

Path into the grey area: how firms become entangled with organized crime

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Background

Organized crime infiltration into legitimate businesses

Organized crime does not operate only through illegal markets: legitimate businesses can become strategic vehicles for criminal activity, influence, and territorial expansion.

Launder illicit proceeds

Reinvest criminal revenues and conceal their illicit origin.

Access legal markets

Enter legitimate economic activities, including public procurement.

Expand territorial influence

Establish or strengthen a presence in new territories.

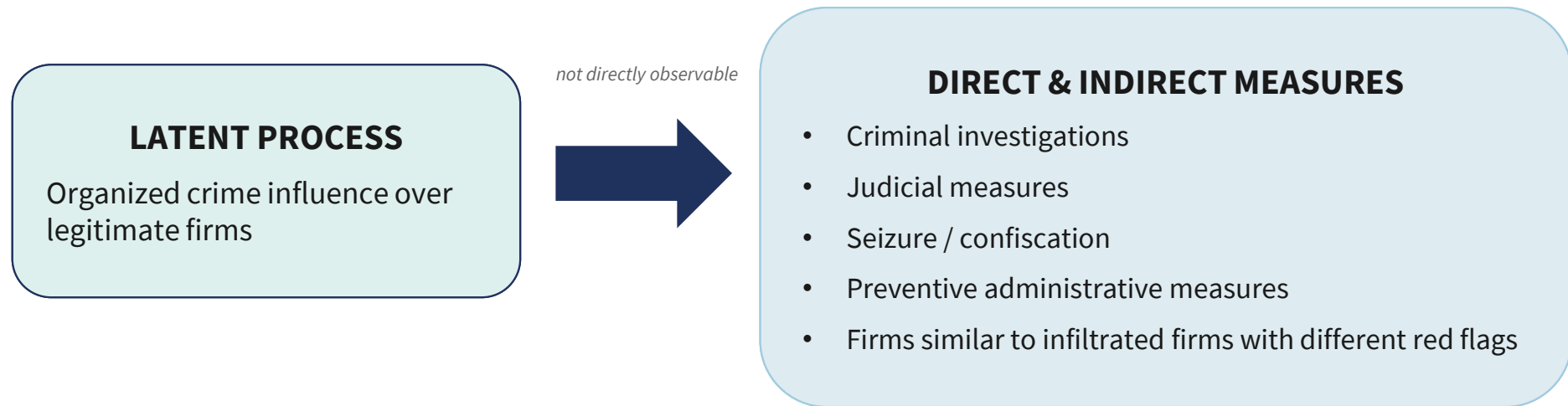
Build economic & social influence

Develop relationships and consolidate influence within the legal economy.

→ **Firms are a key unit of analysis for understanding how organized crime penetrates in the legal economy.**

Measuring criminal infiltration: the empirical challenge

Criminal infiltration is a gradual and only partially observable process through which criminal actors acquire varying degrees of influence over legitimate businesses



→ Different institutional mechanisms identify firms at different stages

They may therefore provide different windows onto the infiltration process.

Research gap and research questions

› Gap:

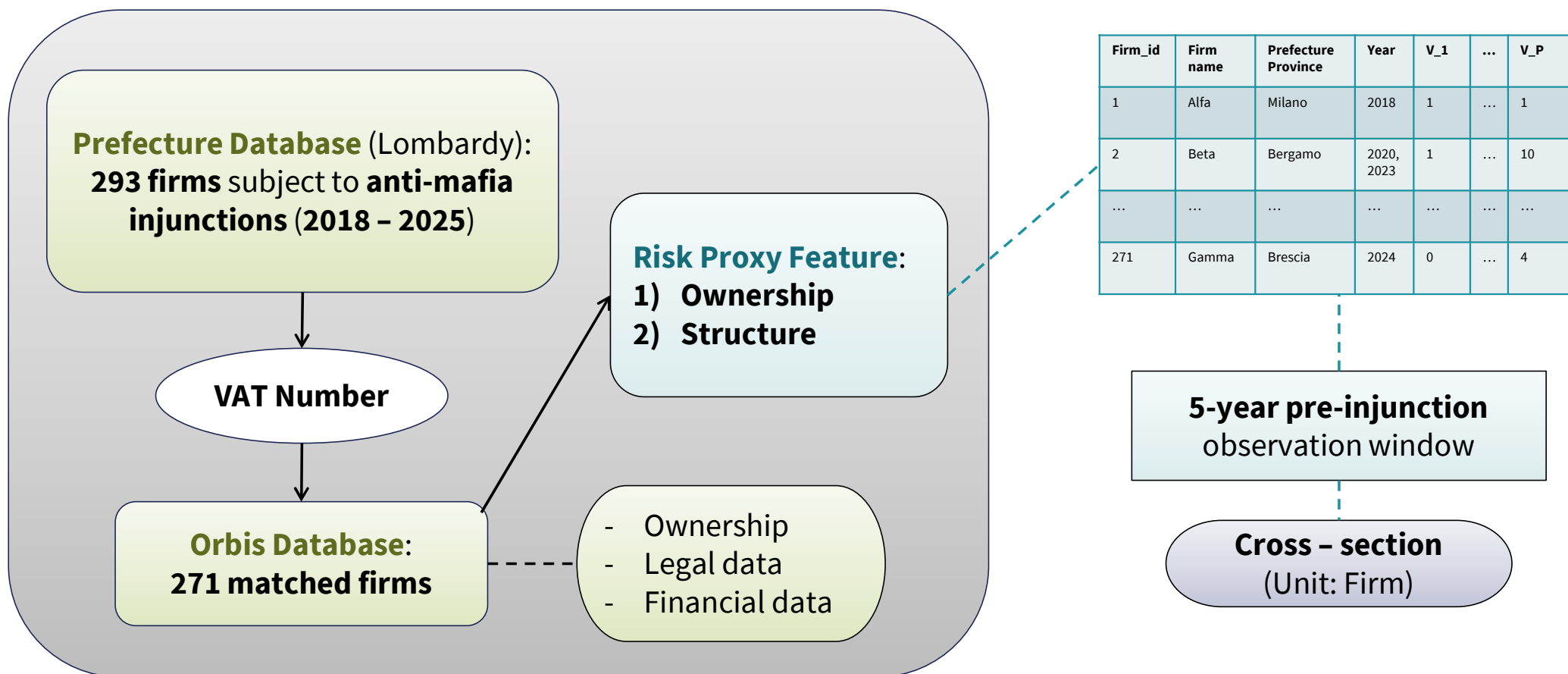
- Empirical evidence based on criminal justice interventions → firms observed after lengthy investigative/judicial processes
- Observed firm-level patterns → unclear whether they precede enforcement or reflect subsequent changes

