Changes in Intra-brand Market Concentration in the Retail Automotive Industry: A Critique of the Prevailing Manufacturer Model of Intra-brand Establishment And a Direct Spatial-Based Model for Impact Assessment

by

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ABSTRACT

This thesis evaluates changes in the concentration of intra-brand competition within the retail automotive industry. This is accomplished through a review of the nature and history of automotive franchising and its relevant industrial organization problems and through a case study analysis of an intra-brand dealership relocation. A significant backdrop to this topic is the legal arena in which regulating courts decide the fates of attempts to add, relocate, and terminate automotive franchises. Specifically, this thesis critiques and tests the prevailing empirical model advanced by manufacturers to support the need for increased retail representation.

Empirical work in this thesis expands previous literature in several ways. A before-and-after statistical analysis directly tests the assumptions of the aforementioned manufacturer model, and examines the role of proximity in intra-brand and inter-brand competition. Finally, this thesis proposes an alternate model for evaluating the effect of an encroachment by an intra-brand competitor.

CHAPTER ONE

INTRODUCTION

Major automotive manufacturers in the United States distribute their vehicles through networks of independent authorized sales and service outlets (dealerships). Individual automotive customers are direct patrons of dealerships, while dealerships are the direct customers of manufacturers. As the link between manufacturers and the end-users of the manufacturers' products, the viability of the authorized dealer networks is critical to the success of the automotive manufacturers. However, to the extent that dealerships earn above-normal profit at the expense of consumer welfare, the retail market for manufacturers' products can suffer. Thus, the health of the automotive retail distribution networks depends upon a delicate balance between the interests of the manufacturer, the dealer network, and the end-using consumer.

The stage for this balancing act is often within the legal arena. Neither manufacturers nor entrepreneurs may freely establish retail sales outlets without first satisfying regulatory, statutory, and contractual criteria. Franchised dealerships generally hold the right to protest the establishment of intra-brand competitors within certain distances of their locations. Manufacturers may not freely terminate retail dealerships. Jointly- willing manufacturers and entrepreneurs must generally overcome the protests of existing dealerships of the same brand before establishing new authorized retail outlets. While the specific governing standards vary, it is generally necessary to show that the expected increases in welfare to the manufacturer and consuming public will exceed the negative impact upon existing dealer(s) of the same brand.

In these tribunals, automotive manufacturers and their expert consultants assert that large dealer networks result in increased consumer welfare through increased competition and product access. This, in turn, leads to not only more productive retail sales efforts for the manufacturer, but also increased sales by the independent dealerships. The prevailing model offered by manufacturers in support of the need for additional dealerships states that increasing the concentration of a brand's retail outlets (adding and relocating dealerships) stimulates the brand's market share performance, and that the market share increase should be disproportionately higher than the increased concentration of outlets in the market. Thus, the addition of dealerships should benefit the welfare of all three parties: the manufacturer, the dealerships, and the consuming public.

Dealerships and their experts counter that encroachment by intra-brand competitors reduces the sales and profitability of existing dealerships. Reduced profitability ultimately threatens investment and diminishes the degree of service that the dealerships can provide. The lower level of services reduces or eliminates the benefit that consumers may receive as a result of the increased concentration of dealerships in the market.

Recent industry developments run counter to the manufacturer's model of retail network management. In 2009, industry giants General Motors and Chrysler separately filed for bankruptcy protection.[1] Within these filings, the successor companies

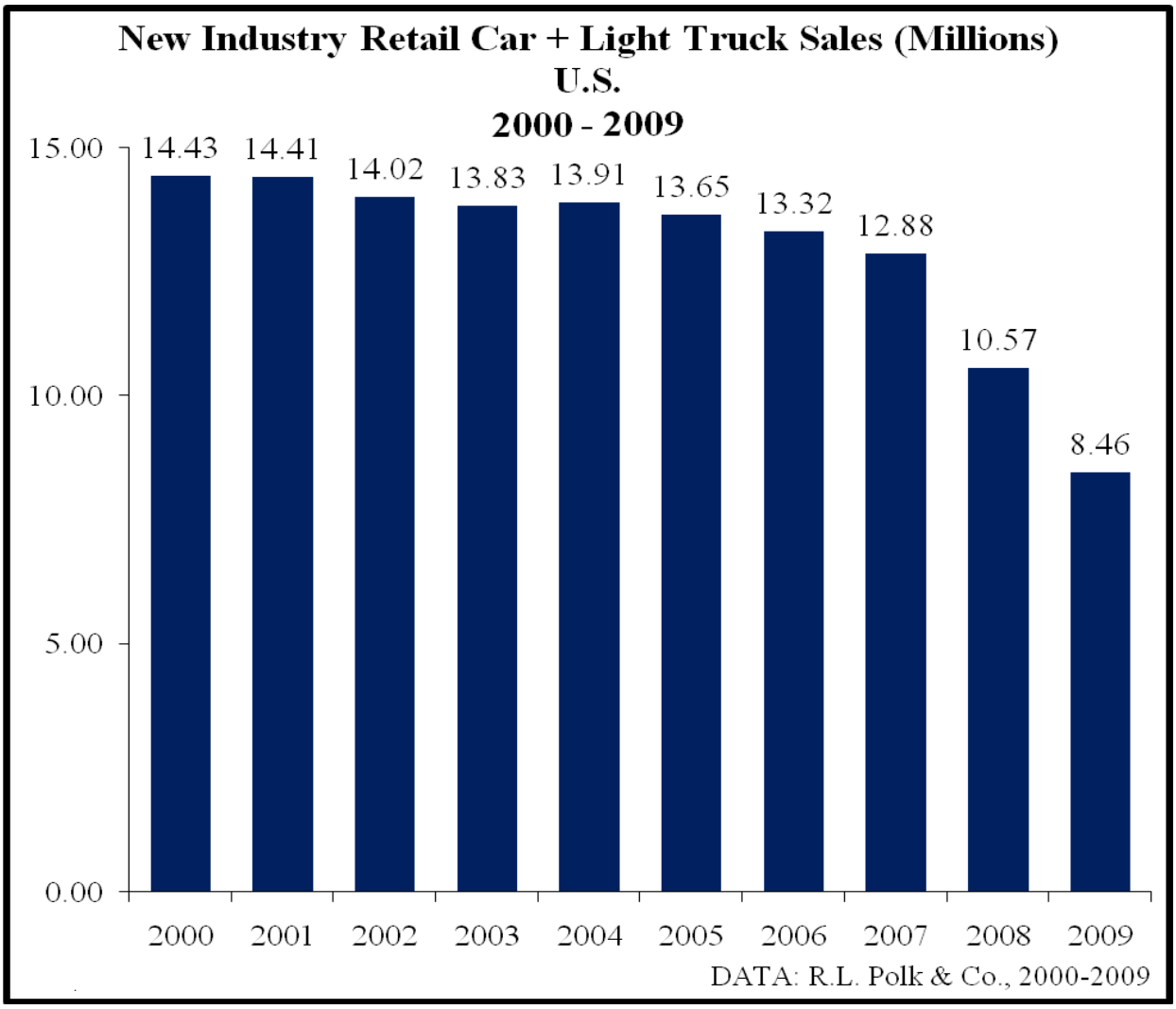
[1] In re: *Motors Liquidation Company: Case no. 09-50026* and *Old Carco LLC (f/k/a Chrysler LLC)*, 09-50002.

successfully rejected contracts with over 3,000 authorized dealerships.[2] Rejection of these dealership contracts reflected the stated desire to downsize to smaller, more profitable dealer networks with *reduced intra-brand competition* and higher average sales volume per outlet.[3] The dealership rejections represented a clear break from prior thinking, which would have dictated that maintaining or increasing outlets would not only salvage the brand's market share but the health of the retail outlets.

It would, however, be overly simplistic to attribute those manufacturers' perceived glut of dealerships simply to their policies of dealer network management. Other factors, such as increased competition from import manufacturers and a collapsing market for new vehicles, had devastating effects. As shown in Figure 1.1 below, the retail market for new vehicles declined continuously since 2000 with calamitous plunges in 2008 and 2009.

[2] In response to the passage of §747 of the *Consolidated Appropriations Act*, the reformed General Motors and Chrysler Corporations reinstated (voluntarily and involuntarily) many of the rejected dealerships.
[3] In re: *Motors Liquidation Company: Case no. 09-50026* and *Old Carco LLC (f/k/a Chrysler LLC)*, 09-50002: *Second Declaration of Peter Grady (Chrysler)*.

Figure 1.1: U.S. Industry Retail Light Vehicle Trend



General Motors and Chrysler experienced even steeper declines. As shown in figure 1.2, their combined retail sales dropped from nearly 5.9 million nationwide in 2000 to just over 3.1 million in 2008 to 2.23 million in 2009. Combining the data from 1.1 and 1.2, GM and Chrysler accounted for over 60 percent of the overall decline in industry retail vehicle sales between 2000 and 2009 levels. Despite a reduction of over 2,500

dealerships between 2000 and 2008[4], average retail sales per dealership fell at an even more rapid pace over the decade than did retail sales, resulting in a per-dealership reduction from 483 to 328 new units.

Figure 1.2: Chrysler and GM New Retail Sales Per Dealership

New Chrysler + GM Retail Car + Light Truck Sales per Dealership

New Car + Light Truck Sales

2000	2001	2002	2003	2004	2005	2006	2007	2008
5.894	5.721	5.557	5.287	5.165	4.888	4.443	4.2	3.123

Dealership Counts*

2000	2001	2002	2003	2004	2005	2006	2007	2008
12,196	12,069	11,982	11,572	11,339	11,006	10,650	10,238	9,523

Chrysler + GM Sales per Dealership

2000	2001	2002	2003	2004	2005	2006	2007	2008
483	474	464	457	456	444	417	410	328

Notes: Dealership Counts are as of January 1, of the following year.
Chrysler and GM include only domestic name-plate brands.

Data: R.L. Polk & Co., 2000 - 2008.
Automotive News Market Data Book, 2002 - 2008.

The GM and Chrysler bankruptcies provide a momentous backdrop for the presentation of this thesis. However, the goals herein exist at a much more focused technical level. While the dealer contract rejections highlight the magnitude of the

[4] The reader should not equate a reduction in dealership count directly with dealership closures. Much of the reduction resulted from the consolidation of families of brands under single rooftops. For example, if formerly separate, Dodge, Chrysler, and Jeep dealerships consolidated. This would result in a deduction of two dealerships but no reduction in franchises.

economic problem of retail network management, the pre-bankruptcy environment already afforded fertile ground for economic study.

Broadly, this thesis seeks to examine and contribute to the understanding of the balancing of economic interests that occurs when weighing the potential establishment of a new automobile dealership. Specifically, it aims to inject a rigorous empirical contribution into the analysis of the impact of intra-brand encroachment. Achieving this end first requires an examination of the retail automotive franchising environment. The questions explored include the history, nature, and purpose of the industry and the degree to which these elements lend insight into the relationship between the economic interests of consumers, dealerships, and manufacturers. Furthermore, this survey will determine whether specific characteristics of the automotive franchising environment enhance or impair the development of the desired theoretical contributions.

Upon establishing an understanding of the salient aspects of the automotive franchising environment, this thesis will review available literature for guidance on the economic relationships that define the dealer-manufacturer-public relationship. Do these relationships explain how increases in intra-brand competition in an entry/exit-restricted market are likely to differ from what would occur in perfectly competitive markets? Additionally, it will explore the effect that the non-integrated structure of the retail automotive industry has on the economic interests of effected parties, both statically, and dynamically in response to changes in dealership concentration.

One should not minimize the significance of the manufacturer's posture on the topic of increased intra-brand competition. If dealerships can, indeed, be added to markets with benefits to consumers, dealerships, and manufacturers, then the balancing of

economic interests is Pareto-preferred. One basis for this position is that the retail automotive market is in a state of increasing returns to scale. A separate explanation, which is not entirely distinct, is the theoretically novel assertion that increasing the concentration of intra-brand competition does not harm incumbent competitors because the market will respond in a manner that remedies the lost opportunity that existing market dealerships have failed to capture. Thereby, the encroaching dealerships can draw from a separate pool of sales, rather than cannibalizing the sales of existing intra-brand dealerships.

This thesis applies what I believe to be the most direct and rigorous tests to date of the prevailing model that supports the manufacturer's (increasing dealer count) position. The originator of this model is Mr. James Anderson of Urban Science Applications, Inc (e.g., *Landmark Chevrolet vs. General Motors Corporation, Chevrolet Motor Division and Austin Chevrolet, Inc, Docket No. 02-0002* LIC, 2002). This thesis will refer to Mr. Anderson's collective work on this topic as the "USAI Model."

Through professional access and good fortune, the data available to this author allow a highly detailed examination of a change in Dodge's retail dealer network (a dealership relocation) that occurred in the Miami market in 1999. The choice of this particular relocation is a function of data availability. The data set offers not just a sufficient time period to cover the period before and after the relocation, but also broad and detailed records of retail automotive activity in the market.

The empirical work presented herein undertakes three original examinations of the effect of the relocation. The first tests the hypothesis of the targeted selling pattern of the encroaching dealership. Specifically, it measures whether the relocating dealership,

indeed, draws from allegedly under-performing portions of the market. The second explores whether intra-brand changes in the market alignment, as expressed by proximity to potential customers, affect inter-brand purchase probabilities. The final models explore whether spatial changes and changes in the selling pattern of the relocating dealership affects the existing Dodge dealerships' shares of Dodge sales. These analyses contribute to existing work in the field through both improved data access and the development of original statistical models.

If successful, this thesis will expand existing literature in three ways. First, it will provide an enhanced framing of the retail automotive franchising environment by undertaking a literature review in a targeted manner. Second, it will conduct rigorous and explanatory tests of the prevailing model used by manufacturers to support their establishment of encroaching dealerships. Finally, using an expanded data set, it will present original models evaluating the dynamic role of proximity change in the contexts of inter-brand and intra-brand competition.

When reviewing the academic literature in connection with the empirical models advanced by the manufacturer, an apparent fissure exists. The manufacturer pro-encroachment position appears to run counter to the general expectation that the loss of market power will reduce the profitability of the entity that is losing it. There are two explanations for this gap: the expectation of significant market share expansion from increased intra-brand competition, and faith in the novel assertion that the encroachment will result in a targeted remedy of lost opportunity in the market.

The qualitative findings of this thesis demonstrate that the prevailing manufacturer model suffers from intrinsic flaws that render it unreliable as a scientific

tool. The six original empirical models presented in Chapters 5 and 6 build upon one-another, first, to dismiss the aforementioned assertion of a targeted response, and, second, to develop a system for predicting the effect of the encroachment upon the sales of existing intra-brand competitors. However, the most powerful and explanatory finding is the discovery of the striking difference between the market's intra-brand and inter-brand responses to the relocation. While intra-brand competition shows extreme sensitivity to proximity changes after the relocation, inter-brand competition shows virtually no effect.

Despite its simplicity, this result speaks to the robustness of economic literature, as presented in Chapter 3, and also provides general guidance in the principles of dealer network management. Automotive brands maintain a degree of differentiation. However, demand for a specific brand of automobile (inter-brand) is more inelastic than demand for a given dealership within a brand (intra-brand). As such, whatever effect an intra-brand encroachment has upon market share, the effect of the encroachment upon intra-brand competition will generally be more pronounced. As predicted in basic industrial organization models, the loss of market power results in reduced profits by the firm losing the market power. As demonstrated by this thesis, proximity change is a viable predictive model for estimating the likely effect of an encroachment upon intra-brand competition.

CHAPTER TWO

INSTITUTIONAL BACKGROUND

Franchise agreements between automobile dealerships and manufacturers assign rights and responsibilities to each party. Dealerships agree to sell and service vehicles from acceptable and distinctly branded facilities. With varying degrees of specificity, contracts require that dealerships vigorously promote the manufacturer's products and maintain acceptable levels of employee training and customer satisfaction. Manufacturers agree to distribute their products to dealerships using fair and reasonable methods and to meet other requirements, such as reimbursing dealerships for warranty work and timely filling product orders. Contracts also set conditions for terminating adding, and relocating dealers. The standard provisions of these agreements are written by manufacturers and are largely uniform for all dealerships of a given brand. Contracts are not generally the product of individual negotiations.

Franchise agreements assign geographic areas to dealerships. These areas are usually unique to given dealerships.[5] However, the areas are non-exclusive and do not restrict where dealerships may sell vehicles. In practice, manufacturers use dealerships' assigned areas primarily for the purposes of developing sales expectations and for measuring dealership performance. Dealer areas may also form the basis for the assignment of referrals or other marketing efforts. From the dealerships' perspective, these contractual areas may offer certain territorial protections, such as preventing other

[5] In metropolitan areas, manufacturers may assign the entire market to all authorized dealerships therein. Heavy truck dealerships also have common market areas.

dealerships (of the same brand) from conducting sales events and constraining the manufacturer from establishing additional outlets.

In order to protect dealerships from potentially harmful exercise of the uneven power that uneven franchise agreements bestow upon the franchisors, many states have instituted laws intended to protect dealerships from coercive or unfair acts by manufacturers. These potential acts may include but are not limited to unwarranted termination of franchise rights, requiring dealerships to purchase unwanted inventory, or discriminating between franchisees.[6] Additionally, these laws often restrict the manufacturer's ability to establish dealerships, either through addition or relocation, within certain proximities of existing intra-brand outlets. This final topic provides the context and venue for this thesis.

In the mid-1990s, Dadeland Dodge ("Dadeland") sought to relocate its franchise from its existing location in Dadeland, FL. to a new site in Hileah, FL, that was approximately 11.1 miles from the authorized location of Sptizer Dodge ("Spitzer"). The manufacturer ("Chrysler") approved the relocation and sent to Spitzer a notice of its intent relocate Dadeland. The Florida New Motor Vehicle Statute ("Statute") provided Spitzer the right to protest the relocation.[7] The Statute required that if Chrysler wished to over-rule the protest, it must, first, satisfy certain criteria. Those criteria appear in Appendix 2.1 at the end of the chapter. Within those criteria, *Criterion (2)(b)(1)* shown below captures the statutory balancing of economic interests associated for the proposed market action.[8]

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[6] I.E., Florida New Motor Vehicle Act and California New Motor Vehicle Act, among others.

[7] Spitzer established standing to protest under *320.642 Dealer licenses in areas previously served; procedure*, of the Statute.

[8] Section (2)(a)(2), addressing "adequacy of representation" evaluates whether the manufacturer enjoys

Florida New Motor Vehicle Statute: **Criterion (2)(b)(1) and :**

> The impact of the establishment of the proposed or relocated dealer on the consumers, public interest, existing dealers, and the licensee; provided, however, that financial impact may only be considered with respect to the protesting dealer or dealers.

The portion of (2)(b)(1), relating to the effect of the relocation on existing franchises of the same brand, is the most contextually relevant to this thesis.. However, the analysis of Criterion (2)(a)(2), which addresses the adequacy of representation by existing dealerships of the relevant line make, is a critical precursor to this topic. Adequacy of representation, in its most basic form, is a measure of the brand's market share locally compared to the market share achieved in some subjectively-selected benchmark area. Later sections of this thesis will show that not only are conclusions related to adequacy of representation highly sensitive to the choice of performance benchmark, manufacturer models relating to likely impact from the encroachment are also similarly vulnerable.

An evaluation of salary expectations illustrates this sensitivity through simple analogy. At the extreme, if one assumed that for all occupations minimum wage were a proper salary expectation, no worker would legally fall below that standard. Accordingly, there would be little reason to study whether external factors contributed to workers' falling below salary expectations. Likewise, if one assumed that adequate effort alone would always earn any worker at least $1 million per year, then any worker earning less than that amount would be a victim primarily of his own sloth, and other potentially explanatory factors would not come into play. Because of the potentially precluding

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sufficient representation of its brand in the relevant market and supplements the balance of economic interests appearing in (2)(b)(1).

effect of the performance expectation selected, this thesis' before-and-after impact analysis of the relocation strives to evaluate impact in a manner that is largely insensitive to brand performance expectations.

The legal backdrop of the balancing of economic interests is a critical step in shaping the topics addressed in this thesis. Much of the prevailing "literature" is in the form of expert reports submitted in the context of legal hearings ("establishment hearings"), such as the one governing the proposed Dadeland relocation. Dealer-level and market-level data used therein are generally proprietary, with their release is strictly controlled. Protective orders govern the data's potential use outside of litigation. Neither dealers nor manufacturers have the incentive to publicize any but the most aggregate data. While experts can and do conduct analyses for general consulting purposes, the literature and analysis presented in establishment hearings is primarily that which legal counsel for the parties has selected as helpful to their clients' positions.

The themes of the resulting expert work are not surprising. Manufacturers who seek to support the need for additional representation generally present findings that purport to demonstrate that the market is not adequately represented by the current dealer network, and that changes to that network will not harm the existing dealerships. Dealerships who seek to block additional representation generally present findings, such as those of Dr. Ernest H. Manuel, Jr. (e.g., *Landmark Chevrolet vs. General Motors Corporation, Chevrolet Motor Division and Austin Chevrolet, Inc, Docket No. 02-0002* LIC, 2002) that either the existing dealer network already provides adequate representation for the brand, or that exogenous factors explain disparities between actual market performance and benchmark levels. Dealerships generally argue that increases in

the concentration of intra-brand competition will likely harm existing dealerships and threaten investment.

