Online Appendix for

"Who Paid Los Angeles' Minimum Wage? A Side-by-Side Minimum Wage Experiment in Los Angeles County"

Christopher Esposito, Edward Leamer, and Jerry Nickelsburg

Contents

The online appendix has the following 10 sections:

1. Generalizability of the Survey to Los Angeles County

To assess the external validity of our price survey with respect to the population of restaurants in Los Angeles County, we compiled descriptive statistics for the restaurants in our survey and the full population of restaurants in LA County, based on the County health inspection records. We present the resulting figures in Table A1. The variables we show are the wage strata of the restaurants, the median household income of their census tracts, and the percentage of the restaurants that are full-service (as opposed to Independent fast Food or Chain Fast Food). The median household income figure reported in the table ($57,215) differs somewhat from the median used as a cutoff in the main text ($59,807) because the main-text figure is weighted at the item level while the figure reported below is weighted at the restaurant level.

The statistics show that our survey restaurants were spread relatively evenly across the four strata, which is to be expected because we took a stratified random sample of restaurants. There Notably, the City Border is slightly under-represented relative to the other three strata. This is because we assigned restaurants to strata before the cities of Beverly Hills and West Hollywood changed course and elected to follow the State Wage, as described in the main text. In comparison to the strata composition of the sample, the population of restaurants was heavily concentrated in the City Non-Border.

Table A1: Descriptive Statistics of Restaurants in Survey and in LA County Population

		Survey	Population
Restaurants in Strata (%)	**State Non-Border**	24.2%	11.5%
	State Border	29.6%	14.1%
	City Border	20.1%	18.0%
	City Non-Border	26.1%	56.4%
	Median Household Income (2015)	$57,215	$52,955
	% Full Service	67.3%	73.9%

Table A1 also indicates that the sample and population differed in terms of census tract income (which was higher in the survey) and the percent of restaurants that are full-service (which was higher in the population). These differences can be explained by the greater concentration of restaurants in the City Non-Border in the population, because the City Non-Border has lower median household incomes and higher shares of full-service restaurants than the other strata.

2. Economic Differences Across Wage Strata

The four wage strata in our study may differ in terms of their economic fundamentals, such as population density, restaurant density, and the composition thereof. We therefore computed summary statistics for each strata, broken out by income segment, on the population density, restaurant density, restaurants per capita, share of restaurants in the census tract that are full-service (as opposed to counter-service), and median household income for restaurants in each strata. We computed these values by calculating the values by census tracts and then assigning them to restaurants located in each tract. We obtain information on census tract population from the 2010 census, the number of restaurants in each tract by geocoding the full set of restaurants that were inspected by LA County restaurant health officials in 2014, and median household income from the 2011-2015 ACS estimates. We show mean values of each of these indicators, broken out by wage strata and income segment, in Table A2. As throughout the study, define high-income census tracts as those with median household income above the county-wide average ($59,807), and all other tracts as low-income.

Table A2: Descriptive Statistics of Neighborhood Characteristics of Restaurants in Sample

	Strata	Population Density	Restaurant Density	Restaurants per Capita	Share Full Service	Median Household Income ($)
Low-Income Tracts	**State Non-Border**	16485	59	4	0.71	43106
	State Border	15132	58	4.1	0.67	43560
	City Border	16204	46	3	0.64	44928
	City Non-Border	22342	128	5.7	0.71	36794
High-Income Tracts	**State Non-Border**	7488	34	5.2	0.75	99113
	State Border	7797	42	5.8	0.73	86956
	City Border	9997	49	4.6	0.74	84108
	City Non-Border	8777	51	6.5	0.78	83537

Note: Population density and restaurant density are expressed as thousands of units per square mile. Restaurants per capita is expressed as restaurants per thousand capita. Median Household Income is expressed in 2020 dollars using measured values from the 2011-2015 5-year ACS.

Table A2 shows that population density and restaurant density was considerably lower in high-income census tracts. In addition, both densities were somewhat higher in the tracts subject to the City Cage than those subject to the State Wage. The number of restaurants per capita was slightly higher in high-income tracts, but did not show a discernable differences across the wage strata. This point suggests that the supply of restaurants and the demand for restaurant meals (proxied through population) was in equilibrium prior to the first increase of the City Wage. In addition, the higher number of restaurants per capita in high-income City Non-Border tracts (6.5) relative to the number in high-income State Non-Border tracts (5.2) suggests that there was more competition in the City Non-Border than in the State Non-Border. This evidence suggests that the higher price increases we identify in the City Non-Border are unlikely to have been generated by monopoly rents from their location in regions with captive customer bases, such as office parks or the central business district.

The final column of Table A2 shows median household income by wage strata and income segment. As expected, restaurants that are in census tracts classified as high-income tend to be wealthier. More interesting, median household income is generally lower in the tracts subject to the City Wage than the State Wage. For example, household income was $83,537 in the high-income City Non-Border, but $99,113 in the high-income State Non-Border. One might expect that this difference would allow restaurants in the State Non-Border to increase prices more; however, we find larger price increases in the City Non-Border than in the State Non-Border, so their differences in baseline median household does not appear to be the reason why we pick up greater price increases in the City Non-Border.

In the regression of direct and spillover effects in the main text, we included differences across census tracts in terms of their population density, restaurant density, restaurant composition, and income growth as control variables in the main regression. In that analysis, find that the inclusion of these control variables does not substantially change our findings on price increases. Below, we present additional evidence that the inclusion of these control variables does not affect our main results, using a similar but simpler regression model of price increases across the four strata. We show this model because it is intuitive, but we opted to keep it in the appendix because the regression in the main text is more elegant in that it condenses the main explanatory variables into two terms instead of four. In the below model, each the strata of each restaurant is included as a dummy variable. The reference group (the State Non-Border) is the reference category and thus price changes in the State Non-Broder are given by the constant term. The model is run separately for restaurants in above and below-median income census tracts. We run the model several times, in order to show how the coefficients on our strata dummy variables changes following the introduction of our control variables.

Table A3: Regression Results of Changes in Item Prices by Strata with Census Tract-Level Control Variables

	% Change in Item Price							
	Low-Income Census Tracts				High-Income Census Tracts			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State Border	-2.447	-2.627	-2.884	-2.891	5.516	5.424	5.366	5.302
	(2.192)	(2.187)	(2.214)	(2.218)	(1.875)	(1.871)	(1.873)	(1.919)
City Border	-0.851	-0.870	-1.178	-1.172	-0.197	-0.018	-0.124	-0.204
	(2.434)	(2.439)	(2.500)	(2.500)	(1.960)	(1.947)	(1.956)	(1.974)
City Non-Border	-0.716	-1.028	-1.097	-1.083	4.395	4.331	4.362	4.269
	(2.559)	(2.666)	(2.669)	(2.691)	(1.977)	(2.057)	(2.066)	(2.109)
Population Density (Thousands)		-0.130	-0.189	-0.188		-0.132	-0.230	-0.235
		(0.098)	(0.119)	(0.118)		(0.131)	(0.187)	(0.191)
Restaurant Density (Thousands)		11.644	24.189	23.912		10.522	29.549	30.274
		(13.695)	(20.804)	(20.761)		(13.203)	(32.256)	(32.779)
Restaurants Per Capita			-253.968	-253.167			-155.640	-159.856
			(308.887)	(308.457)			(222.272)	(225.841)

Share Full Service			-4.106	-4.130			-0.356	-0.400
			(4.527)	(4.558)			(3.606)	(3.622)
% Change Household Income				0.611				1.209
				(4.692)				(5.061)
Constant	19.021	20.479	24.645	24.499	13.958	14.622	15.789	15.718
	(1.634)	(2.185)	(4.379)	(4.366)	(1.192)	(1.537)	(3.106)	(3.123)
Observations	1,032	1,032	1,032	1,032	1,030	1,027	1,027	1,027
R^2	0.002	0.006	0.009	0.009	0.025	0.026	0.027	0.027
Adjusted R^2	-0.001	0.001	0.002	0.001	0.022	0.021	0.020	0.019
Residual Std. Error	21.369 (df = 1028)	21.344 (df = 1026)	21.334 (df = 1024)	21.34 (df = 1023)	16.355 (df = 1026)	16.380 (df = 1021)	16.389 (df = 1019)	16.396 (df = 1018)

Note: Population density and restaurant density are expressed as thousands of units per square mile. Restaurants per capita is expressed as restaurants per thousand capita. Median Household Income is expressed in 2020 dollars using measured values from the 2011-2015 5-year ACS.

