Analaysis of Public Housing in County Census Tracts and Proximity to CE(s)

Original Analysis
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KNITR File: Report_Logistic_Model.Rnw

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Methods: A multistep data processing routine was performed for each county to integrate spatial and tabular data sets of CE presence/absence and public housing counts at a census tract level in each county. Data were aggregated to the final observed year for each county. Census tract data and HUD data date to 2000. HUD data include Section-8 vouchers and Low-Income Housing Tax Credit (LIHTC) unit counts in each census tract.The final tabular data set for each county is presented in this analysis. A logistic regression was performed on an all county data set to test the probability of a CE located in census tract dependent upon HUD housing counts (Tables 1-3). Tables 4-30 show results of the logistic regression for each individual county. ALB and DGL were not included in the anlaysis due small sample size. CHS is generating an error that I can not solve at this time. The model appears to run correctly in R as a stand-alone, but when output to Latex it generates the error found on page 8. LEB is of particular interest.

The data processing by county can be found in the path below.
C:\Users\whitedl\Documents\R_Code\HUD_Project_Code\CNTYNAME_Public_Housing_CE.R

Table 1 shows the coefficient estimates and related information that result from fitting a logistic regression to predict the probability of a CE located in a census tract based on the predictors Section 8 and Tax Credit housing counts in the corresponding census tracts. A positive coefficent will indicate that an increase in public housing is associated with an increase in the probability of a CE in a given Census Tract. A negative coefficent will imply that increased numbers of public housing units are associated with a decreased probability of a CE in a census tract. A highly significant negative effect is observed for Section 8 housing (P<.01) while a positive significant effect (P<.05) is observed for Tax Credit housing.

Table 2 reports a NULL model deviance of 1093. A residual deviance of 1032 is observed.

A McFadden statistic is reported in table 3. The McFadden statisitic is complementary to a linear regression R2 value. A value of 0.068 indicates a relatively poor model fit. Although not as severe if it were an OLS R2 value.

Observations: 1. Many zeros are present in the Tax Credit housing. Originally, these were coded as NA, but that was an error. 2. I examined other model derivatives such as each predictor alone and an interaction effect. Those other models were even less compelling. 3. Overall, I do not find this to be a strong model. But my limited experience with logistic/categorical modeling could be an issue.
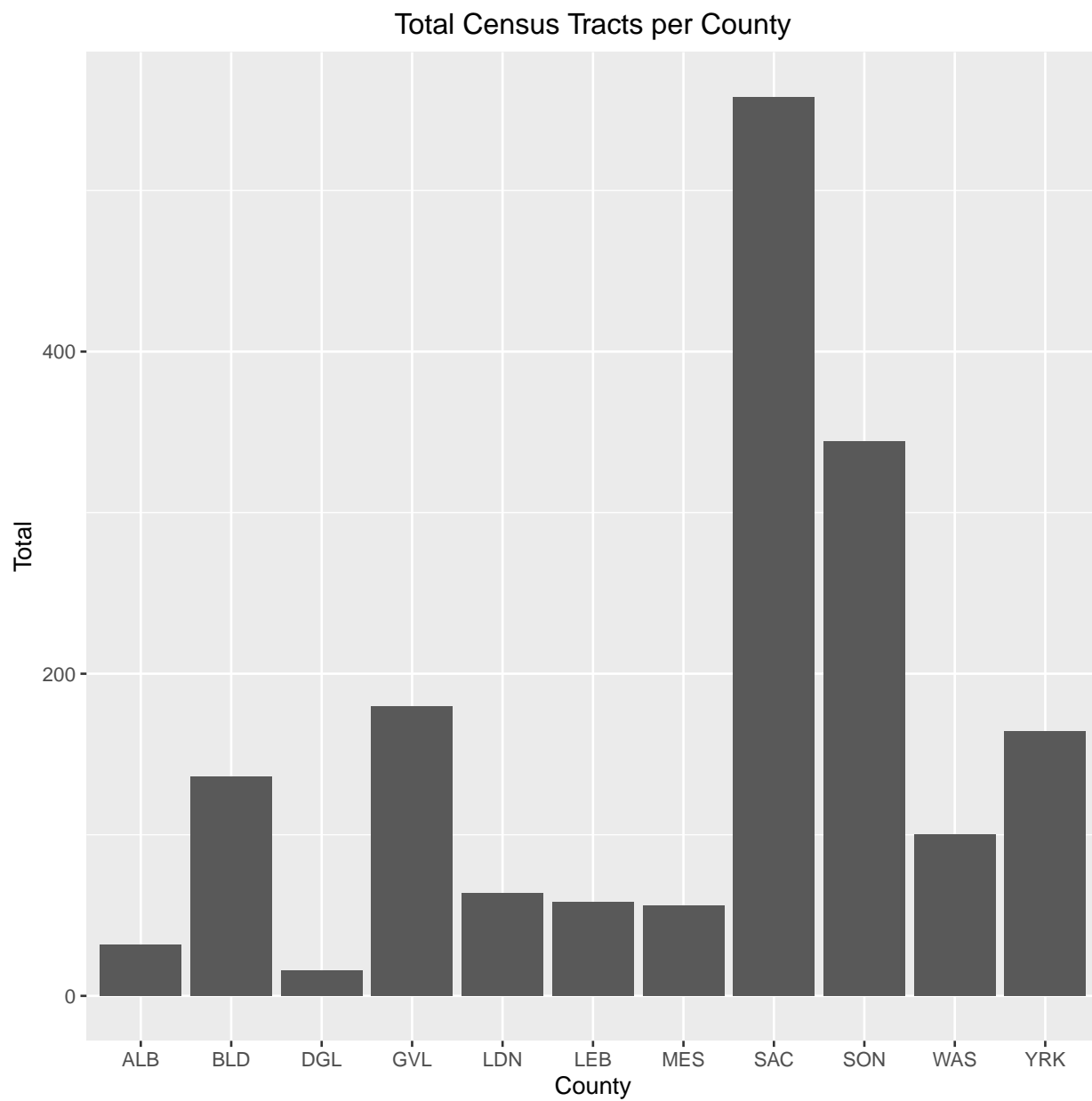
Total Census Tracts per County

