Online Appendix for "The Supply–Equity Trade-off: The Effect of Spatial Representation on the Local Housing Supply"

Contents

A Descriptive Statistics

Figure A-1: Proportion of California Cities with District Elections over Time

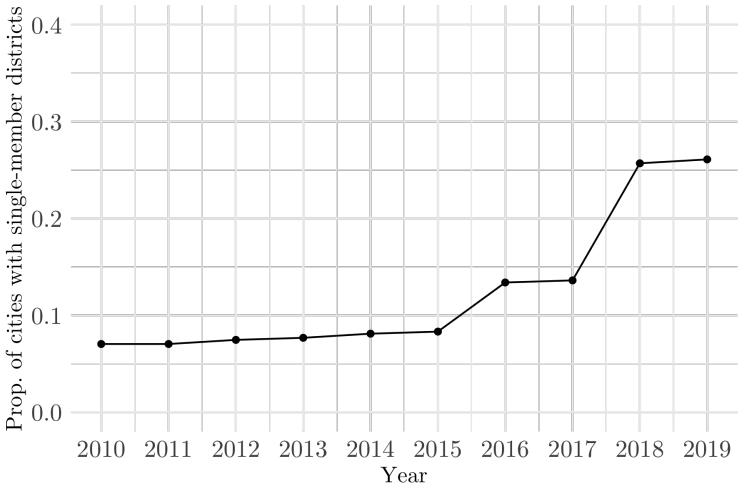
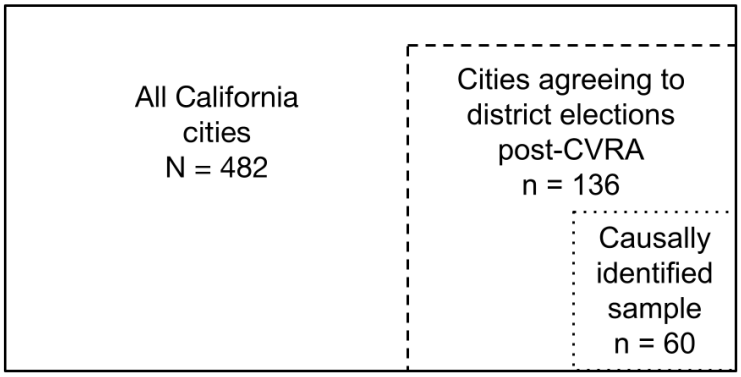
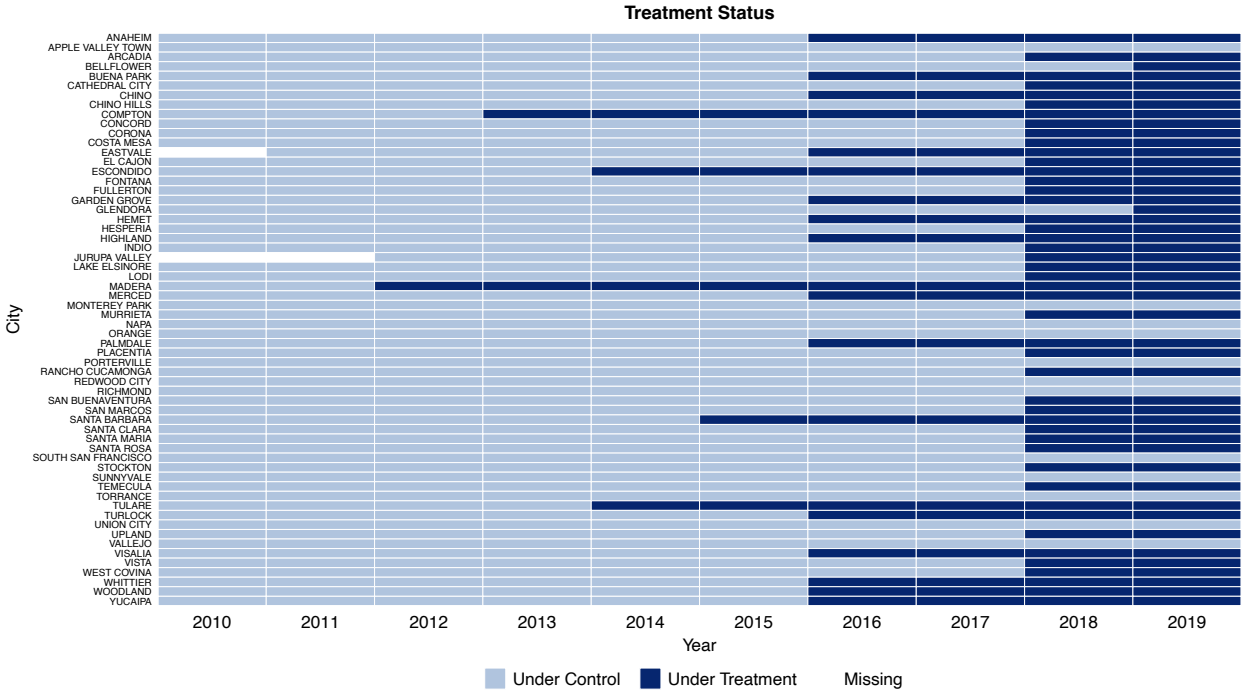


Figure A-2: Relation of Causally Identified Sample to All California Cities



Notes: Rectangle size proportionate to number of cities includes in each group.

Figure A-3: Treatment Status Over Time, Causally Identified Sample



Notes: Cities included here that were not treated over this panel were ultimately treated in 2020. The cities of Eastvale and Jurupa Valley are shown as missing in 2010 and 2010-11, respectively, because they were not yet incorporated in those years.

Table A-1: Cities Treated by CVRA and Year of First District Elections; **Bold** Included in Causally Identified Sample

City	Year	Duarte	2018	Palm Springs	2019
Modesto	2008	**El Cajon**	**2018**	Novato	2019
Madera	**2012**	Encinitas	2018	Antioch	2020
Sanger	2012	Eureka	2018	**Apple Valley**	**2020**
Compton	**2013**	Exeter	2018	Brentwood	2020
Escondido	**2014**	**Fontana**	**2018**	Camarillo	2020
Tulare	**2014**	Fremont	2018	Campbell	2020
Santa Barbara	**2015**	**Fullerton**	**2018**	Chico	2020
Anaheim	**2016**	**Hesperia**	**2018**	Citrus Heights	2020
Banning	2016	**Indio**	**2018**	Claremont	2020
Buena Park	**2016**	**Jurupa Valley**	**2018**	Davis	2020
Chino	**2016**	Kingsburg	2018	Elk Grove	2020
Chula Vista	2016	**Lake Elsinore**	**2018**	Half Moon Bay	2020
Dixon	2016	Lake Forest	2018	Imperial Beach	2020
Eastvale	**2016**	Lemoore	2018	Lincoln	2020
Garden Grove	**2016**	**Lodi**	**2018**	Livermore	2020
Hemet	**2016**	Lompoc	2018	Los Alamitos	2020
Highland	**2016**	Martinez	2018	Marina	2020
King City	2016	Menlo Park	2018	**Monterey Park**	**2020**
Los Banos	2016	Morgan Hill	2018	Moorpark	2020
Merced	**2016**	**Murrieta**	**2018**	**Napa**	**2020**
Palmdale	**2016**	Oceanside	2018	Ojai	2020
Patterson	2016	Oxnard	2018	**Orange**	**2020**
Riverbank	2016	**Placentia**	**2018**	Oroville	2020
S. Juan Capistrano	2016	Poway	2018	Pacifica	2020
Turlock	**2016**	**Rancho Cucamonga**	**2018**	Palm Desert	2020
Visalia	**2016**	Redlands	2018	Paso Robles	2020
Wildomar	2016	**S. Buena(Ventura)**	**2018**	**Porterville**	**2020**
Whittier	**2016**	**San Marcos**	**2018**	**Redwood City**	**2020**
Woodland	**2016**	**Santa Clara**	**2018**	**Richmond**	**2020**
Yucaipa	**2016**	**Santa Maria**	**2018**	Rohnert Park	2020
La Mirada	2017	**Santa Rosa**	**2018**	Roseville	2020
Alhambra	2018	Santee	2018	San Rafael	2020
Arcadia	**2018**	South Pasadena	2018	Santa Ana	2020
Atwater	2018	Stanton	2018	Selma	2020
Barstow	2018	**Stockton**	**2018**	Simi Valley	2020
Big Bear Lake	2018	Tehachapi	2018	Solana Beach	2020
Carlsbad	2018	**Temecula**	**2018**	**S. San Francisco**	**2020**
Cathedral City	**2018**	Twentynine Palms	2018	**Sunnyvale**	**2020**
Ceres	2018	**Upland**	**2018**	**Torrance**	**2020**
Chino Hills	**2018**	**Vista**	**2018**	**Union City**	**2020**
Coalinga	2018	Wasco	2018	Vacaville	2020
Concord	**2018**	**West Covina**	**2018**	**Vallejo**	**2020**
Corona	**2018**	Yucca Valley	2018	Westminster	2020
Costa Mesa	**2018**	**Bellflower**	**2019**	Windsor	2020
Dana Point	2018	**Glendora**	**2019**	Goleta	2022

