Social Frictions, Community Ties, and Officer Performance

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- All organizations must decide how to allocate personnel
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- Less studied is the effect of the **match** between people and workplace
- How does the level of social frictions between the worker and community affect performance?
- Examine this question in the context of police officers assigned to patrol districts

Roadmap

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- Compare officers working on same shift but with differing level of social frictions
- Find that officers with weak ties make more arrests that lead to no charges, dismissed charges, or a "Not Guilty" court outcome, relative to those with strong ties

Process of being a Chicago Police Department Officer

1. Every few years, CPD offers written exam for entry-level officers.
2. Those who pass the exam are put on a wait list according to a randomly assigned lottery number.
3. When number is called, applicants enter Police Academy for 6 months and field training for 12 months.
4. After training is complete, new Police Officers are assigned to a patrol district for permanent assignment.

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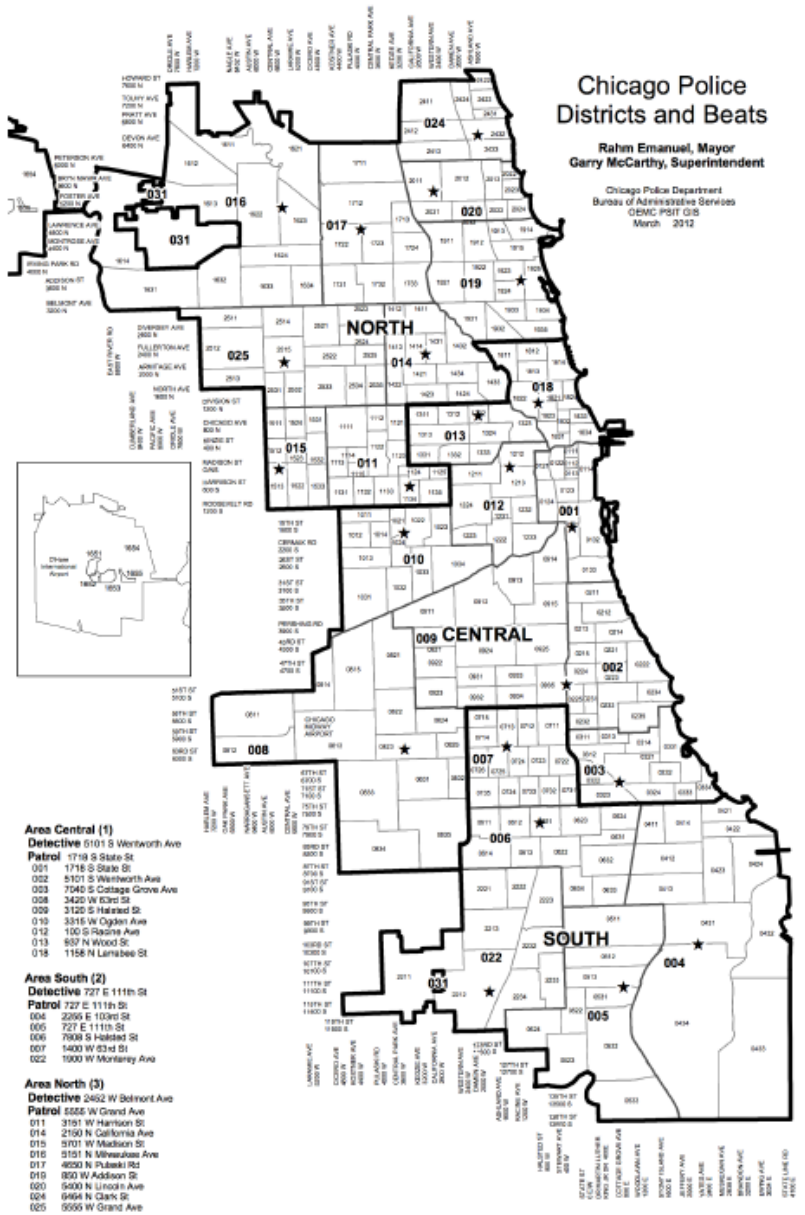
CPD District and Beat Map

- Chicago divided into 22 districts, which are subdivided into beats
- Beats are a small collection of city blocks, average 0.82 sq miles
- Sectors are aggregated beats: $\sim$5 beats/sector, 3 sectors/district
- Three watch periods
  - Watch 1: 12 midnight to 8 am
  - Watch 2: 8 am to 4 pm
  - Watch 3: 4 pm to 12 midnight



