Competition and Cooperation between OCGs An Analysis of Merseyside, U.K.

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This presentation and the originating papers are available upon request:

1. Giovannetti A. and Campana, P., *A Theory of Competition and Cooperation between Organized Crime Groups*, 2025 [**LINK**]
2. Rozzi, R., Giovannetti, A., Pin, P. and Campana, P., *Endogenous Property Rights over Drug Markets*, 2025 [**LINK**]
3. Campana P., and Giovannetti, A., *The structure of cooperation among organized crime groups: A network study of Merseyside, UK.*, Journal of Criminal Justice, 96, 2025 [**LINK**]

Motivating Questions

1. Is there a **relationship** between violence and drug markets in **urban** environments?
2. And what **role** (if any) do OCGs play?

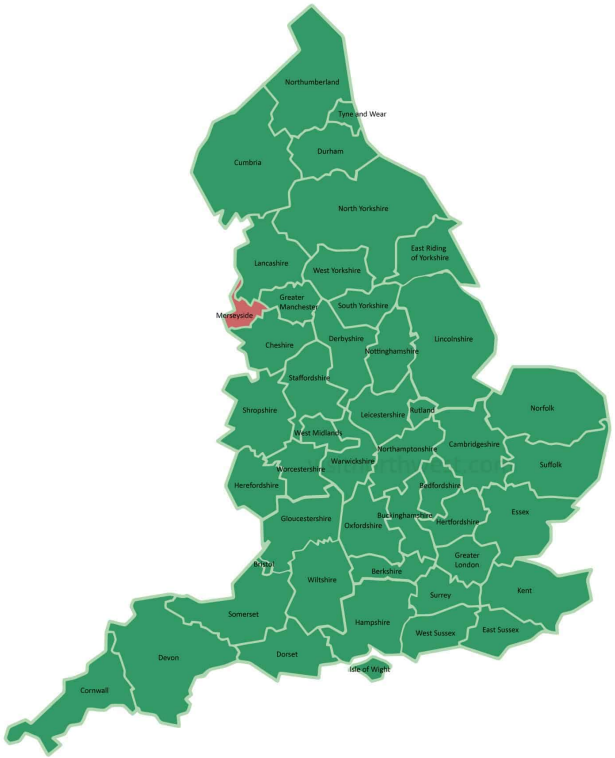
- **Classic theme** of in urban criminology (2k papers published on the topic)
- **Typical Result I**: correlations are generally positive and strong: violence and drug dealing cluster in space (hotspots)
- **Typical Result II**: By disaggregating crime volumes: OCGs are more likely to be engaged in episodes of violence surrounding drug dealing

- **However**, more recent works show that as we move away from cross-sectional analysis, the direction/intensity **vary** across geography and institutions, everything else equal
  - Many drug markets are relatively **peaceful**
  - In some places, the correlation **fails**

Geographic nexus (if any) is **ambiguous**: many moving parts at play...

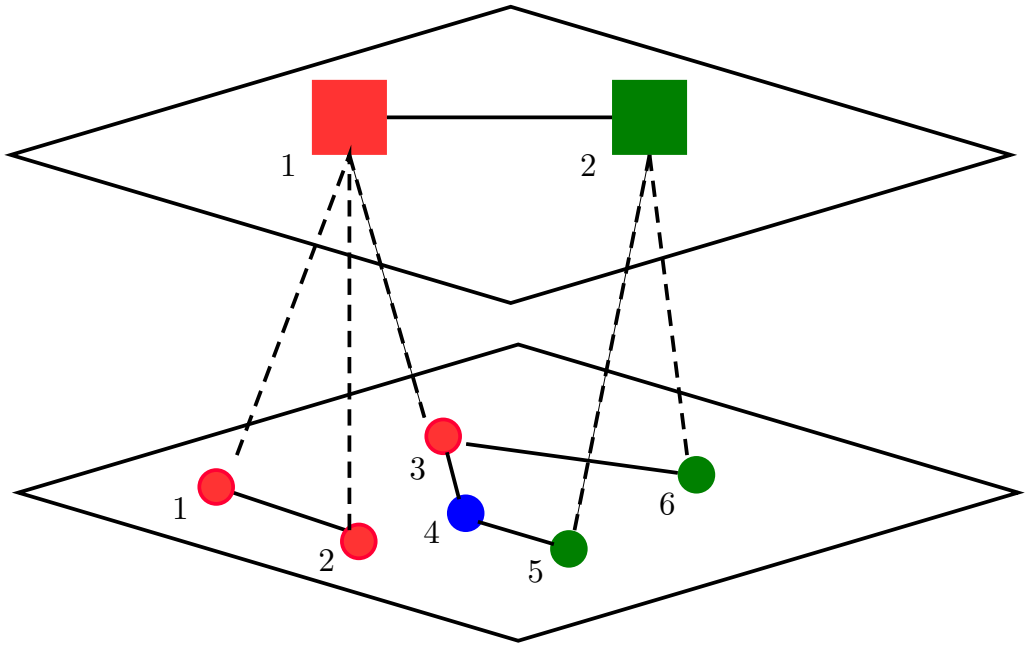
In this set of works we speculate that an important transmission link between violence and drugs is given by OCG dynamics

MERSEYSIDE!



- 4th most populated metropolitan county (22 districts, Liverpool main one)
- Population: 1.38 million, similar in size to Sydney's Eastern Harbour city area in the "6 Cities Region" system.
- Highest number of OCGs per million: x2 national average. 25% more groups than Greater London
- Merseyside Police force: "outstanding" in analytics/tackling serious and organized crime

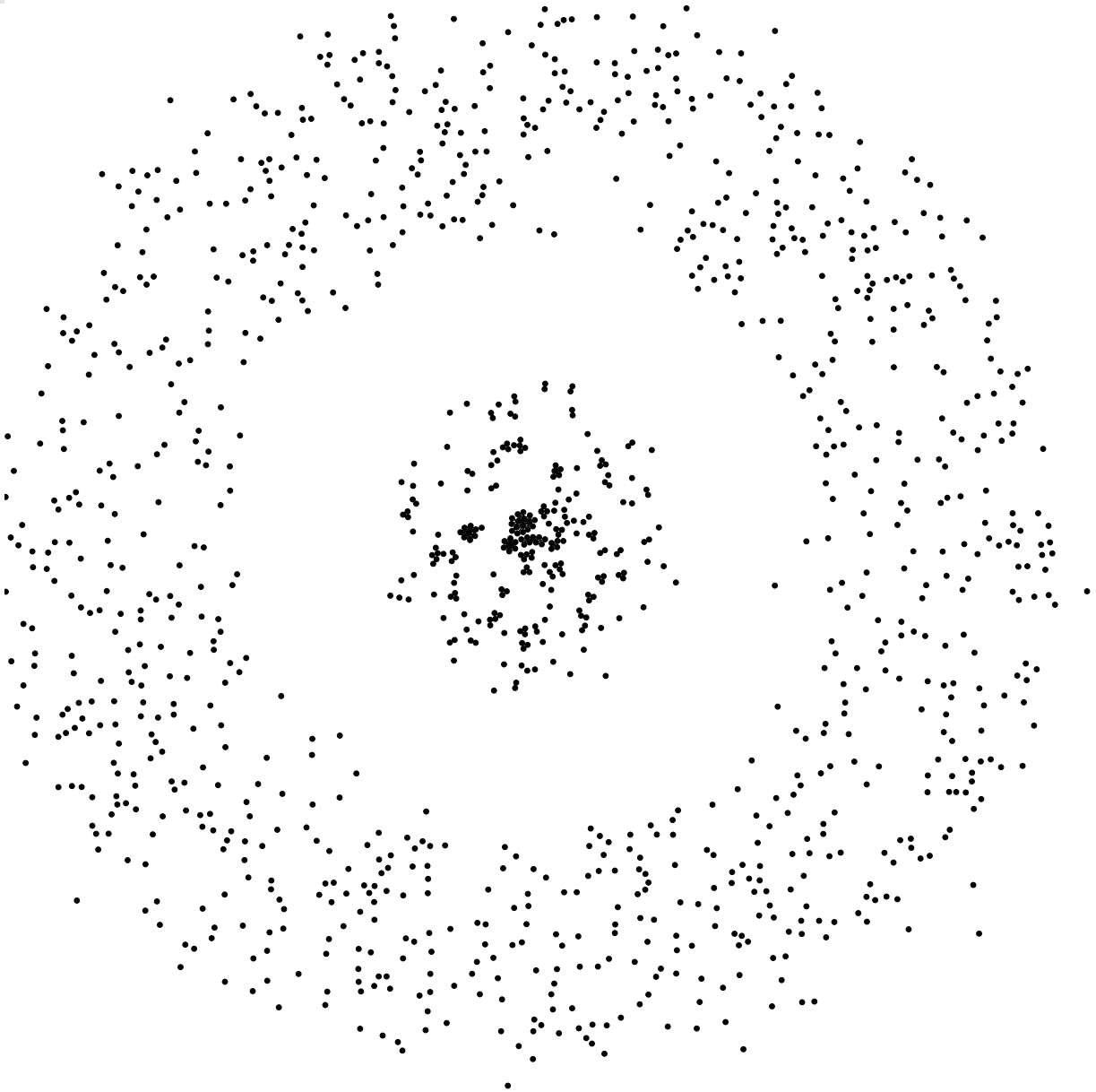
OCGs



- **Our data**: crime reports involving OCGMs
- OCGs (and their interaction) are our **unit of analysis**
- OCGM: "*Individuals, normally working with others, with the capacity and capability to commit serious crime on a continuing basis*" (OCG Mapping Manual)
- **Data Limits**: no information on victims, no non-crime information

- **375,599 crime reports** (corresponding to **353,530 individual incidents**)
- **62,948 actors**, of which: **1,211 OCGMs**
- **134 OCGs**

- At individual level, OCG members are **less likely** to engage in violence and to commit low-profile crime and **more likely** to engage in structured crime involving complex co-offendig structures.



