Better for Everyone: Black Descriptive Representation and Police Traffic Stops

Online Appendix

Leah Christiani*, University of Tennessee
Kelsey Shoub, University of South Carolina
Frank R. Baumgartner, University of North Carolina at Chapel Hill
Derek A. Epp, University of Texas at Austin
Kevin Roach, University of North Carolina at Chapel Hill

*Corresponding author: email: christiani@utk.edu

Table of Contents

Appendix A: Data Collection

A.1 Political Variable and Municipality Characteristics

The cities and municipalities in the dataset are determined by the availability of traffic stops data. Once the traffic stops data was collected, a list of cities (and years) for which a sufficient amount of traffic stop data is available (recall we set a threshold at 10,000 annual stops, 100 stops of black drivers, and 100 stops of white drivers – discussed on page 5 of manuscript) was compiled.

With this list, we hired undergraduate research assistants to identify the race of each city council member (and of the police chief) in a given municipality, in a given year. The research assistants identified the racial identity of the members either through looking at pictures of the councilors online, or by sending written requests to the municipality for the racial makeup of their councils during the year in question. Students recorded all of their data sources. While there is some error that could be introduced with identifying the racial identity of city councilors visually, it is likely minimal.

The control variables for the regressions that correspond to demographics and contextual features of the municipality were collected from the Census and American Community Survey. The racial makeup of the police force comes from the Law Enforcement Management and Administrative Services (LEMAS) survey. LEMAS is a survey of select police agencies about their practices. We have LEMAS data for the years 2000, 2003, 2007, and 2013. Because there is not information for each agency for each year (and the years administered do not always match up with years in our dataset), we calculate the mean proportion of the police force that is black for each agency. The information about the racial makeup of the police force does not vary much within agency. Below, Table A-1 demonstrates that there is much more between agency variation (standard deviation = 0.12) than within agency variation (standard deviation = 0.01) when it comes to racial makeup of the police force.

Table A-1: Variation in proportion of the police force that is black

Variable		Mean	Std. Dev.	Min	Max	N Obs.
Prop. Force that is Black	Overall	0.06	0.12	0.00	1.00	N = 3824
	Between		0.12	0.00	1.00	n = 3098
	Within		0.01	-0.06	0.19	T-bar = 1.23

Appendix B: Full Models

Tables B-1 and B-2 present the full model results for the OLS regressions that are presented in the body of the paper.

Table B-1: Predicting the white and black search rates

	White Search Rate		Black Search Rate	
	(1)	(2)	(3)	(4)
50% or more black council	-0.02***	-0.01**	-0.04***	-0.02*
	(0.00)	(0.00)	(0.01)	(0.01)
Prop. black in population	0.00	0.02	0.00	0.03
	(0.00)	(0.03)	(0.00)	(0.05)
Logged total population	0.03**	0.00	0.03	0.02**
	(0.01)	(0.00)	(0.03)	(0.01)
Prop. black with HS diploma	0.01	0.02	0.03	0.04
	(0.01)	(0.01)	(0.03)	(0.03)
Prop. black unemployed	0.05***	0.02	0.18***	0.08
	(0.02)	(0.03)	(0.04)	(0.05)
Total crime rate	0.00***	0.00***	0.00**	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
B-W segregation	-0.04***	-0.05*	-0.08***	-0.07*
	(0.01)	(0.02)	(0.02)	(0.04)
Mean prop. black on force	-0.01	-0.04	0.16***	-0.08
	(0.02)	(0.06)	(0.05)	(0.11)
Black police chief	0.01*	0.00	0.01**	0.00
	(0.00)	(0.00)	(0.01)	(0.01)
(Intercept)	0.03*	0.00	0.05	-0.10
	(0.02)	(0.04)	(0.04)	(0.07)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	No	Yes	No
Agency RE	No	Yes	No	Yes
R2	0.37		0.37	
Adj. R2	0.33		0.33	
Num. obs.	467	467	467	467
RMSE	0.02		0.04	
AIC		-2259.38		-1629.59
BIC		-2151.57		-1521.78
Log likelihood		1155.69		840.79
Num. groups		79		79

*p<0.1, **p<0.05, ***p<0.01

Table B-2: Predicting search rates by race, and the black-white search rate ratio (full models)

