

Twelve Cities

Does lowering speed limits save pedestrian lives?

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StanCon

1/21/2017

Vision Zero: Mayor de Blasio Announces 2016 Saw Fewest Fatalities Ever on New York City Streets

January 11, 2017

Bucking strong national trends, 2016's 229 traffic fatalities were fewest ever in New York City, marking three years of decline and a 23 percent reduction since 2013

"A record year of safety on our streets is no coincidence," said **Council Member Stephen Levin**. "The City's steadfast commitment to Vision Zero has resulted in tangible improvements to the safety of New Yorkers everywhere. Let's continue doing the work that takes us closer to our ambitious goal – investing in proven, effective transit improvements and enforcing traffic laws that value life over expediency. I applaud Mayor de Blasio and will continue to do my part to support this vision."

"The efforts of the Vision Zero campaigns continue to save lives as our streets are safer to cross than any other year on record," said **Council Member Donovan Richards**. "Slowing drivers down, improving street designs and building bike lanes has delivered results across the City. I'd like to thank Mayor de Blasio, DOT Commissioner Trottenberg and NYPD Commissioner O'Neill for all their hard work and dedication to taking every measure to make New York City safer for pedestrians."

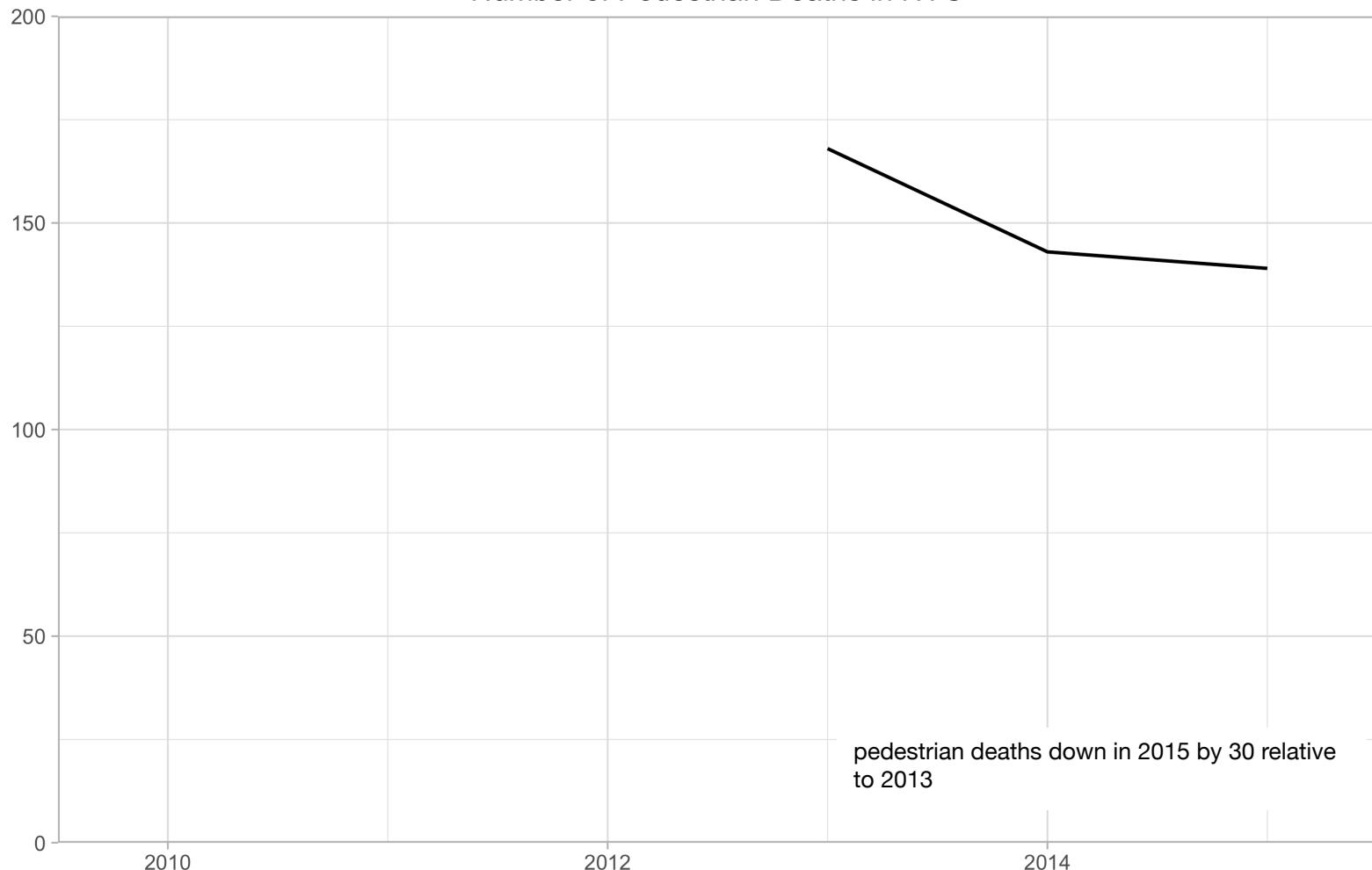
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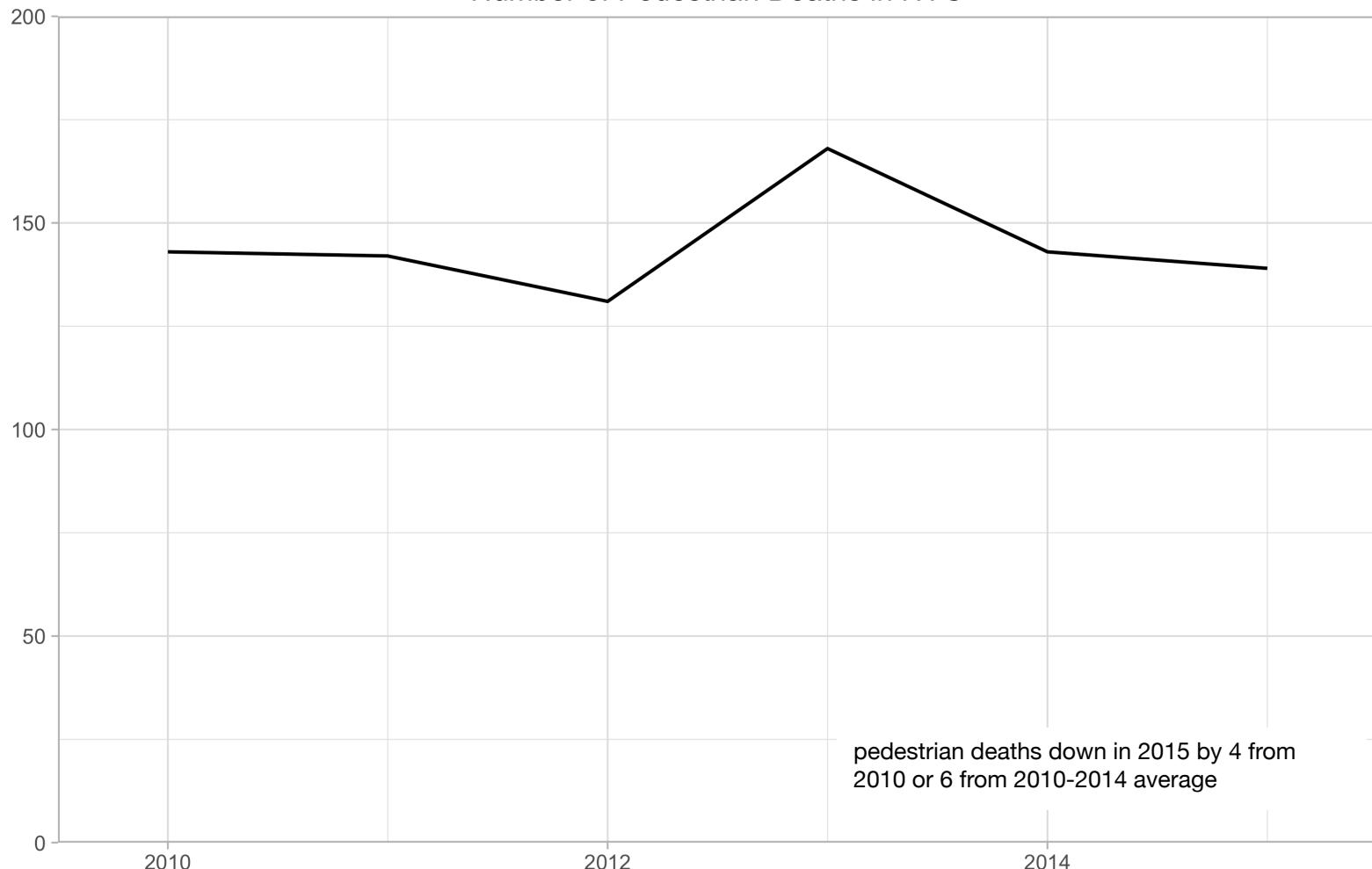
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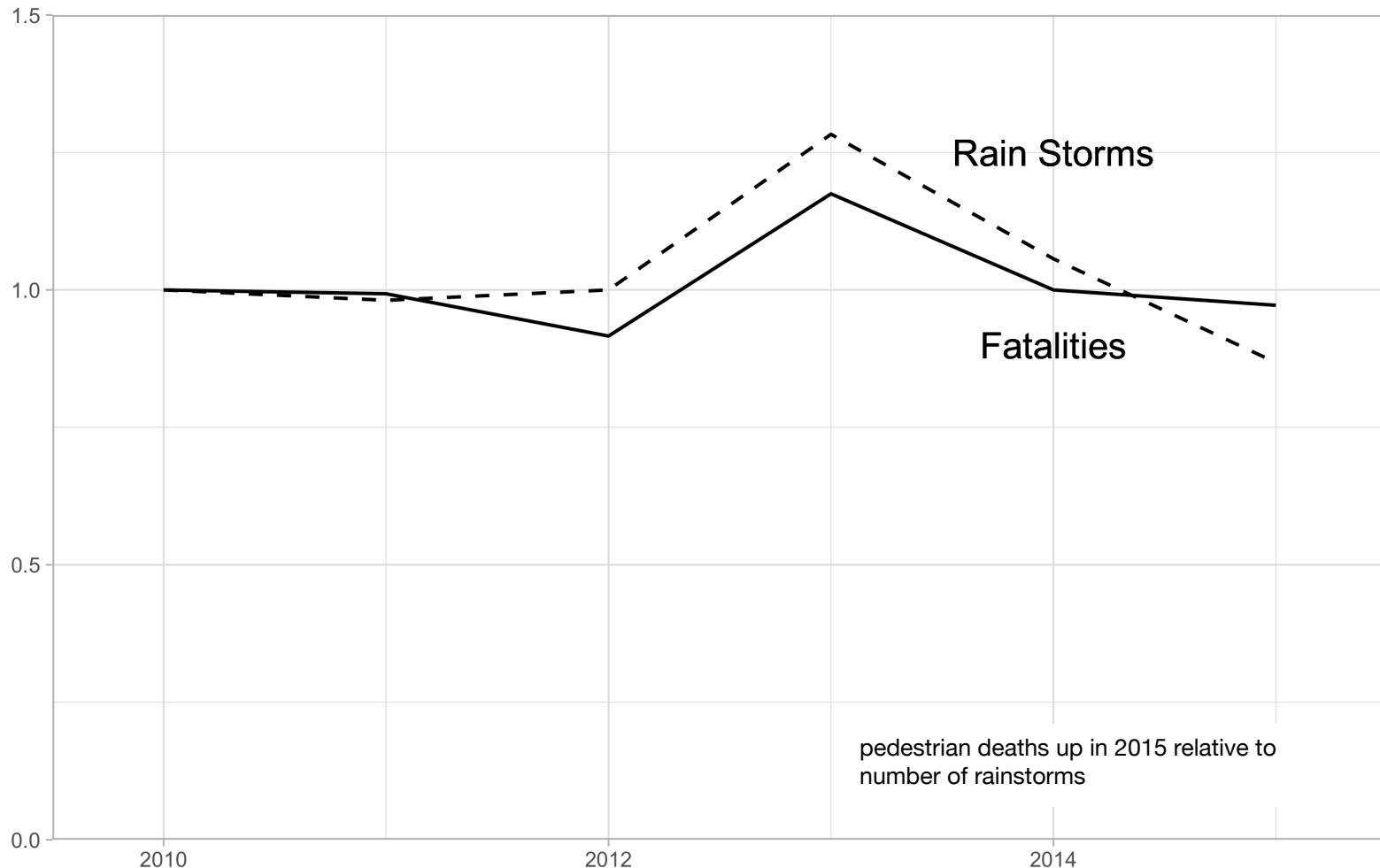
Number of Pedestrian Deaths in NYC



