

Running from Money?

The puzzle of bars and liquor stores locating in black neighborhoods

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Abstract. Data from sample markets in Minneapolis, St. Paul, Tampa, Birmingham, and Oakland show that bars and liquor stores tend to cluster disproportionately in predominantly black neighborhoods. Longitudinal data on alcohol consumption, however, suggests blacks on average consume less alcohol than whites. Thus, it appears that bars and liquor stores do not locate nearest the best consumers. Using regression analysis I find I cannot reject the hypothesis that race independently impacts the location decisions of bars and liquor stores. I also find suggestive evidence that being black is correlated with lower expected regulatory costs facing firms contemplating entry into black neighborhoods.

I. Introduction

Firm address data suggests liquor stores and bars locate disproportionately in predominantly black neighborhoods near the urban core. For example, in Hillsborough County, Florida, 46% of all bars in the county are located in the top quartile of block groups by proportion of the block group population that is black. Further evidence of the association between bar location choices and the presence of black populations can be found in Section 6, wherein regressions of sample market bar and liquor store counts on discrete categorizations of block groups by percentage population black yield statistically significant, positive coefficients. LaVeist and Wallace (2000) find the same phenomenon in their analysis of 194 Census tracts in Baltimore, Maryland, where they conclude that “liquor stores are disproportionately located in predominantly black Census tracts.” This tendency to locate near black population centers is counterintuitive; Costanzo et al (2007) demonstrate that for the vast majority of the average person’s lifetime blacks are significantly less prone to drink heavily than whites. At age 20, about 35% of black males drink heavily, compared to 55% of whites. The gap between white and black females is even larger. Similarly, regression analysis in Section 6 using demographic and alcohol consumption estimates by sample market reveals a negative association between consumption and the percent population black quartiles. Therefore, at first glance these firms are not locating nearest the most potentially profitable

customers, a curious phenomenon in economics. I ask: why this counterintuitive observation? To my knowledge, no one has examined this puzzle at length before.¹

The vast majority of scholarship on the relationship between race and the economic disposition of the urban space focuses on residential segregation, which is the subject of a large body of scholarly literature (Massey and Denton 1993). The location decisions of firms, however, also play a significant role in the welfare of urban communities. Bars and liquor stores generate negative externalities for nearby residents; the extent to which these negative externalities are concentrated in black “ghettos” increases racial disparities in health outcomes and quality of social environment. Gyimah-Brempong (2001) finds that increasing the number of alcohol licenses in a Census tract by 10% raises the total crime rate by roughly 9.2%. Brown and Jewell (1995) find that increasing the number of alcohol vendors in an average county by 0.166 per mile of road (one-half of one standard deviation) results in 41.65 additional automobile accidents per year. Identifying the primary factors contributing to the racially skewed spatial distribution of alcohol establishments would enrich policymakers’ understanding of how public policy might optimize alcoholic consumption and limit these adverse consequences.

Attempting to explain the puzzling tendency of firms to cluster near black enclaves requires an economic model designating what factors influence bar and liquor store location decisions in an urban landscape. No literature exists on the economic determinants of the location decisions of bars and liquor stores specifically; most literature, like that above, focuses on the impact of alcohol seller location on consumption and environmental or health outcomes. However, two simple facts about bars and liquor stores stand out: bars and liquor

¹ LaVeist and Wallace (2000) do control for median income and race-income interactions in their analysis of race and liquor store locations, but that is the extent of their analysis.

stores generate negative externalities suffered by nearby residents, and they provide goods for nearby residents. These two basic observations suggest the relevance of two sets of theoretical frameworks used to analyze other types of firms. In one, the location decisions of firms are driven by communities' varying willingness and capacity to demand compensation for externalities; in the other, the geographic distribution of competitors and economically relevant features is decisive.

Hamilton (1993, 1995) examines the role of collective action in imposing costs on hazardous waste facilities for the negative externalities they generate. Similarly, communities may impose regulatory costs through restrictive zoning provisions on nearby, externality-generating bars and liquor stores. Variations in the incidence of such collective action, which raises the costs to firms of locating in a given area, might explain patterns in firm location decisions. With regards to the influence of the geographic distribution of competitors and economically relevant features, Netz and Taylor (2002) explore the determinants of gas station location decisions using spatial competition theory and industrial organization, placing special emphasis on how the lack of product differentiation among gas stations results in differentiation in geographic space. The theory they expand on is especially useful for introducing controls into my study.

My study will benefit by improving upon several shortfalls in the Hamilton and Netz and Taylor models. A significant shortcoming of Hamilton's studies (1993, 1995) is their reliance on imprecise proxies for the capacity of a given community to overcome the free-rider problem and impose sanctions on firms producing negative externalities. Netz and Taylor (2002) use weak proxies for important variables like zoning regulations and characterize consumer heterogeneity in a relatively narrow sense inappropriate to the study of location

decisions by bars and liquor stores. Finally, their sampling techniques are suspect due to the selection bias introduced by centering sample market areas on existing firms.

The present study merges, extends, and enhances the models used by Hamilton and Netz and Taylor in addressing a new question previously untouched by the literature: why do bars and liquor stores tend to locate near black population centers when blacks on average consume less alcohol than whites? It does this by using a more detailed data set, improved sampling techniques, and direct measurement of political sanctions. I use data on demographic and market characteristics; the distribution of consumers across geographic space; heterogeneity of consumer preferences in product space; product differentiation; the level of competition; environmental amenities; and political sanctions expressed through zoning to comprehensively characterize the geographic distribution of observed, economically relevant features in the cities of Saint Paul, Minneapolis, Tampa, Birmingham, and Oakland.

I ask two questions: what causative factors best explain the counterintuitive pattern of firm location observed, and, therefore, what theoretical framework best explains that pattern? To this end I test four hypotheses. First, the market space may explain the disproportionate tendency to locate in black neighborhoods. For instance, the physical distribution of effective consumer demand is largely a function of the time costs involved in purchasing alcohol or patronizing bars, which in turn depends not only on distance but also transportation technology. Perhaps a measure of superior transportation technology - like the existence of at least one interstate exit in a sample market - happens to be positively correlated with the proportion of the market population that is black. Second, the counterintuitive observation may be driven by variance in the capacity of individuals and collectives to demand compensation from firms for the negative externalities they generate. Third, the higher credit risks of doing

business in black neighborhoods or the higher resource constraints of black entrepreneurs may result in an overabundance of small retailers like bars and liquor stores in predominantly black neighborhoods. Finally, perhaps location decisions are driven by utility derived from inflicting negative externalities on minority populations, or cognitive imperfections like stereotypes that bias firm owners to believe that blacks drink more than whites when they really do not. I find mixed evidence in support of the fourth hypothesis, which indicates the existence of market imperfections and stereotype bias in the alcohol sellers market. The association with race is weakened in the full model, however, and I find suggestive evidence that this attenuation is explained by the role of zoning regulatory mechanisms in shaping the geographic profile of the alcohol sellers market.

This paper proceeds as follows. Section 2 examines the existing literature. Section 3 describes the theoretical framework. Section 4 summarizes the data. Section 5 specifies the model used to test my hypotheses. This model examines the profit-maximizing interests of the firm, the attempts of individuals and collectives to demand compensation, possible evidence of a bias towards small retailers in predominantly black neighborhoods, and discriminatory intent or cognitive biases as possible explanatory factors for the counterintuitive observation under consideration. Section 6 presents the results. Section 7 draws conclusions and makes policy recommendations based on the results.

II. Literature Review

No research has been done attempting to determine why bars and liquor stores tend to locate disproportionately in black communities even though blacks on average drink less than whites. In filling this gap, this study utilizes two different strands of related literature. The first attempts to explain the tendency of firms that produce negative externalities for nearby

residents to locate near minority population centers by exploring variation in the collective actions communities take to obtain compensation for negative externalities. This literature is relevant since bars and liquor stores inflict (or are perceived to inflict) significant negative externalities on nearby residents in a manner similar to Hamilton's hazardous waste facilities (1993, 1995). The second strand of literature explains determinants of firm location behavior by employing a theoretical framework of spatial competition, which emphasizes factors such as differentiation in product and geographic spaces, the distribution of consumers and competitors, heterogeneity of consumer preferences, demand elasticity, and type of transportation technology (Netz and Taylor, 2002). This literature has obvious relevance for profit-maximizing bars and liquor stores making location decisions in an urban landscape. Both of these literatures will therefore be useful in developing the model of bar and liquor store location decisions necessary to explain the counterintuitive pattern of location decisions described above. Relevant studies from both literatures also suffer from methodological weaknesses and data limitations that this study will improve on in attempting to explain a puzzling phenomenon no one has confronted before.

The literature linking the Coase Theorem, negative externalities, compensation demands, and community activism and collective action in a city or other local environment is relatively thin given the specificity of the subject matter. Since the classic negative externality case is pollution, it is perhaps unsurprising that most of what literature does exist deals primarily with polluting firms and other environmentally-related economic activities. For instance, Brooks and Sethi (1997) find in their analysis of variation in air toxicity across US zip codes that voter turnout and therefore the capacity of a community to demand compensation for negative externalities are important determinants of the variation in toxicity

across communities. The importance of race in predicting variations in toxicity is enhanced to the extent that race is associated with difficulties in overcoming the free-rider problem, or institutional obstacles that impede the effectiveness of collective action. Pargal and Mani (2000) find evidence from an analysis of industrial plant entry in India that when making location decisions firms account for the risk that nearby residents will engage in activism and collective action to demand compensation for negative externalities.