	Total Search Rate		Black-White Search Rate Ratio	
	(5)	(6)	(7)	(8)
50% or more black council	-0.02***	-0.01*	-0.47**	-0.13
	(0.01)	(0.01)	(0.18)	(0.23)
Prop. black in population	0.00	0.06	-0.01	-2.30**
	(0.00)	(0.04)	(0.06)	(1.10)
Logged total population	0.09***	0.01	-2.41***	0.15
	(0.02)	(0.00)	(0.68)	(0.13)
Prop. black with HS diploma	0.03*	0.03	-1.04*	-0.45
	(0.02)	(0.02)	(0.55)	(0.69)
Prop. black unemployed	0.12***	0.05	2.15**	1.80
	(0.03)	(0.04)	(0.88)	(1.22)
Total crime rate	0.00	0.00	-0.00	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
B-W segregation	-0.07***	-0.07**	1.00**	1.18
	(0.01)	(0.03)	(0.43)	(0.86)
Mean prop. black on force	0.09***	-0.02	10.54***	5.49***
	(0.03)	(0.07)	(0.95)	(2.04)
Black police chief	0.01**	0.00	-0.18	-0.04
	(0.00)	(0.00)	(0.14)	(0.14)
(Intercept)	0.03	0.03	2.72***	0.84
	(0.02)	(0.05)	(0.75)	(1.37)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	No	Yes	No
Agency RE	No	Yes	No	Yes
R2	0.34		0.47	
Adj. R2	0.30		0.43	
Num. obs.	467	467	466	466
RMSE	0.03		0.85	
AIC		-1945.66		1168.16
BIC		-1837.85		1275.91
Log likelihood		998.83		-558.08
Num. groups		79		79

*p<0.1, **p<0.05, ***p<0.01

Appendix C.1: Alternative independent variables

Below, Table C-1 presents results from OLS regressions used to predict search rates and the black-white search rate ratio (a measure of disparities) using the proportion of the city council that is composed of black members (as opposed to an indicator for whether or not the city council is majority black, which is what is presented in the body of the paper. There is not an effect. This leads us to the conclusion that having a council with a majority of black members, that are then able to push through changes, is important for police traffic stop outcomes.

Table C-2 predicts the four key dependent variables (search rates and search rate ratio) with an interaction term between whether or not the majority of the city council is black, and the proportion of the city council is black. This interaction is significant and negative in two cases: for the total search rate (i.e. search rate regardless of race) (at the 90% confidence level) and for the search rate for white drivers (at the 95% confidence level). This may indicate that additional black city council members are able to decrease police search rates, at least among white drivers. The coefficient is similarly negative, but insignificant for black drivers. This may indicate that additional black city council members can make even more of a difference when the majority of the council is already black, but it is curious that we only observe effects for white drivers. Perhaps the city council is able to make the police less aggressive overall, and this comes to bear on the white population first or most heavily, since they likely drive more than black drivers. Or, perhaps they are only successful in constraining police behavior when they interact with white drivers, though this would run counter to our findings presented in the body of the paper. Regardless, more research would be necessary to fully understand the dynamics at play when the proportion of the city council that is black increases in an already majority black city council.

Table C-1: Predicting search rates using the proportion of city council seats held by black members

	Total Search Rate	Black Search Rate	White Search Rate	Black-White Search Rate Ratio
Prop. city council black	-0.01	-0.04	-0.02	-0.26
	(0.02)	(0.03)	(0.01)	(0.52)
Prop. black in population	0.10***	0.05	0.04***	-2.28***
	(0.03)	(0.04)	(0.02)	(0.76)
Logged total population	0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.06)
Prop. black with HS diploma	0.04**	0.04	0.02	-0.91
	(0.02)	(0.03)	(0.01)	(0.56)
Prop. black unemployed	0.13***	0.20***	0.06***	2.32**
	(0.03)	(0.04)	(0.02)	(0.90)
Total crime rate	0.00	0.00*	0.00**	-0.00*
	(0.00)	(0.00)	(0.00)	(0.00)
B-W segregation	-0.07***	-0.07***	-0.04***	1.09**
	(0.01)	(0.02)	(0.01)	(0.44)
Mean prop. black on force	0.07**	0.15***	-0.02	10.26***
	(0.03)	(0.05)	(0.02)	(0.98)
Black police chief	0.01*	0.01	0.00	-0.23
	(0.00)	(0.01)	(0.00)	(0.14)
(Intercept)	0.03	0.04	0.02	2.64***
	(0.03)	(0.04)	(0.02)	(0.78)
State and Year FE	Yes	Yes	Yes	Yes
R2	0.32	0.35	0.35	0.46
Adj. R2	0.28	0.31	0.31	0.43
Num. obs.	467	467	467	466
RMSE	0.03	0.04	0.02	0.85