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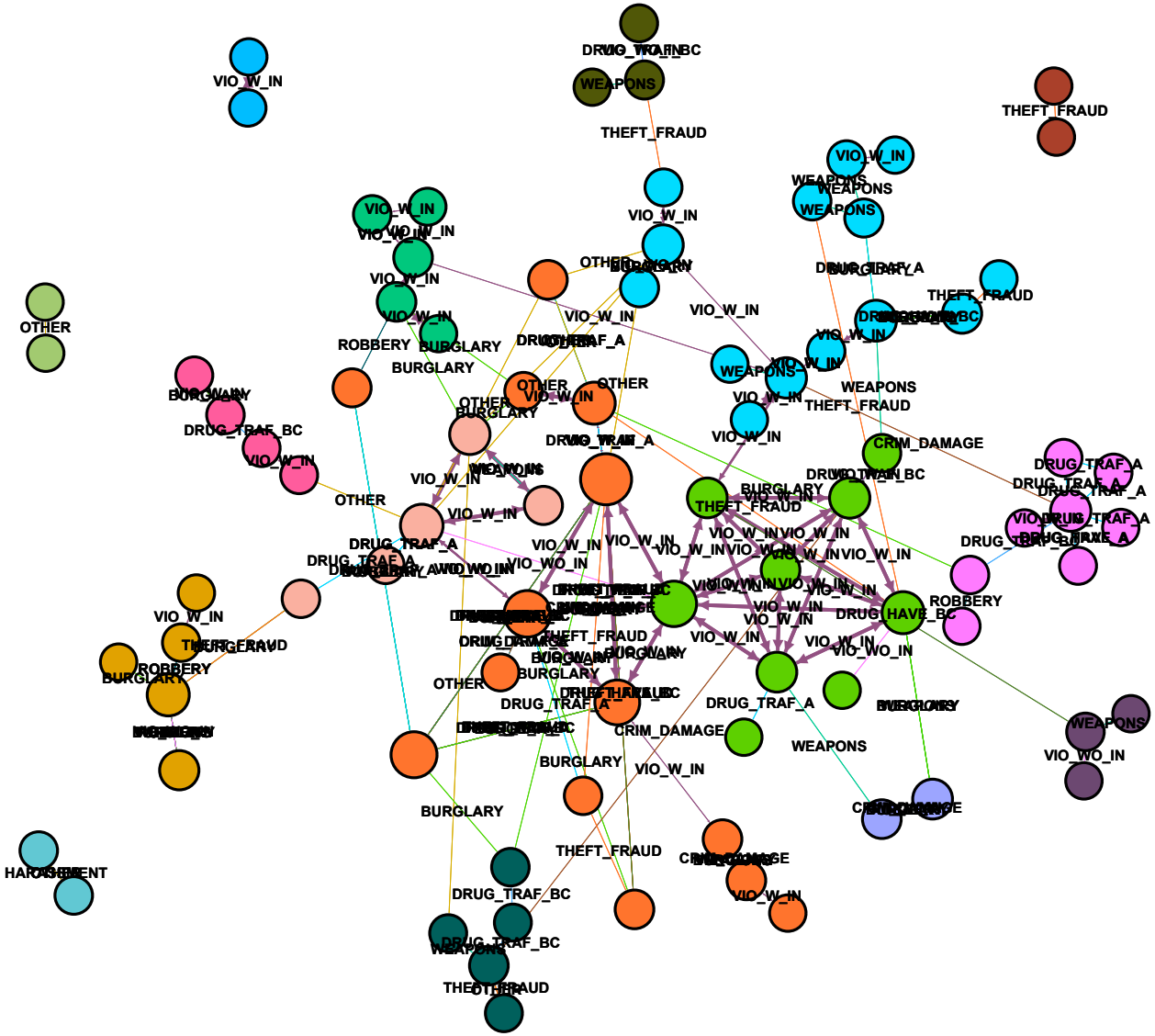
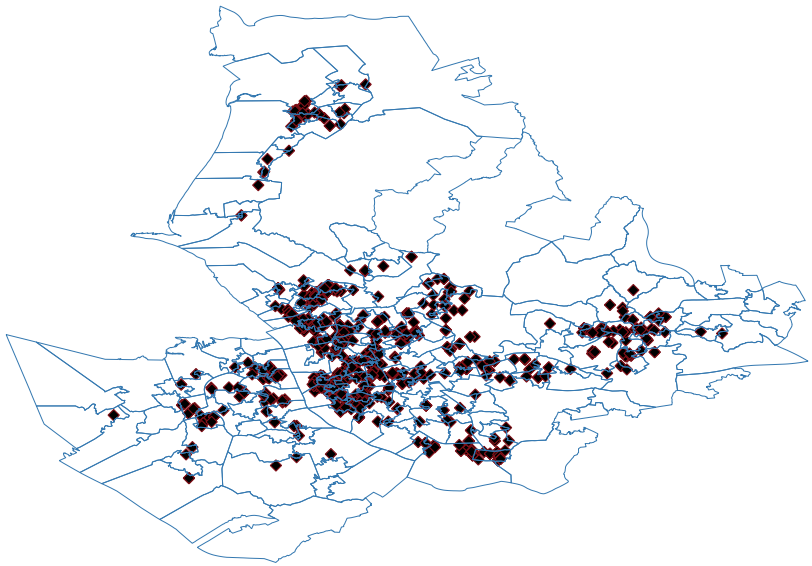
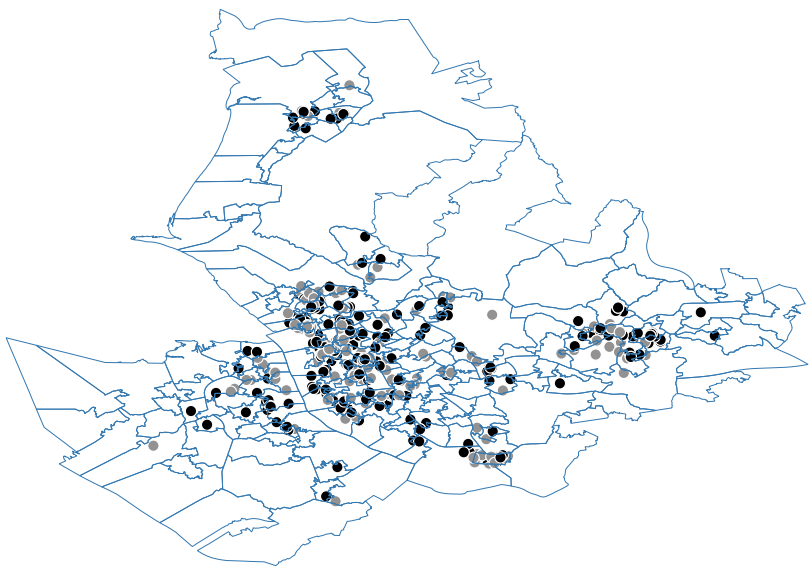
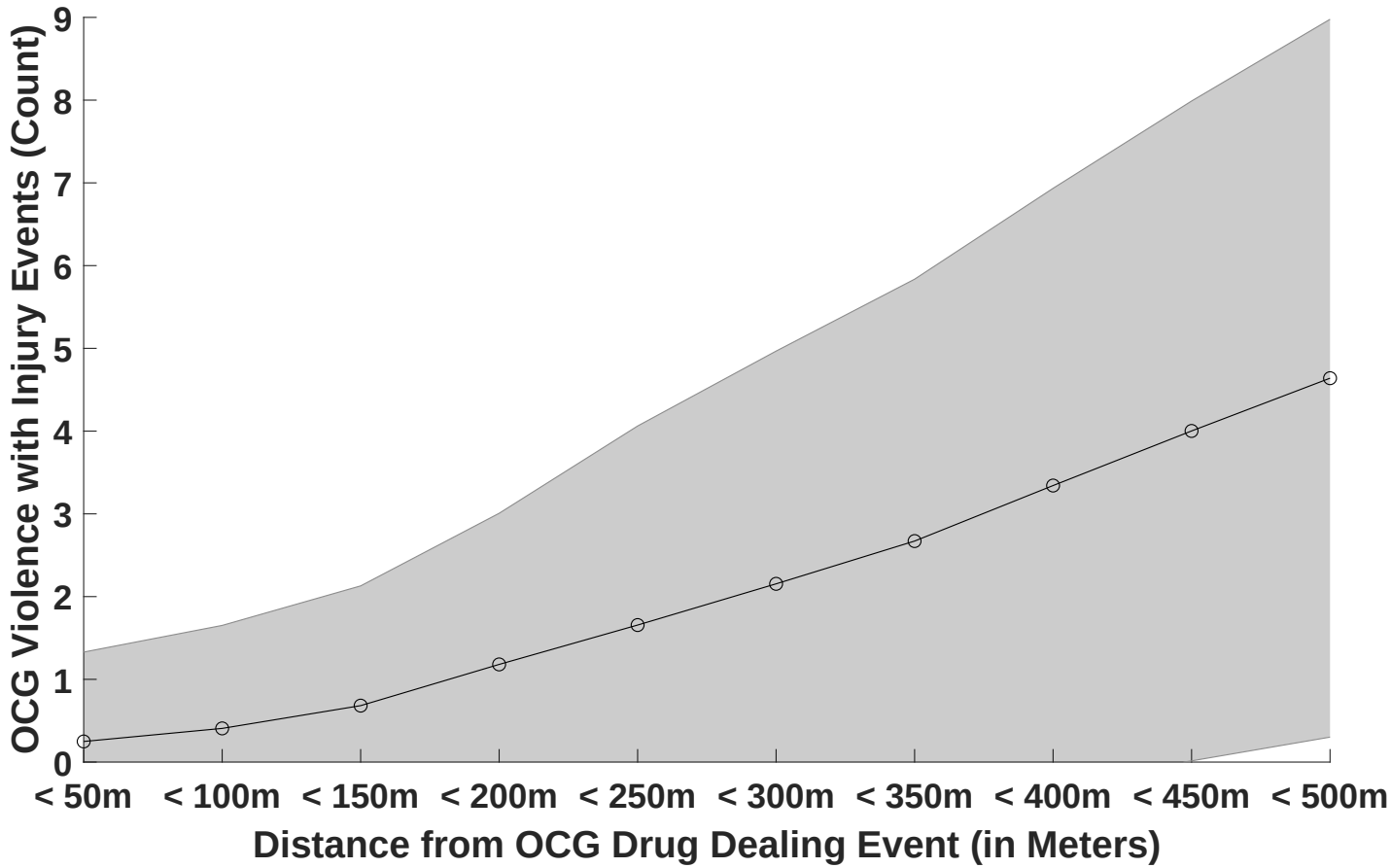

VIO_W_IN
WEAPONS
THEFT_FRAUD
OTHER
ROBBERY
BURGLARY
DRUG_TRAF_BC
DRUG_TRAF_A
VIO_WO_IN
CRIM_DAMAGE
DRUG_HAVE_BC

... to this!

