# Peer effects in Prison

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## Motivation: The social nature of criminal behavior

- ▶ Criminal activity = group phenomenon, rooted in the social networks of individuals: school, prison peers, racial and immigrant groups (Ludwig et al., 2001; Haynie, 2001; Warr et al., 2002; Kling et al., 2005; Bayer et al., 2009; Deming, 2011; Patacchini and Zenou, 2008; Philippe, 2017; Bhuller et al., 2018)
- ▶ Criminal peers / network beneficial to:
  - Transmit information about crime opportunities
  - Connect buyers and sellers
  - Provide information on who to trust
  - Learning skills
  - Contract enforcement via threat of retaliation

## Research questions and contribution

1. What is the effect of co-inmates' characteristics on recidivism?
2. What is the impact of prison on formation/development of criminal networks?

Empirical challenges:

- ▶ Prison population is non-randomly selected
- ▶ Exposure to a given co-inmate is non-random:
- ▶ Data limitations: Criminal data often not linked to broad set of individual characteristics, co-offending not observed

## Literature and contributions

Co-inmates known to affect future criminal behavior (see e.g. Bayer et al. (2009) or Stevenson (2017))

Contributions:

- ▶ Arguably exogenous variation in (length of) exposure to co-inmates
- ▶ High-quality data on criminal activity (all suspects)
- ▶ Disentangle channels between learning of criminal skills; network formation; social contagion of crime-oriented attitudes
- ▶ Measure networks through co-offending

$\rightarrow$ Can we change the composition of co-inmates to reduce recidivism and network formation?

# Data

- Criminal charges and convictions: Person ID, case ID, crime type, crime date, municipality, court decision, decision date, sentence length, conviction date
  $\rightarrow$ measure re-offending and past offences
  $\rightarrow$ construct networks based on co-offenders

- Imprisonments: person ID, prison ID, entry and exit dates, type of imprisonment
  $\rightarrow$ identify co-inmates and number of days of overlap

## Setting - Norwegian prisons and inmates

Norway has 56 prisons with currently around 3000 inmates

▶ Small prisons (mean size=68, median=47) with short spells (mean prison spell length = 79 days).

▶ Almost all prison cells are individual: prison ID

▶ Rehabilitation-focused system with opportunities for interactions (e.g. mandatory work, education or other program)

▶ Inmates' allocation based on:
  ▪ Geography
  ▪ Sentence length (high- vs. low-security prisons)
  ▪ Gender

**Bergen prison (Mixed security, 221 men and women)**

# Typical prison cell

# Typical common areas

## Setting

▶ Sample of 154,441 prison spells in 56 prisons between 2000-2010
  Descriptives

▶ For each focal inmate $i$ in prison spell $s$, we select all co-inmates $j$ with at least one day of overlap in the same facility

▶ Compute weighted average of peers' characteristics with weights = number of days of overlap $\rightarrow$ Pair data collapsed to have one observation at the inmate $i \times$ spell $s$ level

▶ We estimate the effect, for inmate $i$, of exposure to a pool of co-inmates, on recidivism

## Regression model

$$Y_{ifyc} = \beta_0 + \beta_1 P_{ifyc} + \beta_2 X_i + \beta_3 \widetilde{X}_i + \alpha_{fcy} + \nu_{ifyc} \tag{1}$$

- $Y_{ifyc}$: Outcome of inmate $i$ who entered prison $f$ in year $y$ for type of crime $c$.
- $P_{ifyc}$: Weighted average of peer characteristic (weight = nmb overlap days)
- $X_i$: set of individual pre-determined characteristics (age, sex, married, spell length, severity of the crime, type of crime, number of charges in the past 5 years)
- $\widetilde{X}_{j(s')}$: controls for peer characteristics (weighted average)
- $\alpha_{fcy}$ a facility-by-type-of-crime-by-year fixed-effect
- Standard errors clustered at the prison level

## Identifying assumption

▶ Fixed effects account for the fact that:
  - Criminals are not allocated randomly to facilities
  - There are time trends in crime that may be specific to types of crime or facilities
  - Use of the remaining variation from the high turnover of inmates

▶ Identifying assumption: *the timing of inmates' entry to a given facility in a given year is conditionally random*

▶ Peers' criminal experience measured as the **number of arrests in the five years before incarceration** <span style="background:#ccc">Why</span> <span style="background:#ccc">Distribution</span>

▶ Randomization test (following Bayer et al. (2009)): <span style="background:#ccc">Table</span>
  - Predict the probability of being charged within 1 year after prison entry using the age, sex, marital status and crime severity of the peer, and FEs
  - Regress this prediction on the weighted average of peer characteristic

# Peer effect of co-inmates criminal history on recidivism

**Figure 1:** Extensive margin
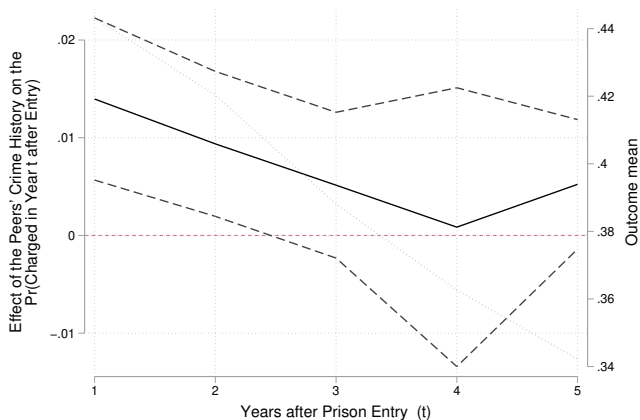
# Peer effect of co-inmates criminal history on recidivism

**Figure 2:** Intensive margin   `Table`   `Employment`   `Deciles`   `Cumulative`
`Heterogeneity`   `Top criminals`
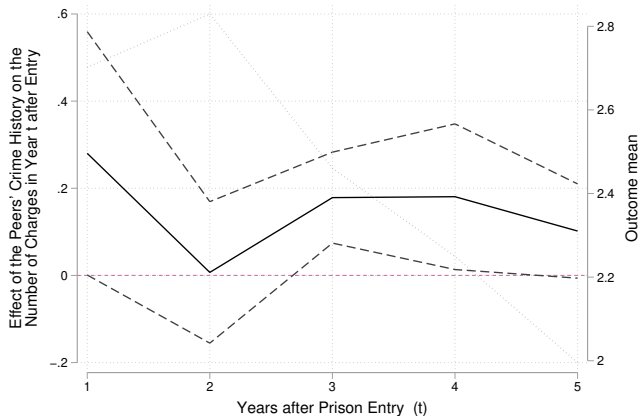


*NOTE:* Sample of prison spells that started between 2000 and 2010. 90% confidence intervals. Standardized independent variable. Outcome mean is equal to 2.6 the first year and 1.9 the fifth year post incarceration.

