Varying the Variable:
Presenting Different Cases for Visualizing the Relative Attractiveness of Retail Business Centers in New Britain, Connecticut

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ABSTRACT

It is common practice in business geography to use gravity models such as the Reilly’s Retail Law of Gravitation model to gauge the extent of presumed trade areas for retail sites based on a variable that models the general demographic attractiveness of the site in question. In the Huff retail model, an exponent represents additional attractiveness factors that differentially affect certain sites; however, it is less common practice to vary the attractiveness of one site alone and to visually inspect in a series of maps the differences in other trade areas given the variation of assumptions about the attractiveness of that site. The idea behind this form of analysis is that business managers benefit from being able to visualize a range of possible contingencies to which they may have to respond. The city of New Britain, Connecticut, is used as a demonstration model in this article to provide these kinds of visualization maps.

Keywords: Business Geography, Contingencies, Geographic Information Systems, Retail Gravitation, Trade Areas

THE BASIC IDEA: VARYING ASSUMPTIONS OF ATTRACTIVENESS

In this paper, the author intends to present a particular methodology for plausibly gauging where the trade or market areas for businesses in retail business zones should be, using standard assumptions about the relationship between the space available for retail activities in those zones and the attractiveness of those zones for the surrounding area’s customers. The novelty of the approach presented in this paper, however, will lie in the variations applied to attractiveness assumptions used by the model.

The space available for retail purposes, which generally goes by the name Gross Leasable Area (or GLA) is often used as a reasonable proxy variable by which one may estimate the revenues one may expect to earn at a site, all other things being equal (cf., Schmitz & Brett, 2001, chapter 5 for a thorough discussion of how GLA is used as an estimator in business and real estate geography; also see Urban Land Institute (2008) for how the GLA statistic is used...
as a standard measure in the retailing industry). The more Gross Leasable Area is available for use by a business or set of businesses, the more revenues should, all other things being equal, flow to those businesses. Emphasis is placed here on the words “all other things being equal,” because it is possible for conditions to vary significantly between different kinds of retail zones.

The idea animating this paper is that varying assumptions about different retailing zones can be very specific, rather than general. In one kind of typical estimation of trade or market areas, such as accomplished by the well-known model of W. J. Reilly (1929), no scaling elements are introduced to differentially gauge retail attractiveness for particular sites. This renders the model very general and insensitive to specific factors that affect only one or a few of those sites. In the more specified version of the Reilly equation created by David L. Huff (Huff, 1963; Huff & Jenks, 1968), scaling elements are introduced to gauge differential attractiveness of sites, but according to the contribution of a weighting variable or set of variables that are applied to all the sites. This renders the model somewhat more specific to locally-important factors that can increase or decrease the capacity of the site to attract customers, but the weighting variable used in the equation is applied by this model to all sites, rather than in order to change assumptions about just one or a few sites.

Useful though the Reilly and Huff approaches are, this paper seeks to pursue a different logic. The idea behind this paper is that it is sometimes revealing to use a control and experiment kind of approach to understanding relationships between retail business site locations. The research question the author seeks to ask here is something on the order of “if one changes assumptions about the attractiveness of this site, how does this affect the calculations for trade/market areas for the other sites?” To put another way, this paper focuses on creating a context for visualizing dynamics of the entire trade area system (cf., O’Kelly & Miller, 1989) for a general discussion of retail gravitation model systems). The focus is on how a system reconfigures itself if assumptions about the attractiveness of one retail site change.

**USING A RETAIL BUSINESS ZONE AREA-BASED GRAVITY MODEL TO REPRESENT TRADE AREAS IN NEW BRITAIN, CONNECTICUT**

In the first part of this paper, the author will explain the base method by which he has estimated the attractiveness of a retail center, namely, by using the area of a business zone as a plausible proxy measure for retail activity. The higher the square footage available for development at a site, the more business managers should, other things being equal, be able to make effective use of the site for retail purposes.

This is based on a similar logic to that employed by business geographers who use Gross Leasable Area as a proxy variable to predict activity at retail centers. Strictly speaking, the GLA is the area for which rent is actually paid by the retail business owner (ULI, 2008). This is the reason that GLA is taken to be the portion of area that is revenue-producing for the retailer, because it is the area for which the retailer is willing to pay. In this model, the author uses the fact that the land is included in a zone designated for retail business purposes to establish the likelihood that it will be used for such purposes. Otherwise, there is no significant difference in using this approach; this uses an area-based proxy variable to plausibly represent the amount of retail business activity likely to occur at a site.

Weighted Thiessen polygons are used to model the gravitational effect in this paper and to set the boundaries of retail trade areas (cf., Boots, 1980; Jones & Simmons, 1993, p. 348; Boots & South, 1997; for a description of the logic of using weighted Thiessen polygons for this purpose); earlier considerations of how to use gravity models (cf., Isard, 1960, chapter 11 for a general discussion of these kinds of models) to create weights for discrete polygons.