Test Document

2023-08-26

R Markdown

This document is meant to test crap.

Table 1: Summary Statistics

	Mean	Std. Dev.	Min	Max	N
Panel A: Priority 1 Outcomes:					
Call-to-Dispatch	281.89	436.53	2.00	3,111.00	3,582,560
	(4.70 mins)	(7.28 mins)	(0.03 mins)	(51.85 mins)	
Call-to-On-Scene	770.86	784.69	11.00	7,671.00	1,997,102
	(12.85 mins)	(13.08 mins)	(0.18 mins)	(127.85 mins)	
Arrest Made	0.02	0.15	0.00	1.00	3,582,560
Victim Injury (Time-Sensitive)	0.01	0.12	0.00	1.00	2,434,526
Panel B: Secondary Outcomes:					
Call-to-Dispatch (Priority 2)	362.04	524.78	2.00	3,577.00	1,604,709
	(6.03 mins)	(8.75 mins)	(0.03 mins)	(59.62 mins)	
Call-to-On-Scene (Priority 2)	964.45	901.10	14.00	6,615.00	776,304
	(16.07 mins)	(15.02 mins)	(0.23 mins)	(110.25 mins)	
Call-to-Dispatch (Priority 3)	1,012.99	1,258.17	2.00	6,550.00	3,284,127
	(16.88 mins)	(20.97 mins)	(0.03 mins)	(109.17 mins)	
Call-to-On-Scene (Priority 3)	1,915.35	1,820.17	10.00	11,702.00	1,226,135
	(31.92 mins)	(30.34 mins)	(0.17 mins)	(195.03 mins)	
Panel C: Other Variables:					
Number Dispatches	73.01	24.63	8.00	223.00	3,582,560
Number SST Dispatches	2.56	3.72	0.00	55.00	3,582,560
Officer Hours	1,259.50	316.36	200.50	3,431.50	3,582,560

Note:
Units are in seconds unless otherwise noted. Data is at the call-level. Call-to-Dispatch represents the amount of time from the 911 call to an officer dispatching to the scene. Call-to-On-Scene is the time from a 911 call to when an officer arrives on scene. Call-to-On-Scene is missing approximately 45 percent of on-scene times. This is discussed further in Appendix A. Arrest Probability is the probability of an arrest occuring during a dispatch. Victim Injury Probability is the probability of a victim being injured during a time-sensitive dispatch call. A time-sensitive dispatch call is one in which the injury outcome has not yet been realized. Priority 1 refers to an immediate dispatch, Priority 2 a rapid dispatch, and Priority 3 a routine dispatch. Officer Hours are the number of working hours sworn police officers work at the district-day level. Number of Dispatches is the number of Priority 1 dispatches at the district-day level. Number of SST Dispatches is the number of dispatches due to ShotSpotter alerts. Importantly, Number of SST Dispatches is also at the district-by-day level and includes days in which ShotSpotter is not implemented. The average daily number of ShotSpotter dispatches across Chicago once all 12 districts have implemented ShotSpotter is approximately 60. Note that New Years Eve/New Years Day/Fourth of July are excluded from the sample as ShotSpotter alerts can be as high as 392 on these days.

Table 2: Effect of ShotSpotter on Response Times (OLS)

	(1)	(2)	(3)	(4)	(5)
Panel A: Call-to-Dispatch					
ShotSpotter Activated	64.142***	64.058***	63.954***	71.929***	61.373***
	(21.541)	(22.394)	(22.235)	(22.405)	(21.641)
Border District Activated					21.406
					(16.503)
Mean of Dependent Variable	281.890	281.890	281.890	281.890	281.890
Observations	3,582,560	3,582,560	3,582,560	3,582,528	3,582,560
Wild Bootstrap P-Value	0.015	0.012	0.015		0.017
Panel B: Call-to-On-Scene					
ShotSpotter Activated	101.813***	103.107***	103.566***	120.721***	101.392***
	(26.205)	(28.801)	(28.182)	(27.992)	(28.167)
Border District Activated					24.407
					(17.882)
Mean of Dependent Variable	770.863	770.863	770.863	770.863	770.863
Observations	1,997,102	1,997,102	1,997,102	1,997,075	1,997,102
Wild Bootstrap P-Value	0.005	0.001	0.002		0.001
FE: Day-by-Month-by-Year	X	X	X	X	X
FE: District	X	X	X	X	X
FE: Call-Type		X	X	X	X
FE: Hour-of-Day		X	X	X	X
Officer Hours			X		
Number 911 Dispatches			X		
Gardner (2022) Robust				X	