The nearest analogues to my research are Hamilton's studies (1993, 1995) of the tendency of hazardous waste facilities to locate disproportionately near minority populations. Hamilton (1995) supposes that in a Coasean world with zero transaction costs, residents would demand compensation for the decision by a waste disposal firm to locate hazardous waste facilities nearby. The greater the externalities and the higher the willingness to pay to forego them, the higher the compensations demands and the more burdensome are the costs of locating in that area. Real world transaction costs, however, imply that the effective demand for compensation requires the collective technology of the political process, which is imperfect. Cooter (1982) suggests, alternatively, that "the final obstacle to private noncompetitive bargains is the absence of a rule for dividing the surplus, not the cost of bargaining," and hence a third party, the political institution, must force agreement. Either way, the extent to which an agreement can be reached by which firms are induced to compensate for their costs depends on the extent to which political collectives overcome the free-rider problem and institutional obstacles to collective action to impose sanctions on such firms.

Hamilton (1995) develops tests for three hypotheses of why toxic waste sites will tend to disproportionately locate closer to black populations. If the Coase Theorem provides the

best explanation, firms will tend to avoid locations with populations possessing a high willingness to pay to forego negative externalities. Therefore, income and education (which increases awareness of the adverse health effects of pollution) should have a statistically significant impact on hazardous waste facilities' location decisions. If transaction costs prohibit a straightforward application of the Coase Theorem, political institutions still might allow some communities to overcome free riding and demand compensation for negative externalities. In this scenario, variables measuring the capacity for collective action therefore should be statistically significant, but not race. If officials and firms making the location decisions derive utility from harming racial minorities, race should be statistically significant.

Given that bars and liquor stores are similarly perceived to generate negative externalities for nearby residents, these hypothesis tests can be adapted to the analysis of location decisions by bars and liquor stores, as outlined in Section 5. But unlike Hamilton's toxic waste dumps, which are purely "bads," the present study deals with firms that also produce "goods" for nearby residents. Therefore, as suggested in the introduction, there may exist market-driven explanations for the counterintuitive pattern of locations I am attempting to understand. Consequently, the prolific literature on spatial competition in product and geographic space provides substantial guidance for this study by helping to identify and model the factors influencing the locational behavior of profit-maximizing bars and liquor stores. I combine important elements from these models with the Hamilton model to explore the full range of possible hypotheses, as well as to identify important controls for use in my empirical model.

Netz and Taylor (2002) explore empirically the tendency for gas stations in the Los Angeles basin to spatially cluster or spread out depending on demand, market characteristics,

entry costs, and proxies for competition. They include in their model of gas station entry decisions key factors of general interest in exploring the location decisions of profit-maximizing firms in an urban landscape. These include the geographic distribution of consumers, competitors, and different transportation technologies; heterogeneity in consumers' preferences and marginal willingness to pay; and the degree of product differentiation between competitors.

This framework hails from a substantial and largely theoretical literature that has gradually relaxed the constraints to Hotelling's original spatial competition analysis (1929). Smithies (1941) loosens the assumption of perfectly inelastic demand, and thereby uncovers tendencies to separate spatially as well as to cluster. In general, as product differentiation increases, spatial differentiation decreases, and vice versa. The tendency to cluster is known as the market share effect; firms attempt to "steal" market share from one another by locating closer to their most numerous and most profitable customers. The tendency to spread out is known as the market power effect; firms spread out so as to reduce price competition between them and obtain some measure of market power (Netz and Taylor, 2002). Liquor stores should tend to exhibit the latter behavior because their product is undifferentiated and price competition fierce; bars should have a tendency to cluster given the greater degree to which they can differentiate their products by varying the atmosphere and "personality" of their establishments. Picone, Ridley, and Zandbergen (2007) find empirical evidence from Tampa using the same firm data used in this analysis that on-site alcohol retailers (bars and restaurants) are "more likely to cluster than offsite retailers" (liquor stores and grocery stores). The authors note this evidence is consistent with the theory of spatial competition given that

bars and restaurants can differentiate their products more than can liquor stores and grocery stores.

Eaton and Lipsey (1975) find that firms gravitate towards bulges in nonuniform distributions of consumers. The behavior of alcohol sellers at first appears to violate this expectation, since they cluster around black populations that exhibit much less effective demand for alcohol than white populations. However, it is important to remember that transportation technology and variations in consumer mobility also impact the effective geographical distribution of consumer demand. Therefore, Netz and Taylor (2002) include a dummy signaling proximity to a “major road.” It is entirely possible that for a variety of possible reasons the confluence of major roads disproportionately occurs in primarily black neighborhoods.

Several opportunities for improvement exist in these two strains of economics literature. First, Hamilton (1995) estimates the role of collective action in affecting the location decisions of hazardous waste facilities with variables that measure merely the “capacity” for collective action, as proxied by the voter turnout rate for a county in the 1980 presidential race. These variables do not capture the actual incidence of collective sanction against hazardous waste facilities.

Netz and Taylor (2002) proxy zoning by assuming that increases in the percentage of the market requiring prepayment and the percentage rented correlate with reductions in zoning restrictiveness. By contrast, my data allows for direct measurement of zoning restrictiveness. Furthermore, in their analysis of gas station location decisions, Netz and Taylor are limited in how extensively they can characterize the local consumer population by the obvious mobility of gasoline consumers. They represent consumer demand and distribution using only median

household income and a dummy indicating proximity to a major road. Their sampling techniques are also suspect. Netz and Taylor define a market area by drawing circles of fixed radii around each firm. This, however, introduces a significant selection bias into their sampling. This method would tend to over sample areas where bars cluster and inflate the explanatory power of variables. For instance, suppose under Netz and Taylor's technique regression analysis shows proximity to interstate exits explains 20% of the variance in firm location decisions. However, what if there exist many places in the urban landscape with concentrations of interstate exits but no bars? Clearly, this would limit the explanatory power of interstate exits.

The present study offers several extensions and improvements on the work of Hamilton and Netz and Taylor. First, my data set allows for a more detailed characterization of the geographic distribution of economically-relevant features than can be found in either Hamilton or Netz and Taylor. This, in turn, allows me to more effectively translate the firm's profit function into empirical measures. I utilize data on the locations and/or characteristics of block groups; age, race, income, and other population data; roadways, interstate exits, and public transportation nodes; firms offering imperfect substitutes for bar and/or liquor store products; environmental amenities; restrictive zoning; and other variables that impact the profitability of bars and liquor stores.

Furthermore, I estimate the actual incidence of collective sanctions levied against firms that produce negative externalities by using zoning data. I possess detailed data on the zoning maps of the metropolitan areas from which this study's sample is drawn. These zoning maps represent a significant component of the collective sanctions a political community imposes on businesses that generate negative externalities. This allows me to directly measure the role of

collective action in influencing the entry decisions of firms that produce negative externalities.²

Additionally, I extend the Netz and Taylor model by introducing detailed measures of consumer heterogeneity. My analysis benefits from income, household size, and race profiles down to the block group level, in addition to the transportation and environmental amenity measures specified above. I improve on the sampling techniques used by Netz and Taylor by randomly selecting points within the urban space to serve as centers of circular markets of fixed radius. The example above suggests that using a random sampling technique will more accurately isolate the impacts of the explanatory variables.

III. Theoretical Framework

1. Race

Race may be associated with a variety of explanatory variables that independently explain the counterintuitive tendency of bars and liquor stores to locate disproportionately in predominantly black neighborhoods. The literature reviewed above helps to further characterize in this section the four hypotheses (labeled here a through d) outlined in brief in Section 1.

a. Low Income: Housing Density

First, blacks' lower average income is associated with certain environmental factors that moderate firm location behavior. The most obvious is that lower-income blacks will tend

² One possible objection to the use of a zoning variable is the extent to which political support for restrictive zoning may reflect reduced consumer preference for alcohol consumption. Since included demographic variables do not explain all the variation in consumer preferences, this may result in omitted variable bias with the unobserved determinants of consumer preferences. This objection will be discussed in detail in Section 5.

to purchase housing in denser housing areas. The distribution of bars and liquor stores is determined in part by the distribution of consumers across geographic space. Firms gravitate toward bulges in the nonuniform distribution of consumer demand in geographic or product space (Ansari et al, 1994). Therefore, areas with higher population densities should attract more firms, *ceteris paribus*.

Additionally, higher density housing areas are a convenient place to locate transportation nodes because high volume can justify the substantial fixed costs involved in constructing roads. This matters for firm location behavior because time costs factor into consumption decisions. If methods of transportation were ubiquitous, the only variable impacting transportation costs would be distance. However, access to different transportation technologies varies across space. Interstate on/off ramps and major roadways are not uniformly distributed. Therefore, the locations of these transportation technologies also impact the location decisions of firms. The association between the geographic distribution of transportation technologies and race would therefore associate race with the geographic distribution of alcohol sellers.

b. Low Income, Community Investment, and Political Activism

Second, as another consequence of lower average income, blacks tend to rent housing more than do whites. The literature on political activism suggests that one consequence of renting is a relative diminishment in a sense of investment in a community, and a concomitant decline in civic activism. Di Pasquale and Glaeser (1999) find that “in the U.S... homeownership is strongly correlated with variables that attempt to measure good citizenship, such as... involvement in local politics.” They conclude that “standard economic influences (both the effects of ownership and tenure) influence investment in social capital.” Although

tenure is unobserved in my sample and may compound this hypothesis, it is consistent with the literature to suggest that lower rates of homeownership in predominantly black neighborhoods may reflect or contribute to less community involvement and lower average social cohesion, both factors which might inhibit effective collective action against alcohol sellers that are perceived to inflict negative externalities on nearby communities.

Because of the large transaction costs involved in privately demanding compensation for the perceived negative externalities bars and liquor stores impose on nearby residents, the political technology is used to impose sanctions on such firms. But this technology is imperfect, and requires that residents overcome the free rider problem. Therefore, to the extent that race is correlated with less social capital or institutional obstacles to political action, race may also be associated with weaker political sanctions and, consequently, with fewer barriers to the entry of bars and liquor stores.