Stylized Facts



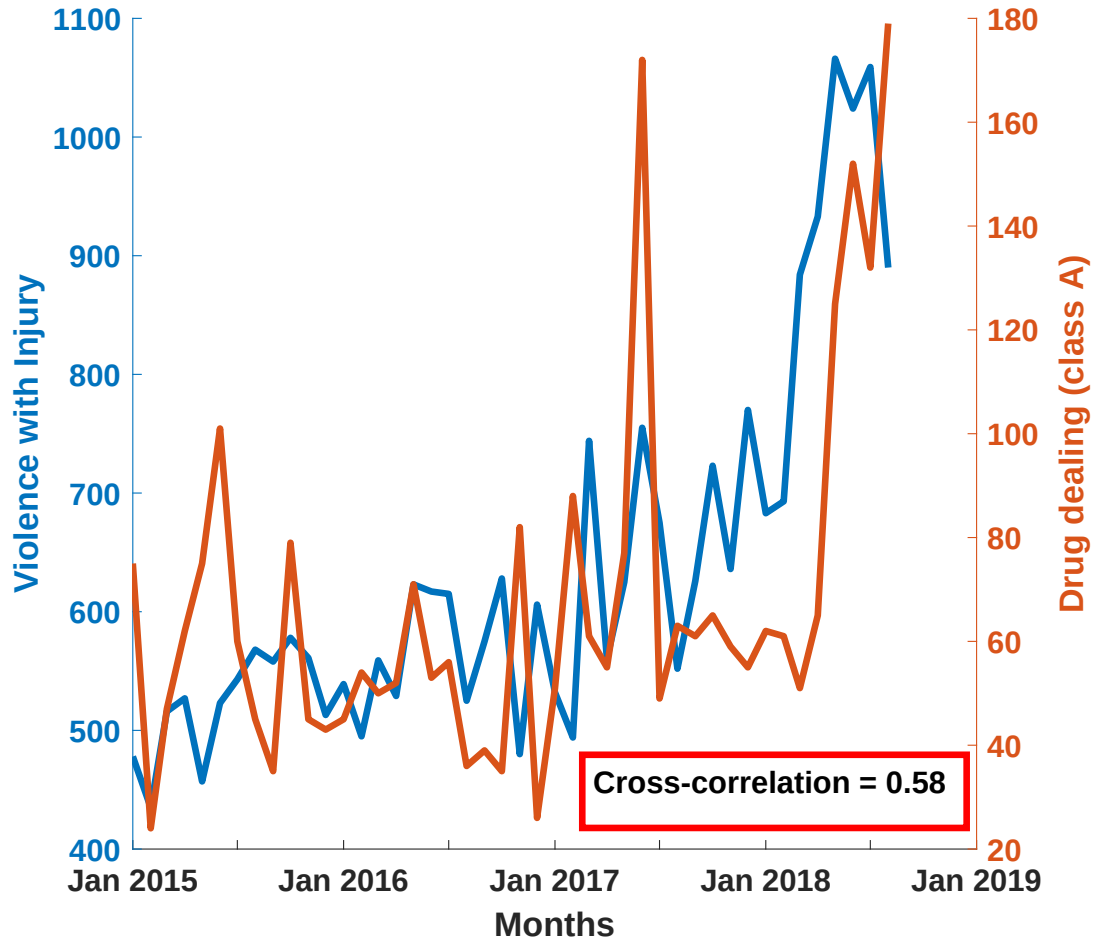




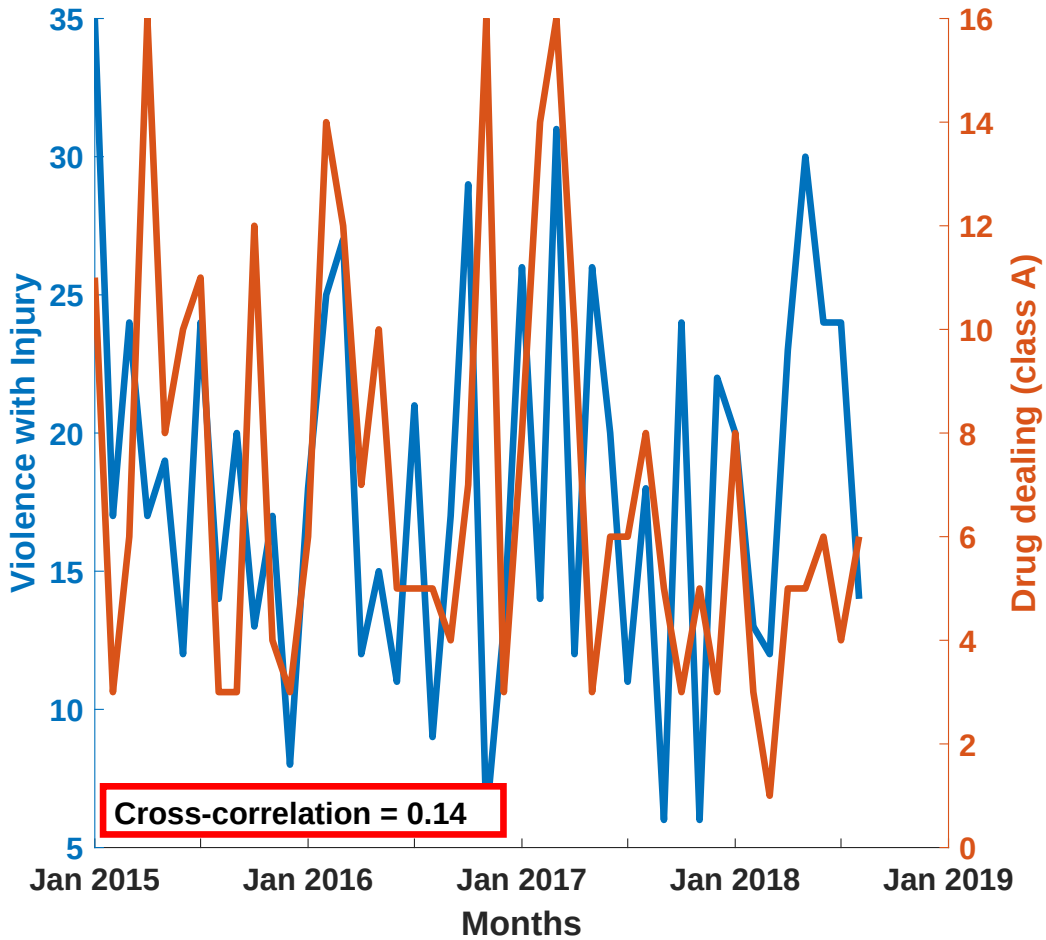
1. Stable Drug Markets and Violence coexist

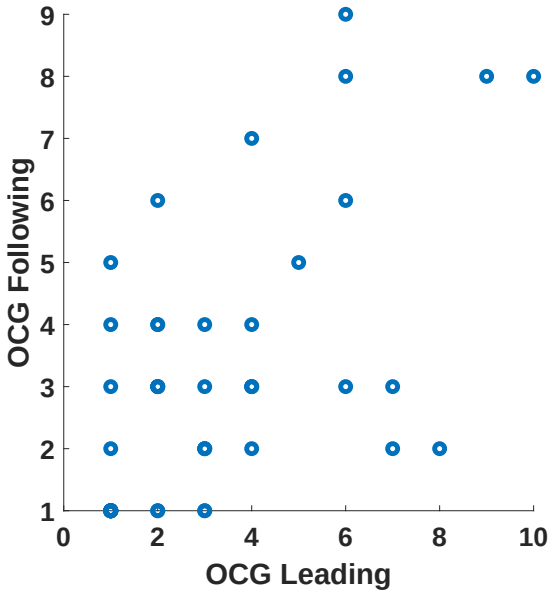
- In a **static** approach, clustering of drug dealing and OCG violence is **stable** and widespread also in Merseyside
- Classical result of **disorganization** literature is confirmed

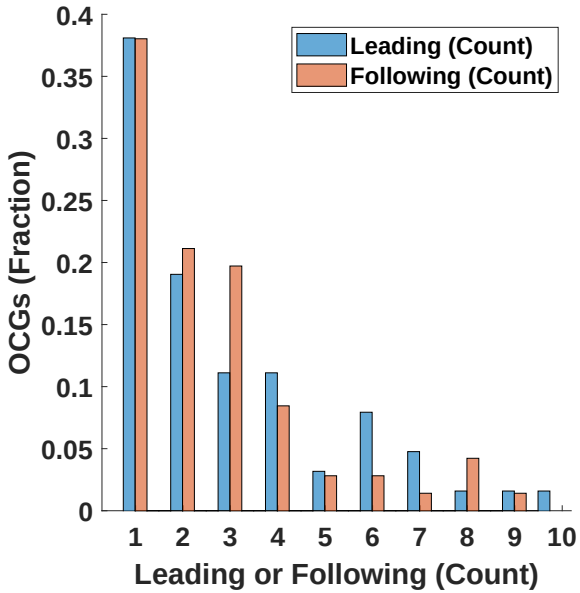
From a Dynamic Perspective,



- **However**, when we **zoom into OCGs** activities, correlations fall apart!
- No (direct) relationship...







