Exploring Whether Fast Food Companies Target Food Insecure Communities

Abstract:

Food insecure families have been shown to gravitate to fast food restaurants' convenience and affordability. However, evidence suggests that fast food consumption is associated with increased obesity and heart disease rates. Evidence also suggests that fast food chains disproportionately advertise to populations with higher food insecurity rates, such as Black and Hispanic populations. This study seeks to understand whether fast food restaurants make entry decisions based on food insecurity rates. State-level fast food restaurant data in a multivariable ordinary least squares regression design were used to compare the change in the total number of restaurants in a state for one period based on that state's food insecurity rate from the previous period. For example, for a given state with a population of 25.4 million in one period, we found that a fast food insecurity rate increase of one percentage point would result in approximately 31 additional fast food restaurants opening in the next period. Examining county-level data would help iron out some of the state-level characteristic variations.

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1. Introduction

In 2020, the U.S. Department of Agriculture (USDA) classified 11.8% of all households and 33.1% of low-income households as food insecure (Coleman-Jensen 2021). The USDA defines food insecurity as the limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways. These food insecure households must use alternative strategies to meet their hunger needs. These strategies usually involve relying on government and non-profit programs for food and substituting typical food consumption for cheaper, unhealthier foods such as fast food (Butcher et al. 2020; Garasky, Morton, and Greder 2006). Furthermore, eating these unhealthy yet energy-dense foods is associated with adverse health outcomes such as obesity (Nackers and Appelhans 2013) and tooth decay (Chi et al. 2015). Since food insecure people are a vulnerable group, there is an ethical concern that communities with higher rates of food insecurity might be targeted by fast food companies, leading to adverse outcomes for those communities.

We are trying to discover whether fast food firms target food insecure populations when deciding where to locate new restaurants. Specifically, this paper examines whether the food insecurity rate and demographic data in a state in one period affect the number of new fast food restaurants in that state in the next period. This paper uses state-level food insecurity, demographic (i.e., percentage of Black and Hispanic), and consumer expenditure data from 2013 through 2017 to examine their relationship with fast food entry. To examine the relationship described above, we will be using an Ordinary Least Squares regression (OLS) and interpreting the changes from one period to the next. Under the assumption that firms make entry decisions based on prior years' information, we lagged our covariates by one year. In other words, we assume that the food insecurity rate and other variables from year zero affect the amount of new fast food restaurants in year one.

2. Literature Review

Food insecurity is a socioeconomic measure derived from several economic factors such as high prices, high unemployment, and poor social safety nets. Racial minority groups, the LGBTQ+ community, older people, disabled people, veterans, and immigrants are associated with a higher food insecurity rate than the general population (Flores and Amiri 2019). Fast food restaurants are an appealing meal source for food insecure people because these restaurants provide quick, cheap meals that can help families feed themselves for longer. Fast food is more prevalent in low-income families (Coleman-Jensen 2021), given its convenience for people with limited time to cook meals at home. This convenience is essential for low-income individuals since they are more likely to work multiple jobs when compared to higher-income individuals (Panos et al. 2014). In a similar study, Butcher et al. (2020) found that fast food restaurants cluster in areas with lower socioeconomic status, increasing unhealthy food consumption in these populations. Our study explores this relationship further. Specifically, whether there is evidence to suggest that firms consider food insecurity when making entry decisions.

Fast food entry strategy varies regionally and between corporate structures. For example, about 40% of fast food retail stores use a franchising model (Rajiv and Kaufman 2003). A key benefit to franchising is rapid expansion into areas with low commercial rental prices, typically tied to a lower income-earning clientele (Bischoff, 2012). Franchising as an industrial strategy could allow fast food restaurants to specifically target these areas.

Fast food restaurants also advertise at a higher rate to Black and Hispanic populations (Dunn, Sharkey, and Horel 2003). Since minorities are among the people with higher average rates of food insecurity than the general population (Flores and Amiri 2019) it is reasonable to assume these factors also influence their location strategy.

Most studies on food insecurity and dietary habits use surveys to collect data, such as Butcher et al. (2020); Bruening et al. (2012); Chi et al. (2015); Garasky, Morton, and Greder (2006); and Nackers and Appelhans (2013). While surveys can elicit information that cannot be observed otherwise, some weaknesses associated with surveying include lack of generalizability for convenience surveys (Nackers and Appelhans 2013) and inability to draw causality from cross-sectional surveys (Fleischhacker et al. 2011). Van Der Velde et al. (2020) found no significant relationship between food insecurity and fast food outlet exposure when studying low-income areas of the Netherlands. However, there is no similar study that has been conducted in the United States to our knowledge. Most other studies focus only on the more general relationship between food insecurity and unhealthy food consumption anywhere, such as within the home. To our knowledge, no studies could draw a direct causal relationship between food insecurity and unhealthy food consumption.