**Peer effect of co-inmates criminal history on recidivism**

- A 1-sd increase in peers' criminal experience leads to a **6% increase** in the number of charges within the next 5 years

- Significant effect of being exposed to a **top criminal**, even controlling for the average criminal experience in the pool of peers

- Larger effect if peers share some similarities or if the focal inmate is **himself experienced** $\rightarrow$ network mechanism?

## Descriptive statistics

**Figure 3:** Association between future common charge and overlap
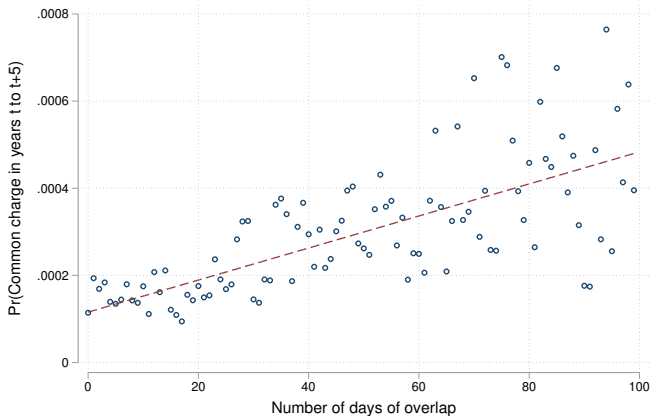


*NOTE:* Sample of spells between 2000 and 2010, excluding past cooffenders.

# Effect of overlapping on future common charges

**Table 1:** Probability of having a common charge in year 1 to 5 after incarceration (dummy) `Randomization`

Past cooffender `Continuous` `Aggregated` `Peers' network` `Prisons characteristics`

| | Co-offence in years t to t+5 | | | |
|---|---|---|---|---|
| Overlap (dummy)=1 | 0.000118*** | 0.000080*** | 0.000064*** | 0.000062*** |
| | (0.000003) | (0.000004) | (0.000010) | (0.000010) |
| Relative effect (%) | 76% | 47% | 39% | 38% |
| Controls | - | Yes | Yes | Yes |
| Spell FE | - | - | Yes | - |
| Peer's type of crime FE | - | - | Yes | - |
| Spell-by-Peer's type of crime FE | - | - | - | Yes |
| Peer's entry month FE | - | - | - | Yes |
| Outcome mean | 0.000156 | 0.000172 | 0.000164 | 0.000164 |
| Observations | 67985021 | 59068190 | 63251605 | 63245337 |

*\* p<0.1, \*\* p<0.05, \*\*\* p<0.01. Standard errors clustered at the prison spell level in parentheses.*
This table reports the coefficients measuring the effect of the spending some time in prison (dummy variable) with an inmate on the probability of having a common charge within 5 years after incarceration. The regression is run at the pair level.

# Heterogeneity: same peer group



90% confidence intervals.

# Heterogeneity: same peer group
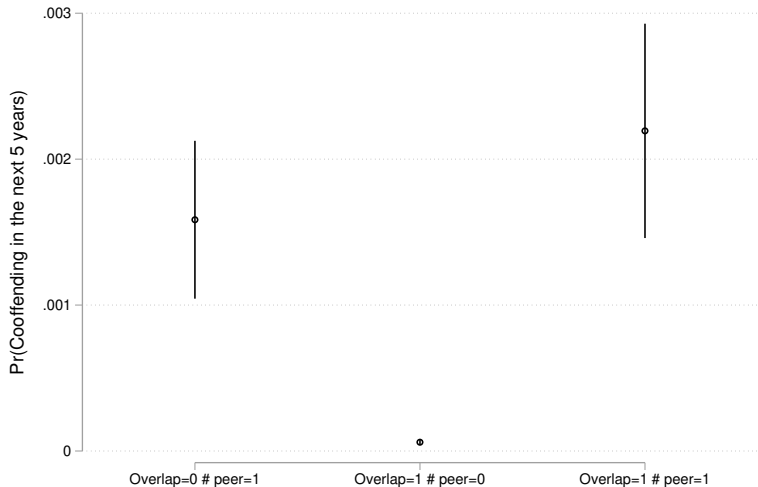


90% confidence intervals. Peer equals 1 means that the pair of inmates belongs to the same age range, have the same country of birth, committed the same type of crime and are from the same municipality.

# Conclusion and next steps

- ▶ Novel causal evidence on peer effects among co-inmates and criminal network formation leveraging **exogenous variation in exposure to other criminals in prison**
- ▶ Peer effect: Being exposed to more experienced co-inmates increases likelihood of recidivism
- ▶ Network effect: Being exposed to a given criminal in prison increases likelihood of co-offending with him
- ▶ Next steps:
  - Extend network analysis: $3^{rd}$-order links, family, schoolmates; importance of position in network
  - Shed light on **optimal composition of inmates** to minimize risk of recidivism and network formation (Graham et al., 2020)

**Bayer, Patrick, Randi Hjalmarsson, and David Pozen**, "Building criminal capital behind bars: Peer effects in juvenile corrections," *The Quarterly Journal of Economics*, 2009, *124* (1), 105–147.

**Bhuller, Manudeep, Gordon B Dahl, Katrine V Løken, and Magne Mogstad**, "Incarceration spillovers in criminal and family networks," Technical Report, National Bureau of Economic Research 2018.

**Deming, David J**, "Better schools, less crime?," *The Quarterly Journal of Economics*, 2011, *126* (4), 2063–2115.

**Graham, Bryan S, Geert Ridder, Petra M Thiemann, and Gema Zamarro**, "Teacher-to-classroom assignment and student achievement," Technical Report, National Bureau of Economic Research 2020.

**Haynie, Dana L**, "Delinquent peers revisited: Does network structure matter?," *American journal of sociology*, 2001, *106* (4), 1013–1057.

