The Costs and Environmental Justice Concerns of NIMBY in Solid Waste Disposal

Phuong Ho*

September 5, 2022

Online Appendices

A Data handling and processing

Waste-disposal data are combined from three sources. First, the waste-quantity data by county of origin and by facility of destination is obtained from California Department of Resources and Recycling and Recovery (CalRecycle). The data are available quarterly from January 1995 to December 2015. Second, the database of waste disposal facility profile (solid waste information system, or SWIS) describing the state identification (SWIS id), location coordinates, operating status, and so on is obtained from CalRecycle. This database is not time series and is updated every Friday on CalRecyle website. I use this database as of September 2017 to obtain information on state identification and location of disposal facilities. Third, information on disposal prices at waste disposal facilities is purchased from Waste Business Journal (WBJ). The data are available quarterly from January 1992 to December 2015.

I merge waste-flow-quantity data with SWIS-and-location data by matching facility name. The two data are from CalRecycle and hence, exact facility names are completely matched. This quantity data set includes 244 disposal facilities and is merged with WBJ price data by manually matching SWIS id, facility names, and location. The final data set for the analysis drops several observations for three reasons. First, observations of facilities that are in the waste flow data but not found in WBJ data, representing 0.52% of California waste. Second, observations with zero prices. Since zero prices may be recorded due to missing values, I drop those observations. They represent 0.41% of the total waste amount. Third, three facilities in California are located on Santa Catalina island and San Clemente island. Because these facilities are built for local needs and the

*SNF – Centre for Applied Research at Norwegian School of Economics, Helleveien 30, NO-5045 Bergen, Norway. Email: phuong.ho@snf.no.

waste management on islands is isolated from other areas on mainland due to geographical and transportation constraints, I drop those observations. They account for 0.01% of the total waste amount.

Using the information on facility location, I calculate car-driving distance using HERE maps from a facility coordinate to the population center coordinate of a county. The population center coordinate of the county is the average centroid weighted by population of all blocks in the county. For out-of-state exports in California solid waste, I observe the export amount, but I do not observe the destination.[1] I construct an out-of-state disposal option for haulers in the county by assuming a hauler would export to the nearest out-of-state facility (among facilities in Oregon, Nevada, or Arizona). Overall, out-of-state exports make up a very small amount of California solid waste, that is, 1.16% during this whole period.

Information on demographics in California is obtained from 2010 US Decennial Census. The data are available on the websites of the US Census Bureau and IPUMS NHGIS. Additionally, I obtain California diesel prices from the Energy Information Agency and CPI index (to adjust for inflation rates) from the US Bureau of Labor Statistics.

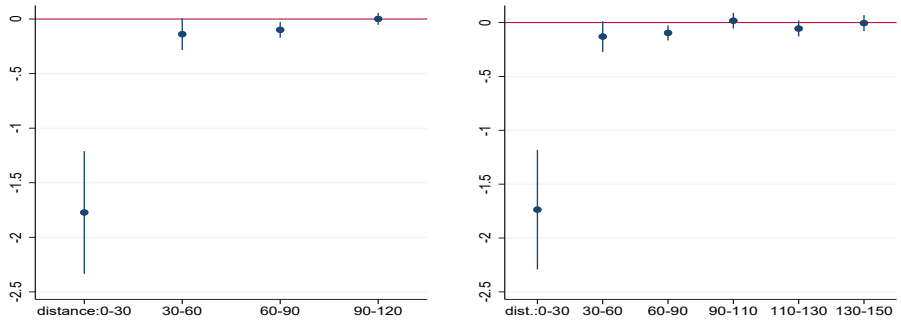
[1] Since 2006, the state of destination has been observed but the out-of-state destination facility has still not been available.

B Price responses and distance responses by choice set radius

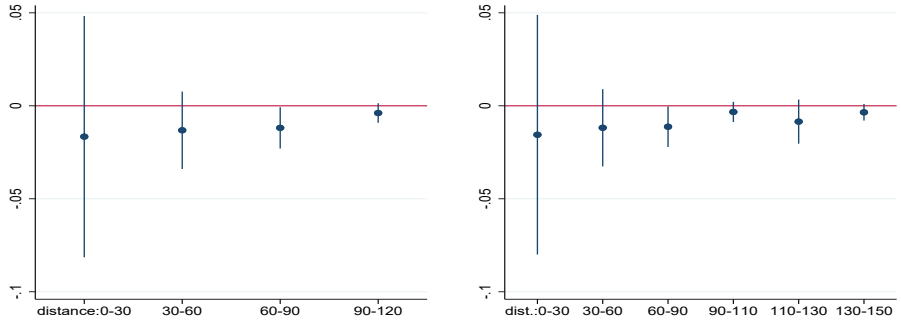
TABLE B1: Regression analysis of trash flows in response to price and distance by distance

s_{mjt}: Trash share from a county of origin to a facility of destination in a quarter										
Trash flows within 120 miles			Trash flows within 150 miles							
	(1)	(2)		(3)	(4)		(5)	(6)		(7)	(8)
price: 0–30	0.0660	-0.0166	price: 0–40	-0.0577	-0.0259	price: 0-30	0.0739	-0.0156	price: 0-30	0.0741	-0.0155
	(0.0613)	(0.0331)		(0.0460)	(0.0186)		(0.0650)	(0.0329)		(0.0651)	(0.0329)
price: 30–60	-0.0157	-0.0132	price: 40–70	0.0547**	-0.0076	price: 30-60	-0.0108	-0.0118	price: 30-60	-0.0096	-0.0118
	(0.0250)	(0.0106)		(0.0250)	(0.0114)		(0.0252)	(0.0106)		(0.0251)	(0.0106)
price: 60–90	0.0132	-0.0119**	price: 70–100	0.0164	-0.0047	price: 60-90	0.0160	-0.0112**	price: 60-80	0.0246	-0.0121
	(0.0238)	(0.0057)		(0.0206)	(0.0031)		(0.0225)	(0.0056)		(0.0263)	(0.0090)
price: 90–120	0.0092	-0.0039	price: 100–130	0.0172	-0.0074*	price: 90-110	0.0083	-0.0033	price: 80-100	0.0176	-0.0066**
	(0.0192)	(0.0027)		(0.0149)	(0.0041)		(0.0166)	(0.0028)		(0.0262)	(0.0026)
			price: 130–150	0.0066	-0.0035	price: 110-130	0.0175	-0.0085	price: 100-125	0.0154	-0.0075
				(0.0155)	(0.0023)		(0.0170)	(0.0060)		(0.0153)	(0.0049)
						price: 130-150	0.0106	-0.0035	price: 125–150	0.0031	-0.0041**
							(0.0162)	(0.0023)		(0.0150)	(0.0020)
distance: 0–30	-1.7723***		dist.: 0–40	-1.4408***		dist: 0-30	-1.7363***		dist:0-30	-1.7364***	
	(0.2866)			(0.1709)			(0.2833)			(0.2832)	
distance: 30–60	-0.1388*		dist.: 40–70	0.0023		dist: 30-60	-0.1298*		dist: 30-60	-0.1322*	
	(0.0738)			(0.0552)			(0.0725)			(0.0738)	
distance: 60–90	-0.0991***		dist.: 70–100	-0.0438		dist: 60-90	-0.0958***		dist: 60-80	-0.1206	
	(0.0365)			(0.0341)			(0.0355)			(0.0761)	
distance: 90–120	0.0014		dist.: 100–130	-0.0148		dist: 90-110	0.0174		dist: 80-100	-0.0200	
	(0.0278)			(0.0218)			(0.0367)			(0.0489)	
			dist.: 130–150	-0.0113		dist: 110-130	-0.0553		dist: 100-125	-0.0019	
				(0.0379)			(0.0376)			(0.0291)	
						dist: 130+	-0.0051		dist.: 125–150	-0.0296	
							(0.0380)			(0.0270)	
facility FE	Y	Y		Y	Y		Y	Y		Y	Y
quarter FE	Y	Y		Y	Y		Y	Y		Y	Y
quarter × origin cnty FE	Y			Y			Y			Y	
origin × des cnty FE		Y			Y			Y			Y
Observations	109,612	109,612	151,988	151,988		151,988	151,988		151,988	151,988	
Adjusted R^2	0.4594	0.8915		0.4350	0.8872		0.4374	0.8872		0.4373	0.8872

Note: This table shows the responses of all trash flows within 120 and within 150 miles to the price and distance by different knots of driving distance. The formal regression is $s_{mjt} = \beta_d f_d(\text{distance}_{mj}) + \beta_p f_p(\text{price}_{jt}) + \text{fixed effects} + \epsilon_{mjt}$. Standard errors are clustered by waste-origin county. Significant level: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.



(A) Distance response in 120-mile flows (B) Distance response in 150-mile flows



(C) Price response in 120-mile flows (D) Price response in 150-mile flows

FIGURE B1: Price response and distance response by distance

Note: The figures show the coefficients of distance and price at different knots of distance (linear splines) of waste transportation of the regression: $s_{mjt} = \beta_d f_d(\text{distance}_{mj}) + \beta_p f_p(\text{price}_{jt}) + \text{fixed effects} + \epsilon_{mjt}$, where s_{mjt} is the share of waste amount generated in county m to be disposed of at facility j in quarter t and f_d, f_p are linear splines of distance and price. Figures B1a and B1b show distance response after controlling county-by-quarter fixed effects and facility fixed effects, using the sample of all combinations of flows by a county and a facility within 120 miles and within 150 miles, respectively. Figures B1c and B1d show price response after controlling quarter fixed effects and origin-county-by-facility fixed effects, using the sample of flows within 120 and 150 miles, respectively. Point estimates are displayed with 95% confidence intervals. Standard errors are clustered by waste-origin county. Exact estimates are reported in Table B1.

C Tests and caveats for the model estimation

C.1 Measurement error of distance

To test the potential severity of the bias caused by the error, I test whether the estimate holds up when county fixed effects are added. The reason is that if measurement error exists, the error will be significant for shipments from a very large county. For shipments in a small county, because the population centroid is not very far from other places, the difference between the distance from

a population centroid to a given facility and the true distance from the waste-collection point to the facility is small. Hence, the estimate of the distance coefficient would be more consistent if the county fixed effects are added.

Table C1 shows the estimates with a variety of fixed effects and with and without price being instrumented by the market size. Columns (3)-(6) show that the estimates of the distance coefficient are very similar with and without county fixed effects, suggesting the estimate of the distance coefficient is robust and the measurement error of the distance variable is negligible. Because the county fixed effects absorb substantial variation to identify the price coefficient, the model with time and facility fixed effects is the main model in the paper.

