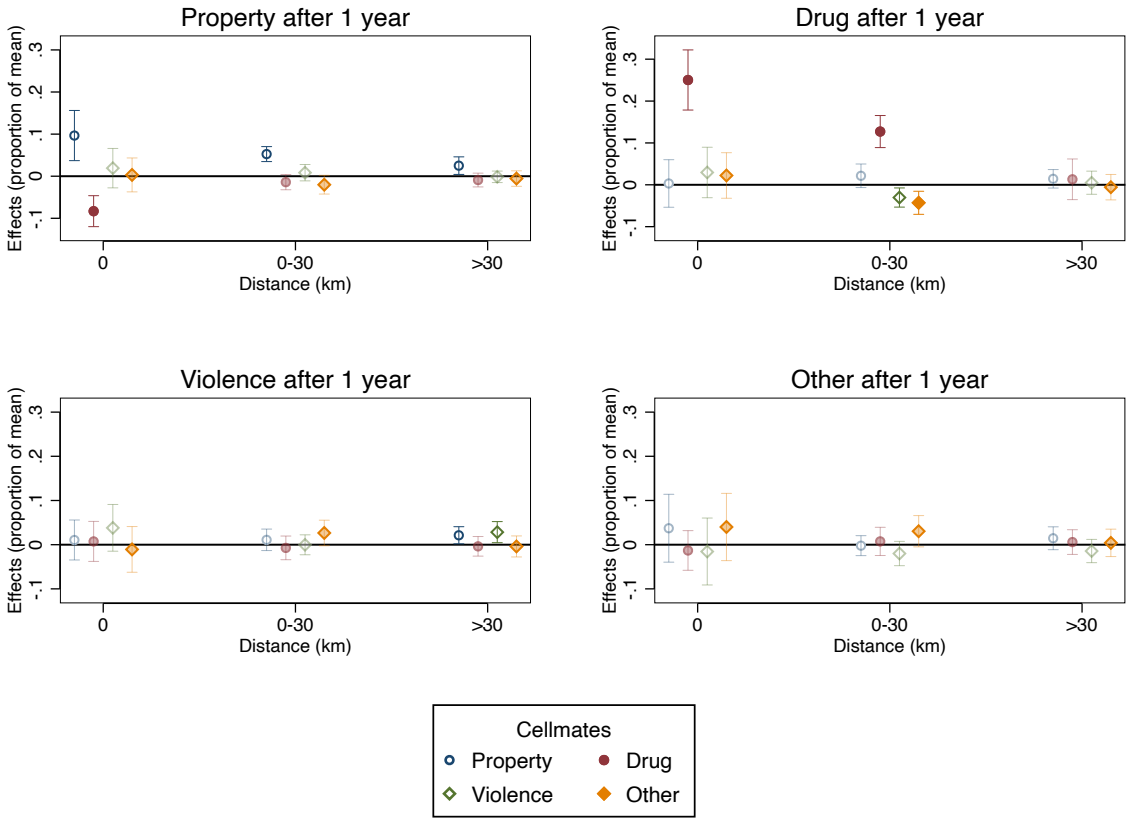
Figure E.6: *Effect of the number of cellmates with children or not on re-incarceration for different crimes*



Notes:

