

# The Evolution of the Supermarket Industry: From A&P to Walmart\*

Paul B. Ellickson  
University of Rochester

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## Abstract

This chapter identifies important economic features of the supermarket industry and highlights their connection to market structure and economic policy. Starting with a historical overview the industry's evolution, I then discuss the broad determinants of market structure and review several empirical studies that quantify their importance. I then consider the various empirical studies that quantify the extent to which supermarket firms exploit this structure to prevent entry or maintain high margins. Finally, I discuss the growing literature on the competitive impact of Walmart, emphasizing the connection to market structure and the mechanisms of supermarket competition.

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\* This chapter draws on an historical overview prepared for the 2007 Grocery Store Anti-Trust Conference organized by the

## 1. Introduction

According to the Food Marketing Institute (FMI), Americans spent 620 billion dollars in U.S. supermarkets in 2013, accounting for 5.6% of their total disposable income. There are 37 459 supermarkets operating in the U.S. and the average store now carries almost 44 000 products in roughly 46 500 square feet of space. The average customer visits a store just under twice a week, spending just over \$30 per trip (FMI<sup>1</sup>). As the primary channel for sales for food at home, supermarkets play a central role in ensuring access to affordable and nutritious food. Consequently, the competitive structure of this industry is tracked closely by government agencies both in the U.S. and abroad. Between 1998 and 2007, the Federal Trade Commission (FTC) challenged mergers affecting 134 anti-trust markets and investigated an additional 19. The corresponding agencies in the U.K. and E.U. have taken a similarly active role. Understanding how supermarket firms compete is important for economic policy.

More broadly, given the large number of stores, the frequency with which consumers visit them, and the extent to which urban shopping centers cluster around them, supermarkets also play a key role in economic geography and urban planning. In the U.S., there is growing concern that poor and minority consumers are underserved by chain supermarkets and therefore lack sufficient access to fresh and nutritious food. In the U.K., environmental planning authorities have placed restrictions on the development of “big box” supermarkets aimed at protecting town centers. Understanding how supermarket firms compete is important for social policy.

Finally, supermarkets offer a staggering variety of differentiated products in outlets that are themselves differentiated in both product and geographic space. They invest strategically and heavily in information and distribution technology aimed at reducing cost. They wield significant buyer power vis a vis their upstream suppliers and control the scarce shelf space across which the vast majority of consumer packaged goods are sold. Understanding how supermarkets compete is important for evaluating broader economic frameworks.

The aim of this chapter is to highlight important economic features of this industry and examine their connection to market structure and economic policy. The chapter begins with an historical overview of the evolution of the grocery industry. I turn next to a discussion of the broad determinants of market structure and related empirical studies, highlighting the mechanisms by which supermarket firms differentiate themselves either geographically or in product space. I then discuss various empirical studies quantifying the extent to which supermarket firms exploit this structure to prevent entry or maintain high margins. Next, I discuss the

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<sup>1</sup> Food Marketing Institute (2015), ‘Supermarket Facts’, available at <http://www.fmi.org/research-resources/supermarket-facts> (accessed 15 March 2015).

growing literature on the impact of Walmart, emphasizing the connection to market structure and the mechanisms of supermarket competition.

The chapter is organized as follows. Section 2 provides an historical overview, focusing mostly on the United States, but providing a brief comparison with Europe. Section 3 focuses on the determinants of market structure, highlighting academic work on scale, scope, and differentiation and summarizing the main empirical findings. Section 4 discusses key empirical findings regarding the exercise of market power, and concludes with a brief discussion of the issues of access to food and the role of food deserts. Section 5 summarizes the main empirical work analyzing the impact of Walmart on the grocery industry. Section 6 concludes.