Data that are generally absent from expert presentations can be as significant as those that are included. The most notable absentee is price. The reasons for its exclusion are twofold. The first is confidentiality. The second is that retail automotive transactions are both individually negotiated and multi-faceted. For example, one dealership may advertise generous trade-in allowances on used vehicles but hesitate to discount new car prices significantly. Another may cast itself as a price leader while paying less for traded vehicles. Others may supplement vehicle profits through the aggressive sales of after-market products. In short, "price" is not comparable across transactions; nor is a true market "price" practically observable.

State statutes provide no relief from most other actions that intra-brand competitors may take to capture sales. There is no statutory protection from an intra-brand competitor that wishes to build an upgraded facility, advertise more, cut prices, or increase its trade-in allowance, although any of these actions could conceivably increase the competitor's market share. Lost territorial advantage that follows from an encroachment can be observed and measured. Accordingly, most dealer-introduced expert literature on this subject seeks to explain the role that objective geographic factors play in intra-brand and inter-brand competition and the degree to which changes in those objective factors are likely to affect brand performance within a market and that brand's dealerships therein.

As a result of these constraints, the primary currency in expert discussion of impact is the number of sales of new vehicles. This is not to suggest that experts are

unaware of other factors such as price changes or changes in advertising volume. Rather, new vehicle sales are a consistently available data source that can be compared across dealerships and across time periods. Facing the same constraints, this thesis employs as its unit of measure counts of new vehicles sold or registered, rather than dollars of sales or profits.

Likewise, infringement by an encroaching dealership is generally evaluated in terms of objective spatial measures of proximity. Proximity can be expressed in terms of absolute advantage (closest dealership), relative advantage (proximity relative other dealers' proximity), or ranked advantage (closest, second closest, etc.). As described later, this thesis employs a gravity-based model of relative proximity.

The absence of an observable market price impairs the evaluation of the economic interests of the consuming public or conventional measurement of consumer welfare. By convention, a presumption exists that increased competition generally enhances the public interest. Likewise, courts have found that in markets in which a brand's market share falls short of some accepted standard, inadequate levels of competition are presumed to exist to the detriment of the public welfare. One observable element of the public interest is access to product (dealerships). Product access is observable in terms of measures of geographic proximity, both statically and in terms of the dynamic effect that franchise encroachment would have upon the public's access to the product.

The analytical challenge posed is to translate the observable changes in proximity (to consumers, to competition) into valid estimates of impact upon welfare-sensitive commodities, such as dealership sales and brand market share. In the legal arena, there is little substantive disagreement about objective measures of spatial impact, market share,

sales volumes, or profitability. Disputes arise in the interpretation of measures such as the appropriate level of market share necessary for competition to be considered "adequate," the importance of the role of proximity in intra-brand and inter-brand competition, the degree to which concentration of intra-brand competition affects inter-brand competition, and the questions of whether and the degree to which exogenous factors such as demographic differences validly explain variation in market share. The next section of the thesis introduces the institutional components necessary to evaluate these questions.

II.a Institutional Components

This section introduces the reader to relevant terms and concepts from the retail automotive industry. Analysis of the retail automotive markets benefits heartily from the availability of extensive data concerning the behavior of buyers and sellers of new vehicles. The root source of these data is the requirement that buyers register their vehicles with governing state agencies. The vehicle registration includes relevant information about the buyer, the seller, and the vehicle purchased. Private companies like R.L. Polk & Co. ("Polk")[9] acquire vehicle registrations from public bodies and summarize and process the information for sale to private entities, such as manufacturers, dealers, and industry analysts and vendors. The following paragraphs describe the uses of registration data and general methods for evaluating retail automotive markets.

[9] *www.polk.com*, 12/1/10.

II.a.1 Data:

Vehicle registrations are matched to the address of the end user, as opposed to vehicle sales, which are identified by the selling dealership. Most registration data are available in summary form, with vehicle counts segregated in varying levels of detail, such as make, model, engine type, driving wheels (four-wheel drive), body style, and trim level. Companies like Polk can code vehicle registrations to virtually any geographic level, with the most commonly used being United States Census tracts. This thesis, as do most market analyses, focuses on retail automotive purchases. Fleet buyers are those who purchase large numbers of vehicles within a year and who exhibit substantially different behavior from retail buyers.[10]

Most automotive manufacturers cooperate with Polk to improve the quality of available automotive data. Collaborations include sharing selling dealer information and working with Polk to segregate vehicles into different market segments. Much of the shared information, such as product segment definitions, is proprietary, preventing public access to the data in the same form as employed by the manufacturer. While Polk makes available similar general information, access to manufacturer data generally requires either manufacturer cooperation or legal measures compelling access.

Source data for this thesis come from a legal matter in which Chrysler sought to add a dealership to the Orlando area over the protest of an existing dealership[11]. While protective orders generally prohibit the use of such data outside of the instant matter, no protective order was entered. Unintentionally, data produced in that matter covered a

[10] Ibid.
[11] Florida Department of Administrative Hearings, *Daimler Chrysler Motors, Corp, et al, vs. Bob Dance Incorporated, Case No*.:00-5152, 2003.

broad enough geographic and temporal scope to allow an analysis of Miami market before and after the relocation of Dadeland in 1999. Since 1999 includes some time periods that were pre-relocation and others that were post-relocation, this thesis treats 1998 as the "before" period and September 2000 year-to-date (the end of data coverage) as the "after" period.

This thesis employs 1990 U.S. Census tracts boundaries in order to conform to the contemporaneous geographic definitions used by Polk. At the time of the original matter, Polk did not offer comprehensive Census tract coverage, so some registration data are by ZIP code. Chrysler was and is a cooperating manufacturer with Polk, so dealer sales data (for Dodge) are available for each geographic feature (Census tract/ZIP code) for which registration data are available.

II.a.2 Performance Measurement:

The evaluation of the performance of retail automotive markets can roughly be separated into two branches, measurement of brand performance and measurement of dealer performance.[12] Brand performance relates to the market share captured in a given geographic area, while dealer performance compares a specific outlet's gross number of new vehicle sales to some expected level of opportunity. Brand performance measurement is generally independent of specific dealerships' contribution to the overall market share. The measurement of both brand performance and dealer performance depend on two underlying principles, the description of which follows.

[12] These categories are not necessarily mutually exclusive, the explanation of which is extraneous to this paper.

Benchmarking is a common, if not universal, element of retail automotive analysis. Benchmarking involves selecting a comparison area by which to establish some expected level of brand performance. The brand's market share in the comparison area is overlain upon the count of new retail registrations by all competitive brands in the study area. This results in a numeric estimate of the number of registrations that the brand would capture in the study area if the brand in the study area had the same market share that it did in the comparison area ("Expected Registrations").

Figure 2.1 shows the hypothetical derivation of Expected Registrations by Brand A in a hypothetical market. Note that this process calculates a separate market expectation for each product segment, rather than applying an aggregate brand share.[13] This refinement controls for vehicle preference differences across markets which could overstate/understate brand performance if customers purchased disproportionate types of vehicles in which the brand performed better/worse than its overall market share. As a simple example, Brand A has no entrant in the Luxury car segment. Even if the market being studied were affluent with luxury cars being the vehicle of choice, the expectation for the brand would be zero, avoiding an artificial inflation of brand opportunity.[14]

The product segment definitions employed in this thesis (Appendix 2.2) are those employed by Chrysler in the original hearing. Following the benchmark selection process from the USAI model, the comparison area selected was Dodge's national market share. Section 2(a)(2) of the Statute required analysis of the "Community/Territory," where Dadeland was to be established. Chrysler defined the Community/Territory as the

[13] Expected Registrations, once calculated by product segment, are compared to actual registrations at an aggregate level.

[14] For a discussion of the limitations of segment analysis, see Stockton and Manuel, *White Paper on Sales Effectiveness (RSI and MSR): Flaws in Manufacturers' Measurement of Dealers' Sales Performance,* The Fontana Group, Inc.

"Miami Community/Territory ('C/T')" (see attachment), which was equivalent to the Miami Sales Locality or Miami Market definition used by Chrysler in the ordinary course of business.

Figure 2.1: Illustrative calculation of Expected Registrations in an area for Brand A

	(1)	(2)	(3) (1)*(2)
Product Segment	**Number of Registrations by all Brands ("Industry") Within Area**	**Statewide Brand A Market Share Within Segment**	**Brand A Expected Registrations Within Area**
Small Coupe	150	10%	15
Medium Coupe	100	15%	15
Small Sedan	200	10%	20
Medium Sedan	300	5%	15
Luxury Car	50	0%	0
Small Pick-up	200	20%	40
Full-sized Pick-up	400	30%	120
Medium SUV	500	20%	100
Crossover	200	0%	0
Total	2,100		325

The most common measure of brand performance is called "Registration Effectiveness." This measure compares the number of registrations that a brand actually captures in a geographic area to the number of Expected Registrations within the same area. Calculating the ratio of the former to the latter results in a standardized measure in

which 100% means that the brand's segment-adjusted market share locally is equivalent to the brand's share in the comparison area.

This thesis makes significant use of measures of proximity (described in more detail in the Literature Review). The measures employed are as depicted in Figure 2.3.

Figure 2.2: Proximity Measures

Drive Time: One-half of the round-trip drive time between the observed dealership and the population centroid of observed Census tract/ZIP code ("feature");

Share of Drive Time: $$\frac{\frac{1}{\frac{1}{2}rt\ drive\ time^2\ (Dealer\ i\ to\ feature\ j)}}{\sum_{i=1}^{I}\frac{1}{\frac{1}{2}rt\ drive\ time^2\ (Dealer\ i\ to\ feature\ j)}}$$

The Share of Drive Time equals a dealership's share (of all Community/Territory dealers) of reciprocal-squared drive time to a feature, where drive time is defined as one-half the round-trip drive time from the dealership to the centroid of the geographic feature. The use of drive time as a measure for proximity has advantages over other measures of proximity, such as air distance and drive distance. The obvious deficiency of air distance is that consumers do not fly to dealerships. Natural and man-made boundaries have practical effects upon proximity that air distance does not capture. Drive distance suffers from the flaw that consumers are intuitively much more likely to optimize travel routes based on travel times, rather than mileage. The primary deficiency in the drive time measure is its instability. The time elapsed while traversing routes changes based on time

of day, driving habits, and other traffic variations. However, since all ground travel is subject to these disturbances, drive time measures are not practically uniquely flawed.

This section of the thesis has attempted to introduce the reader to the context of the analysis of changes to the concentration of intra-brand competition among automotive franchises. It described some elements of the franchise environment, the data strengths and limitations of the retail automotive industry, the units of measure of the interests of consumers, dealerships, and manufacturers, and the analytical goals of the studies of this topic. The next section of the thesis reaches outside the world of expert testimony to study available economic literature that could contribute to the objectives of this thesis.

Appendix 2.1: Florida New Motor Vehicle Statute

(1) Any licensee who proposes to establish an additional motor vehicle dealership or permit the relocation of an existing dealer to a location within a community or territory where the same line-make vehicle is presently represented by a franchised motor vehicle dealer or dealers shall give written notice of its intention to the department. Such notice shall state:

(a) The specific location at which the additional or relocated motor vehicle dealership will be established.

(b) The date on or after which the licensee intends to be engaged in business with the additional or relocated motor vehicle dealer at the proposed location.

(c) The identity of all motor vehicle dealers who are franchised to sell the same line-make vehicle with licensed locations in the county or any contiguous county to the county where the additional or relocated motor vehicle dealer is proposed to be located.

(d) The names and addresses of the dealer-operator and principal investors in the proposed additional or relocated motor vehicle dealership.

Immediately upon receipt of such notice the department shall cause a notice to be published in the Florida Administrative Weekly. The published notice shall state

that a petition or complaint by any dealer with standing to protest pursuant to subsection (3) must be filed not more than 30 days from the date of publication of the notice in the Florida Administrative Weekly. The published notice shall describe and identify the proposed dealership sought to be licensed, and the department shall cause a copy of the notice to be mailed to those dealers identified in the licensee's notice under paragraph (c).

(2)(a) An application for a motor vehicle dealer license in any community or territory shall be denied when:

1. A timely protest is filed by a presently existing franchised motor vehicle dealer with standing to protest as defined in subsection (3); and

2. The licensee fails to show that the existing franchised dealer or dealers who register new motor vehicle retail sales or retail leases of the same line-make in the community or territory of the proposed dealership are not providing adequate representation of such line-make motor vehicles in such community or territory. The burden of proof in establishing inadequate representation shall be on the licensee.

(b) In determining whether the existing franchised motor vehicle dealer or dealers are providing adequate representation in the community or territory for the line-make, the department may consider evidence which may include, but is not limited to:

1. The impact of the establishment of the proposed or relocated dealer on the consumers, public interest, existing dealers, and the licensee; provided, however, that financial impact may only be considered with respect to the protesting dealer or dealers.

2. The size and permanency of investment reasonably made and reasonable obligations incurred by the existing dealer or dealers to perform their obligations under the dealer agreement.

3. The reasonably expected market penetration of the line-make motor vehicle for the community or territory involved, after consideration of all factors which may affect said penetration, including, but not limited to, demographic factors such as age, income, education, size class preference, product popularity, retail lease transactions, or other factors affecting sales to consumers of the community or territory.

4. Any actions by the licensees in denying its existing dealer or dealers of the same line-make the opportunity for reasonable growth, market expansion, or relocation, including the availability of line-make vehicles in keeping with the reasonable expectations of the licensee in providing an adequate number of dealers in the community or territory.

5. Any attempts by the licensee to coerce the existing dealer or dealers into consenting to additional or relocated franchises of the same line-make in the community or territory.

6. Distance, travel time, traffic patterns, and accessibility between the existing dealer or dealers of the same line-make and the location of the proposed additional or relocated dealer.

7. Whether benefits to consumers will likely occur from the establishment or relocation of the dealership which cannot be obtained by other geographic or demographic changes or expected changes in the community or territory.

8. Whether the protesting dealer or dealers are in substantial compliance with their dealer agreement.

9. Whether there is adequate interbrand and intrabrand competition with respect to said line-make in the community or territory and adequately convenient consumer care for the motor vehicles of the line-make, including the adequacy of sales and service facilities.

10. Whether the establishment or relocation of the proposed dealership appears to be warranted and justified based on economic and marketing conditions pertinent to dealers competing in the community or territory, including anticipated future changes.

11. The volume of registrations and service business transacted by the existing dealer or dealers of the same line-make in the relevant community or territory of the proposed dealership.

Appendix 2.2: Dodge Segmentation

Illustration of Dodge Expected Retail Registrations Calculation Using Actual Chrysler Corp Product Segment Definitions And Dodge's National-Average Market Share (1995)

Segment Name	(1) Number of Registrations of All Brands in Segment in Miami C/T	(2) Dodge's National Market Share in Segment	(3) (1) * (2) Expected New Dodge Registrations Within Miami C/T
Mini-Subcompact	850	0.00%	0
Subcompact	24,539	5.46%	1,339
Small Specialty	6,951	0.68%	48
Compact	7,501	6.72%	504
Basic Middle	19,235	4.82%	926
Middle Specialty	2,453	6.85%	168
Basic Large	3,352	0.00%	0
Luxury	11,728	0.19%	22
Small Pickup	6,126	11.13%	682
Standard Pickup	5,450	16.90%	921
Mini Sport Utility	879	0.00%	0
Small Sport Utility	12,108	0.00%	0
Standard Sport Utility	1,393	0.00%	0
Small Wagon	7,338	22.73%	1,668
Standard Wagon	252	28.56%	72
Small Van	326	1.29%	4
Standard Van	1,626	18.04%	293
Other Light Duty	154	0.00%	0
Medium/Heavy	506	0.00%	0
Total Car & Truck	112,767		6,647
Expected Dodge Market Share in Miami C/T			5.89%

Source: Chrysler Corp
Data: Chrysler Corp
R.L. Polk & Co.

CHAPTER THREE

LITERATURE REVIEW

A primary research objective of this thesis is to examine the effect on existing franchised automobile dealers that results from the relocation of an intra-brand competitor to a site closer to those dealers. Specifically, it investigates how the decline in relative proximity advantage that results from the aforementioned relocation affects the existing dealerships' ability to sell into those territories—the role of proximity in intra-brand competition. While it is possible to frame this topic in narrow terms, it is first necessary to consider the context that leads to such an explanation in the first place. The relevant topics are as follows:

A) What is the nature of retail automotive franchising and what is the rationale for its existence?
B) Does available literature provide guidance either on the study of the behavior of retail automotive markets or on the likely effect on retail markets from the proposed relocation?
C) What does the available literature imply in terms of the likely impact that the relocation will have upon the sales and profits of the existing dealerships?
D) What are the prevailing theoretical and empirical models specific to the topic?

To a lesser extent, the literature review also investigates the impacts upon the manufacturer and the consuming public that result from the relocation. However, as shown in the prior chapter, data availability and practicality limit the ability to conduct this analysis in a comprehensive manner. For example, while an increase in the concentration of intra-brand competition might reasonably be expected to reduce prices in the market, price data are effectively unavailable. And while an increase in quantity demanded for manufacturer's products may result, changes in profits to the manufacturer

are unobservable. Practically, the market share of the brand in question largely serves as a proxy for the welfare of the manufacturer and the consuming public.

III.a The Retail Automotive Franchising Environment:

A survey of retail automotive franchising could follow multiple paths. Most states have statutes that provide some measure of territorial protection to franchised dealerships. The effect of these protections could enter the realm of welfare economics. Likewise, anti-trust theory and other industrial organization problems are close to the surface. The retail automotive industry, like any other in which the manufacturer of the goods is not the ultimate seller to the consuming public, is subject to principle-agent problems. Similarly, competing incentives exist within dealerships, as salespeople and managers differ on the choice of the optimal products to emphasize and the nature of the relationship with the public. Two final examples follow, although admittedly, they do not serve to exhaust a comprehensive list. The first relates to micro-economic questions about profit-maximizing behavior in an industry where advertising is largely uniform but sales are individually transacted. The second is a question of economics and the law, where competing entities battle in courts and legislative bodies to promote their interests.[15] Without discounting the relevance of any of these fields to the topic at hand, it is possible to narrow this list without sacrificing a great deal of context.

One effective way to winnow the layers is to start at the finish line and work backwards. The process of narrowing the literature review begins with an identification of the compelling factors that may affect or define the impact of the proposed relocation

[15] Examples may include, but are not limited to, conflicts over the degree to which manufacturers may add, relocate or terminate franchises, requirements relating to reimbursement to dealers for warranty work, or the legality of sales incentive programs that may result in differential pricing between dealerships.

and follows with an analysis of the economic relevance of those factors. While this process may omit analysis of economically meaningful aspects of franchising, their existence or non-existence in the market being studied would be constant in the periods before and after the relocation. The relocation itself would not change the nature of franchising or of the overall retail automotive market. Thus, for the purpose of this thesis, a topic is considered salient if it either meaningfully defines general market behavior of automotive franchises or if it is likely to explain the probable effects from the dealership relocation on the sales of existing intra-brand competitors.

If the retail market for new motor vehicles were perfectly competitive, the impact of the proposed relocation would be straightforward. Identical firms would offer identical products, and buyers and sellers alike would behave as price takers in the market. Information would be full and symmetrical. The encroachment on a firm's territorial advantage would result in largely proportional sales decreases[16], as travel and search time would function as direct costs to consumers, and convenient access to the dealership would be the only distinguishing characteristic between sales outlets. In a perfectly competitive market, an analysis of the proposed relocation would add little to the works of Harold Hotelling (1929) and William J. Reilly (1931), whose publications established how outlet locations would affect equilibrium prices, quantities, and market shares in competitive environments.

Available literature and the law governing automotive franchises quickly establish that the retail automotive market is not perfectly competitive. Dealers enjoy protection from intra-brand competitors both through their operating agreements with manufacturers

[16] "Largely" intentionally modifies "proportional" as potential customers may identify different points as their starting locations (workplace, home, favored shopping areas, etc.)

and through state statutes designed to protect dealer rights and investments. In *The Development of the Franchise Distribution System in the U.S. Automobile Industry*, Thomas Marx (1993) discusses the evolution of the franchise system, while offering some insight into its non-competitive aspects.

Marx notes that the franchise system was not the only distributional method attempted by manufacturers. Branches, wholesalers, and even traveling salesmen were among the early methods of selling vehicles to the public. Exploding demand for automobiles in the early 20th century provided the impetus for manufacturers to focus on manufacturing and not distribution. Dealers made fortunes, conducting largely cash transactions, and were willing to tolerate one-sided manufacturer demands, such as C.O.D. payment terms, termination rights without cause, and lack of product support. Because of the seemingly endless streams of retail customers, dealerships acquiesced to onerous manufacturer requirements.

The inevitable leveling of product demand coincided with another change in the market. As documented by Marx, customers were no longer purchasing their first vehicles. Nascent competition from used vehicles, customer demand for trade-in services, and the manufacturers' growing ability to focus on their distribution systems resulted in the need for higher levels of service and sophistication from dealerships and increased innovation of products from manufacturers. New issues arose. Whereas vehicles had not generally changed from year to year, management of aging inventory and prior model years' products was necessary. Increased requirements for display capacity and parts inventory enlarged dealers' capital investment and gave rise to disputes over who would pay these costs and who would carry the newfound risk. Still,

dealerships, many of whom had grown their operations from bicycle shops, generally tolerated the demands placed on them by manufacturers. In aggregate their numbers grew to a high of 53,217 in 1927 compared to 20,841 in 1989 (Marx).