3. Conceptual Framework

With the literature showing that food-insecure people are more likely to frequent fast food restaurants, it might follow that the fast food industry shows an affinity toward placing restaurants in areas of higher food insecurity. Considering industrial organization principles, monopolistic competition's assumptions fit the fast food industry well. These restaurants sell horizontally differentiated products, defined as goods consumers choose based on personal preference rather than superiority. There are also high barriers to entry due to medium to high fixed costs of opening. In addition, the firms can hold market power because of consumer preferences for different fast food restaurants. Even though many firms sell at low prices, their differentiated products allow them to make at least some economic profit. Firms with market power can establish their prices, advertise, and choose locations to maximize monopolistic economic profit. Furthermore, fast food is generally considered an inferior good, a good that consumers want less of as they get richer.

Our research examines whether fast food companies consider food insecurity when selecting new restaurant locations, considering many of these behavioral decisions. It bears mentioning that some game theory models, such as Hotelling's and Dudey's models, predict that similar firms, like fast food restaurants, will locate near each other (Dudey 2019). Unfortunately, the geographic area we are studying is likely too large to consider the effect of firm clustering.

These entry decisions occur over long periods, and with high fixed costs, fast food firms need to consider entering a new market well in advance. In addition, information lags, or delays in the information that occur as economic conditions shift, are crucial to firm strategy. These firms likely use current food insecurity data to make future location decisions.

4. Empirical Framework

4.1 Hypotheses

Our null and alternative hypotheses are:

H_0: *Fast food location decisions are not associated with food insecurity rates.*

H_A: *Fast food location decisions are associated with food insecurity rates.*

4.2 Data and Summary Statistics

This paper utilizes fast food restaurant data from the US DOL BLS, food insecurity data from Feeding America's Map the Meal Gap project, state-level demographic data from the US Census Bureau American Community Survey (ACS), and consumer expenditure survey data from the US DOL BLS. We use data from 2013 through 2017 to obtain food insecurity, demographic, and consumer expenditure values. We use data from 2014 through 2019 to obtain fast food restaurant entry values. The units of observation in this study are 50 states.

Table 1 shows the summary statistics for our variables of interest and covariates that we will use in our OLS model. While the averages in this table are not weighted by state population, they can still provide insight into the relationship between fast food density and food insecurity.

There is no discernible pattern for average fast food entry over time, which stays between 8.29 and 11 additional fast food restaurants per million residents of a state. 2016 contains a notable outlier of 86 additional fast food restaurants per million residents corresponding to New York. The values for additional fast food restaurants per million residents were calculated by dividing the number of fast food restaurants in a state by the state's population (in millions) for a given year and then taking the difference in the new normalized values between years. These values are lagged backward by one year in Table 1 so they are in line with the covariates explaining restaurant entry.