## 2. The Evolution of the Industry

“Today in a city of any significant size, a grocery shopper can be served by a high-quality supermarket, a price-emphasis supermarket, a true discount store, a ‘mom and pop’ store, a quick-shop operation, or a large integrated shopping center.” David Appel, 1972

The modern era of food retailing in the United States essentially began in 1912 with the Great Atlantic and Pacific Tea Company’s (henceforth, A&P) introduction of the “economy” grocery store format. The introduction of standardization and scale revolutionized retailing, quickly catapulting A&P to national prominence. Indeed, many of the advantages we associate with Walmart were first introduced in the grocery industry over 100 years ago. So too was the controversy, as A&P quickly ran afoul of both politicians and rivals, prompting a slew of legislation aimed squarely at chains, culminating in the passage of the Robinson-Patman Act of 1936.<sup>2</sup>

There have been four major eras in the evolution of the supermarket industry. The first was the chain store revolution, which was led by A&P. The next major innovation was the introduction of the supermarket format, a disruptive innovation that brought scale and scope economies to the stores themselves. Again, much of the appeal of today’s club stores is based on the same basic format introduced 50 years ago by pioneers in the food industry. The third major milestone was the rise of computerization and the complementary explosion in product variety that occurred in the 1980s and 1990s, laying the groundwork for modern supercenters and the entry of Walmart. The fourth phase in this evolution is the rise of Walmart itself, and the formation of the first truly national chains.

In a sense, each innovation has been about the same thing - getting products to consumers as cheaply and efficiently as possible. Sometimes the innovations were driven by external demographic shifts, other times by the firms themselves. What seems clear is that this was and will continue to be a highly competitive industry in

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<sup>2</sup> The Robinson-Patman Act was an amendment to the more general Clayton Act of 1914, which, along with the Sherman Act of 1890 and the Federal Trade Commission act of 1914, form the core of the federal antitrust laws that govern business practices in the United States. The Robinson-Patman amendments ban certain forms of discriminatory prices, services and allowances that were not fully specified under the original Clayton Act. In particular, Robinson-Patman is aimed at ensuring that all consumers have access to the same prices at a given level of trade. At the time, it was widely perceived that chain firms like A&P obtained large discounts from suppliers and manufacturers that were not made available to their smaller-scale rivals.

which a small number of firms - but no single firm - compete to provide the widest array of products at the lowest possible prices. The following historical overview focuses on the United States. A brief comparison with Europe and the rest of the world follows.

### *A&P and the Chain Store Revolution (1913-1930)*

This section draws heavily on Chapter 4 from Tedlow (1990), which charts the rise and fall of A&P. Before 1900, American shoppers purchased their groceries through a wide array of specialty shops and general stores. Meat was purchased from a butcher, fish from a fishmonger, bread from a baker, and produce from a vegetable stand. Mostly sole proprietorships, these stores were often run in a haphazard manner with little use of modern accounting practices or scientific management principles. There were certainly many stores, likely well over half a million, although accurate historical statistics do not exist for this period. Because most people arrived on foot, grocers needed to be close to their customers, so the stores were small and ubiquitous. They often delivered what was purchased and sold many goods on credit. The small sales volume of these tiny shops led to high costs and sizable markups. Furthermore, the shop owners purchased their own supplies from a Byzantine collection of jobbers and middle-men that was rife with corruption, adding additional costs to an already expensive distribution system. The Great Atlantic & Pacific Tea Company changed all of this.

Although A&P began as a mail order tea business in 1859, it was the move to grocery stores in the late 1800s that changed the nature of retailing. The brainchild of brothers John and George Hartford, A&P's "economy" store format did for retailing what Henry Ford's Model-T did for automobiles, introducing both standardization and scale. The economy format was a standardized store, selling branded goods produced in A&P factories and delivered through a vertically integrated supply chain of factories, warehouses, and trucks. A&P quickly abandoned customer delivery and scaled back on credit, converting groceries to a cash and carry business. This move alone yielded significant cost savings (Lebhar, 1952). They also introduced modern accounting practices and scientific management principles such as Taylorism, yielding efficiencies in both back and front-end operations.<sup>3</sup> Their investments quickly paid off; from 1914 to 1919 A &P went from operating 650 to 4 224 outlets (Lebhar, 1952). This number would double again by 1923.