Marx details that despite the growth in the automotive industry, bankers still looked skeptically upon individual automotive manufacturers. Literally hundreds of companies attempted to manufacture and sell automobiles in the early days; their absence today speaks to their failures. Henry Ford's Ford Motor Company, although hugely successful, had a rocky relationship with New York bankers, who were possibly angling for company control in the event of a default. To pay his debts, Ford leaned upon his dealers, setting high "sales" quotas and threatening termination of those dealers who refused to accept the vehicles. High retail profits generally persuaded dealerships to comply with Ford's demands.

Although many elements of the manufacturer-dealer relationships were heavy-handed in favor of the manufacturer, governing agreements were not entirely one-sided. Marx identifies provisions that were favorable to dealerships, such as exclusive sales territories, protection from "middlemen," strong provisions against selling out of one's own market area, and confidential price information. These anti-competitive protections contributed to dealers' acceptance of manufacturer strong-arm tactics.

The actions of Ford and other manufacturers eventually caught the attention of U.S. lawmakers. The *Dealers' Day in Court Act* (1956) prohibited certain practices like arbitrary dealer terminations and forced purchases of unordered vehicles. However, the Act also exposed dealer-friendly contract provisions, such as exclusive sales territories, and contributed to the disappearance of such provisions from franchise agreements.

Many states eventually followed suit, passing franchise protection acts that established criteria for adding and terminating dealerships, thereby restricting manufacturers' ability to locate and manage their dealer networks and control the operations of their franchisees. Many states also restricted manufacturers' ability to operate dealerships and sell directly to the public. Thus, government regulation reduced but did not eliminate both manufacturer control over retail outlets and the protected nature of franchised dealerships.

In *Franchise Regulations: An Economic Analysis of State Restrictions of Automobile Distribution,* Richard L. Smith (1982) traces the steps of the retail automotive industry from its early days to its regulated modern state. Smith considers the contractual and statutory protection received by dealers to function as the incentives for dealers to make the large capital investments necessary to represent manufacturers' brands effectively. He argues that representatives of each brand have at least some power in the market for that brand's automobiles, and that territorial restrictions enhance that market power to some degree.

Smith extends his analysis by estimating the effect of statutory protections on the retail automotive market. He finds that provisions, such as restricting manufacturers' ability to establish and terminate franchises, reduce output (in terms of the number of retail sales) and result in a net welfare loss. Additionally, these statutory protections enable dealerships to extract economic rent, resulting in a wealth transfer from consumers to dealerships. Smith concludes that while initial dealer protection statutes were necessary in the face of overbearing manufacturer pressures, the degree of protection extended to franchise dealers is largely a function of political forces. Nonetheless, the

author notes on several occasions that the absence of the development of a better system indicates that the genesis of another, more efficient, distributional regime is not likely to be forthcoming.

Although the referenced literature offers little fertile ground for broad additional theoretical and empirical work, in the narrower context of this thesis, it is clear that the statutory protections offered to dealerships allow at least the potential for above-normal profits. In aggregate, territorial and entry restrictions reduce retail sales output and increase dealership wealth. In contrast, the loss of territorial advantage would likely result in a loss of profits for that dealership. When a court considers the merits of a proposed franchised addition, or relocation, the decision is not independent of the rich history of automobile distribution, and the stakes of that decision are high.

III.b Non-integrated automotive markets (double-marginalization):

A significant characteristic of the retail automotive industry is that sales to end-users (retail sales) are the product of two firms' profit maximizing behavior. Manufacturers sell vehicles to dealerships, their only customers. Dealerships sell vehicles to retail customers. In general, retail operations are not integrated with the operations of the manufacturer.

Joseph J. Spengler (1950) identified the "double marginalization" problem that arises in non-integrated industries. The manufacturing and retailing firms each seek to profit from its operations, which results in a higher retail price and lower retail output than what would exist if the firms were integrated. Spengler illustrates the existence of the double-marginalization problem using the successive monopoly model, which

assumes the existence of at least some market power at the manufacturing and retail levels.

Breshnahan and Reiss (1985) employ the successive monopoly model in a single product case to illustrate the manufacturer's pricing (to dealers) problem. In the first stage, the dealership observes retail demand for automobiles. The manufacturer observes the dealership's marginal revenue curve and treats that as the demand curve for its (wholesale) products, setting its own price-quantity level. The result is a higher retail price and lower level of retail sales than would occur in an integrated industry.

The work of Breshnahan and Reiss highlights the inherent conflict between manufacturers and dealerships. Dealerships maximize profits at output levels that are lower than those which would maximize the manufacturers' profits. As the dealership is the sole customer for the manufacturer's products, the manufacturer faces the choice between acquiescing to the dealership's behavior, incentivizing the dealership's behavior, or using its position as dealership's sole source of authorized products to force the dealership's pricing strategy closer to the manufacturer's optimal level. Choosing the first option would imply the existence of an improbable corner solution in which no manufacturer efforts to influence dealer behavior are worthwhile. The second and third options are practical and realistic.

Manufacturers regularly incentivize the purchase of their vehicles through discounts at the customer and dealership level. Other efforts include volume-based incentives and conditional pricing discounts when dealerships meet certain requirements. While these techniques are common and present, state laws often limit the ability of

manufacturers to influence individual dealer behavior in a manner that results in disparate wholesale pricing across the dealer body.

Despite the protection of state laws, manufacturers still maintain the threats of encroachment and termination. State laws generally require that the manufacturer show good cause to undertake these actions. However, manufacturers still maintained the ability to terminate some allegedly low-performing dealerships and to encroach upon low-performing territories (adding and relocating dealerships). As the dealership faces the loss of its franchise or a substantial decline in profitability from termination or encroachment, rational behavior dictates that the individual dealership will alter its pricing (and volume) to the point at which it maximizes profits, subject to staving off the threats of termination and/or encroachment.

The successive monopoly model and its dependent dual marginalization problem and manufacturer problem provide guidance on the likely effect of a market encroachment. The addition of a same-make dealership will shift out supply, lowering the retail price for automobiles, reducing the profits of the dealership, and increasing the profits of the manufacturer. It is likely that the impacts from the encroachment would be mitigated by the anticipatory dealership pricing behavior that was intended to prevent the encroachment in the first place.

III.c A Case for Apparently Anti-competitive Provisions:

United States Versus United Shoe Machinery Corporation on the Merits, by Scott E. Masten and Edward A. Snyder (1993), examined a Supreme Court case ruling in which many of United Shoe Machinery Corporation's restrictive contracts with customers were adjudged to be anti-competitive. However, the authors observed that these restrictive arrangements prevented free riding and allowed United Shoe to offer high levels of service to customers. After the ruling, United Shoe's provision of these services declined, and the expected welfare benefits from the removal of the restrictive provisions did not occur.

Retail automobile dealerships, likewise, provide services for which little or no specific appropriable market exists. Examples of these services include the display of vehicles, provision of product education and test-drives. Encroachment by a same-make competitor reduces the dealership's ability to recapture the proceeds of investment in these services, potentially decreasing the aggregate provision of non-appropriable services in the market. Consequently, the threat of free-riding discourages investment in non-appropriable services. Masten and Snyder's work suggests that perceived quality of the brand's retail profile may decline after the addition or relocation of a same-make competitor, despite overall increase in the number of outlets. This would reduce or eliminate welfare benefits derived from increased intra-brand concentration.

III.d Impact from the Relocation: A Market Share Prospective:

The literature considered up to this point has leaned heavily on the notion that territorial protection and entry restriction allow dealerships to earn above-normal profits.

The loss of those protections would have the opposite effect. However, some interpret marketing theory to suggest that another factor is important: the encroachment by a same-make outlet mitigates the effects of the loss of territorial advantage by increasing the demand for that brand.

Before delving into this question, it is necessary to highlight the limitations of attempting to merge economic and marketing theories. The marketing models largely, if not entirely, consider undifferentiated products, such as retail gasoline sales. Automotive brands are at least somewhat differentiated. Furthermore, marketing models employ market share as their currency whereas franchised automobile dealers are motivated by profit.

To the extent that marketing theory could show that market share increases from adding or relocating retail outlets offsets existing dealers' territorial losses, it must be noted that the higher market share may have been available to existing dealerships (through price decreases, additional advertising, etc.) even without the addition or relocation of the intra-brand competitor. Likewise, a dealership that maintains its sales volume after the loss of territorial advantage may do so at the expense of its profit margins.

Consider a hypothetical dealership that will lose 20% of the territory to which it is currently the most proximate outlet (of that brand). Before the territorial encroachment, the dealership sells 1,000 units at a per-unit profit of $1,000. In response to the new competitor, the dealership cuts its prices and maintains sales of 1,000 units but with a per-unit profit of $800. This would not be a case in which marketing theory had

"prevailed;" from the dealership's perspective, the market share increase has not offset the loss of territorial advantage.

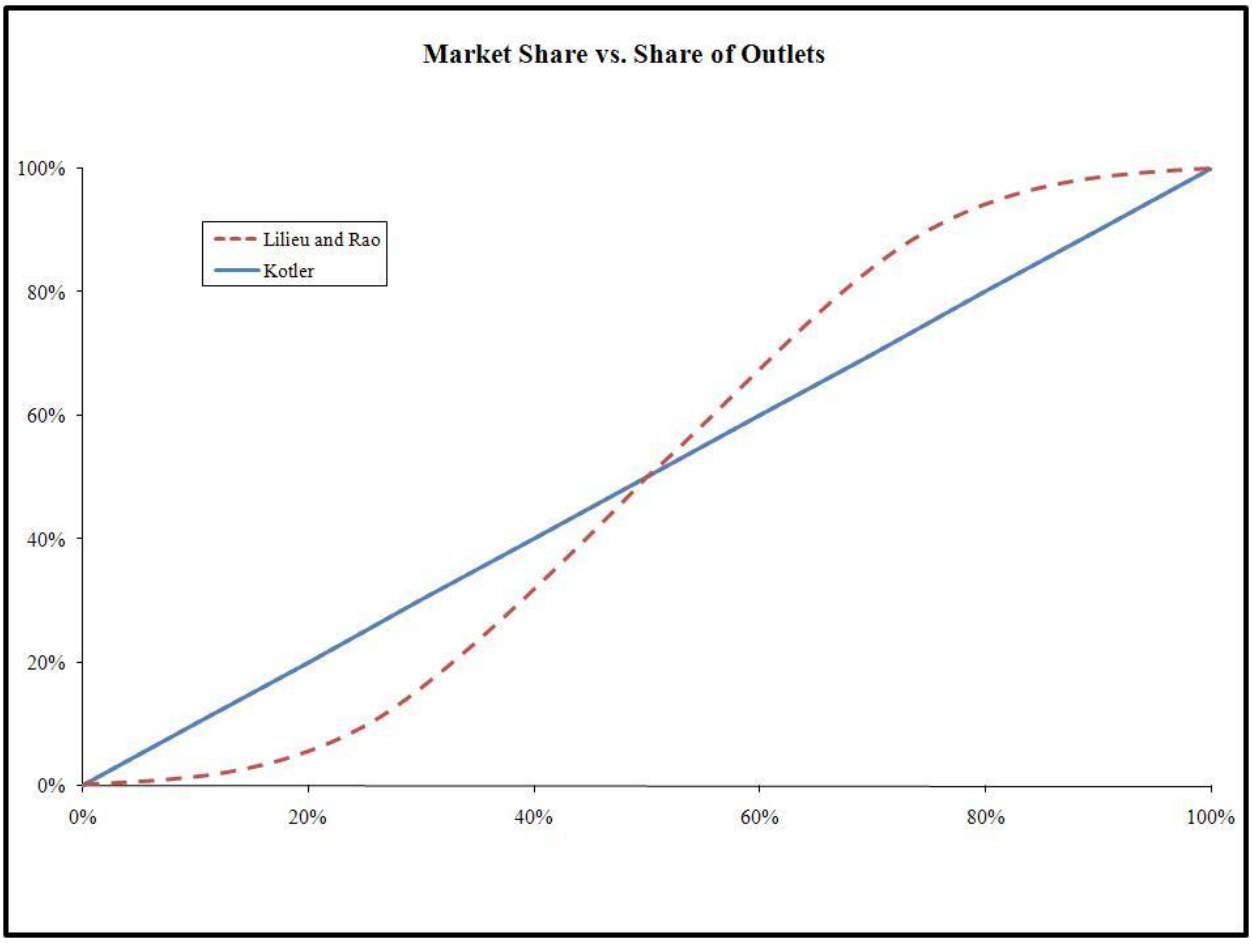
The most basic marketing principle is Kotler's Fundamental Theorem, Dr. Philip Kotler (1971), or the Fundamental Theorem of Market Share. Kotler is considered by some to be the father of modern marketing. This theorem states that a brand's market share is equal to that brand's share of marketing effort. "Marketing effort" is subject to interpretation and measurement questions. In the retail automotive field, some experts interpret Kotler's share of marketing effort to mean a brand's share of retail franchises. This interpretation of Kotler's theorem is equivalent to an assumption that that all outlets of all brands in the market exert equal "effort." This simplified assumption has apparent limitations. First, not all outlets exert equal effort. Additionally, local outlets do not represent the entirety of a brand's efforts in a market (national advertising, etc.). However, Kotler's work provides much of the foundation for prominent models that appear later in this thesis.

In their article, *Emerging Approach to Retail Outlet Management*, Gary Lilien and Ambar G. Rao (1979) identify a non-linear response to outlet share. They find that, rather than Kotler's direct linear relationship, market share follows an S-shaped curve with respect to share of outlets. When a brand has a very low share of outlets, its market share will lag outlet share. As share of outlets increases, market share will eventually increase at an increasing rate, slowing when market share equals brand share.

Lilien and Rao state that their model applies to undifferentiated goods and services. Their study group includes bank branches and gas stations. They also note that their model does not include profit parameters. The implication of the observed non-

linear relationship between market share and outlet share is that brands should enter the market with a sufficient share of outlets to capture the benefits of increased brand presence. For example, a national brand seeking to enter a local market should not do so at a point on the curve where market share is less than brand share. Recognizing the nature of the types of markets studied, Lilien and Rao qualify their work by stating that their model would need significant adjustment if it were to be adapted to markets for differentiated products.

Figure 3.1: Market Share vs. Share of Outlets:



One key element of Lilien and Rao's work is their assessment of an outlet's potential. Kotler's model seems to assume that the market is closed (no sales in or out)

and that retail outlets and buying population are evenly distributed throughout the market. Lilien and Rao divide an outlet's potential into two parts. The first portion is the convenience portion, which is comprised of buyers who live and shop in the market. The second portion of is comprised of out-of-market residents whose purchase (or potential) purchase is of a secondary purpose to the visit to the outlet's general area. This distinction receives more extensive treatment later in the thesis.

The works of Kotler (1971) and Lilien and Rao (1979) are straightforward in their concepts. Evaluated from a perspective most favorable to the position that outlet share increases mitigate the loss of territorial advantage to an intra-brand competitor, these models suggest that at least some offsetting effect exists. However, the leap from undifferentiated products to a market for differentiated products is not trivial. As the Kotler and Lilien and Rao models receive substantial attention and reliance in the retail automotive field, empirical tests are in order.

III.e The Development of Empirical and Theoretical Models:

Retail automotive data are noteworthy for their breadth, volume, and precision. Several companies (most prominently RL Polk "Polk"[17]) collect and record motor vehicle registration data and correlate those data based on detailed vehicle characteristics and the locations of the buyer and seller. Manufacturers cooperate in the process by providing proprietary information such as product segment definitions, geographic market parameters, and dealer information.

Despite the abundance of information in the study of retail automotive markets, several complicating factors restrict empirical analysis and publication. First, most data

[17] www.polk.com

are either proprietary or privileged. Manufacturers purchase data from Polk under jealously protected terms. Polk has no interest in disclosing pricing information; nor do the manufacturers, who expend considerable resources in creating and monitoring product segment information. Manufacturers do release or authorize release of data for use in litigation but generally do so under strict designations of confidentiality. The data employed in litigation generally apply to a local study area *before an establishment or relocation occurs*. Even when analysts undertake before-and-after case studies, these projects generally focus on aggregate comparisons.[18]

The second impediment to scholarly publication is the absence of price data. Retail automotive purchases are negotiated at the individual transaction level. While some one-price shopping exists[19], this is the exception and is often a misnomer. New automobile purchases tend to include trade-ins, financing, and other add-ons, such as extended service contracts. The purchase price of the new vehicle may reflect little meaningful information about transaction cost or profit—even in a one-price transaction! One anecdote comes from the Fresno, CA market—an economically depressed area. Some new vehicle dealers there regularly increase the price paid for new vehicles by adding large supplemental sticker mark-up to the prices of vehicles. While this mark-up may seem counter-intuitive in a lower-income market, it exists so the dealer can pay off trade-in vehicles, which often have values lower than the remaining loan amount.[20]

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[18] California New Motor Vehicle Board, *Pacific Honda, et. Al, vs. American Honda* is one example.
[19] Saturn dealers attempted to create a one-price shopping environment; however, the Saturn brand currently faces extinction.
[20] California New Motor Vehicle Board, *Fresno Dodge, Inc. vs. DaimlerChrysler, Inc*, *No. PR-1763-01,* 2002.

Even if true transaction price could be available, it would not be divulged. Dealers guard their price data and have no incentive to publicize this information. Manufacturer's Suggested Retail Price ("MSRP") and invoice price data are similarly unhelpful as customers rarely pay either MSRP or invoice price. Thus, the analyst works without the benefit of meaningful price data.

The most fruitful source of available "literature" is the published record of courts and quasi-courts that hear cases related to the retail automotive industry. The type of case that yields the most abundant and valuable information is an establishment/encroachment case in which the manufacturer wishes to add or relocate a dealer to an area close to an existing dealership of the same make. Either by statute, contract, or both, the existing dealership holds the right to protest the establishment.

While courts (nominally) consider many factors in deciding these cases, the essence of the decision is the relative weight of the probable benefits to the public that the establishment would accrue versus the impact on the existing franchisee(s) if the establishment were allowed. Obviously, the absence of reliable price data limits measures of welfare impacts. As a proxy, courts have considered local market shares of brands compared to benchmark levels where the benchmark levels are assumed to represent some desirable level of equilibrium quantity for the brand. Their conclusion has been that in areas with lower market shares, the brand's outlets are either A) charging monopolist rent or B) providing insufficient service, yielding below-competitive equilibrium quantities at competitive equilibrium prices.

III.f Summary

Available literature paint a picture of an industry in which the first survivors initially earned excess rents sufficient to support tolerance of the intolerable by both manufacturers and dealerships. Manufacturers placed now-unthinkable demands upon dealerships, while dealerships enjoyed onerous anti-competitive protections. In short, dealerships could finance the demands of the manufacturers by extracting excess rents from consumers.

The leveling of product demand coincided with increasing complexity of dealership operations. Dealership numbers declined by over half, and existing manufacturers faced increased competition. Still, statutory protections for dealerships preserved the potential for excess profits at the retail and wholesale levels.

The non-integrated structure of the retail automotive industry results in conflicting incentives between dealerships and manufacturers. Trade-offs exist between the well-being of consumers, dealerships, and manufacturers. With some degree of market power for both dealerships and manufacturers, literature shows that the intuitively expected result of the increased concentration of retail outlets would be welfare gains for the manufacturer and the consumer at the expense of the dealership.

Masten and Snyder call this result into question. Their work raises the possibility that apparently anti-competitive contract provisions could allow dealerships to capture profits in exchange for the provision of services offered that have costs but no specific revenue. The loss of above-normal profits could diminish the provision of services by

the dealership, harming consumers, dealerships, and the manufacturer. The actions of GM and Chrysler in bankruptcy appear to be consistent with this line of thought.

The marketing models of Kotler (1971), and Lilien and Rao (1978) suggest that increased intra-brand competition could enhance the brand's ability to compete with other brands, thereby increasing market share and offsetting welfare losses that the dealership experiences from reduced market power. Their work requires attention when considering the impact of increased intra-brand competition. However, neither of the models includes parameters for price or profit, and both models are insufficient to conclude generally that increased market share potential would be sufficient to offset the expected profit loss from decreased market power.

The coverage of the literature is somewhat narrow in predictable ways and for predictable reasons. The absence of price data and the cost and/or confidentiality of market data practically preclude the publication of broad studies of consumer welfare. The confidentiality of dealer profit data outside of litigation also impairs scholarly estimation of the relationship between dealership profitability and market power. While this thesis does not employ price or profit data, it is hoped that novel empirical models and broad data access will contribute to the literature through its analysis of the impact of an intra-brand market encroachment.

CHAPTER FOUR

DATA AND DESCRIPTIVE STASISTICS

This section of the thesis reviews general retail automotive terminology for the reader and introduces the terms used in the original empirical models advanced herein. While some terms are previously introduced or later explained in some detail, this section is intended to provide a quick reference of terminology.

Table 4.1 Glossary[21]

Term	Definition
Benchmark/Standard	A comparison area used to evaluate dealer performance (State average).
Census tract	Census tracts are small, relatively permanent statistical subdivisions of a county. Tracts are delineated by a local committee of census data users for the purpose of presenting data. Census tract boundaries normally follow visible features, but may follow governmental unit boundaries and other non-visible features in some instances; they always nest within counties. Designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions, census tracts average about 4,000 inhabitants. (From www.census.gov)
Centroid	The "middle" of a Census tract or ZIP code. This could be based on population or geographic measures.
Dealer Network	Motor Vehicle dealers in a market or group of markets.

[21] Descriptions are in part from The Fontana Group, Inc.