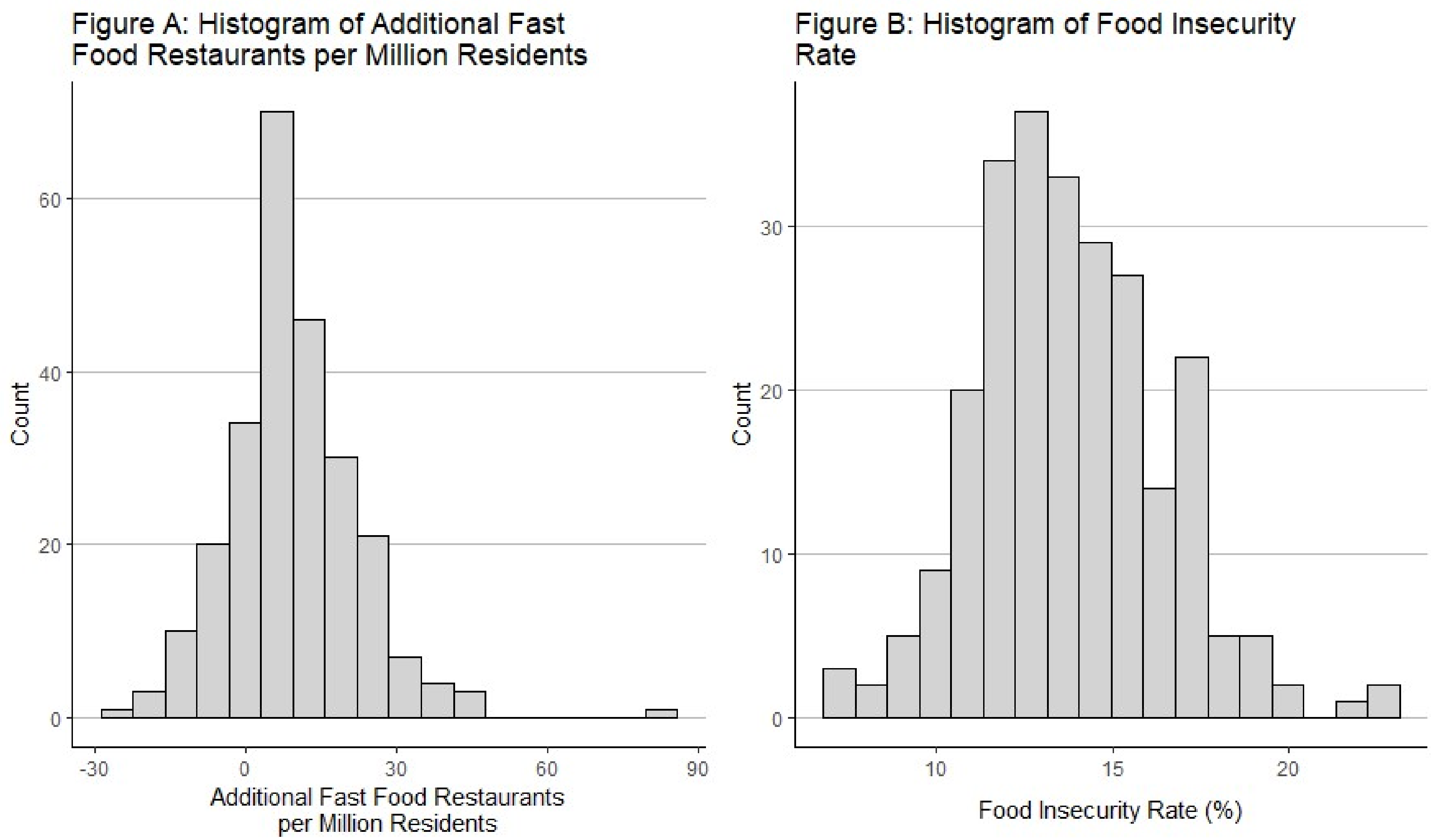
The average food insecurity rate decreases over time which is expected based on the prevalence of programs to combat food insecurity and increased economic conditions during this period. Figure 3 shows that our data for additional fast food restaurants per million residents and food insecurity are approximately symmetric and normally distributed, with a slight right skew for each.

Table 1: *Summary Statistics*

	Year					
	2013 (N=50)	2014 (N=50)	2015 (N=50)	2016 (N=50)	2017 (N=50)	Overall (N=250)
Additional Fast Food Restaurants per Million Residents in Next Year						
Mean (SD)	8.29 (12.1)	9.68 (9.03)	11.0 (16.0)	9.72 (14.0)	8.75 (12.8)	9.49 (12.9)
Median [Min, Max]	9.01 [-18.7, 32.8]	8.43 [-9.10, 36.2]	9.36 [-17.0, 85.9]	7.37 [-21.2, 46.1]	7.88 [-22.3, 41.8]	8.23 [-22.3, 85.9]
Food Insecurity Rate (%)						
Mean (SD)	15.0 (2.63)	14.6 (2.59)	13.7 (2.50)	13.1 (2.36)	12.6 (2.33)	13.8 (2.62)
Median [Min, Max]	14.6 [7.80, 22.7]	14.2 [8.00, 22.3]	13.2 [7.70, 21.5]	12.7 [7.40, 20.1]	12.3 [7.30, 19.2]	13.7 [7.30, 22.7]
% Black						
Mean (SD)	10.3 (9.55)	10.4 (9.56)	10.4 (9.54)	10.5 (9.56)	10.5 (9.55)	10.4 (9.48)
Median [Min, Max]	7.05 [0.400, 37.2]	7.15 [0.500, 37.3]	7.15 [0.500, 37.4]	7.30 [0.400, 37.5]	7.35 [0.400, 37.6]	7.25 [0.400, 37.6]
% Hispanic						
Mean (SD)	10.8 (10.0)	11.0 (10.1)	11.2 (10.2)	11.4 (10.2)	11.6 (10.3)	11.2 (10.1)
Median [Min, Max]	8.45 [1.30, 46.7]	8.65 [1.30, 47.0]	8.75 [1.40, 47.4]	8.85 [1.40, 47.8]	9.05 [1.50, 48.2]	8.75 [1.30, 48.2]
Household Expenditures on Meals Away from Home (Thousands of 2018 Dolars)						
Mean (SD)	3.11 (0.539)	3.23 (0.570)	3.17 (0.651)	3.37 (0.722)	3.35 (0.621)	3.25 (0.626)
Median [Min, Max]	3.03 [2.16, 4.66]	3.06 [2.40, 5.31]	3.11 [1.94, 4.96]	3.30 [1.24, 5.03]	3.35 [2.40, 5.54]	3.18 [1.24, 5.54]
Missing	19 (38.0%)	19 (38.0%)	17 (34.0%)	17 (34.0%)	17 (34.0%)	89 (35.6%)
Median Household Income (Thousands of 2018 Dollars)						
Mean (SD)	58.0 (9.46)	57.7 (9.46)	58.2 (9.59)	58.9 (9.71)	59.7 (9.85)	58.5 (9.57)
Median [Min, Max]	56.3 [42.5, 80.0]	56.0 [42.3, 79.4]	56.4 [42.5, 79.9]	57.1 [42.9, 80.4]	58.1 [43.3, 81.4]	56.5 [42.3, 81.4]