› Research questions:

- *What characteristics distinguish firms subject to anti-mafia injunctions from the broader population of firms?*
- **Hypotheses:** Firms subject to anti-mafia injunctions are expected to exhibit:
 1. *Stronger territorial embeddedness in areas at higher risk of organized crime infiltration*
 2. *Ownership arrangements consistent with the use of nominee shareholders*
 3. *Greater use of complex and opaque corporate structures*

Methodology

Data collection



Methods

1. Control sample match → Firms subject to **anti – mafia injunctions** vs «**legitimate**» firms

1) Exact matching

(Postcode • NACE • Legal form • Size)

2) Coarsened Exact Matching (CEM)

(Legal form • Size • NACE)

3) Stratified random sampling



a) 271 firms subject to anti-mafia injunctions vs **820** control firms (CEM with NACE sector)

b) 271 firms subject to anti-mafia injunctions vs **1096** control firms (CEM without NACE sector)

2. Logistic regression → $P(\text{Anti – mafia injunction}) = f(\text{Covariates})$

Target: Anti-mafia injunction (Yes = 1 ; No = 0)

Covariates = Territorial – Local Risk + Ownership Structure and Governance

3. Models:

- **GLM** → baseline logistic regression
- **LASSO** → selects the most informative predictors (coefficients of weak predictors shrunk to zero)
- **Ridge** → reduces the influence of weaker predictors (coefficients of less relevant predictors shrunk toward zero)

(Fabrizi et al., 2017; Parbonetti, 2021; Calderoni et al., 2023; Cariello et al., 2024; Ambrosini et al., 2024; Jofrè et al., 2024; Hastie et al., 2009; Tay et al., 2023)



Explanatory and control variables

	Variable	Operationalization	Source
Territorial – Local Risk	Shareholders from high-mafia areas	% of shareholders born in high-risk municipalities (IPM index)	Orbis Database - Transcrime
	Female shareholders (%)	% of female shareholders	Orbis Database
Use of individual shareholders as nominees	Foreign-born shareholders (%)	% of shareholders born abroad	Orbis Database
	Shareholder anomalous age (%)	% of shareholders with anomalous age (age < 26 or age > 79)	Orbis Database
Use of complex and opaque corporate structures	Name or Legal form change	Binary dummy indicating whether the company changed its name or legal form	Orbis Database
	Change shareholders	Total number of annual ownership changes throughout the company's history	Orbis Database
	Firm shareholders (%)	% of shareholders that are legal entities	Orbis Database
Control variable	Firm size	Firm size category (Small, Medium, Large, Very Large)	Orbis Database
	Sector	Main NACE sector	Orbis Database



(Fabrizi et al., 2017; Fiandaca, 2007; Calderoni et al., 2023; Cariello et al, 2024; Dugato et al., 2020; Jofrè et al., 2024; Riccardi & Maggioni, 2025)