Expected Registrations	Industry Registrations by Segment in a market multiplied by a benchmark. Used to evaluate brand performance and dealer performance.
Feature	A geographic sub-unit, generally a Census tract or ZIP code.
Fleet Registration	Vehicle registered to anyone registering 10 or more units in a given year.
Gross Loss	The number of Expected Registrations for a brand minus actual registrations for that brand in all Features in which actual registrations are less than Expected Registrations.
Lost Opportunity	Gross Loss Plus Insell.
Market Share	A brand as a percent of industry (all) registrations in a market.
Registration	An official state record of a vehicle purchased by a person or entity and assigned to a certain address (regardless of where it was purchased).
Registration Effectiveness	Brand registrations as a percent of expected brand registraions in a market.
Retail Registration	Vehicle registered to an individual.
Sale	A vehicle sold by a particular dealer (regardless of where the vehicle is registered).
Sales Effectiveness	A dealer's sales a percent of expected registrations in a market.
Segment	A grouping of like-vehicles such as small car, large car, SUV, minivan, small pickup, large pickup. Each manufacturer defines each of its segments to include "competitive" models of other brands.
ZIP code	A U.S. geographic unit associated with postal delivery. Retail automotive data are recorded and summarized by ZIP code.

The following are descriptions of the data employed in the original empirical models in this thesis. As these models attempt to conduct a before-and-after analysis, it

is critical to differentiate those variables that reflect pre-relocation conditions, those that reflect post-relocation conditions, and those that compare pre and post-relocation conditions.

Table 4.2 Detailed Data Descriptions:

Variables Reflecting Pre-Relocation Conditions

Grossloss: A unit count of the difference (only if positive) between actual new Dodge retail registrations and expected new Dodge retail registrations in the feature (expected minus actual) in 1998. Grossloss is not model-specific.

Insell: Any new Dodge vehicle sold by an out-of-market dealership and registered at retail within the Miami C/T. Insell is a count of the number of these units in a feature in 1998. Insell is not model-specific.

Lostopp: Lostopp is the sum of Grossloss and Insell within a feature in 1998.

Variables Reflecting Post-Relocation Conditions

90Dadsls: A unit count of the new Dodge retail vehicles registered within a feature (ZIP code or Census tract) and sold by Dodge of Dadeland through September 2000 year-to-date. This variable is not model-specific, so a Dodge Neon counts the same as a Dodge Ram or Dodge Charger.

90Expreg: The number of Expected new Dodge retail registrations within a feature through September 2000 year-to-date. An illustration of the calculation of this statistic appears earlier in the thesis. Per the parameters of the USAI Model, the benchmark selected is Dodge's U.S. average segmented market share. The calculation of Expected Registrations results in a blended unit and is not model-specific.

ReloDT: "ReloDT" equals one-half of the round-trip drive time between Dodge of Dadeland's post-relocation facility and the geographic centroid of the feature being evaluated.

Variables Comparing Pre-Relocation to Post-Relocation Conditions

RegeffΔ: The ratio of September 2000 year-to-date Registration Effectiveness in a feature to that same measure for full-year 1998.

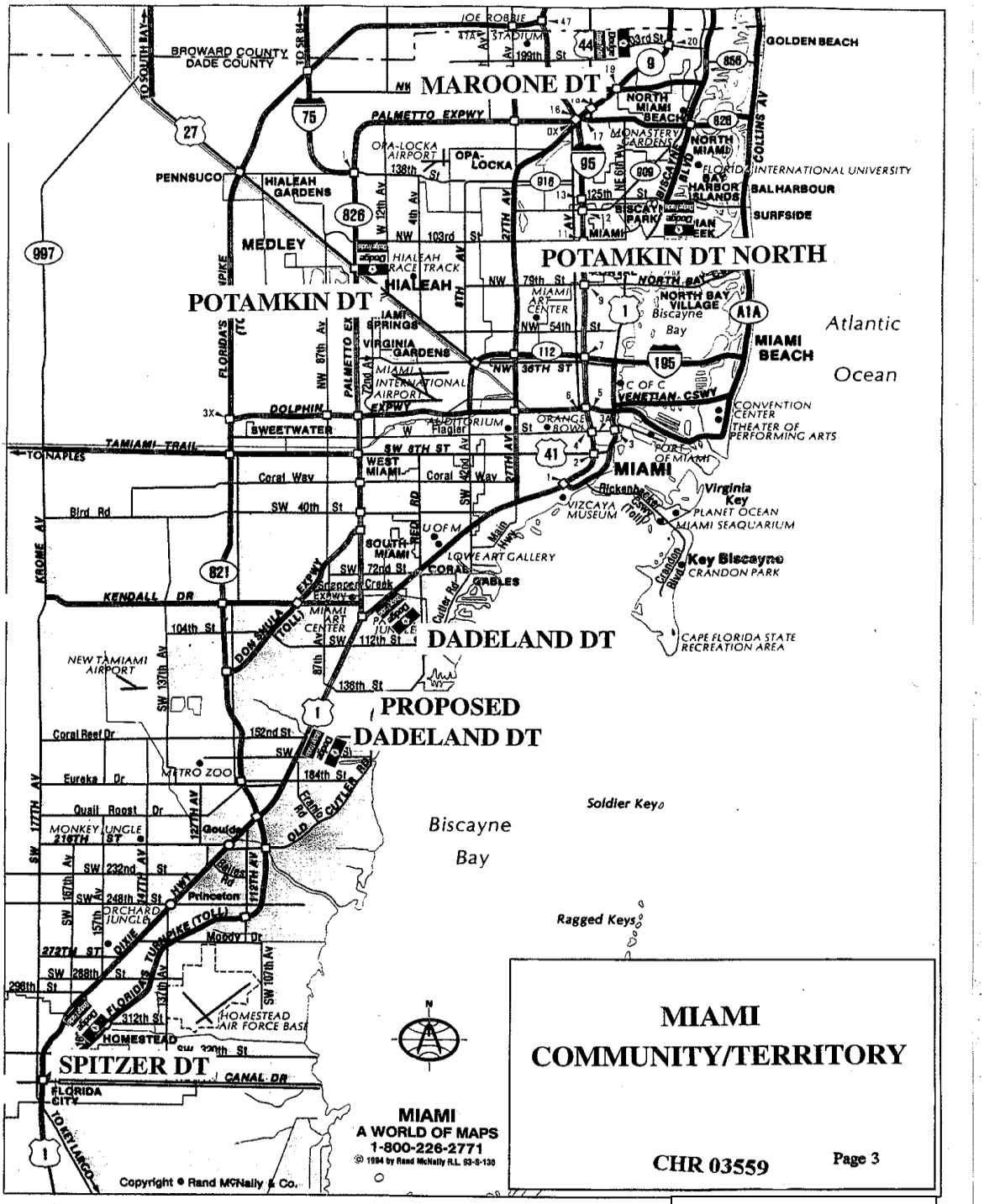
CTDLRDTΔ: A measure of the change in aggregate proximity share experienced by the C/T dealers (less Dodge of Dadeland) as a result of Dodge of Dadeland's relocation. The figure below shows the calculation of hypothetical dealerships' shares of reciprocal squared drive time to a given Census tract. CTDLRDTΔ equals the ratio of the C/T dealers' post-relocation to pre-relocation shares of reciprocal squared drive time.

DADSLSΔ: The number of new Dodge retail sales in a feature by Dodge of Dadeland through September 2000 year-to-date divided by the analogous count for that feature for 1998.

IV.a Descriptive Statistics

This section of the thesis discusses characteristics of the statistics employed in the original empirical models. As stated earlier, the data are from the Miami market, specifically, a Chrysler-defined area called the Miami Community/Territory ("Miami C/T"). The data are subdivided into features with 413 available data points.

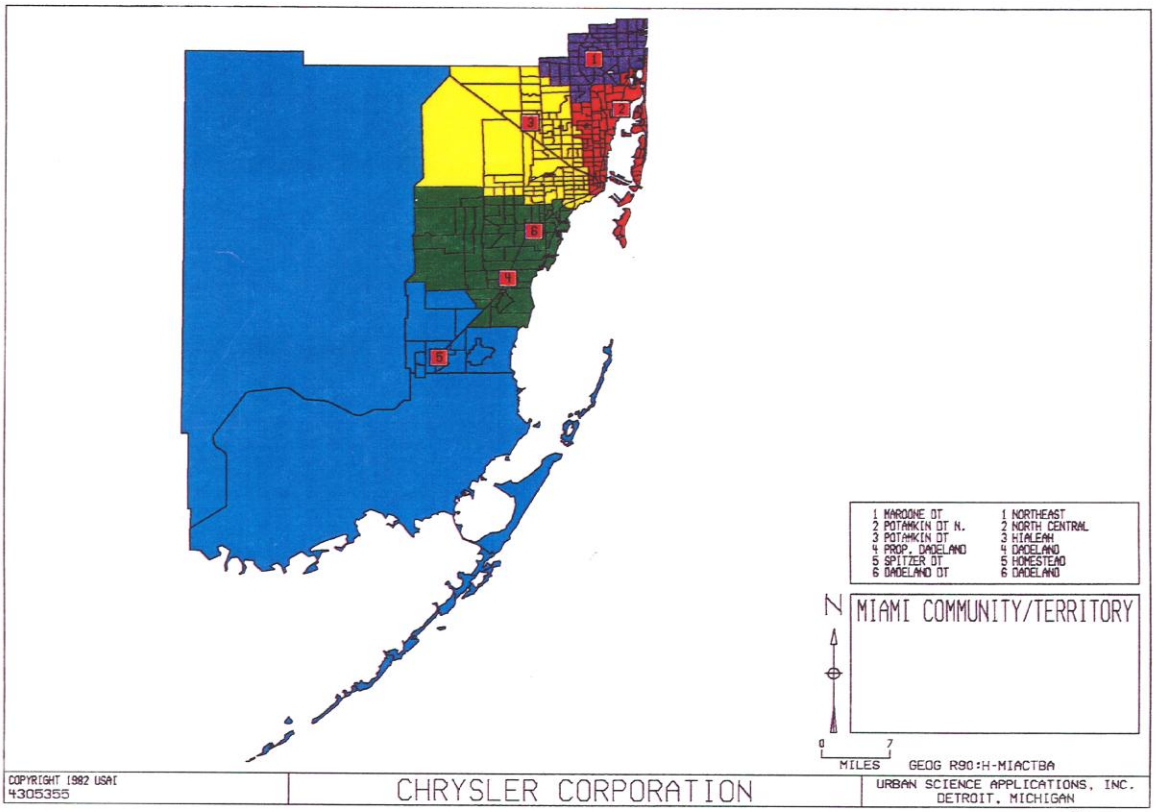
Figure 4.1: Miami Community/Territory



Source: Chrysler Corp.

Aside from conventional descriptive statistics, the table includes a column for "# of zeros." This count is relevant as many features within the Miami C/T may be relatively small, or otherwise lacking in occurrences of the variables recorded here. For example, Dadeland Dodge sold vehicles in 139 features in the Miami C/T in the September 2000 year-to-date period. Therefore the median value of 90Dadsls is zero. However the mean value is 1.225. In features in which the dealership actually sold vehicles, the mean is approximately 3 (413/139).

Figure 4.2: Miami Community/Territory by Feature:



Source: Urban Science Applications, Inc. and Chrysler Corp.

Because of the zero-value features, the sample size changes for several of the variables. The three statistics, described above, that compare the post-relocation period to the pre-relocation period are incalculable if the 1998 value is zero. DadeslsΔ is most affected by this phenomenon, reducing the count for this variable to 166.

Table 4.3 Summary of Descriptive Statistics

Variable Name	**# of Obs.**	**Mean**	**Median**	**Min**	**Max**	**# of zeros**	**Units of measure**
90Dadsls	413	1.225	0	0	33	274	1 vehicle sale
90Expreg (**Expected Registrations use U.S Benchmark)**	413	14.593	9	0	144	27	1 expected Dodge vehicle registration (rounded)
Grossloss (censored)	413	6.852	4	0	80	74	1 vehicle shortfall
Insell	413	1.741	1	0	19	177	1 vehicle sold into market
Lostopp (Grossloss + Insell)	413	8.593	5	0	89	43	1 vehicle shortfall or 1 vehicle sold into market
RegeffΔ	352	1.1999	0.982	0	14	20	Percentage
ReloDT	413	0.00368	0.00123	0.000095	0.189	0	Reciprocal of minutes squared
CTDLRDTΔ	413	1.0483	0.9553	0.0191	18.7198	0	Percentage [1=100%]
ExpregΔ	387	0.869	0.846	0	3.667	8	Percentage [1=100%]
CTDLRSLS8	413	7.1	4	0	70	68	1 vehicle sale
90CTDLRSLS	413	5.9419	4	0	64	77	1 vehicle sale
DADESLSΔ	166	0.6761	0.375	0	5	61	Percentage

The values for CTDLRDTΔ in Table 4.3 show that, in aggregate, Miami C/T dealerships experienced modest changes change in their proximity shares after the relocation. This result is not unexpected but is somewhat misleading, or at least incomplete. As depicted on Figure 4.1, Dodge of Dadeland moved farther away from 3 dealerships but much closer to Spitzer. For most features, individual dealership's proximity change from the relocation will vary, with some gaining relative proximity and one or more losing proximity.

A later section of this chapter evaluates the proximity change from the relocation in more detail. However, it is helpful, first, to introduce the reader to summary data on this topic. Tables 4.4 and 4.5 depict these more-detailed measures of proximity for Miami C/T dealerships.

Table 4.4: Drive Time Proximity (one-half round-trip drive time) to Miami C/T Features

	Spitzer	Dadeland	Dadeland (R)	Maroone	Potamkin	Potamkin (N)
Mean	41.269	24.366	29.749	27.551	23.944	27.863
Median	42.617	23.100	28.850	23.583	21.625	22.759
Min	2.242	1.275	2.300	1.842	1.809	2.117
Max	88.584	108.467	102.534	135.95	120.917	136.584

The maximum values in Table 4.4 show that some dealerships have little meaningful proximity to certain portions of the market. Notably, Spitzer, in the southern

portion of the market has substantially lower maximum drive times, suggesting that the southern fringes of the market contain the features that are least accessible.[22] The feature map of the Miami C/T appears to confirm this expectation.

The proximity measure used herein addresses this concern by using a squared term in the denominator. When drive times grow large, a dealerships reciprocal-squared drive time becomes very small. When portions of a market and dealerships are distant or not practically accessible to each other, very low corresponding shares of reciprocal drive time will likely result.[23]

While each of the Dodge dealerships in this study was assigned to the Miami C/T, this does not mean that they sell equally effectively throughout the entire market. Rather, the expectation is that dealerships would experience a concentration of sales closest to their own dealerships. Table 4.5 addresses this question by repeating Table 4.4 with the added restriction of counting only feature into which dealerships sold at least one new vehicle in 1998. As a point of interpretation, the reader should note that the column for Dodge of Dadeland is for display purposes only, as the relocation site was not in place during 1998. Additionally, it is notable that the maximum sales proximity did not change for four of the five dealerships, and that the median proximity to features in which Maroone made sales was not lower than the dealership's proximity to all features.

[22] Spitzer, at the southern edge of the Miami C/T, can reach any feature within approximately 90 minutes, whereas Maroone, in the north, has maximum drive times of over 130 minutes. This suggests that north-south travel can be accomplished within Spitzer's drive-time profile, and that the western fringe of the market is what drives the higher maximum drive times for northern dealerships.

[23] If remote areas of a market were comparably inaccessible to all dealerships, proximity shares would not be low.

Table 4.5: Drive Time Proximity (one-half round-trip drive time) to Miami C/T Features in which Dealership Sold at Least one New Vehicle in 1998.

	Spitzer	Dadeland	Dadeland (R)	Maroone	Potamkin	Potamkin (N)
Mean	32.384	19.491	24.641	27.306	22.004	22.726
Median	30.859	16.892	22.780	23.809	20.275	20.459
Min	2.242	1.275	2.633	1.842	1.809	2.325
Max	88.584	108.467	102.534	135.95	120.917	56.835

IV.b Evaluation of Proximity Share Change

This section of the thesis briefly addresses the spatial effect of the Dodge of Dadeland relocation. While it was Dodge of Dadeland's proposed move to a location closer to Spitzer that precipitated the legal action referenced herein, the effect of the relocation on intra-brand concentration was not universal throughout the market. A review of Figure 4.1 clearly shows that Dodge of Dadeland's move south situates the dealership closer to Spitzer to the benefit of the three northern dealerships. A more subtle effect is that Spitzer also gains proximity share in each feature in which Dodge of Dadeland's proximity declines.

The directional effect of Dodge of Dadeland's relocation on the other Miami C/T dealership's proximity share in a feature is relatively simple. Since stationary dealerships' aggregate proximity does not change, their share of proximity rises if Dodge of Dadeland moves farther from a feature and falls if the converse is true. The overall effect on the market is more complex, as the significance of changes in proximity share

depends not just upon spatial measures but also on the size of the feature (in terms of registrations).

In order to evaluate the magnitude and direction of the proximity change, I calculate a weighted proximity share for each dealership in the market. The share is calculated for a dealership as follows in Figure 4.3. For each feature, the dealership's share of reciprocal drive time is multiplied by that feature's Expected Registrations divided by the number of Expected Registrations in the Miami C/T.

Figure 4.3: Calculation of Weighted Proximity Share

$$\sum_{j=1}^{J} \frac{\textit{Dealer i Reciprocal Drive Time Squared to Feature j}}{\sum_{j=1}^{J} \textit{Dealer i Reciprocal Drive Time Squared to Feature j}} \; * \; \frac{\textit{Expected Registrations in Feature j}}{\sum_{j=1}^{J} \textit{Expected Registrations in Feature j}}$$

Table 4.6 paints somewhat of a surprising picture. Each stationary dealership, including Spitzer, gains in aggregate proximity share. According to the table, the casualty of the Dodge of Dadeland relocation is Dodge of Dadeland itself! This raises three important questions. The first is whether the market-wide weighted proximity statistic is appropriate in this matter. The second relates to Dodge of Dadeland's incentives in making the relocation. The third relates to the manufacturer's incentives in approving the relocation. Table 4.7, which immediately follows Table 4.6, addresses the first question by modifying the weighted proximity measure to include only features in

which dealerships sold during 1998.[24] Some treatment of the second and third questions follows.

Table 4.6: Weighted Proximity Shares before and after Relocation (N=413):

	Before Relocation	**After Relocation**
Spitzer	11.63%	11.72%
Dadeland	30.25%	23.86%
Maroone	18.22%	19.62%
Potamkin	24.08%	27.56%
Potamkin (N)	15.82%	17.24%

Table 4.7: Weighted Proximity Shares before and after Relocation
In features in which dealership sold at least one vehicle in 1998:

	Before Relocation	**After Relocation**
Spitzer (N=106)	20.74%	19.93%
Dadeland (N=166)	38.91%	31.14%
Maroone (N=293)	18.32%	19.68%
Potamkin (N=229)	26.82%	30.68%
Potamkin (N) (N==99)	19.37%	20.32%

[24] Note that Table 4.6 includes all 413 Miami C/T features, while the results in Table 4.7 vary based on the number of features into which dealers sold in 1998.

The recalculated weighted proximity shares in Table 4.7 change the picture only somewhat. Perhaps in a manner that is only symbolically relevant, Spitzer fares somewhat worse after the relocation. For other dealerships, share changes are comparable to those in the prior exercise.

The changes in weighted proximity shares draws into question why Dodge of Dadeland and the manufacturer choose to execute the location. Regrettably, no firm answers lie in the available data. Possible motivations for Dodge of Dadeland include quality of location, incentives related to facility costs or ownership, the relative location of other enterprises owned by related entities, or other economies of scale. Benefits to the manufacturer may include an improved location, investment in a newer facility, or proximity to targeted competition. Each of the potential motivations discussed here highlights the integrated concerns associated with managing a retail network.

The surprising findings in Table 4.6 and 4.7 will test the robustness of the original empirical models advanced later. The market-level proximity changes reveal that the spatial changes associated with Dodge of Dadeland's relocations are not simple. Empirical models must detect and estimate the effects from decreases and increases in relative proximity, as market-wide, the territory left behind by the relocation is as significant, if not more so, than the territory encroached upon. These dynamic effects also provide a clear demarcation from the legal venue of the relocation, which seeks an evaluation only of effect of the encroachment. This thesis seeks to explain broadly the effects of the relocation market-wide.

IV.c Market-Level Statistics

The next section of this chapter contains a summary of market-level statistics before and after the relocation. These statistics measure whether Dodge market share in the Miami C/T increased relative to the national average (Registration Effectiveness), and the degree to which Insell and Gross Loss (components of the USAI Model) changed after the relocation. Additionally, this section includes an evaluation of new Dodge sales by market dealerships.

Table 4.8: Market-Level Statistics Before and After Relocation[25]

	1998	9/2000 Year-to-Date
Expected Registrations	7,089	6,028
Dodge Retail Registrations	4,315	3,541
Registration Effectiveness	60.9%	58.7%
Gross Loss (count of registrations)	2,830	2,558
Insell (count of registrations)	719	568
Insell % Dodge Retail Registrations	16.7%	16.0%

The market-level statistics offer little or no evidence that relocation accomplished its market-based mission. The Dodge brand in the Miami C/T actually performed worse relative to the nation in the year after the relocation. While Insell declined somewhat, the decline was small on a percentage basis. Admittedly, these data do not include all information that an analyst would consider, such as price, advertising levels, and facility

[25] The data available are counts for full-year 1998 and September 2000 year-to-date. Thus, comparable partial-year data for 1998 are not available. However , the data are largely self-scaling, as Expected Registrations within the market are also derived using partial-year data for 2000.

quality. However, as described in more detail later, the results displayed are inconsistent with the expectations of the USAI Model.