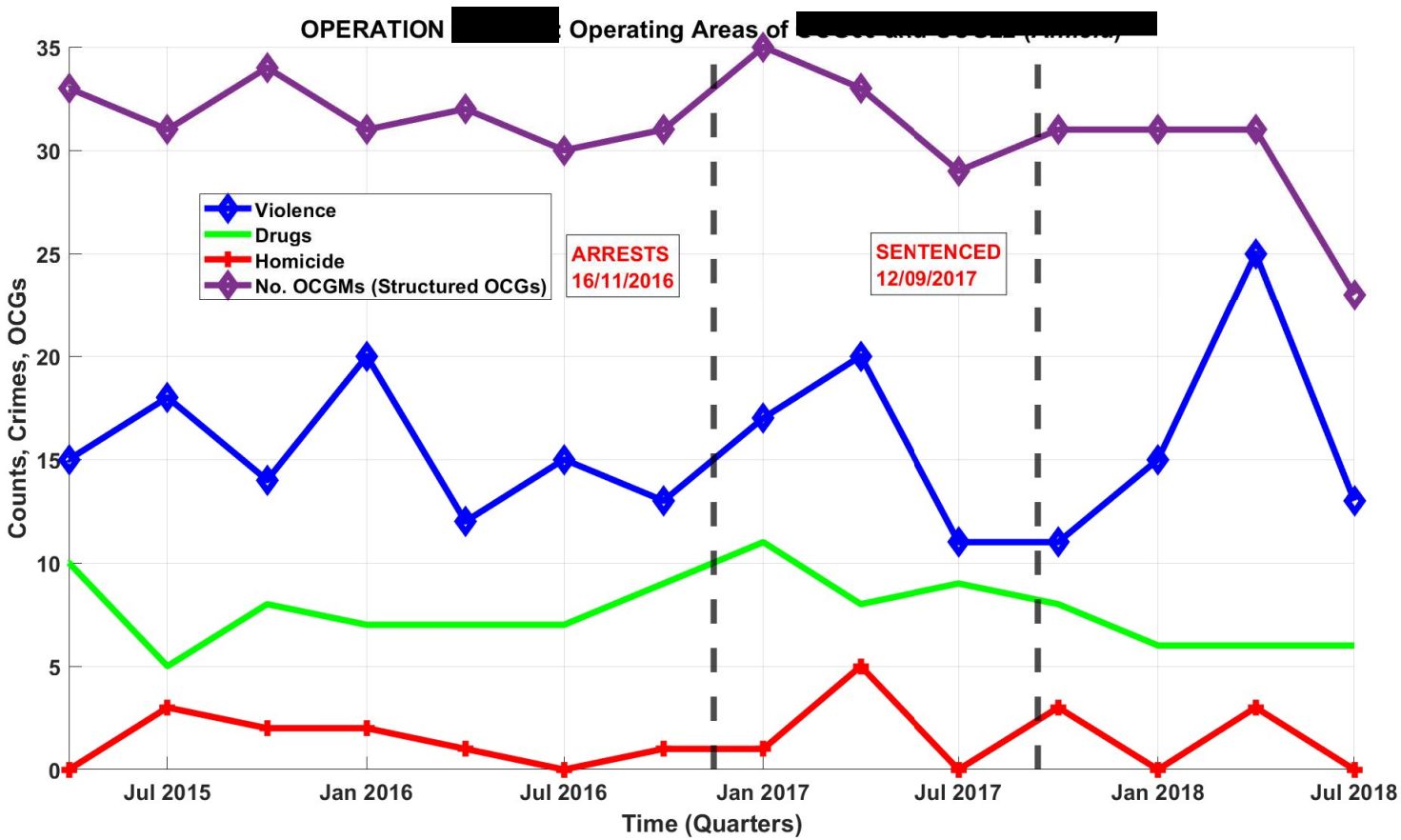
2. Areas are contendible...

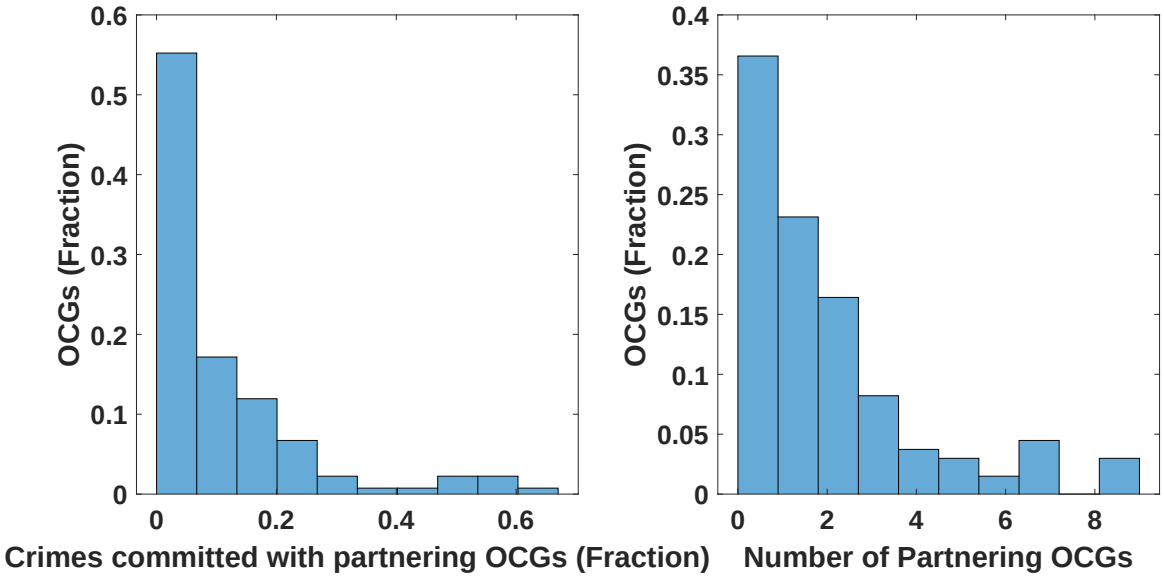
- **Frequent overlaps**. OCGs are dominant in some areas **and** second-dominant elsewhere
- (Very **different** from a **consolidated** mkt where observations are squeezed on the X axis, no overlaps)

...and in fact, are actively contended!

- Market is **competitive**: leaders/followers fall in number of areas
- OCGs active in multiple areas are more likely to be dominant rather than second-dominant in those areas
- Hence, areas are actively contended and **defeat is costly**

A PRESSURIZED ENVIRONMENT...





3. OCGs are Heterogeneous in the Degree of Cooperation

- Cooperation unlocks fresh resources (via division of labor, collusion in price setting, improved market access...)
- Cooperation is **rational**, but **constrained** by multiple factors: potentially unbounded competitive pressure, lack of contracts, etc.
- Episodic and highly asymmetric relationships are favoured
- **In Merseyside**
  - 63% of OCGs crime with other OCGs

Operative Questions:

1. Why do OCGs cooperate?
2. How do they choose their partners?

Operative Hypotheses:

1. In contendible illegal markets, cooperation is a mechanism to regularize relations.

   If cooperation falls apart, we expect market pressure to kick in.

   Market pressure in illicit markets means violence

   In other words: **Business falls** and **Violence surges**

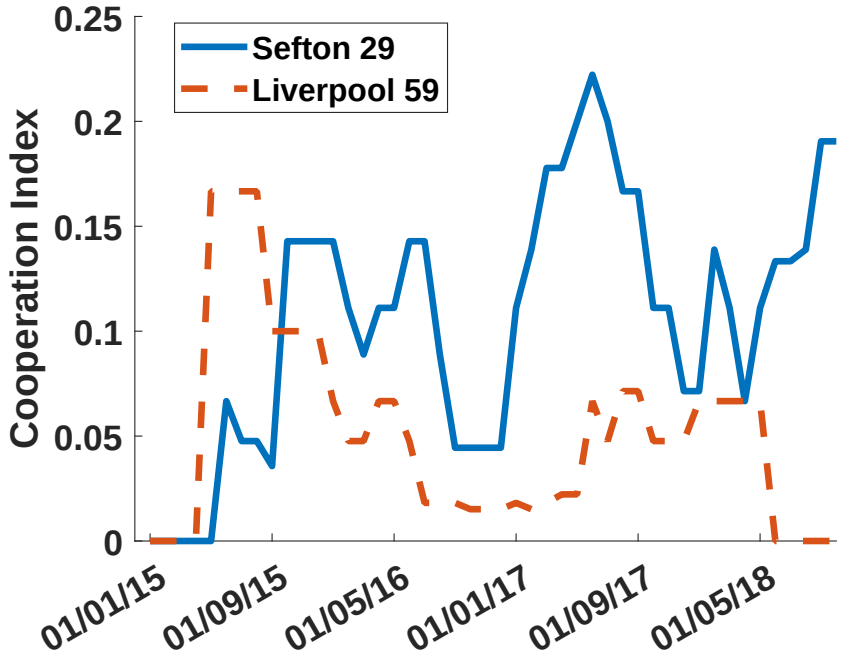
2. OCGs **strategically select** their partners minimizing risk of future conflict

MEASURING OCG COOPERATION ON AREAS

- We build a dynamic cooperation index for each area m and month T:

$$I_{m,T} = \frac{\text{links (across city) btw OCGs active in m at T}}{\text{potential links (across city) btw OCGs active in m at T}}$$

- For each month T, the index is built across all data recorded through a 1-year rolling window.



- We then estimate a Dynamic Poisson model:

$$\log\left(E\left[\text{count crimes}_{m,t}\right]\right) = \text{fixed effects} + I_{m,T}$$

- **Important**: Fixed effect control for any time-varying and time-fixed (i.e. neighborhood, disorganization, etc.) motif.

RESULT 1. COOPERATION AND THE IMPACT ON AREAS

	(1)	(2)	(3)	(4)	(5)	(6)
	Drug Dealing (class A)			Violence with Injury		
Cooperation Index	0.011**	0.012***	**0.014*** **	-0.01	-0.010**	**-0.015****
	(-0.01)	(0.00)	(0.00)	(-0.01)	(0.00)	(0.00)
Constant	-3.48***	-	-	-2.37***	-	-
	(-0.23)	-	-	(-0.08)	-	-
Time F.E.	N	Y	Y	N	Y	Y
Neighborhood F.E.	N	N	Y	N	N	Y
Observations	6,792	3,639	2,283	6,792	3,639	2,283
AIC	2,000.02	1,444.69	1,457.72	4,285.27	3,429.42	3,406.32
BIC	2,020.50	1,450.89	1,550.71	4,305.74	3,435.97	3,504.57

Coefficients computed on a month-neighborhood basis (T = 1,...,42; m =1,...,201), % changes

- **1% increment** in coop idx **jointly** and **strongly** associated to a **1.4% increment** in the monthly levels of drug dealing and a **1.5% reduction** of serious violence in the neighborhood
- This result implies that ”tranquility” is not necessarily ”good news”!