CPD Patrol Assignments

- District
- Beat/Sector
- Watch

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- Beat/Sector
  - Beat assignments are largely out of junior officers' control
- Watch
  - Officers bid for preferred watch every year, based on seniority more
- **Takeaway: Senority-based assignment rules mean junior officers have little say in their patrol assignments**

Identification Strategy

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  - If home beat and work sector are racially similar, strong community tie
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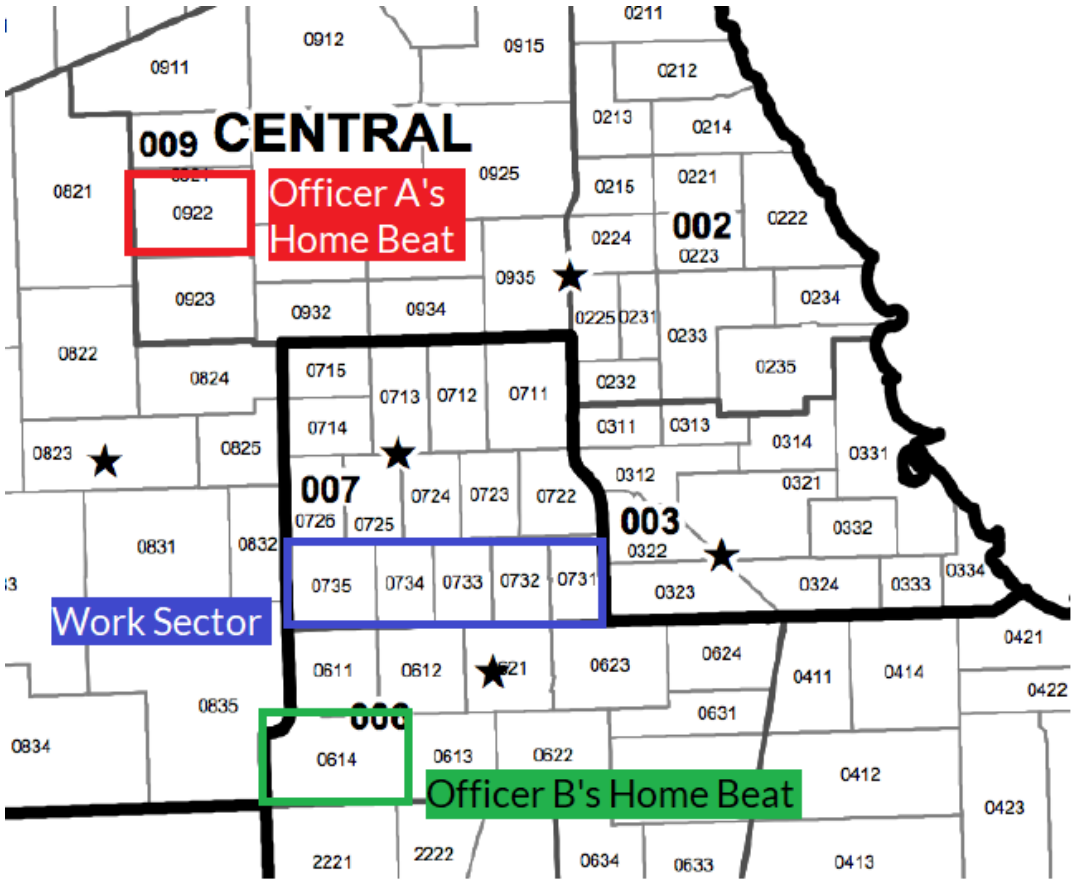
- Idea: Level of social frictions randomly assigned across officers working the same shift
  - Because shifts are out of officer's control and—more importantly—not determined by officer's home address

Example


009 CENTRAL
Officer A's Home Beat
002
007
003
Work Sector
Officer B's Home Beat
0911
0912
0915
0211
0212
0213
0214
0821
0922
0925
0215
0221
0224
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Data Summary

- Officer Personnel Data: demographics, rank, tenure, patrol assignment, stops, arrests
  - Freedom of Information Act requests
- Court Outcomes Data: case details, final disposition
  - Chicago Data Collaborative - a cooperative effort to collect and release data on the Cook County criminal justice system
  - Merge onto arrests data so we know outcome for each arrest/charge
- Officer Home Address (annual)
  - InfoUSA - proprietary database of US consumers with residential information
  - Able to match about 85% of CPD officers
- ACS Population Data: annual by beat and race
- Analysis Sample: 220,740 observations on 1,112 officers with $<$ 5 yrs of experience between 2013-2016