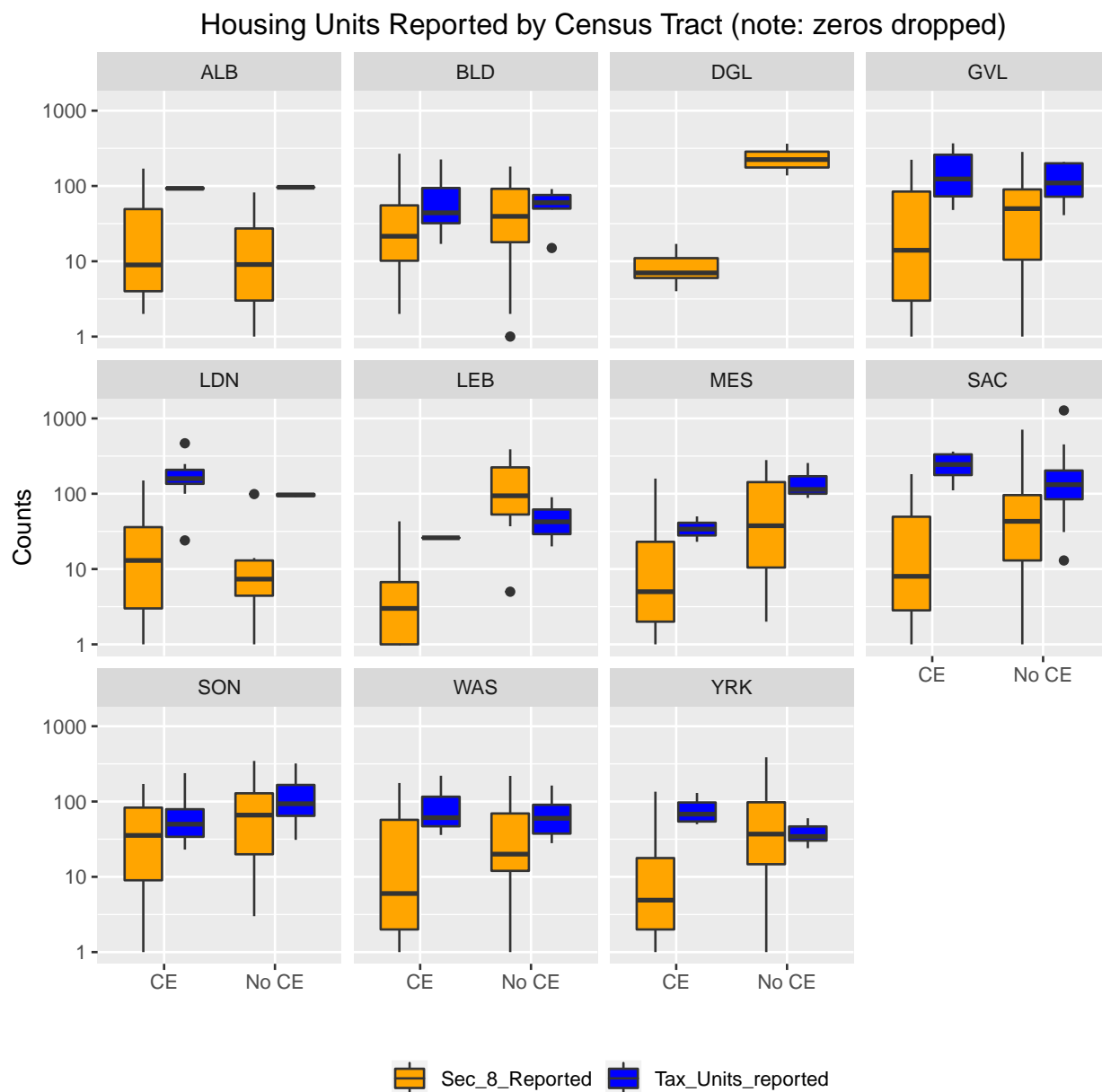Figure 1: Total Census Tracts by County
