

Appendix E – Technical Appendix

**Table B1 - Relative risk of experiencing landlord abuse
(harassment, discrimination, and/or retaliation)**

	Est.	S.E.
(Intercept)	0.043***	0.009
Small LL	1.467*	0.368
Medium LL	1.487*	0.264
Large LL	1.689*	0.421
BIPOC Head of Household	1.211*	0.184
HH Income < 50% AMI	1.454*	0.251
Tract Majority BIPOC	1.126	0.222
Family/Friend Owned	0.474*	0.292
North Minneapolis	2.457***	0.624
Bloomington	1.783*	0.801
Hennepin Remainder	1.973**	0.483
STPL East Side	1.621*	0.325
STPL Remainder	2.105***	0.462
Ramsey Remainder	2.174*	0.793
Number of observations	1045	
AIC	846.5	
BIC	915.8	
Log likelihood	-409.255	
Root Mean Square Error (RMSE)	0.34	

Notes: Relative risk regression. p < 0.5, ** p < 0.01, *** p < 0.001.
Standard errors clustered at zip code level.

Table B2: Relative risk of needing repairs at move-in

	Est.	S.E.
(Intercept)	0.418***	0.036
Small LL	1.171*	0.127
Medium LL	1.475***	0.144
Large LL	1.640***	0.142
BIPOC Head of Household	0.923*	0.064
HH Income < 50% AMI	1.183**	0.063
Tract Majority BIPOC	0.953	0.107
Family/Friend Owned	0.921	0.156
North Minneapolis	0.845*	0.086
Bloomington	0.830**	0.060
Hennepin Remainder	0.720**	0.073
STPL East Side	0.768**	0.077
STPL Remainder	0.886*	0.140
Ramsey Remainder	0.816*	0.087
Num.Obs.	1057	
AIC	1427.8	
BIC	1497.3	
Log.Lik.	-699.894	
RMSE	0.48	

Notes: Relative risk regression. $p < 0.5$, ** $p < 0.01$, *** $p < 0.001$.
Standard errors clustered at zip code level.

Construction of Tenant Well-being Index

We constructed the Tenant Well-being Index (TWI) using the following questions 11 questions from sections related to tenant/landlord relationship as well as housing quality and safety:

Landlord/Tenant Relationship

- Q36_2 - My landlord is easy to reach
- Q36_4 - My landlord is responsive to me
- Q36_6 – I've never had a problem with my landlord
- Q31_1 – Experienced harassment?
- Q31_2 = Experienced discrimination?
- Q31_3 – Experienced retaliation?

Housing Quality

- Q23a – Total repairs needed
- Q23b – Move-in repairs?
- Q23c – Were repairs completed?
- Q36_3 – Is this a safe house to live in?
- Q36_5 – Is this a healthy house to live in?

Variables that were on a Likert scale were converted into numeric values based on the number of options presented (e.g. if the original question offered 5 choices the answers were recoded 1-5). In all cases answers were scored so that a worse tenant experience was a lower number and a positive experience was a higher value. Each variable was then transformed using a z-score transformation which normalizes the variable and centers it at mean zero with the units being standard deviations above or below the mean.

The index was constructed using Principal Component Analysis (PCA). PCA is a helpful step in creating indexes from multiple input variables because it creates uncorrelated linear combinations of the individual variables in the index (Bro & Smilde, 2014). It can combine the signal of each variable while removing the noise. The index represents the first principal component.

Bro, R., & Smilde, A. K. (2014). Principal component analysis. *Analytical Methods*, 6(9), 2812–2831.