Measuring Officer's Community Tie

- Calculate Euclidean demographic distance (EDD) between officer's work sector and home beat:

$$||share_{home} - share_{work}||/\sqrt{2}$$

- Ranges between 0 and 1, with higher values indicating greater racial dissimilarity
- Use it to measure level of social frictions as a proxy for community tie
  - Strong Community Tie if $\in [0, 0.4)$
  - Medium Community Tie if $\in [0.4, 0.7)$
  - Weak Community Tie if $\in [0.7, 1)$

EDD Examples

	EDD value of 0.4		EDD value of 0.7	
Beat/Sector	1614	141	1211	72
Share White	79.6%	42.1%	39.9%	0.8%
Share Black	2.4%	4.6%	13.9%	95.3%
Share Hispanic	9.4%	48.5%	43.1%	2.7%
Share Other	8.6%	4.8%	3.0%	1.2%

Image Source: Bill Rankin of Radical Cartography, http://www.radicalcartography.net/index.html?chicagodots

Summary Statistics

	Mean/Share	SD
Male	0.814	
Race		
White	0.519	
Black	0.148	
Hispanic	0.283	
Other	0.048	
Missing	0.002	
Number of Officers per Shift	10.984	9.151
EDD	0.562	0.268
Shift-level EDD	0.507	0.218
Number of Officer-Days	220,749	

Regression Model

$$y_{it} = \beta_0 + \beta_1 MedTie_i + \beta_2 WeakTie_i + \alpha_s + X\delta + \varepsilon_i$$

- y_{it} is officer i's work performance on day t
- α_s contains shift FE, where **shift** is a unique month-day of week-watch-sector
- X includes officer birth year, tenure, and commuting distance

Community Tie Categories:

- $StrongTie_{ijt} = 1$ if EDD is [0, 0.4) (reference group)
- $MedTie_{ijt} = 1$ if EDD is [0.4, 0.7)
- $WeakTie_{ijt} = 1$ if EDD is [0.7, 1)

Results

	Stops	Arrests
	(1)	(2)
Medium Community Tie	0.101***	0.0113**
	(0.0109)	(0.00486)
Weak Community Tie	0.146***	0.0224***
	(0.0115)	(0.00514)
p-value	0.000	0.016
Observations	220,749	220,749
Baseline Mean	0.603	0.282

Notes: *Non-Guilty* includes not guilty findings, dismissed charges, and arrests with no charges. An arrest is classified as a *Guilty Arrest* if at least one charge has a guilty finding. *p-value* reports the p-value of a t-test on the difference of means between medium tie and weak tie. All estimates control for officer birth year, tenure, shift, and commuting distance.

▸ 5+ ▸ Distance ▸ EDDxDist

Results

	Stops	Arrests	Arrests with No Charges	Non-Guilty Arrests	Guilty Arrests
	(1)	(2)	(3)	(4)	(5)
Medium Community Tie	0.101***	0.0113**	0.00306	0.00640*	0.00485**
	(0.0109)	(0.00486)	(0.00201)	(0.00389)	(0.00241)
Weak Community Tie	0.146***	0.0224***	0.0100***	0.0162***	0.00508**
	(0.0115)	(0.00514)	(0.00213)	(0.00412)	(0.00256)
p-value	0.000	0.016	0.000	0.008	0.919
Observations	220,749	220,749	220,749	220,749	220,749
Baseline Mean	0.603	0.282	0.057	0.190	0.074

Notes: *Non-Guilty* includes not guilty findings, dismissed charges, and arrests with no charges. An arrest is classified as a *Guilty Arrest* if at least one charge has a guilty finding. *p-value* reports the p-value of a t-test on the difference of means between medium tie and weak tie. All estimates control for officer birth year, tenure, shift, and commuting distance.

