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# The Endogeneity of Crime and Supermarket Locations: Implications for Food Access

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# The Endogeneity of Crime and Supermarket Locations: Implications for Food Access

by Adam N. Rabinowitz

## I. Introduction

Anecdotal evidence exists that crime is a deterrent to economic activity and hence urban areas that have high levels of crime are expected to have reduced access to retail opportunities, including supermarkets (Giang, et al., 2008). Crime becomes one of many measures of a grocers cost because when crime increases, costs of safety and theft prevention activities increase as well. This increased cost of doing business is believed to be a deterrent to supermarkets from locating in high crime areas, thus potentially presenting problems of access to affordable and nutritious food in high crime communities. This study evaluates the relationship between crime and supermarket access, which has a direct effect on current and future policy initiatives that are geared toward increased economic development to improve supermarket access in current food deserts or underserved areas.

When studying supermarket access in urban cities, previous research has primarily focused on race, income, and vehicle ownership as neighborhood characteristics that indicate reduced supermarket availability. Few studies have considered crime as a possible deterrent to supermarket access, however, those that have included crime do so as an exogenous explanatory variable and find insignificant and contradictory results, especially when compared to more general literature on crime and retail development (Fisher, 1991; Donohue, 1997; Gibson, 1999; Diez-Roux, 2009). One reason for these mixed results is the potential for an endogenous relationship between crime and store locations (Bowes, 2007).

Considering an alternative method of evaluating the impact of crime, Bowes (2007) investigates whether crime deters retail development and whether retail development attracts

crime. Hypothesizing that a larger number of businesses create greater opportunities for crime in urban areas, he focuses on the Atlanta, Georgia metropolitan area and estimates the impact of retail development on the density of crimes and the density of crimes on retail development. His findings indicate that an increase in criminal activities deters retail development while an increase in the density of retail employment leads to an increase in crime. The presence of this endogeneity presents for an interesting empirical question when studying the effects of crime on supermarket access.

It is logical to say that the endogeneity of crime and supermarket access is one where supermarkets attract crime and crime deters supermarkets. However, supermarkets have an ability to promote a healthy lifestyle, thus one might consider the health benefits associated with supermarket access. The presence of a supermarket can lead to less crime because supermarkets promote a healthy neighborhood environment and the lack of criminal behavior is a byproduct of a healthy environment. The effect of neighborhood environment on crime has rarely been explored, but those studies that have addressed the issue suggest that a neighborhood plays an important role in reducing crime (Ellen and Turner, 1997). Therefore, knowledge of the relationship between crime and supermarket access can influence future policy initiatives that are geared toward improving supermarket access in current food deserts or underserved areas.

To test the relationship between crime and supermarket access I follow Bowes (2007) in developing a two-stage simultaneous equation model that specifies supermarket access as a function of crime and neighborhood characteristics while also specifying crime as a function of neighborhood characteristics and supermarket access. Following previous literature (Greenbaum and Tita, 2004 and Bowes, 2007), neighborhood characteristics are defined in various subgroups. The first are attributes which offer a higher reward or increased opportunity

for crime, such as population, income, roadway/highway access, and mass transit availability. The second is a characteristic that makes crime unattractive because it increases the likelihood of being caught, such as a measure of police presence in the area. The third category of variables are demographic variables known to relate to the opportunity cost of crime. Variables that are included in this category include race, age, poverty level, and education. This set can also be expanded to include indicators of family structure, such as female-headed households and divorce rates. Additional explanatory variables include housing attributes such as the existence of vacant housing, housing values, and rent. Some of the previous research has also found significant effects relating to the distance to downtown business districts (where crimes are more prevalent) and the density of manufacturing employment.

## II. Literature Review

### II.a. The impact of crime on retail development/neighborhood environment

Only two known empirical studies exist that indirectly consider crime as a determinant of supermarket access. Gibson (1999) uses crime as a proxy for costs since areas with higher crime rates are assumed to have higher costs related to safety and theft prevention activities. Her findings indicate that crime does not have an effect on distance to supermarkets.<sup>1</sup> Donohue (1997) also finds insignificant results as well as mixed coefficient signs when considering the impact of crime on grocery service levels.

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<sup>1</sup> Gibson (1999) focuses on crime as one of many measures of a grocers cost. Costs are higher with an increase in crime because of the increased safety and theft prevention activities. Using a murder rate and a property crime rate, Gibson finds no significant affects on distance to grocery stores. Donohue (1997) finds mainly insignificant results and mixed signs on the impact of crime on grocery store service levels.

## II.b. The impact of retail development/neighborhood environment on crime

## II.c. The endogeneity of crime and supermarket access

A study by Bowes (2007) gives some insight to other crime related research. This study focuses on the relationship between crime and retail development. The author presents evidence that an endogenous relationship exists between the two, which gives reason to the unexpected and contradictory findings by Donohue (1997) and Gibson (1999). When estimating a two-stage simultaneous equation model, Bowes finds that crime is a deterrent to retail development.

## III. Model

The model used for analysis consists of a series of two equation estimated simultaneously. The first equation has access as a dependent variable, while the second equation has crime as a dependent variable.

$$(1) \quad S = \alpha_0 + \beta_x X_A + \beta_c C + \varepsilon$$

where:

S = supermarket access

X = neighborhood characteristics related to access

C = crime scores

$$(2) \quad C = \lambda_0 + \gamma_x X_c + \gamma_s S + \mu$$

where:

S = supermarket access

X = neighborhood characteristics related to crime

C = crime scores

#### IV. Data

The crime data used for this study are obtained from CAPIndex and represents an index of the likelihood, or risk, of crime for each zip code. The risk of crime measure is widely used by businesses, consultants, and court proceedings. The CAPIndex methodology allows for comparison between different areas across the entire US, state, or county. Data on supermarket locations are obtained from TDLinx for 21 metropolitan areas, thus allowing for a broad based study of the impact of crime and supermarket access in major metropolitan areas in the United States. Neighborhood characteristics are obtained from the U.S. Census Bureau.

#### V. Results

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#### VI. Conclusion

The issue of food store access and the food environment has been a topic of interest for agricultural and applied economists as well as policy makers throughout the world. Michele Ver Ploeg (2010) presents an overview of these issues including the links between diet, obesity, and the lack of healthy food. The White House has also recognized the need to increase access to affordable and healthy food through the creation of the Healthy Food Financing Initiative that provides financing for development of food stores in underserved areas (<http://www.letsmove.gov>). Adding a more comprehensive discussion of the impact of crime on supermarket access has great relevance with regard to the implementation of current public policies.

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