The main takeaway from Table A3 is that the inclusion of the control variables does not change our results: in every model run for low-income census tracts, price changes are no different in the State Border, City Border, or City Non-Border than in the reference group. Meanwhile, in every model run for high-income census tracts, price increases were larger in the State Non-Border and City Non-Border than in the reference group. In addition, the size of these coefficients are stable following the inclusion of our control variables. Therefore, we conclude that our main price findings are not driven by differences across strata in terms of their baseline characteristics, nor their changes in median household income.

3. Analysis of First-Order Effects from QCEW data

In this section of the appendix, we review the County-level QCEW data to test for first-order effects of the minimum wage increase on wages and employment. A limitation of the QCEW data is that they do not provide fine-grained geographical locations, and so they cannot be matched to establishments subject to the City and State wages. Therefore, our identification relies on time-specific treatments and does not contain untreated control units. In general, we find suggestive evidence of impacts on paid wages, but no evidence of impacts employment.

Average weekly wage, shown in Figure A1 for limited-service restaurants, full-service restaurants, and overall employment, have big positive spikes up in the fourth quarter of each year. This suggest that wages generally increase in Q4. These seasonal patterns may have been changed when the minimum wages started to rise because the State increases occur in Q1 and the City increases occur in Q3. To explore this possibility, the panels separate seasonal factors for data up through year 2013 and for the 2014-2019 period. If the minimum wage increase had an immediate wage effect, the seasonals after 2013 would be greater in the first and third quarter when the minimum wages were increasing. This is exactly what happened to limited-service restaurants but not to full-service restaurants or to wages overall. This provides suggestive evidence that the City minimum wage increase lead to observable changes in the timing of wage increases at limited service restaurants in LA County. At the same time, an important feature of the experiment that we are studying is that the schedule of minimum wage increases was established years in advance and employers may have decided to comply in advance with the minimum wage increases and to spread the employment and price changes over time. That anticipation and delay story greatly reduces the relevance of the seasonal factors just discussed.

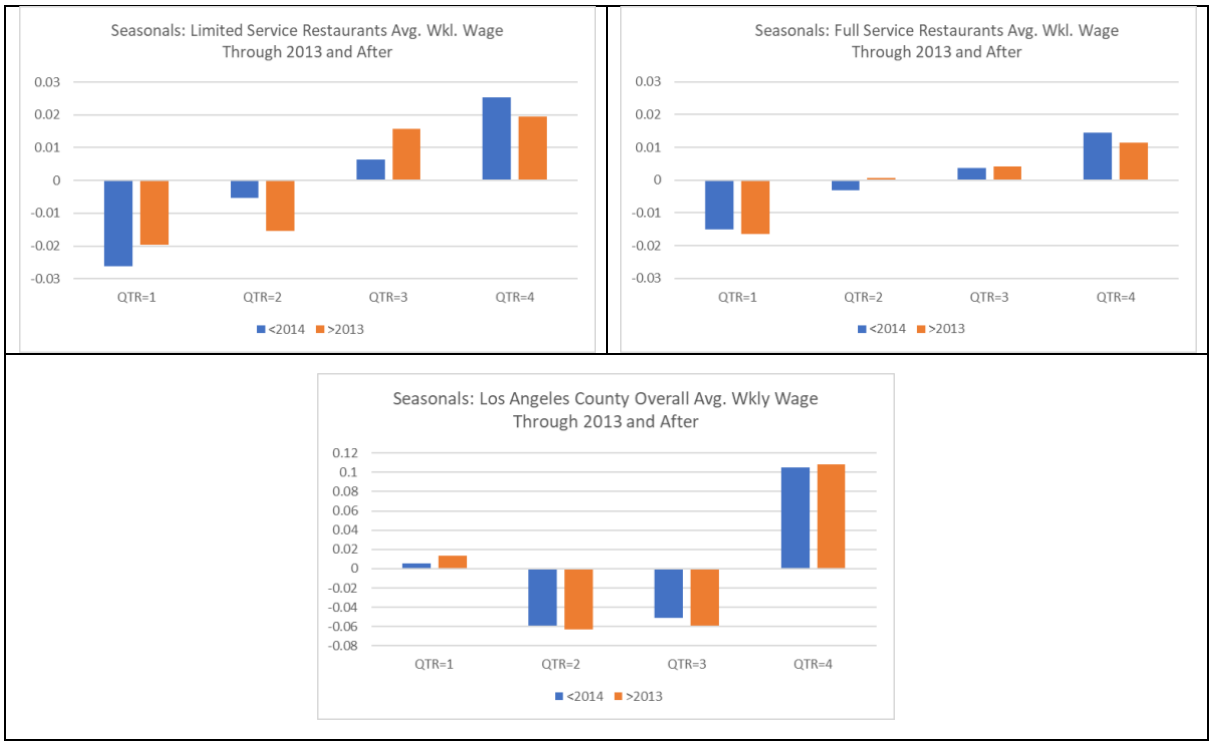

Figure A1: Seasonals for Average Weekly Wages

To study employment trends, Figure A2 illustrates the Los Angeles employment in the three sectors, each divided by the employment level in 2010q1, which was the employment trough. In the recession of 2008, overall employment fell by over 10% but the restaurant sectors were not as hard hit. From 2010 until 2019, employment overall was up 23%, full-service up 39% and limited-service up 51%. If the increases in the minimum wages were hurting employment in the lowest-wage sectors, the opposite ordering would likely apply, with the weakest employment growth in limited-service restaurants. You might see a minimum wage effect on full-service restaurant employment which leveled off after 2015 while limited-service employment continued to grow. However, the finding discussed below that restaurants in high-income neighborhoods increased their prices the most makes one think that full-service restaurants faced inelastic demand which would help maintain employment levels.