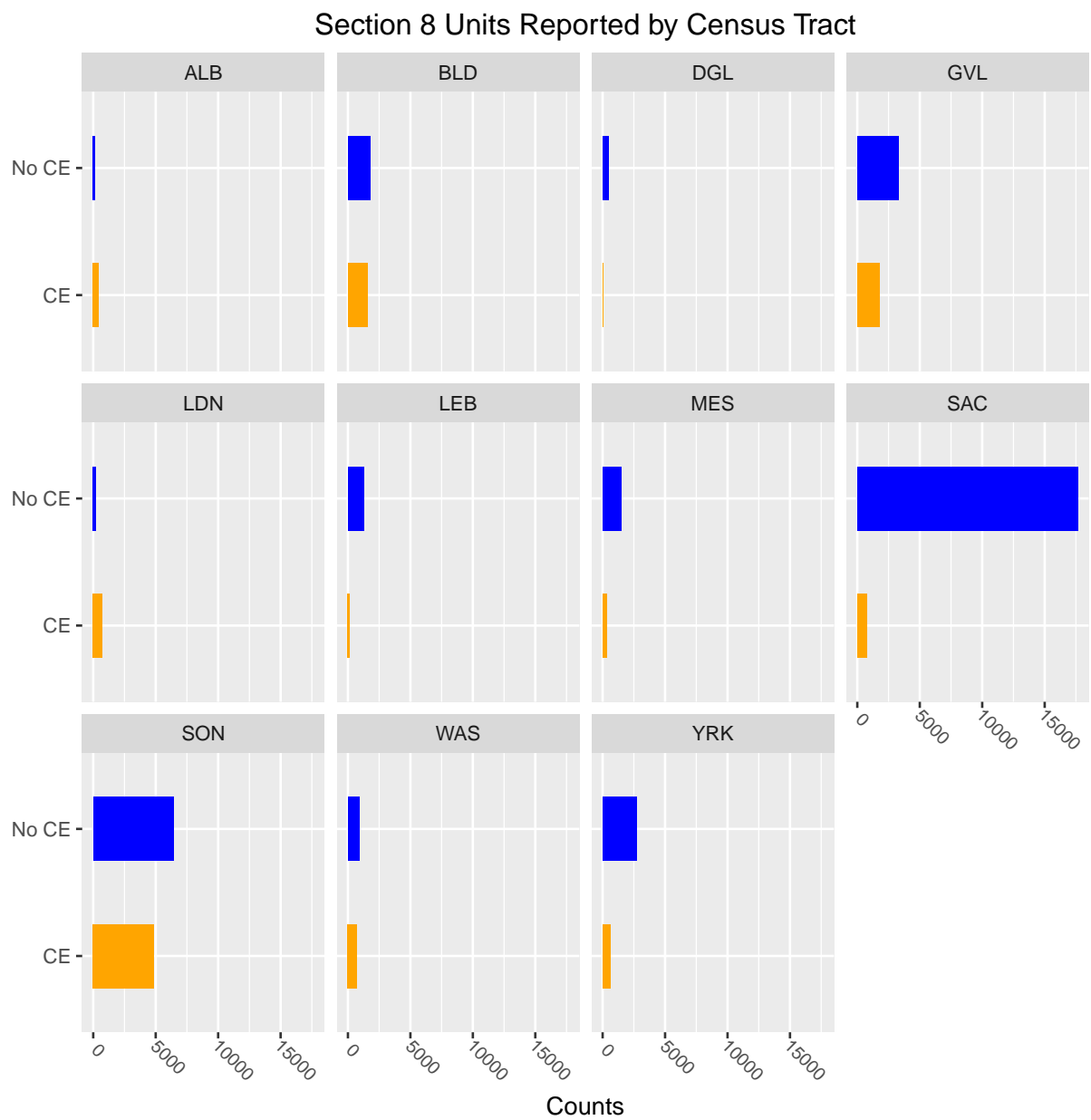
Figure 2: Housing Units Reported by Census Tract