The zoning map is a major policy instrument by which political collectives impose sanctions on firms producing negative externalities at the neighborhood level. As Pogodzinski and Sass (1990) note in their literature review of the economics of zoning, “externalities are the usual *raison d’être* for zoning regulations.” Zoning will therefore be considered as the primary tool used by residents to impose sanctions on bars and liquor stores. Typically, cities institute a zoning map that assigns parcels of city land to different land use categories. Usually there are residential, commercial, and industrial zones. Generally speaking, bars and liquor stores are prohibited in residential zones, and only sometimes permitted in commercial and industrial zones. These regulations should limit the geographic choice set available to bars and liquor stores, and increase the price of available plots of land.

c. Credit Availability and Black Entrepreneurs

Credit markets could impact the prevalence of small retailers like bars and liquor stores in predominantly black neighborhoods in two ways. First, perhaps the risk of default is higher for businesses locating in black neighborhoods due to a relatively less healthy local economy. With higher costs of borrowing, higher interest rates may lead to a local bias towards smaller retailers that require fewer resource commitments to start. Thusly, higher risks of default may lead to a disproportionate number of bars and liquor stores locating in black communities.

Additionally, perhaps the resource constraints of black entrepreneurs result in a relative abundance of small retailers in predominantly black areas, and hence a tendency for black neighborhoods to host disproportionately many alcohol sellers. There exists extensive literature documenting the special challenges blacks face in obtaining credit. Identified barriers to good credit include limited wealth, weaker credit histories, racial discrimination, and other factors (Canner, Gabriel, and Woolley 1991; Munnell et al 1996). Blanchflower, Levine, and Zimmerman (2003) find strong evidence that “black-owned small businesses are about twice as likely to be denied credit even after controlling for differences in creditworthiness and other factors.” These resource constraints may lead black entrepreneurs to concentrate on smaller retailers, like bars and liquor stores.

The composition of an area’s entrepreneurial population may have an impact on that area’s commercial landscape if there exist market imperfections in capital flows within a given city. Imperfect credit markets may impose resource constraints on local entrepreneur population that lead them to fail to exploit certain profit making opportunities, while disproportionately pursuing others (those that require fewer resource commitments). If capital flowed costlessly from one neighborhood of a city to another, firm entry and exit by “outside”

owners would prevent these constraints on local owners from manifesting themselves in the overall pattern of firm types found within a given neighborhood. Black owners would still disproportionately own smaller retailers, but firm entry and exit by outside entrepreneurs would lead the allocation of capital more generally to match its most profitable employments. However, perhaps information is imperfect (i.e., not costless) and hence entrepreneurs from one neighborhood are less likely, *ceteris paribus*, to employ their capital in another neighborhood they do not know as well due to this uncertainty. If these capital market imperfections make capital disproportionately unlikely to flow as easily from one neighborhood of a city to another as to different employments within a given neighborhood, the proclivity of black entrepreneurs for starting smaller retailers would translate into a relative abundance of smaller retailers like bars and liquor stores in predominantly black neighborhoods.

To test this hypothesis I include a variable in my empirical model for a Census count of retailers earning \$250,000 or less in receipts per year. Note that a failure to reject this hypothesis is also a failure to reject the proposition that race has an independent effect on bar and liquor store location decisions, since the resource constraints on black entrepreneurs are likely at least partially due to racial discrimination in credit markets.

d. Stereotypes

Finally, perhaps stereotypes bias firm owners to believe blacks drink more than whites when they actually do not. Thusly, owners perceive the geographic distribution of consumer demand to be different than the reality, leading them to gravitate towards “perceived” bulges in the distribution of demand. Market imperfections, perhaps due to regulatory barriers to

entry (like licensure caps), may prevent these errors in perception from being corrected through the usual processes of competition, firm entry, and firm exit.

2. Controls

I introduce a variety of controls to account for the determinants of firm location decisions.

a. Competition

An examination of the possible economic factors motivating the counterintuitive tendency of bars and liquor stores to locate near black populations requires controls to account for variance in firm location decisions. The spatial competition and collective action literature discussed above helps identify empirical measures needed to construct such controls.

One important factor is the price elasticity of demand. As price elasticity increases, firms will tend to spread out in geographic space in order to achieve market power and avoid a price war (Smithies, 1941). This should result in lower firm density. A variety of factors influence price elasticity. For instance, as income increases price sensitivity declines. This reduces the tendency of a given firm to maximally differentiate in geographic space in order to avoid a price war. Separately from its impact on demand, increases in income should therefore increase the density of firms in a given sample market by decreasing the price elasticity of demand.

Additionally, the more firms and their competitors product differentiate, the lower price elasticity of demand and the greater the influence of so-called “market share” effects. One should expect, then, that bars will tend to cluster more than liquor stores; the former can differentiate their products and the atmosphere of their establishments to a degree the latter cannot. Bars can position themselves to serve different communities of consumers by varying

furnishings, entertainment offered, music featured, and specialty drinks. Additionally, there may be agglomeration economies; customers seeking a vigorous nightlife often engage in “barhopping” by seeking out clusters of bars and clubs. By contrast, different liquor stores, typically sell very similar portfolios of brand name products. Indeed, bar count has a maximum value of 63 for the sample markets drawn, while liquor store count has a maximum value of 19 for those same markets. Additionally, Picone, Ridley, and Zandbergen (2007), as discussed in section 2, find empirical evidence of clustering among bars and spatial differentiation among liquor stores in Tampa. It is therefore appropriate, given the different competitive dynamics affecting bars and liquor stores, to consider counts of bars and liquor stores separately in the regression equations defined in the Empirical Specification section.

The products of bars and liquor stores exist on a continuum of substitutability with products offered by other firms. For instance, the alcohol offerings of grocery stores typically consist of beer and wine but not liquor; their offerings are therefore imperfectly substitutable with the alcohol portfolios of liquor stores. Proximity to a grocery store should increase the sensitivity to price of consumer demand for a liquor store’s products, though not as much as would proximity to another liquor store. Therefore, the locations of firms offering imperfect substitutes for the product offerings of bars and liquor stores – such as restaurants, grocery stores, convenience stores, and gas stations - will also factor into the location decisions of those firms. No matter the specific manner of differentiation, the general rule is the same: the more substitutable two firms’ product offerings, the farther they will tend to separate in geographic space to avoid a price war.

b. Consumers

The role of the distribution of consumer demand in geographic space suggests additional variables of interest. In addition to the distribution of consumers across geographic space, heterogeneity in consumption preferences and the capacity and inclination to act on those preferences also play a role. One consumer is not necessarily like another. By moderating preferences and budget constraints, age, race, culture, family background, income, and a variety of other observables impact effective demand for alcohol. Cook and Moore (2000) note in their review of the literature on price elasticity of demand for alcohol that age, sex, education, family income, and race (prevalence for drinking is less for blacks than whites) all influence variation in individual consumption. Montgomery et al (1998) analyze longitudinal data on British males to conclude that “men who had experienced unemployment in the year prior to the interview, compared to those who had not... were significantly more likely to... drink heavily... and to have a drink problem.” Bergmann et al (2003) use data on German alcohol consumption to uncover evidence that “among women, alcohol consumption was associated with... socioeconomic status, household size,” and a variety of lifestyle decisions like use of soft drugs and smoking. Specifically, increasing household size is associated with reduced consumption among women, and rising socioeconomic status with increased consumption. Costanzo et al (2007), as noted earlier, find evidence of racial variation in lifetime alcohol consumption patterns, with blacks on average drinking significantly less than whites over most of the life course.

It is intuitively obvious that firms should consider first the geographic distribution of consumer demand, not the number of consumers per se, which can only serve as one indicator of the distribution of consumer demand. Therefore, although many studies on alcohol

consumption utilize epidemiological and lifestyle variables unobserved here due to data set limitations, observed demographic and market information at the block group level should help explain a substantial portion of the variation in the location decisions of bars and liquor stores. These variables will also be used to specify a regression of alcohol consumption on demographic, market, and environment characteristics to further investigate the relationship between consumption, race, and alcohol seller location.

Table 1 – Theory, Measures, and Expectations

Role of Competition			
Theoretical Concept	Measure(s)	Predicted Effects, Concentration of Bars	Predicted Effects, Concentration of Liquor Stores
Price elasticity	Income	+	+
	# Competitors	? (agglomeration economies?)	-
	Product differentiation between firm types	+	+
Role of Consumers			
Theoretical Concept	Measure(s)	Predicted Effects, Concentration of Bars	Predicted Effects, Concentration of Liquor Stores
Nonuniform distribution of consumer demand	Population density	+	+
	Distribution of transportation technology	+	?
Environmental amenities	Commercial activity	+	+
Consumer heterogeneity	Income	+	+
	Household Size	-	-
	Unemployment	+	+
	Percent Black	-	-
Role of Collective Action			
Theoretical Concept	Measure(s)	Predicted Effects, Concentration of Bars	Predicted Effects, Concentration of Liquor Stores
Political sanctions	Zoning	-	-

IV. Data

1. Competition: GIS and Firm Data

Data is collected for the cities of Minneapolis and Saint Paul, MN; Tampa, FL; Oakland, CA; and Birmingham, AL. These cities are chosen because they are the cities (except for Tampa) used in the Coronary Artery Risk Development in Young Adults