On an adjusted basis, Miami C/T dealerships collectively sold modestly fewer new vehicles into the market after the relocation. To account for changes in Dodge's market share and demand within the market, dealership sales are indexed to the change in Expected Registrations in the market between 1998 and September 2000 year-to-date. Individually, Spitzer showed an adjusted decline of 25%, while Potamkin North's sales more-than doubled. The other three dealerships were within 10% of their prior period sales.

Table 4.9: Dealer New Retail Vehicle Sales into the Miami C/T 1998 and September 2000 Year to Date

	1998	**September 2000 YTD**	**Indexed Sales**
Spitzer	545	346	75%
Dadeland	661	507	90%
Maroone	1,380	1,052	90%
Potamkin	829	708	101%
Potamkin (N)	181	348	226%
Sum	3,596	2,961	97%

IV.d: Other Data

A final technical point is a brief discussion of the parameters that this thesis employs to evaluate proximity. The Fontana Model and USAI model have employed as measures of proximity air distance, drive time, and drive distance. This thesis will employ drive time in its empirical work. The evaluation of relative proximity (a dealership's territorial advantage) borrows from a gravity based model adapted from Reilly's Law of Retail Gravitation. While Reilly sought to estimate the point of indifference between markets (where a customer is equally likely to shop one market as the other), it is possible to adapt Reilly's model to calculate the share of "gravitational pull" that a dealership holds in portions of the market.

Drive time parameters are as calculated by MapInfo$_{tm}$ Routing J. Server. This is a GIS software package that estimates the normal round trip drive time (in minutes) between two geographic coordinates. United States Census tract definitions correlate with the vintage of the registration data (from R.L Polk) and are based on the 1990 Census. The geographic definition of the market being studied is that employed in the normal course of business by Chrysler Corp. Product segment definitions are also as employed contemporaneously by Chrysler.

IV.e: Summary

This chapter has introduced the reader to retail automotive terminology and the specific measures to be used in empirical models later. It has also described the nature of the data and oriented the reader to the behavior of those data within the market. Despite the abundance of descriptive statistics, one omission likely to catch the reader's eye is the absence of demographic data.

As described later, proponents of the USAI Model assert that the nature of the calculation of Expected Registrations negates the effect of demographic variation on brand performance. This assertion has been the subject of significant theoretical and empirical attack. However, the question of demographic effects upon brand performance is not a critical, or even necessary, topic for this thesis. Even if demographic variation explained deviations in market share, the empirical models herein are concerned only with the changes resulting from the relocation. Even if timed demographic information were available, there is little reason to expect significant changes in demographic characteristics in a two-year period. In short, the degree to which demographic variation explained deviations in market share before the relocation, it is likely to do so afterwards.

Appendix 4.1:

Transformation of Newton's Law of Universal Gravitation to Reilly's Law of Retail Gravitation:

Reilly's Law Defined

The point of indifference, or Breaking Point ("BP"), between two markets A, and B with populations Pa and Pb occurs at a distance from Market A where $BP_{AB} = \frac{D_{AB}}{1+\sqrt{\frac{P_B}{P_A}}}$

$$\textit{Reilly's Law of Retail Gravitation: } BP_{AB} = \frac{D_{AB}}{1+\sqrt{\frac{P_B}{P_A}}}$$

Definitions:
BP = The point of indifference between the two markets.
D_{AB} = The distance between Market A and Market B.
P_A= The population of Market A.
P_B = The population of Market B.

Newton's Law of Universal Gravitation defined

The gravitational pull between two objects is equal to the product of the gravitational constant and the ratio of the product of the masses of the two objects to the square of the distance between the objects.

$$\textit{Newton's Law of Universal Gravitation: } F = G\frac{M_1 * M_2}{r^2}$$

Definitions:
F = Magnitude of the gravitational force between the two objects.
G = Gravitational constant.
M_1 = The mass of object 1.
M_2 = The mass of object 2.
r = The distance between objects 1 and 2.

$$\textit{Modified Law of Gravitation (Gravity Model): } F = \frac{P_1 * P_2}{d^2}$$

Definitions:
F = Magnitude of the gravitational force between the two communities.
P_1 = The population of community 1.
P_2 = The population of community 2.
d = The distance between communities 1 and 2.

Transformation from the Universal Gravitation Model to the Modified Gravity Model

Social scientists employ the Modified Law of Gravitation or the "Gravity Model" for purposes such as predicting trade or migration or developing retail boundaries. The Gravity Model differs from Newton's Law of Universal Gravitation in two ways. First, it excludes the gravitational constant. Second, it replaces the mass of bodies with their populations.

Derivation of Reilly's Law

Assume that the Breaking Point ("BP") between Market A and Market B falls at Market C, which is situated at d_{AC} from Market A and d_{BC} from Market B. The markets are linearly situated such that $d_{AB} = d_{AC} + d_{BC.}$ For Reilly's Law to comport with the Gravity Model, then the gravitational pull between Markets A and C should equal the gravitational pull between Markets B and C.

$$\textit{Condition 1 : } F \frac{P_A * P_C}{d_{AC}^2} = \frac{P_B * P_C}{d_{BC}^2}$$

The population of Market C (P_c) is extraneous, as P_c disappears from the equation through simple division.

$$\textit{Revised Condition 1: } F = \frac{P_A}{d_{AC}^2} = \frac{P_B}{d_{BC}^2}$$

Since BP falls at Market C, BP is defined as: BP=$\boldsymbol{d_{ABP} = d_{AC}}$

Rewriting terms yields the following:

(1) $$\boldsymbol{d_{AC} = \sqrt{\frac{P_A}{P_B}} * d_{BC}}$$

(2) $$\boldsymbol{d_{BC} = \sqrt{\frac{p^B}{p^A}} * d_{AC}}$$

(3) Inserting (2) into (1): $$\boldsymbol{d_{AC} = \sqrt{\frac{P_A}{P_b}} * \sqrt{\frac{p_B}{p_A}} * d_{AC}}$$

(4) Adding Equations (2) and (3) $$\boldsymbol{d_{AB} = \sqrt{\frac{p_A}{p_B}} * \sqrt{\frac{p_B}{p_A}} * d_{AC} + \sqrt{\frac{p_B}{p_A}} * d_{AC}}$$

(5) By cancellation and the distributive property:

$$d_{AB} = d_{AC}\left(1 + \sqrt{\frac{p_B}{p_A}}\right)$$

$$\textit{Reilly's Law of Retail Gravitation: } BP = d_{AC} = \frac{d_{ab}}{1+\sqrt{\frac{p_B}{p_A}}}$$

CHAPTER FIVE

EMPRICAL MODELS

V.a The USAI Model

Manufacturers present their cases for the need for increased intra-brand competition through the testimony of expert witnesses, often from Urban Science Applications, Inc ("USAI").[26] The president and most prominent figure from USAI is James Anderson. Virtually all manufacturers attempting to add or relocate dealerships over the protest of existing franchises rely on market analysis using the USAI Model. Most have enjoyed regular success in employing the USAI Model to convince courts and other tribunals to overrule dealer protests. Many courts have unambiguously endorsed the USAI Model, a description of which follows.[27] For simplicity, this thesis refers to Anderson's collection of methods and equations as the "USAI Model."

A critical element of the USAI Model is an initial determination of whether the market in question is adequately represents. The evaluation of the adequacy of a brand's representation in a market employs the following process. First, it identifies the relevant market to be studied, the definition of which is often defined by statutory criteria. Second, it selects a performance benchmark from three potential areas; a local comparison, intermediate area (state or region), or the United States. The benchmark area usually excludes portions of the comparison area in which no dealer from that brand is operating ("[area]-represented markets"). The USAI model generally selects the

[26] http://urbanscience.com/
[27] Texas Department of Transportation Division of Motor Vehicles, *Landmark Chevrolet vs. General Motors Corporation, Chevrolet Motor Division and Austin Chevrolet, Inc, Docket No. 02-0002* LIC, 2002.

highest-performing of the three candidate markets to be the standard for minimum acceptable performance, which is equivalent to adequacy of representation.

The justification for this selection process is that the benchmark itself should not appear to be inadequately represented. According to proponents of the USAI model, a brand would appear to be under-represented by its dealerships in that area if its market share were lower than another potential comparison area. The final step compares actual brand registrations in the market to the number of registrations the brand would achieve if its local market share in each product segment equaled the same share that the brand captured in each product segment in the benchmark area ("Expected Registrations"). If the number of actual registrations in the market falls short of Expected Registrations, the USAI model deems that the dealer network does not adequately represent the brand in the market being studied.

Figure 5.1: USAI Model Adequacy of Representation:

USAI MODEL DEFINITION OF ADEQUACY OF REPRESENTATION

If Actual Registrations $\geq$ Expected Registrations: **Adequately Represented**
If Actual Registrations $<$ Expected Registrations: **Inadequately Represented**

The calculation of Expected Registrations uses a process called "segmentation" to divide the market for automobiles into product segments, which are based on vehicle characteristics, such as body style, size, and price. Examples include Medium Pick-up, Minivan, Luxury Coupe, and Mid-Size Sports Utility Vehicles.[28] Segmentation refines

[28] *Ibid.*

the measurement of market share in at least two ways. First, it allows for comparison of similar products across competitors. Second, it avoids distortions that would occur in measuring only total sales. For example, throughout the late 1990s Ford Motor Company achieved a market share of approximately 30% in the truck market but only 10% in the car market. Ford would obviously appear to perform much better in a market that favored trucks over a car-friendly market, such as Boston or San Francisco.[29]

The USAI model assumes that segmentation fully controls for all differences in consumer characteristics between the local area and the benchmark against which it is compared. For example, model proponents reason that if a preference exists for domestic/import brands, then that preference is already embodied in the benchmark figures. If vehicle buyers have higher incomes, they will simply purchase vehicles in segments that reflect those buying patterns, and the system will self- correct.

Consider an example of a hypothetical luxury brand dealership located in Beverly Hills versus a dealership of the same make in East Los Angeles. The dealership would obviously prefer the wealthier area for the purpose of having a more receptive market for its products. In contrast, customers would purchase relatively fewer luxury vehicles of all brands in the more depressed market. However, while income affects the aggregate number of vehicles likely to be sold, product segmentation leads to a reduction in Expected Registrations in the less affluent area and, according to the USAI model, eliminates performance implications that would arise from demographic differences.

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[29] *Ford Market Action Report*, 1997-1999.

If, in the evaluation of a proposed establishment, the USAI Model determines a market to be inadequately represented, the next quantitative step is to perform an impact analysis. The purpose of the impact analysis is to determine whether adequate opportunity exists to support the establishment of the new dealership without cannibalizing the sales of existing intra-brand dealerships. The impact analysis involves two steps. The first is to calculate the likely number of sales that the newly established dealership will make into the market.[30] The second step is to calculate the amount of "Lost Opportunity" that exists in the market. The concept of Lost Opportunity is critical to this thesis; additional theoretical and empirical analysis appears in a later chapter.

The USAI Model defines Lost Opportunity as follows. The first component is "Gross Loss." Gross Loss equals the sum of Expected Registrations minus actual registrations, calculated at the Census tract-level for the entire market. Note that the calculation of Expected Registrations yields a single blended unit number, rather than separate subtotals by models. Actual new retail registrations are aggregated and compared to Expected Registrations, with the resulting difference being a unit number of sales that is not monetized and is not model-specific. Features in which actual registrations exceed Expected Registrations do not factor into the Gross Loss calculation.

The other component is "Insell." Insell is comprised of the counts of vehicles registered to addresses within a market[31] but sold by dealerships located outside the market. Like Gross Loss, Insell is not generally model-specific. Its unit of measure is a specific number of vehicles—not a monetary figure. The USAI model does not relate

[30] If the study concerns a relocated dealership, the USAI Model deducts the number of sales that the dealership already makes into the market.

[31] In some cases USAI includes sales from dealerships within a market to be Insell. This usually relates to statutory considerations. Analysis of these instances is not necessary for the empirical work within this thesis.

Insell to "outsell" and does not consider the locations of the selling dealers of the other brands' vehicles registered in the market. Lost Opportunity equals Gross Loss plus Insell.

The following is a simple example of a Lost Opportunity calculation. Assume that a market has two Census tracts. Each has Expected Registrations of 10 vehicles. In the first tract, there are 8 brand registrations, all by resident dealerships. In the second tract, there are 12 registrations, of which two units are Insell. Lost Opportunity for the market would equal four units, the two Gross Loss units from the first Census tract and the two Insell units from the second Census tract. Although on a net basis actual registrations exactly equal Expected Registrations in the hypothetical market, Lost Opportunity still exists according to the USAI model.

According to the USAI Model, the establishment, through addition or relocation, of an intra-brand competitor heightens competition and increases the effectiveness of the brand's efforts across all dealers (a rising tide floats all boats). A critical assertion is that the new or relocated dealership will first draw from Lost Opportunity within the market. Thus, as long as Lost Opportunity exceeds the number of sales projected for the new or relocated dealership, existing dealers (of that brand) will not lose sales—as long as they respond to the increased competition.[32]

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[32] Texas Department of Transportation Division of Motor Vehicles, *Landmark Chevrolet vs. General Motors Corporation, Chevrolet Motor Division and Austin Chevrolet, Inc, Docket No. 02-0002* LIC, 2002.

Figure 5.2: USAI Model Lost Opportunity:

USAI MODEL DEFINITION OF LOST OPPORTUNITY

Lost Opportunity = Gross Loss (vehicle units) + Insell (vehicle units)
Gross Loss:
If in feature 'i' Actual Registrations ≥Expected Registrations: Loss $_i$ **= 0**
If in Census tract 'i' Actual Registrations < Expected Registrations:
Loss$_i$ = (Expected Registrations-actual registrations)

Gross Loss = $\sum_i^I Loss_i$

Insell:
All vehicles registered in a market but sold by a dealership outside of the market.

Proponents of the USAI Model cite extensively the work of Kotler and Lilien as theoretical support. Proponents of the USAI Model have suggested that the retail automotive industry is still in a state of increasing returns with respect to the share of outlets. If correct, an establishment that increases a brand's share of outlets by some percentage 'x' will result in an increase in market share by a factor of greater than 'x'. Proponents claim that the USAI Model incorporates all necessary adjustments to apply Lilien's undifferentiated product-based model to the retail automotive industry.

V.b The Fontana Model

Protesting dealerships also present their positions through expert testimony. The largest firm providing these services is The Fontana Group, Inc. ("Fontana") from Tucson, AZ. This firm is the writer's employer. Fontana's president and most prominent witness is Dr. Ernest H. Manuel ("Manuel"). Generically, this thesis will attribute the positions taken by Manuel and other Fontana witnesses as the "Fontana Model."

The Fontana Model presumes that dealerships are rational, profit-maximizing firms. This premise is important, as it attributes variation in dealership operations to response to incentives, rather than ability or effort. For example, if a dealership advertised less than its intra-brand counterparts, proponents of the Fontana Model would generally argue that market conditions made advertising less fruitful, rather than concluding that the dealership should advertise more in order to improve its market performance.

Additionally, the Fontana Model gives little weight to the characterization of whether a brand is adequately represented within a given market. In other words, it would make little difference if the market share were at 99% or 101% of the benchmark level. Rather, the model seeks to explain differences between local market performance and benchmark performance levels. By assuming rational profit-maximizing behavior and examining exogenous factors (outside of dealerships' control), the Fontana Model attempts to narrow the market analysis to only those factors that are likely change as a result of a new or relocated dealership in the market.

The hallmark of the Fontana Model is the role of a factor that is certain to change after an establishment or relocation—the territorial advantage held by existing dealerships. The Fontana Model has shown on numerous occasions the role that proximity plays in intra-brand competition. Dealerships not only have higher sales capture rates in areas closest to the dealership; relative distance plays a critical role in competition between same-brand outlets.[33] In contrast, the Fontana Model has shown

[33] California New Motor Vehicle Board, *Fremont Toyota vs. Toyota Motor Sales, USA, Inc., Protest No. PR-1844-03*, 2003 and Florida Department of Administrative Hearings, *General Motors Corporation vs. Roger Whitley Chevrolet*, *Case Nos.: 03-4083* and *03-4084*, 2005

that distance plays less of a role in inter-brand competition.[34] The effect from territorial encroachment will be the primary focus of the empirical work that follows in a later chapter.

The Fontana Nationwide Sales Model depicted in Figure 5.3 measures the role of absolute proximity (the closest dealer or that brand) in intra-brand competition. This model relates the number of sales dealerships make nationwide to the number of Expected Registrations to which the dealerships are most proximate (generally in their market areas). Across dozens of markets and brands, this model has demonstrated that sales nationwide relate positively and significantly to Expected Registrations in the market.[35] In simpler terms, dealers with bigger markets sell more cars.

Figure 5.3: Fontana Nationwide Sales Model

Fontana Nationwide Sales Model
Y_i (number of dealer i's sales nationwide) = $b_0 + b_1$ (Expected Registrations in Dealer i's market)
Dealer i's market is assumed to be the areas to which Dealer i is most proximate.

Notwithstanding the consistent findings of the aforementioned model, there is little doubt that the intuitive link between a dealership's sales within its own market and expected registrations therein is more strongly detectable by the model than the dealer's sales outside of its own market. While the consistent findings of a relationship by the model as shown suggest that dealerships' sales outside to customers outside of their markets correlate with expected registrations therein, this correlation cannot be presumed

[34] United States District Court District of Minnesota, *JMR/FLN, R.L Imports vs. Subaru of America, et al*., 2005, *CV 03-6114 JMR/FLN*, et al.
[35] Florida Department of Administrative Hearings, *General Motors Corporation vs. Roger Whitley Chevrolet, Case Nos.: 03-4083* and *03-4084*, 2005, among others.

to hold generally. Fontana does not dispute this distinction and has addressed it when data allow.[36],[37]

The Fontana Model has also employed binary choice analyses that relate capture rates between intra-brand competitors to the relative proximity of the dealerships to customers. Instead of the absolute advantage of proximity evaluated above, these models calculate "shares" of proximity and evaluate those shares' ability to predict the division of sales between intra-brand competitors. I refer to this family of models as the "Fontana Logit Model."

Figure 5.4: Fontana Logit Model

Fontana Logit Model

P_{ij} (Probability that dealer i sells to customer j) = b_0 + b_1 (Dealer i's proximity to customer j/$\sum_i^I$ *Dealer i's proximity to customer j*)*

"Proximity" is a proximity measure, such as reciprocal distance.

Feature	Dealer A Sold Vehicle (1/0)?	Drive time to Dealer A	Squared Reciprocal of Drive Time (A)	Drive time to Dealer B	Squared Reciprocal of Drive Time (B)	Dealer A Share of (A)+(B) Reciprocal Drive Time
1	1	5 min	0.04	5 min	0.04	0.5
2	0	10 min	0.01	15 min	0.00444	0.692
3	1	2 min	0.25	7 min	0.0204	0.925
4	1	10 min	0.01	24 min	0.0017	0.852
5	0	20 min	0.0025	10 min	0.01	0.2

- Dependent Variable = Column 2 (1/0); Independent Variable = Dealer A Share of Rec. Sq. DT

[36] United States District Court for the Southern District of New York, *Action Nissan, Inc. vs. Nissan, N.A.*, ***Error! Main Document Only.****OAL Docket No. 05 CIV 3864* (WCC), 2006

[37] As an alternative, Fontana has segregated pre-encroachment intra-brand penetration rates in areas in which the dealership is closest, second closest, third closest, etc., and estimated lost sales impact based on the changes in ranked proximity that would result from the encroachment. See, Circuit Court of Jefferson County, AL, Circuit Court of Jefferson County, AL, *Serra Chevrolet, Inc. vs. Kia Motors America, Inc. and Bill Byrd Kia, CV-2005-2611*, 2008.

The role of the Fontana Logit Model is to estimate the impact of an intra-brand relocation upon the sales of an existing dealership. The assumption is that the model's coefficients capture the role that distance plays between two or more competitors. Upon estimating the coefficients as illustrated above, the values in the fifth column, presumed to relate to the relocating dealership, are replaced with the values that would exist after the relocation. These new values are inserted back into the model and the resulting outputs are used to estimate the change in Dealer A's sales that would result from the relocation. Figure 5.4.a illustrates this process.

Figure 5.4.a Fontana Logit Model calculation of Lost sales

$$\sum_{i=1}^{I} e^{bx_i} * w_i - \sum_{i=1}^{I} e^{bx_i'} * w_i$$

i = geographic feature;

e^{bx} = Estimated probability of a sale by dealer 'a';

w_i = The number of sales in feature i;

x = Proximity measure associated with feature i;

x'= Proximity measure associated with feature i after relocation;

The Fontana Model and USAI Model are mostly similar in terms of the appropriate parameters and technical measures by which to evaluate a retail automotive market. By way of example, both models agree that segmentation is necessary, that United States Census tracts are a preferred geographic level for micro-level analysis, and

that the blended calculation of Expected Registrations is appropriate. The most significant contentions lie in the underlying assumptions of the models and in the conclusions drawn from the models' results.

Proponents of the Fontana Model object to the USAI Model's determination of adequacy of representation, arguing that it yields unsound and inflated brand expectations. Secondly, the Fontana Model considers the possibility that demographic factors affect brand performance and rejects the conclusion that segmentation analysis fully controls for demographic differences between the study market and the benchmark area. Third, supporters of the Fontana Model object to the USAI Model's assumption that sales by a newly established dealership will first draw from lost opportunity before cannibalizing the sales of an intra-brand competitor. The basis for the final objection stems from questions relating to the reliability of the USAI Model's Lost Opportunity measure as well as theoretical and empirical challenges to the assertion that increased intra-brand competition can be expected to offset the effect from loss of territorial advantage.