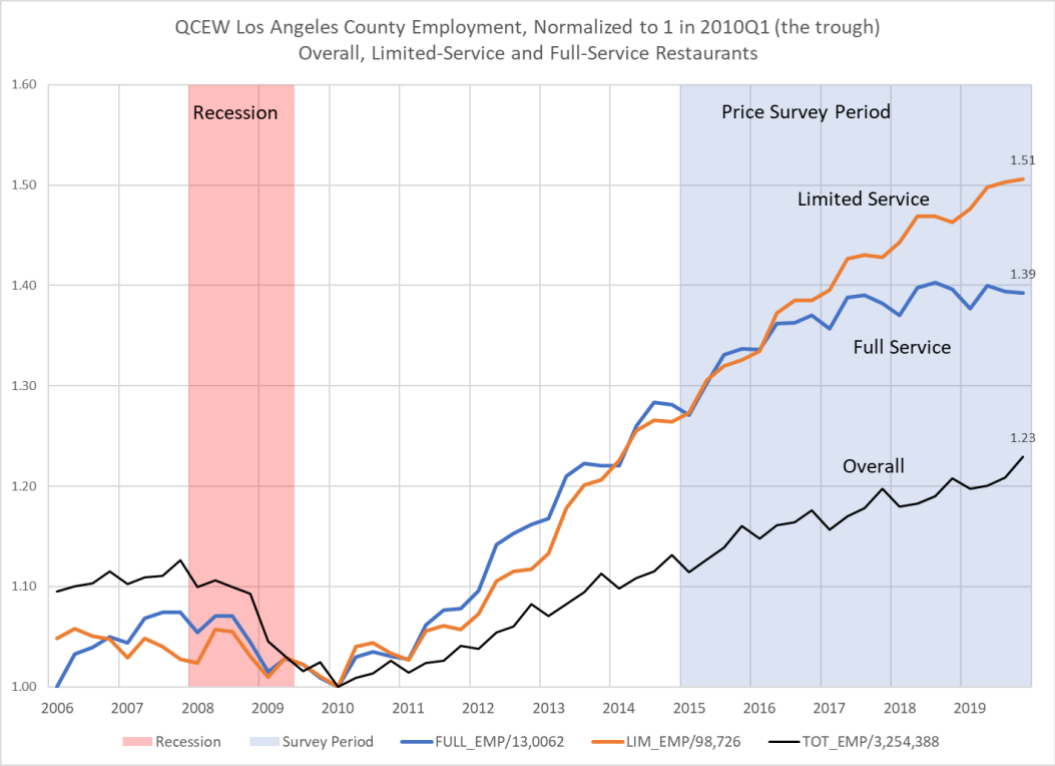

Figure A2: Los Angeles Employment Levels

Understanding these circumstances is important because minimum wage effects may be different during expansions when business energy is focused on acquiring more customers versus recessions when the profits come mostly from cost control. Because our survey of restaurant prices took place during a prolonged period of economic expansion in Los Angeles County, our findings are limited to that period. During periods of strong demand, a widely shared business experience of an increase in the minimum wage allows restaurants collectively to pass the costs on to customers, but in recessions restaurants may not feel comfortable raising prices. This affects their responses to minimum wage increases. On this point, Clemens and Wither (2019) find that the increase of the Federal minimum wage from $5.15 to $7.25 during the Great Recession caused a larger decline of low-skilled employment in states that were fully bound by this increase in contrast with those that already had a minimum wage of $7.25 or more. A more recent example is the study of Minneapolis and St. Paul minimum wages by Karabarbounis, Lise, and Nath (2022).

Figure A3 illustrates the seasonal patterns for employment, which is not much different before and when the minimum wages were on the rise, confirming the point above that employment effects are likely spread over time, though it seems interesting that the first quarter seasonal is not so negative when minimum wages were on the rise.

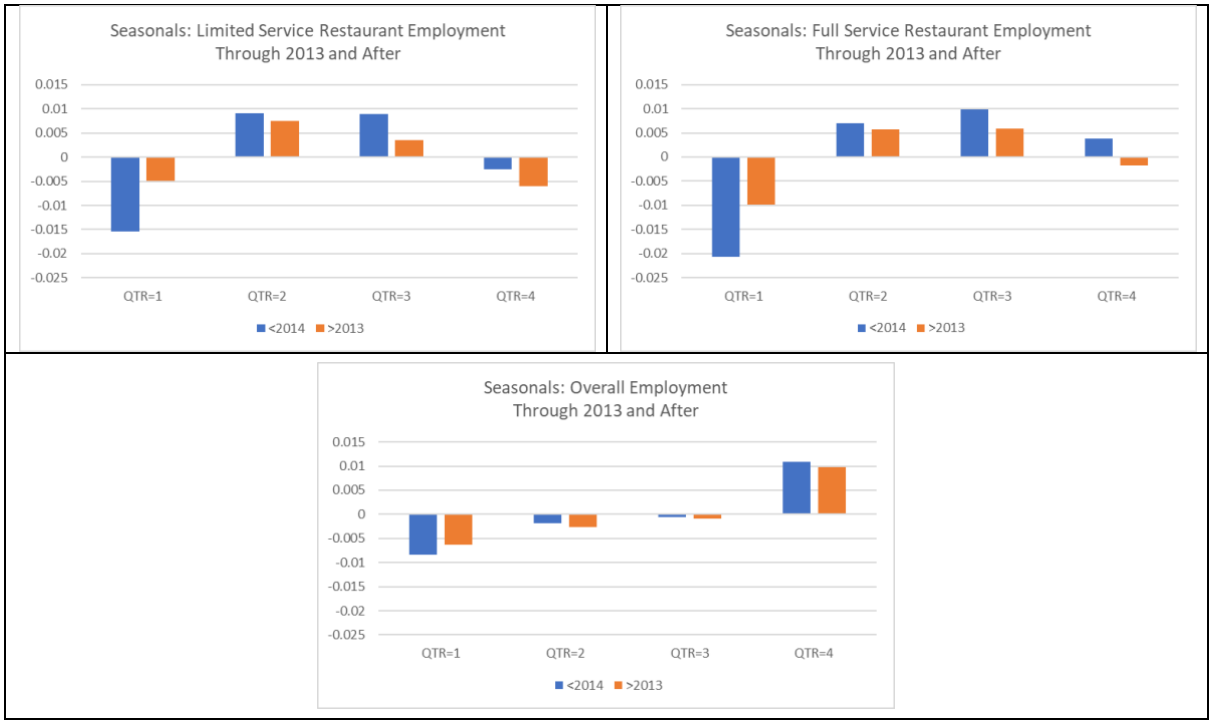

Figure A3: Seasonals for Employment

These results conform with much of the minimum wage literature, which finds apparent wage effects but often does not find employment effects. They further suggest that price pass through could be an important adjustment channel.

4: Description of Pre-Trend Data

To test for pre-trends, we obtained pre-2016 prices for 797 of the 2085 menu items that match the items in our balanced panel of our price survey. We collected these prices by asking our research assistants to search for each of the restaurants that had items in our balanced panel using Yelp and Google Maps. In particular, our research instructors were given the restaurant name, address, and phone number, and the names of the menu items in our dataset and were instructed to do the following:

1. Search for each of the assigned restaurants on Yelp
2. Scan through all user-submitted photos of the restaurant for images of menus with prices
3. Record any prices of items in our dataset
    a. Ignore all photos taken after January 1, 2016.
    b. If the same item had multiple photos with different timestamps, select the most recent photo that was taken *before* July 1, 2015 (to reduce potential contamination effects from the January 1 2016 State minimum wage increase).
    c. If the item has no photos taken before July 1, 2015, record prices from images from between July 1 2015 and December 31, 2016.
4. Record the month and year of the timestamp of the image
5. Record the URL of the image
6. If no images of an item are available on Yelp, repeat steps 1-5 on Google Maps customer reviews.

We name the resulting dataset as Round 0 of our data survey. The number of Round 0 observations by strata and census tract income segment are shown in Table A4. The distribution of our Round 0 observations across strata are similar to the distribution of our Rounds 1-7 observations, with the exception that more of observations were located in the State Border in the Rounds 1-7 dataset than in the Round 0 subset. In terms of market segment, the Round 0 data is slightly biased toward items in high-income neighborhoods; 52% of the items in the Round 0 subset were in high-income neighborhoods, while for the Rounds 1-7 data, that figure was 50%.

Table A4: Number of Item Panels with Round 0 Observations by Strata and Income Segment

	State Non-Border	State Border	City Border	City Non-Border	Total
Low-Income Census Tracts	116	103	73	90	382
High-Income Census Tracts	120	131	77	87	415
Total	236	234	150	177	797

Figure A4 shows the year of each Round 0 observation. Observations were taken between 2008 and 2015, with more observations occurring in the more recent years.