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Appendix Slides

District Crime Rate by Officer Tenure

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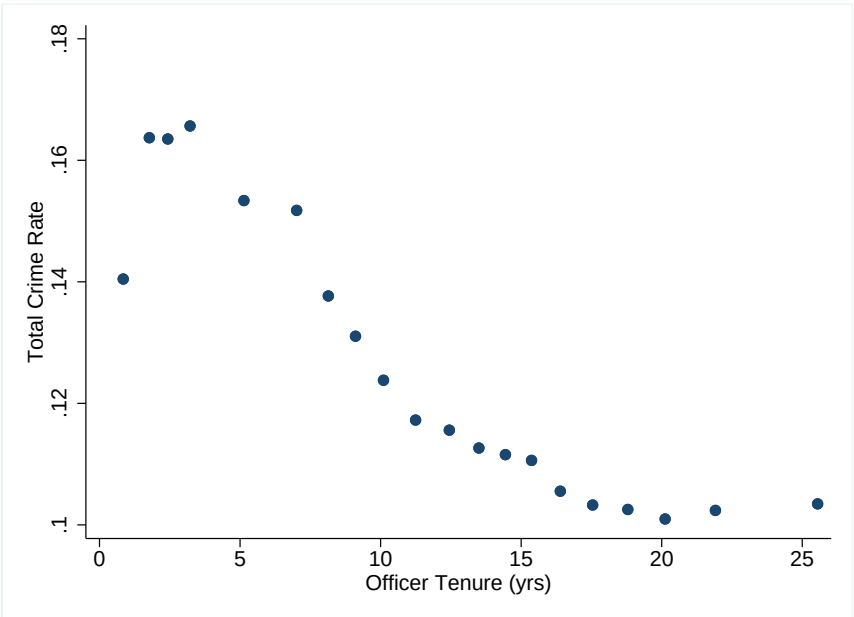
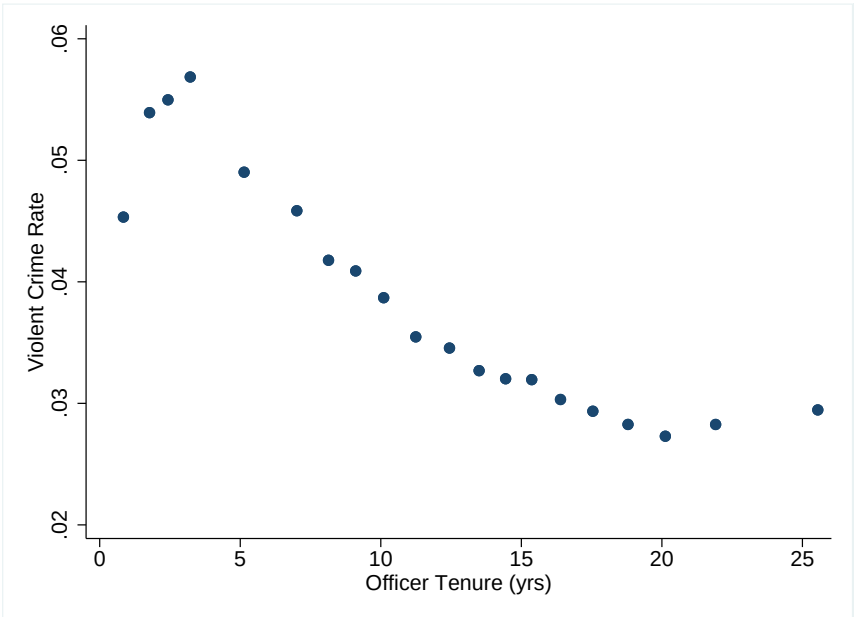
(a) Total Crime



(b) Violent Crime



Distribution of Watch Times by Officer Tenure

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Tenure:	$<$ 5 yrs	5-15 yrs	$\geq$ 15 yrs
Watch 1 (12AM - 8AM)	46.9%	45.6%	21.5%
Watch 2 (8AM - 4PM)	10.4%	12.0%	45.9%
Watch 3 (4PM - 12AM)	42.7%	42.4%	31.6%
Total	100.0%	100.0%	100.0%