Results

Logistic regression models – sample A

Target variable: Anti-mafia injunction (Yes = 1 ; No = 0)							
Variable	Estimate	Std. Error	z-value	p-value	Signif.	LASSO	Ridge
(Intercept)	-1.727	0.383	-4.514	0.000	***	-1.417	0.180
Name or Legal form change	0.594	0.368	1.613	0.107		0.386	0.105
Change shareholders	0.057	0.087	0.655	0.513		.	0.005
Female shareholders (%)	-0.001	0.002	-0.628	0.530		.	-0.000
Foreign-born shareholders (%)	-0.008	0.003	-2.532	0.011	**	-0.005	-0.001
Firm shareholders (%)	-0.008	0.003	-2.385	0.017	*	-0.005	-0.001
Shareholder anomalous age (%)	0.005	0.003	1.480	0.139		0.003	0.001
Shareholders from high-mafia areas (%)	0.019	0.002	7.651	0.000	***	0.018	0.004
<i>Firm size (reference category: Large company)</i>							
Medium sized company	0.289	0.389	0.744	0.457		.	0.013
Small company	0.588	0.378	1.557	0.119		0.216	0.063
Very large company	0.344	1.435	0.240	0.811		.	0.030

Note: Significance codes: *** p < 0.001; ** p < 0.01; * p < 0.05; . p < 0.10

Logistic regression models – sample B

Target variable: Anti-mafia injunction (Yes = 1 ; No = 0)

Variable	Estimate	Std. Error	z-value	p-value	Signif.	LASSO	Ridge
(Intercept)	-3.114	0.518	-6.006	0.000	***	-2.410	0.044
Name or Legal form change	1.261	0.411	3.067	0.002	**	1.163	0.180
Change shareholders	0.003	0.093	0.032	0.974	.	.	-0.001
Female shareholders (%)	-0.006	0.002	-2.391	0.017	*	-0.005	-0.001
Foreign-born shareholders (%)	-0.007	0.003	-2.091	0.037	*	-0.005	-0.001
Firm shareholders (%)	-0.008	0.004	-2.284	0.022	*	-0.007	-0.001
Shareholder anomalous age (%)	0.002	0.003	0.691	0.490		0.002	0.000
Shareholders from high-mafia areas (%)	0.017	0.003	6.820	0.000	***	0.017	0.003
Firm size (ref.= Large company)							
Medium-sized company	0.577	0.418	1.383	0.167		0.242	0.059
Small company	0.615	0.408	1.510	0.131		0.249	0.061
Very large company	-0.148	1.219	-0.121	0.903		-0.227	-0.057
Sector (reference category: Other sectors)							
Manufacturing (C)	1.727	0.496	3.482	0.000	***	1.238	0.189
Water and Waste (E)	3.995	0.757	5.281	0.000	***	3.420	0.653
Construction (F)	1.450	0.370	3.922	0.000	***	1.032	0.140
Wholesale & Retail Trade (G)	1.328	0.382	3.473	0.000	***	0.879	0.120
Transportation & Storage (H)	2.220	0.430	5.161	0.000	***	1.739	0.284
Accommodation & Food Services (I)	1.674	0.379	4.410	0.000	***	1.249	0.180
Financial Services (K)	0.047	1.106	0.042	0.966		-0.068	-0.015
Real Estate (L)	-0.792	0.470	-1.684	0.092	.	-1.054	-0.048
Professional Services (M)	-0.534	0.580	-0.920	0.358		-0.772	-0.060
Administrative Services (N)	1.377	0.488	2.823	0.005	**	0.904	0.123
Education (P)	1.715	0.980	1.751	0.080	.	1.214	0.207
Health & Social Care (Q)	1.325	1.213	1.092	0.275		0.731	0.115
Arts & Entertainment (R)	1.919	0.711	2.699	0.007	**	1.431	0.233
Other Services (S)	1.604	0.605	2.648	0.008	**	1.126	0.165
Missing	2.149	0.385	5.588	0.000	***	1.753	0.285

Note: Significance codes: *** p < 0.001; ** p < 0.01; * p < 0.05; . p < 0.10



Discussion and Limits

Discussion

- › Results are consistent across the two matched samples and estimation approaches
- › Characteristics associated with a higher/lower likelihood of anti-mafia injunction:
 - **More shareholders from high-mafia-presence areas (+):**
 - enduring territorial ties within ownership networks
 - infiltration developing through social and relational embeddedness
 - **Fewer foreign-born shareholders (-):**
 - predominantly local and territorially embedded nature of the firms
 - nominee-related indicators identified may be context-dependent
 - **Fewer corporate shareholders (-):**
 - Relatively simple ownership structures may coexist with criminal influence
 - **Limited evidence for the other ownership/governance indicators:**
 - Fewer female shareholders (-)
 - Name or legal-form change (+)
 - No robust evidence of association with shareholder changes and anomalous shareholder age

Limits

- › **Institutional selection:**
 - Observed patterns may partly reflect how firms are selected by Prefectures
- › **Context specificity:**
 - Findings may partly reflect a specific territorial and institutional context
- › **Specific empirical population:**
 - Firms are concentrated in public procurement and regulated activities



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