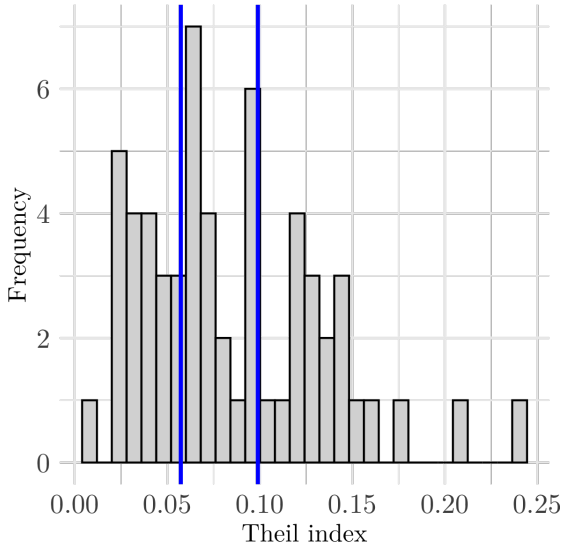
Table A-2: Characteristics of Cities in Aggregate Analysis by Type

	Mean (Untreated)	Mean (All switchers)	Mean (Causally identified sample)	p-value of difference, all switchers vs. untreated	p-value of difference, causal sample vs. untreated
Population					
Number of people	30,258	78,404	102,951	0.00	0.00
Percent non-Hispanic	48	43	36	0.02	0.00
Percent Black	3	5	6	0.01	0.01
Percent Asian	10	11	14	0.25	0.05
Percent Latino	29	29	33	0.89	0.11
Past electoral success					
Prop. of seats w/Latino candidate elected	0.18	0.11	0.09	0.00	0.00
Prop. of seats w/Black candidate elected	0.03	0.03	0.05	0.73	0.32
Prop. of seats w/Asian candidate elected	0.03	0.04	0.04	0.59	0.45
Prop. of seats w/white candidate elected	0.74	0.80	0.77	0.02	0.34
Income and land use					
Median household income ($)	71,310	66,856	63,859	0.11	0.02
Median home value ($)	499,112	412,141	395,692	0.00	0.00
Home vacancy rate	0.10	0.07	0.07	0.00	0.00
Home ownership rate	0.59	0.59	0.58	1.00	0.42
Density (population per sq. mile)	4,132	4,102	4,599	0.92	0.20
Residential segregation (Theil index)	0.03	0.07	0.08	0.00	0.00
Housing outcomes					
Units permitted annually, single-family	44	83	93	0.00	0.00
Units permitted annually, multifamily	31	63	83	0.00	0.00
N	306	136	60		

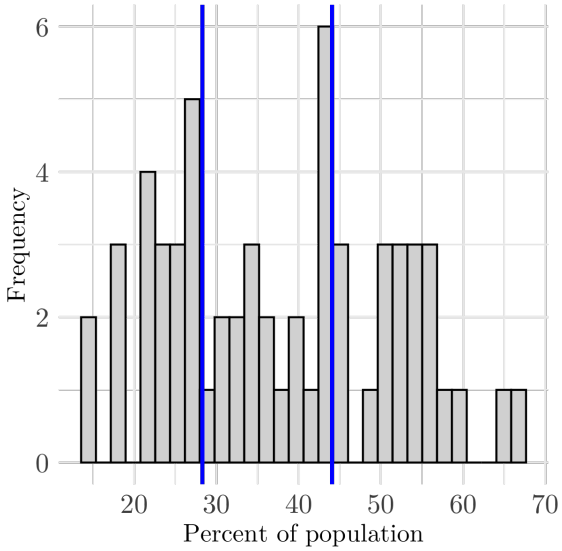
Table A-3: Characteristics of Cities in Distributive Analysis by Type

	Mean (Treatment)	Mean (Control)	p-value of difference
Median income	63836	56294	0.00
Median home value	442599	530896	0.00
Home ownership rate	0.45	0.38	0.00
Home vacancy rate	0.07	0.07	0.78
Proportion Black	0.02	0.02	0.11
Proportion non-Hispanic white	0.49	0.69	0.00
Proportion Hispanic	0.35	0.14	0.00

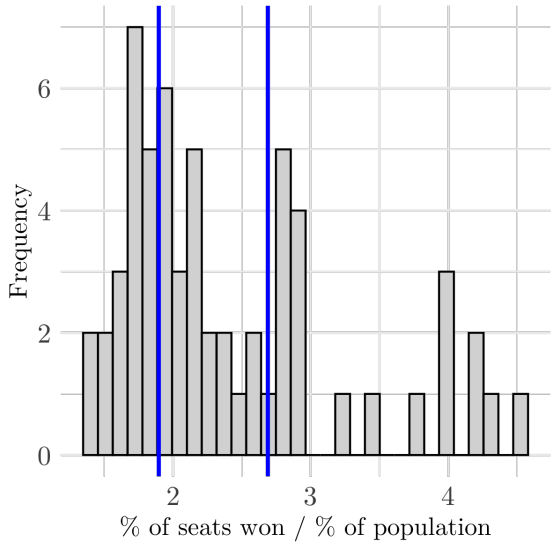
Figure A-4: Distributions of Variables Used to Assess Conditional Effects (Causally Identified Sample)



(a) Segregation



(b) Majority Population

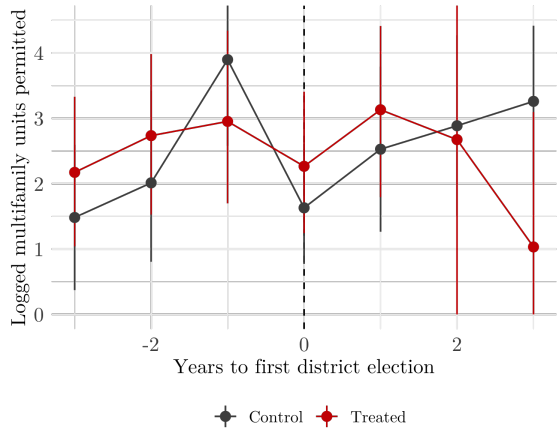


(c) Majority Council Control

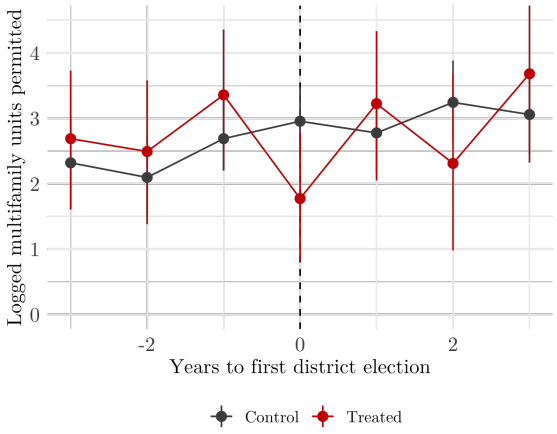
Notes: Tercile cutpoints are marked in blue. Distributions are defined over the pretreatment values of each variable for cities in the causally identified sample. Assignment to terciles is determined at the city rather than observation level: our measure of segregation is time-invariant and observed pretreatment for all cities; for majority population size, we assign cities to terciles based on average values over their pretreatment panels; and for majority council control, we take each city's value from the year before their first district election, as this already incorporates a twelve-year pretreatment history. Causally identified sample includes the 60 California cities that eventually switched to district elections and that had histories of minority underrepresentation; a minority group constituting at least 20% of the population; and a total population of over 50,000 people.