*p<0.1, **p<0.05, ***p<0.01

Table C-2: Predicting search rates using the proportion of city council seats held by black members interacted with whether black members have a majority on the council

	Total Search Rate	Black Search Rate	White Search Rate	Black-White Search Rate Ratio
Prop. city council black	0.03	0.03	0.01	0.39
	(0.02)	(0.03)	(0.01)	(0.61)
Majority black council	0.07	0.07	0.06*	-2.69*
	(0.05)	(0.08)	(0.04)	(1.63)
Prop. black in population	0.07***	0.01	0.03	-2.63***
	(0.03)	(0.04)	(0.02)	(0.78)
Logged total population	0.00	0.00	0.00	-0.02
	(0.00)	(0.00)	(0.00)	(0.06)
Prop. black with HS diploma	0.02	0.02	0.01	-1.10**
	(0.02)	(0.03)	(0.01)	(0.56)
Prop. black unemployed	0.11***	0.17***	0.05**	2.02**
	(0.03)	(0.04)	(0.02)	(0.91)
Total crime rate	0.00	0.00**	0.00***	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
B-W segregation	-0.07***	-0.08***	-0.04***	1.06**
	(0.01)	(0.02)	(0.01)	(0.43)
Mean prop. black on force	0.07**	0.15***	-0.01	10.39***
	(0.03)	(0.05)	(0.02)	(0.97)
Black police chief	0.01**	0.01**	0.01**	-0.20
	(0.00)	(0.01)	(0.00)	(0.14)
Prop. black on council * Majority	-0.18*	-0.21	-0.15**	4.04
	(0.10)	(0.15)	(0.07)	(3.08)
(Intercept)	0.04*	0.06	0.03**	2.78***
	(0.03)	(0.04)	(0.02)	(0.78)
State and Year FE	Yes	Yes	Yes	Yes
R2	0.35	0.38	0.38	0.47
Adj. R2	0.31	0.34	0.33	0.43
Num. obs.	467	467	467	466
RMSE	0.03	0.04	0.02	0.85

*p<0.1, **p<0.05, ***p<0.01

Appendix C.2: Alternative dependent variable

Table C-3 predicts the difference between the black and white search rates – another measure of racial disparities in policing. These results mimic those presented in the body of the paper (that use the black-white search rate ratio as the dependent variable). There is some evidence that the disparity in search rates decline (model 1), but the coefficient becomes insignificant when random intercepts that account for police agency are included (model 2).

Table C-3: Predicting the black-white search rate difference

	Black-White Search Rate Difference	
	(1)	(2)
50% or more black council	-0.02***	-0.01
	(0.01)	(0.01)
Prop. black in population	0.00	0.01*
	(0.00)	(0.00)
Logged total population	-0.00	0.04
	(0.02)	(0.04)
Prop. black with HS diploma	0.01	0.02
	(0.02)	(0.02)
Prop. black unemployed	0.13***	0.06*
	(0.03)	(0.03)
Total crime rate	0.00*	0.00
	(0.00)	(0.00)
B-W segregation	-0.04***	-0.04
	(0.01)	(0.03)
Mean prop. black on force	0.17***	0.03
	(0.03)	(0.07)
Black police chief	0.01*	-0.00
	(0.00)	(0.00)
(Intercept)	0.02	-0.04
	(0.02)	(0.05)
State and Year FE	Yes	Yes
Agency RE	No	Yes
R2	0.38	
Adj. R2	0.34	
Num. obs.	467	467
RMSE	0.03	
AIC		-2002.85
BIC		-1874.31
Log likelihood		1032.43
Num. groups		79