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A Possible Explanation of Pedestrian Deaths in NYC



Updating Vision Zero Beliefs with Data

- Work with Chris Eshleman from NY/NJ Port Authority and members from Community Board 7 to summarize evidence supporting Vision Zero policies
- Why Bayesian?
 - rigorously express our belief in the effectiveness of Vision Zero policy
- Why multilevel model?
 - account for many possible sources of variation but pool across variation known to be similar a priori
- Why Stan?
 - easy to integrate into workflow: model, sample, visualize, repeat

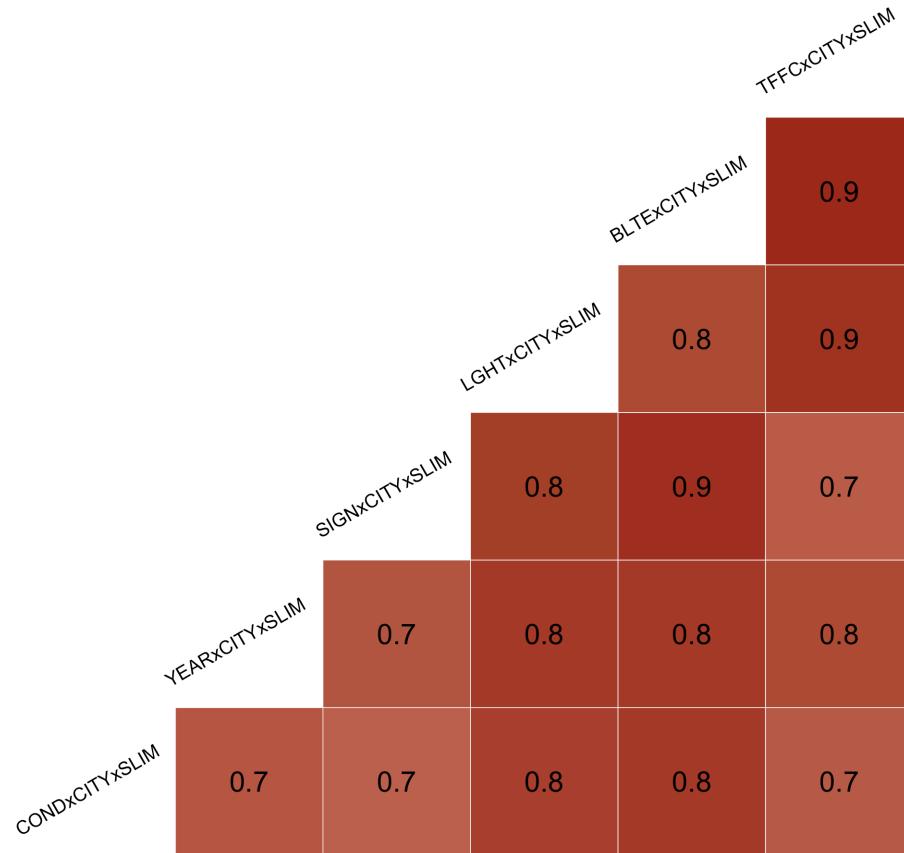
Table 1: Example Observations of Dataset

BLTE	CITY	COND	LGHT	SIGN	SLIM	TFFC	YEAR	EXPR	WGHT
13	3	2	1	1	11	1	1	1300.36	4.69
14	3	2	25	1	6	1	1	196.05	1.90
56	8	2	21	1	8	4	1	398.10	1.77
22	8	2	21	1	8	1	1	497.38	1.72
42	10	2	12	1	9	1	1	458.04	1.68
54	8	24	12	1	8	4	1	317.77	1.60