B Aggregate Outcomes

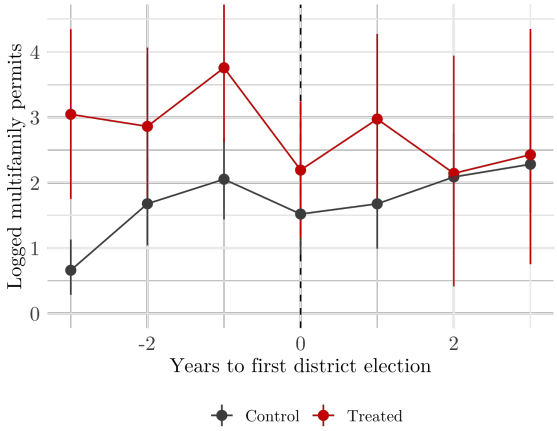
Figure B-5: Logged Multifamily Units Permitted by Treatment Status and Year Relative to First District Election (Causally Identified Sample)



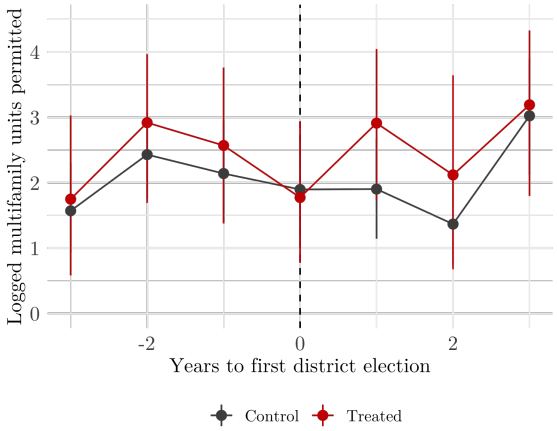
(a) Segregation (Low)



(b) Segregation (High)

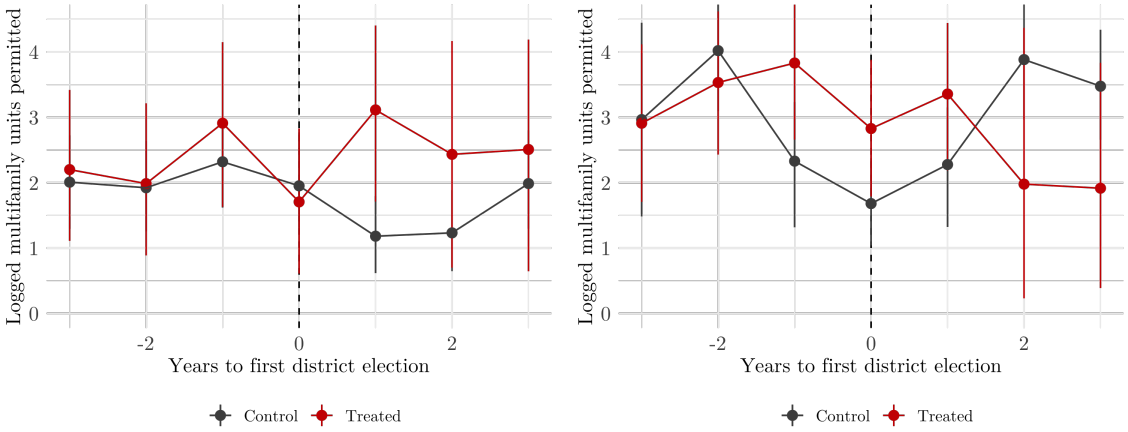


(c) Majority Population (Low)



(d) Majority Population (High)

Figure B-5 (continued): Logged Multifamily Units Permitted by Treatment Status and Year Relative to First District Election (Causally Identified Sample)



(e) Majority Council Control (Low)

(f) Majority Council Control (High)

Notes: Points represent means of logged multifamily units permitted by treatment status and time relative to the year of a city's first district election (represented by 0 on the x-axis); vertical lines represent 95% confidence intervals. Causally identified sample includes the 60 California cities that eventually switched to district elections and that had histories of minority underrepresentation; a minority group constituting at least 20% of the population; and a total population of over 50,000 people. Treated group consists of the subset of these 60 cities that converted to districts during our panel; control group is constructed of the members of the same sample that were not yet treated at the time.

Table B-4: Effect of Conversion to Single-Member Districts on Logged Units Permitted, By Housing Type (Causally Identified Sample)

	Total	Single-Family	Multifamily
	(1)	(2)	(3)
Single-member districts	−0.470	−0.227	−0.805
	(0.255)	(0.236)	(0.459)
Percent non-Hispanic white	0.016	−0.012	0.080
	(0.096)	(0.092)	(0.162)
Percent Black	−0.092	0.110	−0.379
	(0.132)	(0.144)	(0.299)
Percent Hispanic	0.023	0.025	0.051
	(0.080)	(0.086)	(0.171)
Population (thousands)	−0.012	−0.025	−0.055
	(0.078)	(0.080)	(0.103)
Vacancy rate	5.200	6.155	18.206
	(10.607)	(10.666)	(20.706)
Home ownership rate	18.395**	9.107	10.872
	(6.314)	(6.286)	(8.841)
Median home value (thousands)	0.004	0.007	−0.010
	(0.006)	(0.004)	(0.008)
Median income (thousands)	−0.014	−0.032	0.024
	(0.055)	(0.038)	(0.074)
Past minority representation	0.333	0.601	1.549
	(1.485)	(1.302)	(2.732)
City FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
City-specific Trends	Yes	Yes	Yes
Observations	597	597	597
R^2	0.679	0.751	0.573

Notes: *p<0.05; **p<0.01; ***p<0.001. Causally identified sample includes the 60 California cities that eventually switched to district elections and that had histories of minority underrepresentation; a minority group constituting at least 20% of the population; and a total population of over 50,000 people.

Table B-5: Effect of Conversion to Single-Member Districts on Logged Multifamily Units Permitted, Interacted with Segregation (Causally Identified Sample), Robustness to Alternative Specifications

	(1)	(2)	(3)	(4)	(5)
Single-member districts	0.105	−0.816	−1.183**	−1.036*	−0.533
	(0.456)	(0.448)	(0.448)	(0.426)	(0.314)
SMD∗Low segregation	−0.119	0.302	0.406	0.541	−0.792
	(0.713)	(0.481)	(0.481)	(0.572)	(0.718)
Population (thousands)				0.101	
				(0.064)	
Vacancy rate				27.175	29.669*
				(15.428)	(14.580)
Home ownership rate				14.567	5.975
				(9.525)	(8.124)
Median home value (thousands)				−0.007	−0.0002
				(0.007)	(0.014)
Median income (thousands)				0.009	−0.086
				(0.078)	(0.085)
Past minority representation				−0.683	−3.483
				(2.371)	(3.343)
City FE	No	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
City-specific Trends	No	No	Yes	No	Yes
Observations	399	399	399	399	360
R^2	0.0003	0.450	0.549	0.471	0.475

Notes: *p<0.05; **p<0.01; ***p<0.001. Causally identified sample includes the 60 California cities that eventually switched to district elections and that had histories of minority underrepresentation; a minority group constituting at least 20% of the population; and a total population of over 50,000 people.