Note that one may think of testing the measurement error by checking whether the results hold up among the set of very large counties. However, Columns (1)–(4) confirm that facility fixed effects are important to identify both price and distance coefficients. Those facility fixed effects are identified by the panel structure of the data and also by the fact that one facility serves multiple counties (markets). If the sample is divided into several small sub-samples by county group, the facility fixed effects might be not identified due to the missing variation in market shares of multi-county facilities.

TABLE C1: Results of demand estimation with different fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)
	time fixed effects		time and facility fixed effects		time, facility, and county fixed effects	
	without IV	with IV	without IV	with IV	without IV	with IV
price	0.0037	1.6924	−0.0030	−0.1982	−0.0030	−0.0275
distance	−0.0035	0.0658	−0.0330	−0.0341	−0.0330	−0.0330
local facility	2.6022	8.0388	2.4802	2.4060	2.4805	2.4792
price elasticity	0.1051	48.3471	−0.0733	−4.9343	−0.0734	−0.6831
distance elast.	−0.0680	1.2868	−0.5793	−0.5997	−0.5792	− 0.5792

C.2 Industry consolidation

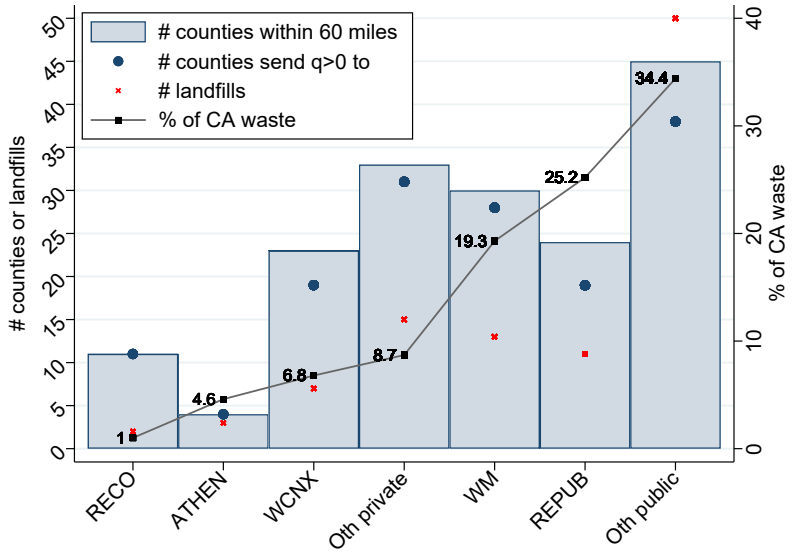
TABLE C2: Results from logit demand by subsample of different periods

	(1) main	(2) 15 years	(3)	(4) 9 years	(5)
Period	1995–2015	1995–2009	2001–2015	1995–2003	2007–2015
price	−0.1982	−0.1206	− 0.1531	−0.0658	−0.0124
distance	−0.0341	−0.0377	− 0.0290	−0.0455	−0.0277
local	2.4060	2.4267	2.4908	2.3562	2.6254
price elasticity	−4.9343	− 2.8585	−3.8550	−1.5295	− 0.3339
distance elasticity	−0.5997	− 0.6463	−0.5225	−0.7574	−0.5020

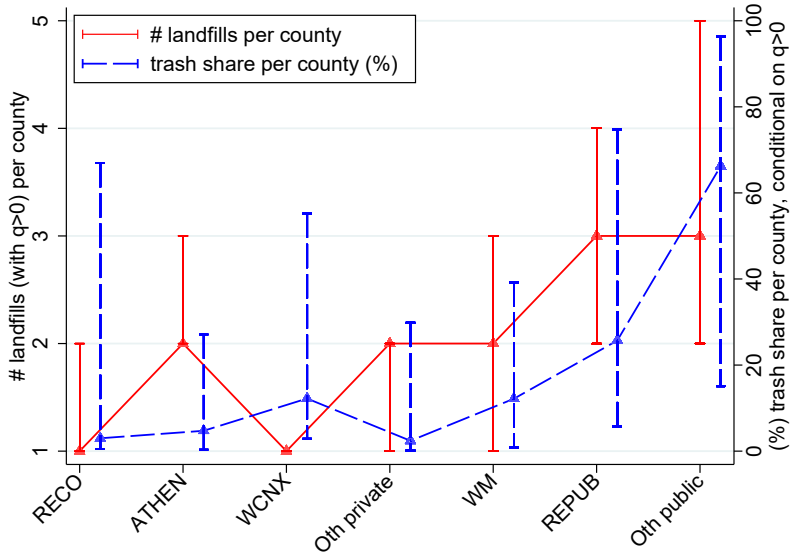
C.3 Industry structure

TABLE C3: Results from logit demand for the sample of top private firms

	(1) main sample	(2) sample of top 4 private firms (WM, REPUB, WCNX, RECO)	(3) sample of top 3 private firms (WM, REPUB, WCNX)
price	−0.1982	−0.1805	−0.1980
distance	−0.0341	−0.0335	−0.0337
local	2.4060	2.4235	2.4095
price elasticity	−4.9343	−4.5264	−4.9901
distance elasticity	−0.5997	−0.5916	−0.5976
observations	36,186	33,849	33,275



(A) Number of counties, landfills, and % of CA waste by firm



(B) Number of counties, landfills, and average trash share per county by firm

FIGURE C1: Number of counties, landfills, and % of CA waste by firm

Note: Snapshot of year 2015. Superfirms (top 5 firms in revenue share in the US non-hazardous solid waste industry) include WM (Waste Management), REPUB (Republic Services), and WCNX (Waste Connections). Other private big firms in California include ATHEN (Athens Services) and RECO (Recology Environmental Solutions). The rest are divided into two groups: other private firms and other public entities.

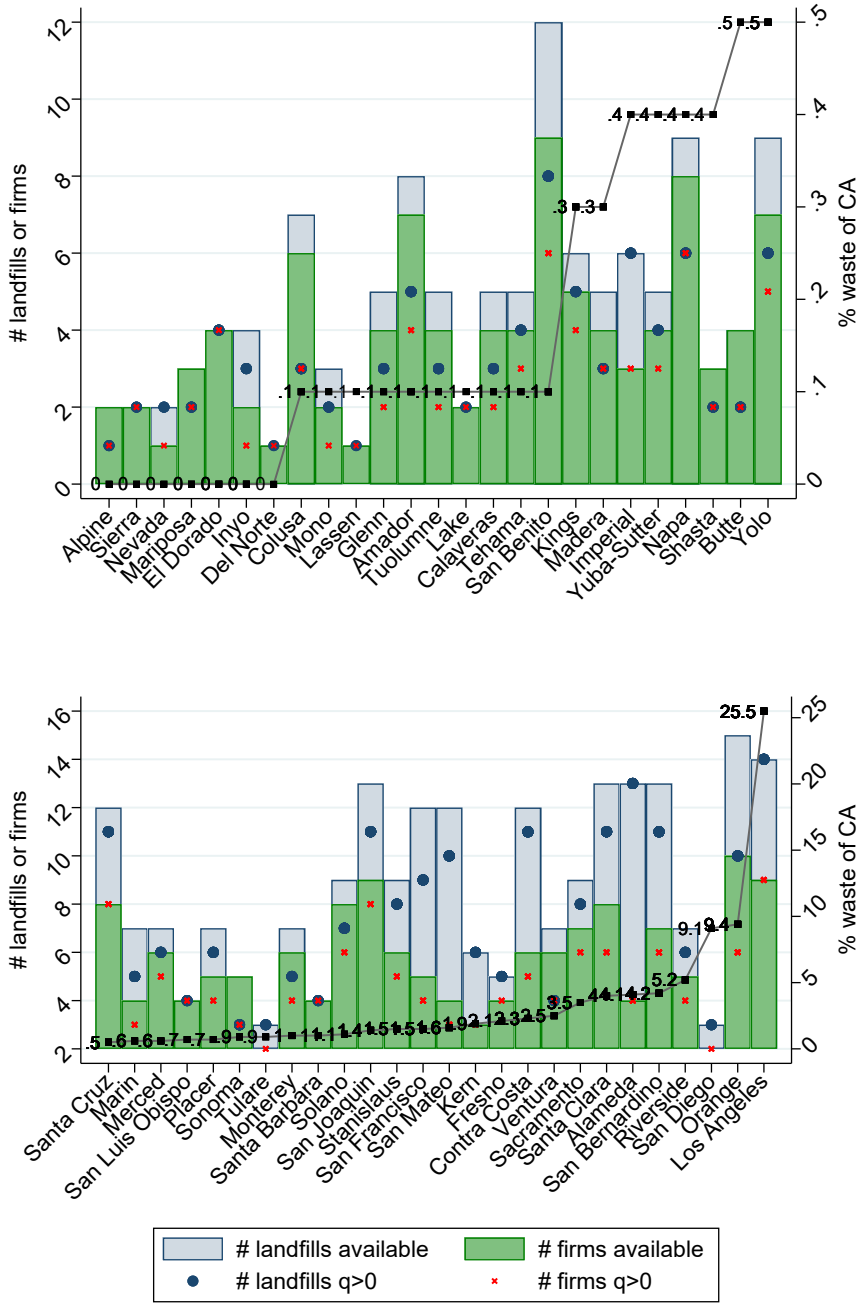


FIGURE C2: Number of landfills and firms by county

Note: Snapshot of year 2015. The blue bars show the number of landfills available within 60 miles, which includes the number of landfills that do receive waste (separately illustrated by blue dots) and landfills that do not. The green bars show the number of firms that own a landfill within 60 miles from the county population center, which includes the number of firms that own landfills that do receive waste (separately shown in red crosses) and the others (firms that own a landfill within 60 miles but do not receive waste from the county). The back line indicates the county's generated waste amount as percentages of California waste to illustrate the market size. Counties are ordered by this waste percentage.