Note:
* p < 0.1, ** p < 0.05, *** p < 0.01
Standard errors are clustered by district. Shotspotter is activated in 12 of the 22 police districts in Chicago. Panel A shows results for Call-to-Dispatch while Panel B shows results for Call-to-On-Scene. Column 1 reports no controls, and only fixed effects. Controls in all other columns include officer hours and number of 911 dispatches. Column 2 reports the preferred specification from Equation 1. Column 3 reports estimates using the Gardner (2022) estimator which is robust to heterogeneous treatment effects across groups and time periods in staggered designs. Column 4 includes Border District Activated which is an indicator for when a police district is adjacent to a ShotSpotter implemented district. Wild cluster bootstrap p-values are also reported as the number of clusters (22) is below the threshold of 30 put forth in Cameron et al. (2008). Columns 5 and 6 split the sample by district median levels of officer hours. Observations for Call-to-On-Scene do not exactly match Call-to-Dispatch since there is one district-day that is missing information for Call-to-On-Scene.

Table 3: Effect of ShotSpotter Enactment on Arrest Probability (OLS)

				Most Frequent Arrest Types		
	All	Gun-Related	Non-Gun-Related	Domestic Disturbance	Domestic Battery	Robbery
	(1)	(2)	(3)	(4)	(5)	(6)
ShotSpotter Activated	-0.002***	-0.002	-0.002***	-0.008***	-0.003**	-0.003
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Mean of Dependent Variable	0.024	0.034	0.024	0.061	0.020	0.042
Observations	3,582,560	317,937	3,264,623	224,022	675,025	270,735
FE: Day-by-Month-by-Year	X	X	X	X	X	X
FE: District	X	X	X	X	X	X
FE: Call-Type	X	X	X	X	X	X
FE: Hour-of-Day	X	X	X	X	X	X

Note:
* p < 0.1, ** p < 0.05, *** p < 0.01
Standard errors are clustered by district. Panel A shows Arrest Rate defined as the number of arrests made divided by the number of dispatches, while Panel B shows Injury defined as the number of injury-related dispatches divided by the number of dispatches that are time-sensitive (see Appendix Figure BLANK). Columns 2 and 3 subset Column 1 by gun-related and non-gun-related arrest rates and injury rates. Gun-related crimes for Arrest Rate are those corresponding to a person with a gun, shots fired, or a person shot. Gun-related crimes to Injury Rate corresponds to person with gun or shots fired. Columns 3-5 report the top 3 most frequent calls that end in arrests: Domestic Battery, Domestic Disturbance, and Battery. Observations are not consistent across each call type since not every type of call occurs on every district-day. Controls of officer hours and number of dispatches are included in all specifications.

Table 4: Effect of ShotSpotter Implementation on Victim Injury (OLS)

	Probability of Victim Injury		
	Full Sample	Gun Dispatch	Non-Gun Dispatch
	(1)	(2)	(3)
ShotSpotter Activated	-0.001*	-0.003	0.000
	(0.000)	(0.002)	(0.000)
Mean of Dependent Variable	0.014	0.024	0.012
Observations	2,434,526	304,544	2,129,982
FE: Day-by-Month-by-Year	X	X	X
FE: District	X	X	X
FE: Call-Type	X	X	X
FE: Hour-of-Day	X	X	X

Note:
* p < 0.1, ** p < 0.05, *** p < 0.01
Standard errors are clustered by district. The main outcome variable is the probability of a victim being injured. The sample here is restricted to only Priority 1 dispatches that are time-sensitive and have the possibility of an injury. For instance, a dispatch for a person shot is not time sensitive since the injury has already been realized. On the other hand, a dispatch for a person with a knife is considered time-sensitive as an injury has not yet occurred, but may occur if an officer arrives slower. Gun Dispatch is restricted to only time-sensitive gun dispatches including 'Person with a Gun' and 'Shots Fired'. Non-Gun Dispatch are all other time-sensitive dispatches. .

Table 5: Effect of ShotSpotter on Response Times Mechanisms (OLS)

	ShotSpotter Rollout			ShotSpotter Dispatches		
		Officer Hours			Officer Hours	
	Full Sample	> Median	<= Median	Full Sample	> Median	<= Median
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Call-to-Dispatch						
ShotSpotter Activated	64.131***	27.222**	93.794***			
	(22.379)	(12.382)	(31.497)			
Number SST Dispatches				5.272***	3.344***	4.237***
				(1.490)	(0.945)	(0.879)
Mean of Dependent Variable	281.890	229.785	333.871	291.300	232.886	349.536
Observations	3,582,560	1,789,157	1,793,403	2,958,754	1,477,121	1,481,633
Panel B: Call-to-On-Scene						
ShotSpotter Activated	102.682***	55.508**	141.492***			
	(28.724)	(21.030)	(38.611)			
Number SST Dispatches				7.053***	4.857***	5.152***
				(1.885)	(1.158)	(1.133)
Mean of Dependent Variable	770.863	700.283	837.941	771.964	690.147	853.515
Observations	1,997,102	973,138	1,023,964	1,732,479	864,836	867,643
FE: Day-by-Month-by-Year	X	X	X	X	X	X
FE: District	X	X	X	X	X	X
FE: Call-Type	X	X	X	X	X	X
FE: Hour-of-Day	X	X	X	X	X	X