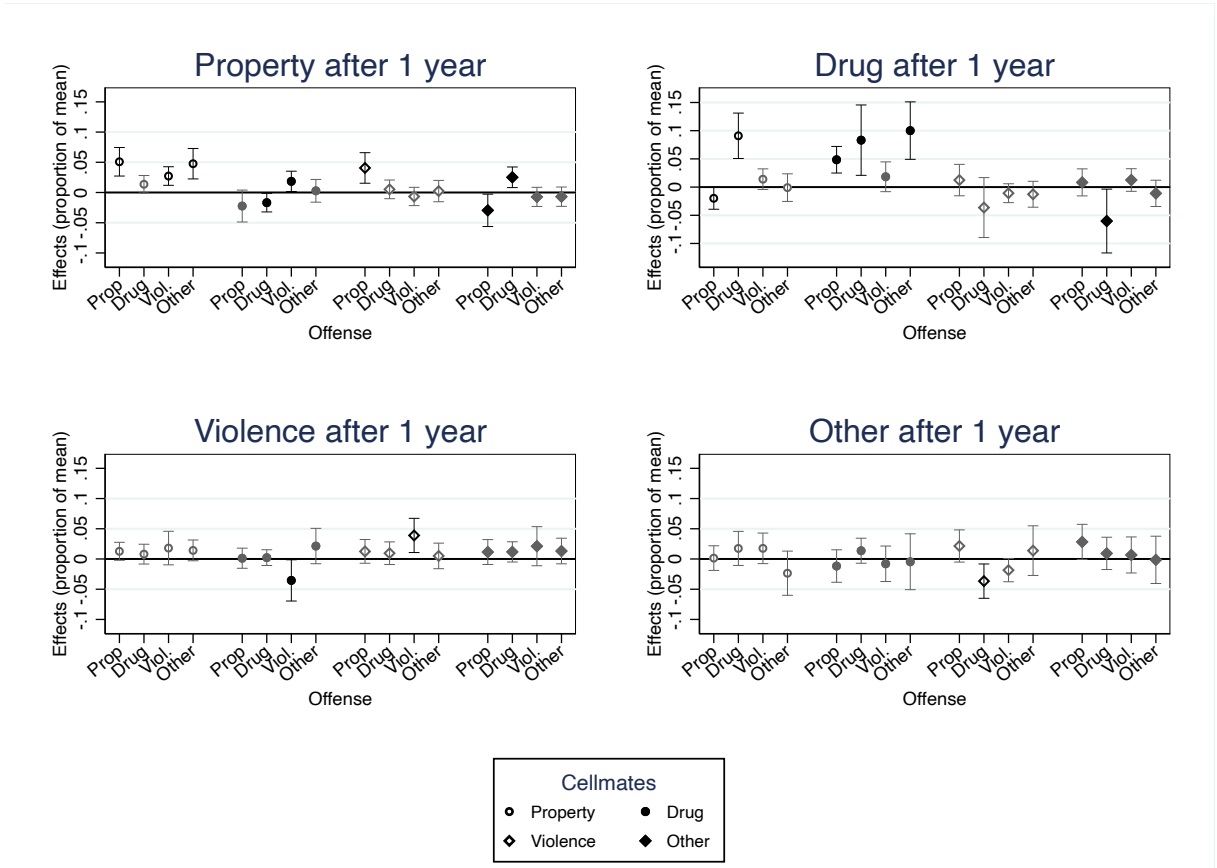
F Heterogeneity

Figure F.1: *Effect of the number of cellmates of different types on re-incarceration for different crimes, by distance*