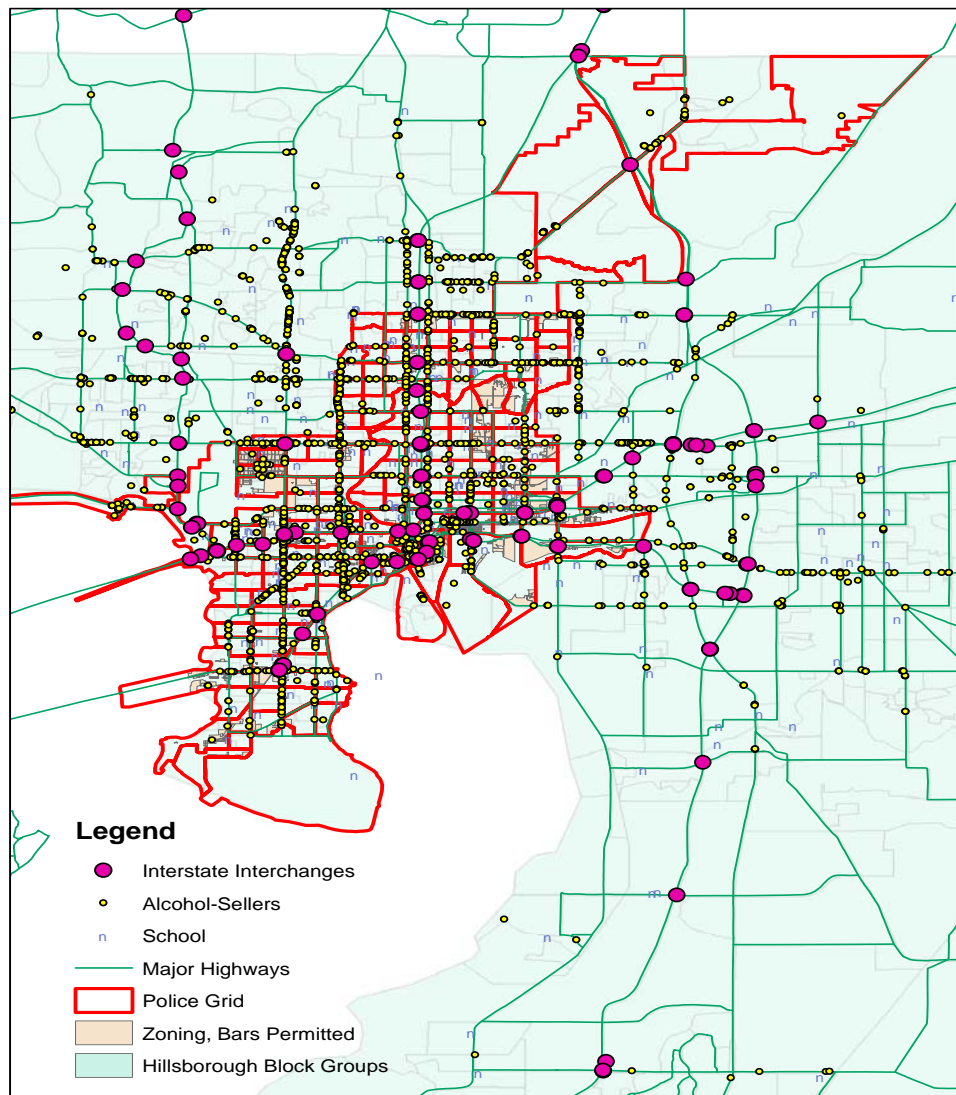
(CARDIA) Study, which is a longitudinal survey designed to isolate factors influencing the development of heart disease. CARDIA collects data on alcohol use, and this data was used by Professor Sloan and his colleagues to explore long-term trends in alcohol consumption. It is from this sample that Costanzo et al (2007) observe that blacks on average drink significantly less than whites during most of the life cycle. This observation is confirmed by regression analysis of consumer expenditure estimates provided by Geolytics for these five cities, as found in Section 6.

I use Geographic Information Systems (GIS) compatible software (ESRI's *ArcMap*) to create city maps of economically relevant features. The basic building block of GIS data are shape files, which are map "layers" composed of either polygon, line, or dot features. For each feature in a shape file, any number of variables - area of a polygon, for instance - can be recorded by the mapmaker in that shape file's attribute table. Different shape files, from different sources and depicting different features, can be layered on top of one another using projection functions to create one detailed map. Then spatial analysis tools can break apart and recombine the different layers to generate variables for regression analysis. I chose this program and the GIS format because these mapping tools are widely used among city planners and academic researchers; a variety of city, state, and national agencies produce mapping and data products compatible with GIS; and because they are flexible enough to map features at the national, state, and local levels, with detail going down to single plots of land. The GIS maps are manipulated to generate the variables described in the empirical model specified in Section V. This process is described in detail below in subsection 7 of this section.

Figure 1 below illustrates a typical GIS map for Hillsborough County, Florida. The map is composed of layers of shape files stacked on top of each other, including interstate

interchanges, alcohol sellers, schools, highways, a police grid, zoning plots designated to permit bars, and Census block groups. There are three shape file types: dot, line, and polygon. Interstate interchanges, designated by purple dots, are an example of the dot layers. Highways (the bright green lines) are an example of the line feature, and block groups (in faint blue against the background) of the polygon feature.

Figure 1 – GIS Map of Hillsborough County, FL



I obtain 2005 firm data from a data set made available to me through Professor Gabriel Picone from the University of South Florida. The data set was constructed by systematically recording phone book entries for bars and liquor stores in each of the cities' metropolitan areas. Data was collected on firm name, street address, and other vital information. Convenience stores, restaurants, grocery stores, pharmacies, and gas stations were also included in the data set. The phone book address data was then "geocoded" into the GIS mapping program for inclusion in the analysis with the other features here described. The phone book headings that were used in each city to record relevant firms are outlined in Table 2 below. I will use this data to generate firm variables equal to counts of each firm type within a given sample market.

Table 2 – Yellow Page Headings by Firm Type and City

Firm Type	Minneapolis	St. Paul	Tampa	Birmingham	Oakland
Bar	Bars	Bars	Taverns, Night Clubs, and Cocktail Lounges	Bars, Night Clubs, Cocktail Lounges	Cocktail Lounges
Liquor Store	Liquor Stores	Liquor Stores	Liquor Stores	Liquor Stores	Liquor Stores
Restaurant	Restaurant	Restaurant	Restaurant	Restaurant	Restaurant
Convenience Store	Convenience Stores	Convenience Stores	Convenience Stores	Convenience Stores	Convenience Stores and Truck Stops
Grocery Store	Grocers	Grocers	Grocers- Retail	Grocers	Grocers
Gas Station	Gas Station	Gas Station	Gasoline- Retail	Gasoline & Oil	Service Stations - Gasoline & Oil
Pharmacy	Pharmacies	Pharmacies	Pharmacies	Pharmacies	Pharmacies

It may be objected that different cities restrict what types of alcohol products may be offered by different establishments. For instance, one city may permit only beer to be sold at a grocery store, while another may permit both beer and wine. Therefore, a grocery store in one city may not be the same as a grocery store in another. However, the current specificity is sufficient for our purposes, and the database of firm locations utilized already allows for far more detail than is common to the literature on firm location decisions. Additionally, the more city-specific the firm categorizations become, the less applicable are the regression results for any single firm category to explaining competitive phenomena for the whole sample.

2. Consumer and Market Characteristics: Census Block Group Data and Estimates

From the Census Bureau I obtain state block group layers. A block group is composed of census blocks, “the smallest geographic area[s] for which the Bureau of the Census collects and tabulates decennial census data.” Blocks “are formed by streets, roads, railroads, streams... and legal boundaries” (Bureau of the Census 1994). Several blocks form a block group; several block groups, in turn, make up a Census tract. Block groups vary significantly in size. For instance, in the Minneapolis-St. Paul metropolitan area the block groups range in size from about 75,000 square feet to 83+ square miles (or over two billion square feet). A detailed discussion of Census blocks and block groups can be found in the Census Bureau’s *Geographic Areas Reference Manual* (1994).

In *ArcMap*, attached to each map layer is an attribute table that contains descriptors - from area and perimeter (if the feature is a polygon) to, say, the population residing in a given block group - for each of the elements that make up a layer. To the table that comes with the Census Bureau block group layer I append for each of the cities examined 2005 estimates and 2010 projections provided by Geolytics for demographic and market characteristics, as well as

consumption data and cultural indices (like an index corresponding to the proportion of the population employed by religious institutions), at the block group level. Geolytics uses Census 2000 and other data on a variety of population characteristics, including birth and death rates by age and race, to create estimates and projections of the demographic and market characteristics of block groups.³

3. Distribution of Consumer Demand: Transportation and Environmental Amenities

In this study I make extensive use of ESRI's *StreetMap USA*, which contains nationwide *ArcMap* GIS layers for roads, churches, schools, zip codes, block groups, and other features. From the *StreetMap USA* data set I obtain a map layer of major roads, churches, and schools nationwide. I manipulate the major roads layer to produce a layer of interstate ramps which I use to generate a dummy for the presence of an interstate exit.⁴ Additionally, I will include a variable equal to the number of miles of major roads within a given sample market area. Public transportation is not particularly useful to consider since most of these cities do not possess extensive public rail systems. From the Census I obtain zip code counts of retailers by different categorizations of receipts per year, which will allow me to test Hypothesis c) regarding credit costs and the resource constraints of black entrepreneurs.

4. Collective Action: Zoning and Proximity Law

From each of the city governments I obtain a zoning map layer. This map is typically obtained from either the city's planning department or, where they exist, a city mapping division or map resource website. By examining each city's most recent zoning ordinance

³ A detailed description of the methodology used by Geolytics can be found at <http://www.geolytics.com/USCensus,Estimates-Projections,Data,Methodology,Products.asp>.

⁴ Specifically, I first select all those poly-lines that have a designator indicating they are part of an interstate ramp. I then convert each selected poly-line into a dot located at the center of each line segment. In my empirical model an interstate ramp dummy value of 1 indicates the presence of at least one such centroid within a given sample market.

(typically posted with the city ordinance or by the planning/licensure department online), I categorize each feature in the zoning map layer into permit, conditionally permit, and prohibit categories for bars and liquor stores. I convert this data into measures of zoning permissiveness by dividing the total land area of a sample area's "permit" and "conditionally permit" zones by the total area of that sample area. Finally, I use ESRI's *StreetMap USA* to record the number of schools and churches in a given sample market since most of these cities have explicit or implicit restrictions on how close alcohol sellers can locate near such civic institutions.

