Lott and Mustard Replication Assignment

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1 Introduction

Prompt: What is the purpose of your study? State very clearly why people should care about this project.

2 Background and Economic Theory

Prompt: This section should only focus on the original Lott and Mustard (1997) project. What was this study? How did they do it? How were the laws coded? It should include a table of the rollout state by state (Table 1), clear description of the laws, the theory behind why you should find deterrence (as well as a description of the economic theory of deterrence), and what the authors found in their original paper.

Table 1: Replication of Table 1

Variable	Standard Deviation of State Means	Mean of Within-State Standard Deviations
Violent Crime Rate	306.62	78.19
Property Crime Rate	1135.99	422.15
Murder Crime Rate	6.19	1.50
Rape Crime Rate	13.26	6.37
Robbery Crime Rate	171.87	28.81
Assault Crime Rate	144.28	57.62
Burglary Crime Rate	372.52	181.39
Larceny Crime Rate	705.73	260.55
Autotheft Crime Rate	210.57	82.24
Violent Arrest Rate	10.38	10.54
Property Arrest Rate	3.07	3.23
Murder Arrest Rate	17.26	29.23
Rape Arrest Rate	11.15	10.65
Assault Arrest Rate	11.42	10.81
Robery Arrest Rate	8.83	8.09
Burglary Arrest Rate	3.08	3.20
Larceny Arrest Rate	3.42	3.49
Autotheft Arrest Rate	10.67	31.62

3   Data

Prompt: In this section, you will describe the state-level data. While the authors used county-level data, we will be using state-level since the laws are ultimately at the state level and critics have noted that the county-level data has substantial measurement error. Describe the data, produce a table of summary statistics for the various crime outcomes as Table 2. Anything additional that you want to show (like time series of the crimes) is up to you. The goal is to create a readable document, so make your own choices.

Table 2: Replication of Table 2 (Panel A)

Variable	N	Mean	Standard Deviation
Shalll	816	0.1912	0.3935
Violent Arrest Rate	802	41.0906	22.2036
Property Arrest Rate	809	16.9180	4.6770
Murder Arrest Rate	806	91.2989	55.9428
Rape Arrest Rate	799	41.0231	17.3887
Assault Arrest Rate	809	44.6250	16.9783
Robery Arrest Rate	808	31.4581	13.5928
Burglary Arrest Rate	809	13.8044	4.5712
Larceny Arrest Rate	809	18.5372	5.1961
Autotheft Arrest Rate	808	22.3455	37.6114
Violent Crime Rate	816	483.9260	318.9425
Property Crime Rate	816	4618.3394	1210.4646
Murder Crime Rate	816	7.7683	6.8817
Rape Crime Rate	816	33.9818	15.0721
Robbery Crime Rate	816	163.4208	176.2506
Assault Crime Rate	816	278.7551	159.6495
Burglary Crime Rate	816	1239.3364	417.7576
Larceny Crime Rate	816	2968.7079	751.0234
Autotheft Crime Rate	816	410.2951	231.1537
Personal Income Rpc	816	9351.8205	4689.7012
Unemployment Insurance Rpc	816	50.0187	38.0808
Income Maintenance Rpc	816	115.2756	70.9528
Retirement Payments Rpc	816	1002.2257	546.4679
State Population	816	4646787.3419	5010349.8734
Density	816	355.9729	1408.2501

Table 3: Replication of Table 2 (Panel B)