**Kling, Jeffrey R, Jens Ludwig, and Lawrence F Katz**, "Neighborhood effects on crime for female and male youth: Evidence from a randomized housing voucher experiment," *The Quarterly Journal of Economics*, 2005, *120* (1), 87–130.

**Ludwig, Jens, Greg J Duncan, and Paul Hirschfield**, "Urban poverty and juvenile crime: Evidence from a randomized housing-mobility experiment," *The Quarterly Journal of Economics*, 2001, *116* (2), 655–679.

**Patacchini, Eleonora and Yves Zenou**, "The strength of weak ties in crime," *European Economic Review*, 2008, *52* (2), 209–236.

**Philippe, Arnaud**, "Incarcerate one to calm the others? Spillover effects of incarceration among criminal groups," 2017.

**Stevenson, Megan**, "Breaking bad: Mechanisms of social influence and the path to criminality in juvenile jails," *Review of Economics and Statistics*, 2017, *99* (5), 824–838.

**Warr, Mark et al.**, *Companions in crime: The social aspects of criminal conduct*, Cambridge University Press, 2002.

## Regression model - network effect

$$Y_{i(s)j(s')f} = \beta_0 + \beta_1 Overlap_{i(s)j(s')f} + \beta_2 \widetilde{X}_{j(s')} + \alpha_i(s) + \nu_{i(s)j(s')f} \qquad (2)$$

▶ $Y_{i(s)j(s')f}$: Outcome of inmate $i$ in spell $s$ matched with inmate $j$ in spell $s'$ in facility $f$.

▶ $\widetilde{X}_{j(s')}$: controls for peer characteristics

▶ $Overlap_{i(s)j(s')f}$: Overlap between $(i,j)$, defined as:
  1. (i) Number of days of overlap (including 0), or
  2. (ii) Dummy equal to 1 if there is at least one day of overlap.

▶ $\alpha_i(s)$ spell FE

▶ Standard errors clustered at the prison level

Exclude peers who had common charge in the last 5 years not to capture effects among members of pre-existing networks.
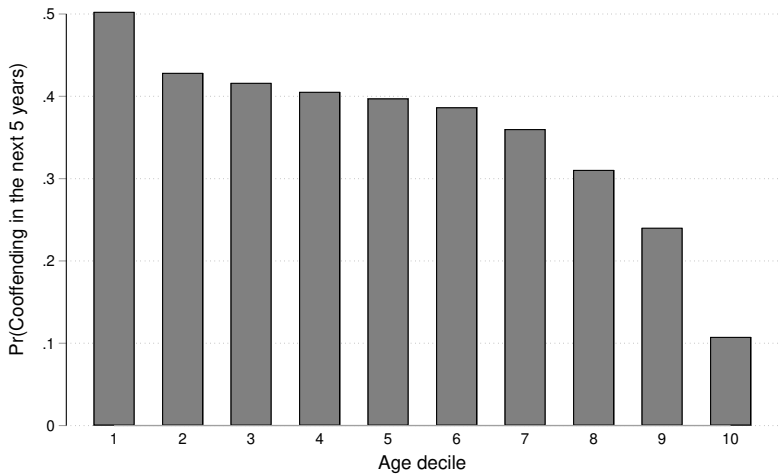
Mean: .359

Mean: .359
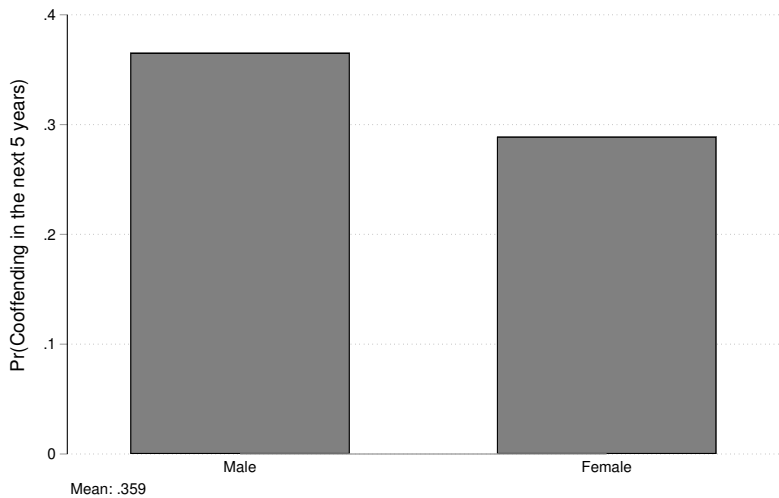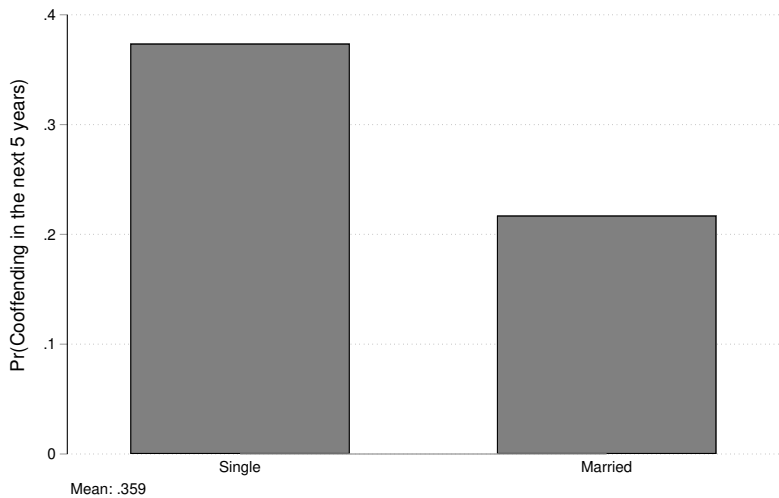
## Table 2: Descriptive statistics  Back

| | Focal inmate characteristics | | | | |
| --- | --- | --- | --- | --- | --- |
| | mean | p10 | p50 | p75 | sd |
| Age | 32.4 | 20 | 30 | 39 | 10.8 |
| Female | 0.077 | | | | 0.27 |
| Married | 0.091 | | | | 0.29 |
| Foreign-born | 0.131 | | | | 0.34 |
| Number of charges years 1 to 5 before spell | 19 | 1 | 9 | 26 | 35 |
| Own violent crime | 0.21 | | | | 0.41 |
| Own property crime | 0.20 | | | | 0.40 |
| Own economic crime | 0.09 | | | | 0.28 |
| Own drug crime | 0.19 | | | | 0.40 |
| Own other crime | 0.11 | | | | 0.31 |
| Own traffic crime | 0.20 | | | | 0.40 |
| | Spell characteristics | | | | |
| Prison spell length (days) | 79 | 9 | 31 | 74 | 158 |
| Number of peers | 194 | 38 | 132 | 224 | 236 |
| Observations | 154441 | | | | |