Table 3 summarizes the empirical measures outlined in this section.

Table 3 – Empirical Measures

Competition	
Empirical Measure(s)	Source(s)
Income	Census Bureau GIS block group map; Geolytics CensusCD Estimates (2005), Projections (2010), Consumer Expenditures & Profiles
# Competitors	Geocoded phone book data, compiled by Dr. Gabriel Picone, University of South Florida
Product differentiation between firm types	Geocoded phone book data, compiled by Dr. Gabriel Picone, University of South Florida
Consumers	
Empirical Measure(s)	Source(s)
Population density	Census Bureau GIS block group map; Geolytics CensusCD Estimates (2005), Projections (2010), Consumer Expenditures & Profiles
Distribution of transportation technology	Major Roads layer and derived interstate exit layer, StreetMap USA (2005)
Commercial activity	Census Bureau, retailer counts by zip code
Demographic, market block group data	Census Bureau block group map; Geolytics CensusCD Estimates (2005), Projections (2010), Consumer Expenditures & Profiles
Collective Action	
Empirical Measure(s)	Source(s)
Zoning	GIS zoning maps from planning departments, mapping services; land use definitions from city ordinances
Schools and Churches	StreetMap USA (2005)

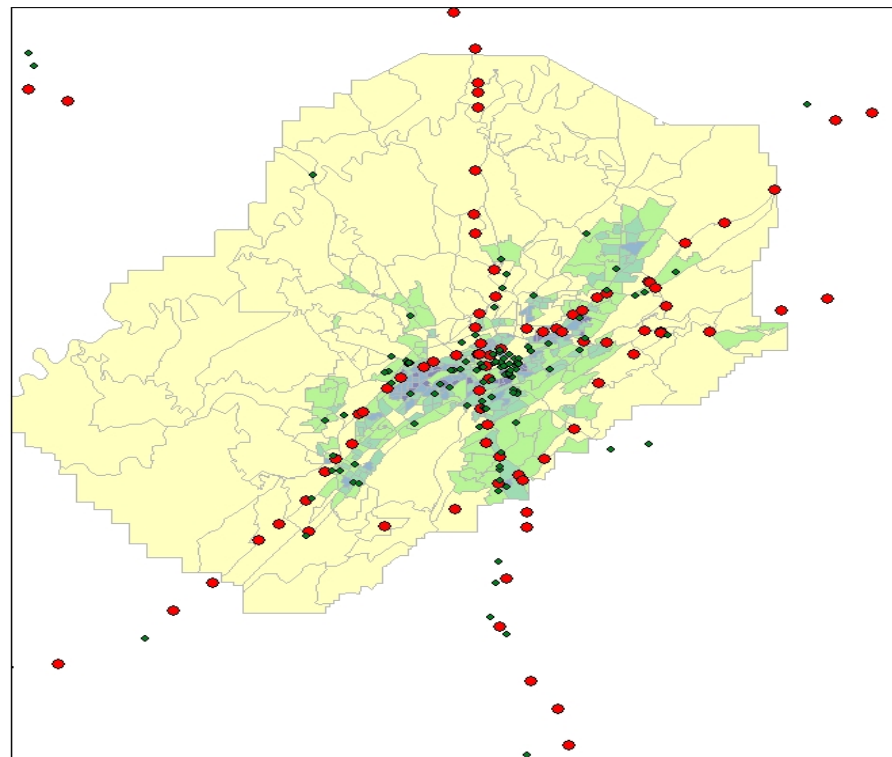
5. Observations with Respect to Hypotheses

A cursory examination of the data reveals patterns of association between bars and key variables suggestive of the hypotheses described above. Given that I am dealing with geographic phenomena, associations between variables of note will be better illustrated through maps than traditional tables of descriptive statistics.

Hypothesis (a) suggests that due to disproportionate selection by blacks into high-density residential areas the presence of black populations may be correlated with variations in

population density and the availability of transportation networks that enhance the desirability of a given area for bars and liquor stores. Figure 2 presents a map of Birmingham with firm locations, interstate exit locations, and block groups categorized by population density. Notice the tendency of bars and liquor stores to gravitate towards areas with higher densities of citizens and transportation nodes.

Figure 2 – GIS Map Illustrating Association with Population Density and Transportation Networks



Birmingham, Interstate Exits and Population Density

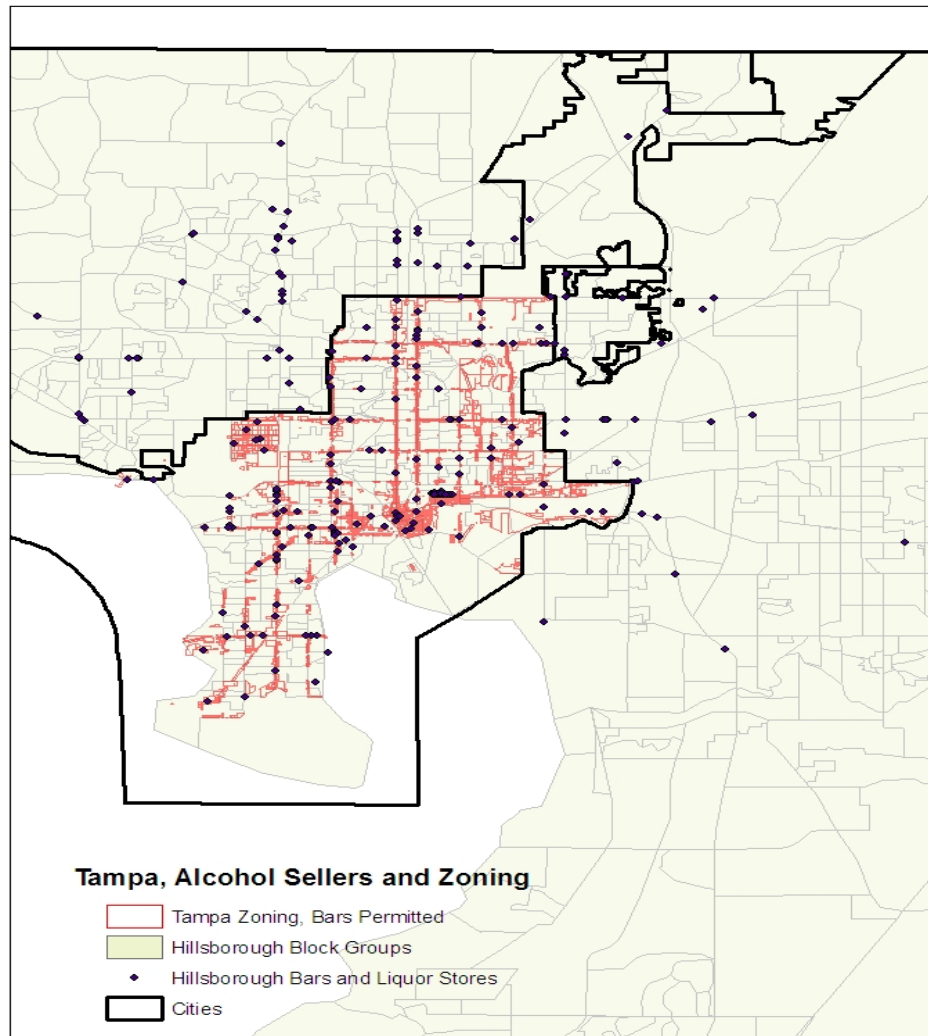
- ◆ Birmingham Bars
- ◆ Interstate Exits

Jefferson County Block Groups by Population Density
DENSITY05

Light Yellow	25.600000 - 1230.000000
Light Green	1230.000001 - 2726.700000
Medium Green	2726.700001 - 4595.000000
Blue	4595.000001 - 7400.000000
Dark Blue	7400.000001 - 14510.000000

In hypothesis (b) I suggest variation in the willingness and ability to impose political sanctions on firms that produce negative externalities may explain the association of bars and liquor stores with black populations. Below is a map of zoning regions and firm locations in Tampa. The zoning map is the most important source of variation in politically-imposed costs on bars and liquor stores within a given city. Figure 3 graphs the locations of bars in the Tampa area against those zoning areas (highlighted in red) that permit or conditionally permit the presence of bars. The black outline near the map's perimeter delineates the city boundaries of Tampa. This map suggests zoning regulations directly restrict the choice set of firms and powerfully influence their location behavior.