As cataloged by Tedlow (1990), A&P introduced several key innovations. It switched to a cash and carry model, standardized both store layouts and product offerings, and integrated backwards into both distribution and manufacturing. Like the modern supermarket firms we observe today, A&P operated its own network of warehouses and delivery trucks, bypassing the middle men and independent jobbers that supplied its rivals and eliminating a prime source of double marginalization. It also produced many of their own products, specializing in what

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<sup>3</sup> Taylorism, which was pioneered by Frederick Winslow Taylor in the late 1800s, is a management theory aimed at improving efficiency and labor productivity. One of the earliest attempts to apply scientific principles to management, it championed the use of time and motion studies, the standardization of best practices, and the efficiency of mass production.

would later come to be known as “store brands” and “private labels.” A&P conducted careful traffic studies to aid in site selection, studied efficient store design, and constantly streamlined their logistical operations. Investments in quality control and inventory management meant that their offerings were not only cheaper, but fresher, higher quality, and less apt to be out of stock. Moreover, its massive scale meant they could exploit buying power with respect to other manufacturers and input suppliers, providing yet another cost advantage over their, typically, single-unit rivals. Of course, A&P was not the only firm to exploit the chain format - Kroger, American Stores, and Safeway were all among the early adopters of this new business model. Not surprisingly (with the benefit of hindsight), chain stores quickly came to dominate the grocery business. Between 1919 and 1932, the share of the top 5 firms in the U.S. increased from 4.2% to 28.8% (see the column labeled “C5” Table 1).

**Table 1: The Chain Store Revolution**

Year	A&P	Kroger	Am. Stores	Safeway	F. National	C5
1919	4,224		1,175			4.2%
1920	4,600	799	1,243			5.6%
1921	5,200	947	1,274			6.3%
1922	7,300	1,224	1,375	118		7.1%
1923	9,300	1,641	1,474	193		8.0%
1924	11,400	1,973	1,629	263		9.3%
1925	14,000	2,599	1,792	330		11.5%
1926	14,800	3,100	1,982	673		13.6%
1927	15,600	3,564	2,122	840	1,681	16.9%
1928	15,100	4,307	2,548	1,191	1,717	20.4%
1929	15,400	5,575	2,644	2,340	2,002	24.5%
1930	15,700	5,165	2,728	2,675	2,549	27.6%
1931	15,670	4,884	2,806	3,264	2,548	29.3%
1932	15,427	4,737	2,977	3,411	2,546	28.8%
1933	15,131	4,400	2,882	3,306	2,705	
1934	15,035	4,352	2,859	3,228	2,653	
1935	14,926	4,250	2,826	3,330	2,623	25.7%
1936	14,746	4,212	2,816	3,370	2,556	
1937	13,314	4,108	2,620	3,327	2,473	

Source: Store counts and concentration estimates drawn from various tables in Tedlow (1990) and Lebharr (1952).

Due at least in part to decreases in transportation costs, the chains were able to create large networks of stores that could take advantage of quantity discounts on the products they did not produce themselves and economies of scale on those they did. The chain stores also benefited from the network externalities associated with information processing. The large number of stores and intricate distribution network allowed the chains to improve demand forecasts and thus plan inventories and site selection more effectively. They were also able to centralize accounting. The resulting cost savings were passed on to consumers in the form of lower prices.

Various price studies performed in the late 1920s and early 1930s found that chain store prices were 4.5-14% lower than their independent counterparts (Tedlow, 1990). While the distribution system they employed was novel, the physical stores operated by many of the chains were not much different from their independent counterparts: delivery and credit were still common in many locations and consumers continued to be served by a clerk who would retrieve items and suggest others. The chains also did not significantly advertise or build physically

larger stores. The main economies were at the level of the chain, as opposed to the store. The supermarket format would later reverse this.

The 1920s and early 30s were a period of creative destruction, as the new business model supplanted the old, and the independent grocers either adapted or perished. Although many (perhaps more than 100 000) small firms exited the grocery business in this period, some of the survivors began to form cooperative associations with independent wholesalers to combat the scale enjoyed by the major chains. Many of these groups continue to exist today, including IGA, C&S, AWG and Wakefern.