# Descriptive statistics

**Figure 4:** Distribution of the number of days of overlap
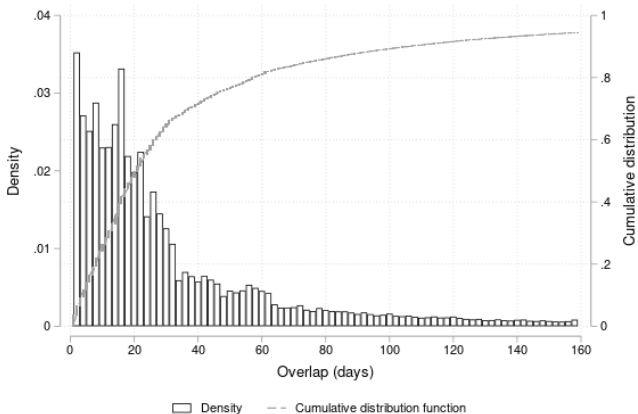


*NOTE: Distribution of the number of days of overlap if overlap>0.*

# Distribution of peers' crime experience <span>Back</span>



| Raw data | Controlling for fixed effects |
|---|---|

Density

Weighted average of peers' number of
arrests in last 5 years

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Weighted average of peers' number of
arrests in last 5 years
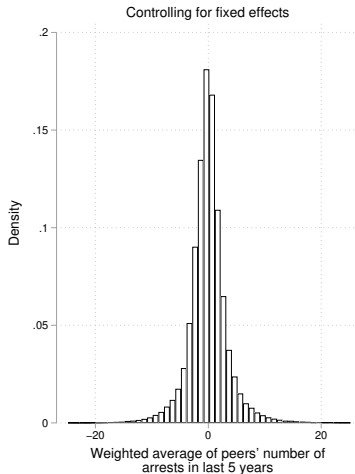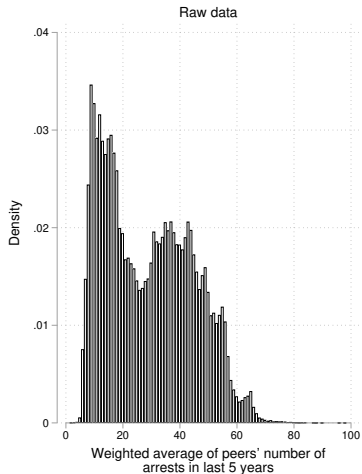
## Which peer characteristics matter?

Focus on **peers' criminal experience** measured as the **number of arrests in the five years before incarceration** ( Back )

- ▶ Captures every interaction with police even if not charged or charge dismissed
- ▶ Index correlated with different dimensions that may influence peers' criminal behavior (age, likelihood of reoffending, type of crime)
- ▶ Easily observable by policymakers

## Table 3: Randomization test  `Back`

| | Pr(Charged within 5 years after incarceration) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Weighted average of peers' suspected crimes in the last 5y | 0.00055*** | 0.00342*** | 0.00236*** | -0.00009 | 0.00034 | -0.00016 | -0.00011 | 0.00009 | -0.00019 |
| | (0.00016) | (0.00026) | (0.00015) | (0.00010) | (0.00026) | (0.00027) | (0.00007) | (0.00012) | (0.00020) |
| Socio-Demographics | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Current Spell Characteristics | - | Yes | Yes | - | Yes | Yes | - | Yes | Yes |
| Crime History | - | - | Yes | - | - | Yes | - | - | Yes |
| Facility-by-Year FE | - | - | - | Yes | Yes | Yes | - | - | - |
| Facility-by-Type-of-crime-by-Year FE | - | - | - | - | - | - | Yes | Yes | Yes |
| Outcome mean | 0.7006 | 0.7031 | 0.7031 | -0.2680 | -0.3289 | -0.2374 | -0.2310 | -0.3380 | -0.2853 |
| Observations | 149541 | 145012 | 145012 | 149541 | 145012 | 145012 | 144920 | 144920 | 144920 |

*p<0.1, ** p<0.05, *** p<0.01. Standard errors clustered at the prison level in parentheses.

**Table 4:** Randomization test

|                        | # of coinmates |            |
|------------------------|---------------|------------|
| Age                    | .0006244      | .0945691   |
|                        | (.0765083)    | (.0913057) |
| Female                 | -.8163003     | 1.444513   |
|                        | (6.740023)    | (6.305879) |
| Foreign-born           | .2612641      | -.2056992  |
|                        | (1.383832)    | (1.597909) |
| Married                | -.9980735     | -1.743448* |
|                        | (1.087976)    | (.973421)  |
| Property crime         |               | .7656358   |
|                        |               | (3.495318) |
| Economic crime         |               | -1.717876  |
|                        |               | (1.444364) |
| Drug crime             |               | -2.745083  |
|                        |               | (3.922822) |
| Traffic crime          |               | -15.49957***|
|                        |               | (3.776507) |
| Other crime            |               | -9.358682***|
|                        |               | (1.98147)  |
| Severity of the crime  |               | .0744433   |
|                        |               | (.0532091) |
| Spell length controls  | Yes           | Yes        |
| Prison-by-Year FE      | Yes           | Yes        |
| Observations           | 149489        | 144966     |

* p<0.1, ** p<0.05, *** p<0.01. Standard errors clustered at the facility level in parentheses.

# Peer effect of co-inmates criminal history on recidivism

**Table 5:** Extensive margin  `Back`

| | Pr(Ever charged in year 1 to 2 after prison entry) | | Pr(Ever charged in year 1 to 5 after prison entry) | | |
| --- | --- | --- | --- | --- | --- |
| | | | | | standardized |
| Weighted average of peers' suspected crimes in the last 5y | 0.00868*** | 0.00072*** | 0.00734*** | 0.00070*** | 0.01097*** |
| | (0.00008) | (0.00025) | (0.00007) | (0.00022) | (0.00341) |
| Controls | - | Yes | - | Yes | Yes |
| Facility-by-Type-of-crime-by-Year FE | - | Yes | - | Yes | Yes |
| Outcome mean | 0.5698 | 0.5698 | 0.7032 | 0.7032 | 0.7032 |
| Observations | 144760 | 144756 | 144760 | 144756 | 144756 |

* p<0.1, ** p<0.05, *** p<0.01. Standard errors clustered at the prison level in parentheses.