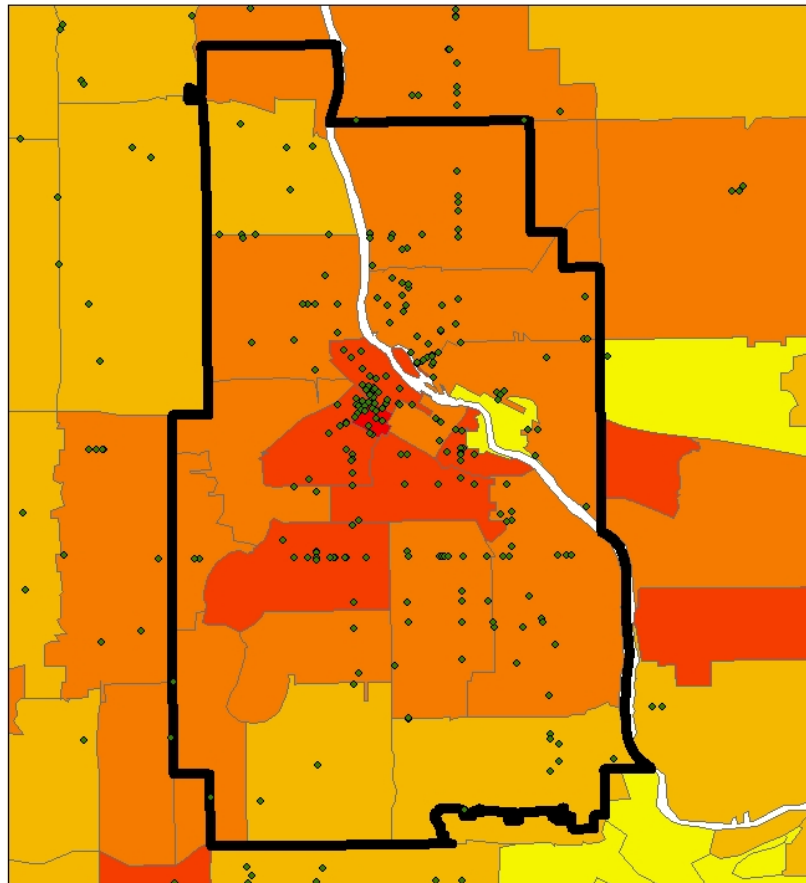
Figure 3 – GIS Map Illustrating Association Between Zoning and Firm Location Decisions



In hypothesis (c) I suppose that increased credit risks for businesses in black neighborhoods or resource constraints on black entrepreneurs lead to a relative abundance of small retailers like bars and liquor stores in black communities. In Figure 4 I show a map of Minneapolis-area bars and liquor stores and zip codes categorized by density of retailers

earning \$250,000 or less per year. Note that bars and liquor stores cluster disproportionately in the darker orange and red areas of the map denoting an abundance of small retailers.

Figure 4 – GIS Map Illustrating Association Between Small Retailers and the Location Decisions of Alcohol Sellers

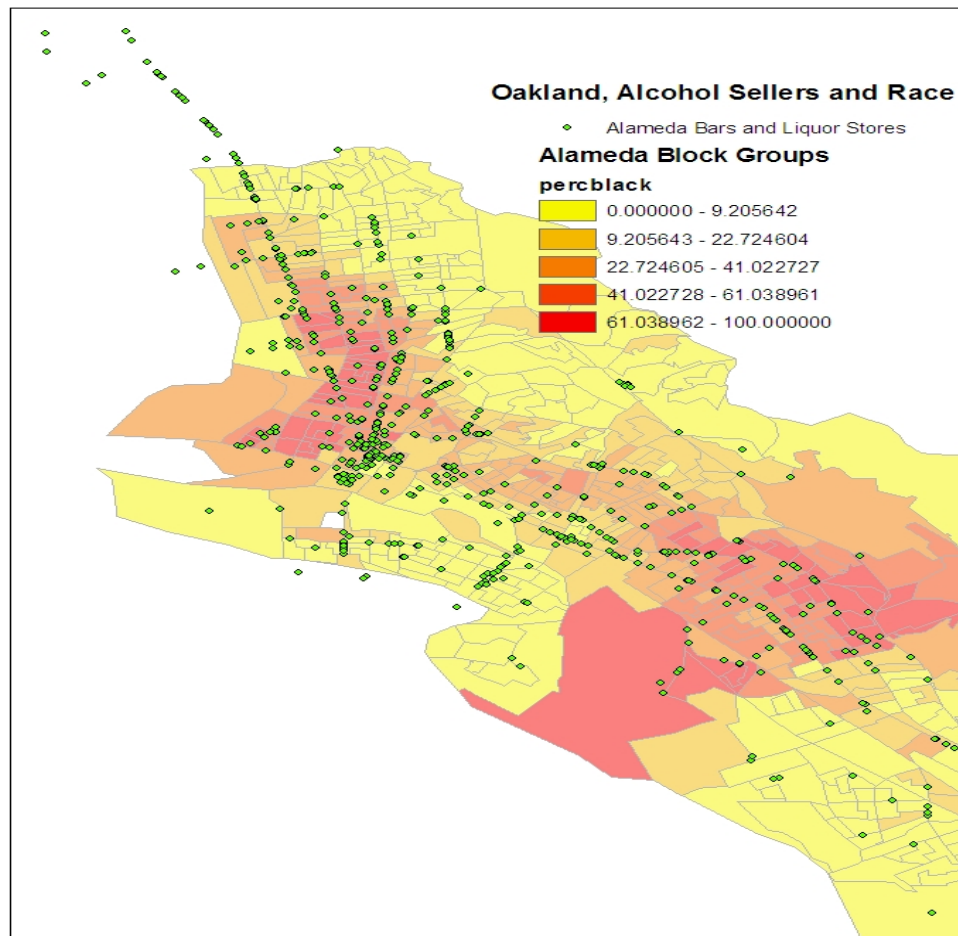


Minneapolis, Small Retailers, Bars, and Liquor Stores



In hypothesis (d) I propose that stereotypes and racial discrimination result in the clustering of bars and liquor stores nearer black population centers. Such an association is suggested by Figure 5, which displays a map of Oakland-area alcohol sellers and block groups categorized by the percentage of the population that is black. The green firms loosely track the “corridors” of block groups that possess high concentrations of blacks.

Figure 5 – GIS Map Illustrating Race Association with the Location Decisions of Alcohol Sellers



The foregoing subsection suggests that each of the hypotheses discussed in the Theoretical Framework might have some validity. The spatial relationships illustrated by these maps indicate that a variety of variables may impact firm location decisions besides race per se. Controlling for these variables might eliminate evidence of the counterintuitive causal relationship suggested by the observation that firms disproportionately tend to locate near areas with above-average concentrations of blacks.

6. Generating Sample Markets

Due to space constraints, I must assume some literacy with the *ArcMap* program in this section.

I generate a series of between 224 (for Tampa) and 250 half-mile radius sample markets fixed around random points for each of the cities Tampa, Minneapolis, St. Paul, Oakland and Birmingham. To do this, I first create a single polygon roughly corresponding to the city limits of each city. Next, I use *Hawth's Tools* to generate 250 random points within each city-polygon, and fix a buffer circle of a half-mile radius around each of these points. Finally, I cut (clip) the layer of sample markets so that their edges may touch but never cross the city boundaries.

7. Generating Data for Sample Markets

I will outline how I construct data for the sample markets from the data attached to each of the layers by describing this process for the block groups. Say I want to find a total population statistic for a single sample market that overlaps parts of four block groups. First I calculate the areas of each of these intersected “pieces” of the block groups, and the fraction of each block group’s total area that each piece represents. I then multiply this fraction by the total population statistic for the whole block group to get a population statistic for each

intersected slice.⁵ Finally, I “summarize” the population of the pieces by sample market, which means the total population statistic for each slice is summed for all the slices that make up a given sample market. In this way I arrive at a total population statistic for each sample market. The basic principles of breaking apart, recalculating, and recombining apply to the other data layers. For interstate exits I select from the major roads layer of *StreetMap USA* (2005) all those line segments designated as ramps. I then generate a count for each sample market of the number of ramp line segments touching or falling within that sample market.

Repeated for each of the data layers, I estimate the following statistics for each sample market: sample market area; total alcohol consumption; total population; median income; average household size; total black population; total feet of roads in each sample market; a count for each sample market of the number of ramp line segments touching or falling within that sample market; total area in each sample market falling inside lots zoned for permitted or conditionally permitted use by bars and liquor stores, respectively; counts of retailers earning less than or equal to \$250,000 per year in total receipts; counts of restaurants, convenience stores, grocery stores, gas stations, and pharmacies; an index value estimated from Geolytics’ unemployment index, which estimates the severity of unemployment in one area relative to the national average; and an index value estimated from Geolytics’ religion index, which estimates the proportion of people in one area who are employed by religious institutions relative the national average. I use this data to generate the values specified in the Empirical Specification section below.

⁵ For variables specific to each person I use a different process. For median income, for instance, I multiply the median income for the entire block group by the total population for the corresponding intersected slice, sum over all slices in a given sample market, and then divide by the total population of the sample market to arrive, finally, at a median income statistic for the sample market.

At the end of this process, my total raw sample is of 1221 observations. I am uninterested in areas of the city that are not commercially developed. Therefore, I drop 416 sample markets with no firms within them that advertise in local phone books.

Because the points around which the half-mile sample markets are fixed are randomly generated within each city's boundaries, the sample markets overlap substantially, threatening the validity of the standard errors. To account for this, each sample market is tagged with the zip code within which its center point falls. I drop 11 observations that possess a zip identifier equal to zero due to imperfections in the mapping strategies employed. This leaves me with a final sample size of 794. I will use Stata's cluster function on this zip code identifier for each sample market to minimize the distorting effects on the standard errors of sample market overlap.

8. Weaknesses

One weakness of my data set is that it is cross-sectional rather than longitudinal. This may be deemed a limitation given that firms have made their location decisions over many decades, and in each case based their decisions off different political, demographic, and market profiles for the city. However, given the lengthy time horizon, the decision by an older firm to stay fixed in its position itself may be considered a reflection of the perceived optimality of that position under the current political, demographic, and market profile. If a location becomes sub-optimal, the firm always has the option to switch locations. There are few costs of moving locations that are different from the costs of entry. Therefore, the decision to stay in a market may be considered as comparable to a decision to enter the market, re-affirmed during each time interval.

Now that I have used economic theory to identify the observable factors that should influence firm behavior; constructed hypotheses on how associations between certain influencing factors and race in particular may have produced the counterintuitive pattern of firm location decisions observed; identified data for representing these factors; and described how I will convert this data into variables for regression analysis, I am ready to specify an empirical model, analyze its output, and draw conclusions concerning the validity of my hypotheses.