D Counterfactual policies imposed in a single county

D.1 Policies imposed at a high-percent-white affected area: Marin County

TABLE D1: Change in intercounty waste flows after Marin bans imports

county	distance to Marin (mile)	(1) Δq to Marin (ton)	(2) Δ receiving (ton)	(3) Δ export (ton)	(4) Δ import (ton)	(5) Δexternal trans cost ($)	(6) Δtipping fees ($/ton)	(7) Δ mileage (mile)	(8) Δhauling cost ($/ton)	(9) Δ hhvalue ($/ton)	(10) Δprice of cnty's sites ($/ton)
Panel A: Assuming no change in prices											
Marin	0	0	-180637	0	-180637	0	0	0	0	0	
San Francisco	17	-35571	0	-48	0	8935	-2.59	1.02	0.5		
Napa	27	-11273	66502	-2721	63803	-675	-4.08	-0.31	0.64	-1.15	
Contra Costa	28	-9033	22044	-6510	15537	-5649	-0.39	-0.34	0.07	-3.59	
Sonoma	31	-110531	16469	-22524	521	17557	-18.37	4.13	6.93	-2961.46	
Solano	31	-2646	14083	-2580	11503	-1443	-0.31	-0.2	0.04	-1.42	
Alameda	31	-5304	24237	-4764	19474	-1946	-0.11	-0.07	0.02	-1.68	
San Mateo	31	-6279	10957	-4979	5980	-3750	-0.43	-0.34	0.07	-6.49	
Santa Clara	58		4952	0	4952	0	0	0	0	0	
Yolo	62		655	0	655	0	0	0	0	0	
San Joaquin	68		306	0	306	0	0	0	0	0	
Lake	69		13745	0	13745	0	0	0	0	0	
Sacramento	75		4	0	4	0	0	0	0	0	
Santa Cruz	77		33	0	33	0	0	0	0	0.03	
Panel B: Allowing equilibrium price response											
Marin	0	-37000	-217637	36950	-180637	16161	-3.69	4.33	2.09	2.25	3.8
San Francisco	17	-35571	0	2	0	11438	-1.97	1.3	-0.03		
Napa	27	-11273	9303	2100	11384	2165	-2.42	0.99	-0.67	6.71	-0.05
Contra Costa	28	-9033	5580	-299	5280	3305	-0.27	0.2	-0.04	7.1	-0.04
Sonoma	31	-110531	116037	-19902	97336	51407	-34.38	12.1	-4.95	11.32	-15.81
Solano	31	-2646	-3848	1573	-2274	1360	-0.02	0.19	0.04	7.02	0.1
Alameda	31	-5304	-2154	-2616	-4767	-1233	-0.14	-0.04	0.1	31.96	0.07
San Mateo	31	-6279	1851	-2461	-602	-2372	-0.21	-0.22	0.24	224.65	0.21
Santa Clara	58		6990	-2391	4599	-1326	0.03	-0.06	0	1.19	-0.01
Yolo	62		-2321	165	-2155	139	0.07	0.04	0.09	7.18	0.05
San Joaquin	68		3306	-157	3149	-225	-0.01	-0.02	-0.02	3.56	-0.02
Lake	69		82814	-623	82074	-328	-7.55	-0.42	-7.87	3.88	-7.5
Sacramento	75		919	-550	369	132	-0.01	0.01	-0.01	15.56	-0.01
Santa Cruz	77		143	-29	114	-33	0	-0.01	0	0.09	0
Colusa	84		-50	73	1	126	-1.73	0.29	-0.83	28636.07	-0.01
Stanislaus	91		-115	93	-22	-72	0	-0.01	0	-39.08	0
Placer	95		-804	92	-710	-69	0.03	-0.02	0.05	14.95	0.05
Yuba-Sutter	95		-882	-64	-946	-33	0.01	-0.01	0.01	2.03	0.01
Amador	100		0	0	0	5	0	0.01	-0.01		
San Benito	101		-29	4	-25	0	0	0	0	2.42	0
Calaveras	105		-34	17	-18	9	0.01	0.01	-0.01	-16.06	0
Monterey	107		-29	2	-27	0	0	0	0	8.68	0
El Dorado	111		3	0	3	0	-0.04	-0.02	0	-15.41	0
Merced	116		-43	34	-9	21	-0.01	0.01	0	-73.36	0
Glenn	117		-88	26	-58	16	0.07	0.04	0.07	24.88	0.08
Tuolumne	121		0	0	0	8	0.01	0.01	-0.01		
Nevada	123		0	-4	0	-6	0	-0.01	0.03		
Butte	125		-46	10	-34	15	0.01	0	0.02	79.26	0.02
Mariposa	145		-6	2	-4	0	0.06	0.01	0	12.27	0
Tehama	148		20	-10	11	0	-0.02	0	0	-13.45	0
Madera	154		-5	2	-3	0	0	0	0	7.64	0
Fresno	176		1	0	0	0	0	0	0	-16.93	0
Shasta	179		12	0	11	0	0	0	0	8.52	0
Kings	197		0	0	0	0	0	0	0	1.28	0

TABLE D2: Change in intercounty waste flows after Marin imposes 10% tax on imports

county	distance to Marin (mile)	(1) Δq to Marin (ton)	(2) Δ receiving (ton)	(3) Δ export (ton)	(4) Δ import (ton)	(5) Δexternal trans cost ($)	(6) Δtipping fees ($/ton)	(7) Δ mileage (mile)	(8) Δhauling cost ($/ton)	(9) Δ hhvalue ($/ton)	(10) Δprice of cnty's sites ($/ton)
Panel A: Assuming no change in prices											
Marin	0	0	-92858	0	-92858	0	0	0	0	0	
San Francisco	17	-26524	0	-36	0	6662	-1.76	0.76	0.37		
Napa	27	-8356	21351	-2017	19350	-500	-2.8	-0.23	0.48	-2.85	
Contra Costa	28	-6852	11872	-4939	6935	-4286	-0.28	-0.26	0.05	-6.11	
Sonoma	31	-40321	12025	-13632	387	3963	-3.09	0.93	3.76	-2164.29	
Solano	31	-2009	10517	-1959	8558	-1095	-0.22	-0.15	0.03	-1.45	
Alameda	31	-4031	18172	-3620	14552	-1479	-0.08	-0.05	0.02	-1.7	
San Mateo	31	-4764	8237	-3777	4462	-2845	-0.3	-0.26	0.05	-6.61	
Santa Clara	58		3701	0	3701	0	0	0	0	0	
Yolo	62		486	0	486	0	0	0	0	0	
San Joaquin	68		233	0	233	0	0	0	0	0	
Lake	69		4186	0	4186	0	0	0	0	0	
Sacramento	75		3	0	3	0	0	0	0	0	
Santa Cruz	77		25	0	25	0	0	0	0	0.04	
Panel B: Allowing equilibrium price response											
Marin	0	-930	-38125	945	-37195	1046	-1.32	0.28	-0.8	-4.18	-0.76
San Francisco	17	-4828	0	18	0	3597	-1.12	0.41	-0.2		
Napa	27	-2676	-12948	8988	-3990	2725	-4.48	1.25	-1.04	-29.66	2.31
Contra Costa	28	-1129	-11401	7889	-3520	3425	-0.53	0.21	-0.18	-43.73	-0.16
Sonoma	31	-26770	-30291	24341	-5980	41694	-12.84	9.81	1.61	59.74	6.94
Solano	31	-848	84813	-2808	81993	-5054	-1.54	-0.71	-1.7	7.77	-1.4
Alameda	31	-425	-23986	5000	-18982	-1773	-0.69	-0.06	0.13	10.63	0.08
San Mateo	31	-519	-8367	1800	-6563	-35	0.1	0	0.14	12.45	0.17
Santa Clara	58		3411	-2852	557	-4271	-0.08	-0.19	-0.05	97.08	-0.02
Yolo	62		836	1552	2380	998	-0.45	0.32	-0.82	56.44	-0.4
San Joaquin	68		-13192	754	-12438	1582	0.08	0.16	0.2	8.29	0.2
Lake	69		65740	-1364	64243	-756	-11.36	-0.98	-10.57	6.66	-10.21
Sacramento	75		-18475	15710	-2764	8517	0.23	0.42	0.01	4.53	0.21
Santa Cruz	77		-268	188	-80	158	0.01	0.05	-0.01	-18.65	0
Colusa	84		-142	208	1	185	-7.02	0.43	-2.55	49158	-0.05
Stanislaus	91		2306	-2137	169	-244	-0.03	-0.03	0.05	-131.65	0
Placer	95		-3940	1527	-2421	815	-0.33	0.18	-0.26	-25.56	-0.2
Yuba-Sutter	95		5747	-643	5093	-250	-0.91	-0.09	-0.88	24.49	-0.88
Amador	100		0	0	0	-32	0	-0.05	0.13		
San Benito	101		-666	62	-604	38	0.06	0.04	0.06	5.03	0.07
Calaveras	105		372	-170	202	-72	-0.06	-0.1	0.07	-13.48	0.03
Monterey	107		-328	-42	-370	-12	0.02	0	0.01	13.1	0.01
El Dorado	111		-9	-17	-25	15	0.23	0.04	0.05	37.23	0.03
Merced	116		597	-314	283	-206	0	-0.05	0.01	-10.55	0
Glenn	117		-514	190	-319	97	0.11	0.25	0.1	6.29	0.16
Tuolumne	121		0	0	0	-57	0.01	-0.07	0.12		
Nevada	123		0	89	0	49	-1.08	0.05	-0.72		
Butte	125		-277	835	453	981	-0.62	0.29	-0.7	270.17	-0.63
Mariposa	145		60	-17	43	-15	-0.02	-0.06	-0.04	14.46	-0.05
Tehama	148		-282	168	-124	112	-0.09	0.09	-0.08	-43.21	-0.02
Madera	154		31	-9	22	0	0	0	0	24.56	0
Fresno	176		-13	7	-6	0	0	0	0	-11.88	0
Shasta	179		-160	5	-155	0	0	0	0	4.28	0
Kings	197		-6	0	-6	0	0	0	0	1.68	0
Tulare	219		0	0	0	0	0	0	0	35.93	0

TABLE D3: Change in percentages of waste going to affected communities after Marin bans imports