*p<0.1, **p<0.05, ***p<0.01

Appendix C.3: Investigating a super-majority

Table C-4: OLS Regressions Explaining the White, Black, and Total Search Rates

	All Drivers		White Drivers		Black Drivers	
	(1)	(2)	(3)	(4)	(5)	(6)
50-60% black council	-0.02***	-0.01*	-0.01***	-0.01*	-0.03***	-0.02*
	(0.02)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
60+% black Council	-0.05***	-0.04***	-0.04***	-0.03***	-0.07***	-0.05***
	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	No	Yes	No	Yes	No
Agency Random Effects	No	Yes	No	Yes	No	Yes
Adj. R2	0.35		0.38		0.38	
Num. obs.	467	467	467	467	467	467
Log Likelihood		997.65		1155.71		839.54

*p<0.1, **p<0.05, ***p<0.01

Table C-5: OLS Regressions Explaining the black-white search rate ratio

	(7)	(8)
50-60% black council	-0.53**	0.79
	(0.18)	(1.37)
60+% black Council	-0.05	-0.18
	(0.42)	(0.23)
Controls	Yes	Yes
Year Fixed Effects	Yes	Yes
State Fixed Effects	Yes	No
Agency Random Effects	No	Yes
Adj. R2	0.43	
Num. obs.	466	466
Log Likelihood		-557.18

*p<0.1, **p<0.05, ***p<0.01

Tables C-4 and C-5 show the results of an alternate analysis where we have split the majority black council's variable into two subsets. The first for simple majorities, where the percent of the council that is black is between 50 percent and 60 percent. The second for super majorities, where the percent of the council that is black is above 60 percent. Both of these variables are dichotomous dummy variables, with the omitted category (which they are referenced against) being councils where blacks do not comprise a majority. As with our main analysis, we find that having a majority black council leads to a reduction in the total, white, and black search rates.

Interestingly, this effect is larger amongst councils where black members comprise a super majority. This suggests that black council members may be strategic in how they address the needs of the black community and having additional black council members can facilitate their problem-solving capabilities. We find fewer convincing results when examining the search rate ratio. We find that having a majority black council leads to a reduction in the search rate ratio only when agency random effects are not included, and that having a super majority black council is not significantly different from having a majority white council. When agency random effects are included, we see that majority and super majority black councils are not statistically significantly different from white majority councils. Overall, these results are consistent with the findings in our main analysis; city councils that are majority black are associated with better outcomes for everyone.

Appendix C.4: Majority-black council and black police chief

The correlation between the presence of a black chief and the presence of a majority black council is not high: rho = 0.26. There are only 13 agency-years in this dataset that have both a black chief and black majority council. When the indicators for black-majority council and black police chief are interacted, there are statistically significant, negative effects on the total search rate, white search rate, and black search rate – though not on the search rate ratio. See Table C-6 below.

Table C-6: Predicting search rates using an interaction between the presence of a majority-black council and of a black police chief

	Total Search Rate		White Search Rate		Black Search Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
(Intercept)	0.04	-0.02	0.03*	0.00	0.05	-0.10
	(0.02)	(0.05)	(0.02)	(0.04)	(0.04)	(0.07)
50% or more black council	-0.01*	-0.01	-0.01**	-0.01	-0.03**	-0.01
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Black police chief	0.02***	0.01**	0.01***	0.01*	0.02***	0.01*
	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Logged total population	0.00	0.01	0.00	0.00	0.00	0.02**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Prop. black in population	0.08***	0.06	0.03**	0.02	0.02	0.03
	(0.02)	(0.04)	(0.01)	(0.03)	(0.03)	(0.05)
Prop. black with HS diploma	0.03	0.02	0.01	0.02	0.02	0.03
	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.03)
Prop. black unemployed	0.12***	0.05	0.05**	0.02	0.18***	0.08
	(0.03)	(0.04)	(0.02)	(0.03)	(0.04)	(0.05)
Total crime rate	0.00	0.00	0.00***	0.00**	0.00**	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
B-W segregation	-0.07***	-0.06**	-0.03***	-0.04*	-0.07***	-0.07
	(0.01)	(0.03)	(0.01)	(0.02)	(0.02)	(0.04)
Mean prop. black on force	0.09***	-0.02	-0.01	-0.05	0.17***	-0.08
	(0.03)	(0.07)	(0.02)	(0.06)	(0.05)	(0.11)
50% or more black council *	-0.03**	-0.03***	-0.02**	-0.01**	-0.04**	-0.04***
Black police chief	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	No	Yes	No	Yes	No
Agency RE	No	Yes	No	Yes	No	Yes
R2	0.35		0.38		0.38	
Adj. R2	0.31		0.33		0.34	
Num. obs.	467	467	467	467	467	467
AIC		-1944.40		-2254.47		-1628.64
BIC		-1832.45		-2142.52		-1516.69
Log likelihood		999.20		1154.24		841.32
Num. groups		79		79		79