Of the three points of contention described above, the first is largely qualitative and depends on the definition of "adequate." Although subjective, the question of adequacy of representation holds tremendous leverage in the process of evaluating a retail automotive market, as measures of market performance are highly sensitive to the selection of the benchmark area or measuring stick. The second point (demographic factors) is one that has received considerable attention from Manuel and other Fontana Model proponents, who have demonstrated substantial evidence that brand performance

is sensitive to demographic effects.[38] However, this thesis does not significantly depend on evaluating the merits of the competing models with respect to these two topics. The third factor (relationship between Lost Opportunity in the market and the sales of the encroaching dealership) provides the richest potential for empirical examination and is the central theme of this thesis.

USAI Model proponents object to the Fontana Model primarily on the basis that it does not adequately account for the possibility that market additions and locations will increase the brand's market share in the study area. For example, the Fontana Logit Model evaluates the redistribution of sales after the relocation, but maintains a fixed number of sales in the before and after cases. USAI Model proponents argue that market share increases will offset some or all impact from proximity losses.

Both Fontana and USAI have presented numerous case studies that evaluate the impact of encroachments upon existing same-make dealerships. These evaluations have either been forward-looking (applying empirical models to pre-encroachment market data) or aggregate-level analyses that compare broad measures of dealership sales from the pre-encroachment period to post-encroachment sales. The data available herein allow an expansion of prior efforts.

The application of the USAI and Fontana Models to the data from this matter is a fairly straightforward task. From the perspective of the USAI Model, the task is elementary. As shown in the prior chapter Lost Opportunity in the Miami C/T is more than 3,500 units. This figure greatly exceeds the sales by Dodge of Dadeland. According

[38] California New Motor Vehicle Board, *Pacific Honda, et al, vs. American Honda Motor Co.*, Inc., *Protests 1945-1948*, 2006.

the principles of the USAI Model, Dodge of Dadeland has sufficient Lost Opportunity from which to draw before cannibalizing the sales of Spitzer or other market dealerships.

Although the estimate of impact (none) from the USAI Model as applied to this matter is concrete, the reasons for this estimate are novel and offer rich opportunities for analysis. Under the most rigid interpretation of the USAI Model, an encroaching dealership will first draw from Lost Opportunity in the market before taking sales from existing intra-brand market competitors. Restated, the encroaching dealership will exhaust the Lost Opportunity before cannibalizing intra-brand sales from market dealerships. Notably, the most rigid interpretation of the USAI Model is what is implied by numeric parameters of the model. Since the model predicts that existing dealerships will lose no sales provided Lost Opportunity exceeds projected sales by the encroaching dealership, this prediction must rely the premise that the encroaching dealership, not just primarily, but first and exclusively draws from Lost Opportunity within the market. I refer to this interpretation as the USAI Impact Condition.

Figure 5.5: USAI Impact Condition

The encroaching dealership first and exclusively draws from Lost Opportunity within a market. **If Lost Opportunity in the market exceeds projected sales by the encroaching dealership, the existing intra-brand competitors will not lose sales from the encroachment.**

Perhaps the most novel element of the USAI Impact Condition is its implications for the sales behavior by the encroaching dealership. If true, the addition or relocation of a dealership strengthens the brand's presence within the market, and this enhancement should manifest itself by remedying the underperforming portions of the market. In other words, the encroaching dealership fills the holes before raising the earth. This assertion is testable and is the subject of original empirical testing later in this chapter.

With regard to Fontana models, the Fontana Nationwide Sales Model requires data beyond the scope of this thesis in order to secure an adequate sample size. However, the Fontana Logit Model is feasible. The model is adapted to this case as follows. The geographic features are those in the Miami C/T in which any Dodge dealership sold at least one vehicle at retail in 1998. The 'w's are the number of new Dodge sales in a feature. Dealer 'a' is Spitzer Dodge, the protestant of the relocation. The proximity measure is Spitzer's share of all Miami C/T dealerships' share of squared reciprocal drive time in the observed feature.

The model uses a weighted logistic regression, in which the dependent variable is modified as a result of practical considerations. Dealer sales data are generally grouped at the feature level. Practically, this means that the data show counts of sales by each dealership but no specific address associated with the registration. Thus, each sale to a customer within a feature is assumed to be registered at the centroid of that feature. Additionally, ungrouping the data to run a pure binary logit would require substantial modification of the data in order to classify the thousands of sales within the market in binary form. Thus, per practice of Fontana, the model treats Spitzer's share of Miami C/T dealerships' Dodge sales within a feature as the dependent variable. The independent

variable is Spitzer's share of Reciprocal Drive Time Squared to that feature. The applied weights are the number of Dodge sales by Miami C/T dealership in the feature.

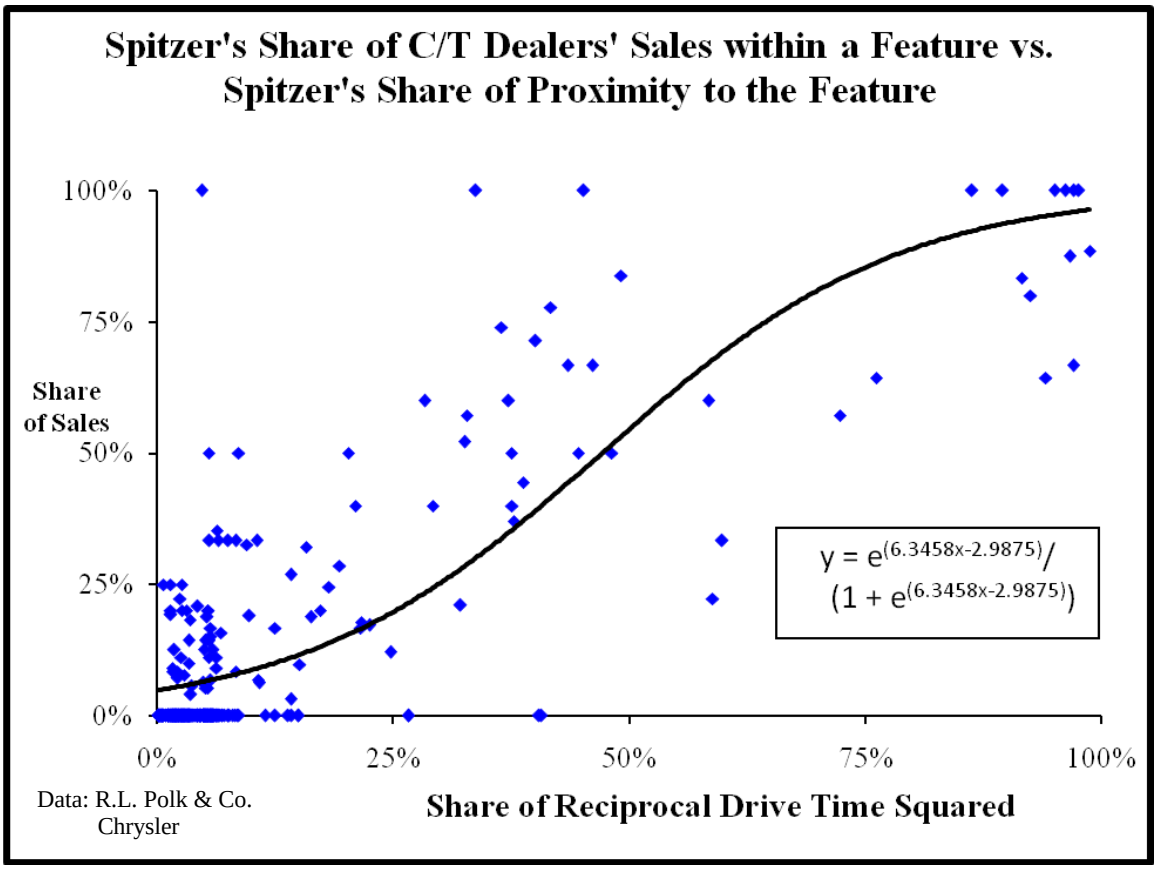
The formula shown below estimates the lost sales that Spitzer will experience based on the modified Fontana Logit Model. Within the calculation e^{bx_i} represents the fitted probability (share of sales) for Spitzer feature 'i'. This is multiplied by the number of sales by C/T dealers in feature 'i', with the product being the fitted sales for Spitzer within that feature. The sum of products for all features within the C/T equals the model's estimate for Spitzer's sales within the market. The process is repeated with Spitzer's proximity shares after the relocation substituting for those that existed before the relocation. The fitted probability for feature 'i' after the relocation is represented by $e^{bx_i'}$. Subtracting the summation of the post-relocation products from the summation of the pre-relocation products results in the loss estimates predicted by the modified Fontana Logit Model. In this case, the model would have predicted that Spitzer would have experienced a loss of 6.3% of its sales into the Miami C/T as a result of the proximity changes from the Dodge of Dadeland relocation.

$$\sum_{i=1}^{I} e^{bx_i} * w_i - \sum_{i=1}^{I} e^{bx_i'} * w_i$$

Figure 5.6 below depicts the data associated with the Fontana Modified Logit Model as applied to the Miami C/T. Each data point show represents for a geographic feature the percentage of Miami C/T dealerships' sales that Spitzer captured and the corresponding share of reciprocal squared drive time that Spitzer held to the centroid of that feature in 1998. The chart uses "cross-sell" data, which is a naming convention for

files showing the locations of dealer-matched sales (as opposed to registrations) within a market.

Figure 5.6: Fontana Modified Logit Model Applied to Miami C/T.[39]



Between the USAI and Fontana Models, estimates of lost sales impact upon Spitzer are either zero or 6.3%. While the Fontana loss estimate does not account for the potential offset of brand growth, we are aware from the summary statistics, that brand performance actually declined somewhat in the Miami C/T. Additionally, Spitzer's adjusted sales fell by a much larger proportion than that estimated by the Fontana Model.

[39] LIMDEP output appears in Appendix 5.1.

V.c: Original Empirical Models

Note: The following empirical models are original work by this author. While Fontana resources contributed to collection and tabulation of data, the design of these models is strictly original product.

The original empirical work, first, directly tests the assumptions of the USAI Impact Condition. These models advance prior efforts by applying a refined micro-level approach that evaluates whether the sales of the existing dealership, indeed, draw from Lost Opportunity. The enhanced data availability enable the estimation of these models by allowing both an identification of Lost Opportunity in the "before" period and the selling behavior of market dealerships in the before and "after" periods.

The empirical results must clear a high bar to confirm the principle of the USAI Impact Condition. If the USAI Model's assertion were that same-make additions and relocations *tended to reduce sales from out of market dealerships and raise brand penetration levels in lower-performing portions of the market*, this would change the necessary empirical finding to merely the existence of a positive relationship between so-called Lost Opportunity and the encroaching dealership's sales. Without relaxing the assumptions of the Impact Condition, a number of obstacles impair the presentation of an explanation for why a market *should* respond in the manner that the USAI Model suggests, much less that the Impact Condition could be considered an axiomatic expectation of market behavior.

Two significant elements of the USAI Model suffer from structural flaws that sew doubt that the Impact Conditions will withstand rigorous empirical tests. The first is the

upward bias in the benchmark selection process. The second is the composition of the Lost Opportunity calculation. Analysis of these concerns follows.

The selection of a benchmark is critical to the USAI model, as the brand's market share performance in the benchmark area will be used as a comparison for the brand's (and dealers') performance in the area being studied. The USAI Model generally offers three candidate markets for consideration as comparison area benchmarks. These candidates include a local area, like surrounding markets or portions therein, an intermediate area, such as the state or region containing the study area, or the United States as a whole.[40] The candidate selected is the one with the highest of the three market shares.

Figure 5.7: USAI Model Benchmark Selection Process (Illustration)

Brand Share in Candidate Benchmark Comparison Areas

	Local Area	Intermediate Area	U.S. Represented Markets	Benchmark Selected
Example 1	12.5%	11.8%	7.7%	12.5% (Local)
Example 2	9.8%	10.0%	13.1%	13.1% (U.S.)
Example 3	12.5%	14.0%	9.9%	14.0% (Intermediate)

Under the assumptions of the USAI Model, it would be inappropriate to employ as a benchmark or comparison area another area that is, itself, inadequately represented.[41] If one benchmark area does not meet the performance level of the other two (or one of the two), then it appears to be inadequately represented and is inapplicable as a yardstick of adequate brand representation. It is easy to see that after a handful of iterations, the

[40] Intermediate or national comparison areas may include only those markets in which the brand in question has active representation (dealers in place).
[41] California New Motor Vehicle Board, *Pacific Honda, et al, vs. American Honda Motor Co.*, Inc., *Protests 1945-1948*, 2006

benchmark selection process will always result in the selection of the candidate market with the highest overall brand market share of the three.[42]

USAI Model proponents do not advocate their system as one that is applicable only to certain brands under certain conditions. Rather, it is touted as a standard system that can be (and is) universally applicable across line makes and markets.[43] Ironically, it is this claim that the USAI Model is universally applicable that leads to the simplest refutation of the claim itself.

As demonstrated in the hypothetical example in Table III.A, the USAI Model will always employ as a benchmark the candidate area with the highest overall brand market share. A simple corollary of this process is that the benchmark area selected can never have overall brand share that is lower than the brand's share nationwide. For example, if the nation as a whole has the highest brand share of the three candidate markets, it will be the benchmark area selected. If not, it will, according to the model's proponents, appear to be inadequately represented; another candidate market will be selected. As a result, each local market (to be adequately represented) must have a market share that is at least equal to the brand's share nationally.[44]

It is the nature of an average that if one component part is above that average, then other components must be below. The expectation of the USAI model is that in each market, the brand should perform *at least* at the level of the benchmark area (minimally at national average). In other words, the USAI Model implies that *average*

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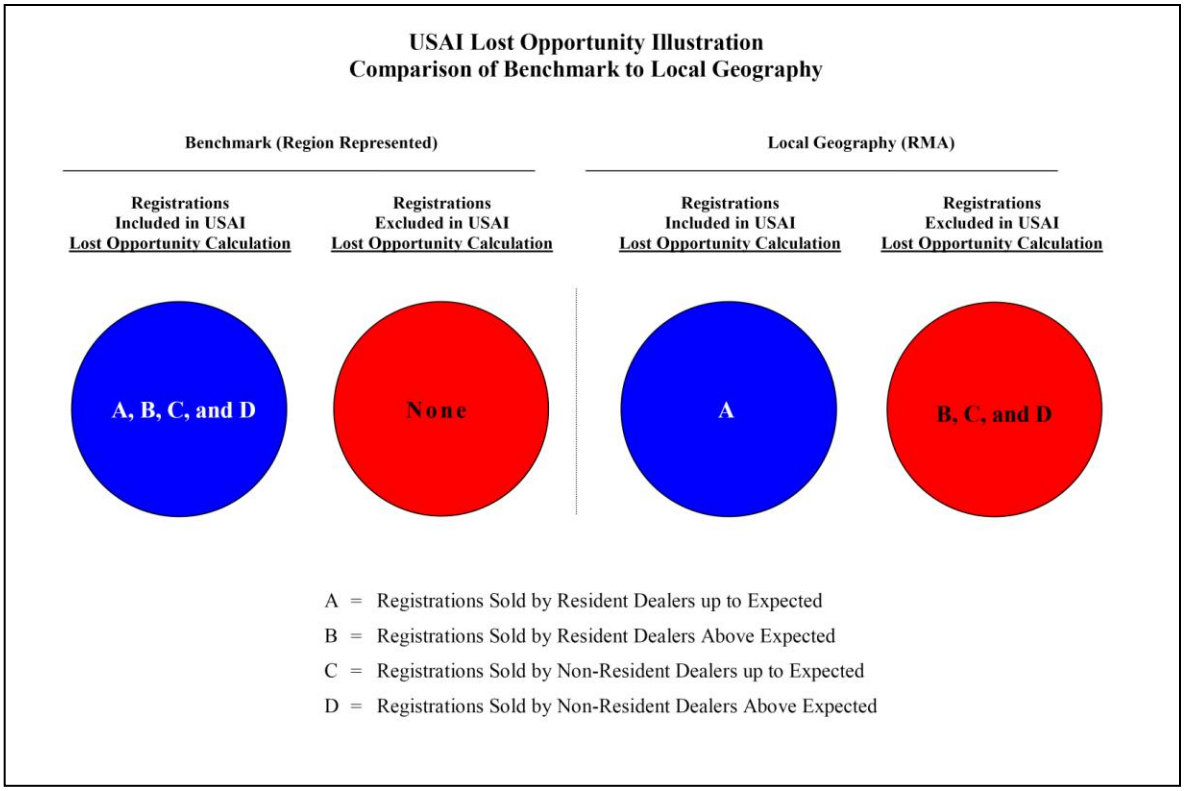
[42] Because market share expectations are eventually calculated by product segment, it is possible that the benchmark selected for its highest overall performance may not yield the highest brand expectations.
[43] California New Motor Vehicle Board, *Pacific Honda, et al, vs. American Honda Motor Co.*, Inc., *Protests 1945-1948*, 2006.
[44] The fact that each and every market should perform at or above the U.S. brand average is sufficient to demonstrate the upward bias in the USAI model benchmark selection process. Consideration of the possibility that other, higher-performing, benchmark areas may be selected only shows that the USAI Model is *more upwardly biased* but is not necessary in demonstrating the existence of this bias.

brand performance in a benchmark area (made of component markets that perform both above and below some average level), is the appropriate standard for *minimum* performance in any given market therein. This internal inconsistency invalidates the USAI Model's benchmark selection process and shows that the USAI Model could not reliably be universally applied across different markets of the same brand, as each market would be expected to perform at or above the average of all markets.

Attempting to apply the USAI Model across not just markets of the same brand, but also across different brands within the same market only exacerbates the upward bias in the benchmark selection process. If, consistent with the assumptions of the USAI Model, any brand's market share in any market must equal or exceed its national brand's average market share in order to be deemed "adequate," then other brands not being considered in the study collectively must perform *at or below* their aggregate brand shares. If expectations for a brand are that it will achieve at least 'x' percent of the market, then other brands should capture *at most* (1-x) percent of the market. This is the fatal flaw in the USAI benchmark selection process. A brand under examination by the USAI Model has an expected market share performance level of at least the highest of the local, intermediate, or national standard candidates. Collectively, brands *not* under examination are "expected" to perform, at most, at the lowest of the three benchmarks. At the individual line make level, the expectations for a brand would be different, depending on whether the brand were the topic of the study. This internal inconsistency ensures that even in identical markets with identical conditions, market share expectations for a brand would vary depending upon whether that brand were the topic of the study. This is a fundamental violation of scientific principles.

The USAI Model's necessary presumed link between the encroaching dealer's sales and Lost Opportunity in the market is suspect. Foremost among these reasons is the one-directional nature of the Lost Opportunity calculation. As illustrated in the graphic below, the Lost Opportunity calculation amounts to a comparison of a subset of brand sales into the local market to the totality of sales in the comparison area. For example, assume that the brand in question achieved an average 20% market share in the study area. This average would be the product of portions of the area that performed above 20% and portions that performed below 20%. Gross Loss ignores gains within a market, counting the shortfall units only in the areas that lag the benchmark penetration levels. Additionally, the 20% share achieved in the hypothetical benchmark area includes Insell units. Insell units are a component of Lost Opportunity in the study area. A more subtle point is that Insell units of other brands are included in developing the market share expectation. In other words, the 20% expectation from above is applied to all registrations—those that are Insell units and those sold by market dealerships. Figure 5.9 below illustrates the uneven treatment of brand registrations in the USAI Lost Opportunity calculation.

Figure 5.8: USAI Lost Opportunity Illustration



A necessary assumption of the Impact Condition is that Lost Opportunity in an adequately represented market should tend towards zero. At the very least, the market action proposed should reduce Lost Opportunity in the market by at least as large amount as the expected sales by the encroaching dealership. Since the benchmark performance used to derive Lost Opportunity in the market is not adjusted for its own Lost Opportunity, the USAI Model lacks an empirical link that would allow an objective estimation of the degree to which Lost Opportunity would decline (if at all) after the proposed market action.

It is not difficult to demonstrate that the realistic expected amount of Lost Opportunity in an adequately represented market is non-zero. If a brand in a so-called

"adequately represented" market performs at an *average* market share level of x, this does not imply that the brand in *all parts* of any other adequately represented market should perform at a level of *at least x*. Even if one held this expectation, the same expectation should hold for other brands as well. Clearly, not all brands could be *at least average* in an entire market, much less in each portion of the market.

Logical expectations for Insell in an adequately represented market would also be non-zero. Anderson does not dispute that Insell is inevitable and exists in virtually every market.[45] Rather, his contention is that each Insell unit represents a customer who purchased from a less convenient dealership and a lost opportunity for market dealerships. Anderson's argument is not well-placed. For examples, imagine an individual with an overall body fat percentage of 25%, compared to a hypothetically "healthy" level of 20%. Although each fat cell represents excess calorie intake, and each fat cell is vulnerable to reduction by implementing a healthy lifestyle, remedying poor living habits only reduces body fat percentage by 5 percentage points—not 25. The existence of adequately represented markets with non-zero Insell indicates that a measure (Lost Opportunity) based on the total remediation of Insell is inappropriate and inflated.[46]

The USAI Model fails to establish the necessary exclusive and proportional link between sales by the encroaching dealership and the model's measure of Lost Opportunity. Downstream flaws in the Lost Opportunity measure also preclude the

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[45] California New Motor Vehicle Board, *Pacific Honda, et al, vs. American Honda Motor Co.*, Inc., *Protests 1945-1948*, 2006

[46] Insell also suffers from several definitional problems beyond the scope of this thesis. Examples include restrictive statutory market definitions that do not conform to actual customer market boundaries, and the rigid assumption that a customer's home registration address is always the most appropriate starting point for evaluating the convenience of purchasing behavior.

possibility that correcting the upwardly-biased benchmark selection process would resurrect the viability of the Impact Condition. However, these qualitatively demonstrated shortcomings do not exclude the possibility that sales by the encroaching dealership, indeed, draw disproportionately from Lost Opportunity in the market. The original empirical models consider this possibility.