By the late 1920s, the price differences between chains and independents had begun to shrink. Moreover, the profitability of the major chain stores declined throughout the late 1920s and 1930s as chains began to compete directly with one another in dense metropolitan markets. Several chains shifted to higher service formats, which increased marginal costs and narrowed the price gap with independent stores. Moreover, the chain stores began to attract the attention of politicians and anti-trust authorities. The Robinson-Patman act was aimed squarely at the chains, and an anti-chain ethos, reminiscent of what we have seen with Walmart over the past two decades, spread throughout the nation. Many states adopted stiff anti-chain ordinances and Congressman Wright Patman even proposed a “chain store death tax” that would levy a crippling tax on all units above a certain store count threshold. While A&P would receive some support from its unionized work force, its legal battles would drag on into the 1950s. However, this early attention was overshadowed (and to a large degree, made irrelevant) by the introduction of the supermarket format.

### *The Birth of the Supermarket (1930-1950)*

This section draws on material from Tedlow (1990) and Charvat (1961). At the same time that the chain format was diffusing through the retail landscape, major demographic shifts were occurring throughout the United States. Increased industrialization was drawing people to the cities and disposable incomes were rising. Transportation costs were falling as automobiles spread, roads were built, and rail lines were extended. Refrigerators began to spread to both commercial and residential use, allowing consumers to visit stores less frequently and purchase more each time they went. Radio (and later television) increased the appeal of national brands by facilitating large-scale advertising campaigns. One of the earliest retailers to note this trend and foresee its impact on the grocery business was a Kroger employee named Michael Cullen.<sup>4</sup>

In 1930, Cullen unveiled his plan for a new breed of huge, cash only, non-delivery, self-service stores. These new ‘super stores’ would be located on the outskirts of town to take advantage of low rents. Furthermore, these stores would sell nationally advertised, branded goods and would advertise heavily. His proposal called for ½% of sales (20% of net profit) to be spent on advertising (Tedlow, 1990).

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<sup>4</sup> Piggly Wiggly in Memphis and Ralph’s Grocery Company in Los Angeles had both introduced large, self-service format several years prior to Cullen’s proposal, but lacked the emphasis on price and promotion that ultimately drove the supermarket’s successful diffusion (Charvat, 1961).

Although this figure is small by today's standards, it represented a substantial outlay in 1930. Cullen's plan was to operate on low margins and low expenses, making up the difference in volume. This was not unlike the formula favored by the chains, only Cullen was taking advantage of both scale and scope economies at the *store* rather than the distribution level, essentially turning warehouses into stores and mitigating one of the main advantages of the national chains.

Among the most notable changes Cullen proposed were increased store size (five to ten times larger), low-cost warehouse district locations, the shift to self-service, and the emphasis on advertising. Supermarkets also benefitted from the growth in nationally advertised brands that the incumbent chains, which were heavily invested in their own brands, often refused to carry. The shift in consumer tastes toward branded products sharply reduced the cost advantages to retailers of vertically integrating into manufacturing.

Falling transportation and storage costs were also key - the spread of the automobile and paved highways facilitated the supermarkets' strategy of locating on the outskirts of town, while advances in refrigeration allowed shoppers to make fewer trips and stores to hold larger inventories. The invention of the shopping cart helped shoppers to buy in bulk. Interestingly, the existing chains (including Cullen's employer, Kroger) were reluctant to adopt Cullen's proposal, so he struck out on his own and formed King Kullen supermarkets. Before long, other independent retailers followed suit.

It is important to note that these early supermarkets were quite crude by today's standards. Dismissively referred to as "cheapies", the early supermarkets occupied abandoned warehouses or factories and were located in low-rent commercial warehouse districts. They featured primitive shelving (often just crudely stacked pallets) and required consumers to serve themselves, which was quite a shock at the time.<sup>5</sup> However, they were very cheap, offering prices that were on average 13% below the conventional chains (Markin, 1968), strikingly similar to the advantage that Walmart offers today (Basker and Noel, 2009). From a current perspective, these early supermarkets were part club store, part supercenter, and part dollar store. In particular, they did not just carry groceries. King Kullen also sold tires and vacuum cleaners. Big Bear, one of the early success stories, made 34% of its sales on non-food items (Charvat, 1961), right in line with the Walmart supercenters we see now.