Variable	N	Mean	Standard Deviation
White Male 1019	816	0.0672	0.0151
Black Male 1019	816	0.0102	0.0112
Other Male 1019	816	0.0036	0.0076
White Female 1019	816	0.0641	0.0149
Black Female 1019	816	0.0101	0.0114
Other Female 1019	816	0.0035	0.0073
White Male 2029	816	0.0741	0.0120
Black Male 2029	816	0.0096	0.0104
Other Male 2029	816	0.0035	0.0072
White Female 2029	816	0.0726	0.0123
Black Female 2029	816	0.0104	0.0123
Other Female 2029	816	0.0036	0.0073
White Male 3039	816	0.0663	0.0118
Black Male 3039	816	0.0071	0.0082
Other Male 3039	816	0.0030	0.0066
White Female 3039	816	0.0658	0.0117
Black Female 3039	816	0.0081	0.0098
Other Female 3039	816	0.0033	0.0070
White Male 4049	816	0.0480	0.0091
Black Male 4049	816	0.0046	0.0056
Other Male 4049	816	0.0020	0.0047
White Female 4049	816	0.0483	0.0090
Black Female 4049	816	0.0055	0.0068
Other Female 4049	816	0.0022	0.0051
White Male 5064	816	0.0580	0.0105
Black Male 5064	816	0.0052	0.0069
Other Male 5064	816	0.0019	0.0061
White Female 5064	816	0.0625	0.0123
Black Female 5064	816	0.0065	0.0089
Other Female 5064	816	0.0023	0.0069
White Male 65o	816	0.0426	0.0114
Black Male 65o	816	0.0035	0.0048
Other Male 65o	816	0.0012	0.0046
White Female 65o	816	0.0623	0.0167
Black Female 65o	816	0.0054	0.0078
Other Female 65o	816	0.0014	0.0048

4 Empirical Model and Estimation

Prompt: Here you should describe the model that you will be using. There are two models.

4.1 Two way Fixed Effects

Prompt: This model should be similar to the one used by the authors only you will be using the state level data with state and year fixed effects plus all controls. Choose the outcome specification (log or levels in rate form) that the authors use.

Table 4: Replication of Table 3 Panel A : Fixed Effects Regressions

Dependent Variables:	violent_crime_rate_log	property_crime_rate_log	murder_crime_rate_log
Model:	(1)	(2)	(3)
Variables			
shalll	-0.0978***	-0.0072	-0.0507
	(0.0324)	(0.0194)	(0.0394)
Relevant_Arrest_Rate	-0.0003	-0.0020*	-0.0004
	(0.0004)	(0.0011)	(0.0002)
Fixed-effects			
state	Yes	Yes	Yes
year	Yes	Yes	Yes
Fit statistics			
Observations	802	809	806
R^2	0.98146	0.96445	0.94792
Within R^2	0.47334	0.55426	0.31137

Clustered (state) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*
Control variables ommited from table, though they were included in the analysis. Consistent with the original paper, control variables include: density, personal_income_rpc, unemployment_insurance_rpc, income_maintenance_rpc, retirement_payments_rpc, state_population, ppwm1019, ppbm1019, ppnm1019, ppwf1019, ppbf1019, ppnf1019, ppwm2029, ppbm2029, ppnm2029, ppwf2029, ppbf2029, ppnf2029, ppwm3039, ppbm3039, ppnm3039, ppwf3039, ppbf3039, ppnf3039, ppwm4049, ppbm4049, ppnm4049, ppwf4049, ppbf4049, ppnf4049, ppwm5064, ppbm5064, ppnm5064, ppwf5064, ppbf5064, ppnf5064, ppwm65o, ppbm65o, ppnm65o, ppwf65o, ppbf65o, ppnf65o.

Table 5: Replication of Table 3 Panel B : Fixed Effects Regressions

Dependent Variables:	rape_crime_rate_log	assault_crime_rate_log	robbery_crime_rate_log
Model:	(1)	(2)	(3)
Variables			
shalll	-0.0340	-0.1004**	-0.0532
	(0.0395)	(0.0424)	(0.0439)
Relevant_Arrest_Rate	-0.0006	-0.0028***	-0.0014
	(0.0005)	(0.0009)	(0.0009)
Fixed-effects			
state	Yes	Yes	Yes
year	Yes	Yes	Yes
Fit statistics			
Observations	799	809	808
R^2	0.94240	0.96632	0.98389
Within R^2	0.52351	0.51645	0.50471