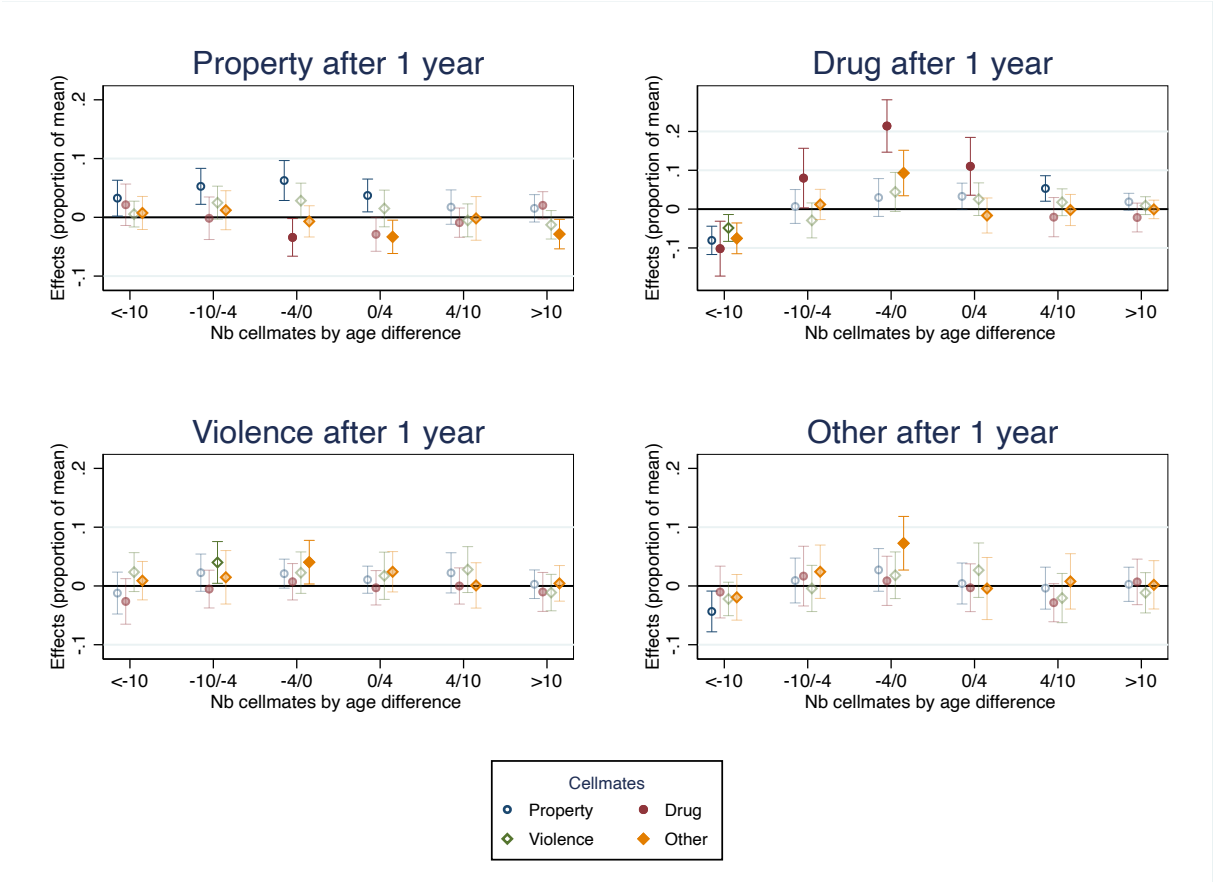
Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for a crime of the type indicated in the header. Each sub-graph presents the results from one regression that includes baseline controls for characteristics observed at the entry into prison. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure F.2: *Effect of the number of cellmates of different types on re-incarceration for different crimes, depending on own crime type*