The Impact condition is that the new or relocated dealership will draw sales from Lost Opportunity in the market before cannibalizing sales that were previously captured by existing dealerships. For this assumption to be generally true, the sales of the encroaching dealership would have to follow a pattern that violated Reilly's Law/Gravity Model expectations. While Reilly's Law would predict a general sales pattern based on retail gravitational pull, the USAI Impact Condition suggests that the encroaching dealership would capitalize on so-called Lost Opportunity in the market, which, only by coincidence, would align with the spatially-based expectations of Reilly's Law. If the area immediately surrounding the location of the encroaching dealership had no Lost Opportunity, the Impact Condition would predict that the encroaching dealership's sales would bypass these more proximate portions of the market in favor of more distant potential customers from areas with Lost Opportunity.

The USAI Impact Condition compares projected sales by the encroaching dealership to actual Lost Opportunity in the market *before the addition or relocation of the dealership*. Lost Opportunity is the product of purchase decisions before the encroachment and is not contemporaneous to the purchase decisions that occur once the addition or relocation happens. At the extreme, the Impact Condition would imply that the existence (absence) of Lost Opportunity (two years earlier) would influence a

customer's decision to buy (not buy) from the encroaching dealership. Logically, there is little reason to expect this outcome.

Rigid interpretation of the Impact Condition is particularly suspect in a relocation (as opposed to an addition) matter. Relocations of dealerships do not change the number of outlets in the market, only the location of one outlet. Even if, arguendo, a relocation were assumed to be to a superior location, thereby enhancing overall brand presence in the market, the amount of benefit to the brand, in aggregate, would depend greatly upon the specific facts of the market and of the relocation. Furthermore, with the exception of geometrically unlikely market alignments, the relocation of a dealership is highly likely to inconvenience *some* customers and reduce brand presence in some portions of the market. To the extent that the dealership relocates to a location farther from Lost Opportunity within a market, it is intuitively less likely that the relocating dealership would draw from Lost Opportunity within those areas.

In order to account for the aforementioned logical flaws in the USAI Model and in the Impact Condition, the first two empirical models consider the possibility that the USAI Model and Impact Condition suffer primarily from overly rigid assumptions but still retain merit. If one assumes that Gross Loss and Insell occur because portions of the market are not adequately represented, and that adding or relocating dealerships within a market remedy deficiently represented areas of the market, then the sales of the encroaching dealership could tend to draw disproportionately from portions of the market where Lost Opportunity existed while still following spatially consistent sales patterns. This outcome would not satisfy the more rigid Impact Condition but would confirm the theoretically novel assertion that increased intra-brand competition targets under-

performing portions of the market. I refer to this possible phenomenon the "Quasi-Impact Condition."

V.c.1 Regression Models:

The first regression model measures the effects of four variables and a constant term upon the post-period sales of Dodge of Dadeland ("90Dadesls"). Data are at the Census tract/ZIP code ("feature") level and cover the Miami Community Territory ("C/T"). Independent regressors include the number of Expected Registrations (based on USAI's U.S. average benchmark) in the feature ("90Expreg"), half the round-trip drive time between Dodge of Dadeland's location (after the relocation) and the centroid of the feature ("reloDT"), Gross Loss (in 1998) in the feature ("Grossloss"), and Insell (in 1998) in the feature ("Insell"). While the USAI Model combines the last two variables into Lost Opportunity, it is appropriate to test each component separately in the event that Insell and Grossloss have different relationships to the encroaching dealership's sales.

This thesis earlier demonstrates the inflationary tendency inherent within the USAI Model's benchmark selection process. To the extent the flaws in this process manifest themselves in the data from the Miami C/T, the affected variables would be 90Expreg and Grossloss. However, the design of the regression model largely mutes this potential inflationary impact. If reliance on an inappropriately high performance benchmark overstates the realistic number of Expected Registrations in a feature, then this overstatement should be captured, at least somewhat, in the estimated coefficient on

90Expreg. Similarly, the coefficient on Gross Loss should also adjust the effect of the overstatement of brand potential[47].

Model #1 may be used to test null hypothesis that all coefficients equal zero ($B_1 = B_2 = B_3 = B_4 = 0$). 90Expreg is a measure of opportunity for Dodge sales within a feature. ReloDT is a measure of Dodge of Dadeland's proximity to the feature. Intuitively, if one were not specifically analyzing the sales of an encroaching dealership, opportunity (accounting for brand strength) and proximity would be the primary predictors of a dealership's ability to sell in an area.

In the event that the Impact Condition holds, one would expect positive and significant coefficients on Insell and Grossloss. It would not be entirely inconsistent with the USAI Model's assumptions for significant relationships to exist between between Dodge of Dadeland's sales and the other regressors, provided Insell and Grossloss were significant. In that case the regression model would be explaining *which* Insell and Grossloss the encroaching dealership tended to capture.

Under the relaxed assumptions of the Quasi-Impact Condition, one would expect observable relationships to exist between 90Dadesls and each of the four independent regressors. This result would signify that Dodge of Dadeland's sales were a function of aggregate sales opportunity (90Expregs) and proximity (reloDT), as predicted by gravity-based models, but that after controlling for these generalized trade factors, the relocating

[47] While directionally true, an inflated benchmark could result in the presence of Gross Loss when brand registrations in the feature do not actually fall below what a reasonable benchmark would project. The model's self-adjustment would occur, for example, as follows. If the inflated benchmark doubled the number of Expected Registrations in the market, then dealer sales would be approximately half as sensitive to variation in expected registration. This would be analogous to a change in temperature units from Fahrenheit to Celsius. However, the Gross Loss coefficient would not adequately account for this overstatement of Expected Registrations. To illustrate, imagine a benchmark in which Dodge captured 100% of the market. Against this standard, the entire market would show Gross Loss, for which the Gross Loss coefficient would not adequately control.

dealership did remedy market inadequacies and draw disproportionately from Lost Opportunity (Insell and Gross Loss).

As the USAI Model proponent could argue against the appropriateness of separating the Grossloss and Insell variables, the second model addresses this potential concern, repeating the first but employing a single Lost Opportunity variable ("Lostopp"), which aggregates Gross Loss and Insell. Thus, Model #2 may be used to test the null hypothesis that all coefficients equal zero ($B_1 = B_2 = B_3 = B_4 = 0$)). The only change is that B_3(Lostopp) combines B_3 and B_4 from above into a single variable.

Figure 5.9: Regression Models 1 and 2

$$Y(90\,Dadesls_i) = B_o\,(Constant) + B_1(90\,Expreg_i) + B_2(Relodt_i) + B_3(Grossloss_i) + B_4(Insell_i)$$

$$Y(90\,Dadesls_i) = B_o\,(Constant) + B_1(90\,Expreg_i) + B_2(Relodt_i) + B_3(Lostopp_i)$$

V.c.2 Supplemental Regression Model (Model 3):

A conflict arises when conducting statistical tests of the merits of the Grossloss variable. While as much as possible, this thesis has attempted to remain faithful to the intent of the USAI Model, the Gross Loss variable suffers from design and specification problems that require attention. First, as alluded to earlier, Gross Loss depends significantly upon the benchmark employed in its derivation. Consequently, it is susceptible to distortions from inflated or inappropriate benchmarks. Second, Gross Loss is a censored variable. If the feature's registration effectiveness equals benchmark levels, then no Gross Loss exists. In the event that Gross Loss does exist, the USAI Model does not account for the magnitude of the observed feature. In other words, a single unit of

Gross Loss in a feature with 50 Expected Registrations counts the same as a single unit of Gross Loss in a feature with one Expected Registration. While Gross Loss is clearly not a ratio variable, it arguably does not qualify as having interval properties either. These characteristics of the Gross Loss variable render it somewhat unreliable for direct statistical testing.

A conventional solution would be to construct an interaction between a binary variable indicating the presence of gross loss and Grossloss itself, which counts the units of Gross Loss. However, this method is still sensitive to the benchmark selection process. An inflated benchmark could effectively return the model to its prior form by "finding" Gross Loss in virtually every feature within a market.

An alternative solution maintains the basic intent of the USAI Model (with respect to Gross Loss) while largely negating the potential effect from benchmark overstatement. This solution involves a second softening of the Impact Condition. I refer to this modified structure as the Weak Impact Condition ("WIC").

The WIC maintains the USAI Model's assertions that Gross Loss in a market results from inadequate representation in those portions of the market and that additions/relocations of dealerships tend to remedy those inadequacies. However, rather than a Boolean condition (Gross Loss or no Gross Loss), the WIC adopts a directional generality that sales by the encroaching dealership tend to occur in the lower-performing portions of the market. Thus, an add point or relocation will *tend to improve* representation within the market without necessarily restricting sales by the encroaching dealership to areas with Lost Opportunity.

Testing the WIC requires re-specification of the first regression model. This

entails the creation of a new variable which measures the feature's Registration Effectiveness in 1998. This variable Regeff98 is equal to the 1998 ratio of actual to expected registrations in feature 'i'. Regeff98 replaces Grossloss and Insell in the regression model. Models 1 and 2 cannot be re-specified to include Regeff98, as Regeff98 is virtually dimensionally additive with Insell and Grossloss.

If the WIC holds, one would expect observable relationships to exist between 90Dadesls and each of the three independent regressors. This result would signify that Dodge of Dadeland's sales were a function of aggregate sales opportunity (90Expregs) and proximity (reloDT), as predicted by gravity-based models, but that after controlling for these generalized trade factors, the relocating dealership did tend to improve representation in lower-performing portions of the market. To examine this possibility, Model #3 tests against the null hypothesis that all coefficients equal zero ($B_1 = B_2 = B_3 = 0$).

Figure 5.10: Regression Model 3

$$Y(90Dadesls_i) = B_o\,(Constant) + B_1(90Expreg_i) + B_2(Relodt_i) + B_3(Regeff98_i)$$

V.c.3 Regression Model 4:

The next regression model tests against a weaker hypothesis—that while the encroaching dealership's sales may not be positively related to Lost Opportunity in the market, the relocation still affects the localized brand presence within the market. This is inherently a test of the role that proximity plays in inter-brand competition. The a priori expectation is that if, indeed, the relocation affects inter-brand purchase probabilities, the

effect on Dodge's market share would be positive in areas to which the dealership becomes more proximate and negative in portions of the market that are less conveniently represented after the relocation. The model tests whether the dependent variable (RegeffΔ) in a feature is related to the aggregate proximity of Dodge dealerships to a feature. In other words, does Dodge Registration effectiveness rise (fall) in portions of the market to which Dodge of Dadeland's relocation site is closer (farther) than it was in the pre-relocation period.

Figure 5.11: Regression Model 4

$$Y(Regeff\Delta_i) = B_o\,(Constant) + B_1(CTDLRDT\Delta_i)$$

V.c.4 Regression Models 5-6:

The fifth regression model tests the degree to which sales by existing dealerships in the post-relocation period relate to changes in proximity within the market. The model includes a constant term and three independent regressors. The first variable, ExpregΔ, is the percentage change in the number of expected registrations in the feature between the before period and the after period. Interpretation of this variable is meaningful in sign and significance only, as, dimensionally, it evaluates a unit change in sales on the basis of a percentage change in Expected Registrations. The second variable, CTDLRSLS8, is the number of sales that the existing dealers made in the feature in the before period. As the after period is only 9 months of the year 2000, the dealers had only three-quarters of a year in the after period to make sales. The final variable is DADEDTΔ. This measures the change in the aggregate share of relative proximity held by the existing dealerships

after the relocation of Dodge of Dadeland. A positive (negative) value implies that Dodge of Dadeland moved closer to (farther from) the centroid of the feature.

This model tests against the null hypothesis that all coefficients equal zero. As the first two independent regressors are control variables. The salient questions revolve around DADEDTΔ. If the coefficient is sufficiently positive to reject the null hypothesis, this would support the contention that the localized market share increase (decrease) that results from an increase (decrease) outweighs the effect of lost (gained) proximity share. In the event that the coefficient is significantly negative to reject the null hypothesis, this would support the thesis of the spatially-based model—that impact upon existing intra-brand competitors can be estimated through proximity change.

The final empirical model replicates the prior model, but replaces the final variable from above, with DADESLSΔ**,** which is equal to the unit change in sales by Dodge of Dadeland in the feature. Collectively, the model evaluates sales by existing dealers in the after period against a constant term, the percentage change in Expected Registrations in the feature, the number of sales made by existing dealerships in the feature in the before period, and the change in the number of sales by Dodge of Dadeland between the after and before periods. The hypothesis testing is similar to that in the prior model, but makes one distinct change. Rather than testing against the null hypothesis that existing dealership's sales in a feature are independent of the change in Dadeland's sales within that feature, the model tests against the null hypothesis of perfect substitution—that Dadeland's sales changes are neither incremental nor decremental to the brand.

Figure 5.12: Regression Models 5 and 6

$$Y(90\text{CTDLRSLS}_i) = B_o\,(Constant) + B_1(90Expreg\Delta_i) + B_2(CTDLRSLS8_i) + B_3(DADDT\Delta_i)$$

$$Y(90\text{CTDLRSLS}_i) = B_o\,(Constant) + B_1(90Expreg\Delta_i) + B_2(CTDLRSLS8_i) + B_3(DADSLS\Delta_i)$$

The original empirical work contained in this chapter takes advantage of the fertile data set to perform before-and-after analysis on the effects of the relocation of Dodge of Dadeland. The first three regression models specifically test the assertions of the USAI Model's Impact Condition and probe generally for more relaxed findings that would support the novel proposition that intra-brand market encroachments behave in an observably different fashion than would be expected by Reilly's Law. If the novel proposition were to hold, then the models would detect a relationship between the locations of the sales of the encroaching dealership and under-performing portions of the market.

The empirical work then migrates to examination of the link between proximity and inter-brand competition. To undertake this test, the regression model evaluates whether localized changes in the proximity of the Dodge brand to potential consumers equates to changes in Dodges market share. This analysis is also conducted on a before-and-after basis.

The final two regression models examine the role of proximity in intra-brand competition. Specifically, they examine whether changes in relative proximity affect relative intra-brand sales share, and finally whether sales changes by the encroaching dealership relate positively, negatively, or not at all the sales by the stationary dealerships.

The next chapter discusses the results of the regression analyses. Additionally, it will focus more on model specification and the technical specifics of the estimation techniques. Finally, it will enumerate efforts to maintain empirical integrity in the testing process.

Appendix 5.1: LIMDEP Output (Fontana Logit Model)

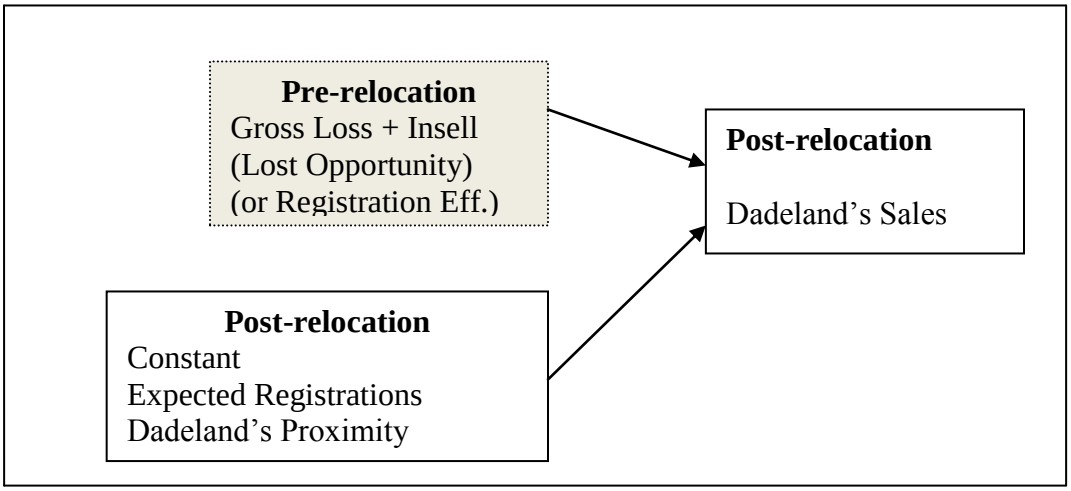
```
+--------------------------------------------+
| Binary Logit Model for Binary Choice       |
| Maximum Likelihood Estimates               |
| Model estimated: Dec 08, 2010 at 04:41:12PM.|
| Dependent variable              SPCTCTS    |
| Weighting variable                CTSLS    |
| Number of observations              351    |
| Iterations completed                  6    |
| Log likelihood function       -1114.455    |
| Number of parameters                  2    |
| Info. Criterion: AIC =          6.36157    |
|   Finite Sample: AIC =          6.36166    |
| Info. Criterion: BIC =          6.38357    |
| Info. Criterion:HQIC =          6.37032    |
| Hosmer-Lemeshow chi-squared =   6.16138    |
| P-value=  .62916 with deg.fr. =       8    |
+--------------------------------------------+
+--------+--------------+----------------+--------+--------+----------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]| Mean of X|
+--------+--------------+----------------+--------+--------+----------+
---------+Characteristics in numerator of Prob[Y = 1]
 Constant|   -2.98749717       .08218194   -36.352   .0000
 SPPCTDT |    6.34577554       .28455313    22.301   .0000    .14350205

+-----------------------------------------------------------------------+
| Information Statistics for Discrete Choice Model.                     |
|                            M=Model MC=Constants Only   M0=No Model    |
| Criterion F (log L)    -1114.45496       -2492.55726   -2492.55726    |
| LR Statistic vs. MC     2756.20460            .00000        .00000    |
| Degrees of Freedom         1.00000            .00000        .00000    |
| Prob. Value for LR          .00000            .00000        .00000    |
| Entropy for probs.      1114.45498        2492.55726    2492.55726    |
| Normalized Entropy         4.58068          10.24501      10.24501    |
| Entropy Ratio Stat.    -1742.32064       -4498.52520   -4498.52520    |
| Bayes Info Criterion       6.36687          14.21930      14.21930    |
| BIC(no model) - BIC        7.85243            .00000        .00000    |
| Pseudo R-squared            .55289            .00000        .00000    |
| Pct. Correct Pred.          .00000            .00000      50.00000    |
| Means:       y=0    y=1    y=2    y=3    y=4    y=5     y=6   y>=7    |
| Outcome     .5000  .5000  .0000  .0000  .0000  .0000  .0000  .0000    |
| Pred.Pr     .8740  .1260  .0000  .0000  .0000  .0000  .0000  .0000    |
| Notes: Entropy computed as Sum(i)Sum(j)Pfit(i,j)*logPfit(i,j).        |
|        Normalized entropy is computed against M0.                     |
|        Entropy ratio statistic is computed against M0.                |
|        BIC = 2*criterion - log(N)*degrees of freedom.                 |
|        If the model has only constants or if it has no constants,     |
|        the statistics reported here are not useable.                  |
+-----------------------------------------------------------------------+
```

CHAPTER SIX

ESTIMATION AND INFERENCE

The link between pre-relocation Lost Opportunity and post-relocation sales is a requisite condition of the USAI Model. The first three empirical models examine the degree to which the USAI Model-defined Lost Opportunity in the *pre-relocation* period explains the encroaching dealership's sales in the *post-relocation* period. The first two models differ from each other only in a minor technical sense. The third significantly relaxes the assumptions of the Impact Condition. The first set of regression models is illustrated in Figure 6.1 below.

Figure 6.1: Regression Illustration



The assumptions of the Impact Condition do not preclude the possibility that factors besides Lost Opportunity would explain the sales of the relocating dealership. To account for both Lost Opportunity and other potential explanatory factors, the first

regression model includes variables for a constant term, Gross Loss and Insell in the pre-relocation period (the components of Lost Opportunity), Expected Registrations in the post-relocation period, and a variable equal to one half of Dadeland's round-trip drive time between the dealership and the centroid of the feature being measured. The second regression model is identical to the first, but groups the Lost Opportunity components, as is consistent with the convention of the USAI Model.

The third regression model evaluates the possibility that sales by the encroaching dealership do tend towards under-performing portions of the market. This possibility is entitled earlier, "WIC." The model includes a variable for Registration Effectiveness in 1998. This allows for the possibility that sales by Dadeland in the after period may draw disproportionately from lower-performing (in terms of market share) portions of the market, but without applying the restriction that those portions of the market must have Gross Loss. The variables in this model are identical with those in Model 2, but Regeff98 replaces Lostopp.[48] Insell and Gross Loss cannot be included in this model as they are too closely related to Regeff98.

The cross-sectional data within the Miami C/T exhibit substantial variation in size and proximity. Notably, the Expreg00 variable provides substantial control for variations in feature size, as this is a function of the number of vehicles of all competitive brands registered within the feature during the first nine months of 2000. Additionally, this variable partially controls for variations in consumer tastes and demographics, to the extent that those variations drive consumers to purchase certain types of vehicles.

[48] The sample size declines for Model 3, because of the divide-by-zero problem. Features with no expected registrations in 1998 cannot be included .