county	Δq to Marin (ton)	Δpayment ($/ton)	Δmileage (mile)	Δexport (ton)	Δimport (ton)	Δ% trash to whites (%)	Δ% trash to blacks (%)	Δ% trash to Asians (%)	Δ% trash to Hispanics (%)
Panel A: Assuming no change in prices									
Marin	0	0	0	0	-180637	0	0	0	0
San Francisco	-35571	-2.59	1.02	-48	0	-2.06	0.3	0.7	0.94
Napa	-11273	-4.08	-0.31	-2721	63803	-4.12	0.94	0.62	2.27
Contra Costa	-9033	-0.39	-0.34	-6510	15537	-0.48	0.1	0.09	0.27
Sonoma	-110531	-18.37	4.13	-22524	521	-12.46	0.37	-1.99	13.91
Solano	-2646	-0.31	-0.2	-2580	11503	-0.32	0.1	0.07	0.11
Alameda	-5304	-0.11	-0.07	-4764	19474	-0.04	0	0.01	0.03
San Mateo	-6279	-0.43	-0.34	-4979	5980	-0.24	0	0.01	0.22
Santa Clara		0	0	0	4952	0	0	0	0
Yolo		0	0	0	655	0	0	0	0
San Joaquin		0	0	0	306	0	0	0	0
Lake		0	0	0	13745	0	0	0	0
Sacramento		0	0	0	4	0	0	0	0
Santa Cruz		0	0	0	33	0	0	0	0
Panel B: Allowing equilibrium price response									
Marin	-37000	-3.69	4.33	36950	-180637	-4.35	0.82	1.1	2.08
San Francisco	-35571	-1.97	1.3	2	0	-0.25	0.04	-0.28	0.39
Napa	-11273	-2.42	0.99	2100	11384	2.46	-0.63	-1.21	-0.65
Contra Costa	-9033	-0.27	0.2	-299	5280	0	0	-0.06	0.05
Sonoma	-110531	-34.38	12.1	-19902	97336	-7.32	1.12	-2.21	7.01
Solano	-2646	-0.02	0.19	1573	-2274	0.06	-0.01	-0.03	-0.04
Alameda	-5304	-0.14	-0.04	-2616	-4767	-0.17	0.01	0.09	0.07
San Mateo	-6279	-0.21	-0.22	-2461	-602	-0.31	0.01	0.12	0.17
Santa Clara		0.03	-0.06	-2391	4599	-0.11	0	0.11	0
Yolo		0.07	0.04	165	-2155	-0.01	0.01	0	0
San Joaquin		-0.01	-0.02	-157	3149	-0.02	0.01	0	0.01
Lake		-7.55	-0.42	-623	82074	0.32	0.05	0	-0.45
Sacramento		-0.01	0.01	-550	369	-0.01	0	0	0.02
Santa Cruz		0	-0.01	-29	114	-0.01	0	0.01	-0.01
Colusa		-1.73	0.29	73	1	0.2	-0.05	-1.31	1.1
Stanislaus		0	-0.01	93	-22	-0.01	0	0	0.01
Placer		0.03	-0.02	92	-710	0	0	0.01	-0.01
Yuba-Sutter		0.01	-0.01	-64	-946	0	0	-0.01	0
Amador		0	0.01	0	0	-0.03	0.01	0	0.02
San Benito		0	0	4	-25	0	0	0	0
Calaveras		0.01	0.01	17	-18	-0.02	0	0	0.02
Monterey		0	0	2	-27	0	0	0	0
El Dorado		-0.04	-0.02	0	3	-0.02	0	0.01	0.01
Merced		-0.01	0.01	34	-9	0	0	0	0
Glenn		0.07	0.04	26	-58	0.04	0	0	-0.03
Tuolumne		0.01	0.01	0	0	-0.03	0.01	0	0.02
Nevada		0	-0.01	-4	0	0.01	0.01	-0.02	0
Butte		0.01	0	10	-34	0	0	0	0
Mariposa		0.06	0.01	2	-4	0	0	0	0
Tehama		-0.02	0	-10	11	0	0	0	0
Madera		0	0	2	-3	0	0	0	0
Fresno		0	0	0	0	0	0	0	0
Shasta		0	0	0	11	0	0	0	0
Kings		0	0	0	0	0	0	0	0

TABLE D4: Change in percentages of waste to affected communities after Marin taxes imports at 10%

county	Δq to Marin (ton)	Δpayment ($/ton)	Δmileage (mile)	Δexport (ton)	Δimport (ton)	Δ% trash to whites (%)	blacks (%)	Asians (%)	Hispanics (%)
Panel A: Assuming no change in prices									
Marin	0	0	0	0	-92858	0	0	0	0
San Francisco	-26524	-1.76	0.76	-36	0	-1.54	0.22	0.52	0.7
Napa	-8356	-2.8	-0.23	-2017	19350	-3.05	0.7	0.46	1.68
Contra Costa	-6852	-0.28	-0.26	-4939	6935	-0.36	0.07	0.07	0.21
Sonoma	-40321	-3.09	0.93	-13632	387	-3.83	0.13	-0.7	4.31
Solano	-2009	-0.22	-0.15	-1959	8558	-0.24	0.08	0.05	0.09
Alameda	-4031	-0.08	-0.05	-3620	14552	-0.03	0	0.01	0.02
San Mateo	-4764	-0.3	-0.26	-3777	4462	-0.18	0	0.01	0.17
Santa Clara		0	0	0	3701	0	0	0	0
Yolo		0	0	0	486	0	0	0	0
San Joaquin		0	0	0	233	0	0	0	0
Lake		0	0	0	4186	0	0	0	0
Sacramento		0	0	0	3	0	0	0	0
Santa Cruz		0	0	0	25	0	0	0	0
Panel B: Allowing equilibrium price response									
Marin	-930	-1.32	0.28	945	-37195	-0.6	0.34	0.18	-0.03
San Francisco	-4828	-1.12	0.41	18	0	-2.35	0.88	0.94	0.26
Napa	-2676	-4.48	1.25	8988	-3990	-1.32	1.57	1.27	-2.27
Contra Costa	-1129	-0.53	0.21	7889	-3520	-0.57	0.28	0.27	-0.08
Sonoma	-26770	-12.84	9.81	24341	-5980	-2.57	0.67	-0.7	1.79
Solano	-848	-1.54	-0.71	-2808	81993	-1.01	0.63	0.68	-0.52
Alameda	-425	-0.69	-0.06	5000	-18982	-0.96	0.1	0.75	0.09
San Mateo	-519	0.1	0	1800	-6563	-0.27	0.02	0.25	-0.01
Santa Clara		-0.08	-0.19	-2852	557	-0.39	0.01	0.41	-0.04
Yolo		-0.45	0.32	1552	2380	-0.44	0.28	-0.03	0.12
San Joaquin		0.08	0.16	754	-12438	0.09	-0.03	-0.02	-0.04
Lake		-11.36	-0.98	-1364	64243	0.71	0.11	0	-0.98
Sacramento		0.23	0.42	15710	-2764	-0.04	0.13	0.03	-0.18
Santa Cruz		0.01	0.05	188	-80	-0.02	0	0.08	-0.06
Colusa		-7.02	0.43	208	1	0.31	-0.04	-2.31	1.91
Stanislaus		-0.03	-0.03	-2137	169	-0.05	-0.03	-0.03	0.11
Placer		-0.33	0.18	1527	-2421	0.09	0.01	-0.12	0.01
Yuba-Sutter		-0.91	-0.09	-643	5093	0.05	0.01	-0.06	-0.01
Amador		0	-0.05	0	0	0.21	-0.05	0.03	-0.19
San Benito		0.06	0.04	62	-604	-0.03	0	0.02	0.01
Calaveras		-0.06	-0.1	-170	202	0.22	-0.02	-0.02	-0.18
Monterey		0.02	0	-42	-370	-0.02	0	-0.01	0.03
El Dorado		0.23	0.04	-17	-25	0.17	-0.04	-0.06	-0.06
Merced		0	-0.05	-314	283	0.02	-0.01	0	-0.01
Glenn		0.11	0.25	190	-319	0.3	0	0.01	-0.28
Tuolumne		0.01	-0.07	0	0	0.21	-0.05	-0.02	-0.14
Nevada		-1.08	0.05	89	0	0.11	0.1	-0.29	0.02
Butte		-0.62	0.29	835	453	-0.09	0.04	0.01	0.01
Mariposa		-0.02	-0.06	-17	43	0.05	0	0	-0.04
Tehama		-0.09	0.09	168	-124	0.07	0	0	-0.05
Madera		0	0	-9	22	0	0	0	0
Fresno		0	0	7	-6	0	0	0	0
Shasta		0	0	5	-155	0	0	0	0
Kings		0	0	0	-6	0	0	0	0
Tulare		0	0	0	0	0	0	0	0

D.2 Policies imposed at high-percent-minority affected area: Solano County

TABLE D5: Change in intercounty waste flows after imposing counterfactual policies in Solano

		(1) import ban	(2) import tax (10%)	
	base-line	eq model	eq model	price inc. tax
Panel A: Change at facility level:				
price change	37.14	0.12	0.06	
($/ton)		(0.32%)	(0.16%)	
price at Marin	41.31	4.86	2.33	6.7
(§/ton)		(11.76%)	(5.64%)	(16.22%)
price at the others	37.06	0.03	0.02	
($/ton)		(0.08%)	(0.05%)	
intercounty waste in CA	4,649,287	-125,741	-44,617	
		(-2.7%)	(-0.96%)	
Panel B: Change in Solano County:				
export	11,863	14,247	5,793	
(ton)		(120.1%)	(48.83%)	
import	273,348	-273,348	-108,219	
(ton)		(-100%)	(-39.59%)	
tipping fees	43.9	4.33	2.14	
($/ton)		(9.86%)	(14.96%)	
mileage	11.5	2.97	1.72	
(mile)		(25.83%)	(14.96%)	
discarding cost ($/ton)		5.53	2.93	
external transport cost	82,240	21,207	12,294	
($)		(25.79%)	(14.95%)	
household value ($/ton)		7.57	10.13	
Panel C: Change in the other counties, average per county:				
export	92,085	-3180	-1,145	
(ton)		(-3.45%)	(-1.24%)	
import	99,453	3,355	1,446	
(ton)		(3.37%)	(1.45%)	
tipping fees	38.79	0.3	0.21	
($/ton)		(0.77%)	(0.54%)	
mileage	21.45	-0.16	-0.05	
(mile)		(-0.75%)	(-0.23%)	
discarding cost ($/ton)		0.25	0.11	
external transport cost	308,202	-1,553	-583	
($)		(-0.5%)	(-0.19%)	
household value ($/ton)		762.37	771.8	