UNDERSTANDING PAIRWISE COOPERATION

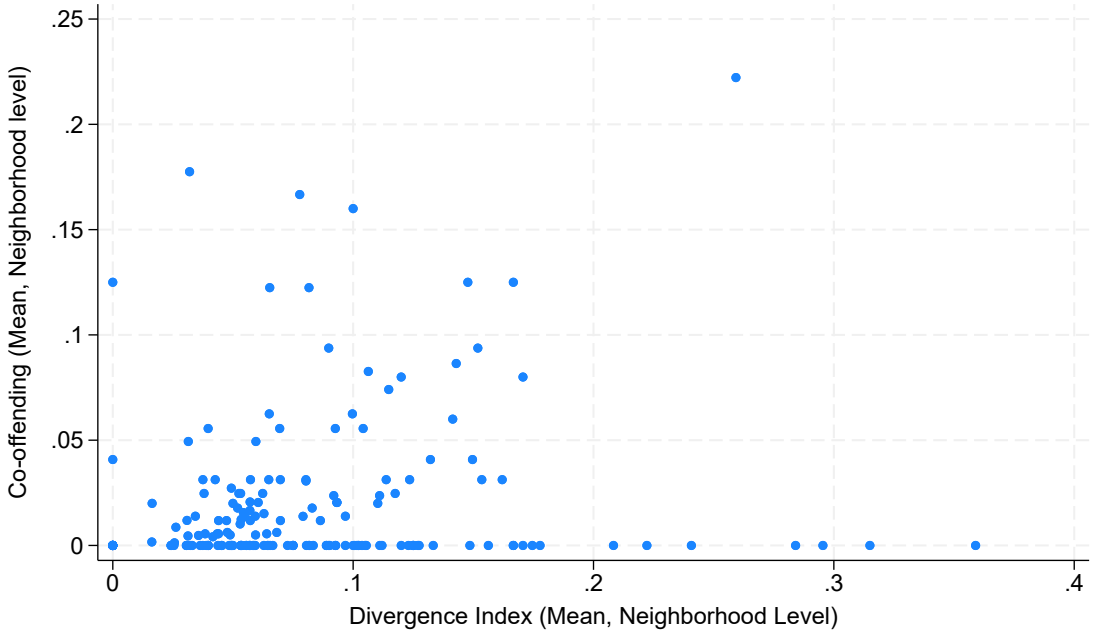
Who collaborates with whom? What are the determinants of cooperation?

1. Construct a per-OCG measure of **geographic predominance**
2. Apply a **divergence index** of area dominance measuring **disjoint** activity of each pair of OCGs:

   Intuition: Compare "relevance" of an OCG *net* of mutual collaborations (similar to an HH index)
3. Estimate:

$$P(\text{link between OCG } i \text{ and OCG } j \text{ in area } m) \;=\; f(X_i, X_j, X_m, d_{i,j,m})$$

RESULT 2. SPECIALIZATION AND SIZE MATTER



- **10%** increase in **divergence index** associated with a **13%** increase in probability of having at least a link between two OCGs
- This means that **more established groups** are more likely to collaborate with **peripheral groups**
- This can be explained as a strategic reaction to perverse incentives of an illicit market where unbounded competition can not be mitigated by contracts

TAKE HOME MESSAGES

1. Competition and Cooperation provide a rich angle for describing the complex relationship between OCGs on urban areas.
2. ”Tranquil” is not necessarily O.K.
3. Understanding incentives at play can help explaining and predicting the evolution of the OCG network

Appendix: More Results, References

What about urban OCGs?

1. Violence can propagate across OCG through both time and space proximity (e.g. Papachristos, 2009, Papachristos et al., 2012, Papachristos, 2014, Papachristos et al., 2015)
2. Various sociological theories linking **competition** to explain **OCG violence**

   Using neighborhood as the unit of measure, determinants of competition can be **group identity** or factors related to **(ethnic) cohesiveness**
3. **OCGs, Violence and drugs**

   Within the network approach, Coutinho et al. (2020) look at motorcycle OCGs intel data in Canada and find that **in the drug business collaborations are important but selective**:

   Large OCGs **tend not** to **collaborate** when their respective illicit (drug) markets **overlap**

However, A unifying theory on OCG, Drugs, Violence is missing

MODEL 1/3

(Rozzi, Giovannetti, Pin, Campana, 2024)

- Imagine Merseyside is made of **10 drug dealing spots** and is populated by **10 OCGs** only.
- OCGs are symmetric in every aspect
- Spots have an **objective** profitability: $u_{10} > u_9 > u_8$, etc.. which all OCGs know
- Each spot can be occupied by one OCG per period: **first come, first served.**
- If two OCGs step on each other, there will be a **costly fight**

MODEL 2/3

Behavioural Assumptions

- **OCGs are rational**: the value of an area does not depend on the **profitability** of the location only, **but also on the risk of finding that area occupied by other OCGs**

  OCGs like profits and do not like to step on each-other feet!

- OCGs:

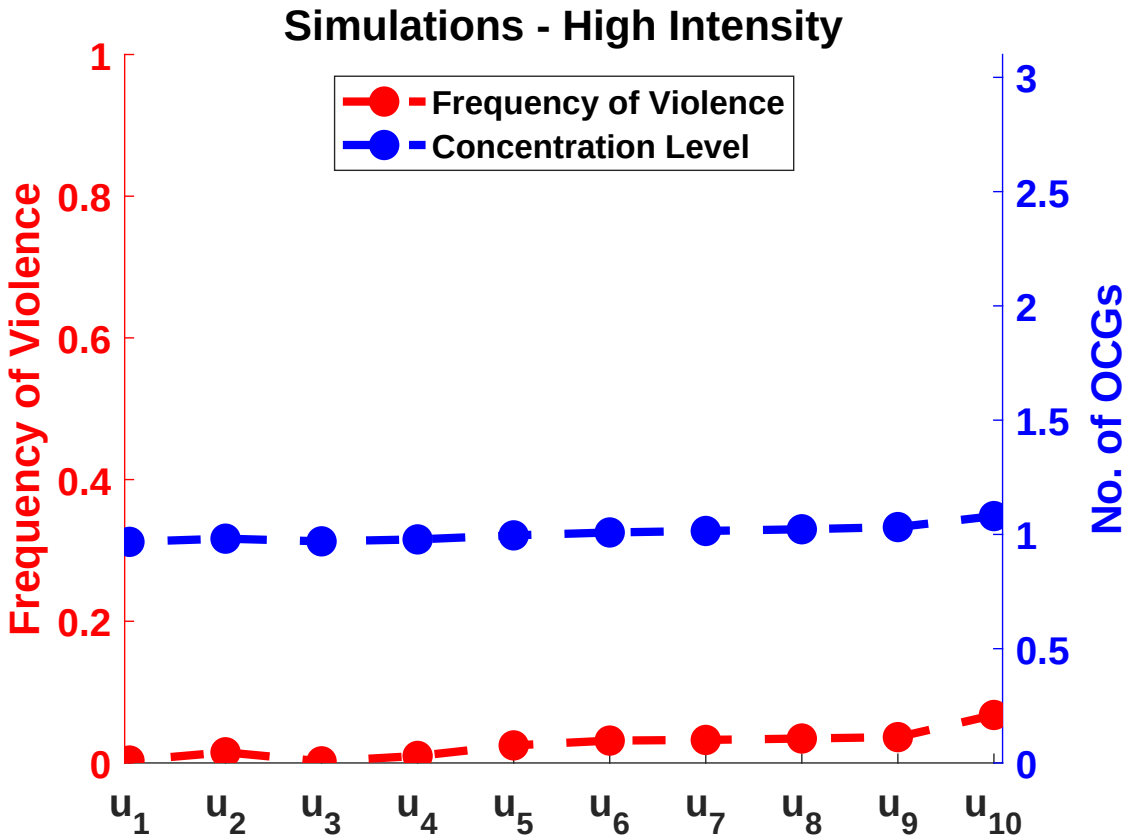
  1. Know the profitability of areas
  2. Remember which areas from those they explored in the previous periods were occupied by other OCGs or free

MODEL 3/3

- Overnight, each OCG hides in its hideout outside Merseyside
- Each morning, each OCG
  1. **Computes the subjective value** of each area and **ranks** areas by their subjective value
  2. Decides whether to engage in drug trade (depending on a parameter of "intensity", universal across OCGs)
- **If No:**
  - They do nothing until the next morning
- **If Yes:**
  - They begin the exploration according to the ranking.
  - Once they find an empty spot, they settle in the spot, sell the drugs then go back to the hideout

EQUILIBRIUM

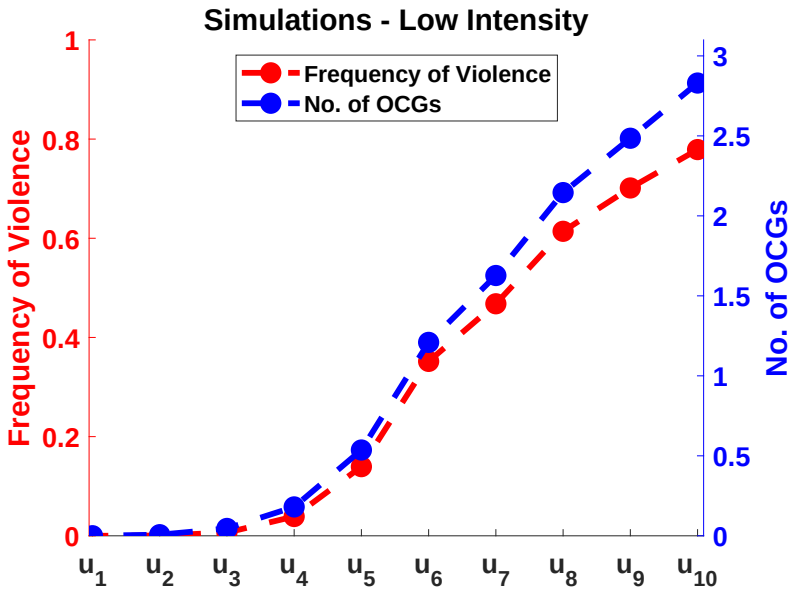
WITH HIGH INTENSITY



- With high intensity, OCGs efficiently sort themselves in areas, no fights.