*p<0.1, **p<0.05, ***p<0.01

Table C-7: Predicting the black-white search rate ratio (SRRB) using indicators for majority-black city council and black police chief

	(7)	(8)
(Intercept)	2.69***	0.80
	(0.76)	(1.38)
50% or more black council	-0.52**	-0.18
	(0.22)	(0.24)
Black police chief	-0.22	-0.10
	(0.16)	(0.16)
Logged total population	-0.01	0.15
	(0.06)	(0.13)
Prop. black in population	-2.37***	-2.28**
	(0.68)	(1.11)
Prop. black with HS diploma	-1.03*	-0.43
	(0.55)	(0.69)
Prop. black unemployed	2.16**	1.80
	(0.88)	(1.22)
Total crime rate	-0.00	-0.00***
	(0.00)	(0.00)
B-W segregation	0.97**	1.15
	(0.43)	(0.86)
Mean prop. black on force	10.52***	5.48***
	(0.95)	(2.04)
50% or more black council *	0.15	0.23
Black police chief	(0.35)	(0.31)
Year FE	Yes	Yes
State FE	Yes	No
Agency RE	No	Yes
R2	0.47	
Adj. R2	0.43	
Num. obs.	466	466
AIC		1170.12
BIC		1282.01
Log Likelihood		-558.06
Num. groups		79

*p<0.1, **p<0.05, ***p<0.01

Appendix C.5 Investigating IL and NC

Below, the main models from the manuscript are replicated with only North Carolina and Illinois. Then, two figures plot the average (C.1) proportion of black city councilors by year and by state and (C.2) the average majority-black city councils by year and by state. These figures indicate that black descriptive representation is not uniformly increasing across both states, but that there is substantial variation from year to year in the racial makeup of city councils.

Table C-8: Predicting the white and black search rates in NC and IL

	White Search Rate		Black Search Rate	
	(1)	(2)	(3)	(4)
50% or more black council	-0.02***	-0.01**	-0.04***	-0.02**
	(0.00)	(0.00)	(0.01)	(0.01)
Prop. black in population	0.00	0.00	0.00	0.01
	(0.00)	(0.00)	(0.00)	(0.01)
Logged total population	0.05***	0.06**	0.07**	0.10*
	(0.01)	(0.02)	(0.03)	(0.06)
Prop. black with HS diploma	0.02	0.02	0.03	0.03
	(0.01)	(0.01)	(0.03)	(0.03)
Prop. black unemployed	0.05***	0.02	0.18***	0.08
	(0.02)	(0.02)	(0.04)	(0.05)
Total crime rate	0.00***	0.00	0.00**	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
B-W segregation	-0.03***	-0.01	-0.07***	-0.03
	(0.01)	(0.02)	(0.02)	(0.04)
Mean prop. black on force	-0.03	-0.06	0.15***	-0.05
	(0.02)	(0.04)	(0.05)	(0.11)
Black police chief	0.01*	0.00	0.01*	-0.00
	(0.00)	(0.00)	(0.01)	(0.01)
(Intercept)	0.03*	0.02	0.05	-0.03
	(0.01)	(0.03)	(0.04)	(0.08)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	No	Yes	No
Agency RE	No	Yes	No	Yes
R2	0.23		0.26	
Adj. R2	0.18		0.22	
Num. obs.	432	432	432	432
AIC		-2227.13		-1553.10
BIC		-2121.35		-1447.32
Log likelihood		1139.57		802.55
Num. groups		61		61