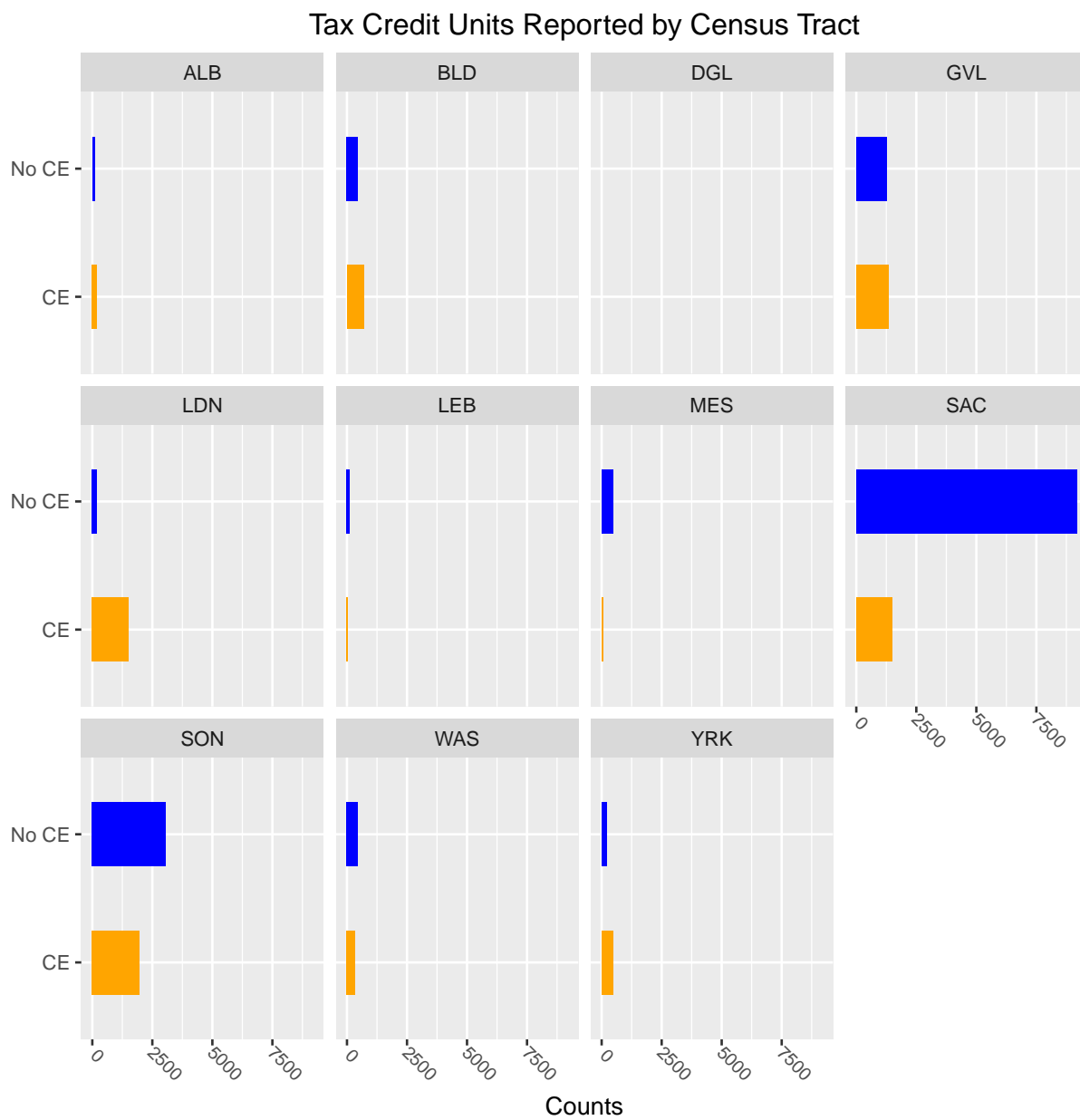Figure 3: Section 8 Units Reported by Census Tract