EQUILIBRIUM

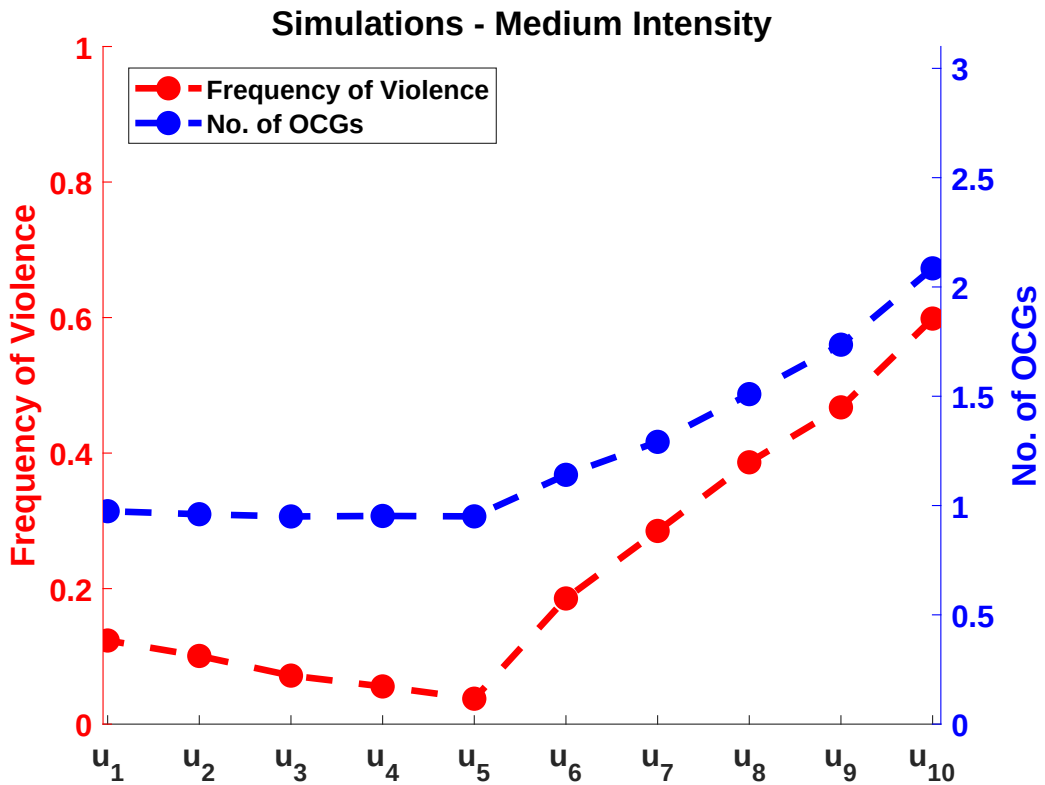
WITH LOW INTENSITY



- With low intensity, all OCGs give little value to previous explorations (as explorations are very discontinuous) and try their chance on high-value area
- As a result, OCGs end up stepping on each-other

EQUILIBRIUM

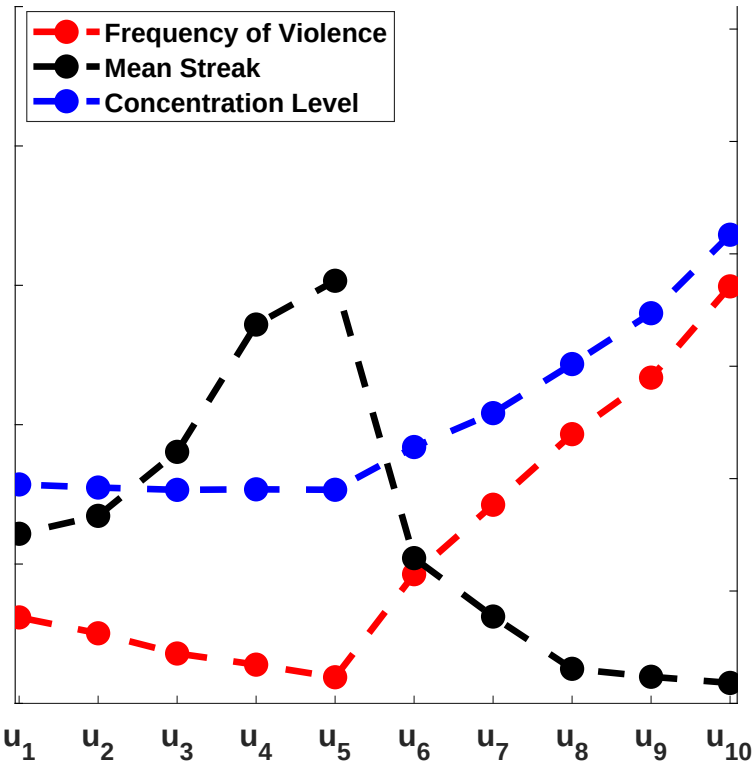
WITH MEDIUM INTENSITY



- With medium intensity, equilibrium dynamics are complex!

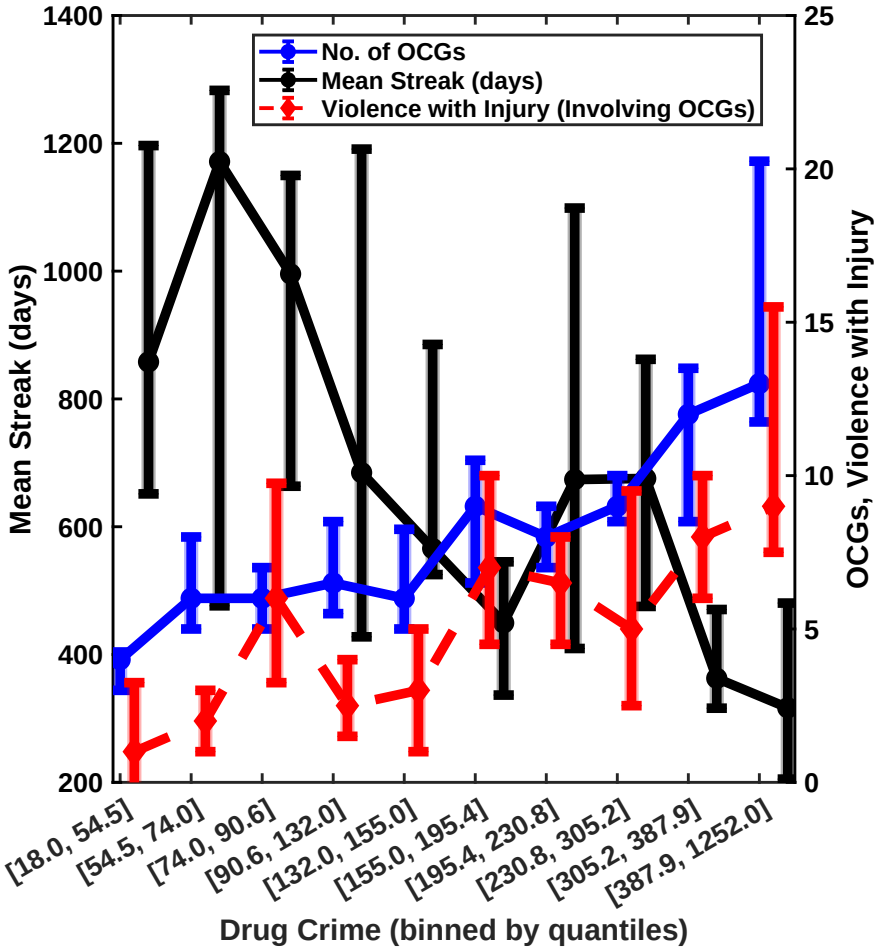
EQUILIBRIUM

WITH MEDIUM INTENSITY (NOW WITH STREAKS)



- With medium intensity, equilibrium dynamics are rich
- Streaks (i.e. periods of uninterrupted control from a single OCG on one territory) emerge only on the mezzanine level (middle-value areas)

STREAKS IN THE DATA



- The streak structure appears in the data too. This highlights the criticality of the medium-value areas for targeting purposes

- From Lum (2008):

  *... More **stable** drug markets may have less violence as **competition wanes**. It is **unclear** how individual routines aggregate into crime patterns and subsequently how drug-violence routines and interactions result in coinciding spatial patterns. Furthermore, the existence of drugs and violence at the same places may **not be due to an interaction between the two**, but both may occur as a result of **other factors***