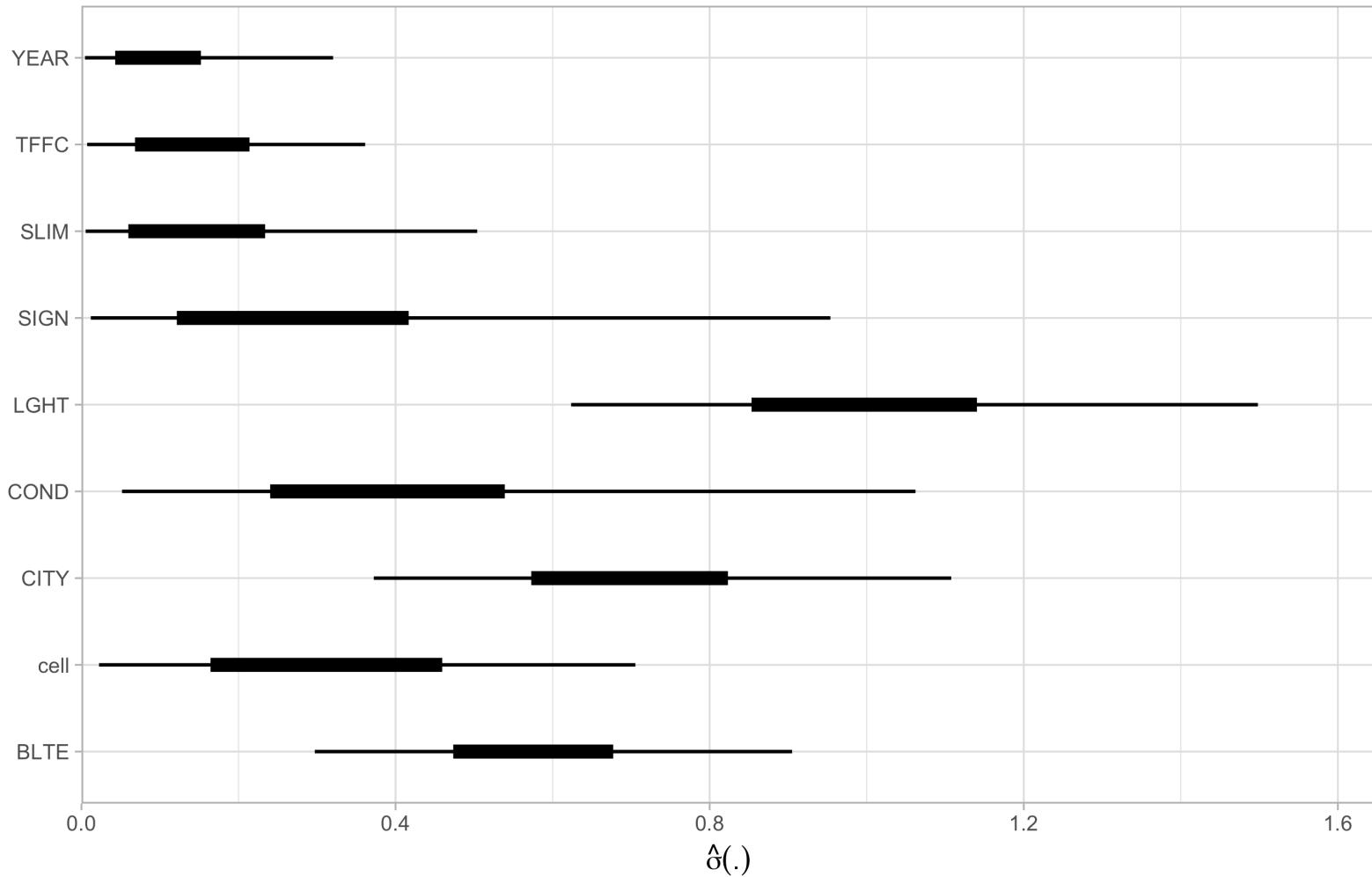
Correlation of Qualitative Variables using Cramer's V

		TFFC				
		BLTE			0.4	
		LGHT		0.2		0.2
		SIGN		0.2	0.3	0.2
		SLIM	0.1	0.2	0.4	0.3
		YEAR	0.2	0.1	0.1	0.2
		CITY	0.1	0.3	0.2	0.3
COND		0.1	0.1	0.2	0.1	0.3
						0.1

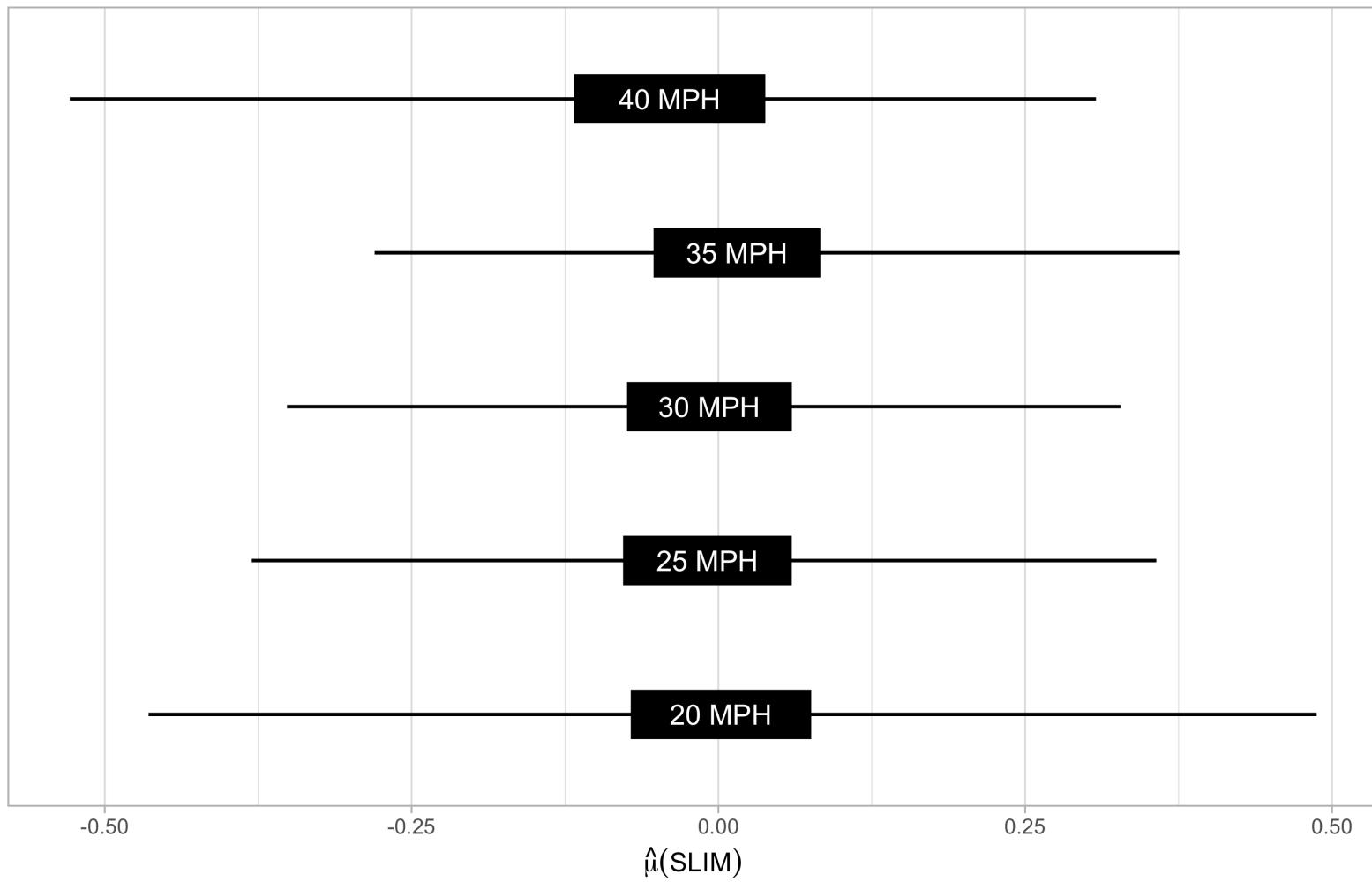
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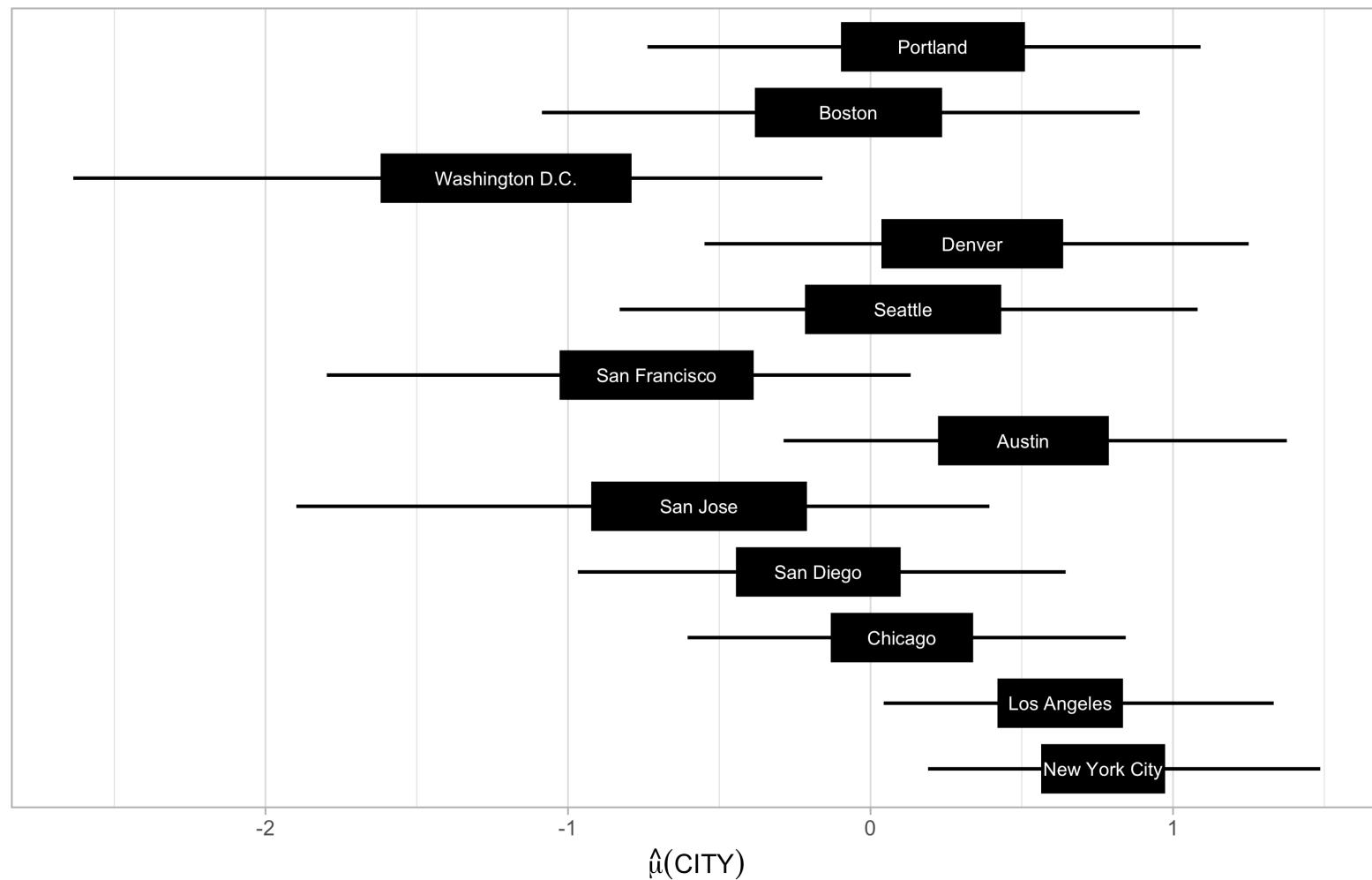
Model 1, Analysis of Variance, Between