Note:
* p < 0.1, ** p < 0.05, *** p < 0.01
Standard errors are clustered by district. Number SST Dispatches refers to the number of ShotSpotter dispatches that occur within a district-day. All coefficient estimates are in seconds. Panel A reports results for Call-to-Dispatch while Panel B reports results for Call-to-On-Scene. Call-to-Dispatch is the amount of time from a 911 call to when a police officer is dispatched to the scene of the crime. Call-to-On-Scene is the time from a 911 call to the time a police officer arrives on-scene. In Column 1, the controls of officer hours and number of 911 dispatches are not included. Column 2 shows the preferred specification, while Columns 3 and 4 split the sample by median number of officer hours within districts to show that response times are driven by resource-constrained time periods. Observations for Call-to-On-Scene do not exactly match Call-to-Dispatch since there is one district-day that is missing information for Call-to-On-Scene.

Table 6: Bad Controls (OLS)

	(1)	(2)
Panel A: Number 911 Dispatches		
ShotSpotter Activated	-4.087***	-4.301***
	(0.989)	(1.241)
Mean of Dependent Variable	73.011	73.011
Observations	3,582,560	3,582,528
Panel B: Officer Hours		
ShotSpotter Activated	-28.855	-53.757*
	(22.204)	(26.299)
Mean of Dependent Variable	1,259.497	1,259.497
Observations	3,582,560	3,582,528
FE: Day-by-Month-by-Year	X	X
FE: District	X	X
FE: Call-Type	X	X
FE: Hour-of-Day	X	X
Gardner (2022) Robust		X

Note:
* p < 0.1, ** p < 0.05, *** p < 0.01
Standard errors are clustered by district. This table shows estimations on two outcome variables, Number 911 Dispatches and Officer Hours, which are not included in the main specification due to possibly being bad controls. Each panel refers to a distinct outcome variable. Number 911 Dispatches is the number of 911 dispatches. Officer Hours is the number of police officer hours. ShotSpotter Activated refers to the timing in which each district receives ShotSpotter technology. The Gardner (2022) estimator is robust to the heterogeneous treatment effects in staggered two-way-fixed-effects designs.

Table 7: Analysis of Missing Call-to-On-Scene Data (OLS)

		Officer Hours	
		> Median	<= Median
	(1)	(2)	(3)
Panel A: Missing Call-to-On-Scene			
ShotSpotter Activated	0.038*	0.032	0.042*
	(0.019)	(0.019)	(0.022)
Mean of Dependent Variable	0.443	0.456	0.429
Observations	3,582,560	1,789,157	1,793,403
Panel B: Call-to-Dispatch			
ShotSpotter Activated	66.408***	29.280**	97.359***
	(23.059)	(12.846)	(32.122)
ShotSpotter Activated x Missing	-0.249	-1.435	-2.469
	(32.877)	(18.407)	(44.942)
Mean of Dependent Variable	281.890	229.785	333.871
Observations	3,582,560	1,789,157	1,793,403

Table 8: Robustness of Estimates Controlling for Other Technologies

	SDSC Controls				BWC Controls	
			Omitting Districts 7 and 9			
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Call-to-Dispatch						
ShotSpotter Activated	50.097**	69.056***	57.445**	86.995***	61.256***	71.856***
	(22.185)	(20.481)	(23.098)	(19.580)	(20.988)	(22.523)
SDSC Activated	16.921		17.795			
	(22.102)		(22.342)			
BWC Activated					-30.735	
					(20.755)	
Mean of Dependent Variable	281.890	281.890	289.018	289.018	281.890	281.890
Observations	3,582,560	3,582,528	3,198,525	3,198,500	3,582,560	3,582,528
Wild Bootstrap P-Value	0.008	0.003			0.062	
Panel B: Call-to-On-Scene						
ShotSpotter Activated	68.486**	100.562***	72.692**	123.226***	98.403***	120.214***
	(27.013)	(28.118)	(29.436)	(24.756)	(27.843)	(28.246)
SDSC Activated	43.771*		48.562*			
	(24.711)		(25.830)			
BWC Activated					-40.821	
					(26.223)	
Mean of Dependent Variable	770.863	770.863	790.897	790.897	770.863	770.863
Observations	1,997,102	1,997,076	1,762,676	1,762,656	1,997,102	1,997,076
Wild Bootstrap P-Value	0.008	0.003			0.062	
Gardner (2022) Robust		X		X		X

Note:
* p < 0.1, ** p < 0.05, *** p < 0.01
Standard errors are clustered by district.