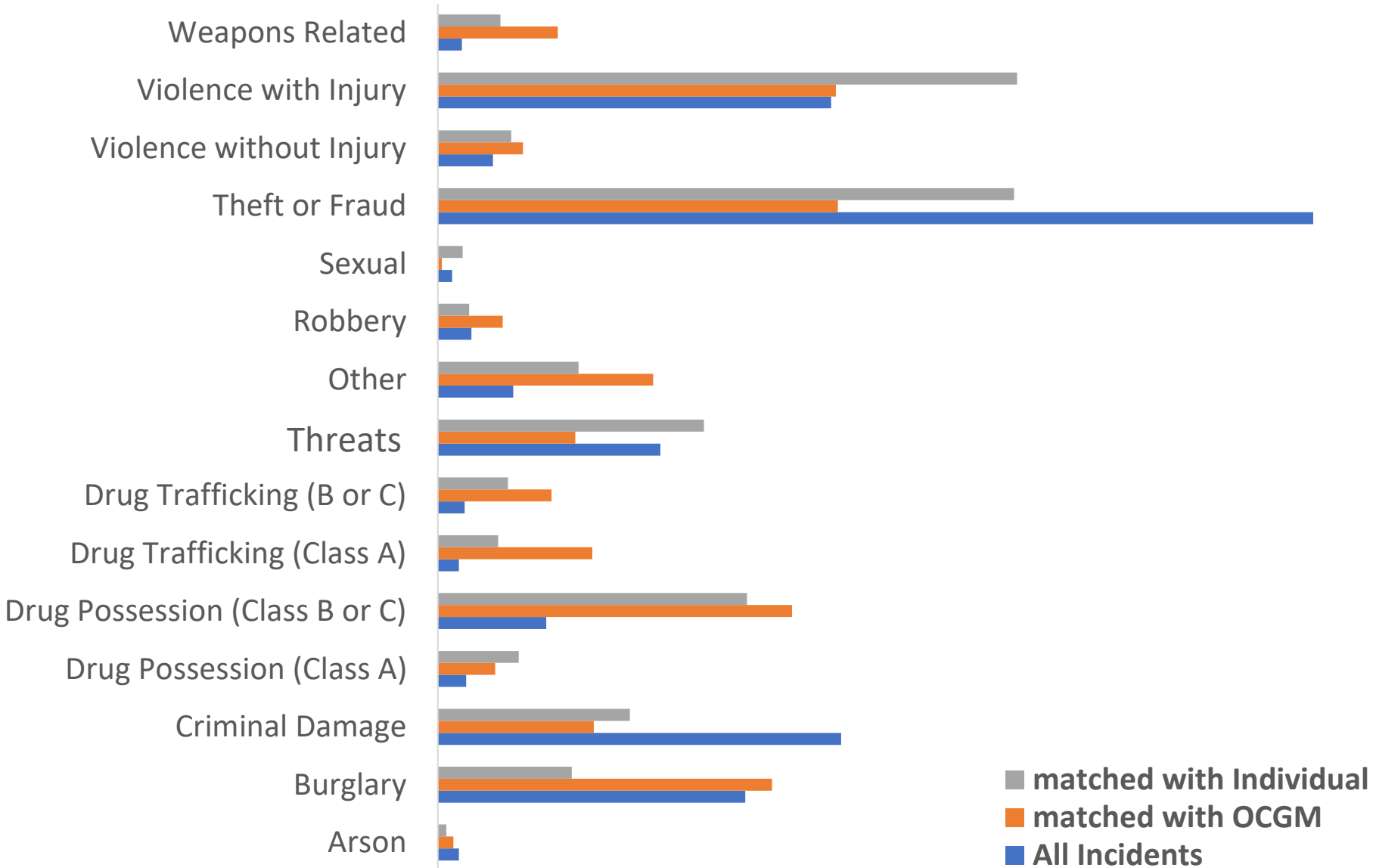
- *Eight tracts in Seattle show **results counter to expectations**. There are areas with spatial clustering of violence or drugs separately.*

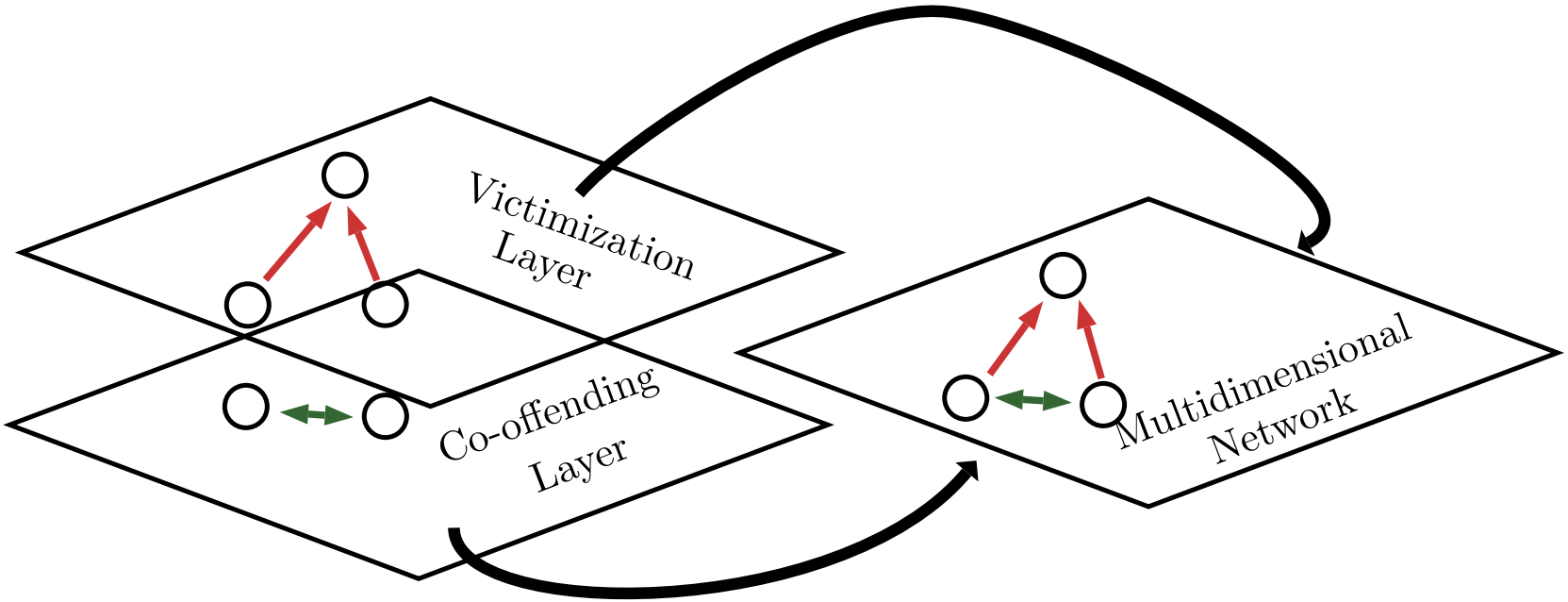
CRIMES

CRIME CLASS	ALL INCIDENTS		WITH INDIVIDUAL		WITH OCGM		MATCHED
	COUNT	%	COUNT	%	COUNT	%	
Arson	3,037	0.81	422	0.33	31	0.59	13.90
Burglary	44,226	11.78	6,615	5.13	671	12.81	14.96
Criminal Damage	57,985	15.45	9,481	7.36	313	5.97	16.35
Drug Possession (A)	4,056	1.08	3,990	3.10	115	2.20	98.37
Drug Possession (B/C)	15,597	4.16	15,263	11.85	711	13.57	97.86
Drug Trafficking (A)	3,029	0.81	2,974	2.31	310	5.92	98.18
Drug Trafficking (B/C)	3,844	1.02	3,462	2.69	228	4.35	90.06
Harassment	32,022	8.53	13,143	10.20	276	5.27	41.04
Other	10,825	2.88	6,952	5.40	432	8.25	64.22
Robbery	4,824	1.29	1,550	1.20	130	2.48	32.13
Sexual	2,070	0.55	1,221	0.95	8	0.15	58.99
Theft or Fraud	125,882	33.54	28,451	22.08	803	15.33	22.60
Violence without Injury	7,942	2.12	3,625	2.81	171	3.26	45.64
Violence with Injury	56,550	15.07	28,598	22.20	799	15.25	50.57
Weapons Related	3,450	0.92	3,096	2.40	241	4.60	89.74
Sum	375,339	100	128,843	100	5,239	100	34.33*

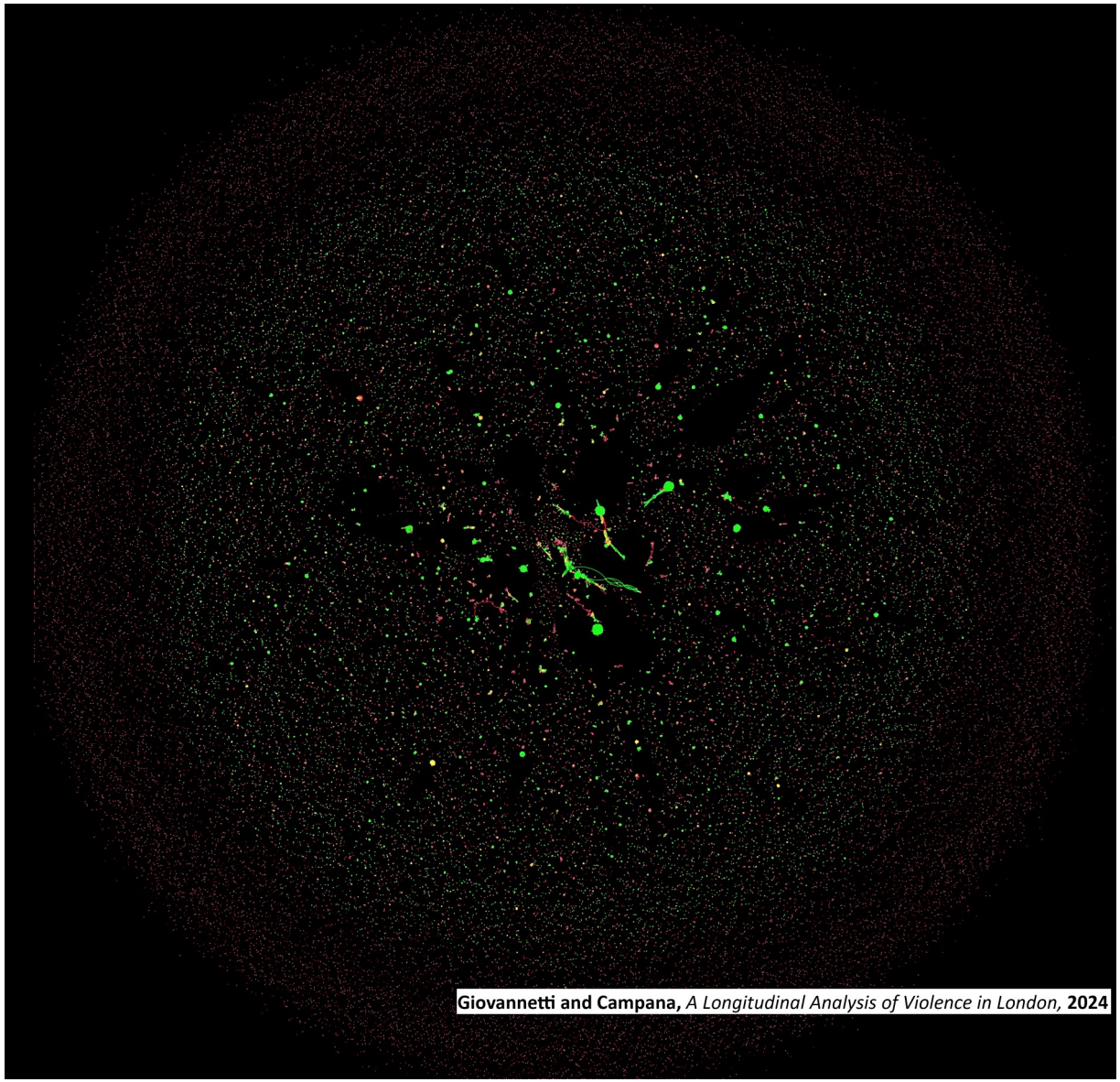
* On total crimes
Source: Merseyside Police Force