Moreover, the supermarkets generated a lot more revenue per store than the incumbent chain outlets, typically 10 to 20 times as much. King Kullen stores sold over \$1 million in groceries per outlet in 1933 (at about \$18M in 2014 dollars, this puts them right in line with the typical modern supermarket). Big Bear, on the other hand, made about \$3.8 million per store (\$69M in 2014), squarely in line with a modern Walmart supercenter. While some are quick to credit the supercenter model to Walmart, it clearly dates to a much earlier era. An interesting point to emphasize here is that it was the *smaller* firms that initially championed the supermarket format, since it did not require the type of scale that the large incumbent chains relied upon and thus did not play to their perceived advantage.

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<sup>5</sup> The shortage of labor brought on by World War II helped hasten the spread of self-service formats (Charvat, 1961).

Moreover, the incumbent chains were sitting on a large portfolio of existing stores that were suddenly outdated by the changing demographic landscape of the United States. It bears repeating that the basic business models behind both the supermarket and supercenter formats date back over 50 years, and the anti-chain sentiment of the 1930s was at least as strong as the movement against big box stores that we see today.

### *Post War Boom & Malaise (1950-1970)*

This section draws on material from Charvat (1961). Supermarket growth was slow at first, but the format really took off after World War II and supermarkets quickly came to dominate the retail landscape over the next three decades. While the overall number of food stores decreased from about 400 000 to 162 000 from 1935 to 1982 (Tedlow, 1990), the number of supermarkets increased from 386 to 26 640, and the share of overall grocery sales accounted for by supermarket firms expanded from 3.2% to 74.5%, roughly comparable to what it is today (see Table 2; note that all sales figures are in 1972 dollars). The incumbent chains were initially slow to adopt the supermarket format, for fear of cannibalizing their own sales, and often rolled out a second brand (e.g. Kroger's Pay 'n Takit line) to mitigate the perceived risk. However, by the late 1930s, most of the dominant chains had at least begun converting to the supermarket format. Nonetheless, the balance of power had shifted, at least temporarily, to more regional firms.

**Table 2: Supermarket Expansion**

Year	Sales Cutoff	Supermarkets	Sales (\$M)	Share of Overall Grocery	
				Stores	Sales
1935	302.9	386	202	0.1	3.2
1939	287.5	1,699	772	0.4	10
1948	635.6	5,600	5,654	1.6	22.8
1954	703.4	10,506	14,214	3.8	41.3
1958	747.0	15,282	23,562	5.9	53.9
1963	762.9	21,167	31,484	8.6	59.9
1967	825.7	23,808	43,433	10.9	66.7
1972	1,000.0	27,231	64,960	14	69.6
1977	1,515.0	30,831	113,111	17.2	75
1982	2,265.6	26,640	175,655	14.4	74.5

Source: Manchester (1992). Sales cutoff is annual sales in \$1000s required to be classified as a supermarket.

The post war boom was a period of steady growth for the supermarket industry. There was plenty of suburban real estate on which to build stores and ample markets to convert from chain grocery store to supermarket. Although the smaller chains were the earliest adopters of the supermarket format, even A&P started converting over by the late 1930s. More importantly, the “cheapies” began to disappear as firms moved closer to the suburbs and “traded up” for less price conscious consumers. In keeping with their increasingly upscale clientele, stores started adding services, while shopping center locations replaced freestanding units. By the 1950s, firms were rolling out stores we would recognize as supermarkets today.

Regional, sectional, and local chains led the postwar supermarket boom. These firms were able to exploit local trends and expand through a mixture of



acquisition and new store development (Table 3). At first, rising incomes and the growth of suburbs ensured a steady supply of new store locations, but as markets became saturated, firms increasingly turned to acquisition as an avenue for growth. From 1949 to 1958, 83 companies bought 415 chains, involving 2 238 stores (Appel, 1972). National Tea and Winn-Dixie were particularly aggressive, acquiring 485 and 306 stores respectively (Charat, 1961). Kroger and Grand Union acquired 130 and 128 each. Broadly speaking, merger was seen as a tool for mid-sized chains to grow, as firms started to covet the economies of scale enjoyed by the largest firms. However, the “acquisition wave” slowed in the 1960s due to pressure from the federal government, which continued to be distrustful of the expanding chains. The Federal Trade Commission put the major firms on notice, taking action against National Tea and Kroger in early 1960s and making it clear that any significant acquisitions would receive close scrutiny. The key case was U.S. Department of Justice (DOJ) vs. Vons in 1966, which involved a merger between the third and sixth largest firms in Los Angeles, a transaction that would be unlikely to raise eyebrows today. The Food Distribution Merger Guidelines were established around the same time.<sup>6</sup>