*p<0.1, **p<0.05, ***p<0.01

Table C-9: Predicting total search rate and the black-white search rate ratio in NC and IL

	Total Search Rate		Black-White Search Rate Ratio	
	(5)	(6)	(7)	(8)
50% or more black council	-0.02***	-0.01**	-0.50***	-0.18
	(0.01)	(0.01)	(0.18)	(0.23)
Prop. black in population	0.00	0.00	-0.02	0.15
	(0.00)	(0.01)	(0.07)	(0.16)
Logged total population	0.12***	0.11***	-2.49***	-2.42*
	(0.02)	(0.04)	(0.72)	(1.29)
Prop. black with HS diploma	0.03*	0.02	-1.03*	-0.19
	(0.02)	(0.02)	(0.56)	(0.71)
Prop. black unemployed	0.12***	0.05	2.27**	1.79
	(0.03)	(0.03)	(0.89)	(1.25)
Total crime rate	0.00	-0.00	-0.00	-0.00**
	(0.00)	(0.00)	(0.00)	(0.00)
B-W segregation	-0.07***	-0.04	1.00**	0.78
	(0.01)	(0.03)	(0.43)	(0.97)
Mean prop. black on force	0.07**	-0.03	11.15***	6.52***
	(0.03)	(0.07)	(0.97)	(2.38)
Black police chief	0.01**	0.00	-0.22	-0.06
	(0.00)	(0.00)	(0.15)	(0.14)
(Intercept)	0.03	0.01	2.78***	0.76
	(0.02)	(0.05)	(0.77)	(1.74)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	No	Yes	No
Agency RE	No	Yes	No	Yes
R2	0.31		0.48	
Adj. R2	0.27		0.45	
Num. obs.	432	432	431	431
AIC		-1855.08		1075.54
BIC		-1749.30		1181.26
Log likelihood		953.54		-511.77
Num. groups		61		61

*p<0.1, **p<0.05, ***p<0.01

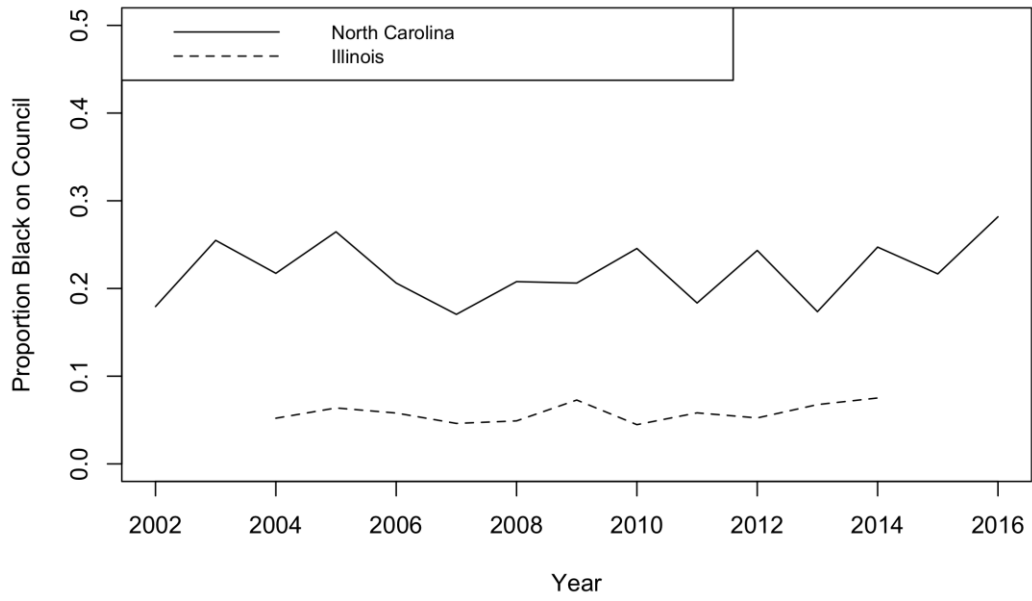Figure C.1: Average proportion of city council seats held by black members in NC and IL over time

Figure C.2: Average majority-black city councils in NC and IL over time