Matching Rates

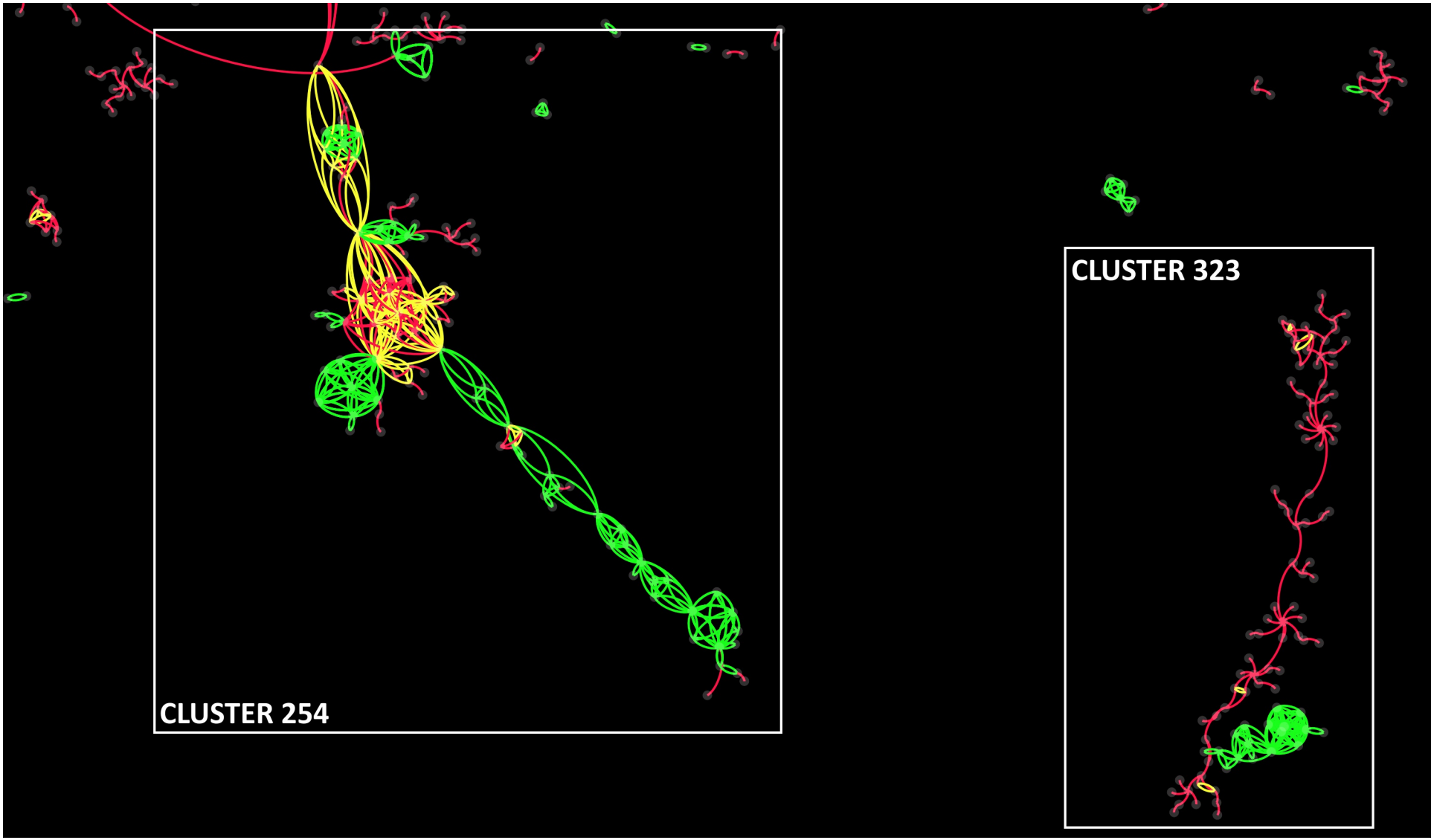




- **Aside**: Networks are flexible tools!
- Can describe complex, dynamic, multilayered relationships
- Layers can be anything (e.g., financial transactions, market stages, family relationships, etc.)

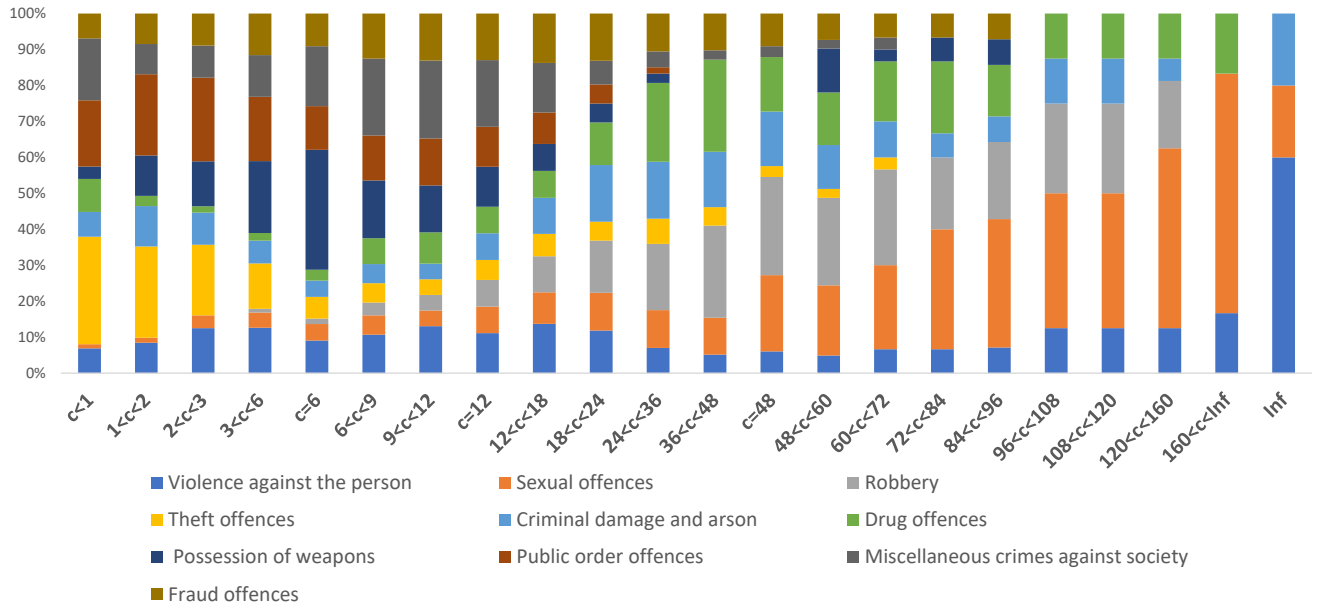


Example: London Network of co-offending and victimization (cross-section: 2018-2023). N = 304,635 accused individuals and/or victims. M = 59,026 coop links, L=153,079 victimization links



Zoom on two clusters (red: victimization. green: coop)

WHAT DO OCG COOPERATE ON?



- **Intuition**: if market pressure exists, it must be that only worth-enough ventures stimulate cooperation
- **Proxy** the ”value” of a crime with the average charge (in months) that similar crimes attracted, taking as a reference the last ten years of court ruling of U.K.
- Use count ERGM estimation methods to estimate:

$$\text{intensity of cooperation btw OCG } i \text{ OCG } j = F(\text{value}_i, \text{value}_j, X_i, X_j)$$

	(1)	(2)	(3)	(4)	(5)
Total Crime (sum)		**1.330*****		0.965***	
		(0.194)		(0.144)	
Total Crime (abs diff)		**-1.883*****		-1.507***	
		(0.394)		(0.351)	
Drug Trafficking (sum)			10.845***		9.207***
			(1.898)		(1.749)
Drug Trafficking (abs diff)			-13.154***		-12.166***
			(3.539)		(3.535)
Acquisitive Crime (sum)			6.506***		5.272***
			(1.493)		(1.424)
Acquisitive Crime (abs diff)			-3.829		-3.246
			(2.027)		(1.928)
Violence with Injury (sum)			1.623***		1.310***
			(0.243)		(0.209)
Violence with Injury (abs diff)			-2.288***		-2.010***
			(0.475)		(0.454)
Weapons (sum)			11.787**		8.790*
			(4.313)		(4.027)
Weapons (abs diff)			-4.874		-3.653
			(6.285)		(6.335)
Age (abs diff)	-0.043**	-0.040**	-0.042**	-0.036**	-0.035*
	(0.013)	(0.015)	(0.014)	(0.013)	(0.014)
Density	0.188	-0.209	-0.836***	-0.269	-0.778***
	(0.138)	(0.160)	(0.246)	(0.156)	(0.224)
Triadic Closure				**0.590*****	**0.499*****
				(0.100)	(0.101)
Observations	3,570	3,570	3,570	3,570	3,570

1. An increment of 1 unit of per-OCGM crime intensity throughout the period raises the odds of cooperation by roughly 3.278 times
2. A comparable increment in the **gap** of crime intensity reduces the odds of collaboration by 6.57
3. **Triadic closure** tests existence of network-based strategic effects. OCGs are 1.80 times more likely to cooperate with an OCG if any of their partners is already collaborating with that OCG.
4. **Disaggregating** for crime classes: relationship holds for given level of intensity
5. Crime typologies diverge in significance and magnitude of effects
   - Theoretical by-product: risk-reward profiles are **heterogeneous** across classes
   - Thin markets: For some classes risk-reward is too weak. Competition act as a leveler. Market forces hinder long-lasting cooperation
   - Thick markets: Drug trade $>$ Weapons $>$ Acquisitive $>$ Violence

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