TABLE D6: Change in intercounty waste flows after Solano bans imports

county	distance to Solano (mile)	(1) Δ waste to Solano (ton)	(2) Δ receiving (ton)	(3) Δ export (ton)	(4) Δ import (ton)	(5) Δexternal trans cost ($)	(6) Δtipping fees ($/ton)	(7) Δ mileage (mile)	(8) Δhauling cost ($/ton)	(9) Δ hhvalue ($/ton)	(10) Δprice of cnty's sites ($/ton)
Panel A: Assuming no change in prices											
Solano	0	0	-273348	0	-273348	0	0	0	0	0	
Napa	15	-57366	24838	-25035	0	3711	6.84	1.7	4.32		
Contra Costa	21	-57197	62965	-43699	19284	-24890	0.51	-1.52	0.42	-18.87	
Marin	31	-13318	28104	-11292	16821	-7165	2.52	-1.92	0.44	-5.05	
Yolo	31	-19683	25481	-18031	7460	-9148	-1.49	-2.94	0.79	-17.3	
Alameda	37	-11615	48722	-10475	38248	-6518	0.08	-0.23	0.05	-1.87	
Sonoma	37		2519	0	2519	0	0	0	0	0	
San Francisco	39	-54855	0	-78	0	-10101	1.52	-1.15	0.78		
Sacramento	44	-50921	40381	-38688	1709	-24844	-0.69	-1.24	0.31	-187.78	
San Joaquin	47	-1447	11441	-1408	10033	-933	-0.02	-0.09	0.02	-0.89	
San Mateo	49		11004	0	11004	0	0	0	0	0	
Lake	62		377	0	377	0	0	0	0	0	
Placer	64	-6947	6589	-5470	1125	-5649	0.32	-1.26	0.18	-38.62	
Santa Clara	64		9065	0	9065	0	0	0	0	0	
Yuba-Sutter	67		1470	0	1470	0	0	0	0	0	
Stanislaus	74		15	0	15	0	0	0	0	0	
Calaveras	78		6	0	6	0	0	0	0	0	
El Dorado	80		37	0	37	0	0	0	0	0	
Panel B: Allowing equilibrium price response											
Solano	0	-14325	-287674	14247	-273348	21207	4.33	2.97	5.53	7.57	5.15
Napa	15	-57366	18859	-21196	-2083	3800	9.15	1.74	5.18	284	1.34
Contra Costa	21	-57197	48745	-28084	20696	-15322	1.08	-0.93	0.76	-31.62	0.17
Marin	31	-13318	31367	-10417	20961	-6678	2.46	-1.79	0.5	-4.64	0.1
Yolo	31	-19683	7073	-13048	-5934	-5451	-0.05	-1.75	2.85	78.19	1.2
Alameda	37	-11615	59910	-11298	48611	-7976	0.13	-0.28	-0.05	1.5	-0.19
Sonoma	37		10232	-3773	6453	-1296	-0.33	-0.31	-0.5	17.21	-1.34
San Francisco	39	-54855	0	-68	0	-10800	1.45	-1.23	0.69		
Sacramento	44	-50921	49124	-41578	7569	-23386	-0.54	-1.17	0.42	-58.55	-0.1
San Joaquin	47	-1447	18143	-1507	16636	-1388	-0.03	-0.14	-0.03	0.94	-0.04
San Mateo	49		25680	-5760	19910	-3776	-0.46	-0.34	-0.34	9.65	-0.41
Lake	62		17	-151	-78	-105	0.67	-0.14	0.85	444.17	0.78
Colusa	64		50	-73	-1	-204	0.74	-0.47	0.68	22823.44	0.01
Placer	64	-6947	1538	-3580	-2018	-5644	0.7	-1.26	0.77	90.34	0.65
Santa Clara	64		7893	1293	9184	-467	-0.02	-0.02	-0.05	6.06	-0.01
Yuba-Sutter	67		10415	-1488	8925	-778	-0.17	-0.29	-0.13	2.13	-0.2
Amador	71		0	0	0	1	0.03	0	0.01		
Stanislaus	74		-495	472	-23	34	0.01	0	-0.01	-268.27	0
Calaveras	78		-44	23	-21	17	0.02	0.02	-0.01	-18.03	0
El Dorado	80		192	-104	92	-76	-0.12	-0.21	0.21	-42.2	0.02
Santa Cruz	87		-444	97	-347	115	0	0.03	0	0.86	0.01
Nevada	92		0	-14	0	-62	-0.47	-0.06	0.1		
Tuolumne	97		0	0	0	19	0.02	0.02	-0.02		
Glenn	99		30	2	28	0	-0.07	-0.01	-0.08	54.6	-0.07
Butte	101		18	135	126	158	-0.16	0.05	-0.17	231.55	-0.16
San Benito	103		-675	58	-617	36	0.05	0.04	0.06	5.19	0.07
Merced	103		-116	83	-34	54	-0.01	0.01	-0.01	-37.16	0
Monterey	114		-274	-63	-337	-26	0.01	0	0.01	14.49	0.01
Mariposa	125		-12	4	-9	0	0.06	0.01	0.01	12.06	0.01
Tehama	130		-90	45	-46	26	-0.04	0.02	-0.01	-16.52	0
Madera	140		-10	4	-7	0	0	0	0	11.97	0
Shasta	162		-34	1	-33	0	0	0	0	8.51	0
Fresno	163		2	-1	1	0	0	0	0	-13.64	0
Kings	188		1	0	1	0	0	0	0	0.94	0

TABLE D7: Change in intercounty waste flows after Solano imposes 10% tax on imports

county	distance to Solano (mile)	(1) Δ waste to Solano (ton)	(2) Δ receiving (ton)	(3) Δ export (ton)	(4) Δ import (ton)	(5) Δexternal trans cost ($)	(6) Δtipping fees ($/ton)	(7) Δ mileage (mile)	(8) Δhauling cost ($/ton)	(9) Δ hhvalue ($/ton)	(10) Δprice of cnty's sites ($/ton)
Panel A: Assuming no change in prices											
Solano	0	0	-124908	0	-124908	0	0	0	0	0	
Napa	15	-19495	8438	-8505	0	1507	3.69	0.69	1.82		
Contra Costa	21	-28061	28952	-21440	7522	-12022	0.39	-0.73	0.21	-24.15	
Marin	31	-6744	12266	-5718	6553	-3628	1.43	-0.97	0.22	-6.68	
Yolo	31	-9118	11114	-8353	2765	-4319	-0.44	-1.39	0.38	-22.36	
Alameda	37	-6064	24287	-5469	18818	-3403	0.06	-0.12	0.02	-1.99	
Sonoma	37		965	0	965	0	0	0	0	0	
San Francisco	39	-27009	0	-39	0	-4973	1.03	-0.57	0.4		
Sacramento	44	-24591	19455	-18683	779	-12199	-0.24	-0.61	0.15	-201.39	
San Joaquin	47	-725	5577	-705	4872	-467	-0.01	-0.05	0.01	-0.91	
San Mateo	49		5429	0	5429	0	0	0	0	0	
Lake	62		128	0	128	0	0	0	0	0	
Placer	64	-3100	2975	-2441	537	-2521	0.21	-0.56	0.08	-36.42	
Santa Clara	64		4474	0	4473	0	0	0	0	0	
Yuba-Sutter	67		687	0	687	0	0	0	0	0	
Stanislaus	74		7	0	7	0	0	0	0	0	
Calaveras	78		3	0	3	0	0	0	0	0	
El Dorado	80		17	0	17	0	0	0	0	0	
Panel B: Allowing equilibrium price response											
Solano	0	-5826	-114045	5793	-108219	12294	2.14	1.72	2.93	10.13	2.53
Napa	15	-15746	5103	-6220	-1042	1981	5	0.91	1.98	217.64	0.64
Contra Costa	21	-24360	12445	-7563	4902	-2932	0.89	-0.18	0.47	-81.87	0.14
Marin	31	-6844	11262	-5000	6269	-3184	1.57	-0.85	0.34	-10.52	0.14
Yolo	31	-5052	-3651	-2157	-5790	-949	0.91	-0.3	1.41	39.77	0.69
Alameda	37	-6338	30918	-5707	25210	-4572	0.1	-0.16	-0.02	0.94	-0.12
Sonoma	37		3752	-1884	1867	-619	-0.02	-0.15	-0.15	17.61	-0.45
San Francisco	39	-28166	0	-36	0	-5818	1.21	-0.66	0.37		
Sacramento	44	-19871	19101	-16053	3059	-9210	0.01	-0.46	0.2	-69.89	-0.05
San Joaquin	47	-633	9732	-724	9008	-756	-0.01	-0.08	-0.03	1.51	-0.03
San Mateo	49		17152	-4625	12519	-3102	-0.35	-0.28	-0.24	11.22	-0.31
Lake	62		26	-111	-67	-70	0.19	-0.09	0.28	170.51	0.24
Colusa	64		29	-43	0	-112	0.49	-0.26	0.4	23546.76	0.01
Placer	64	-1210	-762	-357	-1109	-1141	0.41	-0.25	0.34	72.76	0.33
Santa Clara	64		4930	456	5384	-744	-0.02	-0.03	-0.04	8.29	-0.01
Yuba-Sutter	67		5290	-882	4407	-475	-0.09	-0.17	-0.07	2.42	-0.12
Amador	71		0	0	0	5	0.03	0.01	0.01		
Stanislaus	74		-323	302	-22	0	0	0	-0.01	-182.58	0
Calaveras	78		-35	17	-18	13	0.02	0.02	-0.01	-15.17	0
El Dorado	80		102	-64	41	-39	-0.02	-0.11	0.13	-58.13	0.01
Santa Cruz	87		-350	83	-267	95	0.01	0.03	0	0.55	0
Nevada	92		0	-6	0	-32	-0.25	-0.03	0.05		
Tuolumne	97		0	0	0	14	0.01	0.02	-0.02		
Glenn	99		18	1	17	0	-0.04	0	-0.04	53.16	-0.04
Butte	101		8	78	70	91	-0.09	0.03	-0.1	235.29	-0.09
San Benito	103		-539	47	-492	29	0.05	0.03	0.05	5.16	0.06
Merced	103		-76	59	-18	38	0	0.01	0	-53.89	0
Monterey	114		-223	-49	-272	-20	0.02	0	0.01	14.31	0.01
Mariposa	125		-9	3	-6	0	0	0.01	0.01	11.74	0.01
Tehama	130		-51	26	-26	15	-0.01	0.01	-0.01	-15.34	0
Madera	140		-8	3	-5	0	0	0	0	9.85	0
Shasta	162		-18	0	-18	0	0	0	0	8.39	0
Fresno	163		1	-1	1	0	0	0	0	-15.49	0
Kings	188		1	0	1	0	0	0	0	0.71	0

TABLE D8: Change in percentages of waste going to affected communities after Solano imposes NIMBY laws

	baseline	(1) import ban	(2) import tax (10%)
whites	43.5	0.19	0.1
		(0.4%)	(0.2%)
blacks	3.45	-0.12	-0.06
		(-3.5%)	(-1.7%)
Asians	13.26	-0.05	-0.03
		(-0.4%)	(-0.2%)
Hispanics	36.39	0.02	0.02
		(0.1%)	(0.1%)

Note: The table presents changes in percentage point of percentage of trash sent to specific demographic groups. Numbers in brackets show the percentage-point changes in percentage. Statistics are calculated for every county market and then averaged over markets using market sizes (total trash generated) as weights to get the above reported average. All measures use 2010 levels.