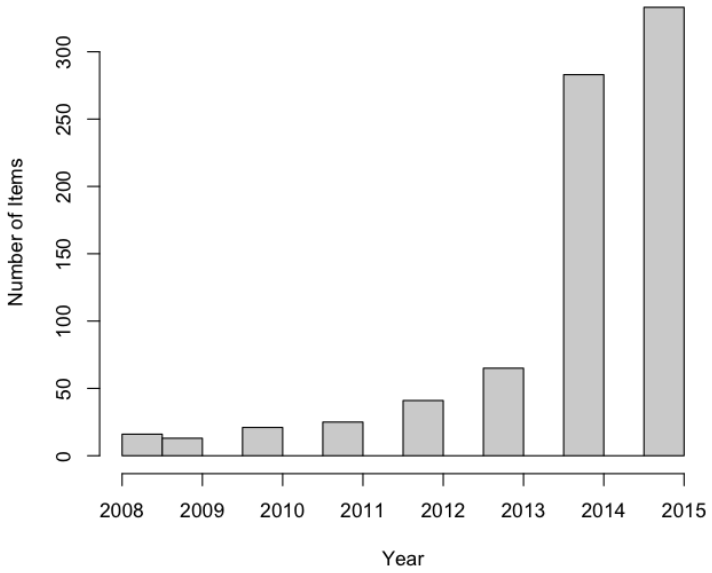

Figure A4: Number of Items by Year of Round 0 Observation

Because of the long time range during which Round 0 observations were recorded, the number of years elapsed between Round 0 and Round 1 observations varied substantially across items. Figure A5 presents a histogram of the duration between these observations. Because of this variation, our pre-trend analyses in the main text annualize price changes by dividing the percent change in an item's price by the number of years elapsed between its Round 0 and Round 1 observation.

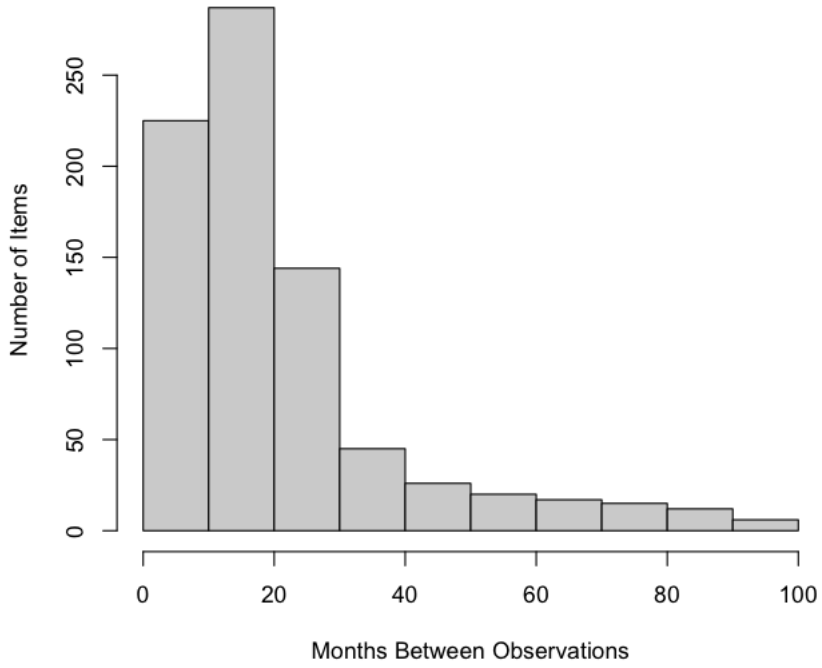

Figure A5: Time Duration Between Round 0 and Round 1 Observations

5. Consumer Price Index and Producer Price Index Data

To verify the quality of our price data, we compared the 6-month price changes from our survey with price changes from Bureau of Labor Statistics (BLS) "food away from home" price index for the Los Angeles Metropolitan Area (Figure A6). We use 3-month rolling averages to smooth the noise in the data. Though taken from different sources and imperfectly overlapping geographical regions, the price changes from our survey and the BLS data share some common patterns. For the period July 2017 to July 2018, price changes recorded by the price survey were higher than those recorded by the BLS index, but the changes in the series are strongly correlated. The series depart around January 2019, when price increases recorded by the price survey decreased while CPI-recorded prices increased. The increase the CPI index is possibly explained by the inclusion of Orange County in LA Metropolitan Area CPI but not in our price survey. Orange County was subject to the State Wage, which increased by 9.1% on January 1, 2019. Since the BLS index has a higher weight for the State Wage region with the inclusion of Orange County, Price increases in the BLS CPI for LA/OC will be higher than those in our price survey. The decline in the size of price increases from our restaurant survey may be explained by the six-month survey frames. The City Wage increased in July 2018 and July 2019. If price increases at City restaurants occurred shortly before or after increases in the City Wage, then we would expect average price increases to have comparatively lower price growth around January 2019. From April 2019 on, the two price change indices were similar.

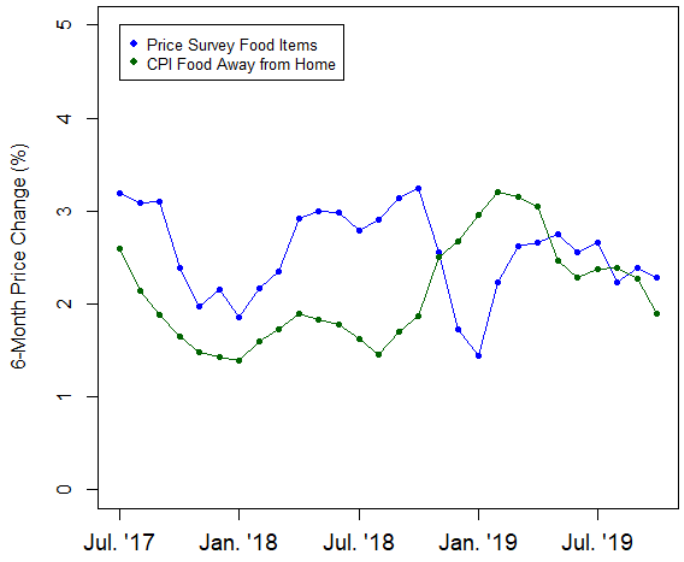

Figure A6: 6-Month Price Changes (3 Month Moving Average)

To complete our data, we collected the national processed food Producer Price indexes from the BLS to account for changes in input prices. We matched the Processed Meat, Poultry, and Fish index to our entrée menu items and the Processed Cereal and Bakery Products to our side dish items. We name these indices PPIProtein and PPICereals in the regressions presented in the tables. We plot trends in PPIProtein, PPICereals, and Los Angeles Food Away from Home CPI sub-index in Figure A7. The food Away from Home index increased by a factor of 1.2 over the study period, while PPICereals increased by a factor of 1.03. PPIProtein decreased during the study period and exhibited considerable volatility.

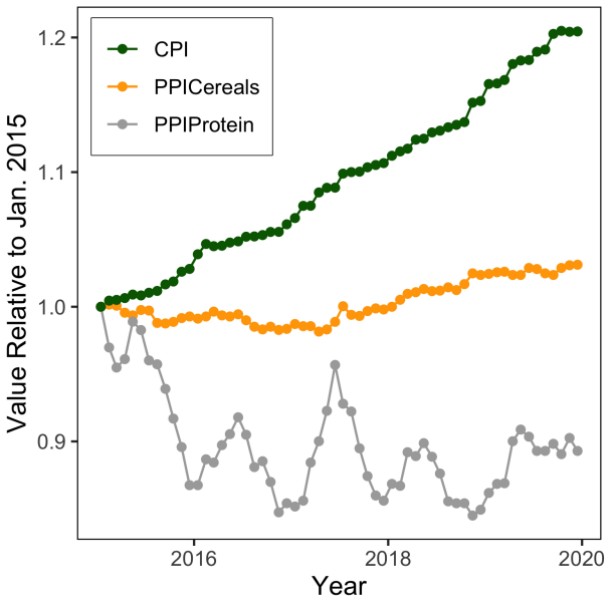

Figure A7: Los Angeles Food Away from Home CPI and PPI Indices, January 2015 to December 209

6. Analysis of 7 Rounds of Price Survey

Table A5 shows the number of matched item observations between each pair of rounds. Shading corresponds to a change in the minimum wage between when those items were observed. Because a few our observations during round 1 were conducted after the State minimum rose above $9/hr, the wage changes between rounds 1 and 2 are expressed as a range.