Table B-6: Effect of Conversion to Single-Member Districts on Logged Multifamily Units Permitted, Interacted with Majority Population (Causally Identified Sample), Robustness to Alternative Model Specifications

	(1)	(2)	(3)	(4)	(5)
Single-member districts	0.029	−0.925*	−1.420**	−1.101**	−0.747*
	(0.501)	(0.445)	(0.445)	(0.347)	(0.330)
SMD∗High majority population	0.293	0.808	0.548	0.805	0.064
	(0.707)	(0.420)	(0.420)	(0.429)	(0.360)
Population (thousands)				0.088	
				(0.060)	
Vacancy rate				25.965	11.079
				(15.424)	(16.685)
Home ownership rate				5.016	12.021
				(7.529)	(7.209)
Median home value (thousands)				−0.011	0.005
				(0.006)	(0.006)
Median income (thousands)				−0.013	−0.100
				(0.068)	(0.058)
Past minority representation				−0.741	−2.722
				(1.943)	(2.510)
City FE	No	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
City-specific Trends	No	No	Yes	No	Yes
Observations	397	397	397	397	358
R^2	0.002	0.507	0.603	0.524	0.484

Notes: *p<0.05; **p<0.01; ***p<0.001. Causally identified sample includes the 60 California cities that eventually switched to district elections and that had histories of minority underrepresentation; a minority group constituting at least 20% of the population; and a total population of over 50,000 people.

Table B-7: Effect of Conversion to Single-Member Districts on Logged Multifamily Units Permitted, Interacted with Majority Control (Causally Identified Sample), Robustness to Alternative Specifications

	(1)	(2)	(3)	(4)	(5)
Single-member districts	0.158	−0.655	−1.303**	−0.767	−1.360*
	(0.533)	(0.460)	(0.460)	(0.442)	(0.610)
SMD∗Low majority control	0.185	0.534	0.544	0.497	0.969
	(0.781)	(0.509)	(0.509)	(0.559)	(0.747)
Population (thousands)				0.088	
				(0.058)	
Vacancy rate				27.737	8.977
				(15.904)	(17.507)
Home ownership rate				4.130	14.811
				(7.370)	(8.300)
Median home value (thousands)				−0.009	−0.001
				(0.005)	(0.014)
Median income (thousands)				0.036	−0.093
				(0.061)	(0.082)
Past minority representation				−0.590	−3.325
				(1.708)	(2.870)
City FE	No	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
City-specific Trends	No	No	Yes	No	Yes
Observations	397	397	397	397	358
R^2	0.002	0.525	0.607	0.538	0.488

Notes: *p<0.05; **p<0.01; ***p<0.001. Causally identified sample includes the 60 California cities that eventually switched to district elections and that had histories of minority underrepresentation; a minority group constituting at least 20% of the population; and a total population of over 50,000 people.

Table B-8: Effect of Conversion to Single-Member Districts on Multifamily Units Permitted Scaled by Lagged Population, Interacted with City Characteristics (Causally Identified Sample)

	H1	*H2*	*H3*	*H4*
	(1)	(2)	(3)	(4)
Single-member districts	−0.559	−0.533	−0.747*	−1.360*
	(0.291)	(0.314)	(0.330)	(0.610)
SMD∗Low segregation		−0.792		
		(0.718)		
SMD∗High majority population			0.064	
			(0.360)	
SMD∗Low majority control				0.969
				(0.747)
Percent non-Hispanic white	−0.042			
	(0.169)			
Percent Black	0.0004			
	(0.225)			
Percent Hispanic	−0.049			
	(0.182)			
Vacancy rate	5.429	29.669*	11.079	8.977
	(13.358)	(14.580)	(16.685)	(17.507)
Home ownership rate	11.768	5.975	12.021	14.811
	(7.632)	(8.124)	(7.209)	(8.300)
Median home value (thousands)	−0.0002	−0.0002	0.005	−0.001
	(0.010)	(0.014)	(0.006)	(0.014)
Median income (thousands)	−0.062	−0.086	−0.100	−0.093
	(0.068)	(0.085)	(0.058)	(0.082)
Past minority representation	−1.594	−3.483	−2.722	−3.325
	(2.822)	(3.343)	(2.510)	(2.870)
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City-specific Trends	Yes	Yes	Yes	Yes
Observations	538	360	358	358
R^2	0.471	0.475	0.484	0.488

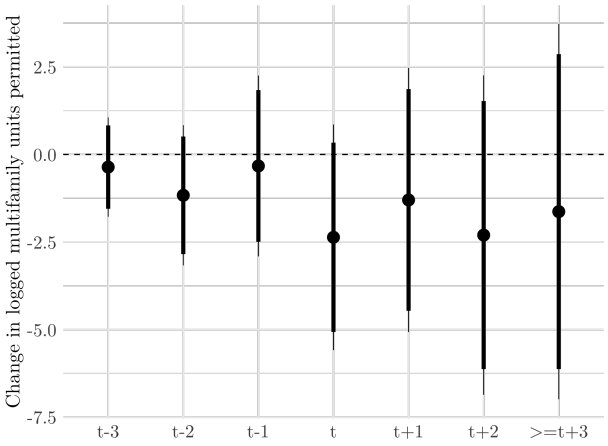
Notes: *p<0.05; **p<0.01; ***p<0.001. Causally identified sample includes the 60 California cities that eventually switched to district elections and that had histories of minority underrepresentation; a minority group constituting at least 20% of the population; and a total population of over 50,000 people. Column 1 (*H1*) includes entire causally identified sample; columns 2-4 include the top and bottom terciles within the causally identified sample of, respectively, segregation (*H2*); size of racial majority (*H3*); and majority group representation on council (*H4*).

Table B-9: Effect of Conversion to Single-Member Districts on Binary Outcome (Any Multifamily Units Permitted = 1), Interacted with City Characteristics (Causally Identified Sample)

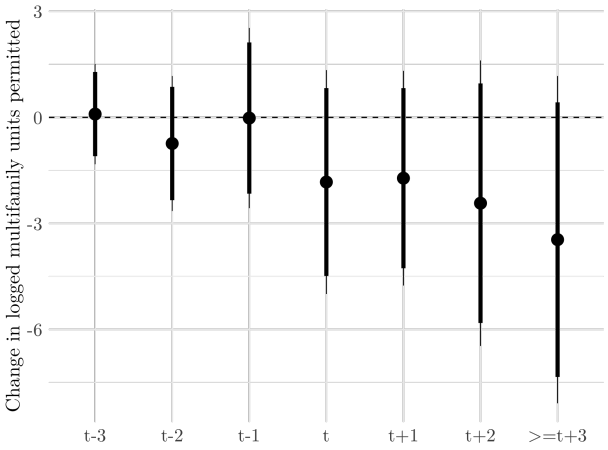
	H1	*H2*	*H3*	*H4*
	(1)	(2)	(3)	(4)
Single-member districts	−0.113	−0.244*	−0.215*	−0.129
	(0.087)	(0.117)	(0.097)	(0.109)
SMD∗Low segregation		0.188		
		(0.176)		
SMD∗High majority population			0.034	
			(0.136)	
SMD∗Low majority control				−0.017
				(0.176)
Percent non-Hispanic white	0.035			
	(0.037)			
Percent Black	−0.099			
	(0.063)			
Percent Hispanic	0.022			
	(0.043)			
Population (thousands)	0.002	−0.001	0.005	0.005
	(0.020)	(0.024)	(0.019)	(0.019)
Vacancy rate	3.627	5.805	9.100	5.524
	(4.967)	(6.186)	(5.760)	(6.610)
Home ownership rate	−0.318	1.851	−2.556	−1.132
	(2.218)	(2.788)	(2.383)	(2.976)
Median home value (thousands)	−0.003	−0.002	−0.003	−0.004*
	(0.002)	(0.002)	(0.003)	(0.002)
Median income (thousands)	0.022	0.016	0.019	0.022
	(0.016)	(0.020)	(0.019)	(0.018)
Past minority representation	0.708	0.302	1.023	0.844
	(0.570)	(0.652)	(0.545)	(0.508)
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City-specific Trends	Yes	Yes	Yes	Yes
Observations	597	399	397	397
R^2	0.534	0.539	0.593	0.583

Notes: *p<0.05; **p<0.01; ***p<0.001. Causally identified sample includes the 60 California cities that eventually switched to district elections and that had histories of minority underrepresentation; a minority group constituting at least 20% of the population; and a total population of over 50,000 people. Column 1 (*H1*) includes entire causally identified sample; columns 2-4 include the top and bottom terciles within the causally identified sample of, respectively, segregation (*H2*); size of racial majority (*H3*); and majority group representation on council (*H4*).