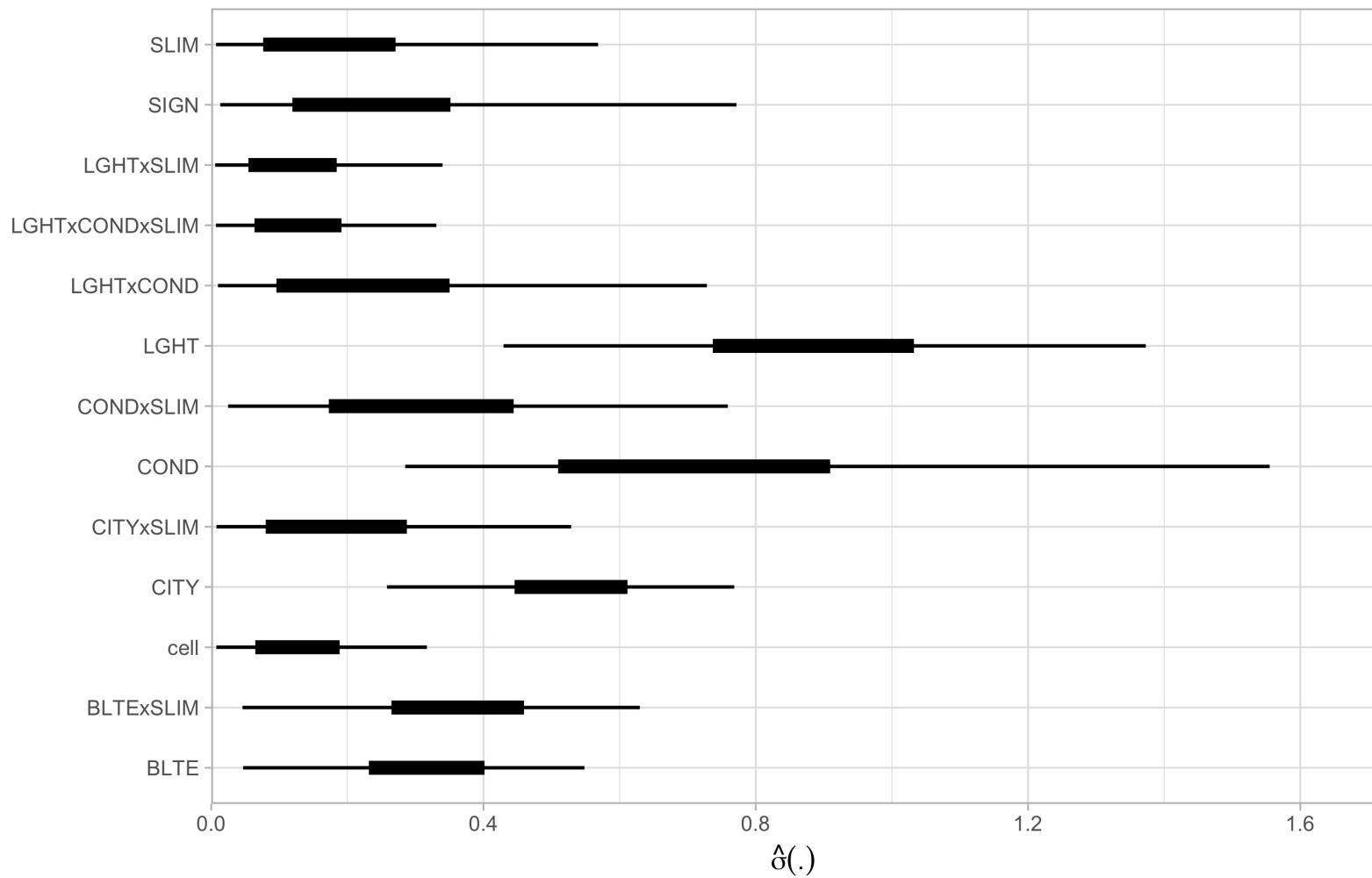
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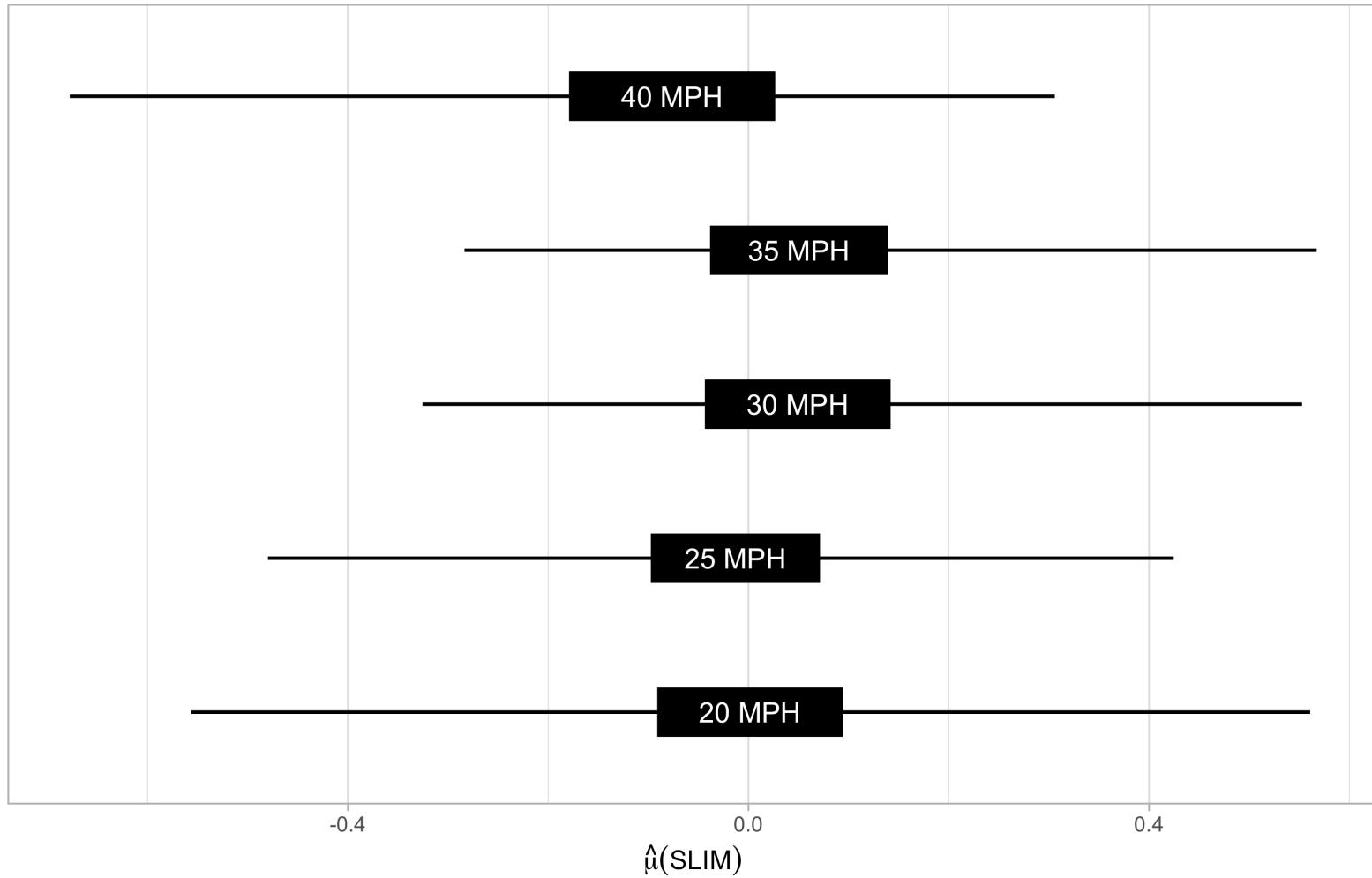
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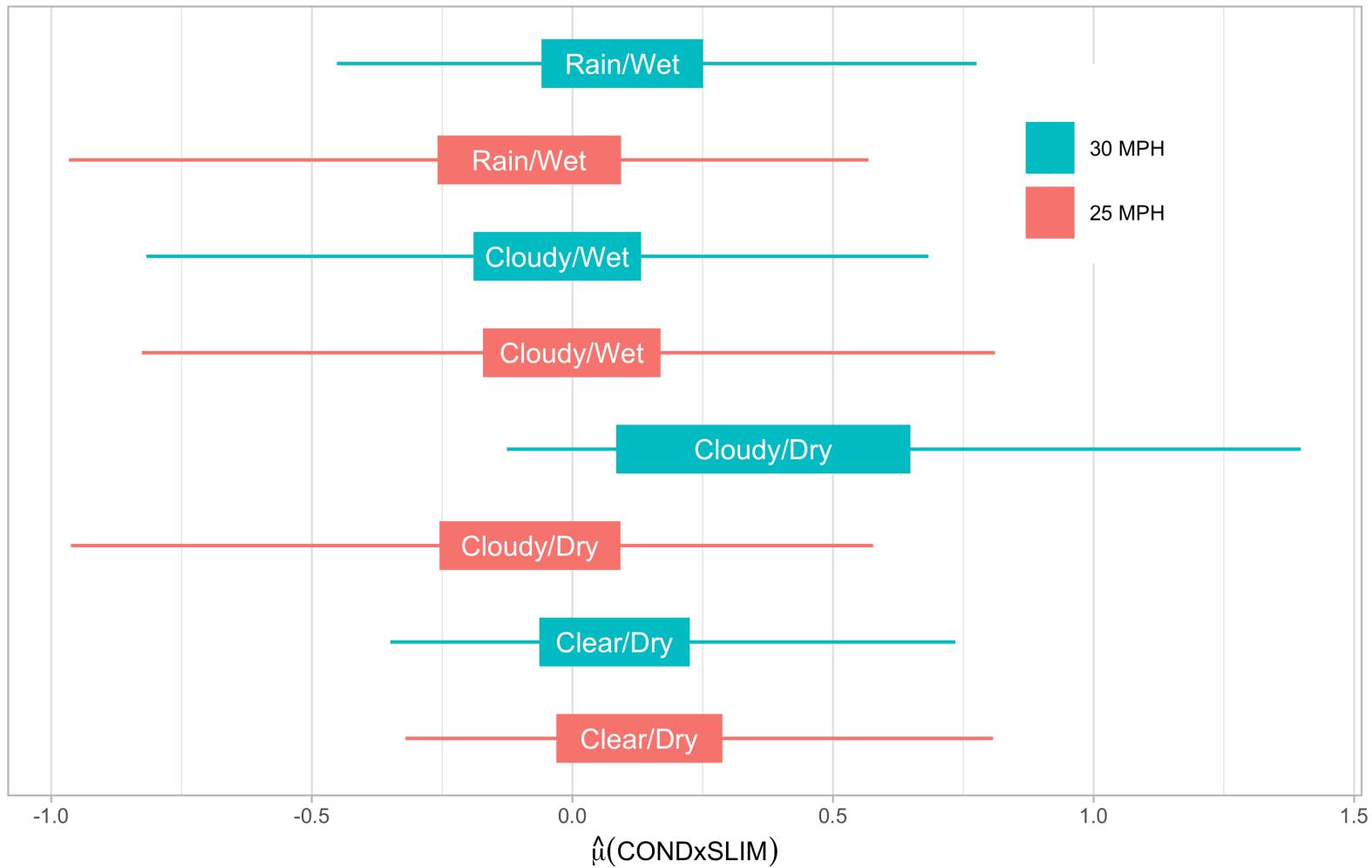
Model 2, Analysis of Variance, Between