Notes: This table shows the summary statistics for each variable in our model by year and in total. Note that these values are not weighted by state population. The data used for this table are from the US DOL BLS table NAICS 722513 2014, 2015, 2016, 2017, 2018, and 2019; Feeding America’s Map the Meal Gap Project 2013, 2014, 2015, 2016, and 2017; the US Census Bureau American Community Survey 2013, 2014, 2015, 2016, and 2017; and the US DOL BLS Consumer Expenditure Survey 2013, 2014, 2015, 2016, and 2017.

Figure 3: *Histograms of Fast-Food Restaurant Entry and Food Insecurity Rate*



Notes: These histograms show that the data for fast food entry and food insecurity rates are symmetric and approximately normally distributed. The data used for this figure are from the US DOL BLS table NAICS 722513 2014, 2015, 2016, 2017, 2018, and 2019, and from Feeding America's Map the Meal Gap Project 2013, 2014, 2015, 2016, and 2017.

The average percentage of the population that is Black remains relatively constant over time. The average percentage of the population that is Hispanic increases slightly over time. Average median household income in 2018 dollars increases modestly over time. These variables are all 5-year averaged estimates.

Average household expenditures on meals away from home in 2018 dollars stays relatively constant over time. This variable was computed using weighting to correct for selection bias, nonresponse, and matching specific characteristics to known control totals and other characteristics.

4.3 Regression Equation

We will use an ordinary least squares (OLS) model to identify the association between fast food restaurant entry into a state and food insecurity within that state. The equation we will use is:

$$AFFRPMR_{it} = \beta_0 + \beta_1 * FIR_{i(t-1)} + \beta_2 * BLACK_{i(t-1)} + \beta_3 * HISPANIC_{i(t-1)} + \beta_4 * HHEFA_{i(t-1)} + \beta_5 * MEDINC_{i(t-1)} + \beta_6 * \mathrm{YEAR}_{(t-1)} + \epsilon_{i(t-1)} \qquad (1)$$

$AFFRPMR_{it}$ represents the additional fast food restaurants per million residents in a state for a given year. $FIR_{i(t-1)}$ represents the state food insecurity rate in a given year. $BLACK_{i(t-1)}$ and $HISPANIC_{i(t-1)}$ represent the percent of Black residents and Hispanic residents, respectively, in a state in a given year. It is useful to include race in our model since minorities are more swayed by fast food advertisements than other demographics (Dunn, Starkey, and Horel 2003). They are also more likely to be food-insecure than people of other racial backgrounds (Flores and Amiri 2019). $HHEFA_{i(t-1)}$ represents average household expenditures on food away from home by state measured in 2018 dollars for a given year. Specifically, it is the average amount a household unit spends on restaurants, fast food, coffee shops, and other food, excluding alcohol. $MEDINC_{i(t-1)}$ represents the median household income in each state for a given year. YEAR$_{(t-1)}$ is a year fixed effect. The subscripts *i* and *t* represent data at the state and year levels, respectively. Standard errors are clustered at the state level. Descriptive statistics for these variables can be found in Table 1.

The response variable of interest is additional fast food restaurants per million residents. This data is measurable and comes from the US Department of Labor (DOL) Bureau of Labor Statistics (BLS).

Looking at the fitted versus residuals and normal quantile plots for our regressions gives us confidence that our models' assumptions of normality, homoskedasticity, and linearity hold. However, we cannot say that the assumption of independence holds, as this is an observational study, and the amount of fast food restaurants added in a state in one year is likely related to the amount added in the next year. We also removed the observation associated with additional fast food restaurants in New York in 2016 because it is an extreme outlier, not seen in any other combination of year, location, and food insecurity rate.