Figure 4: Tax Credit Units Reported by Census Tract

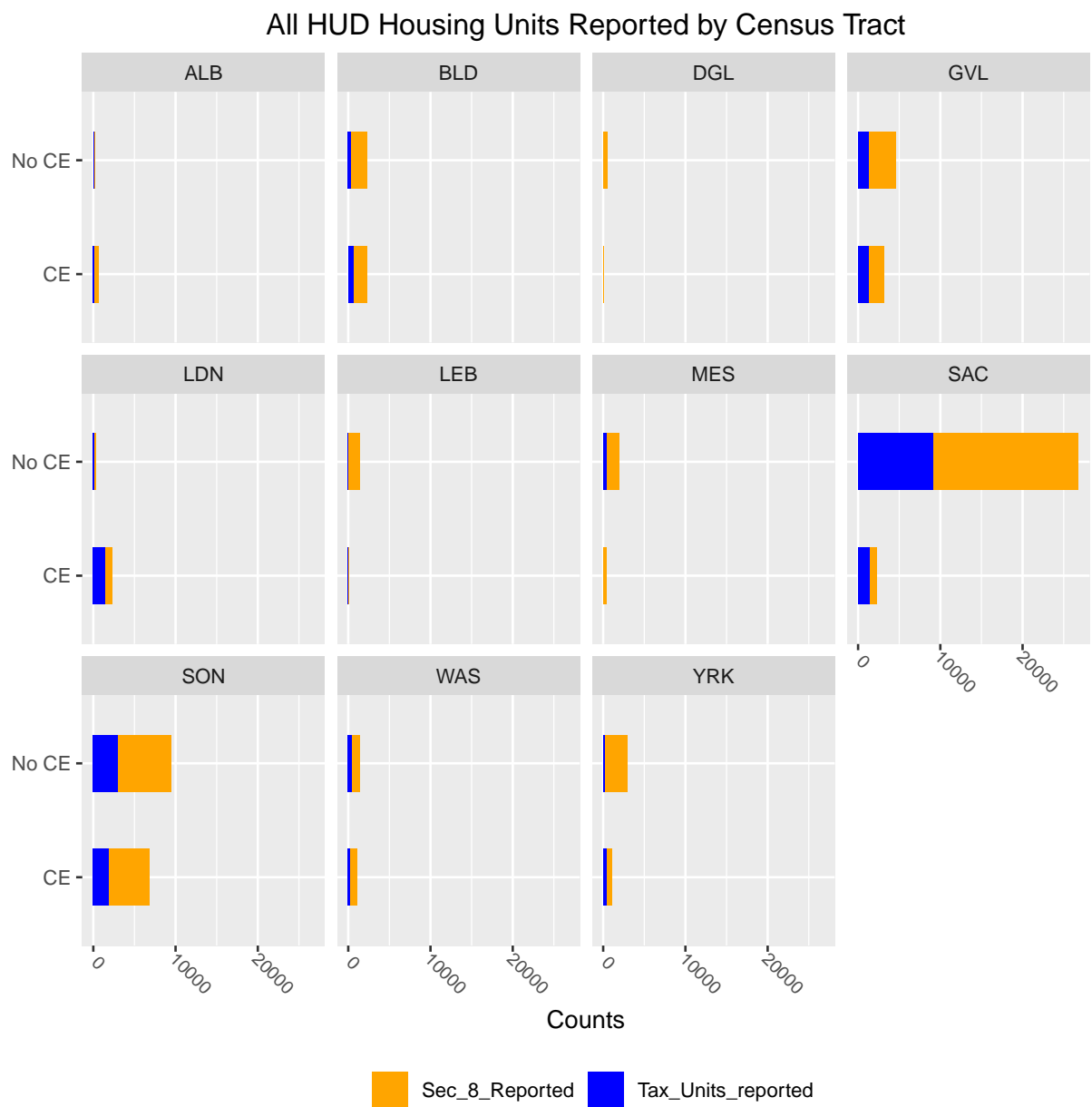