Figure B1: Interaction Effect of Study Area and Landlord Size on Rent

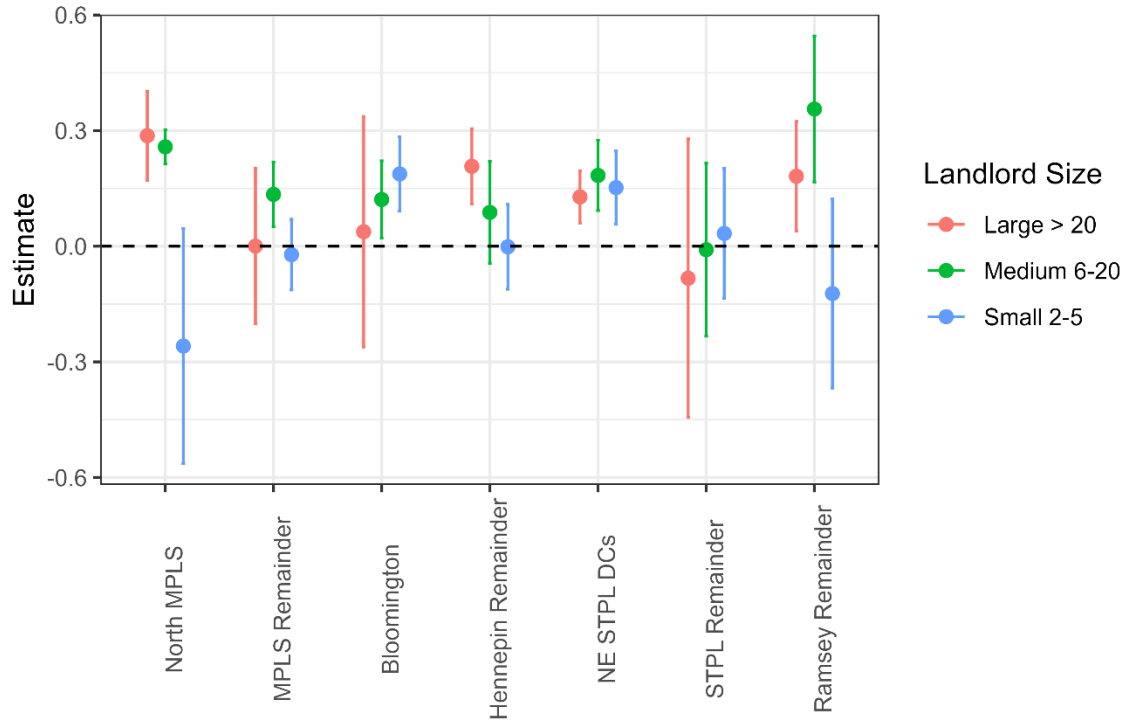


Table B3: Institutional Investor-Owned Homes by Study Area

	Total SFR	Institutional Investor-owned Homes	
	N	N	%
North MPLS	3,982	248	13.8
MPLS Remainder	7,252	123	5
Bloomington	2,027	60	5.7
Hennepin Remainder	15,227	893	9.4
STPL East Side	2,699	155	11.4
STPL Remainder	5,696	126	6.7
Ramsey Remainder	5,558	236	8.2
Total	42,441	1,841	8.5

Note: Institutional Investor defined as either a REIT, private equity firm, or rent-to-own company.

Table B4: Effects of landlord size on log(rent)

	Est.	S.E.
(Intercept)	4.251***	0.849
Small LL	0.012	0.046
Medium LL	0.121***	0.023
Large LL	0.120***	0.031
HH Income < 50% AMI	-0.142***	0.031
BIPOC Head of Household	0.012	0.030
2 Bedrooms	0.023	0.066
3 Bedrooms	0.148*	0.067
4+ Bedrooms	0.190*	0.075
log(Est. Market Value)	0.250***	0.068
Built 1946-1980	-0.043*	0.023
Built 1981-Present	0.002	0.038
North Minneapolis	-0.026	0.072
Bloomington	0.019	0.038
Hennepin Remainder	0.105*	0.042
STPL East Side	-0.023	0.048
STPL Remainder	0.012	0.056
Ramsey Remainder	-0.074*	0.056
Tract Majority BIPOC	-0.095*	0.038
Family/Friend Owned	-0.322***	0.070
Num.Obs.	797	
R2	0.246	
R2 Adj.	0.228	
AIC	14303.6	
BIC	14401.9	
RMSE	1859.58	

Notes: Ordinary Least Squares Regression (OLS). $p < 0.5$, ** $p < 0.01$, *** $p < 0.001$. Standard errors clustered at zip code level.