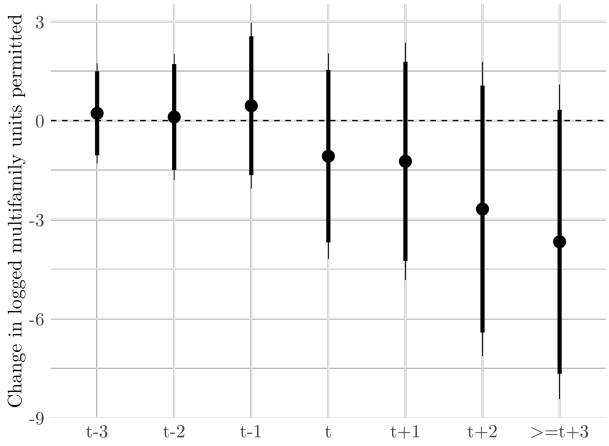
Figure B-7: Event Study Plots of Treatment Effects and Confidence Intervals (Causally Identified Sample)



(a) Top Segregation Tercile



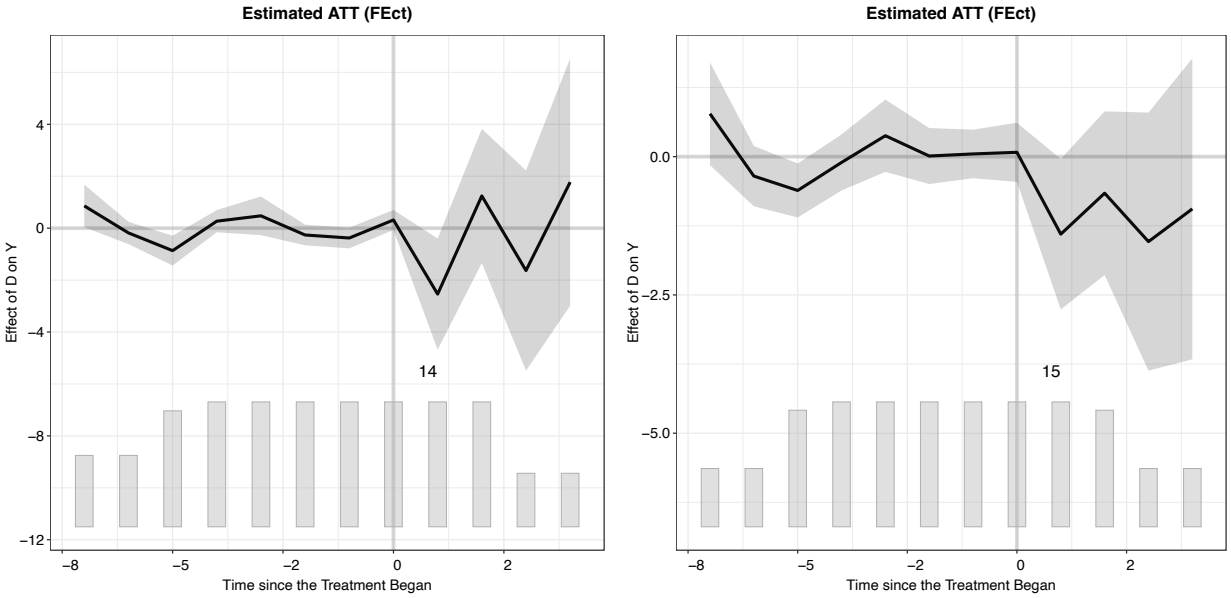
(b) Bottom Majority Population Tercile



(c) Top Majority Control Tercile

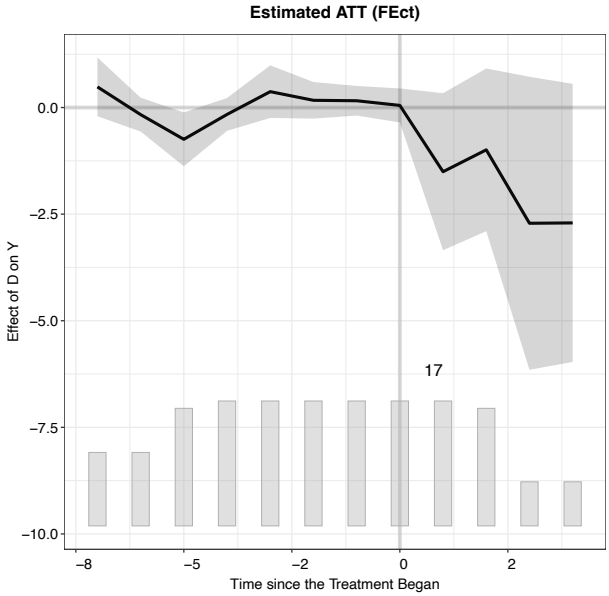
Notes: Point estimates from Granger test, conducted on relevant terciles within the causally identified sample. This sample includes the 60 California cities that eventually switched to district elections and that had histories of minority underrepresentation; a minority group constituting at least 20% of the population; and a total population of over 50,000 people. Lines indicate 95% confidence intervals (thin lines) and 90% confidence intervals (thick lines).

Figure B-8: Effect of Conversion to Single-Member Districts on Logged Multifamily Units Permitted, Estimated Using Fixed Effects Counterfactual Estimator (Liu, Wang, and Xu 2020) (Causally Identified Sample)



(a) Top Segregation Tercile

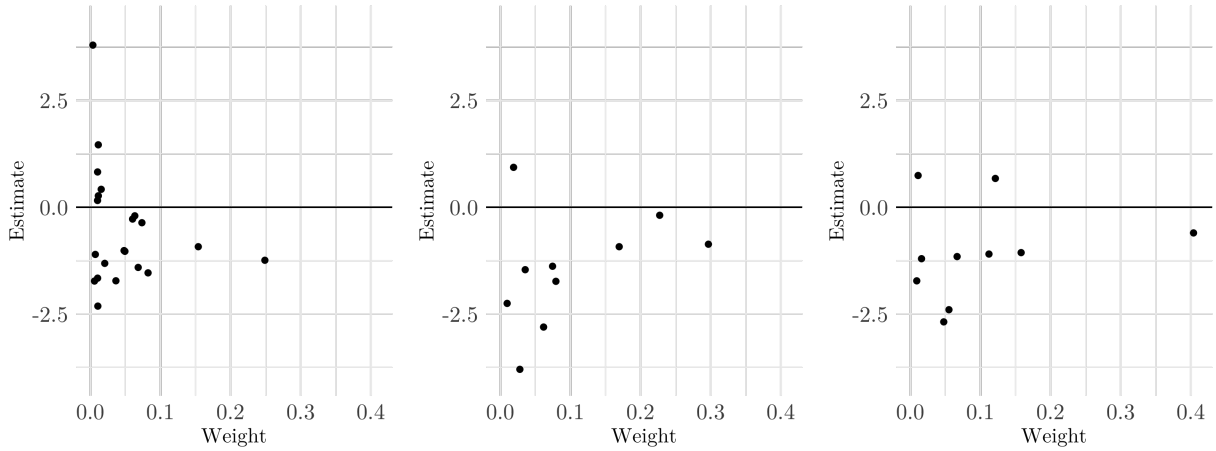
(b) Bottom Majority Population Tercile



(c) Top Majority Control Tercile

Notes: Estimated treatment effects and 95% confidence intervals, conducted on relevant terciles within the causally identified sample. This sample includes the 60 California cities that eventually switched to district elections and that had histories of minority underrepresentation; a minority group constituting at least 20% of the population; and a total population of over 50,000 people.