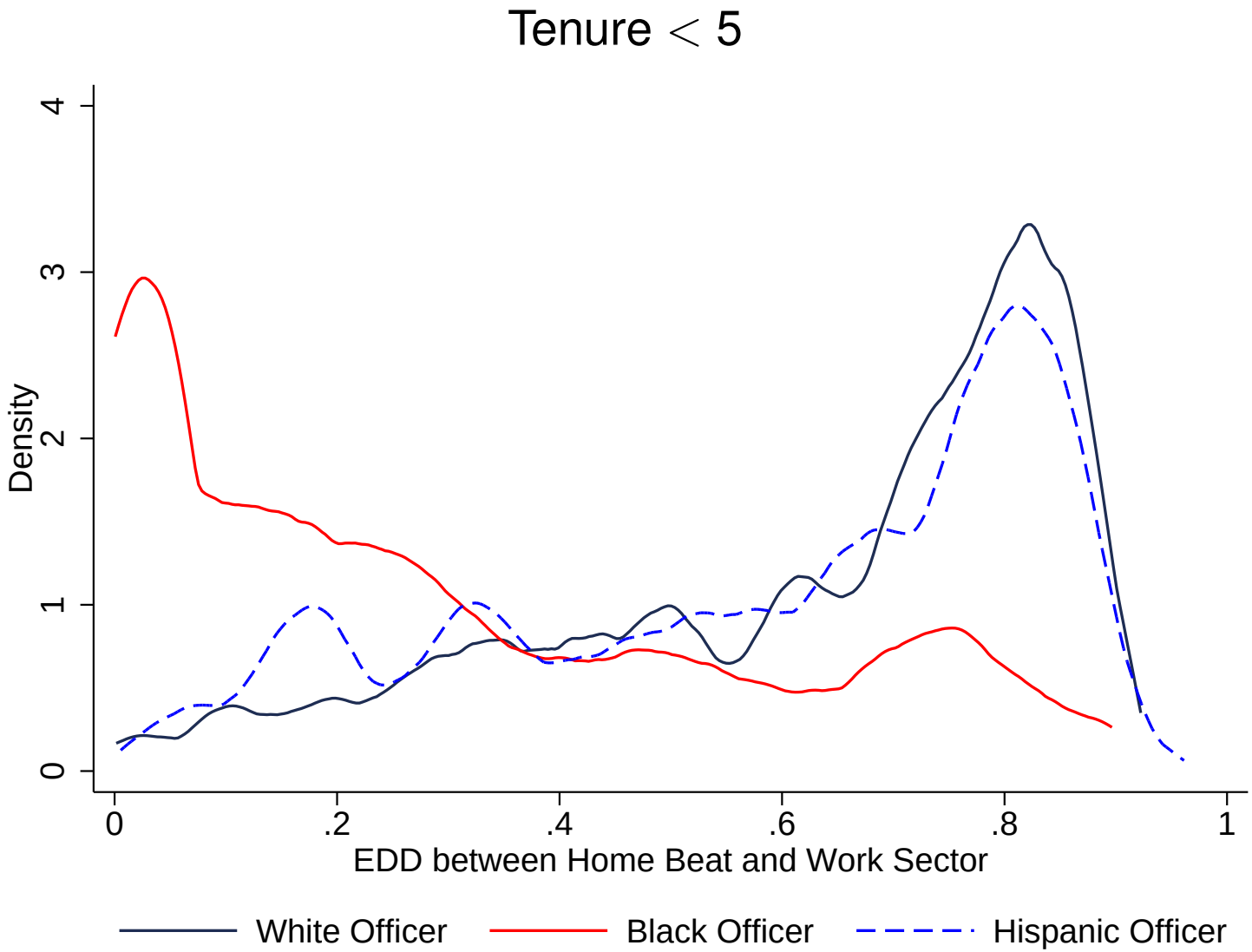
Summary Statistics

back

Sample:	Tenure < 5		All Officers	
	Mean/Share	SD	Mean/Share	SD
Male	0.814		0.791	
Race				
White	0.519		0.469	
Black	0.148		0.224	
Hispanic	0.283		0.262	
Other	0.048		0.041	
Missing	0.002		0.000	
Number of Officers per Shift	10.984	9.151	28.769	10.986
Number of Shifts	37,709		67,115	
EDD	0.562	0.268	0.415	0.263
Shift-level EDD	0.507	0.218	0.416	0.169
Number of Officer-Days	220,749		1,533,673	