# Peer effect of co-inmates criminal history on recidivism

**Table 6:** Intensive margin

|  | Number of charges in years 1 to 2 after prison entry | | Number of charges in years 1 to 5 after prison entry | | standardized |
|---|---|---|---|---|---|
| Weighted average of peers' suspected crimes in the last 5y | 0.18708*** | 0.01846 | 0.39151*** | 0.04816*** | 0.75176*** |
|  | (0.00336) | (0.01275) | (0.00502) | (0.01723) | (0.26890) |
| Controls | - | Yes | - | Yes | Yes |
| Facility-by-Type-of-crime-by-Year FE | - | Yes | - | Yes | Yes |
| Outcome mean | 5.5340 | 5.5341 | 12.2421 | 12.2418 | 12.2418 |
| Observations | 144760 | 144756 | 144760 | 144756 | 144756 |

* p<0.1, ** p<0.05, *** p<0.01. Standard errors clustered at the prison level in parentheses.

# Effect of peers' criminal experience on employment

**Table 7:** Effect of peers' characteristics on employment  Back

| | Ever employed in the 5 years after incarceration | | | |
|---|---|---|---|---|
| Weighted average of peers' suspected crimes in the last 5y | -0.00724*** | -0.00110 | -0.00030 | -0.00471 |
| | (0.00008) | (0.00205) | (0.00030) | (0.00472) |
| Weighted proportion of peers of the same age | 0.52418*** | 0.05930** | 0.09297*** | 0.00908*** |
| | (0.01355) | (0.02370) | (0.01974) | (0.00193) |
| Weighted proportion of peers of the same country of birth | 0.03994*** | 0.01069 | 0.01946** | 0.00606** |
| | (0.00456) | (0.00890) | (0.00753) | (0.00234) |
| Controls | - | Yes | Yes | Yes |
| Facility-by-Month-Year FE | - | Yes | - | - |
| Facility-by-Type-of-crime-by-Year FE | - | - | Yes | Yes |
| Outcome mean | 0.3815 | 0.3815 | 0.3816 | 0.3816 |
| Observations | 134187 | 134177 | 134183 | 134183 |

* p<0.1, ** p<0.05, *** p<0.01. Standard errors clustered at the prison level in parentheses.
This table reports the coefficients measuring the effect of different peers' characteristics on the probability that the focal inmate is ever employed within five years after incarceration.

# Peer effect of co-inmates criminal history on recidivism

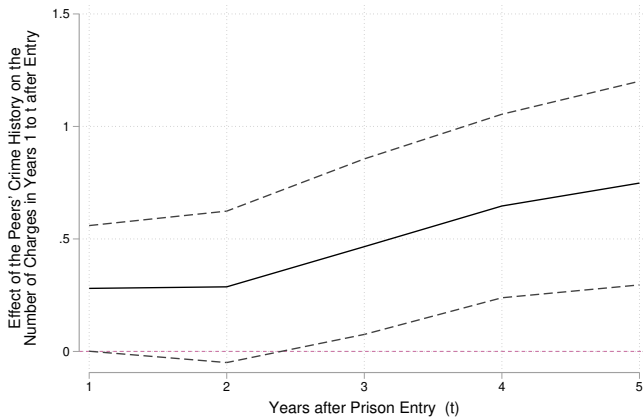**Figure 5:** Extensive margin  Back
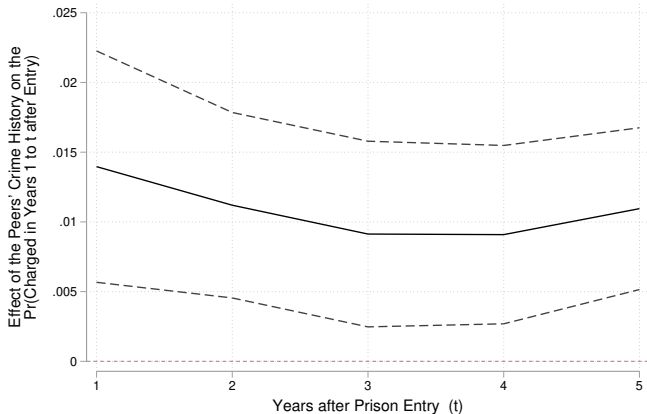


*NOTE:* Sample of prison spells that started between 2000 and 2010. 90% confidence intervals. Standardized independent variable. Outcome mean is equal to 0.6 after two years post incarceration and to 0.7 after five years post incarceration.

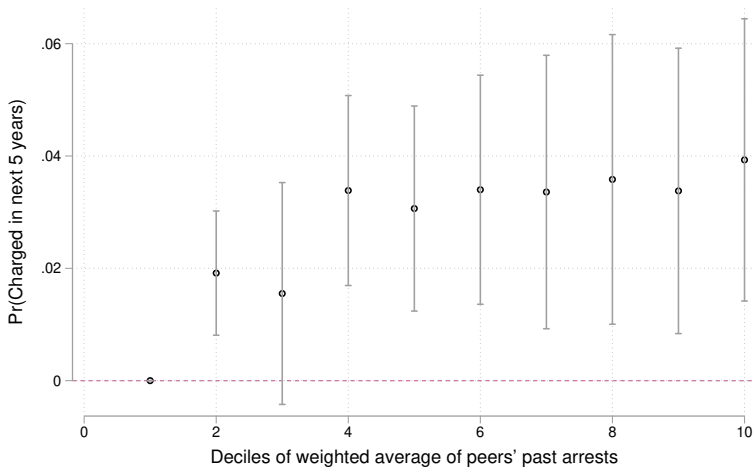# Peer effect of co-inmates criminal history on recidivism