Table B5: Effects of landlord size on fees log(fees)

	Est.	S.E.
(Intercept)	4.338*	1.919
Small LL	0.022	0.089
Medium LL	0.365*	0.161
Large LL	0.450***	0.116
HH Income < 50% AMI	0.054	0.087
BIPOC Head of Household	0.190*	0.084
2 Bedrooms	0.186	0.393
3 Bedrooms	0.242	0.366
4+ Bedrooms	0.168	0.381
log(Est. Market Value)	-0.042	0.161
Built 1946-1980	0.095*	0.107
Built 1981-Present	0.166*	0.133
North Minneapolis	-0.017	0.180
Bloomington	-0.022	0.138
Hennepin Remainder	0.155*	0.120
STPL East Side	-0.004	0.105
STPL Remainder	0.047	0.108
Ramsey Remainder	-0.053	0.165
Tract Majority BIPOC	0.120*	0.172
Family/Friend Owned	-0.071	0.186
Num.Obs.	595	
R2	0.070	
R2 Adj.	0.039	
AIC	7760.0	
BIC	14401.9	
RMSE	1859.58	

Notes: OLS regression. $p < 0.5$, ** $p < 0.01$, *** $p < 0.001$.
Standard errors clustered at zip code level.

Table B6: Effects of landlord size on log(utilities)

	Est.	S.E.
(Intercept)	5.176***	0.936
Small LL	-0.033	0.050
Medium LL	0.027	0.066
Large LL	0.130*	0.063
HH Income < 50% AMI	0.005	0.054
BIPOC Head of Household	0.126*	0.052
2 Bedrooms	0.157*	0.186
3 Bedrooms	0.178*	0.171
4+ Bedrooms	0.272*	0.184
log(Est. Market value)	-0.014	0.078
Built 1946-1980	0.048*	0.053
Built 1981-Present	0.036	0.096
North Minneapolis	0.005	0.096
Bloomington	-0.006	0.100
Hennepin Remainder	-0.025	0.088
STPL East Side	0.064*	0.075
STPL Remainder	0.016	0.082
Ramsey Remainder	0.152*	0.121
Tract Majority BIPOC	0.187*	0.077
Family/Friend Owned	-0.083*	0.072
HH Size	0.067***	0.017
Num.Obs.	702	
R2	0.146	
R2 Adj.	0.121	
AIC	10232.0	
BIC	10332.2	
RMSE	342.90	

Notes: OLS Regression. $p < 0.5$, ** $p < 0.01$, *** $p < 0.001$.
Standard errors clustered at zip code level.

Table B7: Effects of landlord size on tenant cost-burden

	Est.	S.E.
(Intercept)	174.548***	27.235
Small LL	-0.068	1.474
Medium LL	3.854**	1.216
Large LL	5.324***	1.596
Log(HH Income)	-26.742***	0.974
BIPOC Head of Household	0.605	0.929
Log(Est. Market Value)	7.132**	2.181
Tract Majority BIPOC	-2.636*	1.092
2 Bedrooms	-1.775*	2.513
3 Bedrooms	3.184*	2.613
4+ Bedrooms	2.441*	2.535
Family/Friend Owned	-10.403***	1.545
North Minneapolis	-0.332	2.026
Bloomington	2.224*	1.999
Hennepin Remainder	1.750*	1.178
STPL East Side	-0.473	0.998
STPL Remainder	2.201*	1.248
Ramsey Remainder	-4.709*	2.333
Num.Obs.	668	
R2	0.672	
R2 Adj.	0.663	
AIC	6834.6	
BIC	6920.1	
RMSE	39.19	

Notes: OLS regression. $p < 0.5$, ** $p < 0.01$, *** $p < 0.001$.

Standard errors clustered at zip code level.

Table B8: Relative risk of living in a home owned by a medium or large landlord

	Est.	S.E.
(Intercept)	0.206***	0.077
Asian	0.907	0.243
Black	1.854***	0.252
Hispanic/Latino	1.316*	0.195
Other race/ethnicity	1.063	0.235
HH Income < 50% AMI	1.022	0.062
Children present	1.230*	0.111
North Minneapolis	1.659*	0.549
Bloomington	0.645*	0.269
Hennepin Remainder	1.081	0.373
STPL East Side	1.168	0.377
STPL Remainder	1.009	0.369
Ramsey Remainder	0.763	0.373
Num.Obs.	1051	
AIC	1204.7	
BIC	1269.2	
Log.Lik.	-589.354	
RMSE	0.43	

Notes: Relative risk regression. $p < 0.5$, ** $p < 0.01$, *** $p < 0.001$.
Standard errors clustered at zip code level.