TABLE D9: Change in percentages of waste going to affected communities after Solano bans imports

county	Δ waste to Solano (ton)	Δpayment ($/ton)	Δmileage (mile)	Δexport (ton)	Δimport (ton)	Δ% trash to whites (%)	blacks (%)	Asians (%)	Hispanics (%)
Panel A: Assuming no change in prices									
Solano	0	0	0	0	-273348	0	0	0	0
Napa	-57366	6.84	1.7	-25035	0	7.46	-5.89	-4.04	4.75
Contra Costa	-57197	0.51	-1.52	-43699	19284	-0.01	-0.37	-0.09	0.68
Marin	-13318	2.52	-1.92	-11292	16821	3.01	-1.19	-0.76	-0.66
Yolo	-19683	-1.49	-2.94	-18031	7460	2.01	-1.2	1.39	-2.03
Alameda	-11615	0.08	-0.23	-10475	38248	0.3	-0.13	-0.09	-0.03
Sonoma		0	0	0	2519	0	0	0	0
San Francisco	-54855	1.52	-1.15	-78	0	3.52	-1.96	-0.74	-0.2
Sacramento	-50921	-0.69	-1.24	-38688	1709	0.34	-0.3	0.32	-0.3
San Joaquin	-1447	-0.02	-0.09	-1408	10033	0.02	-0.02	-0.03	0.05
San Mateo		0	0	0	11004	0	0	0	0
Lake		0	0	0	377	0	0	0	0
Placer	-6947	0.32	-1.26	-5470	1125	0.27	0.01	0.39	-0.72
Santa Clara		0	0	0	9065	0	0	0	0
Yuba-Sutter		0	0	0	1470	0	0	0	0
Stanislaus		0	0	0	15	0	0	0	0
Calaveras		0	0	0	6	0	0	0	0
El Dorado		0	0	0	37	0	0	0	0
Panel B: Allowing equilibrium price response									
Solano	-14325	4.33	2.97	14247	-273348	3.99	-2.54	-2.68	2.1
Napa	-57366	9.15	1.74	-21196	-2083	8.35	-5.76	-4.17	3.82
Contra Costa	-57197	1.08	-0.93	-28084	20696	0.76	-0.59	-0.12	0.18
Marin	-13318	2.46	-1.79	-10417	20961	2.99	-1.22	-0.72	-0.65
Yolo	-19683	-0.05	-1.75	-13048	-5934	1.93	-1.09	1.19	-1.88
Alameda	-11615	0.13	-0.28	-11298	48611	0.05	-0.11	0.08	0
Sonoma		-0.33	-0.31	-3773	6453	0.31	0	0	-0.33
San Francisco	-54855	1.45	-1.23	-68	0	3.67	-2.05	-0.75	-0.24
Sacramento	-50921	-0.54	-1.17	-41578	7569	0.09	-0.2	0.11	0.07
San Joaquin	-1447	-0.03	-0.14	-1507	16636	-0.02	-0.01	-0.02	0.06
San Mateo		-0.46	-0.34	-5760	19910	0.02	-0.02	-0.11	0.12
Lake		0.67	-0.14	-151	-78	0.08	0.01	0	-0.11
Colusa		0.74	-0.47	-73	-1	0.98	0.29	-1.55	0.15
Placer	-6947	0.7	-1.26	-3580	-2018	0.24	0.08	0.24	-0.65
Santa Clara		-0.02	-0.02	1293	9184	-0.09	0	0.17	-0.07
Yuba-Sutter		-0.17	-0.29	-1488	8925	0.1	0.05	-0.19	0.02
Amador		0.03	0	0	0	-0.1	0.02	-0.12	0.21
Stanislaus		0.01	0	472	-23	0	0.01	0.01	-0.02
Calaveras		0.02	0.02	23	-21	-0.04	0.01	0	0.04
El Dorado		-0.12	-0.21	-104	92	-0.08	0.05	-0.07	0.11
Santa Cruz		0	0.03	97	-347	0	0	0.02	-0.01
Nevada		-0.47	-0.06	-14	0	0.14	0.12	-0.36	0.02
Tuolumne		0.02	0.02	0	0	-0.06	0.02	0.01	0.03
Glenn		-0.07	-0.01	2	28	0.01	0	0	-0.01
Butte		-0.16	0.05	135	126	-0.02	0.01	0	0
San Benito		0.05	0.04	58	-617	-0.03	0	0.02	0.01
Merced		-0.01	0.01	83	-34	-0.01	0	0	0
Monterey		0.01	0	-63	-337	-0.02	0	-0.01	0.03
Mariposa		0.06	0.01	4	-9	-0.01	0	0	0.01
Tehama		-0.04	0.02	45	-46	0	0	0	0
Madera		0	0	4	-7	0	0	0	0
Shasta		0	0	1	-33	0	0	0	0
Fresno		0	0	-1	1	0	0	0	0
Kings		0	0	0	1	0	0	0	0

TABLE D10: Change in percentages of waste to affected communities after Solano taxes imports at 10%

county	Δ waste to Solano (ton)	Δpayment ($/ton)	Δmileage (mile)	Δexport (ton)	Δimport (ton)	Δ% trash to whites (%)	blacks (%)	Asians (%)	Hispanics (%)
Panel A: Assuming no change in prices									
Solano	0	0	0	0	-124908	0	0	0	0
Napa	-19495	3.69	0.69	-8505	0	2.74	-2.13	-1.52	1.73
Contra Costa	-28061	0.39	-0.73	-21440	7522	0.02	-0.2	-0.06	0.35
Marin	-6744	1.43	-0.97	-5718	6553	1.52	-0.6	-0.38	-0.34
Yolo	-9118	-0.44	-1.39	-8353	2765	0.99	-0.59	0.6	-0.91
Alameda	-6064	0.06	-0.12	-5469	18818	0.15	-0.07	-0.05	-0.02
Sonoma		0	0	0	965	0	0	0	0
San Francisco	-27009	1.03	-0.57	-39	0	1.73	-0.96	-0.36	-0.1
Sacramento	-24591	-0.24	-0.61	-18683	779	0.19	-0.16	0.14	-0.13
San Joaquin	-725	-0.01	-0.05	-705	4872	0.01	-0.01	-0.01	0.03
San Mateo		0	0	0	5429	0	0	0	0
Lake		0	0	0	128	0	0	0	0
Placer	-3100	0.21	-0.56	-2441	537	0.12	0	0.17	-0.32
Santa Clara		0	0	0	4473	0	0	0	0
Yuba-Sutter		0	0	0	687	0	0	0	0
Stanislaus		0	0	0	7	0	0	0	0
Calaveras		0	0	0	3	0	0	0	0
El Dorado		0	0	0	17	0	0	0	0
Panel B: Allowing equilibrium price response									
Solano	-5826	2.14	1.72	5793	-108219	2.52	-1.61	-1.76	1.39
Napa	-15746	5	0.91	-6220	-1042	3.23	-2.2	-1.91	1.71
Contra Costa	-24360	0.89	-0.18	-7563	4902	0.63	-0.38	-0.12	-0.01
Marin	-6844	1.57	-0.85	-5000	6269	1.47	-0.63	-0.33	-0.31
Yolo	-5052	0.91	-0.3	-2157	-5790	0.76	-0.44	0.04	-0.28
Alameda	-6338	0.1	-0.16	-5707	25210	-0.06	-0.06	0.11	0.02
Sonoma		-0.02	-0.15	-1884	1867	0.14	0	0	-0.16
San Francisco	-28166	1.21	-0.66	-36	0	1.84	-1.07	-0.33	-0.12
Sacramento	-19871	0.01	-0.46	-16053	3059	0.07	-0.11	-0.08	0.18
San Joaquin	-633	-0.01	-0.08	-724	9008	-0.02	0	-0.01	0.03
San Mateo		-0.35	-0.28	-4625	12519	0	-0.02	-0.08	0.1
Lake		0.19	-0.09	-111	-67	0.06	0.01	0	-0.08
Colusa		0.49	-0.26	-43	0	0.58	0.17	-0.93	0.09
Placer	-1210	0.41	-0.25	-357	-1109	0.05	0.04	-0.02	-0.09
Santa Clara		-0.02	-0.03	456	5384	-0.1	0	0.16	-0.06
Yuba-Sutter		-0.09	-0.17	-882	4407	0.06	0.03	-0.11	0.01
Amador		0.03	0.01	0	0	-0.06	0.02	-0.07	0.14
Stanislaus		0	0	302	-22	0	0.01	0.01	-0.01
Calaveras		0.02	0.02	17	-18	-0.03	0	0	0.03
El Dorado		-0.02	-0.11	-64	41	-0.02	0.02	-0.06	0.06
Santa Cruz		0.01	0.03	83	-267	0	0	0.02	-0.01
Nevada		-0.25	-0.03	-6	0	0.07	0.06	-0.19	0.01
Tuolumne		0.01	0.02	0	0	-0.04	0.01	0.01	0.02
Glenn		-0.04	0	1	17	0.01	0	0	0
Butte		-0.09	0.03	78	70	-0.01	0	0	0
San Benito		0.05	0.03	47	-492	-0.02	0	0.01	0.01
Merced		0	0.01	59	-18	0	0	0	0
Monterey		0.02	0	-49	-272	-0.02	0	-0.01	0.03
Mariposa		0	0.01	3	-6	-0.01	0	0	0.01
Tehama		-0.01	0.01	26	-26	0	0	0	0
Madera		0	0	3	-5	0	0	0	0
Shasta		0	0	0	-18	0	0	0	0
Fresno		0	0	-1	1	0	0	0	0
Kings		0	0	0	1	0	0	0	0

E Demographic distribution of waste by different ranges of neighborhood

This section provides the environmental justice perspective of NIMBY laws when affected communities are defined as blocks with their centroids within 1-mile, 2-mile, 4-mile, and 5-mile buffers of disposal facilities. When considering narrow neighborhoods (1-mile and 2-mile buffers), I found a few affected communities where nobody lives. Average population in 1-mile-buffer neighborhoods is even less than a thousand. Without NIMBY laws, most of trash is disposed of at facilities in isolated areas where nobody lives. So, the current distribution of waste flows appears harmless. NIMBY laws would make the distribution bad, because facilities in isolated areas currently import substantial amount of transboundary trash. Import bans, import taxes, and trash taxes would significantly reduce waste flows going to these facilities, while increasing trash share to black and Hispanic areas.

The distributions of waste flows by race in other ranges of neighborhoods (2-mile, 4-mile, 5-mile) show similar features to the distribution of waste flows by race in 2-mile-buffer neighborhoods. Facilities in predominantly Hispanic neighborhoods tend to receive more waste because these facilities have low disposal fees and/or near to the population centers of waste-generating counties. Facilities in predominantly black communities tend to receive more waste because of other factors beyond prices and transportation costs. NIMBY laws that directly adjusts disposal fees and transportation costs would tend to substitute waste share from facilities in white communities toward facilities in Hispanic areas.