Figure B-9: Goodman-Bacon Decomposition of the Effect of Single-Member Districts on Logged Multifamily Units Permitted (Causally Identified Sample)

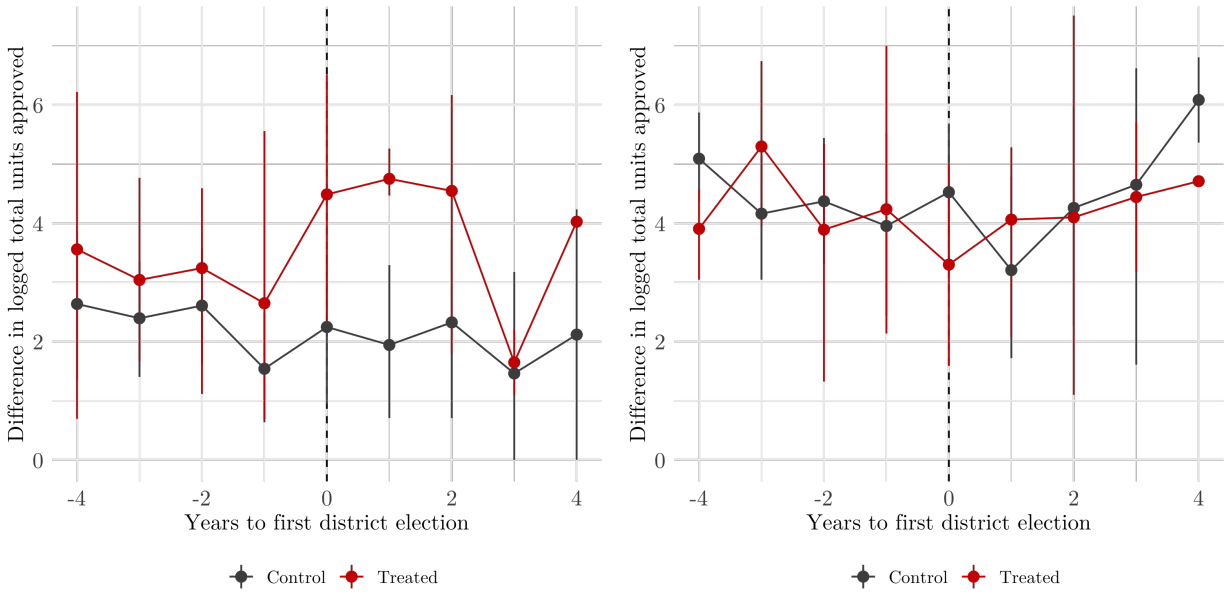


(a) Top Segregation Tercile (b) Bottom Majority Population Tercile (c) Top Majority Control Tercile

Notes: Models in each panel are equivalent to a fully interacted version of Table 2, where the treatment effect on which we conduct the Goodman-Bacon decomposition corresponds to the effect reported under "Single-member districts." Each point represents one of the difference-in-differences comparisons that constitute the overall two-way fixed effects estimate, with the weight assigned to that estimate on the x-axis. Causally identified sample includes the 60 California cities that eventually switched to district elections and that had histories of minority underrepresentation; a minority group constituting at least 20% of the population; and a total population of over 50,000 people.

C Distributive Outcomes

Figure C-10: Difference in Logged Total Units Approved (High Minority Block Groups Minus Low Minority Block Groups), by Treatment Status and Year Relative to First District Election (Case Study Sample)



(a) White Block Groups

(b) Minority Block Groups

Notes: Points represent means of the difference between logged total units approved in minority and white block groups, by treatment status and time relative to the year of a city's first district election (represented by 0 on the x-axis); vertical lines represent 95% confidence intervals. Case study sample includes Santa Barbara, Escondido, and Anaheim (treated) and Santa Cruz, Ventura, and Glendale (control).

Table C-10: Effect of Conversion to Single-Member Districts on Logged Total Units Approved (Case Study Sample)

	(1)	(2)	(3)	(4)	(5)
Single-member districts	0.040	0.160	0.059	0.179	0.210
	$p = 0.749$	$p = 0.300$	$p = 0.761$	$p = 0.334$	$p = 0.126$
Minority block groups	0.387	0.387	0.387	0.312	0.311
	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$
SMD∗Minority block groups	−0.377	−0.377	−0.377	−0.425	−0.424
	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$
Controls	No	No	No	Yes	Yes
City FE	No	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
City Trends	No	No	Yes	No	Yes
Observations	1,184	1,184	1,184	1,184	1,184

Notes: *p<0.05; **p<0.01; ***p<0.001. Case study sample includes Santa Barbara, Escondido, and Anaheim (treated) and Santa Cruz, Ventura, and Glendale (control).

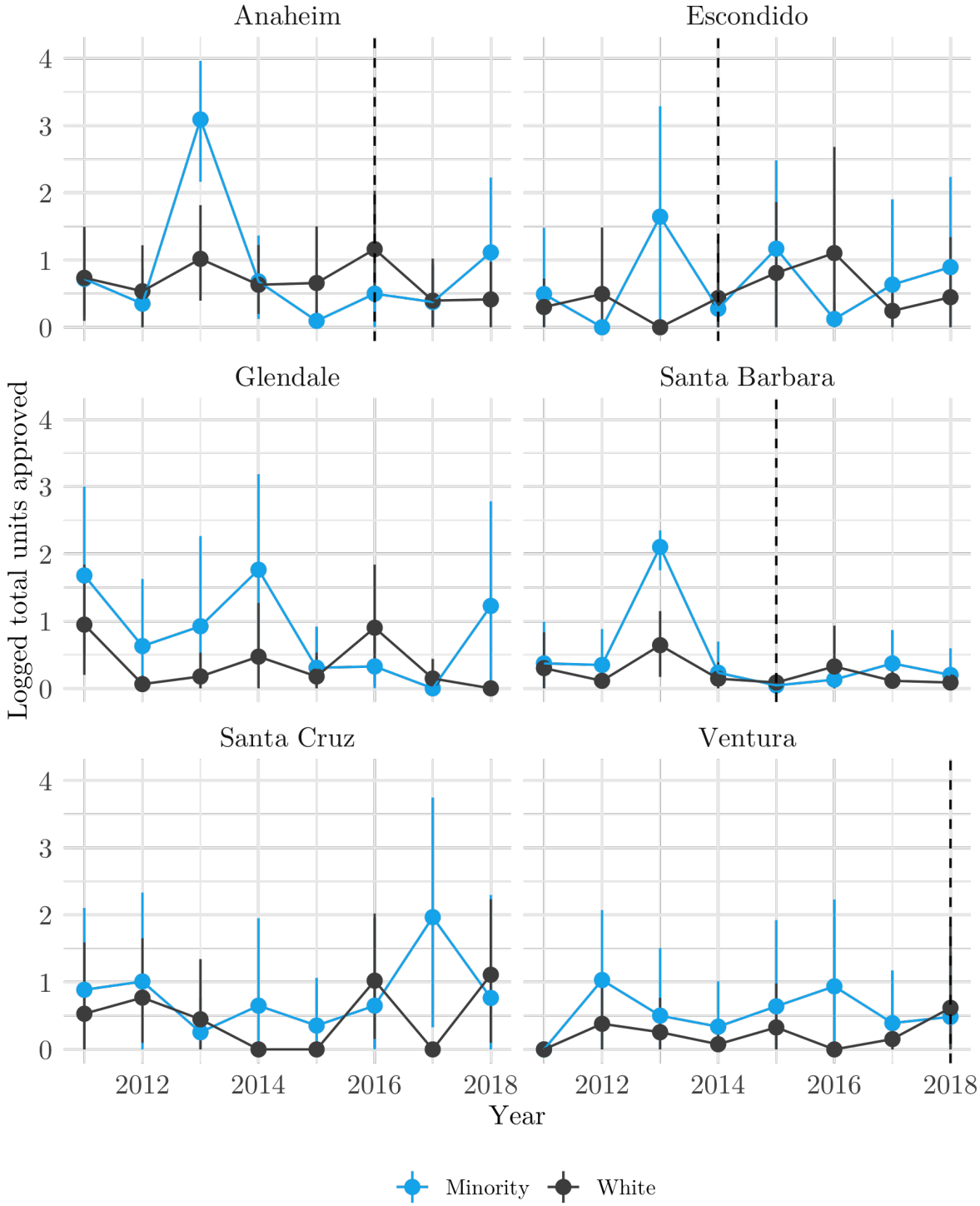
Table C-11: Effect of Conversion to Single-Member Districts on Logged Total Units Approved, Robustness to Exclusion of One City (Case Study Sample)

	Full	No Anaheim	No Escondido	No Glendale
	(1)	(2)	(3)	(4)
Single-member districts	0.210	0.115	0.065	0.222
	$p = 0.126$	$p = 0.132$	$p = 0.494$	$p = 0.205$
Minority block groups	0.311	0.326	0.318	0.352
	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$
SMD∗Minority block groups	−0.424	−0.500	−0.403	−0.334
	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$
Controls	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City Trends	Yes	Yes	Yes	Yes
Observations	1,184	832	1,040	1,008

	Full	No Santa Barbara	No Santa Cruz	No Ventura
	(1)	(2)	(3)	(4)
Single-member districts	0.210	0.234	0.281	0.252
	$p = 0.126$	$p = 0.583$	$p = 0.126$	$p = 0.189$
Minority block groups	0.311	0.301	0.338	0.268
	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.000^{***}$
SMD∗Minority block groups	−0.424	−0.426	−0.432	−0.431
	$p = 0.000^{***}$	$p = 0.249$	$p = 0.000^{***}$	$p = 0.000^{***}$
Controls	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City Trends	Yes	Yes	Yes	Yes
Observations	1,184	928	1,072	1,040

Notes: *p<0.05; **p<0.01; ***p<0.001. Case study sample includes Santa Barbara, Escondido, and Anaheim (treated) and Santa Cruz, Ventura, and Glendale (control).