Table A5: Number of Repeat Observations of Items between Rounds

	Month of Repeat Observation	State Non-Border	State Border	City Border	City Non-Border	Total
Rounds 1 - 2	Jan-17	125	185	137	148	595
	Feb-17	127	153	127	170	577
	Mar-17	139	218	92	122	571
	April-17	146	180	120	117	563
	May-17	179	114	113	132	538
	June-17	118	141	68	163	490
Rounds 2 - 3	July-17	117	162	129	146	554
	Aug-17	131	154	147	204	636
	Sep-17	163	241	104	158	666
	Oct-17	122	203	124	133	582
	Nov-17	199	120	112	136	567
	Dec-17	148	147	71	166	532
Rounds 3 - 4	Jan-18	123	180	147	159	609
	Feb-18	119	167	141	203	630
	Mar-18	135	225	98	136	594
	April-18	135	209	123	136	603
	May-18	194	125	129	137	585
	June-18	153	149	81	171	554
Rounds 4 - 5	July-18	120	186	135	157	598
	Aug-18	143	172	135	185	635
	Sep-18	139	217	89	134	579
	Oct-18	147	189	136	128	600
	Nov-18	181	117	99	140	537
	Dec-18	150	150	75	165	540
Rounds 5 - 6	Jan-19	117	179	121	153	570
	Feb-19	134	161	124	165	584
	Mar-19	138	214	83	128	563
	April-19	125	173	116	120	534
	May-19	171	114	87	130	502
	June-19	149	155	70	168	542
Rounds 6 - 7	July-19	131	175	147	165	618
	Aug-19	127	153	119	183	582
	Sep-19	137	223	76	127	563
	Oct-19	118	171	104	121	514
	Nov-19	169	123	94	132	518
	Dec-19	138	145	68	174	525
	Total	5107	6090	3941	5412	20550

Key: Δ Min Wage	0%	4.8%	7.5%	9.1%	10.4%	11-13.5%	14.3%

Table A6 summarizes the average price changes for all matched items in our dataset. Price changes are annualized because the observations taken in rounds 1 and 2 were not always exactly 6 months apart. Between rounds 2 and 3 the City Wage rose by 14.3% while the State Wage did not increase. Restaurants in the State Non-Border increased prices by an annualized 5.8% and restaurants in the City Non-Border increased prices by an annualized 4.3%.

Table A6: Annualized Price Changes

Rounds	State Non-Border	State Border	City Border	City Non-Border	Average
1 to 2	4.7%	5.0%	4.8%	5.4%	5.0%
2 to 3	5.9%	6.5%	5.1%	4.9%	5.6%
3 to 4	3.7%	4.8%	4.6%	5.8%	4.8%
4 to 5	6.2%	5.5%	6.1%	6.3%	6.0%
5 to 6	4.1%	5.5%	3.2%	2.9%	4.1%
6 to 7	3.9%	3.6%	5.4%	7.3%	5.0%

Key: Δ Min Wage	0%	4.8%	7.5%	9.1%	10.4%	11-13.5%	14.3%

Table A7 summarizes mean price changes by strata broken down by restaurants in high-income census tracts (those with above-average median household income) and low-income census tracts. Price changes between rounds 2 and 3 are greater at restaurants which were not subjected to a minimum wage increase during that time period.

Table A7: Low and High-Income Neighborhoods Annualized Price Changes

Rounds	Low-Income Census Tracts				High-Income Census Tracts			
	State Non-Border	State Border	City Border	City Non-Border	State Non-Border	State Border	City Border	City Non-Border
1 to 2	5.4%	4.5%	4.8%	5.8%	4.1%	5.5%	4.7%	4.6%
2 to 3	6.7%	7.3%	4.4%	4.1%	5.3%	5.9%	5.7%	6.1%
3 to 4	3.6%	4.8%	4.7%	5.2%	3.6%	4.9%	4.4%	6.5%
4 to 5	6.5%	6.1%	8.6%	7.3%	5.7%	4.8%	4.0%	5.0%
5 to 6	6.2%	5.4%	4.7%	2.9%	2.3%	5.7%	2.0%	3.1%
6 to 7	4.3%	2.7%	7.5%	6.3%	3.6%	4.0%	4.6%	8.6%

Key: Δ Min Wage	0%	4.8%	7.5%	9.1%	10.4%	11-13.5%	14.3%

Figure A8 shows the difference in prices by restaurants and fitted Loess regressions with 100% search ranges.