Given that we assume a fair amount of omitted variable bias, we are unlikely to satisfy the assumption of unconfoundedness needed to draw causality. Although our regression specification has this limitation, we hope that the results will provide useful insights. Without data accessibility as a constraint, further experimentation using difference-in-difference or a natural experiment would help address unconfoundedness.

5. Results

5.1 Graphical Analysis

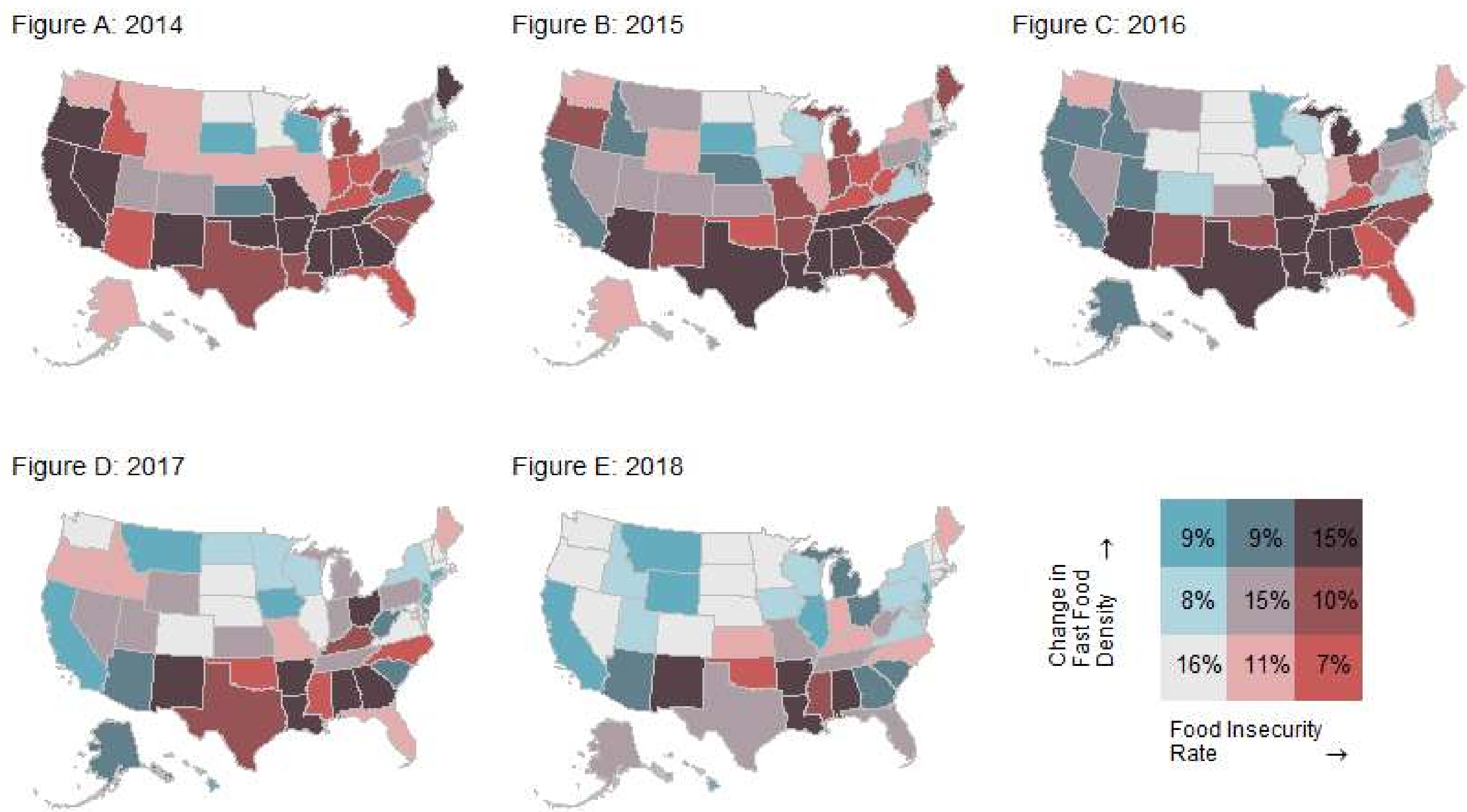
Preliminary graphical analysis shows a positive relationship between fast food entry and food insecurity rates. Figure 1 shows the relationship between fast food entry and food insecurity rates for each US state in 2014, 2015, 2016, 2017, and 2018. In these maps, it looks less common to see bright reds and blues, which indicate a negative relationship between our variables of interest, than maroons and grays, which indicate a positive relationship between our variable of interest. In addition, 46% of the states in Figure 1 have colors that indicate a positive relationship between fast food entry and food insecurity rates. Conversely, only 31% of states have colors that indicate a negative relationship.