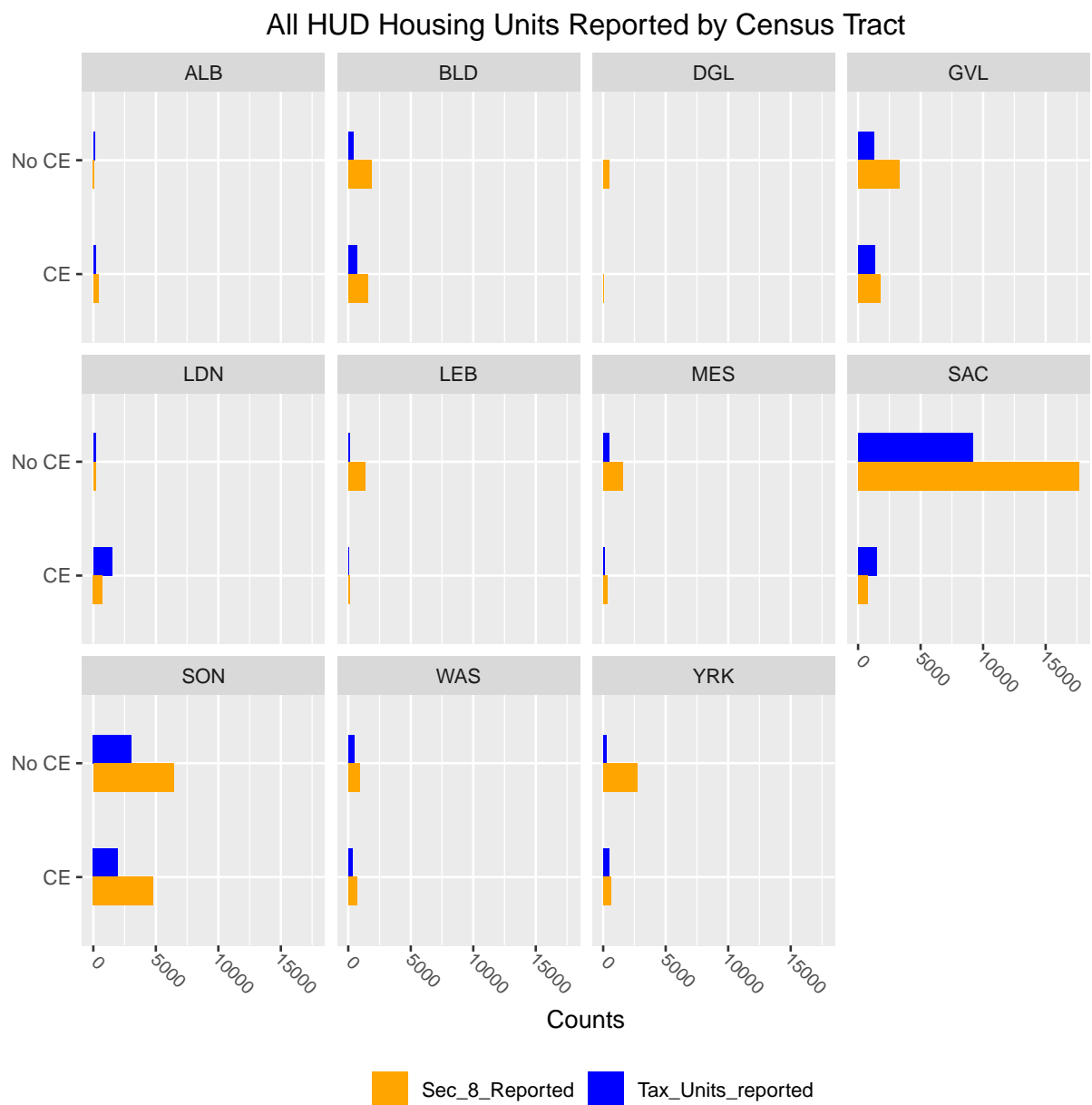# All HUD Housing Units Reported by Census Tract