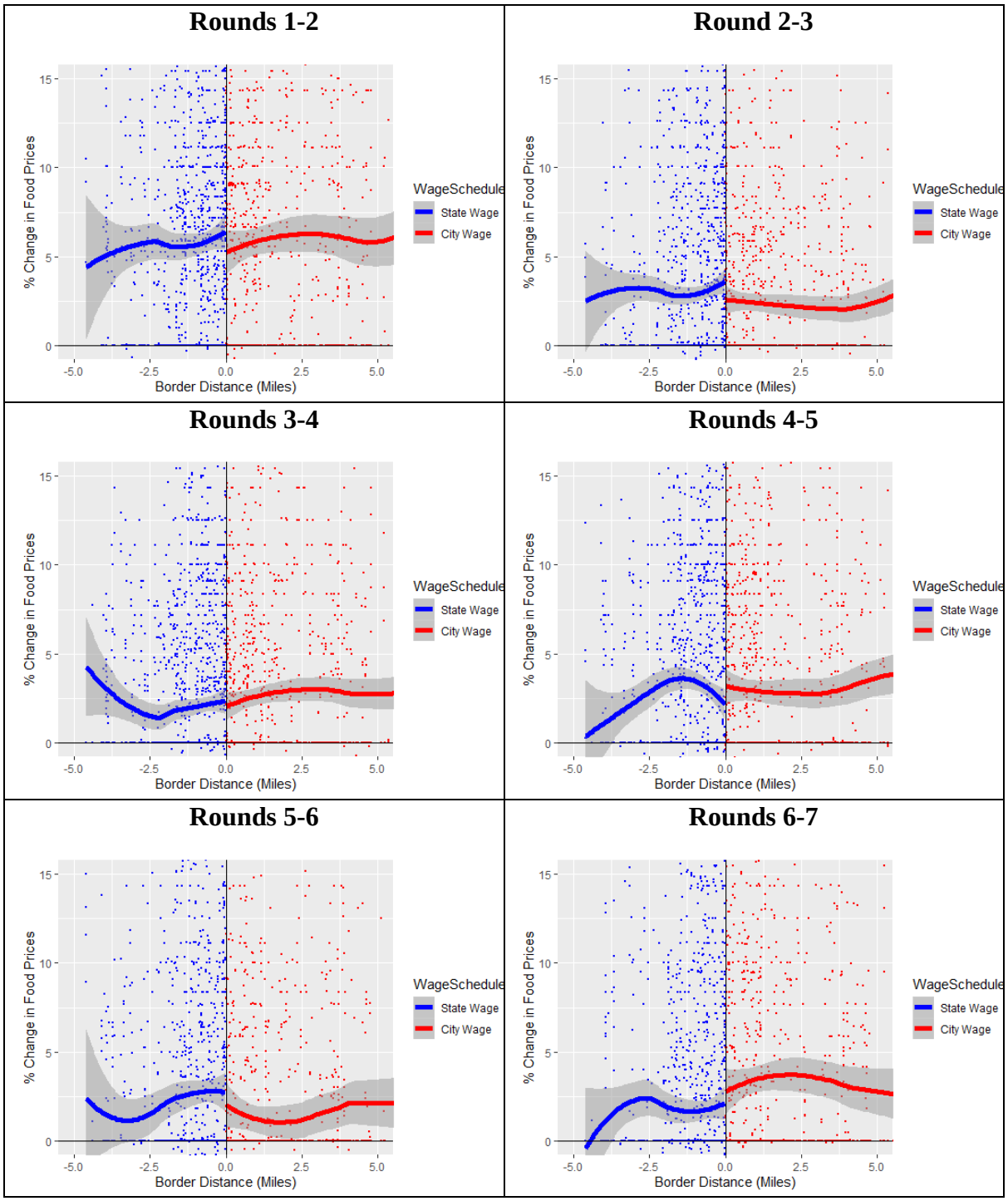

Figure A8: Differences in Food Item Prices by Distance to Wage Border with 100% Search Range Loess Regressions

Table A8 shows closure rates in the sample by round and strata.

Table A8: Closure Rate of Restaurants by Round and Strata

		Round of Observation							Cumulative Totals
		1	**2**	**3**	**4**	**5**	**6**	**7**	
State Wage Non-Border	**Open**	194	188	182	176	167	159	156	
	Closed	0	6	6	6	9	8	3	38
	% Closed	0	3.1%	3.2%	3.3%	5.1%	4.8%	1.9%	19.6%
State Wage Border	**Open**	237	229	217	212	204	196	191	
	Closed	0	8	12	5	8	8	5	46
	% Closed	0	3.4%	5.2%	2.3%	3.8%	3.9%	2.6%	19.4%
City Wage Border	**Open**	159	151	144	142	130	122	116	
	Closed	0	8	7	2	12	8	6	43
	% Closed	0	5.0%	4.6%	1.4%	8.5%	6.1%	4.9%	27%
City Wage Non-Border	**Open**	207	199	195	190	179	170	170	
	Closed	0	8	4	5	11	9	0	37
	% Closed	0	3.9%	2.0%	2.6%	5.8%	5.0%	0%	17.9%
Totals across Strata	**Open**	797	767	738	720	680	647	633	
	Closed		30	29	18	40	33	14	164
	% Closed		3.8%	3.8%	2.4%	5.6%	4.9%	2.2%	20.6%
Min Wage Key (Per Hour)		$9.00	$10.00	$10.50	$11.00	$12.00	$13.25	$14.25	

Note: Only restaurants first observed in Round 1 are included in the closure analysis.

7. Effect of City Border Closures on State Wage Prices

In our main analysis, we showed that restaurants in the City Border closed more frequently than the reference groups, and that State Border restaurants in high-income neighborhoods increased prices significantly more than the reference group. The alleged mechanism is that the closure of City Border restaurants led customers to cross the wage border in search for meals, allowing State Border restaurants to increase prices and thus earn temporary monopoly rents from their location.

We can test this mechanism directly using an event study, where prices for items at State Border restaurants are modeled as a function of the time-to-closure of a nearby City Border restaurant. We do caution that this analysis forces us to split the data at such a low level of granularity, that we begin to run into problems with power. There were only 44 City Border restaurants that were located within 1 mile of a State Wage restaurant in our sample. In addition, our restaurant closures are only observed in our sample and therefore can only serve as a noisy proxy of the change in the competition faced by the restaurants in the State Border.

With these caveats in mind, we conducted an event study wherein the closure of a City Border restaurant is modeled as a "treatment event" for the State Wage restaurants located within 1 mile of the closed City Border restaurant. We compute the variable *RoundsToCompetitorClosure*, that records the number of survey rounds (6 month time periods) before or after the closure of a competitor in the City Wage region. The regression is run on only focal restaurants in the State Border. The regression is given as follows:

$$\%\Delta Price_i = \beta RoundsToCompetitorClosure_{r,t} + X_t + \varepsilon_i$$

In the regression, RoundsToCompetitorClosure is a factor variable. The treatment round equals 0 in the round that we observe a closure and serves as the reference category in the regression. X_t are round fixed effects. Because our first round of price observations were taken over a longer and non-regular timeframe in contrast to the other 6 rounds of our price survey, we omit data from the first round from this analysis. Finally, we estimate the model separately for focal restaurants in above and below-median household income census tracts and plot the β coefficients with 95% confidence intervals in Figure A9.

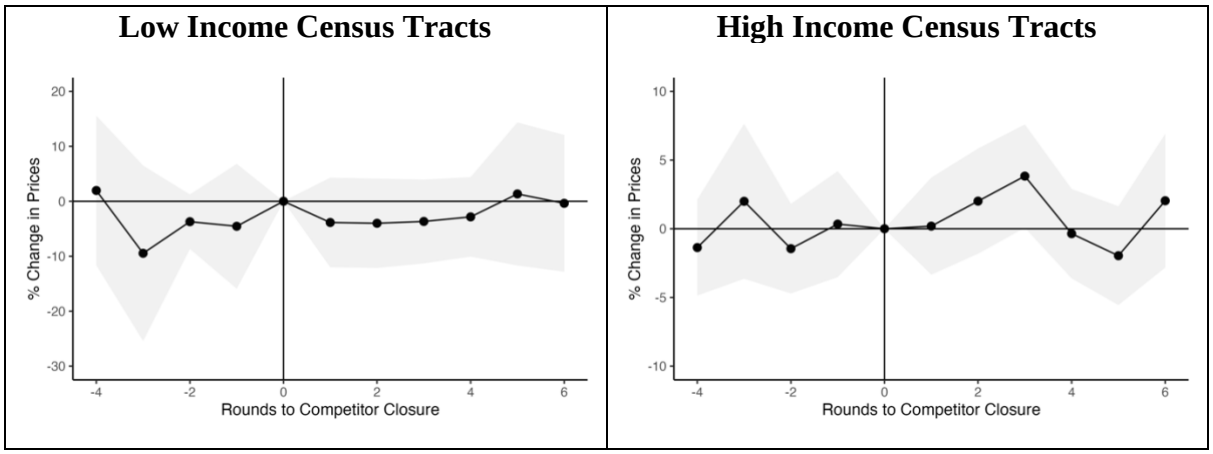

Figure A9: Effect of Closure of City Wage Competitor on State Wage Prices

Figure A9 shows no significant price changes at restaurants in low-income census tracts following the closure of a City Wage competitor. However, in high-income census tracts, there

is a substantial increase in prices that begins 2 rounds (1 year) after we observe a closure of a City Wage competitor. This effect becomes statistically significant 3 rounds (18 months) after the observation of the closed City Wage competitor. This effect is very noisy, which we would expect given that we only observe closure information for 800 of the roughly 20,000 restaurants in Los Angeles County. Therefore, the closures that we observe constitute a small share of the closures in the County. Nonetheless, these figures suggest that restaurants in the State Border received rents from their proximity to closing City Wage restaurants, but only if they were located in high-income neighborhoods. This finding is in line from our main results, which showed that City Border restaurants were more likely to close, and that State Border restaurants in high-income neighborhoods had higher price increases.

8. Identifying Inelastic Consumer Demand

In the main text, we primarily use the median household income of a restaurants' neighborhood as a proxy of the income level of a restaurant's customers. An alternative measure might use the median (initial) price of the entrees at a restaurant. In this section, we show that these two indicators are correlated, but that neighborhood income appears more strongly correlated with price responses to minimum wage increases.