Figure C-11: Logged Total Units Approved, by Block Group Composition (Minority or White) and Year Relative to First District Election (Case Study Sample)



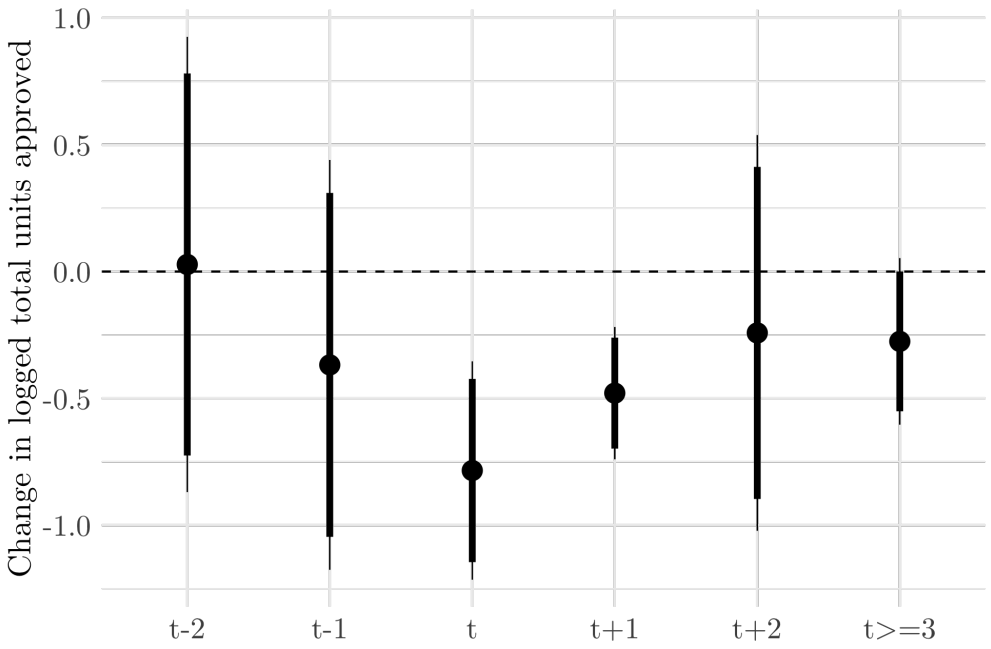
Notes: Dotted vertical lines represent year of first district elections for treated cities. "White" and "minority" block groups are defined as being in the top and bottom terciles of percent non-Hispanic white in each city prior to treatment; block groups belonging to the middle tercile are not shown.

Table C-12: Effect of Conversion to Single-Member Districts on Logged Units Approved Terciles Defined Over All Treated Cities (Case Study Sample) (Minority block groups: less than 38 percent white, white block groups: more than 67 percent white)

	Total Units	Multifamily Units	Single-family units
	(1)	(2)	(3)
Single-member districts	0.392	0.254	0.117
	$p = 0.176$	$p = 0.316$	$p = 0.623$
Minority block groups	0.365	0.393	0.048
	$p = 0.097$	$p = 0.134$	$p = 0.761$
SMD∗Minority block groups	−0.546	−0.491	−0.120
	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.496$
Controls	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
City Trends	Yes	Yes	Yes
Observations	1,136	1,136	1,136

Notes: *p<0.05; **p<0.01; ***p<0.001. Case study sample includes Santa Barbara, Escondido, and Anaheim (treated) and Santa Cruz, Ventura, and Glendale (control).

Figure C-12: Event Study Plot of Spatial Diff-in-Diff Interaction (Case Study Sample)



Notes: Point estimates from Granger test, conducted on case study sample. This sample includes Santa Barbara, Escondido, and Anaheim (treated) and Santa Cruz, Ventura, and Glendale (control). Lines indicate 95% confidence intervals (thin lines) and 90% confidence intervals (thick lines). Baseline year is set to $t-3$ so that every treated city has at least one pretreatment year.

C.1 Distributive Standard Errors

The wild cluster bootstrap algorithm does not produce standard errors, so we only report p-values in Table 3. Although one could compute the standard deviation of the bootstrap distribution of the estimate, doing any kind of inference using this quantity relies heavily on an asymptotic normality assumption that is unlikely to hold when the number of clusters is small (Roodman et al. 2019). While there is not a correct approach for inference with a small number of clusters, Appendix Table C-13 shows that the patterns of statistical significance are identical whether we use the wild bootstrap, block cluster bootstrap (Bertrand, Duflo, and Mullainathan 2004), or conventional cluster-robust standard errors.

Table C-13: Effect of Conversion to Single-Member Districts on Logged Units Approved, Alternative Clustering Approaches (Case Study Sample)

	Total Units	Multifamily Units	Single-family units
	(1)	(2)	(3)
Single-member districts	0.210	0.124	0.083
Wild Bootstrap	$p = 0.126$	$p = 0.161$	$p = 0.444$
Block Bootstrap	$p = 0.168$	$p = 0.304$	$p = 0.242$
Cluster Robust SEs	$p = 0.107$	$p = 0.212$	$p = 0.199$
Minority block groups	0.311	0.370	−0.033
Wild Bootstrap	$p = 0.000^{***}$	$p = 0.040^{*}$	$p = 0.521$
Block Bootstrap	$p = 0.006^{**}$	$p = 0.000^{***}$	$p = 0.186$
Cluster Robust SEs	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.324$
SMD∗Minority block groups	−0.424	−0.358	−0.097
Wild Bootstrap	$p = 0.000^{***}$	$p = 0.000^{***}$	$p = 0.292$
Block Bootstrap	$p = 0.006^{**}$	$p = 0.000^{***}$	$p = 0.112$
Cluster Robust SEs	$p = 0.000^{***}$	$p = 0.001^{**}$	$p = 0.151$
Controls	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
City Trends	Yes	Yes	Yes
Observations	1,184	1,184	1,184

Notes: *p<0.05; **p<0.01; ***p<0.001. Case study sample includes Santa Barbara, Escondido, and Anaheim (treated) and Santa Cruz, Ventura, and Glendale (control).

D Data Collection

D.1 Aggregate Permits

The Census Bureau's Building Permits Survey is the leading source of cross-municipality data on housing permits, surveying the over 20,000 local governments which permit 98% of US housing production. On average, 94% of units permitted are eventually completed, with the decrease in units stemming from design changes or permits abandoned (*Data Relationships between Permits, Starts, and Completions* 2020). Our dependent variable is units permitted because permitting is a political decision, whereas building completions are affected by exogenous factors such as internal financing. Of note, the number of observations in our panel models falls below 600 and 400 because two of the cities in our causally identified sample were incorporated early in the panel. Eastvale was incorporated in 2010 and entered our panel in 2011. Jurupa Valley was incorporated in 2011 and entered our panel in 2012.