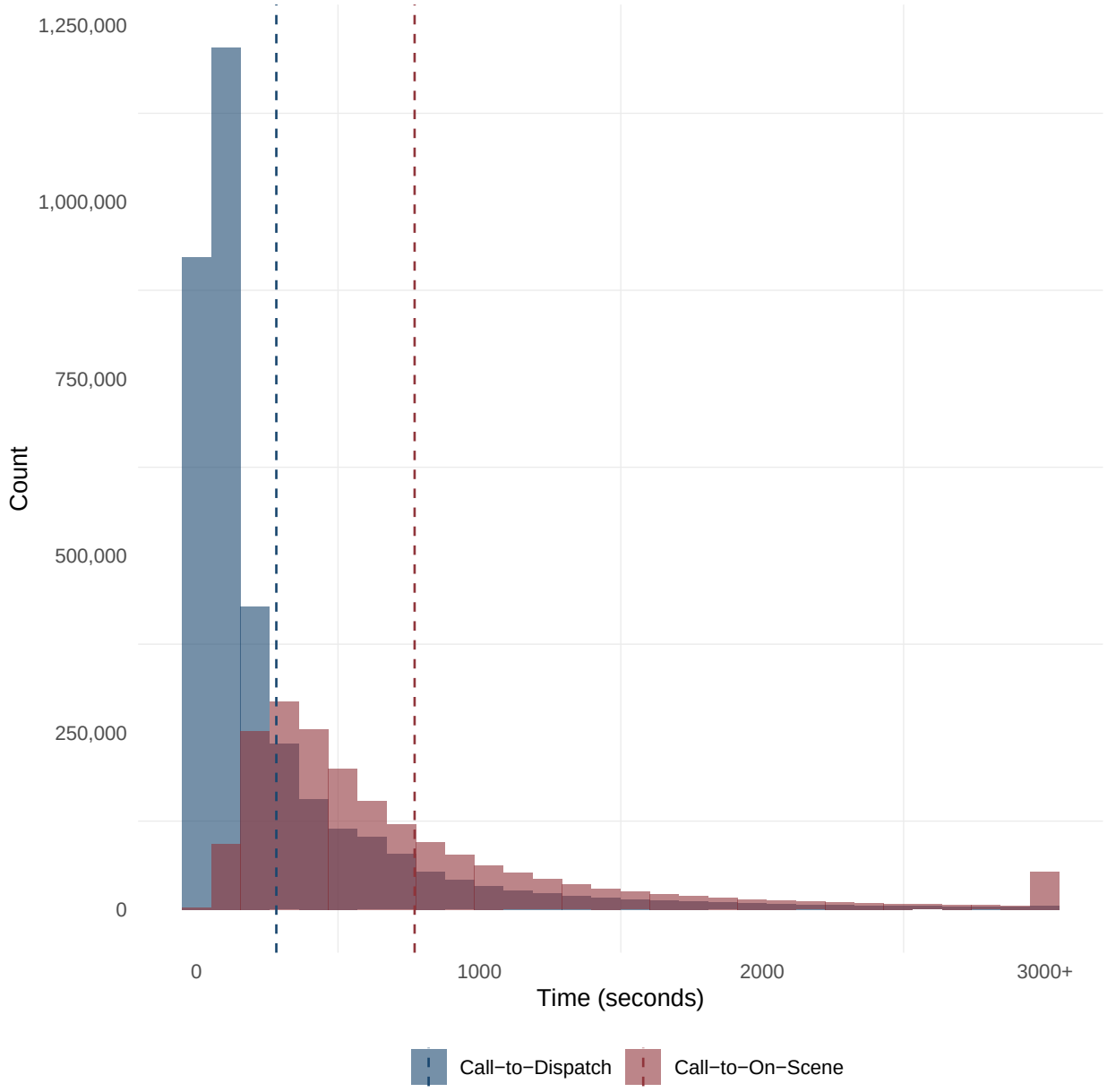

Figure 1: Distribution of Outcome Variables

Note: The two plotted variables are Call-to-Dispatch and Call-to-On-Scene. Call-to-Dispatch is time it takes for a police officer to be dispatched to the scene of the reported crime from the time of the 911 call. Call-to-On-Scene is the time from a 911 call to the time a police officer arrives at the scene of the reported crime. This sample excludes outliers that are greater than three standard deviations from the mean for each outcome. However, the main results remain consistent when including these outliers as shown in Appendix Figure BLANK.