Model 2, Analysis of Variance, Within



Model 2, Analysis of Variance, Within



Model 2, Analysis of Variance, Within

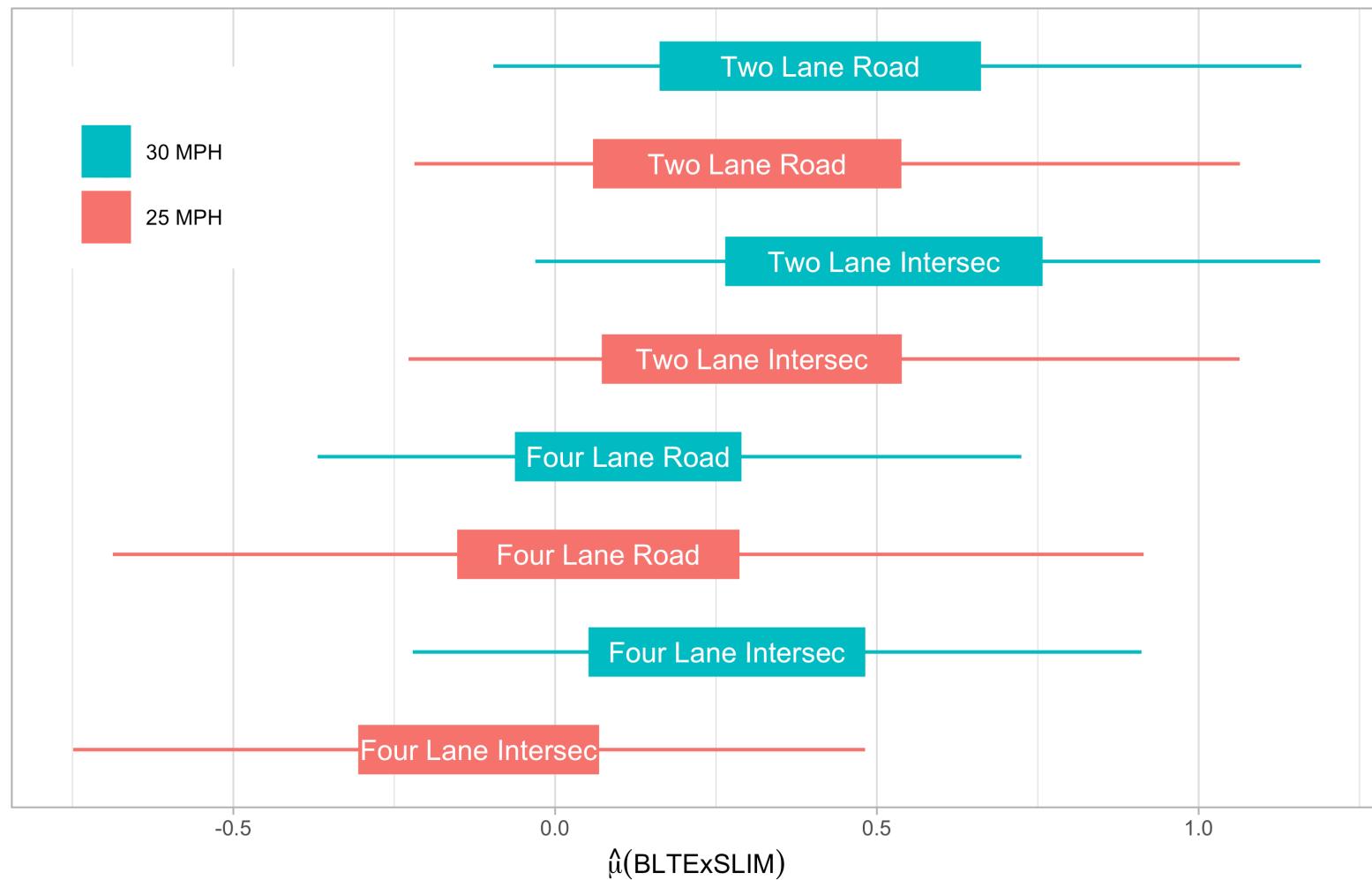
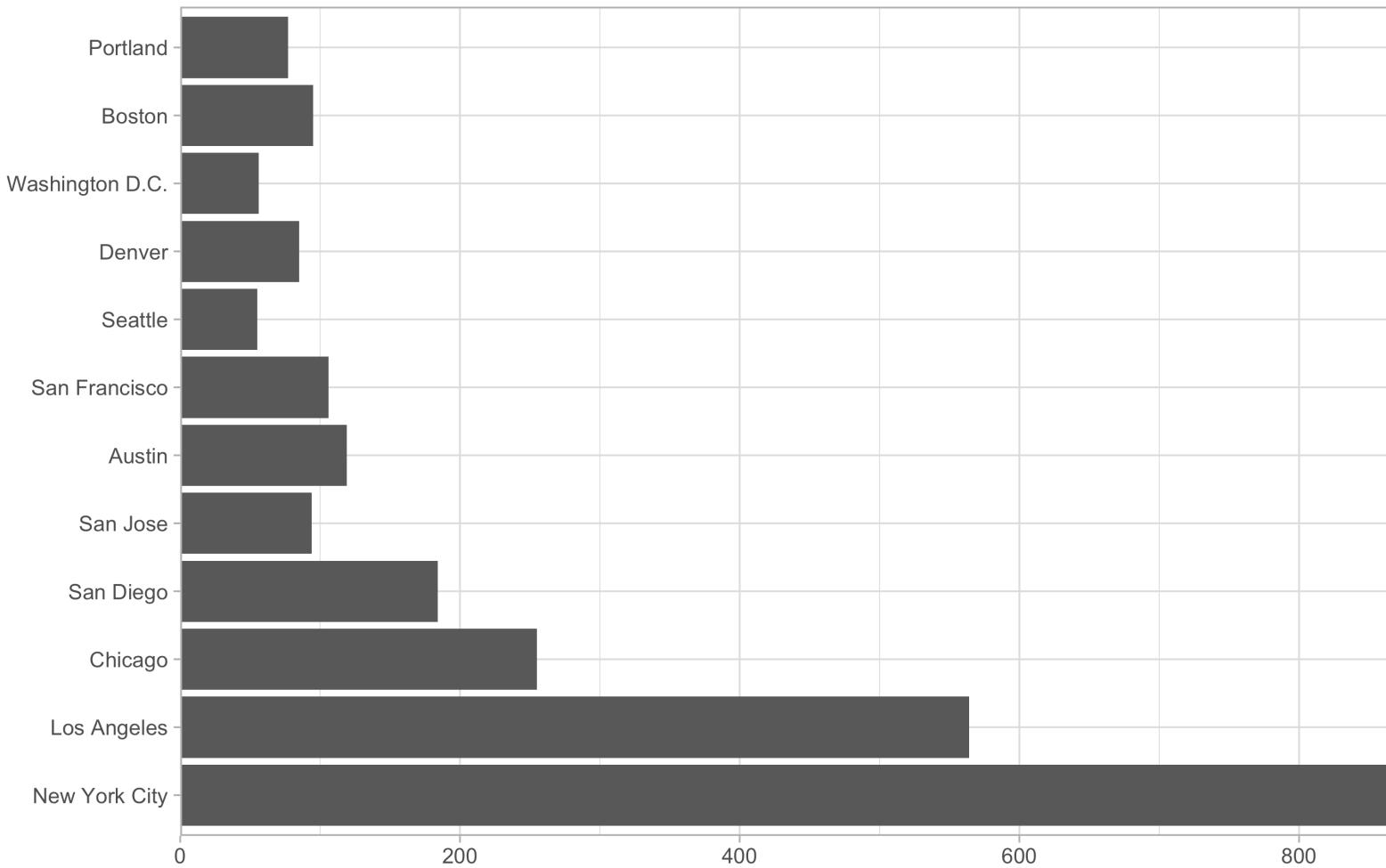