V. Empirical Specification

In order to determine what factors best explain the counterintuitive tendency of bars and liquor stores to locate disproportionately near black population centers, I used economic theory to develop a series of hypotheses that might account for this pattern of observations. Hypothesis (a) is that by locating in higher density housing areas blacks locate near a variety of economically relevant features – like transportation networks – that attract alcohol sellers. Hypothesis (b) is that, for a variety of possible reasons not intrinsic to race, blacks tend to not organize politically as effectively as some other race groups, which diminishes regulatory barriers that might block the entry of bars and liquor stores in other areas. Hypothesis (c) suggests that the resource constraints of black entrepreneurs may result in an overabundance of small retailers like bars and liquor stores in predominantly black neighborhoods. Hypothesis (d) contends that firm owners suffer racial stereotypes and perceive the distribution of consumer demand to be different than it actually is, overestimating average black demand for alcohol. I develop an empirical model for estimating 1) alcohol consumption and 2) bar and liquor store location decisions using the hypotheses and controls outlined in the Theoretical

Framework section above. These equations will be modified as the findings are explored in the Results section below.

1. Alcohol Consumption

For the alcohol consumption equation, I designate thousands of dollars of alcohol consumption by sample market as the dependent variable.

$$\text{CONSUMPTION}_i = \alpha D + \beta \text{INC} + \theta E + \mu S \quad i = 1,2 \quad (1)$$

D is a vector of demographic and profile variables including variables for sample market population, household size, and racial composition (percentage black dummies). INC is median household income. E denotes an environmental vector, including an unemployment index variable and an index corresponding to the proportion of a sample market's inhabitants that are employed at religious institutions. Finally, S denotes a vector for city fixed effects.

I use ordinary least squares to estimate the regression equation. I also control for sample market area, since some sample markets intersect and are cut to fit each city's political boundaries. Finally, to account for sample market overlap I apply the cluster function of Stata to a variable designating the zip code within which the center point of each sample market falls. .

2. Dependent Variables and Regression Technique

Before specifying the firm regression equation, I define the regression method and dependent variables. I use an ordered probit to estimate the coefficients in the equations specified below. To run an ordered probit I first generate firm-count dependent variables with five discrete count categories for each firm type. Table 4 below outlines the categories chosen for each firm type and the cumulative distributions associated with the lowest count value subsumed within each category. An ordered probit and the categorized dependent variables

are designed to capture the tail of the distribution without allowing the results to be unduly determined by extreme outliers. Given the extreme upper values of the bar count variable, for instance, which have a maximum of 31 (22 bars above the 97% point in the cumulative distribution), I contend this concern is valid and the chosen dependent variables and regression method appropriate.

Table 4 – Dependent Variable Categorizations

Variable	Category	Lowest Value	Cumulative Distribution
Bar Count	0	0	59.45
	1	1	77.46
	2	2	86.02
	3	4	93.7
	4	9	96.98
Liquor Count	0	0	66.62
	1	1	82.24
	2	2	88.92
	3	3	92.82
	4	4	96.1
Convenience Store	0	0	29.72
	1	1	56.68
	2	2	77.08
	3	3	88.16
	4	5	96.47
Restaurant Count	0	0	27.58
	1	1	47.36
	2	4	74.31
	3	12	90.18
	4	32	97.1
Grocery Store	0	0	19.77
	1	1	45.72
	2	3	75.82
	3	6	90.93
	4	9	97.86
Gas Station Count	0	0	50.5
	1	1	79.35
	2	2	93.32
	3	3	98.36
	4	4	99.37

3. Firm Location

I designate count categories for firms in a given sample market as the dependent variable; for regression 1 bar count categories are the dependent variable, for regression 2 liquor store count categories are the dependent variable.

$$\text{COUNT}_i = \alpha D + \beta \text{INC} + \gamma R + \delta C + \theta E + \zeta T + \mu S \quad i = 1, 2 \quad (2)$$

D is a vector of demographic and profile variables including variables for sample market population, household size, and racial composition (percentage black quartile dummies). INC is household income. R is a vector of regulatory variables, including the fraction of a sample market that is zoned to permit or conditionally permit bars and liquor stores, respectively.⁶ C denotes a vector of competition variables, including total number of competitors for liquor stores and bars separately, defined as restaurants for bars, and convenience stores, grocery stores, gas stations, and pharmacies for liquor stores. T denotes a vector of transportation variables, including a variable denoting the total miles of “major roads” in the sample market area and a dummy indicating the presence of at least one interstate exit in a given sample market. E denotes a vector of environmental variables including a variable for a count of retailers earning \$250,000 or less in receipts per year, and an unemployment index variable. Finally, S denotes a vector of city fixed effects.

I estimate using an ordered probit. This estimation technique is appropriate because it helps to minimize the undue influence of outlier values for the dependent variable. I also

⁶ An index of regulatory restrictiveness accounting for citywide regulations such as licensure caps and minimum distance regulations between alcohol sellers was considered, but dropped since such an index could not be distinguished conceptually from the vector of city fixed effects.

control for sample market area, since some sample markets intersect and are cut to fit city limits. Finally, to account for sample market overlap I apply the cluster function of Stata to each sample market's zip code designator.

A possible source of omitted variable bias in the zoning coefficient estimate is the potential correlation between harsher political sanctions and Puritan consumer preferences for alcohol. If these two are correlated, perhaps bars and liquor stores would avoid tightly regulated neighborhoods even in the absence of such regulations, because those regulations also reflect lower consumer preferences for alcohol. In order to soak up this "Puritan consumer" component of the regulation variable, I add to vector E an index variable corresponding to the proportion of a sample market's population that is employed by religious institutions. This allows me to more precisely isolate the impact of zoning regimes per se.

This model allows me to isolate the determinants of firm location decisions. If the population density or transportation variables are statistically significant, the impact of blacks' residing in areas of higher-density housing may account for part of firm location decisions. If zoning variables are statistically significant, then political sanctions and collective action against firms that generate negative externalities account for part of the pattern of locations observed. If the small retailer count variable is statistically significant, local credit risks or black entrepreneurs' resource constraints may account for part of the puzzling phenomenon observed. If race is statistically significant, then stereotypes may account for firm location choices.

VI. Results

I am attempting to explain why bars and liquor stores tend to cluster near black populations despite the fact that blacks on average consume less alcohol than do whites. In

earlier sections, I used economic theory to develop a series of hypotheses that might account for this pattern of observations. Hypothesis (a) supposes that by locating in higher density housing areas blacks locate near a variety of economically relevant features – like transportation networks – that attract alcohol sellers. Hypothesis (b) is that, for a variety of possible reasons not intrinsic to race, blacks tend to not organize politically as effectively as some other race groups, which diminishes regulatory barriers that might block the entry of bars and liquor stores in other areas. Hypothesis (c) suggests that the resource constraints of black entrepreneurs may result in an overabundance of small retailers like bars and liquor stores in predominantly black neighborhoods. Hypothesis (d) contends that firm owners suffer racial stereotypes and perceive the distribution of consumer demand to be different than it actually is, overestimating average black demand for alcohol.

1. The Puzzle

The Results section is organized as follows. An initial, highly simplified model will demonstrate the positive association of bar and liquor store locations with black population centers and the negative association of alcohol consumption with black population centers. Then I will test for the sensitivity of these associations to city fixed effects, and, finally, to the full models as specified in Section 5. Finding that the second and third black quartile coefficients retain their positive sign and statistical significance, I cannot reject hypothesis d), that race has an independent effect on alcohol seller location decisions. I further demonstrate, through regressions of count-category variables for other firm types (restaurants, convenience stores, grocery stores, and gas stations) on a set of nearly identical control variables, that the robustness of the association with race is peculiar to alcohol sellers. Finally, I explore possible reasons for the loss of statistical significance for the highest quartile dummy in the bar

concentration regression. Hypothesis b), dealing with collective action, cannot be rejected, so I attempt to find further proof suggestive of the validity of hypothesis b). I find a positive relationship between the black population quartiles and looser zoning regimes, and suggestive evidence that the zoning variable can explain the diminishment in significance of the highest black quartile coefficient in the full bar regression.

I run an OLS regression of alcohol consumption by sample market on sample market area, population, and discrete, quartile categorizations of block group racial composition by percentage black. I also use an ordered probit regression of, separately, bar and liquor store counts on the same set of independent variables. The results are summarized in Table 5.

Table 5 – Observed Relationship to Race

	Variable	Coefficient	T/Z-Value
Total Alcohol Consumption (\$000)	Population	0.151	12
	2nd Quartile	-221.84	-4.48
	3rd Quartile	-208.88	-3.59
	4th Quartile	-420.75	-8.06
Bar Concentration	Population (000)	0.07	3.81
	2nd Quartile	0.67	2.83
	3rd Quartile	0.95	4
	4th Quartile	0.79	3.46
Liquor Store Concentration	Population (000)	0.19	6.47
	2nd Quartile	0.25	1.02
	3rd Quartile	0.42	2.13
	4th Quartile	0.72	3.31

Notice that the quartile dummy variables are negative and statistically significant at the 5% level in the consumption equation, and positive and statistically significant in the both the bar and liquor store location equations (with the exception of the second quartile dummy in the liquor store equation). Why would bars and liquor stores gravitate to worse customers?

2. Sensitivity Tests

I test for sensitivity by including city fixed effects and rerunning the above regressions. In the liquor stores equation the quartile dummies lose their significance at the 5% level (see Table 6 below). In the bar and alcohol consumption equations, however, the statistical significance and sign of the black population dummy coefficients are identical with those of the initial specification.

Table 6 – Sensitivity to City Fixed Effects

	Variable	Coefficient	T/Z-Value
Total Alcohol Consumption (\$000)	Population	0.14	10.9
	2nd Quartile	-212.69	-5.24
	3rd Quartile	-239.69	-4.78
	4th Quartile	-522.62	-7.21
Bar Concentration	Population (000)	0.07	2.67
	2nd Quartile	0.93	4.28
	3rd Quartile	1	4.04
	4th Quartile	0.67	2.58
Liquor Store Concentration	Population (000)	0.16	5.31
	2nd Quartile	0.38	1.51
	3rd Quartile	0.33	1.54
	4th Quartile	0.41	1.86

To explore whether this pattern is robust, supporting hypothesis (d) suggesting the existence of racial discrimination and cognitive biases in the alcohol sellers' market, I run the full alcohol consumption and bar and liquor store location decision regressions as defined under the Empirical Specification section. Notable results for the bar and consumption regressions are displayed in Table 7 below.