D.2 Electoral Institutions

We assembled an original panel dataset of city council structures from 2010 through the present for the 482 Census-designated places in California. We began by coding all of these cities as at-large, except for the 59 cities identified by California Common Cause to be by-district as of 2016 (`https://www.commoncause.org/california/wp-content/uploads/sites/29/2018/03/california-municipal.pdf`). For each of these cities, we used internet searches to learn the year of their first district election. To find all subsequent conversions to districts under the CVRA, we used a combination of internet searches, city council websites, local media reports, and interviews (see section D.4 below). For each city that converted, we collected the following information:

- Year of decision to convert
- Year of first district election
- Reason for conversion (lawsuit, threat letter)
- Method of conversion (court order, council resolution, or ballot initiative)
- Plaintiff/source of threat letter

D.3 Estimating Candidate Ethnicities

CEDA's data only includes names, not ethnicities, of candidates, so we coded the ethnicity of candidates using the `wru` package in `R` (Imai and Khanna 2021). This package uses data from the U.S. Census to compute the probability that a person is of a given ethnicity given their last name and county of residence. Similar prediction procedures are known to have higher error rates for women and Blacks, but this should not pose a major issue for our analysis. Latinos and Asians constitute the vast majority of the nonwhite population

across most cities in our sample. As for women, Imai and Khanna (2016) point out that their method is biased only if surname is correlated with location or personal attributes, including the rate of interracial marriage and the likelihood of changing one's last name after marriage. For instance, as long as white and nonwhite women are equally likely to marry someone of a different ethnicity, and to change their last names when doing so, the misclassification of white women as nonwhite and vice-versa should only introduce random noise, but no bias, into our coding of city council members' ethnicities.

D.4 Interviews with Key CVRA Stakeholders

We conducted a site visit to Southern California in January 2020 to talk to key stakeholders in CVRA litigation, local government, and housing politics. Their names, locations, and titles are given in Table D-14.

Excerpts from Conversation with Thomas Saenz, President and General Counsel of MALDEF (January 13, 2020)

What informed your selection of cities in which to pursue legal action under the CVRA?
"There's no hard and fast rule, but we had to use some general criteria that include size of the jurisdiction and our ability to draw a majority Latino district. We have generally not challenged anyone under 25,000 in population, and our goal has been to focus on those that are over 50,000 in population. I think there are circumstances that apply in smaller jurisdictions that don't necessarily apply in larger jurisdictions. In small jurisdictions — and this is my personal view — there is a greater justification for an at-large system. If a city's so small that you don't see the distinction between neighborhoods that you see in larger jurisdictions, where the wealthier neighborhood ends up, wholly apart from race, having all the city council or governing body coming from one neighborhood — that's a little bit less likely to occur when it's a much smaller jurisdiction. We have also insisted on the ability to draw a Latino majority CVAP (Citizen Voting Age Population) district — a compact district, we're not going to pursue something where you can only draw a Latino district with spindles in different directions...We also look at electoral history. If there have been Latinos consistently elected, we won't even do an RPV (racially polarized voting) analysis and we will forego that jurisdiction for the moment."

Why did it take a couple years since the passage of the CVRA to see litigation take off?
"I can only speak for MALDEF: things were going on that kept us very busy in the early years. Then I left, and litigation was more or less consciously downplayed by the leadership at the time, first for philosophical reasons, and ultimately for a mix of philosophical and financial reasons. I came back in 2009 and it took a little time to get a system up and running, but now we have a very good, comprehensive system to identify jurisdictions and move forward in systematically challenging at-large systems at the local level."

Table D-14: Stakeholders Interviewed During Site Visit to Southern California, January 2020

Name	City	Position
City Council		
Jose Moreno	Anaheim	City council member
Denise Barnes	Anaheim	City council member
Danny Fierro	Anaheim	Policy aide to city council member Jordan Brandman
Grant Henninger	Anaheim	Candidate for city council
Paul McNamara	Escondido	City council member and current mayor
Consuelo Martinez	Escondido	City council member
Olga Diaz	Escondido	City council member
Ardy Kassakhian	Glendale	City council member
Ara Najarian	Glendale	City council member and current mayor
Mike van Gorder	Glendale	Candidate for city council
Maegan Harmon	Santa Barbara	City council member
Oscar Gutierrez	Santa Barbara	City council member
Kristen Sneddon	Santa Barbara	City council member
Eric Friedman	Santa Barbara	City council member
Jeanette Sanchez-Palacio	Ventura	Candidate for city council
Planning Commissioners and Urban Planners		
Steve White	Anaheim	Planning Commission member
John Armstrong	Anaheim	Planning Commission member
Mike Strong	Escondido	Planning Commission member
Jeffrey Lambert	Ventura	Planning Commission member
Alex McIntyre	Ventura	City Manager
Sandy Smith	Ventura	Former Mayor and Land Use Consultant, Sespe Consulting
John Hecht	Ventura	Land Use Consultant, Sespe Consulting
Shine Ling	Los Angeles*	Urban Planner
Plaintiffs and Lawyers Involved in CVRA Litigation		
Thomas Saenz	Los Angeles	President and General Counsel, MALDEF
Lydia Camarillo	San Antonio, TX*	President, SVREP
Kevin Shenkman	Malibu*	Attorney for several CVRA plaintiffs & threat letters
Sebastian Aldana, Jr.	Santa Barbara	Plaintiff, CVRA lawsuit against City of Santa Barbara
Frank Banales	Santa Barbara	Plaintiff, CVRA lawsuit against City of Santa Barbara
Barry Capello	Santa Barbara	Attorney for plaintiffs, CVRA lawsuit against City of Santa Barbara

* *Conversation conducted by phone.*

Name	City	Position
Community Organizers, Activists, and Interest Groups		
Ada Briceño	Anaheim	Labor leader/Chair, Democratic Party of Orange County
Catherine Jurca	Glendale	Member, Glendale Historical Society Board of Directors
Lee Moldaver	Santa Barbara	Board Member, Citizens Planning Association of Santa Barbara County
Vijaya Jammalamadaka	Santa Barbara	President, League of Women Voters of Santa Barbara
Pedro Paz	Santa Barbara	Board Member, The Fund for Santa Barbara
Anna Marie Gott	Santa Barbara	Local Activist
Lucas Zucker	Ventura	Policy and Communications Director, CAUSE
Writers and Journalists		
Spencer Custodio	Anaheim	Reporter, Voice of OC
Bill Fulton	Ventura	Urban planner and former mayor of Ventura, CA

D.5 Zoning Amendments

To geocode increases in buildable capacity within cities, we reviewed the meeting minutes of the two bodies which control the discretionary review of new housing proposals: the planning commission and city council. We begin with minutes from 2011, as Census block group boundaries will be stable post-2010. This allows enough time to establish pre-trends within our treated cities. For each proposal, we recorded the street address, total units, and the divide of units between single-family and multifamily housing.

As political outcomes, our goal was to identify the year the proposal emerged from the discretionary process. This year may be different from the year of construction and even different from the year of the final permit, as the final permit may rely on a back and forth the discretionary body about design details even after the number of units has been approved. To identify this year of final discretionary review, we first check if the city council voted on the project. Any lower board decisions can be appealed to city council, meaning the voice of the city council is the most important discretionary hurdle. If city council does vote on the project, we use the year of the city council vote. If city council does not vote on the project, we used the year of the last density-based discretionary approval by the planning commission.

Occasionally, a city will make a change to their overall zoning code by amending the General Plan. Such changes affect a swath of the city, potentially many neighborhoods and thousands of individual parcels. While these zoning changes (or "rezonings") may not become reality until a decade into the future, they are politically meaningful increase in the

capacity to build by-right. As a result, we code each rezoning by its increase in buildable capacity. Because the overlap between block groups and upzoned neighborhoods is not perfect, this process involves discretion in allocating upzoned units across multiple block groups. Still, we believe we have generated the most accurate multi-city representation of changes in allowable density over the past 8 years.

There are several types of residential proposals we do not include. First, we do not collect data on renovations nor conversions of apartments to condominiums. The legalization of existing illegal units is coded, as legalization is similar enough to building a new unit. Additionally, we include proposals by commercial enterprises seeking to designate part of their existing structure as residential. Finally, we do not collect data on permits approved by the staff of the city's planning division. These projects are less vulnerable to discretionary approval and often are only reviewed for conformance with existing code.

Ultimately, the data we collect represent the corpus of permits that were approved by passing through the political gauntlet of discretionary review. These data capture the output of permits that should be most directly affected by the change in representation from district elections.