**Figure 6:** Intensive margin

# Non linear effects  Back



Outcome mean: .6900000000000001

# Top criminals

**Table 8:** Effect of extreme values of peers' characteristics on Pr(Charged) within 5 years after incarceration  `Back`

| | Dummy: exposed to | | # days of exposure to | | Maximum peer's criminal experience | |
| --- | --- | --- | --- | --- | --- | --- |
| | a top 10% criminal | a top 1% criminal | top 10% criminals | top 1% criminals | Unweighted | Weighted |
| Extreme values of peers' suspected crimes in the last 5y | 0.00411 | 0.00573* | 0.00429** | 0.00268** | 0.00345** | 0.00209 |
| | (0.00416) | (0.00289) | (0.00179) | (0.00120) | (0.00145) | (0.00267) |
| Weighted average of peers' suspected crimes in the last 5y | 0.00068*** | 0.00064*** | 0.00071*** | 0.00071*** | 0.00052** | 0.00064** |
| | (0.00022) | (0.00022) | (0.00021) | (0.00021) | (0.00023) | (0.00025) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Facility-by-Type-of-crime-by-Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Outcome mean | 0.7032 | 0.7032 | 0.7032 | 0.7032 | 0.7032 | 0.7032 |
| Observations | 144753 | 144753 | 144756 | 144756 | 144756 | 144756 |

*\* $p<0.1$, \*\* $p<0.05$, \*\*\* $p<0.01$. Standard errors clustered at the prison level in parentheses.*
*This table reports the coefficients measuring the effect of different measure of peers' criminal experience on the probability that the focal inmate is charged within 5 years after incarceration. Continuous independent variables (columns (3)-(6)) are standardized.*

# Top criminals

**Table 9:** Effect of extreme values of peers' characteristics on Pr(Charged) within 5 years after incarceration

| | Baseline | Dummy: exposed to | | # days of exposure to | | Maximum peer's criminal experience | |
| | | a top 10% criminal | a top 1% criminal | top 10% criminals | top 1% criminals | Unweighted | Weighted |
|---|---|---|---|---|---|---|---|
| Peers' criminal experience | 0.01108*** | 0.00557 | 0.00680** | 0.00425** | 0.00264** | 0.00385** | 0.00269 |
| | (0.00344) | (0.00404) | (0.00287) | (0.00180) | (0.00121) | (0.00148) | (0.00259) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Facility-by-Type-of-crime-by-Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Outcome mean | 0.7032 | 0.7032 | 0.7032 | 0.7032 | 0.7032 | 0.7032 | 0.7032 |
| Observations | 144756 | 144753 | 144753 | 144756 | 144756 | 144756 | 144756 |

*\* $p<0.1$, \*\* $p<0.05$, \*\*\* $p<0.01$. Standard errors clustered at the prison level in parentheses.*
This table reports the coefficients measuring the effect of different measure of peers' criminal experience on the probability that the focal inmate is charged within 5 years after incarceration. Continuous independent variables (columns (1), (4)-(7)) are standardized.

# Heterogeneous effects
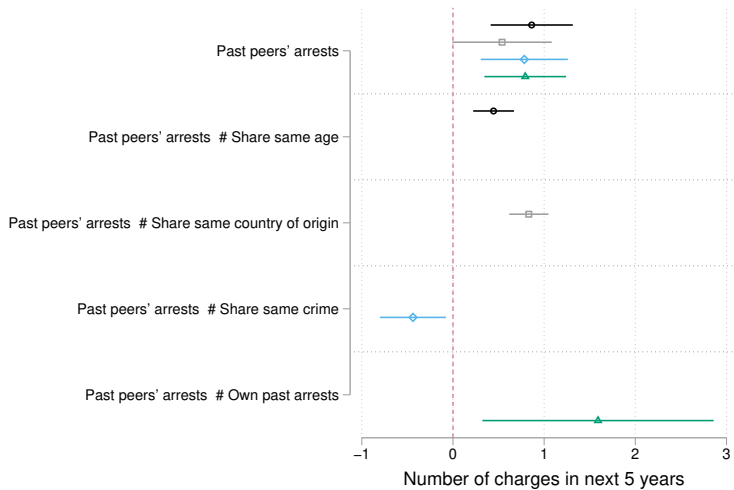


Back

# Effect of overlapping on future common charges

**Table 10:** Effect of overlapping on future common charges within 5 years - Likely cooffenders  (Back)

| | Unweighted | | | Weighted with mean # cooffenders | |
|---|---|---|---|---|---|
| Overlap | 0.03172*** | 0.02625*** | 0.02129*** | 0.02777*** | 0.02063** |
| | (0.00475) | (0.00618) | (0.00578) | (0.00769) | (0.00796) |
| Controls | - | Yes | Yes | Yes | Yes |
| Prison FE | | Yes | - | Yes | - |
| Spell FE | | - | Yes | - | Yes |
| Outcome mean | 0.037531 | 0.037531 | 0.037531 | 0.048812 | 0.048812 |
| Observations | 6368 | 6368 | 6368 | 6368 | 6368 |

*\* p<0.1, \*\* p<0.05, \*\*\* p<0.01. Standard errors clustered at the prison spell level in parentheses.*
This table reports the coefficients measuring the effect of the spending some time in prison (dummy variable) with an inmate on the probability of having a common charge within 5 years after incarceration. The regression is run at the spell×overlap dummy level.

# Randomization test

|  | Predicted Pr(Common charge within 1 year) | | | |
|---|---|---|---|---|
| Number of days of overlap | 2.17e-09 | | 1.72e-09 | |
|  | (1.67e-09) | | (1.71e-09) | |
| Overlap (dummy) | | 1.46e-07 | | 1.22e-07 |
|  | | (1.10e-07) | | (1.09e-07) |
|  | Predicted Pr(Common charge within 5 years) | | | |
| Number of days of overlap | 2.60e-10 | | -4.76e-10 | |
|  | (4.74e-09) | | (4.89e-09) | |
| Overlap | | 2.18e-07 | | 1.84e-07 |
|  | | (2.99e-07) | | (2.99e-07) |
| Controls | Yes | Yes | Yes | Yes |
| Spell FE | - | - | Yes | Yes |
| Peer's type of crime FE | - | - | Yes | Yes |
| Spell-by-Peer's type of crime FE | Yes | Yes | - | - |
| Peer's entry month FE | Yes | Yes | Yes | Yes |
| Outcome mean | | | | |
| Observations | 47850327 | 47850327 | 47857905 | 47857905 |

*\* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Standard errors clustered at the facility level in parentheses.*