TABLE E1: Current distribution of waste disposal and policy implications on 1-mile-buffer neighborhoods

Panel A: Average values (unweighted and weighted by facility waste quantity)

	(1) population	(2) white	(3) black	(4) Hispanic	(5) Asian	(6) % white	(7) % black	(8) % Hispanic	(9) % Asian	(10) income
unweighted mean	833	313	26	353	112	37.84	1.39	25.18	5.88	39,888
waste weighted mean	1,218	401	37	502	242	32.98	1.61	26.66	10.38	47,954

Panel B: Current distribution of county waste share in facility neighborhoods

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent	market share ($\times 100$)						
No population	5.41*	3.51	1.60	-1.05	1.01	1.22	2.06
	(2.90)	(4.38)	(4.53)	(6.54)	(4.91)	(4.71)	(4.71)
% black	-0.25	-0.26	-0.36*	-0.02	0.15	-0.08	-0.18
	(0.21)	(0.21)	(0.21)	(0.33)	(0.27)	(0.28)	(0.26)
% Hispanic	0.02	0.01	0.01	-0.03	-0.01	-0.03	0.00
	(0.04)	(0.05)	(0.05)	(0.07)	(0.05)	(0.05)	(0.05)
% Asian	0.19***	0.21***	0.21***	0.17**	0.16**	0.18**	0.16*
	(0.07)	(0.06)	(0.06)	(0.08)	(0.07)	(0.08)	(0.08)
income ($K)		-0.03	-0.04	-0.07	-0.02	-0.02	-0.01
		(0.05)	(0.05)	(0.07)	(0.06)	(0.06)	(0.06)
price			0.14*	0.16	0.16*	0.09	0.09
			(0.08)	(0.10)	(0.09)	(0.09)	(0.07)
distance				-0.41***	-0.45***	-0.50***	-0.50***
				(0.11)	(0.09)	(0.08)	(0.08)
railway access					9.31***	7.11***	5.42**
					(2.32)	(2.44)	(2.43)
private						6.74***	7.87***
						(2.57)	(2.42)
days in a year							0.09**
							(0.04)
observations	1478	1478	1478	1478	1478	1478	1478
non-zero observations	1114	1114	1114	1114	1114	1114	1114

Panel C: Change in percentages of waste going to affected communities after NIMBY laws

% trash to	baseline	(1) import ban	(2) import tax (10%)
whites	31.35	2.54	1.14
		(8.1%)	(3.6%)
blacks	1.55	0.23	0
		(14.8%)	(0%)
Asians	9.84	0.19	0.05
		(1.9%)	(0.5%)
Hispanics	27.38	0.45	-0.74
		(1.6%)	(-2.7%)
to no population	27.44	-4.44	-0.5
		(-16.2%)	(-1.8%)

Note: Panel A reports mean levels of the demographic composition in affected communities. Panel B reports coefficients of a Tobit model. The dependent variable is trash shares, that is, the share of a generating county's waste to a facility. Dependent variable is weighted by market size (total waste generated by a county). The sample only includes quarterly observations in 2010. Models include quarter fixed effects and waste-origin count fixed effects. Significant level: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Panel C presents percentage-point changes in the amount of trash sent to a specific demographic group in neighborhoods surrounding disposal facilities. Numbers in brackets show the percentage-point change in percentage. Statistics are calculated for every county market and then averaged over markets using market sizes as weights to get the above reported average. All measures use 2010 levels.

TABLE E2: Current distribution of waste disposal and policy implications on 2-mile-buffer neighborhoods

Panel A: Average values (unweighted and weighted by facility waste quantity)

	(1) population	(2) white	(3) black	(4) Hispanic	(5) Asian	(6) % white	(7) % black	(8) % Hispanic	(9) % Asian	(10) income
unweighted mean	8,148	2,754	348	3,451	1,307	50.21	3.34	30.57	10.24	58,923
waste weighted mean	11,321	3,764	443	4,859	1,897	43.76	3.60	34.80	13.21	64,433

Panel B: Current distribution of county waste share in facility neighborhoods

Dependent	(1)	(2)	(3)	(4)	(5) market share ($\times$100)	(6)	(7)	(8)
No population	1.04	16.52	14.59	15.43	9.78	6.36	5.50	
	(8.24)	(10.42)	(10.56)	(10.47)	(10.74)	(10.87)	(9.44)	
% black	0.03	0.10	0.09	0.63***	0.60***	0.46**	0.34	
	(0.20)	(0.22)	(0.22)	(0.19)	(0.19)	(0.21)	(0.24)	
% Hispanic	-0.01	0.10	0.09	0.02	-0.00	-0.01	-0.01	
	(0.05)	(0.06)	(0.06)	(0.08)	(0.06)	(0.07)	(0.06)	
% Asian	0.08	0.08	0.08	-0.03	-0.01	0.01	-0.01	
	(0.09)	(0.08)	(0.08)	(0.10)	(0.10)	(0.11)	(0.11)	
income ($K)		0.21***	0.19**	0.21**	0.14	0.12	0.09	
		(0.08)	(0.08)	(0.10)	(0.09)	(0.09)	(0.09)	
price			0.07	0.11	0.14*	0.11	0.10	
			(0.07)	(0.09)	(0.08)	(0.08)	(0.07)	
distance				-0.48***	-0.51***	-0.53***	-0.53***	
				(0.09)	(0.08)	(0.08)	(0.08)	
railway access					8.23***	7.40***	6.10***	
					(2.24)	(2.25)	(2.33)	
private						3.91*	5.36**	
						(2.37)	(2.44)	
days in a year							0.07*	
							(0.04)	
observations	1478	1478	1478	1478	1478	1478	1478	
non-zero observations	1114	1114	1114	1114	1114	1114	1114	

Panel C: Change in percentages of waste going to affected communities after NIMBY laws

% trash to	baseline	(1) import ban	(2) import tax (10%)
whites	42.74	-1.15	0.05
		(-2.7%)	(0.1%)
blacks	3.32	-0.36	-0.08
		(-10.8%)	(-2.4%)
Asians	13.21	-0.23	0.19
		(-1.7%)	(1.4%)
Hispanics	35.85	1.56	-0.34
		(4.4%)	(-0.9%)
to no population	1.53	0.19	0.17
		(12.4%)	(11.1%)

Note: Panel A reports mean levels of the demographic composition in affected communities. Panel B reports coefficients of a Tobit model. The dependent variable is trash shares, that is, the share of a generating county's waste to a facility. Dependent variable is weighted by market size (total waste generated by a county). The sample only includes quarterly observations in 2010. Models include quarter fixed effects and waste-origin count fixed effects. Significant level: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Panel C presents percentage-point changes in the amount of trash sent to a specific demographic group in neighborhoods surrounding disposal facilities. Numbers in brackets show the percentage-point change in percentage. Statistics are calculated for every county market and then averaged over markets using market sizes as weights to get the above reported average. All measures use 2010 levels.

TABLE E3: Current distribution of waste disposal and policy implications on 4-mile-buffer neighborhoods

Panel A: Average values (unweighted and weighted by facility waste quantity)

	(1) population	(2) white	(3) black	(4) Hispanic	(5) Asian	(6) % white	(7) % black	(8) % Hispanic	(9) % Asian	(10) income
unweighted mean	60,764	20,969	2,775	23,972	10,832	47.77	3.79	32.16	12.04	56,270
waste weighted mean	98,599	32,007	3,628	44,366	15,731	42.79	3.97	36.10	13.72	62,834

Panel B: Current distribution of county waste share in facility neighborhoods

Dependent	(1)	(2)	(3)	(4)	(5) market share (×100)	(6)	(7)	(8)
% black	-0.00	0.29	0.27	0.80***	0.71***	0.58***	0.39	
	(0.21)	(0.23)	(0.23)	(0.21)	(0.20)	(0.21)	(0.25)	
% Hispanic	-0.03	0.14*	0.13*	0.13	0.10	0.08	0.07	
	(0.05)	(0.07)	(0.07)	(0.09)	(0.08)	(0.08)	(0.07)	
% Asian	0.07	0.06	0.07	-0.05	-0.02	-0.01	-0.03	
	(0.08)	(0.08)	(0.07)	(0.08)	(0.08)	(0.09)	(0.08)	
income ($K)		0.29***	0.27***	0.38***	0.30***	0.28***	0.24**	
		(0.08)	(0.08)	(0.11)	(0.10)	(0.10)	(0.11)	
price			0.09	0.11	0.12	0.08	0.08	
			(0.07)	(0.09)	(0.09)	(0.08)	(0.07)	
distance				-0.49***	-0.51***	-0.53***	-0.54***	
				(0.09)	(0.08)	(0.08)	(0.08)	
railway access					6.82***	5.92**	4.80*	
					(2.22)	(2.45)	(2.49)	
private						4.27*	5.68**	
						(2.51)	(2.48)	
days in a year							0.07*	
							(0.04)	
observations	1478	1478	1478	1478	1478	1478	1478	
non-zero observations	1114	1114	1114	1114	1114	1114	1114	

Panel C: Change in percentages of waste going to affected communities after NIMBY laws

% trash to	baseline	(1) import ban	(2) import tax (10%)
whites	41.83	-0.87	0.05
		(-2.1%)	(0.1%)
blacks	3.76	-0.05	0.01
		(-1.3%)	(0.3%)
Asians	13.92	-0.19	0.17
		(-1.4%)	(1.2%)
Hispanics	37.14	1.19	-0.26
		(3.2%)	(-0.7%)

Note: Panel A reports mean levels of the demographic composition in affected communities. Panel B reports coefficients of a Tobit model. The dependent variable is trash shares, that is, the share of a generating county's waste to a facility. Dependent variable is weighted by market size (total waste generated by a county). The sample only includes quarterly observations in 2010. Models include quarter fixed effects and waste-origin count fixed effects. Significant level: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Panel C presents percentage-point changes in the amount of trash sent to a specific demographic group in neighborhoods surrounding disposal facilities. Numbers in brackets show the percentage-point change in percentage. Statistics are calculated for every county market and then averaged over markets using market sizes as weights to get the above reported average. All measures use 2010 levels.