Table 7 – Comprehensive Regressions, First Run

	Hypothesis	Variable	Coefficient	T/Z-Value
Bar Concentration	a	Miles Roads	0.02	0.56
		Interstate Exit	-0.26	-1.46
	b	Bar zoned	0.66	1.63
	c	Small retailers	0.039	1.01
	d	2nd Quartile	0.73	3.58
		3rd Quartile	0.71	3
		4th Quartile	0.52	1.88
	Demog Controls	Population (000)	0.006	0.19
	Market Controls	Median Income (\$000)	-0.02	-2.39
		Competition	Restaurant Count	0.09
Total Alcohol Consumption (\$000)	Demography	Population	0.16	15.53
		Household size	-420.88	-8.02
	Market	Median Income	0.007	5.83
	Environment	Unemployment Index	-0.64	-1.07
		Religiosity Index	-0.26	-1.06
	Race	2 nd Quartile	27.45	0.91
		3 rd Quartile	67.76	1.37
		4 th Quartile	98.36	1.83

Before exploring the results of the consumption regression, I note that in the bar equation very few of the variable coefficients are statistically significant at the 5% level. The relatively large magnitude, unexpected positive sign, and statistical significance of the coefficients for the competition variables suggests that these variables are endogenous and are capturing unobserved determinants of demand; for the bars regression it is also possible the variable is picking up agglomeration effects. This specification is not particularly helpful, since this merely removes the question one step further to why these other firms exhibit their respective patterns of location decisions. Therefore, I rerun the above regressions, dropping all

competition variables. Results for statistically significant controls and for each of the hypotheses are laid out in Table 8 below.

Table 8 –Modified Regression Results, Bar Count

	Hypothesis	Variable	Coefficient	T/Z-Value
Bar Concentration	a	Miles Roads	0.06	1.8
		Interstate Exit	-0.3	-1.78
	b	Bar zoned	0.9	2.11
	c	Small Retailers	0.05	1.68
	d	2 nd Quartile	0.6	2.66
		3 rd Quartile	0.53	2.19
		4th Quartile	0.32	1.14
	Demog Controls	Population (000)	0.06	2.62
		Household Size	-0.79	-4.31
		Median Income (\$000)	-0.02	-2.95
Market Controls				

3. Case Closed?

These results, taken in conjunction with the results from the alcohol consumption regression in Table 7 above, may lead one to declare “case closed.” Confidence in the model is warranted since key controls like population and household size are statistically significant with the expected sign. The zoning variable is also statistically significant with its expected sign. Most importantly, all but the highest of the quartile coefficients remain statistically significant and positive in the bar equation, at the same time as they lose their significance in the consumption equation. Hypothesis d), that race has an independent effect on bar location decisions, therefore cannot be rejected. But two questions remain. First, could the association between race and alcohol seller location be spurious? Second, what explains the loss of statistical significance for the fourth quartile? I address these questions in order.

To test whether the relationship between race and alcohol seller location is spurious, I use regression analysis to search for such an association between race and other firm types. If I find a statistically significant association, this weakens support for my model given that it is

not particularly compelling to suggest that grocery stores and gas stations, for instance, discriminate against blacks based on stereotypes. I run regressions of restaurant, convenience store, gas station, and grocery store count categories on population, the interstate exit dummy, miles major roads, household size, median income, the small retailer count, the race quartiles, and city fixed effects. These controls are chosen to mimic as nearly as possible the bar concentration regression while excluding variables like bar zoning and religiosity that theoretically should play little role in determining the location decisions of restaurants, convenience stores, gas stations, or grocery stores. The race coefficients and their z-values are reported for each of the regressions in Table 9 below.

Table 9 – Other Firms and Race

	Variable	Coefficient	Z-Value
Restaurant Concentration	2nd Quartile	0.008	0.05
	3rd Quartile	-0.25	-1.22
	4th Quartile	-0.36	-1.34
Convenience Store Concentration	2nd Quartile	0.11	0.66
	3rd Quartile	-0.18	-1.04
	4th Quartile	0.13	0.58
Gas Station Concentration	2nd Quartile	-0.05	-0.24
	3rd Quartile	-0.18	-0.79
	4th Quartile	-0.16	-0.53
Grocery Store Concentration	2nd Quartile	0.08	0.44
	3rd Quartile	-0.27	-1.02
	4th Quartile	-0.32	-1.03

Notice that none of the quartile dummies are statistically significant. The association between race and firm location decision appears to be peculiar to bars, lending further support to hypothesis d), that racial stereotypes and market imperfections drive the counterintuitive tendency of bars to locate nearer black populations.

Returning to Table 8, I address my second question: what explains the loss of statistical significance for the fourth race quartile? Hypothesis a), that blacks locate disproportionately near extensive transportation networks, receives no support given the statistical insignificance at the 5% level of the ramp dummy and the miles roads variable. Hypothesis b) seems to receive some support given the positive and statistically significant coefficient of the zoning variable. Hypothesis c) receives no support given that the coefficient for the small retailer variable is statistically insignificant at the 5% level. Hypothesis b), therefore, seems a good place to start.

4. Zoning

To explore hypothesis b) further, I run an OLS regression of fraction zoned for bars on population, race quartile dummies, and fixed effects. The results are presented in Table 10 below.

Table 10 – Zoning

Variable		Coefficient	T-Value
Fraction Zoning Permitted	Population (000)	-0.03	-3.26
	2nd Quartile	0.19	4.51
	3rd Quartile	0.17	3.06
	4th Quartile	0.17	2.75

As is apparent from Table 10, higher concentrations of black populations are associated with looser zoning regimes with respect to alcohol-selling firms. This is strong suggestive support of hypothesis b). Pursuing the issue further, I regress the bar count dependent variable on population, percent zoned to permit bars, the race quartile dummies, and the vector of city fixed effects. The results are presented in Table 11.

Table 11 – Impact of Zoning

	Variable	Coefficient	Z- Value
Bar Concentration	Bar zoned	1.88	5.1
	2nd Quartile	0.63	2.94
	3rd Quartile	0.75	3.64
	4th Quartile	0.36	1.45

The zoning variable is positive and highly statistically significant, and the statistical significance of the highest quartile variable disappears at the 5% level. The results from Table 11 are highly suggestive that hypothesis b) plays a large role in eliminating the statistical significance of the highest percentage-population-black quartile, as observed in Table 8.

VII. Conclusions

Data from sample markets in Minneapolis, St. Paul, Tampa, Birmingham, and Oakland show that bars and liquor stores tend to cluster disproportionately in predominantly black neighborhoods. Longitudinal data on alcohol consumption and regression analysis using alcohol expenditure estimates from these cities, however, suggest that blacks on average consume less alcohol than whites. Thus, it appears that bars and liquor stores do not locate nearest the best consumers. To explain this counterintuitive observation, I draw on industrial organization, spatial competition, and collective action theoretical frameworks to construct an empirical model for predicting bar and liquor store firm location decisions. By analyzing the output of this regression I find suggestive evidence that this association is in part explained by a positive correlation between percent population black and more liberal zoning regimes, which in turn decrease the expected regulatory costs facing firms contemplating entry into predominantly black neighborhoods. But I cannot reject the hypothesis that race independently impacts the location decisions of bars and liquor stores.

The most straightforward interpretation of the failure to reject an independent impact of race on bar location decisions is that bar owners simply harbor negative stereotypes of blacks, and believe that blacks engage more often in unhealthy behaviors like heavy drinking. This would lead them to mistakenly estimate the geographic distribution of consumer demand. Given that the alcohol sellers market in these cities is imperfect, especially given alcohol licensure laws that restrict market entry, the rigors of perfect competition may not exist to correct these mistaken perceptions through the usual, impersonal process of firm entry and exit. Unfortunately, however, my characterization of the specific pathway (misperceptions of demand) by which race might exert an independent effect on the location decisions of bars and liquor stores remains speculative. Further research is necessary to determine whether these negative stereotypes about blacks and drinking in fact exist, and whether these stereotypes offer a compelling explanation for the highly resilient empirical relationship between race and bar location observed.

The suggestive evidence in favor of hypothesis b) indicates that one promising public policy response for weakening the tendency of alcohol sellers to locate disproportionately near black population centers would be to tighten current zoning regimes in those areas. Maximizing neighborhood control over zoning regulations is especially important to achieving this purpose for racial minorities, who cannot as easily compel redress for grievances addressed at the city-wide policymaking level.

This study suffers some limitations. First, the high statistical significance of the competition variables in Table 7 of the Results Section above indicates that agglomeration economies may exist. If these agglomeration economies confer strong benefits, then firms may exhibit reduced sensitivity to changes in the profitability of sample markets due to shifts

over time in their economically-relevant features. This is because even if a firm on its own would move in response to a negative change in, say, a sample market's market profile, if it enjoys strong benefits from agglomeration with nearby firms, it will not move unless all or most of the firms move simultaneously. Because of this coordination problem, cross-sectional data may, after all, imprecisely characterize a distribution of firms that has developed over many decades, with firms entering many years apart, in different years when the local communities possessed different economic, demographic, and regulatory profiles. Therefore, many of the determinants that shaped the observed pattern of firm locations may themselves no longer be observed. Future research might deal with this difficulty by focusing on entry and exit using longitudinal data.

In conclusion, although I could not explore and invalidate every possible alternative, there exists strong evidence that race exerts an independent effect on the location decisions of bars contrary to consumption trends. This result supports the contention that racial discrimination and stereotypes persist in the alcohol sellers market.

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