Figure 5: Housing Units Reported by Census Tract

Figure 6: Housing Units Reported by Census Tract

Table 1: All Counties: Regression Results: HUD Housing

	Dependent variable:
	CE_Present
Sec_8_Reported	-0.010***
	(0.002)
Tax_Units_reported	0.003**
	(0.001)
Constant	-0.063
	(0.093)
Observations	846
Log Likelihood	-537.417
Akaike Inf. Crit.	1,080.834
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 2: All Counties: Analysis of Deviance

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Df	2	1.000	0.000	1.000	1.000	1.000	1.000
Deviance	2	26.543	29.441	5.725	16.134	36.952	47.360
Resid. Df	3	844.000	1.000	843	843.5	844.5	845
Resid. Dev	3	1,094.438	29.137	1,074.834	1,077.697	1,104.239	1,127.920
Pr(>Chi)	2	0.008	0.012	0.000	0.004	0.013	0.017

Table 3: All Counties: McFadden Statistic:similar to R2

llh	llhNull	G2	McFadden	r2ML	r2CU
-537.417	-570.634	66.433	0.058	0.076	0.102

```
## Error in family$linkfun(mustart):  Argument mu must be a nonempty numeric vector
## Error in .stargazer.wrap(..., type = type, title = title, style = style, :  object 'CHS_model1'
not found
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## Error in anova(CHS_model1, test = "Chisq"):  object 'CHS_model1' not found
## Error in .stargazer.wrap(..., type = type, title = title, style = style, :  object 'CHS_model_anova'
not found
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## Error in pR2(CHS_model1):  object 'CHS_model1' not found
## Error in .stargazer.wrap(..., type = type, title = title, style = style, :  object 'CHS_model_pR2'
not found
```

Table 4: BLD Regression Results: HUD Housing

	Dependent variable:
	CE_Present
Sec_8_Reported	-0.010*
	(0.006)
Tax_Units_reported	0.013
	(0.009)
Constant	0.480
	(0.336)
Observations	68
Log Likelihood	-44.997
Akaike Inf. Crit.	95.995
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 5: BLD: Analysis of Deviance

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Df	2	1.000	0.000	1.000	1.000	1.000	1.000
Deviance	2	1.872	0.683	1.388	1.630	2.113	2.355
Resid. Df	3	66.000	1.000	65	65.5	66.5	67
Resid. Dev	3	92.027	1.892	89.995	91.172	93.044	93.738
Pr(>Chi)	2	0.182	0.080	0.125	0.153	0.210	0.239

Table 6: BLD: McFadden Statistic:similar to R2

llh	llhNull	G2	McFadden	r2ML	r2CU
-44.997	-46.869	3.743	0.040	0.054	0.072

Table 7: GVL Regression Results: HUD Housing

	Dependent variable:
	CE_Present
Sec_8_Reported	-0.006
	(0.004)
Tax_Units_reported	0.005
	(0.004)
Constant	-0.143
	(0.274)
Observations	90
Log Likelihood	-59.773
Akaike Inf. Crit.	125.546
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 8: GVL: Analysis of Deviance

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Df	2	1.000	0.000	1.000	1.000	1.000	1.000
Deviance	2	1.517	0.530	1.143	1.330	1.704	1.892
Resid. Df	3	88.000	1.000	87	87.5	88.5	89
Resid. Dev	3	121.188	1.532	119.546	120.491	122.009	122.580
Pr(>Chi)	2	0.227	0.082	0.169	0.198	0.256	0.285

Table 9: GVL: McFadden Statistic:similar to R2

llh	llhNull	G2	McFadden	r2ML	r2CU
-59.773	-61.290	3.034	0.025	0.033	0.045

Table 10: LDN Regression Results: HUD Housing

	Dependent variable:
	CE_Present
Sec_8_Reported	0.003
	(0.014)
Tax_Units_reported	0.007
	(0.008)
Constant	0.463
	(0.455)
Observations	32
Log Likelihood	-18.791
Akaike Inf. Crit.	43.583
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 11: LDN: Analysis of Deviance

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Df	2	1.000	0.000	1.000	1.000	1.000	1.000
Deviance	2	1.083	0.126	0.994	1.039	1.128	1.172
Resid. Df	3	30.000	1.000	29	29.5	30.5	31
Resid. Dev	3	38.636	1.085	37.583	38.080	39.163	39.750
Pr(>Chi)	2	0.299	0.028	0.279	0.289	0.309	0.319

Table 12: LDN: McFadden Statistic:similar to R2

llh	llhNull	G2	McFadden	r2ML	r2CU
-18.791	-19.875	2.167	0.055	0.065	0.092

Table 13: LEB Regression Results: HUD Housing

	Dependent variable:
	CE_Present
Sec_8_Reported	-0.090**
	(0.038)
Tax_Units_reported	0.137
	(0.285)
Constant	3.130***
	(1.089)
Observations	29
Log Likelihood	-5.563
Akaike Inf. Crit.	17.126
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 14: LEB: Analysis of Deviance

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Df	2	1.000	0.000	1.000	1.000	1.000	1.000
Deviance	2	12.399	17.160	0.265	6.332	18.466	24.533
Resid. Df	3	27.000	1.000	26	26.5	27.5	28
Resid. Dev	3	19.480	14.241	11.126	11.258	23.657	35.924
Pr(>Chi)	2	0.303	0.429	0.00000	0.152	0.455	0.607

Table 15: LEB: McFadden Statistic:similar to R2

llh	llhNull	G2	McFadden	r2ML	r2CU
-5.563	-17.962	24.798	0.690	0.575	0.809

Table 16: MES Regression Results: HUD Housing

	Dependent variable:
	CE_Present
Sec_8_Reported	-0.013
	(0.010)
Tax_Units_reported	0.004
	(0.016)
Constant	0.018
	(0.513)
Observations	28
Log Likelihood	-16.506
Akaike Inf. Crit.	39.012
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 17: MES: Analysis of Deviance