Figure 2 visualizes the relationship between food insecurity rate and fast food entry as a scatterplot. The relationship is linear and upward sloping, with an outlier of 86 additional fast food restaurants per million residents at a food insecurity rate of 12.6%. This outlier corresponded to New York in 2016.

5.2 Regression Analysis

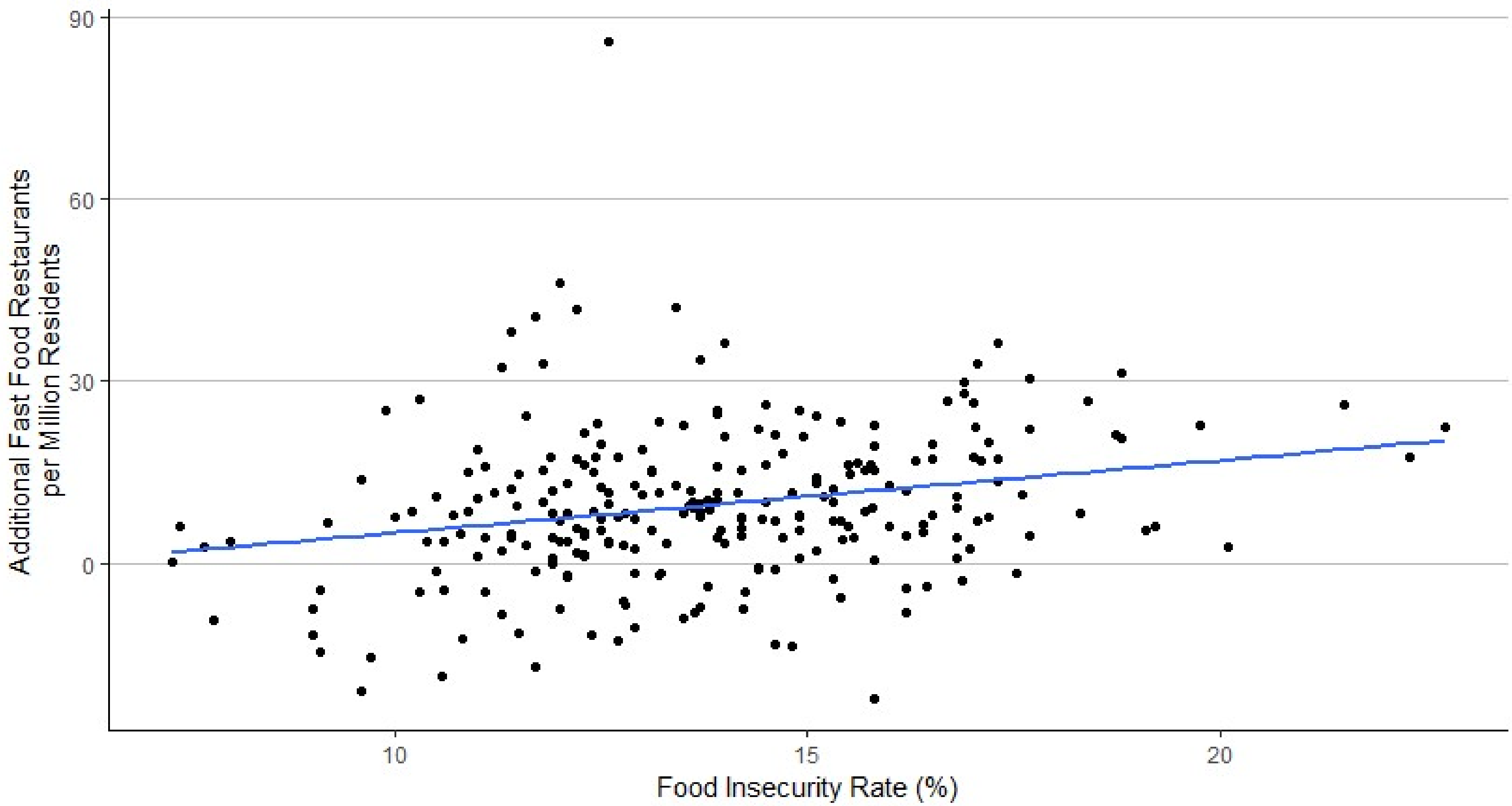
Our regression results provide evidence that higher fast food entry is associated with higher food insecurity rates. Table 2 shows that the coefficient on food insecurity rate is positive for all seven of our models. The coefficient is significantly different from zero for equations one through five. This suggests that as the food insecurity rate in a state increase, the number of additional fast food restaurants per million residents in that state increases. We believe that the coefficient on food insecurity rate is not significantly different from zero in equations six and seven because the inclusion of the coefficient for money spent on meals away from home limits the number of observations that we can use in our regression equations.