In Figure A10, we plot the median entrée price at restaurants during round 1 of our survey (an indicator of how high-end the restaurant is) against the median household income of the surrounding census tract (an indicator of how wealthy the surrounding neighborhood is. Note that entrée prices across all restaurants are somewhat lower than you might expect, because in our survey sought to track a la carte entrees (such as a hamburger without fries or bacon) in order to reduce volatility in the content of items. Each restaurant appears once in the scatterplot. We also overlay a linear regression in the figure.

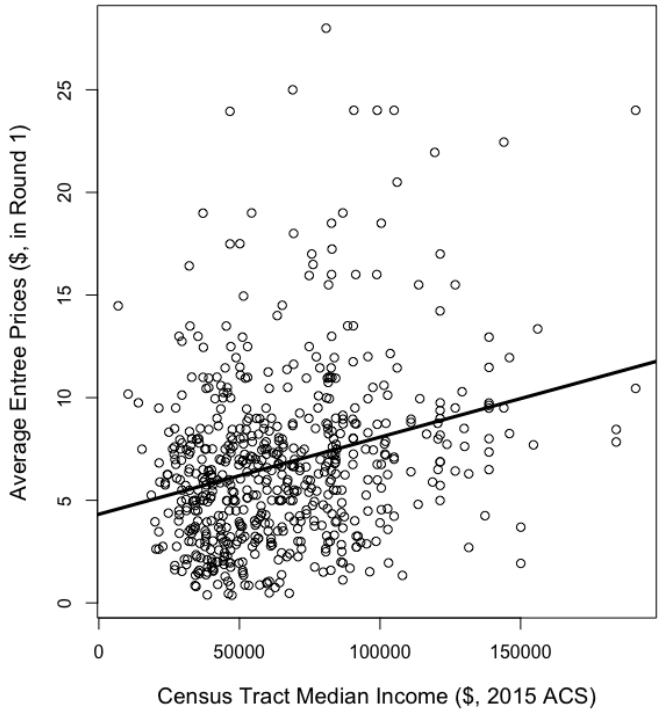

Figure A10: Scatterplot of Median Entrée Prices and Census Tract Household Income

Figure A10 shows that entrée prices and household incomes are correlated, but not perfectly. The regression line has a slope of 0.0000376, indicating that for every $1000 increase in census tract median household income, prices are $0.038 higher. Because the variance of household income across census tracts in LA County is very large (the 25th percentile and 75th percentile are $40,000 apart), differences in census tract income has the potential to explain much of the range of the variation in prices. The R^2 of the price-income regression is 0.073. This value is not usually interpreted as high, but nonetheless shows that the median household income of a census tract alone explains 7.3% of the variation in prices. With that said, we most of the variation in restaurant prices is not explained by neighborhood income levels.

Restaurant prices could thus be a potentially stronger predictor of the elasticity of demand faced by restaurants, and thus their ability to push prices higher when subjected to an increase in the minimum wage. We can test this by seeing if wage increases (as captured by whether a restaurant is impacted by the City wage) better predict price increases at high-income restaurants, or at high-initial-price restaurants. To do so, we run a simple price regression where the change in item prices between rounds 1 and 7 of our survey are modeled as a function of the restaurants' wage strata (State Non-Border, State Border, City Border, and City Non-Border). We run the model four times, with different subsets of the dataset: first, on only restaurants in above-median income neighborhoods, second on restaurants in top-quartile income neighborhoods, third on restaurants with above-median initial entrée prices, and fourth on restaurants with top-quartile entrée prices. Standard errors are clustered at the restaurant level and results are shown in the table A9.

The table shows that price increases were significantly and robustly larger in two "treated" strata (the City Non-Border and the State Border) relative to the State Non-Border reference group when we subset the data based on census tract income, but not when we subset the data based on initial entrée prices. This holds true regardless of whether we subset the data at the median or top quartile. Thus, while there is restaurant-level heterogeneity in demand elasticity, neighborhood income levels appear to be the stronger predictor of the ability for restaurants to pass on a minimum wage increase. A potential explanation for this is that customers in wealthy neighborhoods are more willing to substitute lower-end restaurants for higher-end restaurants in the same neighborhood than they are willing to substitute restaurants in low-income neighborhoods for those in their own high-income neighborhood. The resulting substitution leads to price increases at the low-end restaurants in high-income neighborhoods.

Table A9: Regression of Price Changes Between Rounds 1 and 7

	Restaurant Subset			
	Above-Median Neighborhood Income	Top Quartile Neighborhood Income	Above-Median Entrée Prices	Top Quartile Entrée Prices
Constant (State Non-Border)	14.0 (1.19)	13.9 (1.34)	13.7 (1.09)	12.8 (1.20)
State Border	5.51 (1.88)	5.05 (2.48)	3.7 (1.58)	0.620 (1.81)
City Border	-0.197 (1.96)	3.17 (2.58)	1.34 (1.94)	1.39 (2.40)
City Non-Border	4.39 (1.98)	6.18 (2.71)	2.30 (1.94)	2.77 (2.30)
NOBS (Items)	1030	525	1089	496
R^2	0.025	0.024	0.0072	0.0060

9. Power Analyses

We performed power calculations for our three main descriptive results tables in the paper (the tables on price changes, menu changes, and closures) to compute the minimum effect size required for 95% power. This gives the minimum differential required to reject the null hypothesis in 95% of occurrences, given the observed observation counts and standard deviations. We pooled the standard deviations. The results are shown (in percentage-point terms) in the following tables:

Table A10: Minimum Price Change Differential for 95% Power

	Comparison Group		
	State Border	**City Border**	**City Non-Border**
All Census Tracts	3.82	4.24	4.50
Low-Income Census Tracts	5.91	6.69	7.35
High-Income Census Tracts	4.92	5.12	4.93
High-Income Census Tracts and Restaurants with High Entrée Prices	5.49	5.98	5.73

Table A11: Minimum Likelihood of Menu Change Differential for 95% Power

	Comparison Group		
	State Border	**City Border**	**City Non-Border**
All Census Tracts	19.0	21.1	18.8
Low-Income Census Tracts	27.3	29.8	24.8
High-Income Census Tracts	26.6	30.1	28.9

Table A12: Minimum Likelihood of Closure Differential for 95% Power

	Comparison Group		
	State Border	**City Border**	**City Non-Border**
All Census Tracts	13.9	16.2	14.1
Low-Income Census Tracts	20.7	23.2	19.9
High-Income Census Tracts	18.5	22.7	20.0

Each of the three tables shows a considerably large effect size needed to achieve 95% power. In particular, the first table shows that, for restaurants in census tracts at all income levels, an effect size of 4.5pp is needed to reject the null that restaurants in the city non-border did not increase prices more than restaurants in the state non-border. The minimum effect size to achieve 95% power for restaurants in high and low income census tracts is larger, because of the smaller number of observations in those subsets. In the tables of menu changes, large effect sizes are also needed to reject the null hypothesis. Therefore, we acknowledge that some aspects of our analysis are underpowered, particularly with regard to menu changes and closures.

10. Alternative Border Distance Thresholds

To assess whether our results are robust to changes in the cutoff value we use to identify restaurants in the Border regions, we replicated our analysis using narrower and wider border definitions. The main text uses a 1 mile (1600 meter) border region. Below, we show results for price changes, menu changes, and restaurant closures using 1400 and 1800 meter border thresholds.