TABLE E4: Current distribution of waste disposal and policy implications on 5-mile-buffer neighborhoods

Panel A: Average values (unweighted and weighted by facility waste quantity)

	(1) population	(2) white	(3) black	(4) Hispanic	(5) Asian	(6) % white	(7) % black	(8) % Hispanic	(9) % Asian	(10) income
unweighted mean	101,293	35,368	4,539	39,453	18,272	47.72	3.76	32.09	12.24	55,448
waste weighted mean	177,680	52,271	6,385	80,057	28,850	41.92	4.03	36.45	14.03	61,620

Panel B: Current distribution of county waste share in facility neighborhoods

Dependent	(1)	(2)	(3)	(4)	(5) market share (×100)	(6)	(7)	(8)
% black	0.03	0.34	0.31	0.86***	0.75***	0.59**	0.37	
	(0.22)	(0.24)	(0.24)	(0.24)	(0.22)	(0.23)	(0.27)	
% Hispanic	-0.03	0.14*	0.13*	0.15	0.11	0.08	0.06	
	(0.06)	(0.08)	(0.08)	(0.09)	(0.08)	(0.08)	(0.08)	
% Asian	0.08	0.08	0.09	-0.04	-0.02	-0.01	-0.03	
	(0.08)	(0.08)	(0.08)	(0.09)	(0.09)	(0.10)	(0.09)	
income ($K)		0.28***	0.26***	0.38***	0.29***	0.25**	0.20*	
		(0.08)	(0.08)	(0.11)	(0.10)	(0.10)	(0.11)	
price			0.10	0.12	0.13	0.10	0.09	
			(0.07)	(0.09)	(0.09)	(0.08)	(0.07)	
distance				-0.48***	-0.50***	-0.53***	-0.53***	
				(0.08)	(0.08)	(0.08)	(0.08)	
railway access					7.04***	6.25***	5.08**	
					(2.13)	(2.39)	(2.45)	
private						4.11	5.68**	
						(2.64)	(2.60)	
days in a year							0.08*	
							(0.04)	
observations	1478	1478	1478	1478	1478	1478	1478	
non-zero observations	1114	1114	1114	1114	1114	1114	1114	

Panel C: Change in percentages of waste going to affected communities after NIMBY laws

% trash to	baseline	(1) import ban	(2) import tax (10%)
whites	41.11	-0.85	-0.03
		(-2.1%)	(-0.1%)
blacks	3.79	0.03	0.04
		(0.8%)	(1.1%)
Asians	14.29	-0.15	0.17
		(-1%)	(1.2%)
Hispanics	37.28	1.06	-0.19
		(2.8%)	(-0.5%)

Note: Panel A reports mean levels of the demographic composition in affected communities. Panel B reports coefficients of a Tobit model. The dependent variable is trash shares, that is, the share of a generating county's waste to a facility. Dependent variable is weighted by market size (total waste generated by a county). The sample only includes quarterly observations in 2010. Models include quarter fixed effects and waste-origin count fixed effects. Significant level: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Panel C presents percentage-point changes in the amount of trash sent to a specific demographic group in neighborhoods surrounding disposal facilities. Numbers in brackets show the percentage-point change in percentage. Statistics are calculated for every county market and then averaged over markets using market sizes as weights to get the above reported average. All measures use 2010 levels.

F Other figures and tables

3.1 SOLID WASTE HAULING. Commencing on the effective date, Contractor agrees to provide solid waste, green waste, and recyclable material (including any state-mandated organics/compost recycling) (collectively hereinafter referred to as "waste") containment, hauling, disposal, and recycling services, and all of the equipment necessary for such services as set forth in Exhibit "A" for and on behalf of the District during the term of this agreement. Contractor agrees to accept all waste pursuant to the terms of the Agreement, and shall haul such waste to a disposal, transfer, or recycling facility of its choosing. Upon deposit of materials into waste receptacles Contractor will take sole ownership of all such materials. This Agreement shall be exclusive as to residential services.

3.2 RECYCLING EDUCATION. Contractor agrees to hold bilingual educational forums twice a year at a venue agreed to by Contractor and the District. The intention of the forums is to promote recycling efforts within the community. Contractor will provide all educational materials for these events and will actively promote the events within the community.

3.3 COMMUNITY CLEAN UP. Contactor agrees to conduct a community clean up once per year for at least five hours, at the District Park or other named location, and will prepare a flier listing materials that may be accepted for hauling. This clean up shall be held on a day and time mutually agreed upon between the parties that will have maximum benefit to the community.

3.4 COMMUNITY BENEFITS. Contractor agrees to provide additional benefits to the District which are intended to enhance the quality of life in Del Rey, as set forth in Exhibit "B".

4.0 COMPENSATION & TERMS OF PAYMENT.

4.1 COMPENSATION. District shall pay Contractor according to the terms and rates set forth in Exhibit C, attached hereto and made a part hereof.

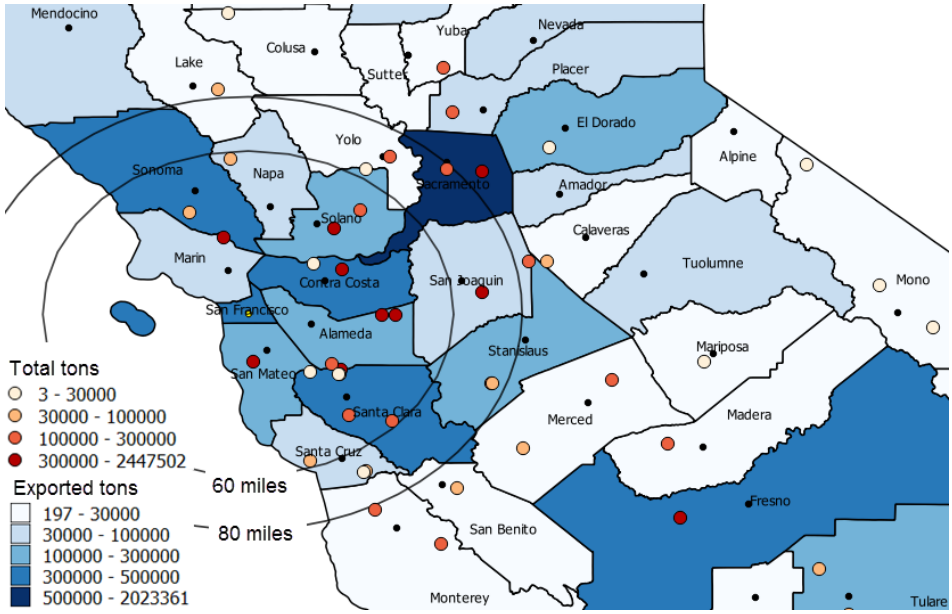
4.2 CONSUMER PRICE INDEX ADJUSTMENT ("C.P.I."). Beginning two (2) years after the commencement of this Agreement, hauling and disposal fees may be adjusted annually on the effective date each year by the actual change in the C.P.I. (as hereinafter defined) for the previous twelve (12) month period. Contractor will notify District thirty (30) days in advance of the proposed C.P.I. adjustment, of the expected amount of any adjustment allowed under this section with respect to such period. "C.P.I." means the consumer price index for the Western Region published by the United States Department of Labor Bureau of Labor Statistics ("BLS") or its successor. In the event of a negative change in the CPI, the rates shall not be adjusted negatively, but shall remain static for that rate period.

5.0 TERMS OF PAYMENT.

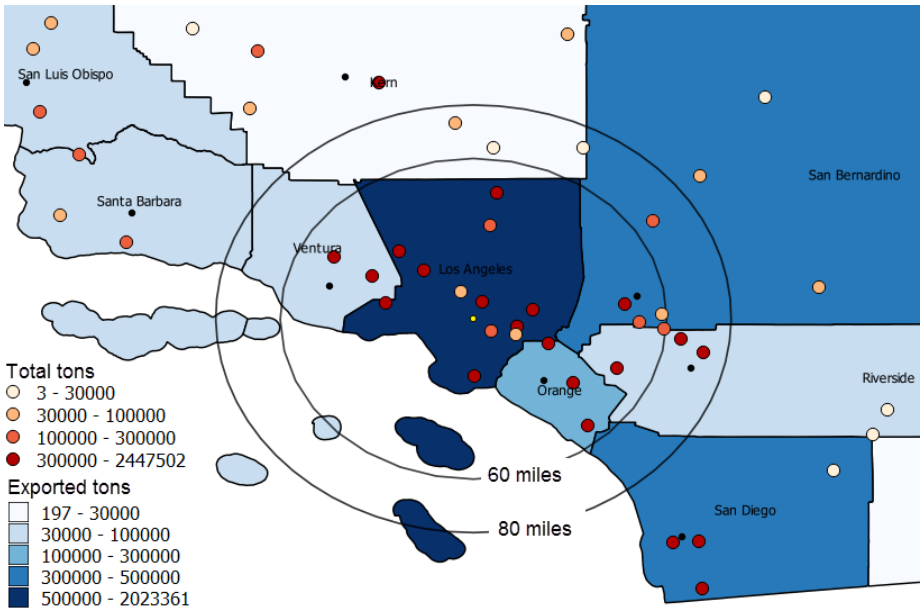
5.1 FEES, TAXES, AND OTHER ADJUSTMENTS. If during the term of the Agreement any state, federal, or local law, rule, regulation, or ordinance imposes any new or increased fees (including landfill Disposal Fees) or taxes on Contractor, or should Contractor incur unforeseen or uncontrollable increases in cost, it shall provide District with reasonable documentation of the increase in costs. District shall have ninety (90) days to accept or reject a compensatory price increase. If District rejects the price increase, the parties will meet and confer to resolve any dispute over the increase. If the parties cannot agree, Contractor may elect to terminate this Agreement by providing District with one hundred twenty (120) days' written notice.

FIGURE F1: A contract on solid waste hauling services between a hauler and a municipality

Note: This exhibit is extracted from the contract on solid waste hauling services between Industrial Waste & Salvage Co. and Del Rey Community District, Fresno County, California. The contract is signed on June 18, 2020 and specifies the term of 5 years between July 1, 2020 and June 30, 2025. Full contract can be accessed at `https://delreycsd.com/documents/1249/IWS_Contract_2020-2025.pdf`



(A) Choice set for haulers in San Francisco county in 2010



(B) Choice set for haulers in Los Angeles county in 2010

FIGURE F2: Illustration of choice sets in San Francisco and Los Angeles

Note: The graph illustrates the set of available disposal options within 60 miles and 80 miles for haulers in the counties of San Francisco and Los Angeles. This illustration uses air distance instead of driving distance, which is used in the analysis. Black dots represent population-center coordinates of counties. Counties are blue colorized by out-of-county exports of waste. Facilities are red colorized by total receiving waste amount.

TABLE F1: Summary statistics of demographics at waste-generating county vs. receiving community

	3-mile buffer		receiving county		generating county	
	unweighted	weighted	unweighted	weighted	unweighted	weighted
population	26,573	41,144	798,131	3,550,303	753,333	3,993,731
	(44,459)	(43,580)	(1,574,105)	(3,539,681)	(1,517,561)	(3,791,670)
white	8,657	13,716	315,605	1,181,551	300,017	1,289,182
	(13,063)	(14,353)	(491,569)	(946,047)	(474,959)	(999,398)
black	1,050	1,598	46,908	248,290	44,083	290,452
	(2,268)	(2,565)	(127,057)	(313,591)	(122,159)	(336,261)
Asian	3,727	6,408	100,029	481,614	97,328	544,765
	(7,486)	(7,508)	(229,767)	(490,828)	(222,654)	(520,212)
Hispanic	12,295	18,189	307,254	1,530,798	285,047	1,749,941
	(31,392)	(28,649)	(725,248)	(1,753,682)	(698,587)	(1,887,725)

Note: This table shows summary statistics of the population in waste-receiving communities versus waste-generating communities. Receiving communities are presented as receiving counties and nearby communities. A nearby community is defined by a 3-mile radius centered around a trash site. Population counts for the nearby communities are aggregated from 2010 census blocks that have their centroid location in the buffer. Median household income at a block is the one at its block group. The table contrasts the unweighted average population level and the average level weighted by waste amount.