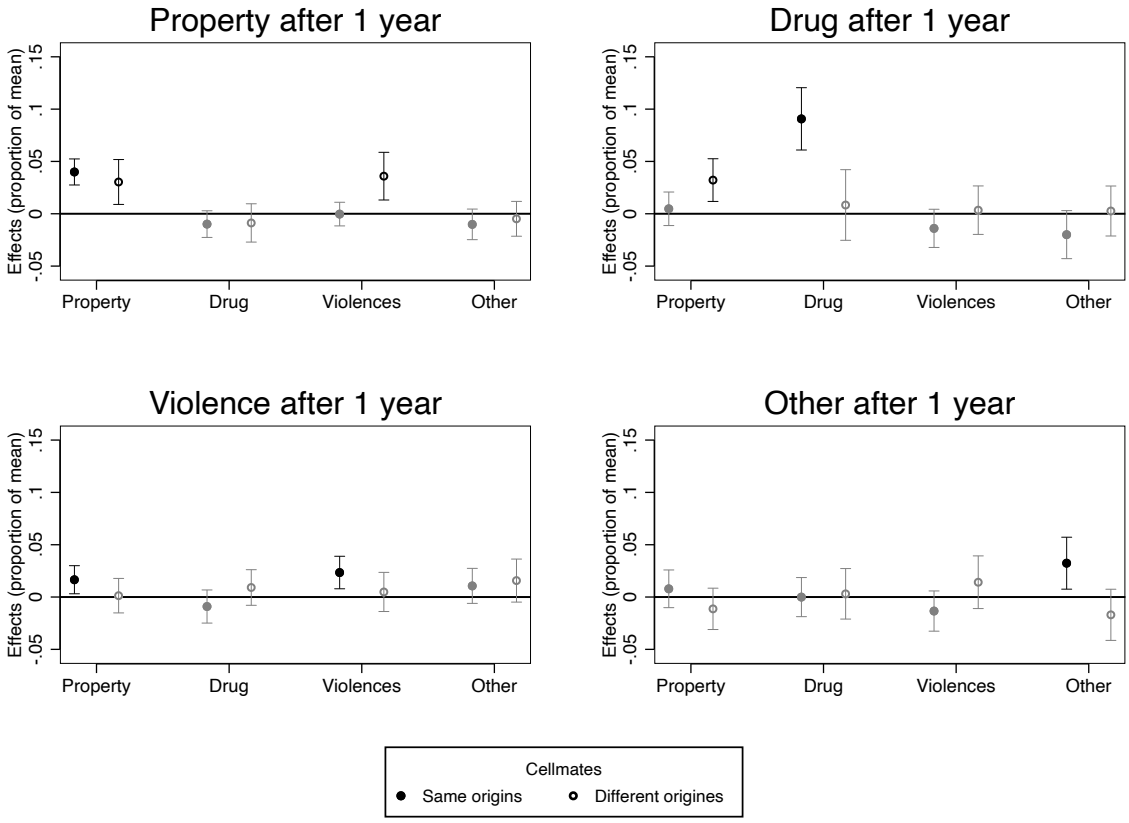
Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. Coefficients from three sets of four regressions (one per type of re-incarceration) are presented. The first set – whose coefficients are presented with black dots – includes baseline controls for characteristics observed at the entry in prison. The second set – whose coefficients are presented with empty dots – includes baseline controls plus fixed effects for the number of cellmates encountered in prison. Lastly, the third set – whose coefficients are presented with black triangles – includes baseline controls, fixed effects for the number of cellmates encountered in prison, and controls for the time spent with cellmates of each type. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure F.3: *Effect of the number of cellmates of different types on re-incarceration for different crimes, heterogeneity by age difference*