EDD Density by Office Race

back



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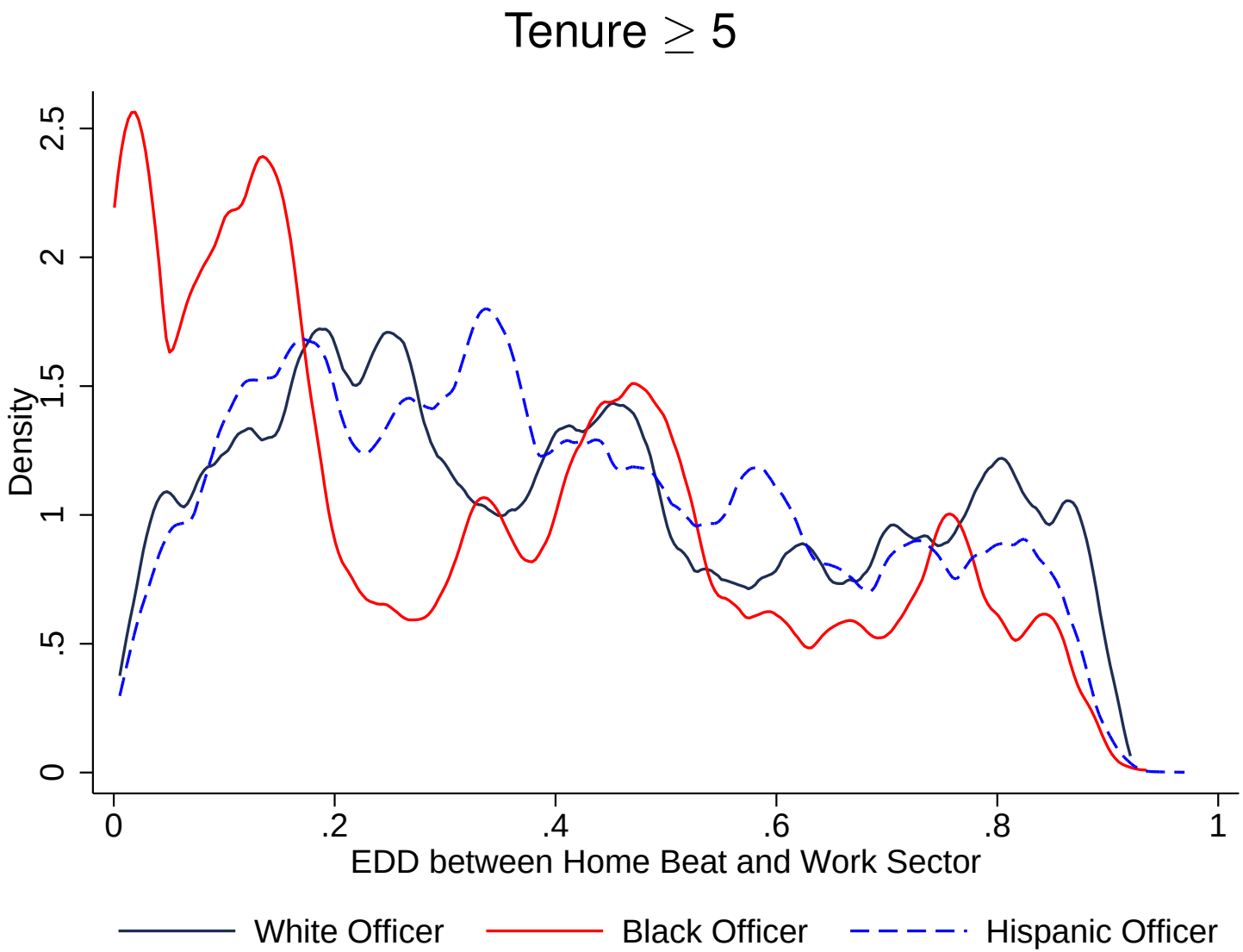

Results for officers with 5+ yrs of experience

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	Stops	Arrests	Arrests with No Charges	Non-Guilty Arrests	Guilty Arrests
	(1)	(2)	(3)	(4)	(5)
Medium Community Tie	0.0397***	0.000818	0.00212***	0.000638	0.000345
	(0.00297)	(0.00124)	(0.000470)	(0.000979)	(0.000630)
Weak Community Tie	0.0472***	0.00715***	0.00221***	0.00204	0.00469***
	(0.00385)	(0.00160)	(0.000608)	(0.00127)	(0.000815)
p-value	0.057	0.000	0.890	0.279	0.000
Observations	1,213,596	1,213,596	1,213,596	1,213,596	1,213,596
Baseline Mean	0.490	0.152	0.025	0.100	0.042

Notes: *Non-Guilty* includes not guilty findings, dismissed charges, and arrests with no charges. An arrest is classified as a *Guilty Arrest* if at least one charge has a guilty finding. *p-value* reports the p-value of a t-test on the difference of means between medium tie and weak tie. All estimates control for officer birth year, tenure, and shift.