**Table 3: The Waning National Chain**

Year	All	Chain Type					Other
		National	Regional	Sectional	Local	Wholesaler	
1948	34.5	18.7	3.9	3.1	5.6		3.2
1954	38.8	19.1	6.3	2.9	7.6		2.9
1958	46.7	20.9	8.7	4.5	11.1		1.5
1963	49.4	18.8	9.6	6.6	11.4	1.4	1.6
1967	51.4	16.2	8.5	6.6	13.4	1.6	5.1
1972	55.9	15.4	9.2	11.7	11.2	1.5	6.9
1977	58.7	15.4	10.1	11.1	14.5	1.3	6.3
1982	61.5	12.2	11.1	10.8	20.2	3.5	3.7
1987	63.5	13.3	12.7	6.8	23.5	2.7	4.5

Source: Manchester (1992). National: chains with stores in three or more geographic divisions. Regional: two or more. Sectional: one or more. Local: single market. Wholesaler: chains owned by wholesalers.

In the 1970s, saturation met recession and supermarkets increasingly turned to new formats to increase profits. The first club stores and limited assortment superettes were both introduced in the late 1970s and early 1980s. In particular, the first Price Club (1976), the first Costco (1983), and the first Sam's Club (1983) were all opened during this era, as discussed by Carden and Courtemanche in Chapter 18 of this handbook. The first Aldi was opened in 1976 and the first Save-A-Lot in 1977. At the other end of the spectrum, natural food stores and superettes like Whole Foods (1978) and Trader Joes (1966) began cropping up as well. Notably, while these are the same firms and formats that dominate the headlines today, they all have roots in a much earlier era. Of course, it would be several years before many of these alternative formats would really take off (see Table 4, which tracks how the share of stores by format evolved over time; note that a “superstore” is a large footprint supermarket, while warehouse, super warehouse and hypermarket are closer to what we now refer to as supercenters today).

<sup>6</sup> For a more recent perspective on retail mergers, see Chapter 11 in this volume by Hosken and Tenn.

*The Information Age: Bandwidth, Store Size & IT (1980-1995)*

While the 1970s introduced a host of new store formats, the most significant innovations were the introductions of the UPC code and the scanning register, which would transform back end operations and radically expand the number of products carried in each store. The first bar code scanner was installed in a Marsh supermarket in Troy, Ohio in 1974. By 1986, scanning registers were installed in half the existing stores, and by the early 1990s adoption was essentially universal (Progressive Grocer, various April issues). A tremendous labor saving device, scanning registers also gave retailers access to the same information as manufacturers, and a newfound ability to engage in market research and data based marketing (Messinger and Narasimhan, 1995). Basker discusses the adoption and impact of scanning registers in chapter 2 of this handbook.

A new industry sprang up to support the processing of information. Information Resources Incorporated (IRI) was founded in 1978, beginning the era of the test marketing of new brands and laying the groundwork for an explosion of new products. By the mid 1980s, both IRI and Nielsen were running extensive consumer panels and integrating purchase and sales information with couponing, price, display and advertising data. From 1974 to 1990, the number of products carried per store went from 9 000 to 30 000 (Messinger and Narasimhan, 1995), while store size grew steadily at 1 000 square feet per year (Progressive Grocer, various April issues).

**Table 4: Format Evolution**

	1980	1982	1984	1986	1988	1990	1992	1994
Conventional	73.1	47.9	49.7	47.4	42.9	35.3	30.3	27.4
Superstore	17.7	28.9	28.3	27.5	30.2	33.5	34.3	37.0
Food/Drug Combo	4.0	8.3	8.0	8.0	8.6	11.2	15.5	17.8
Warehouse or L.A.	4.2	14.9	11.9	12.3	12.2	12.6	12.2	9.5
Superwarehouse	1.0		1.7	3.2	3.9	4.8	5.1	5.6
Hypermarket			0.4	1.6	2.2	2.6	2.5	2.7

Source: Progressive Grocer Marketing Guidebook, selected issues. L.A. is limited assortment, a store carrying a reduced set of products (e.g. Aldi).