Figure 1: *Bivariate Choropleth Maps of Food Insecurity Rates and Fast-Food Entry*



Notes: These maps show the relationship between state food insecurity rates in the previous year and fast-food restaurant entry in the year listed. Colors on the diagonal from the bottom left to the top right of the legend show a positive relationship between these variables. The positive relationship weakens as the colors move away from that diagonal. For example, a state with the same color as the top right square in the legend would be in the top third in the U.S. for both food insecurity and fast food entry. The numbers on the legend indicate the percent of states in the maps that correspond to each respective square. The data used for this figure are from the US DOL BLS table NAICS 722513 2014, 2015, 2016, 2017, 2018, and 2019, and from Feeding America's Map the Meal Gap Project 2013, 2014, 2015, 2016, and 2017.

Figure 2: *Scatterplot of Food Insecurity Rate Versus Additional Fast Food Restaurants per Million Residents*



Notes: The figure above shows a positive linear trend between food insecurity rate and additional fast food restaurants per million residents. The data used for this figure are from the US DOL BLS table NAICS 722513 2014, 2015, 2016, 2017, 2018, and 2019, and from Feeding America's Map the Meal Gap Project 2013, 2014, 2015, 2016, and 2017.

Table 2: *Regression Specification*

	Dependent variable:						
	Additional Fast Food Restaurants Per Million Residents						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Food Insecurity Rate (%)	1.25***	0.79***	0.95***	0.86**	1.19**	0.69	0.77
	(0.26)	(0.30)	(0.33)	(0.43)	(0.54)	(0.56)	(0.85)
% Black		0.26***	0.24***	0.26***	0.22**	0.33***	0.33***
		(0.09)	(0.09)	(0.09)	(0.10)	(0.11)	(0.12)
% Hispanic		0.15**	0.14**	0.14**	0.13*	−0.01	−0.01
		(0.06)	(0.06)	(0.07)	(0.07)	(0.08)	(0.09)
Median Household Income (Thousands of 2018 Dollars)				0.02	0.08	−0.0001	0.02
				(0.12)	(0.13)	(0.15)	(0.21)
Household Expenditures on Meals Away From Home (Thousands of 2018 Dollars)						−0.25	−0.40
						(1.97)	(1.98)
Constant	−8.08**	−6.14	−9.96**	−8.32	−17.59	−4.66	−7.58
	(3.78)	(3.82)	(4.73)	(11.22)	(14.10)	(14.80)	(22.21)
Year Fixed Effects	No	No	Yes	No	Yes	No	Yes
Observations	249	249	249	249	249	160	160
R^2	0.08	0.12	0.12	0.12	0.13	0.12	0.12
Adjusted R^2	0.07	0.11	0.10	0.10	0.10	0.09	0.07
Residual Std. Error	11.55 (df = 247)	11.33 (df = 245)	11.38 (df = 241)	11.35 (df = 244)	11.39 (df = 240)	11.45 (df = 154)	11.57 (df = 150)
F Statistic	20.10*** (df = 1; 247)	10.85*** (df = 3; 245)	4.90*** (df = 7; 241)	8.12*** (df = 4; 244)	4.33*** (df = 8; 240)	4.20*** (df = 5; 154)	2.36** (df = 9; 150)

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

Notes: The table above provides ordinary least squares regressions with robust standard errors clustered at the state level. The data used for this table are from the US DOL BLS table NAICS 722513 2014, 2015, 2016, 2017, 2018, and 2019; Feeding America's Map the Meal Gap Project 2013, 2014, 2015, 2016, and 2017; the US Census Bureau American Community Survey 2013, 2014, 2015, 2016, and 2017; and the US DOL BLS Consumer Expenditure Survey 2013, 2014, 2015, 2016 and 2017.

The coefficient on % Black is positive for regression equations two through seven which is what we would expect. It is also significantly different from zero for these regressions. The coefficient on % Hispanic is positive for regression equations two through five, which is what we would expect, and negative for regression equations six and seven. We believe that this change in sign has to do with the limitations from adding the coefficient money spent on meals away from home mentioned above. However, the coefficient on % Hispanic in models six and seven is not significantly different from zero.

The coefficient on median income in regression equations four through seven is positive, which is surprising, but not significantly different from zero. However, we still believe that median income is worth including in our equations.

The coefficient on money spent on meals away from home is negative for equations six and seven, which is not what we would expect. However, the coefficient in both equations is not significantly different from zero.