It is fairly simple to demonstrate that the calculation of Expected Registrations does not generally control fully for demographic variation. Perhaps the simplest explanation is that for demographic effects to be negated, this would imply that the partial derivative of registration effectiveness with respect to a given demographic variable is zero, or that the matrix of partial derivatives with respect to all demographic variables is all zeroes. A single variable (Registration Effectiveness) could not control for all demographic variation unless demographic effects *could not* influence market share—an impossible proposition. Therefore, it would be reasonable to include demographic variables in the model.

For a number of reasons, the models do not include demographic variables. First, the first three models are intended to test the USAI Model on its own terms—which presume no demographic effects. Second, contemporaneous demographic estimates were available for Census tracts, but not for ZIP codes, reducing sample size by approximately one-third. Third, initial tests of the model with demographic variables included (median age and the natural log of median household income) did not favor their inclusion. Therefore, for practical, principled, and prudential reasons, demographic variables are not included. Table 6.1 displays model results.

Table 6.1: Estimation Results

		Model 1:	Model 2:	Model 3:
		Dependent variable: 90Dadsls		
N		413	413	387
R^2		0.6508	0.6508	0.5958
Constant		1.3477 (0.2651)	1.3432 (0.2626)	1.2342 (0.3237)
90 Expreg	Expected Registrations in feature 'i', 9/2000 year-to-date	0.1560*** (0.0135)	0.1561*** (0.0134)	0.1137*** (0.0053)
ReloDT	½ Round-trip drive time from Dadeland (relocation) to feature 'I'.	-.0587*** (0.0079)	-0.0584*** (0.0076)	-0.0635*** (0.0081)
Grossloss	Gross Loss in feature 'I' in 1998	-0.0778*** (0.00231)		
Insell	Insell in feature 'I' in 1998	-0.0713 (0.0492)		
Lostopp	Gross Loss + Insell in feature 'I' in 1998		-0.0771*** (0.0225)	
Regeff98	Registration Effectiveness in feature 'I' in 1998			0.3347 (0.3031)

Significance levels: * <.05 ** <.01 *** <.001

The cross-sectional data give rise to the possibility of heterskedasticity in the model. Indeed, the White Test suggests rejection of the null hypothesis of homoskedasticity. The consistent parameter estimates follow in table 6.1.a.

Table 6.1.a: Estimation Results (corrected for heteroskedasticity)

		Model 1:	Model 2:	Model 3:
		Dependent variable: 90Dadsls		
N		413	413	387
R^2		0.6508	0.6508	0.5958
Constant		1.3477 (0.4062)	1.3432 (0.3787)	1.2342 (0.4115)
90 Expreg	Expected Registrations in feature 'i', 9/2000 year-to-date	0.1560*** (0.0344)	0.1561*** (0.0339)	0.1137*** (0.0215)
ReloDT	½ Round-trip drive time from Dadeland (relocation) to feature 'I'.	-.0587*** (0.0100	-0.0584*** (0.0086)	-0.0635*** (0.0098)
Grossloss	Gross Loss in feature 'I' in 1998	-0.0778 (0.0442)		
Insell	Insell in feature 'I' in 1998	-0.0713 (0.0814)		
Lostopp	Gross Loss + Insell in feature 'I' in 1998		-0.0771 (0.0444)	
Regeff98	Registration Effectiveness in feature 'I' in 1998			0.3347 (0.1641)*

Significance levels: * <.05 ** <.01 *** <.001

With heteroskedasticity present in the model, the use of corrected parameters is appropriate for hypothesis testing. In each of the three models, 90Expreg and ReloDT support rejection of the null hypothesis at the <.001 significance levels. These results are consistent with expectations, as it is intuitive that an outlet's sales into a feature would be positively related to the size of the feature (in terms of number of vehicles registered) and negatively related to distance from the feature. None of the Lost Opportunity variables is significant in either of the first two models. Separating the Insell and Gross Loss has no significant effect upon the model.[49]

In the third model, the coefficient on Regeff98 is positive and significant to a level of <0.5. The positive coefficient suggests rejection of the null hypothesis and can be interpreted that sales by the encroaching dealership tend towards the *higher-performing* portions of the market. This finding is the opposite of the result predicted by the WIC.

VI.a Inter-brand competition and proximity

A hallmark of the USAI Model is its assertion that convenient access to a product (expressed by proximity) is a driving factor in the brand's market share performance. The data available herein allow a direct test of the role of proximity in inter-brand competition. Evidence in this document has shown the observable role of relative proximity in intra-brand competition, but no exploration has yet been undertaken in whether proximity affects inter-brand performance. In the simplest sense, the next regression model tests the degree to which changes in proximity changes in brand market share performance (the ratio of September 2000 year-to-date Registration Effectiveness

[49] Recall that sample size declines in the third model as a result of the features with no Expected Registrations in 1998.

to the same measure for 1998) are explained by changes in proximity resulting from the Dodge of Dadeland relocation.

As this model compares brand performance in corresponding features with just one calendar year of separation, the role of demographics in the model is negligible. Second, there is little reason for concern of heteroskedasticity. The model captures only changes in Registration Effectiveness between the before and after periods, with little reason to expect that the drivers of the error-terms changed in a short time period. In other words, to the extent that error terms correlated with cross-sectional characteristics of the market in the pre-period, it is reasonable to expect the correlation to remain in the post period. The White Test also confirms this expectation, suggesting a failure to reject the null hypothesis of homoskedasticity. Table 6.2 below shows estimation results.

Table 6.2: Estimation Results

	Dependent variable: RegeffΔ	
N	352	
R^2	<0.00001	
Constant	1.2013	
	(0.0843)	
CTDLDTΔ (change in C/T Dealers (all) proximity to feature 'i'	-0.0014 (0.0574)	
Significance levels: * <.05	** <.01	*** <.001

VI.b Spatially-based Impact: Proximity Change and Intra-brand Competition

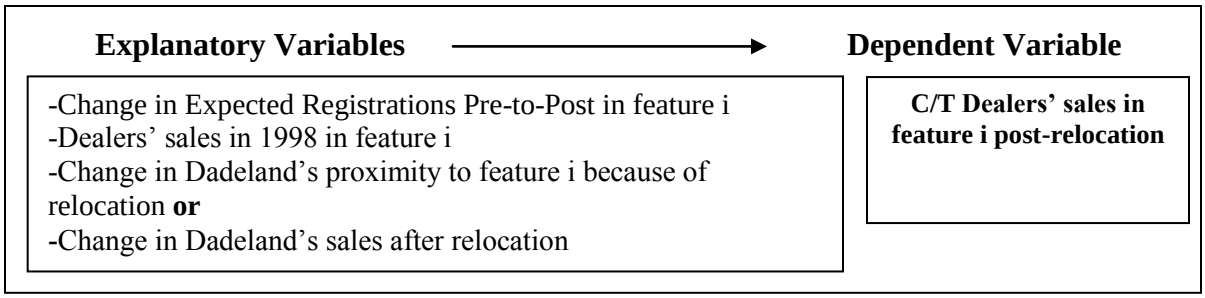
In the event that the first three regression models show sales of the relocating dealership draw from other sources than Lost Opportunity in the market, then it is appropriate to examine the possibility that those sales come at the expense of intra-brand competitors. The fourth regression model tests whether changes in proximity result in changes in brand performance. In the event that they do not, it stands to reason that changes in selling patterns by the relocating dealership *will* affect intra-brand competitors.

As shown earlier, the summary data forced a detour from the original route of this thesis. This study is no longer merely an encroachment, but also a dynamic realignment in which dealerships both gain and lose proximity advantage within the market at the micro level and may have a competitor move to a closer or more distant location in the absolute sense. This complexity presents a challenge for the empirical work—that it not only calculate the impact of an effective market-size reduction, but that it generally explain how changes in intra-brand proximity share affect intra-brand sales share—the generalized role of proximity in intra-brand competition.

In order to capture the degree (if any) to which change in intra-brand proximity share results in changes in intra-brand sales share, Regression Model 5 takes the following variables into account. The dependent variable is the number of sales by Miami C/T dealers (less Dodge of Dadeland) in feature 'i' through September 2000. ExpregΔ is the ratio of September 2000 year-to date to 1998 Expected Registrations in that feature. This intent of including this variable is to account for changes in demand for

Dodge products between the before and after periods. CTDLRSLS8 is the number of vehicles sold in that feature by the same dealer set in 1998—before the relocation. This accounts for the selling patterns that existed before the relocation. The final variable DADEDTΔ is the change in Dodge of Dadeland's share of reciprocal drive time to the feature that results from the relocation (see Figure 6.2).

Figure 6.2: Regression Illustration:



Regression Model 6 replaces the change in Dodge of Dadeland's proximity share with the change in Dodge of Dadeland's sales in the feature (DadeslsΔ). The intent is to test for the possibility that Dodge of Dadeland's sales changes are simply directly cannibalized in encroaching features and available for cannibalization in the features from which the relocation leaves the dealership less proximate. If sales lost (gained) by Dodge of Dadeland were simply directly to the benefit (detriment) of intra-brand competitors, the expected coefficient on DadeslsΔ would be negative-one.

Regression Models 5 and 6 also employ ordinary least squares to acquire parameter estimates. Like prior models, the varying size of features results in the possibility of heteroskedasticity. Thus, the consistent parameter estimates (Table 6.3.a) follow the initial estimates in Table 6.3.

Table 6.3: Estimation Results

		Model 5:	Model 6:
Dependent variable:		90CTDLRSLS	
N		387	166
R^2		0.7859	0.8058
Constant		0.5767	-5.2075**
		(0.6596)	(1.6826)
ExpregΔ	9/2000%1998 Expected Registrations in feature 'i'	2.0300 ***	7.4759***
		(0.5402)	(2.0233)
CTDLRSLS8	C/T dealer 1998 sales in feature 'i'(less Dadeland)	0.7609 ***	0.7598***
		(0.0204)	(0.0298)
DADEDTΔ	2000%1998 Dadeland Proximity share	-2.3566 ***	
		(0.5922)	
DADESLSΔ	9/2000 % 1998 Dadeland sales in feature 'i'		1.0503 #
			(0.4514)

Significance levels: * <.05 ** <.01 *** <.001
null hypothesis: B3 (DADESLSΔ)= -1

Using the consistent estimators below, the parameter estimates on the control variables, ExpregΔ and CTDLRSLS8 support rejection of the null hypothesis at the <0.001 level in both models. Overall model fit shows an R^2 of .7859 in Model 5 and .8058 in Model 6. The higher R^2 in the latter model as it has 221 fewer observations as a result of the divide-by-zero feature into which Dodge of Dadeland did not sell in 1998. DADEDTΔ is negative and significant to the <0.01 level, suggesting that dealer sales rose in areas that became less proximate to Dodge of Dadeland and declined when the converse was true. The coefficient on DADESLSΔ is virtually identical to negative-one,

which is consistent with a finding of perfect substitutability of dealership's intra-brand sales.

Table 6.3.a Estimation Results (corrected for heteroskedasticity)

		Model 5:	Model 6:
Dependent variable:		90CTDLRSLS	
N		387	166
R^2		0.7859	0.8058
Constant		0.5767 (0.4292)	-5.2075** (1.6908)
ExpregΔ	9/2000%1998 Expected Registrations in feature 'i'	2.0300 *** (0.3322)	7.4759*** (1.9375)
CTDLRSLS8	C/T dealer 1998 sales in feature 'i'(less Dadeland)	0.7609 *** (0.0456)	0.7598*** (0.0541)
DADEDTΔ	2000%1998 Dadeland Proximity share in feature 'i'	-2.3566 ** (0.5857)	
DADESLSΔ	9/2000 % 1998 Dadeland sales in feature 'i'		-1.0503 # (0.3333)

Significance levels: * <.05 ** <.01 *** <.001
null hypothesis: B3 (DADESLSΔ)=1

The six models estimated herein confirm the choice of control variables. Dealerships' selling patterns are a function of demand for the product, prior selling patterns, and both relative (intra-brand) and absolute proximity. The models were able to detect dynamic effects that related to the changes in Dadeland's proximity and sales after the relocation. Despite the effect of Dadeland's relocation upon intra-brand competitors, the models detected no dynamic influence from the relocation upon inter-brand

competition. Finally, without exception, the results predicted by the USAI Model, and even the relaxed Quasi-Imact Condition and Weak Impact Condition did not occur. The models detected no tendency of the relocating dealership's sales to target lower-performing (market share) portions of the market. In one model, the opposite appeared to be true, as pre-location market share performance related positively to the post-relocation sales of Dodge of Dadeland.

CHAPTER SEVEN

IMPLICATIONS AND CONCLUSIONS

The study of the effect of franchise encroachments within the retail automotive industry is, admittedly, a niche within a niche. However, the degree of specialization does not diminish the magnitude of consequences associated with the management of dealership networks. In the ordinary course of business, dealerships build heavily-branded monuments for the retail sales of vehicles and services. The decision to undertake these specific investments must come with an expectation of return based on a presumed ability to extract profit from the market. Part of this expectation is logically derived from the presumed ability to wield some degree of market power within the market for a given brand of automobiles.

The manufacturer seeks to balance the capacity of the dealer network to promote and maintain an acceptable level of retail sales with the maintenance of the ongoing incentive for independent operators to make specifically-branded investment and provide a high level of service for retail customers—the end-users of manufacturers products. At the margins, one would expect the manufacturer, given that specific investment had already been undertaken, to prefer to expand its retail presence. However, as illustrated by the dealership closures in GM's and Chrysler's bankruptcies, excess retail capacity can and does dilute the degree of brand investment at the individual facility level.

Since the free-wheeling days of Henry Ford and exclusive dealership territories, competition has increased, both among dealerships and among manufacturers. The literature paints a picture of the history of the American retail automotive network as a

fight over the spoils of monopolist rent paid by consumers for their preferred brands of automobiles. The successive monopoly model, as skillfully adapted by Breshnahan and Reis, illustrates this fissure between the manufacturer's and dealership's incentives. As overall increases in competition squeeze excess rents from the American automobile industry, the consequences from the loss of market power become dire.

The USAI Model injects a novel perspective into the dealer-manufacturer wrangling. Its proponents suggest that increasing the concentration of intra-brand competition results in an expansion of the brand's presence and the eventual brand market share. If pre-encroachment market share is sufficiently below some "expected" level of performance, then the increased competition will be win-win-win for the dealership, manufacturer, and consumer. If substantiated, the USAI Model could show that the incentives of the consumer, manufacturer and dealer align on the subject of intra-brand competition, and the ongoing fight should actually be no fight at all.

Substantiation of the USAI Model, however, is no trivial matter. The tenets of the USAI Model rely on another novel assertion—one that would not be limited to the retail automotive industry—that increases in intra-brand competition result in a targeting of underperforming portions of the market. Thus, new dealerships survive and thrive off of the opportunity left behind by incumbent outlets. Whatever intuitive or empirical merit this assertion may have, its confirmation would suggest that newly established dealerships follow different selling patterns from that predicted by gravity-based trade models, such as Reilly's Law, which predict than an outlet's retail draw is a function of its mass and proximity to a market.

Theoretical critiques of the USAI Model could have been, and have been, underway for years. However, a fortuitous data set provided in an unrelated matter provided opportunity for analysis not previously undertaken. This data set included micro-level sales and registration data for the Miami market (called the Miami Community/Territory) for a three-year period surrounding the relocation of Dodge of Dadeland to a location closer to intra-brand competitor, Spitzer Dodge. The relocation triggered a statutory protest by Spitzer, which was denied, allowing the relocation to consummate in 1999. This enabled a before-and-after analysis with 1998 as the pre-relocation period and September 2000 year-to-date as the after period.

An initial theoretical critique of the USAI Model illustrates significant defects in the model's design and assumptions. Notably, the instability of the benchmark selection process as well as problems with the definition and calculation of Insell and the resulting Lost Opportunity calculation are serious flaws that call into doubt whether the rigid assumptions of the USAI Model could be substantiated. These critiques represent contributions to literature through their depth and refinement compared to prior efforts. However, while they call into doubt the underlying science of the USAI Model, they do not alone refute the model's general value in the "art" of dealer network management.

The novel empirical work results in powerful findings, generally and specifically. The first two models undertake a direct test of what the USAI Model considers to be Lost Opportunity in the pre-relocation period and test it for the predictive power to explain the sales of the relocating dealership in the "after" period. No observable relationship exists. A second significant finding is that, rather than targeting the lower-performing portions

of the market, the sales of the relocating dealership tend disproportionately to higher market share areas.

The empirical findings to this point confirm the literature and eviscerate the novel suggestion of a targeted sales pattern by the encroaching dealership—at least one that targets lower performing portions of the market. Specifically, the USAI Model's tenet of Lost Opportunity does not withstand scrutiny when assessed directly on its own terms. These results indicate that the relationship described by the body of literature—a fight over the spoils of market power—still exists and must be confronted in any consideration of the balancing of economic interests between manufacturer, dealership, and consumer.

The fourth regression model stands alone in simplicity and topic. It tests directly whether the changes in intra-brand proximity resulting from the relocation are significant enough to appear on the radar of consumers choosing between inter-brand competitors. This is accomplished through a direct comparison of changes in Dodge's inter-brand performance after the relocation to its changes in intra-brand proximity. No relationship exists. While one could argue that spatial effects of the relocation are too small to detect, the next set of regressions dispatches this argument. The data support a conclusion that the changes in intra-brand proximity were insufficient to influence the choices of consumers deciding between brands. This finding is weighty, as manufacturers gain no market share from actions that simply reshuffle sales among competitors—winning market share is the currency used in evaluating network management.

Regression Model 5 shows that, while proximity changes were insufficient to tip the scales on inter-brand purchase decisions, the relocation resulted in a re-distribution of sales that related directly to the spatial changes that occurred. Proximity loss resulted in

declining sales; proximity gain resulted in increasing sales. This finding is meaningful to manufacturers, dealerships, and tribunals deciding the fate of proposed encroachments. Spatial impact appears to be a meaningful predictor of the intra-brand effect of encroachments. However, in conjunction with the prior finding, proximity changes have a distinctly different effect (or an unconfirmed effect), upon inter-brand competition.

The results of the final regression model follow virtually by proof. The absence of the targeted sales pattern predicted by the USAI Model, the non-effect upon inter-brand competition, and the link between proximity changes and intra-brand sales shares, portend a finding of substitutability of sales by intra-brand competitors. The finding is not surprising, as the model shows no difference between parameter estimates and the expectation of perfect substitutability of Dodge sales.

Two motivations form the origins of this thesis. Both relate to the employment of the author. The first is simply comparative advantage. Access to and familiarity with the retail automotive industry suggest a shorter learning curve in collecting, compiling, and framing the data The second motivation is a desire to work outside the constraints that exist within legal tribunals. Notwithstanding the careful and creative work that exists therein, analysis within these tribunals is subject to protective orders, data limitations, legal strategies, and the attention spans and comprehension of finders of facts. Expert analysis is just one element of a hearing upon the merits of a market action. Additionally, as in this thesis, it is first necessary to introduce the listener to the complexities of the institutional elements of the topic. These factors constrain the reasonable level of depth that studies in legal venues that studies can undertake.

In the end, these motivations are ironic, as is the broad undertaking of this thesis. It is the simplest finding of all—inter-brand competition is not sensitive to relocation-induced intra-brand proximity changes—that is most telling. Despite an historical pattern of increased competition, individual automotive brands still hold a degree of market power. Accordingly, the bar for switching a customer's brand choice is higher than the bar for switching his dealer choice. Some of this market power remains in dealer hands--market power which stands to be lost to an intra-brand encroachment. The elementary literature on markets with entry and exit restrictions still stands strong.

Why, then, the interest in the USAI Model? It suffers from obvious flaws that at least raise the suspicion that the manufacturer's allegiance to the model in litigation flows from its flexibility in demonstrating the need for additional representation, when that is the action the manufacturer desires. The reasons are practical and academic. The USAI Model is touted as the day-to-day handbook for how manufacturers manage and evaluate their dealer networks, and gains significant traction in courts that accept its findings. In many courts, the USAI Model *is* the prevailing literature.

In an academic sense, the USAI Model stands in the way of a conclusion that basic industrial organization and firm theory models are well-suited to evaluate the retail automotive industry. Neither the examination of literature conducted herein, nor fundamental economic literature suggests that the loss of market power could be a positive for the firm losing it. Yet, the USAI model offers a two-pronged novel alternative, which suggests that market share gains from increased brand presence and targeted selling behavior by the encroaching dealership, should offset the loss of market power.

The intricacy of the data and analysis in this thesis mask the simplicity of the findings. Conventional economic theory holds up very well, leaving one to wonder if the economically informed but auto-industry naive observer might say of the findings, "what else did you expect to find?" In the end, dispatching the USAI Model led the author to the place from whence he came, but blessed with the satisfaction of completing "the proof that is left to the reader."

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Figure 1.1: U.S. Retail Light Vehicle Trend.

Figure 1.2: Chrysler and GM New Retail Sales per Dealership.

Figure 4.1: Glossary.

Figure 5.6: Logit Model Applied to Miami Community/Territory.

Figure 5.9: Illustration of USAI Lost Opportunity.

Original Documents Attributable to Urban Science (with Cooperation from Chrysler)

Appendix 2.2: *Miami Community/Territory: 1995 Expected Dodge Car/Truck Retail Registrations and Market Share.*

Figure 4.1: Map of the Miami Community/Territory with Dealer Locations.

Figure 4.2: Map of the Miami Community/Territory by feature.

Ford Market Action Report, 1997-1999.

Florida New Motor Vehicle Statute

California New Motor Vehicle Act