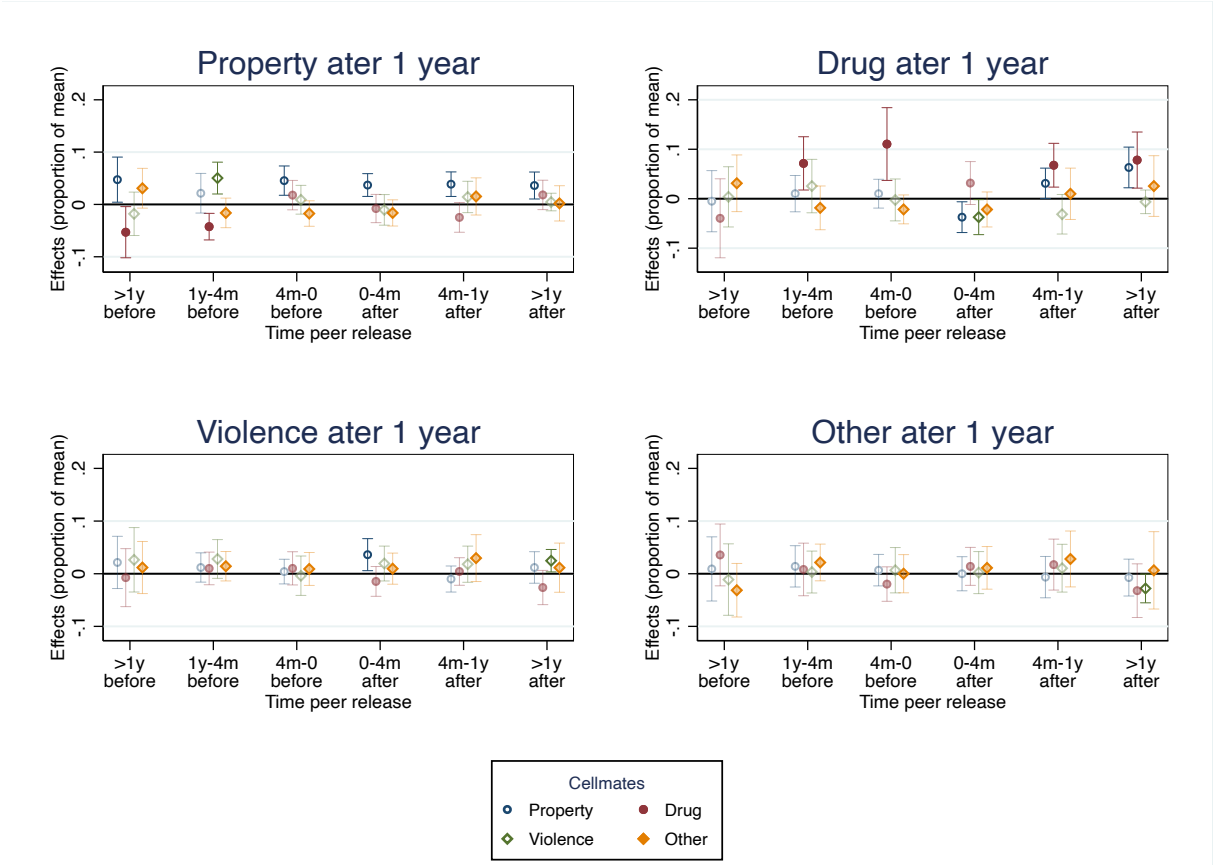
Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. Coefficients from three sets of four regressions (one per type of re-incarceration) are presented. The first set – whose coefficients are presented with black dots – includes baseline controls for characteristics observed at the entry in prison. The second set – whose coefficients are presented with empty dots – includes baseline controls plus fixed effects for the number of cellmates encountered in prison. Lastly, the third set – whose coefficients are presented with black triangles – includes baseline controls, fixed effects for the number of cellmates encountered in prison, and controls for the time spent with cellmates of each type. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure F.4: *Effect of the number of cellmates of different types on re-incarceration for different crimes, heterogeneity by origin*



Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. Coefficients from three sets of four regressions (one per type of re-incarceration) are presented. The first set – whose coefficients are presented with black dots – includes baseline controls for characteristics observed at the entry in prison. The second set – whose coefficients are presented with empty dots – includes baseline controls plus fixed effects for the number of cellmates encountered in prison. Lastly, the third set – whose coefficients are presented with black triangles – includes baseline controls, fixed effects for the number of cellmates encountered in prison, and controls for the time spent with cellmates of each type. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.

Figure F.5: *Effect of the number of cellmates of different types on re-incarceration for different crimes, heterogeneity by date of release*



Notes: This Figure presents the correlation between the number of cellmates convicted for the type of crime indicated in the x-label and re-incarceration after 1 year for the type of crime indicated in the header. Coefficients from three sets of four regressions (one per type of re-incarceration) are presented. The first set – whose coefficients are presented with black dots – includes baseline controls for characteristics observed at the entry in prison. The second set – whose coefficients are presented with empty dots – includes baseline controls plus fixed effects for the number of cellmates encountered in prison. Lastly, the third set – whose coefficients are presented with black triangles – includes baseline controls, fixed effects for the number of cellmates encountered in prison, and controls for the time spent with cellmates of each type. Bars present 95% confidence intervals. Standard errors are clustered at the prison level.