Looking at regression equation five, an increase in one percentage point in a state's food insecurity rate is associated with an increase of 1.19 fast food restaurants per million residents of that state in the next year on average, holding everything else constant. We are 95% confident that this increase is between 0.13 to 2.25 fast food restaurants per million residents on average. To put this into perspective, imagine two states, state A and state B, which are identical in every way except that the food insecurity rate is one percentage point higher in state B than in state A. In this case, state B would add 1.19 more fast food restaurants per million residents than state A would in the following year. This can be written out using the equation below:

$$FIR_{State\ A} + 1pp = FIR_{State\ B}$$

$$\Rightarrow AFFRPM_{State\ A} + (1.19\ AFFRPM) = AFFRPM_{State\ B} \quad (2)$$

FIR stands for food insecurity rate and AFFRPM stands for additional fast food restaurants per million residents.

For a state like Texas in 2014 with a population of 25.4 million, this would translate to an increase of about 31 more fast food restaurants in 2015 compared to a hypothetical Texas that had a food insecurity rate one percentage point lower in 2014.

Regression equations two through seven in Table 2 all have an R^2 value of 12% or 13% and a residual standard error between 11.33 and 11.55. These R^2 and residual standard errors suggests that our models do not explain a lot of the variation in fast food restaurant entry. We believe that we could explain more of this variation with access to better data, which is discussed in section 7.

6. Discussion

The existing literature focuses on the perspective of how fast food availability affects vulnerable populations such as youth (Harris, Schwartz, and Brownell 2010;Davis and Carpenter 2009), minority groups (Baker et al. 2006; Fleischhacker et al. 2011), and people with low socioeconomic status (Baker et al. 2006; Smoyer-Tomic et al. 2008). The main question these studies ask is, how does increased access to the low quality, caloric dense, and non-nutritious food served at fast food restaurants affect the health outcomes of vulnerable groups. We found that papers on this topic didn't explicitly study the relationship between fast food and food insecurity rates. Instead, they focus on characteristics largely associated with food insecurity. The disciplines that study questions similar to ours are public health, dietary and human sciences, humanities, and social science. Our paper approaches this topic from an economic perspective, focusing specifically on a fast food firm's decision to enter a disadvantaged area with high food insecurity.

One critique of the existing literature is that they seem to approach the problem from the same angle. Specifically, they focus on already existing fast food locations and examine the characteristics of the surrounding area. Instead, our paper incorporates the firm's decision to enter locations with factors that might make them more likely to consume their product. Another critique is that comparable studies used a convenience survey for a smaller location that may not represent the nation. Therefore, we designed our study to use representative data for the United States.

The results from our model support the conclusions found in existing literature except for socioeconomic status. Specifically, we did not find evidence that our socioeconomic variable, median household income, affected the number of restaurants added in a state. However, we did find a statistically significant positive effect of the percentage of the population who are Black and Hispanic on the number of restaurants added. In a systematic review of increased access to fast food, ten out of twelve studies found an association between race and fast food density like we did. In contrast, only three out of nineteen found no association between income level and fast food availability like us (Fleischhacker et al. 2011).

7. Conclusion

Our study found some evidence to suggest that fast food restaurant location decisions are associated with higher food insecurity rates. This is concerning for the health outcomes of vulnerable populations and warrants further studies.

The biggest limitation of our research is that we cannot draw causality from our results because we did not use a natural experiment, nor do we think we satisfied unconfoundedness using our covariates. Therefore, our results can only be interpreted as a relationship between fast food entry and food insecurity. One possible source of cofounding is wages paid to fast food workers. Fast food restaurants may want to locate in areas with low wages, but low wages would also lead to more food insecurity. Another source of confounding is existing fast food restaurant density. Fast food restaurants may not want to locate in an area overcrowded with competitors, but an increase in fast food availability may lead to lower food insecurity. This second potential source of confounding is not as applicable to our study and is not as likely to hold in the real world.

The relationship we found can also only be interpreted at the state level to avoid making an ecological fallacy. For example, while we found that fast food restaurants tend to locate more restaurants in states with higher food insecurity rates, they might locate fewer restaurants in cities within that state that have high food insecurity rates. It is also possible that an ecological fallacy could occur when generalizing our results to rural and urban areas within states.

We would have also liked to use data on commercial real estate prices in each state over time as we believe that these prices have a large effect on fast food location decisions. However, this data is difficult to find and what does exist online is costly and difficult to obtain.

Additional research would help answer whether the relationship we found holds at the city or even neighborhood level. However, accurate food insecurity data only exists at the state level. It would also be interesting to explore whether a different time lag than we used in our model yields different results.

An ideal scenario (experimentally, not ethically) would be one where there were two identical locations, but one received an exogenous shock that changed its food insecurity rate and nothing else. Then, we could observe the fast food entry in both locations over time to determine the effect of a location's food insecurity rate on fast food entry.

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