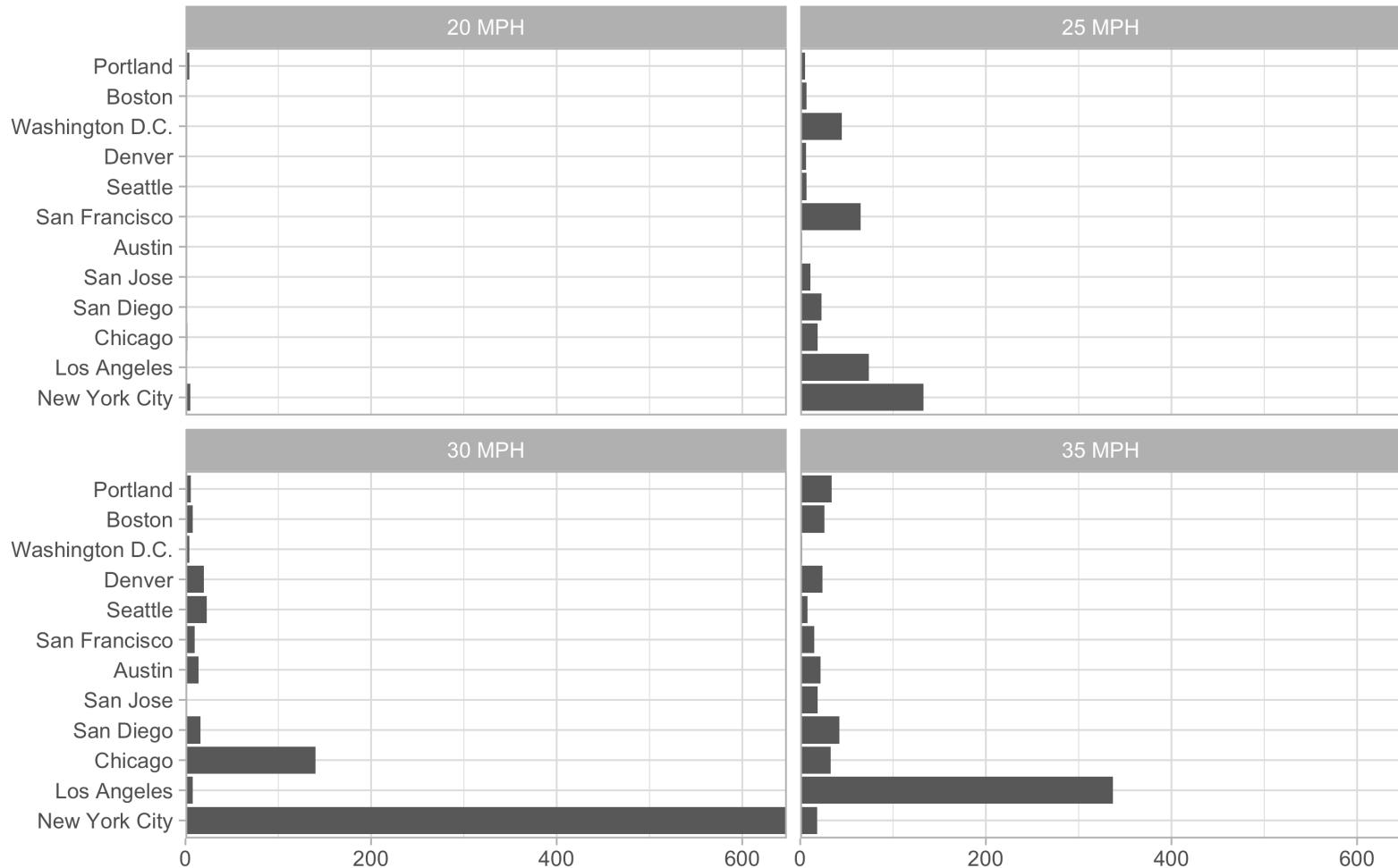
Table 2: Summary of Dataset

BLTE	CITY	COND	LGHT	SIGN	SLIM	TFFC	YEAR
16 : 358	12 :866	2 :1976	8 :386	1 :1578	7 :898	1:546	1:409
56 : 259	8 :564	23 : 232	21 :357	4 : 476	8 :580	2:830	2:398
14 : 243	6 :255	9 : 198	29 :227	3 : 340	6 :397	3:640	3:443
54 : 192	9 :184	24 : 56	1 :223	6 : 78	10 :170	4:540	4:455
41 : 77	3 :119	3 : 24	34 :221	9 : 24	9 :136	NA	5:406
79 : 63	10 :106	18 : 16	25 :161	2 : 19	14 :135	NA	6:445
(Other):1364	(Other):462	(Other): 54	(Other):981	(Other): 41	(Other):240	NA	NA