# Effect of overlapping on future common charges

**Table 12:** Effect of overlapping on future common charges within 5 years - Previous co-offenders ⬤Back

| | Co-offence in years t to t+5 | | | |
|---|---|---|---|---|
| Overlap=1 | 0.008491** | 0.011402*** | 0.017365** | 0.000642 |
| | (0.003967) | (0.004253) | (0.007170) | (0.012510) |
| Controls | - | Yes | Yes | Yes |
| Spell FE | - | - | Yes | - |
| Peer's type of crime FE | - | - | Yes | - |
| Spell-by-Peer's type of crime FE | - | - | - | Yes |
| Peer's entry month FE | - | - | - | Yes |
| Outcome mean | 0.049984 | 0.050151 | 0.045768 | 0.040343 |
| Observations | 12224 | 11625 | 4938 | 2801 |

*\* p<0.1, \*\* p<0.05, \*\*\* p<0.01. Standard errors clustered at the prison spell level in parentheses.*
This table reports the coefficients measuring the effect of the spending some time in prison (dummy variable) with an inmate on the probability of having a common charge within 5 years after incarceration. The regression is run at the inmate-coinmate pair level. The sample is restricted to pairs of previous co-offenders. Previous co-offenders are defined as individuals who cooffended between one and five years before incarceration, but not the year before incarceration.

**Table 13:** Probability of having a common charge in year 1 to 5 after incarceration (continuous)   Back

| | Co-offence in years t to t+5 | | | |
|---|---|---|---|---|
| Number of weeks of overlap | 0.00000780*** | 0.00000780*** | 0.00000768*** | 0.00000765*** |
| | (0.00000021) | (0.00000031) | (0.00000141) | (0.00000144) |
| Controls | - | Yes | Yes | Yes |
| Spell FE | - | - | Yes | - |
| Peer's type of crime FE | - | - | Yes | - |
| Spell-by-Peer's type of crime FE | - | - | - | Yes |
| Peer's entry month FE | - | - | - | Yes |
| Outcome mean | 0.000156 | 0.000172 | 0.000164 | 0.000164 |
| Observations | 67985021 | 59068190 | 63251605 | 63245337 |

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. Standard errors clustered at the prison spell level in parentheses.
This table reports the coefficients measuring the effect of the spending some time in prison (continuous variable in weeks) with an inmate on the probability of having a common charge within 5 years after incarceration. The regression is run at the pair level.

**Table 14:** Network effect: Effect of overlapping on co-offending within 5 years <span>Back</span>

|  | Unweighted | | | Weighted with mean # cooffenders | |
|---|---|---|---|---|---|
| Overlap | 0.01250*** | 0.01096*** | 0.00915*** | 0.01467*** | 0.01280*** |
|  | (0.00045) | (0.00222) | (0.00189) | (0.00247) | (0.00193) |
| Controls | - | Yes | Yes | Yes | Yes |
| Prison FE | | Yes | - | Yes | - |
| Spell FE | - | - | Yes | - | Yes |
| Outcome mean | 0.014193 | 0.014193 | 0.014193 | 0.019460 | 0.019460 |
| Observations | 280286 | 280286 | 280286 | 280286 | 280286 |

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01. Standard errors clustered at the prison spell level in parentheses.
This table reports the coefficients measuring the effect of the spending some time in prison (dummy variable) with an inmate on the probability of having a common charge within 5 years after incarceration. The regression is run at the spell × overlap dummy level.

# Effect of overlapping on future common charges with the network

**Table 15:** Probability of having a common charge with peer's past network in the 5 years after incarceration (dummy)  `Back`

| | Future charge with peer's past network | | | |
|---|---|---|---|---|
| Overlap=1 | 3.70e-06** | -8.34e-07 | 4.31e-07 | 7.07e-07 |
| | (1.75e-06) | (1.82e-06) | (1.01e-06) | (8.86e-07) |
| Controls | - | Yes | Yes | Yes |
| Spell FE | - | - | Yes | - |
| Peer's type of crime FE | - | - | Yes | - |
| Spell-by-Peer's type of crime FE | - | - | - | Yes |
| Peer's entry month FE | - | - | - | Yes |
| Outcome mean | 0.00001123 | 0.00001123 | 0.00001123 | 0.00001123 |
| Observations | 14960496 | 14960496 | 14960496 | 14960496 |

*p<0.1, ** p<0.05, *** p<0.01. Standard errors clustered at the prison spell level in parentheses.
This table reports the coefficients measuring the effect of the spending some time in prison (dummy variable) with an inmate on the probability of having a common charge with someone in his past network within 5 years after incarceration. The regression is run at the pair level.

# Heterogeneity: type of prison

**Table 16:** Characteristics of prisons with a high vs. low network effect  `Back`

|  | Top10 | Rest of the distribution | (1) - (2) |
|---|---|---|---|
| Closed prison | 0.200 | 0.588 | -0.388* |
|  |  |  | (0.231) |
| Prison size | 571.400 | 2972.235 | -2400.835* |
|  |  |  | (1338.324) |
| Share of violent offenders | 0.253 | 0.240 | 0.013 |
|  |  |  | (0.037) |
| Prison average severity of crimes | 131.110 | 114.511 | 16.599* |
|  |  |  | (9.469) |

*p<0.1, ** p<0.05, *** p<0.01. Standard errors in parentheses.
This table reports summary statistics comparing prisons where the effect of overlapping on cooffending is large versus prisons where the effect of overlapping is smaller.

**Table 17:** Probability of reoffending and co-offending in the next 5 years  `Randomization`

| | Pr(Reoffending within 5 years) | | Pr(Cooffending within 5 years) | |
|---|---|---|---|---|
| Standardized values of # coinmates | 0.0088*** | 0.0185*** | 0.0180*** | 0.0142*** |
| | (0.00124) | (0.00500) | (0.00131) | (0.00485) |
| Controls | - | Yes | - | Yes |
| Prison × Year FE | - | Yes | - | Yes |
| Outcome mean | 0.705 | 0.705 | 0.364 | 0.364 |
| Observations | 144544 | 144544 | 144544 | 144544 |

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01. *Standard errors clustered at the facility level in parentheses.*
The regression is run at the spell level. Controls include age, sex, married indicator, foreign-born indicator, type of crime, month of prison entry, duration of the spell, severity of the crime of the focal inmate and their weighted average value for coinmates. Weights are days of overlap.