Results by Commuting Distance

back

	Stops	Arrests	Arrests with No Charges	Non-Guilty Arrests	Guilty Arrests
	(1)	(2)	(3)	(4)	(5)
Medium Commute	0.0374***	0.0266***	0.00144	0.0127***	0.0117***
	(0.0104)	(0.00463)	(0.00192)	(0.00371)	(0.00230)
Far Commute	0.0730***	0.0191***	0.00460**	0.0138***	0.00299
	(0.0102)	(0.00454)	(0.00188)	(0.00363)	(0.00226)
p-value	0.000	0.045	0.041	0.717	0.000
Observations	220,749	220,749	220,749	220,749	220,749
Baseline Mean	0.572	0.297	0.065	0.200	0.078

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EDD and Commute Distance

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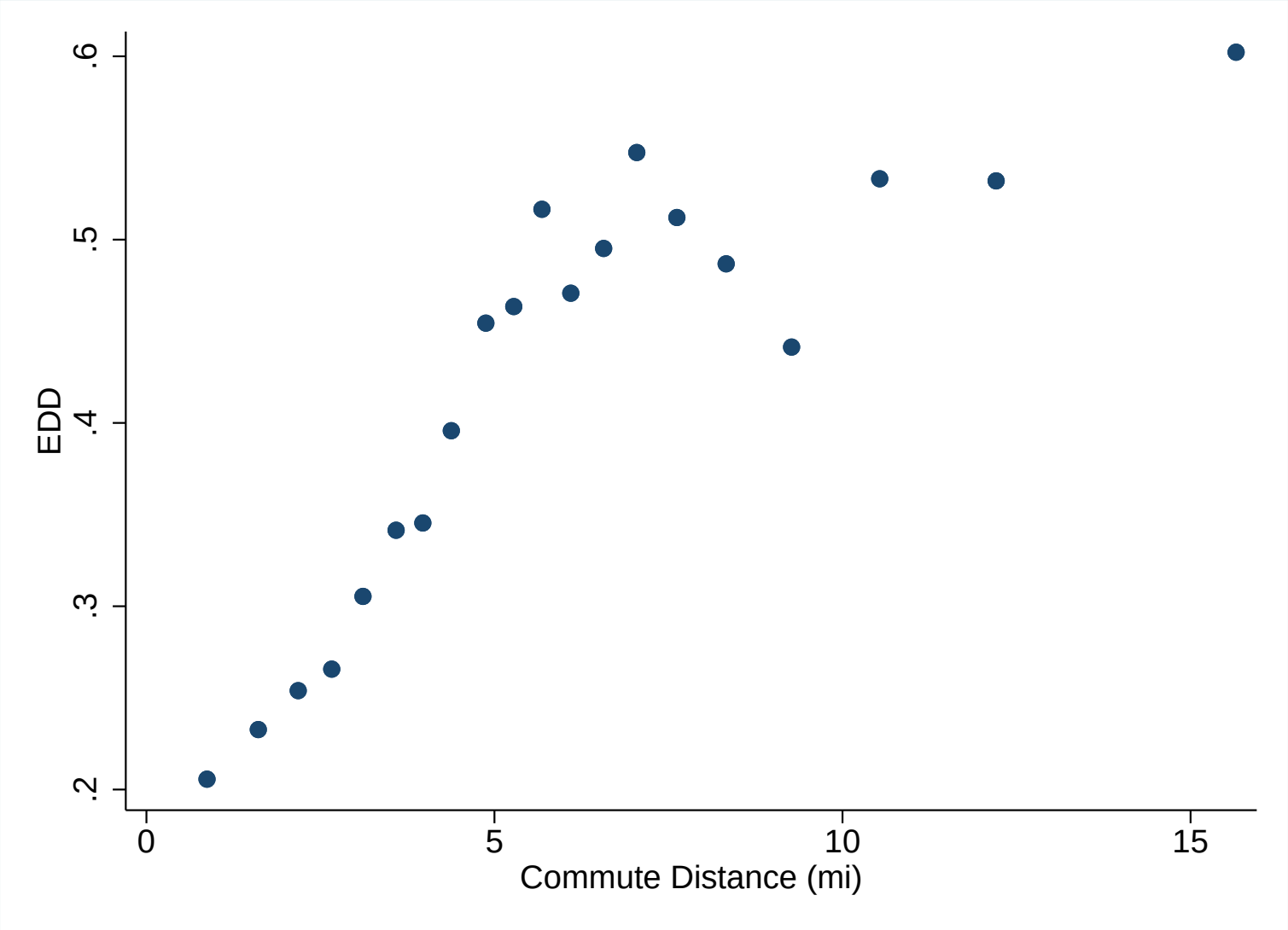
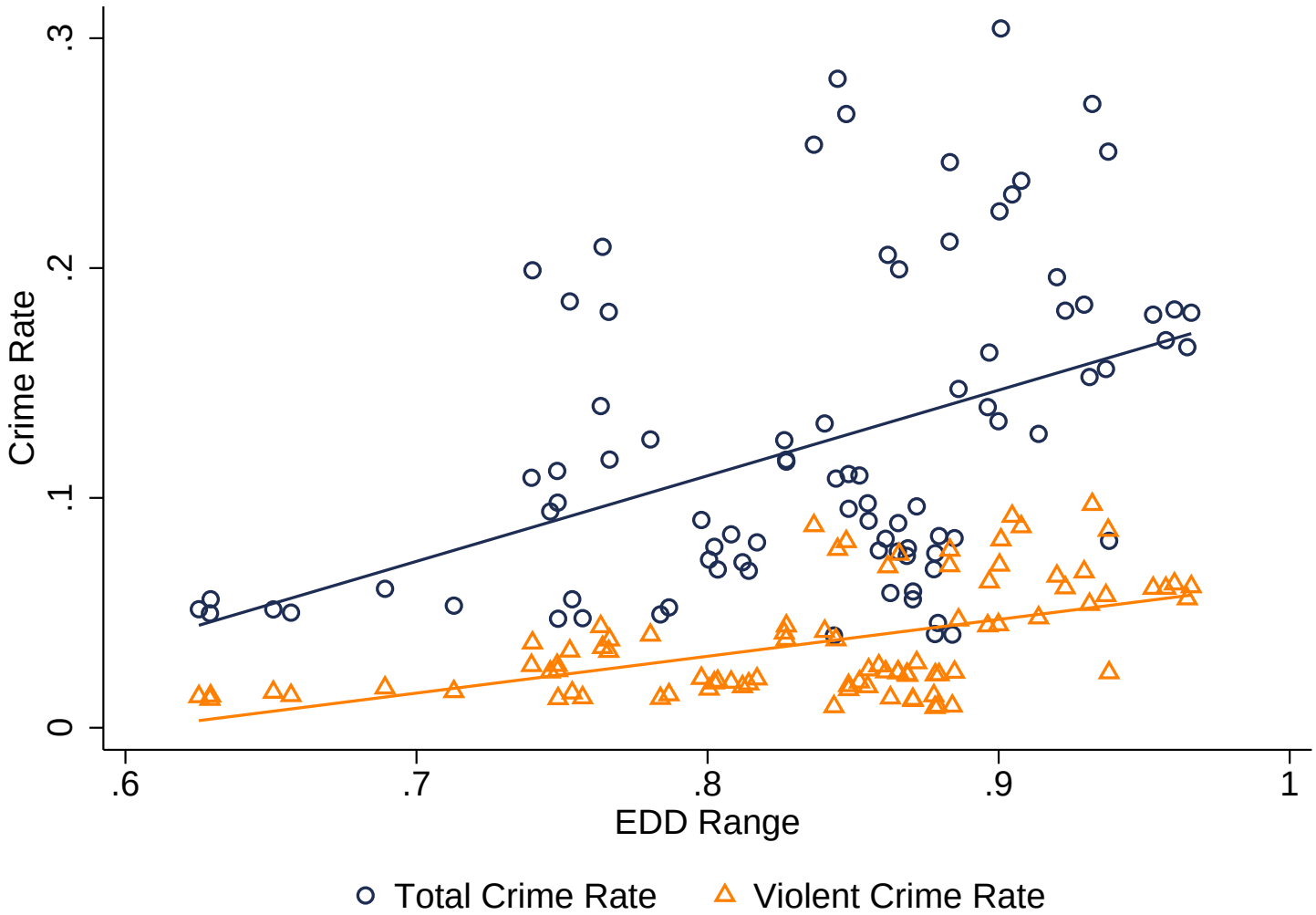


District Crime Rate and EDD Range



District Crime Rate and EDD SD