Clustered (state) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Control variables ommited from table, though they were included in the analysis. Consistent with the original paper, control variables include: density, personal_income_rpc, unemployment_insurance_rpc, income_maintenance_rpc, retirement_payments_rpc, state_population, ppwm1019, ppbm1019, ppnm1019, ppwf1019, ppbf1019, ppnf1019, ppwm2029, ppbm2029, ppnm2029, ppwf2029, ppbf2029, ppnf2029, ppwm3039, ppbm3039, ppnm3039, ppwf3039, ppbf3039, ppnf3039, ppwm4049, ppbm4049, ppnm4049, ppwf4049, ppbf4049, ppnf4049, ppwm5064, ppbm5064, ppnm5064, ppwf5064, ppbf5064, ppnf5064, ppwm65o, ppbm65o, ppnm65o, ppwf65o, ppbf65o, ppnf65o.

Table 6: Replication of Table 3 Panel C : Fixed Effects Regressions

Dependent Variables: Model:	burglary_crime_rate_log (1)	larceny_crime_rate_log (2)	autotheft_crime_rate_log (3)
Variables			
shalll	-0.0461*	0.0033	-0.0090
	(0.0242)	(0.0206)	(0.0382)
Relevant_Arrest_Rate	-0.0052***	-0.0011	-0.0003*
	(0.0018)	(0.0010)	(0.0002)
Fixed-effects			
state	Yes	Yes	Yes
year	Yes	Yes	Yes
Fit statistics			
Observations	809	809	808
R^2	0.95597	0.96600	0.96116
Within R^2	0.50429	0.54529	0.60312

Clustered (state) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*
Control variables ommited from table, though they were included in the analysis. Consistent with
the original paper, control variables include: density, personal_income_rpc,
unemployment_insurance_rpc, income_maintenance_rpc, retirement_payments_rpc,
state_population, ppwm1019, ppbm1019, ppnm1019, ppwf1019, ppbf1019, ppnf1019, ppwm2029,
ppbm2029, ppnm2029, ppwf2029, ppbf2029, ppnf2029, ppwm3039, ppbm3039, ppnm3039,
ppwf3039, ppbf3039, ppnf3039, ppwm4049, ppbm4049, ppnm4049, ppwf4049, ppbf4049, ppnf4049,
ppwm5064, ppbm5064, ppnm5064, ppwf5064, ppbf5064, ppnf5064, ppwm65o, ppbm65o, ppnm65o,
ppwf65o, ppbf65o, ppnf65o.

4.2 Bacon Decomposition

Prompt: Implement the Bacon decomposition discussed in class, but unlike the previous section, only report the TWFE without controls (as we did not discuss the interpretation of the Bacon decomposition with controls in class). It is also discussed in my Mixtape chapter in the Mixtape. Interpret this. Product Table 3 with this information. The types of things I want you to focus on are the weights and average DiD estimate on the early to late 2x2s as well as the late to early 2x2s. Why are the late to early 2x2s a problem? Read closely my section on this in the Mixtape to help you understand this problem.

4.3 Callaway and Sant'anna

Prompt: Present a subsection in which you implement the Callaway and Sant'anna estimator. Describe the model with an equation and a description (short). Use the double robust specification. You will be analyzing each outcome and reporting the overall ATT. Do not report the group-level ATTs because many states simply do not have enough states per treatment date for the bootstrapping to provide accurate 95 percent confidence intervals. Use no more than 2 covariates – use your own judgment in selectin them. Report this in Table 4 and in your discussion compare what you found with the original findings. Are they similar? If not how do they differ?

4.4 Event Study (Sun and Abraham)

Prompt: Finally, implement the Sun and Abraham event study. While you can estimate Callaway and Sant'anna event studies, I would like to use Sun and Abraham. Explain the interaction weighted estimator and show a figure of each crime. Do pretrends appear to hold? How confident do you feel then that parallel trends holds for each outcome. This should only be presented as a Figure, not a table.

5   Conclusion

Prompt: What do you think you learned from this exercise? Feel free to discuss as little or as much as you want. I am just interested in your opinions. The purpose of this is merely to give you a nudge in considering how to interpret results and offer some commentary.