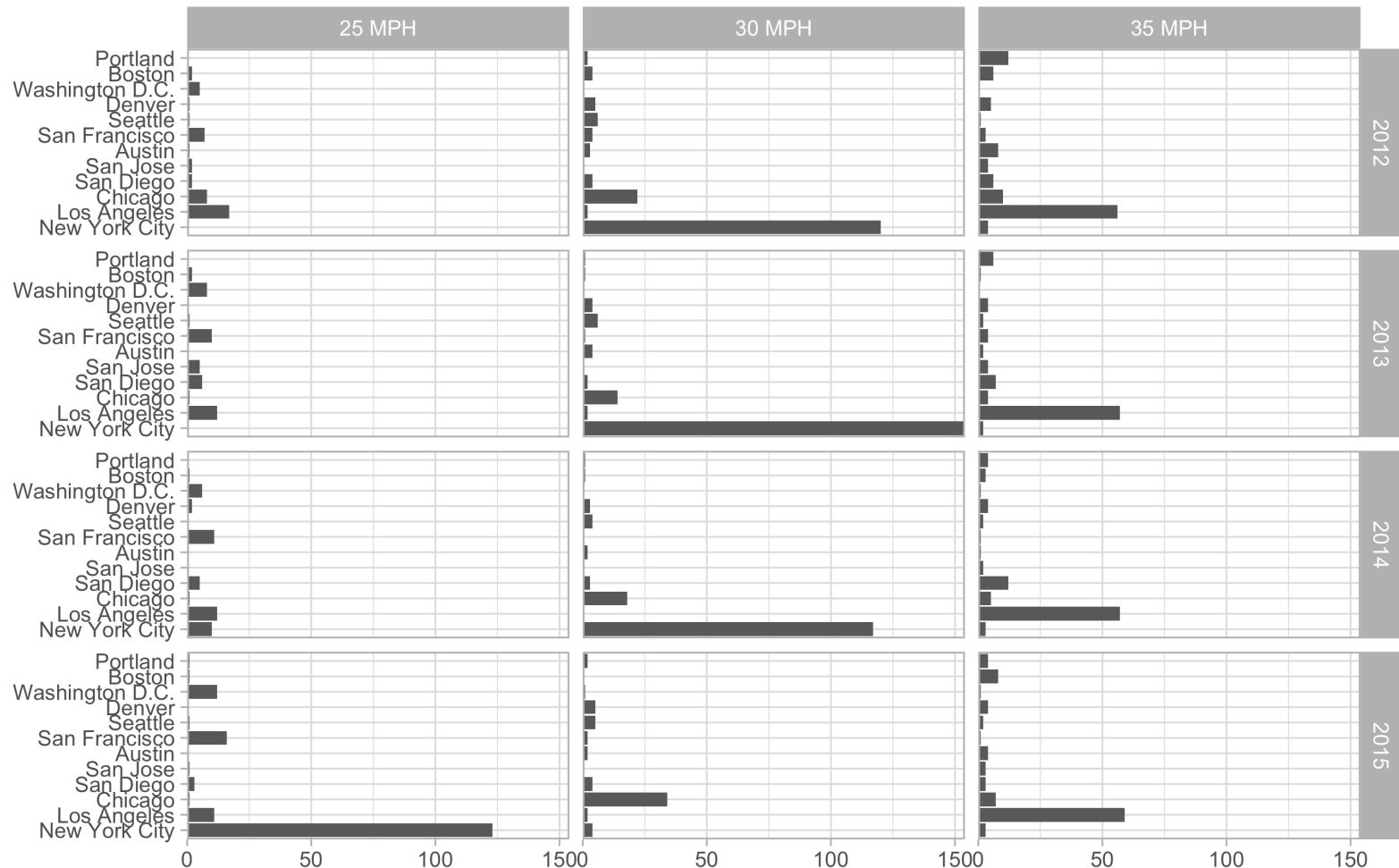
Number of Observations per City



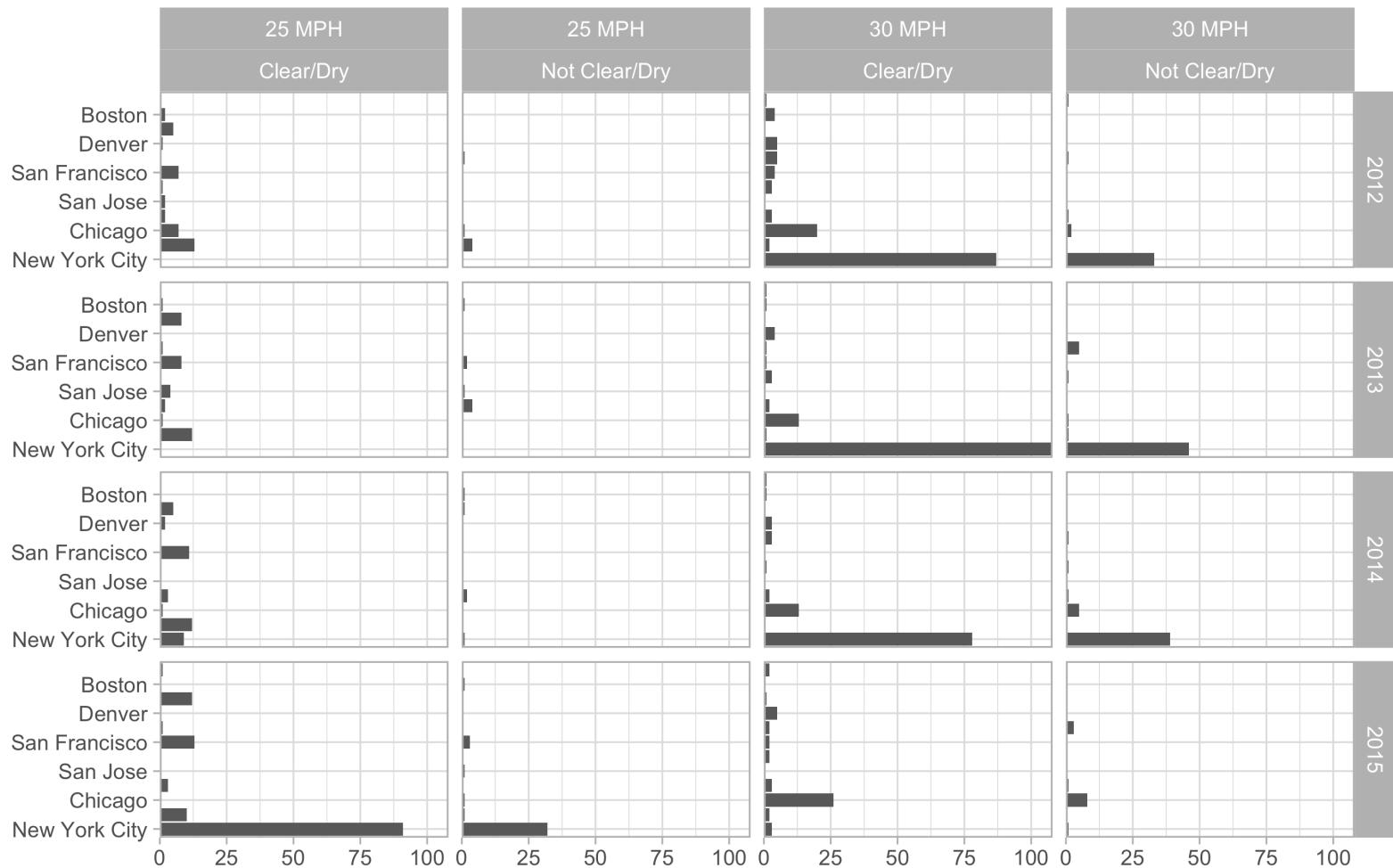
Number of Observations per City by Posted Speed Limit



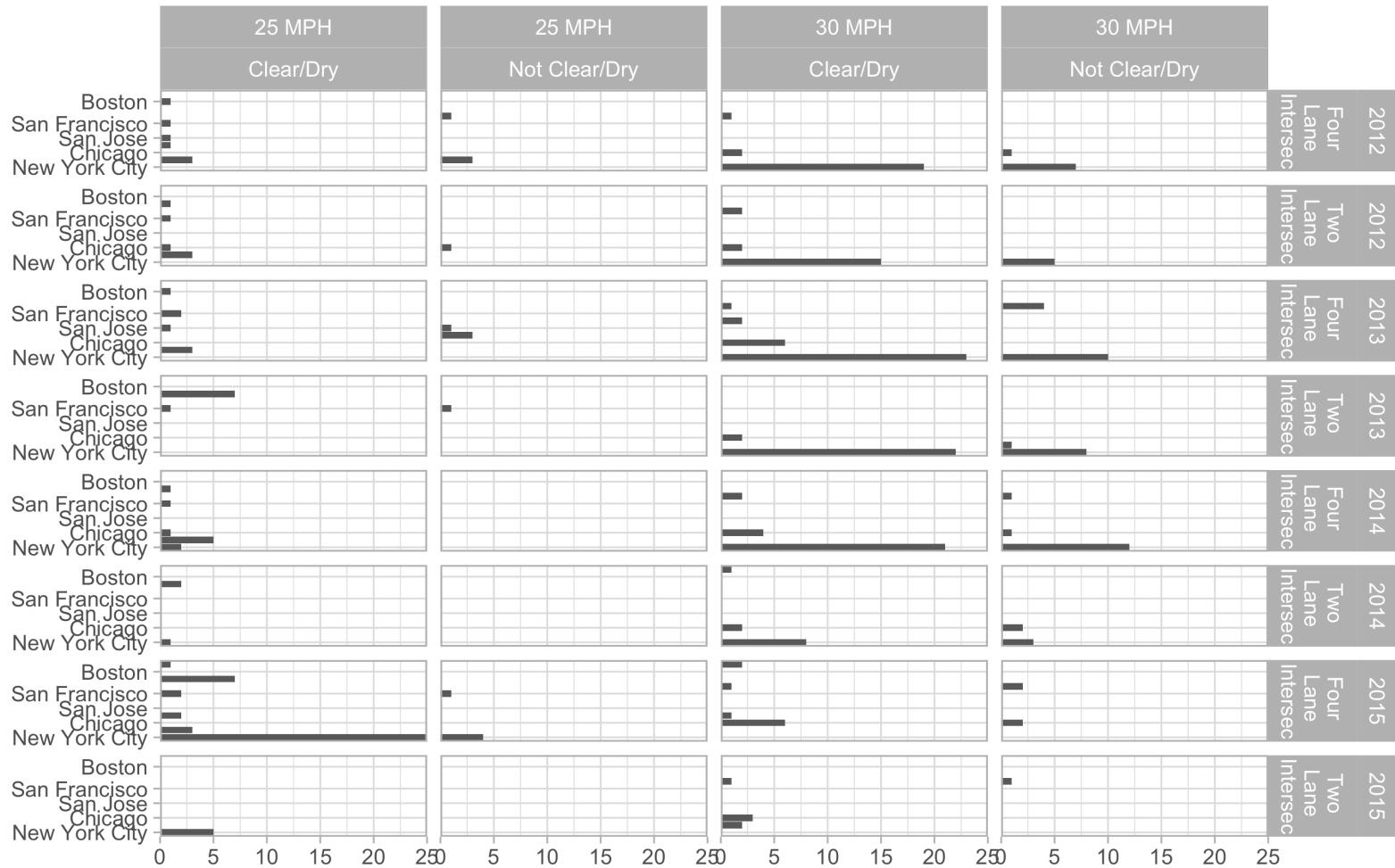
Number of Observations per City by Posted Speed Limit and Year