When compared with the results using the 1-mile borders, all of the statistically-significant regressors in the tables using 1400 and 1800-meter borders have the same sign. The main difference is that the coefficient associated with the City Non-Border tracts in the high-income models were significant at the 95% confidence level when the 1-mile borders was used, but are significant at the 90% level using the 1400 and 1800 border definitions. This decline in significance is to be expected, because our stratified sample was designed to maximize the number of observations in each of our four strata, giving us the maximum amount of power conditional on the number of observations in the study. When we re-define the size of the border regions, the number of observations in each strata changes and power is reduced.

Table A13: Price Change Regression Results using 1400 Meter Borders

% Change in Item Price								
			Low-Income Census Tracts			High-Income Census Tracts		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State Border (1400 meters)	-1.984	-2.006	-2.191	-2.203	4.768	4.694	4.631	4.537
	(2.183)	(2.168)	(2.181)	(2.184)	(1.920)	(1.918)	(1.916)	(1.968)
City Border (1400 meters)	0.233	0.289	0.115	0.129	-1.075	-0.807	-0.902	-1.030
	(2.514)	(2.518)	(2.553)	(2.556)	(2.065)	(2.058)	(2.068)	(2.086)
City Non-Border	-0.701	-0.989	-1.082	-1.075	3.629	3.549	3.556	3.437
	(2.364)	(2.462)	(2.463)	(2.473)	(1.905)	(1.991)	(1.996)	(2.039)
Pop. Density (000s)		-0.117	-0.173	-0.173		-0.122	-0.214	-0.221
		(0.098)	(0.118)	(0.117)		(0.132)	(0.185)	(0.189)
Restaurant Density (000s)		12.078	24.327	24.026		8.776	26.583	27.657
		(13.582)	(20.825)	(20.773)		(13.256)	(31.415)	(32.029)
Restaurants Per Capita			-246.837	-245.895			-147.370	-153.725
			(309.034)	(308.590)			(216.165)	(220.702)
Share Full Service			-3.917	-3.943			-0.059	-0.130
			(4.448)	(4.476)			(3.612)	(3.635)

% Change HHI				0.678				1.734
				(4.653)				(5.070)
Constant	18.636	19.792	23.714	23.552	14.553	15.194	16.097	15.999
	(1.505)	(2.046)	(4.162)	(4.182)	(1.198)	(1.543)	(3.112)	(3.134)
Observations	1,032	1,032	1,032	1,032	1,030	1,027	1,027	1,027
R^2	0.001	0.006	0.008	0.008	0.021	0.022	0.022	0.023
Adjusted R^2	-0.001	0.001	0.002	0.001	0.018	0.017	0.016	0.015

*p<0.1; **p<0.05; ***p<0.01

Table A14: Price Change Regression Results using 1800 Meter Borders

	% Change in Item Price							
	Low-Income Census Tracts				High-Income Census Tracts			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State Border (1800 meters)	-1.742	-1.969	-2.160	-2.174	4.315	4.166	4.113	4.021
	(2.185)	(2.184)	(2.191)	(2.194)	(1.869)	(1.865)	(1.873)	(1.902)
City Border (1800 meters)	-0.747	-0.826	-1.113	-1.117	-0.032	-0.027	-0.138	-0.307
	(2.390)	(2.396)	(2.447)	(2.447)	(1.944)	(1.943)	(1.950)	(1.979)
City Non-Border	-0.267	-0.595	-0.619	-0.602	3.687	3.586	3.634	3.486
	(2.581)	(2.740)	(2.746)	(2.773)	(2.083)	(2.141)	(2.152)	(2.182)
Population Density (000s)		-0.129	-0.188	-0.187		-0.126	-0.226	-0.236
		(0.098)	(0.118)	(0.118)		(0.133)	(0.192)	(0.196)
Restaurant Density (000s)		11.507	23.823	23.507		11.975	31.568	33.002
		(13.727)	(20.746)	(20.715)		(13.496)	(33.194)	(33.831)
Restaurants Per Capita			-249.946	-249.127			-158.835	-167.609
			(306.292)	(305.792)			(227.881)	(233.199)
Share Full Service			-3.999	-4.027			-0.618	-0.700
			(4.506)	(4.541)			(3.669)	(3.699)
% Change Household Income				0.692				2.434
				(4.702)				(5.035)
Constant	18.718	20.213	24.261	24.104	14.423	15.021	16.399	16.239
	(1.611)	(2.109)	(4.232)	(4.218)	(1.255)	(1.597)	(3.148)	(3.176)
Observations	1,032	1,032	1,032	1,032	1,030	1,027	1,027	1,027
R^2	0.001	0.005	0.008	0.008	0.015	0.017	0.018	0.019
Adjusted R^2	-0.002	0.0004	0.001	0.0003	0.012	0.012	0.011	0.011

As for menu changes and restaurant closures, our results are qualitatively the same regardless of whether we use a 1400, 1600, or 1800 border definition. As the following tables show, mean menu change rates and closure rates had similar results regardless of whether a 1400 meter or 1800 meter border definition was applied.

Table A15: Differences in Menu Changes Across Strata with 1400 Meter Borders

	Reference Group	**Percentage Point Difference in Menu Change Frequency Relative to Reference Group**		
	State Non-Border	**State Border (1400 Meters)**	**City Border (1400 Meters)**	**City Non-Border**
All Census Tracts	63.9% (3.7) [169]	-0.20 (5.23) [168]	6.0 (5.84) [103]	7.3 (5.02) [177]
Low Income Census Tracts	65.1% (5.23) [83]	-1.9 (7.51) [76]	1.6 (8.42) [51]	12.0 (6.65) [105]
High Income Census Tracts	62.8% (5.21) [86]	-1.9 (7.28) [92]	10.3 (8.10) [52]	-0.3 (7.73) [72]

Table A16: Differences in Menu Changes Across Strata with 1800 Meter Borders

	Reference Group	**Percentage Point Difference in Menu Change Frequency Relative to Reference Group**		
	State Non-Border	**State Border (1800 Meters)**	**City Border (1800 Meters)**	**City Non-Border**
All Census Tracts	63.9% (4.10) [137]	-3.2 (5.35) [200]	3.7 (5.79) [124]	6.1 (5.42) [156]
Low Income Census Tracts	67.2% (5.23) [67]	-2.0 (7.59) [92]	2.6 (8.15) [63]	9.1 (7.23) [93]
High Income Census Tracts	64.3% (5.21) [70]	-4.1 (7.41) [108]	4.6 (8.24) [61]	0.8 (8.30) [63]

Table A17: Differences in Closure Rates Across Strata with 1400 Meter Borders

	Reference Group	Percentage Point Difference in Closure Rate Relative to Reference Group		
	State Non-Border	State Border (1400 Meters)	City Border (1400 Meters)	City Non-Border
All Census Tracts	18.6% (2.72) [204]	1.60 (3.81) [227]	9.50 (4.48) [160]	-1.64 (3.78) [206]
Low-Income Census Tracts	22.7% (4.17) [101]	-1.67 (5.71) [109]	4.60 (6.40) [84]	-1.34 (5.54) [126]
High-Income Census Tracts	14.6% (3.48) [103]	4.93 (5.04) [118]	14.4 (6.26) [76]	-4.61 (4.83) [80]

Table A18: Differences in Closure Rates Across Strata with 1800 Meter Borders

	Reference Group	Percentage Point Difference in Closure Rate Relative to Reference Group		
	State Non-Border	State Border (1800 Meters)	City Border (1800 Meters)	City Non-Border
All Census Tracts	16.8% (2.66) [197]	5.04 (3.79) [234]	11.6 (4.43) [162]	-0.01 (3.73) [204]
Low-Income Census Tracts	19.6% (4.03) [97]	4.31 (5.69) [113]	7.47 (6.28) [85]	2.01 (5.46) [125]
High-Income Census Tracts	14.0% (3.47) [100]	5.83 (5.02) [121]	15.9 (6.26) [77]	-5.14 (4.72) [79]