# Effect with different peer groups



**Figure 7:** By groups of peers  `Back`
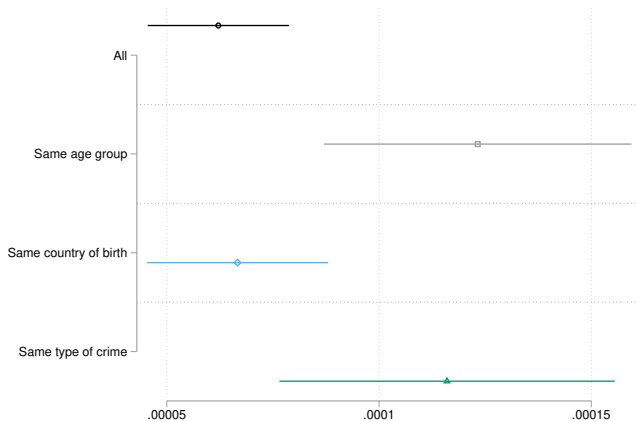
NOTE: Sample of spells between 2000-2010. 90% confidence intervals.

**Table 18:** Probability of having a common charge in year 1 to 5 after incarceration (dummy and continuous)

| | Co-offence in years t to t+5 | | | |
|---|---|---|---|---|
| Number of weeks of overlap | 0.00000547*** | 0.00000641*** | 0.00000674*** | 0.00000674*** |
| | (0.00000023) | (0.00000033) | (0.00000147) | (0.00000151) |
| Overlap (dummy)=1 | 0.00008346*** | 0.00005669*** | 0.00004076*** | 0.00003860*** |
| | (0.00000349) | (0.00000399) | (0.00001125) | (0.00001094) |
| Controls | - | Yes | Yes | Yes |
| Spell FE | - | - | Yes | - |
| Peer's type of crime FE | - | - | Yes | - |
| Spell-by-Peer's type of crime FE | - | - | - | Yes |
| Peer's entry month FE | - | - | - | Yes |
| Outcome mean | 0.000156 | 0.000172 | 0.000164 | 0.000164 |
| Observations | 67985021 | 59068190 | 63251605 | 63245337 |

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. Standard errors clustered at the prison spell level in parentheses.
This table reports the coefficients measuring the effect of the spending some time in prison (continuous and dummy variables) with an inmate on the probability of having a common charge within  years after incarceration. The regression is run at the pair level.
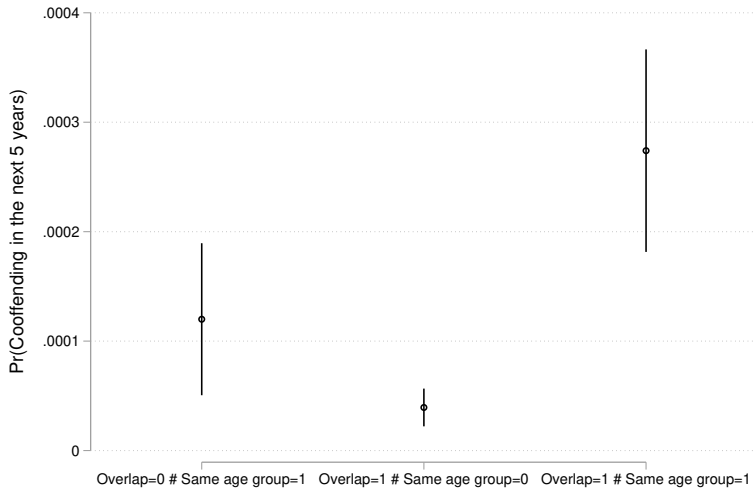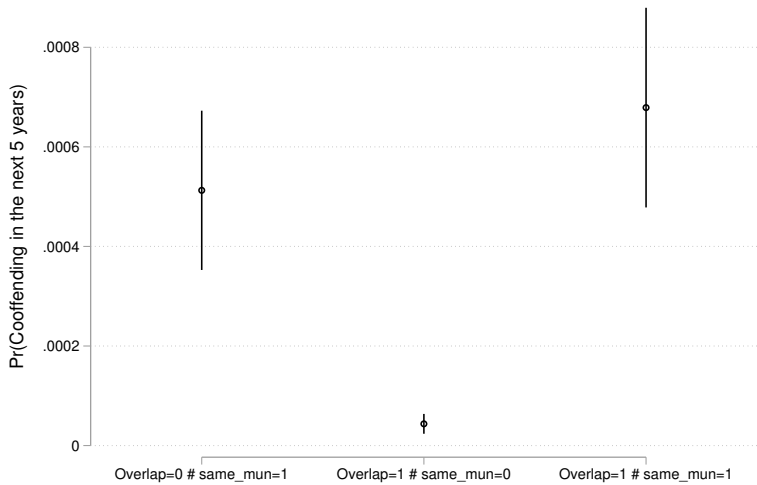
**Table 19:** Probability of having a common charge in year 1 to 5 after incarceration (4-m window around entry date)

| | Co-offence in years t to t+5 | Co-offence in years t to t+5 | Co-offence in years t to t+5 | Co-offence in years t to t+5 |
|---|---|---|---|---|
| Overlap=0 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| | (.) | (.) | (.) | (.) |
| Overlap=1 | 0.000135*** | 0.000079*** | 0.000063*** | 0.000063*** |
| | (0.000006) | (0.000006) | (0.000012) | (0.000013) |
| Controls | - | Yes | Yes | Yes |
| Spell FE | - | - | Yes | - |
| Peer's type of crime FE | - | - | Yes | - |
| Spell-by-Peer's type of crime FE | - | - | - | Yes |
| Peer's entry month FE | - | - | - | Yes |
| Outcome mean | 0.000175 | 0.000175 | 0.000175 | 0.000175 |
| Observations | 20969634 | 20969634 | 20969634 | 20955445 |

*p<0.1, ** p<0.05, *** p<0.01. Standard errors clustered at the prison spell level in parentheses.
This table reports the coefficients measuring the effect of the spending some time in prison (continuous and dummy variables) with an inmate on the probability of having a common charge within years after incarceration. The regression is run at the pair level.

# Effects in the same age range

# Effects if same municipality

# Effects if same country of origin



_y-axis:_ Pr(Coofffending in the next 5 years)

_x-axis labels:_ Overlap=0 # Same country of birth=0   Overlap=1 # Same country of birth=0   Overlap=1 # Same country of birth=1