Number of Observations per City by Posted Speed Limit, Year, Weather and Surface Condition



Num. Obs. per City by Posted Speed Limit, Year, Weather, Surface Condition and Built Environment



Model 1

$$\epsilon \sim \text{Normal}(0, \sigma_\epsilon)$$

$$\alpha_i \sim \text{Normal}(0, \sigma_i)$$

$$\begin{aligned}\bar{y}_{.j} \sim \text{Poisson}^+(&\exp(\mu + \alpha_1^{\text{SLIM}} + \alpha_2^{\text{CITY}} + \alpha_3^{\text{YEAR}} + \alpha_4^{\text{COND}} + \alpha_5^{\text{SIGN}} \\ &+ \alpha_6^{\text{LGHT}} + \alpha_7^{\text{BLTE}} + \alpha_8^{\text{TFFC}} + \epsilon_j + \beta \cdot \log(\text{EXPR}_{.j})))\end{aligned}$$

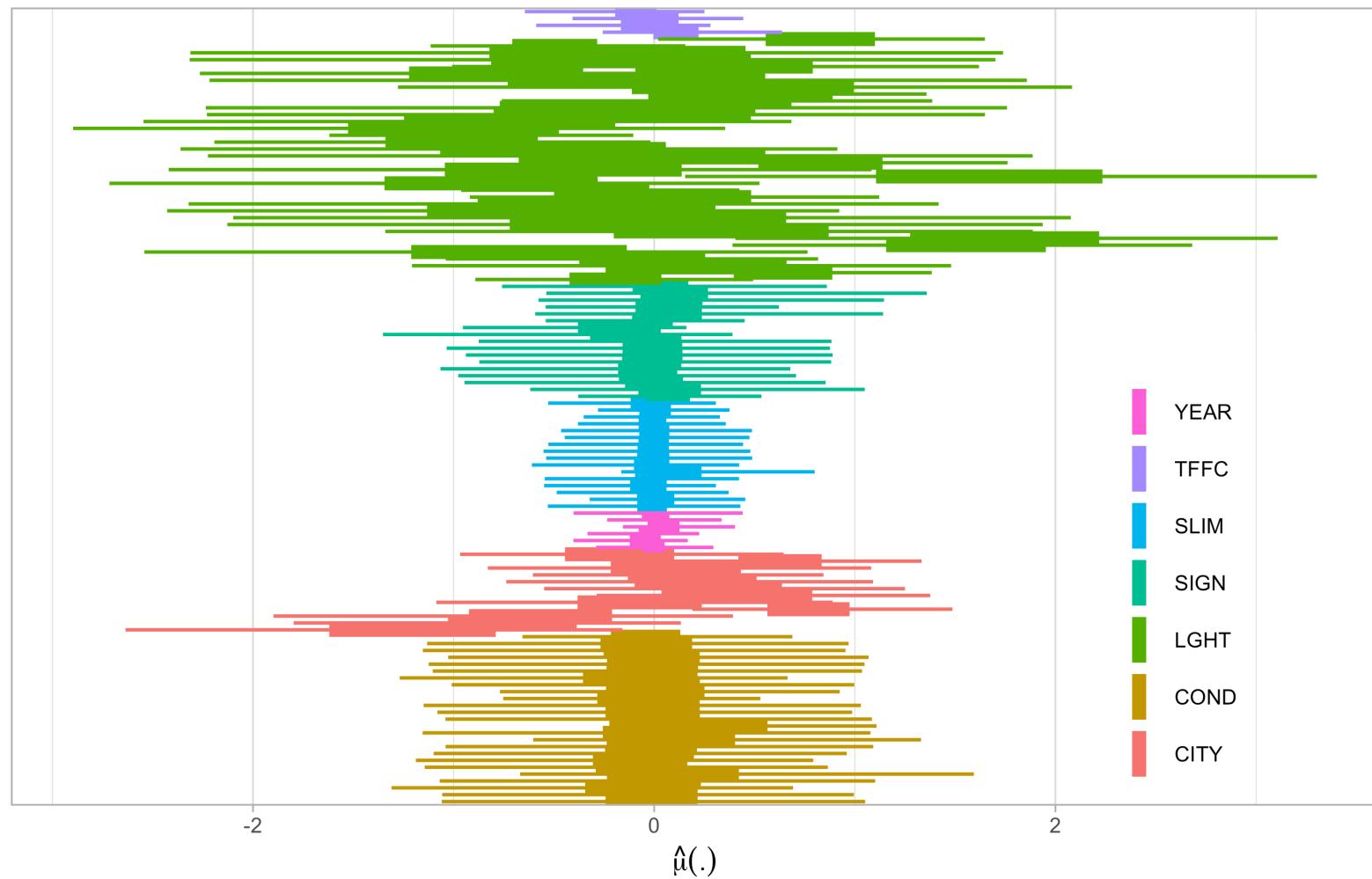
Model 2

$$\epsilon \sim \text{Normal}(0, \sigma_\epsilon)$$

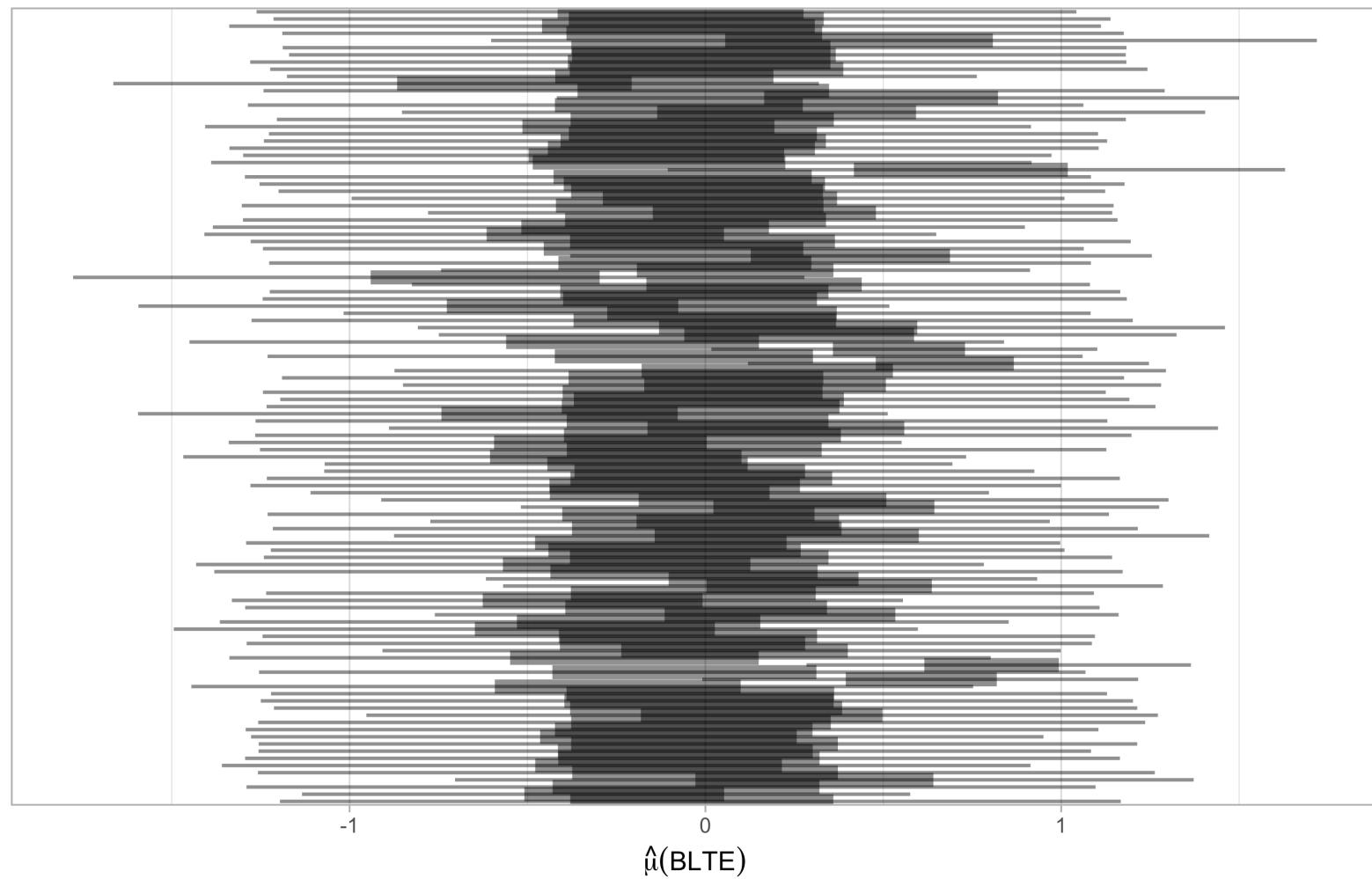
$$\alpha_i \sim \text{Normal}(0, \sigma_i)$$

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Model 1, Analysis of Variance, Within



Model 1, Analysis of Variance, Within



Model 2, Analysis of Variance, Within