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Df	2	1.000	0.000	1.000	1.000	1.000	1.000
Deviance	2	1.743	2.357	0.077	0.910	2.576	3.409
Resid. Df	3	26.000	1.000	25	25.5	26.5	27
Resid. Dev	3	34.200	1.991	33.012	33.050	34.794	36.498
Pr(>Chi)	2	0.423	0.507	0.065	0.244	0.602	0.782

Table 18: MES: McFadden Statistic:similar to R2

llh	llhNull	G2	McFadden	r2ML	r2CU
-16.506	-18.249	3.486	0.096	0.117	0.161

Table 19: SAC Regression Results: HUD Housing

	Dependent variable:
	CE_Present
Sec_8_Reported	-0.017**
	(0.007)
Tax_Units_reported	0.004**
	(0.002)
Constant	-1.834***
	(0.289)
Observations	279
Log Likelihood	-73.232
Akaike Inf. Crit.	152.464
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 20: SAC: Analysis of Deviance

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Df	2	1.000	0.000	1.000	1.000	1.000	1.000
Deviance	2	6.195	0.609	5.764	5.979	6.410	6.625
Resid. Df	3	277.000	1.000	276	276.5	277.5	278
Resid. Dev	3	152.515	6.199	146.464	149.346	155.540	158.853
Pr(>Chi)	2	0.013	0.004	0.010	0.012	0.015	0.016

Table 21: SAC: McFadden Statistic:similar to R2

llh	llhNull	G2	McFadden	r2ML	r2CU
-73.232	-79.426	12.389	0.078	0.043	0.100

Table 22: SON Regression Results: HUD Housing

	Dependent variable:
	CE_Present
Sec_8_Reported	-0.007**
	(0.003)
Tax_Units_reported	-0.001
	(0.003)
Constant	0.694***
	(0.229)
Observations	172
Log Likelihood	-113.379
Akaike Inf. Crit.	232.759
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 23: SON: Analysis of Deviance

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Df	2	1.000	0.000	1.000	1.000	1.000	1.000
Deviance	2	5.097	7.048	0.113	2.605	7.589	10.081
Resid. Df	3	170.000	1.000	169	169.5	170.5	171
Resid. Dev	3	230.194	5.853	226.759	226.815	231.912	236.952
Pr(>Chi)	2	0.369	0.520	0.001	0.185	0.553	0.737

Table 24: SON: McFadden Statistic:similar to R2

llh	llhNull	G2	McFadden	r2ML	r2CU
-113.379	-118.476	10.193	0.043	0.058	0.077

Table 25: WAS Regression Results: HUD Housing

	Dependent variable:
	CE_Present
Sec_8_Reported	-0.006
	(0.007)
Tax_Units_reported	-0.0001
	(0.009)
Constant	0.358
	(0.342)
Observations	50
Log Likelihood	-33.927
Akaike Inf. Crit.	73.854
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 26: WAS: Analysis of Deviance

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Df	2	1.000	0.000	1.000	1.000	1.000	1.000
Deviance	2	0.570	0.806	0.0001	0.285	0.855	1.140
Resid. Df	3	48.000	1.000	47	47.5	48.5	49
Resid. Dev	3	68.234	0.658	67.854	67.854	68.424	68.994
Pr(>Chi)	2	0.639	0.500	0.286	0.462	0.816	0.992

Table 27: WAS: McFadden Statistic:similar to R2

llh	llhNull	G2	McFadden	r2ML	r2CU
-33.927	-34.497	1.140	0.017	0.023	0.030

Table 28: YRK Regression Results: HUD Housing

	Dependent variable:
	CE_Present
Sec_8_Reported	-0.033***
	(0.011)
Tax_Units_reported	0.035**
	(0.016)
Constant	0.726**
	(0.304)
Observations	82
Log Likelihood	-45.494
Akaike Inf. Crit.	96.988
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 29: YRK: Analysis of Deviance

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Df	2	1.000	0.000	1.000	1.000	1.000	1.000
Deviance	2	11.246	6.444	6.690	8.968	13.525	15.803
Resid. Df	3	80.000	1.000	79	79.5	80.5	81
Resid. Dev	3	100.716	11.550	90.988	94.333	105.580	113.481
Pr(>Chi)	2	0.005	0.007	0.0001	0.002	0.007	0.010

Table 30: YRK: McFadden Statistic:similar to R2

llh	llhNull	G2	McFadden	r2ML	r2CU
-45.494	-56.740	22.493	0.198	0.240	0.320