Requiring greater space in which to stack all these new products, supermarkets increasingly turned to superstore and warehouse formats (see Table 4). However, the radical increase in product variety (bandwidth) also led to a renewed focus on logistics, since firms needed to crowd an ever-expanding product line efficiently onto their shelves. The increasing reliance on computerized inventory management systems and sophisticated logistical systems shifted the comparative advantage back to the larger chains. The diffusion of scanners meant access to scanner data, but created a greater need for coordination. Advanced back-end information technologies, such as Electronic Data Interchange and just in time delivery, required increased coordination between upstream warehouses and downstream outlets. Finally, already an established expert in retail logistics,

Walmart started rolling out supercenters (combination grocery/discount store outlets) in 1988.<sup>7</sup>

### *Walmart and the Supercenter Era (1988- )*

A virtual non-entity in the grocery business in the early 1990s, Walmart is now the largest supermarket firm in the United States by sales volume. Starting in 1988, Walmart has averaged more than 100 supercenters openings per year and currently operates more than 3 200 outlets throughout the United States. Not surprisingly, the impact of Walmart's entry has been dramatic. I will postpone a full discussion of Walmart's impact until section 4. However, as shown in Table 5, Walmart's expansion coincides with an almost one for one contraction of the number of supermarkets, and a overall 1.5 for one expansion in the number of gourmet and limited assortment stores, suggesting a possible push toward differentiation. Walmart has also been cited in the bankruptcy proceedings of at least 26, mostly smaller, regional chains (Lambert, 2008) as well as several high profile merger cases. A spate of high profile mega-mergers in the late 1990s and early 2000s has sharply increased concentration at the national level and created several national chains (see Table 6, which shows the expansion of Walmart supercenters alongside the national share of the top 4, 8 and 20 grocery firms, including Walmart). At the same time, alternative formats like limited assortment (Aldi and Trader Joe's) and gourmet (Whole Foods) have thrived in this new retail environment.

**Table 5: Evolving Structure in the Walmart Era**

Year	Gourmet/L.A.	Supermarket	Supercenter	Independent	Chain Store	Total
1996	707	29,742	705	8,691	22,698	31,389
1997	722	28,168	821	7,688	22,260	29,948
1998	866	28,282	899	7,773	22,595	30,368
1999	1,165	27,616	1,060	7,370	22,856	30,226
2000	1,807	27,913	1,263	7,696	23,750	31,446
2001	2,041	27,826	1,509	7,780	24,076	31,856
2002	2,169	27,831	1,720	7,939	24,273	32,212
2003	2,881	28,187	1,885	8,664	24,891	33,555
2004	3,285	28,085	2,114	8,662	25,247	33,909
2005	3,356	27,846	2,382	8,509	25,503	34,012
2006	3,527	27,201	2,659	8,468	25,355	33,823

Source: Author's calculation from Trade Dimensions TDLinx data.

### *Comparison with Europe and the U.K.*

Due in large part to the constant attention of government competition authorities, the evolution of the supermarket industry is very well documented in the United States. The other regions for which this is true are the U.K. (due to the work of the

<sup>7</sup> Foster et al. discuss the increasing role of chains throughout the retail sector in Chapter 1 of this handbook.

Competition Commission) and, to a lesser extent, the European Union. The coverage for the rest of the developed and developing world is much less comprehensive, although Reardon et al. (2007) provide a survey covering the diffusion of the supermarket format in developing countries. They note that this diffusion occurred much later than in the U.S., taking off only in the mid 1990s and then increasing very rapidly throughout the 2000s, due in large part to the increase in foreign direct investment. Reardon et al. also emphasize the importance of rising incomes, urbanization, and increased ownership rates of both automobiles and refrigerators. Bronnenberg and Ellickson (2015) identify several sources for large productivity gains that result when firms in emerging markets adopt modern retail technologies, including the supermarket and supercenter formats. They argue that many of these increases are passed on to consumers in the form of lower prices and decreased transaction costs, leading to large increases in consumer surplus. Lagakos (in press) documents the critical role of car ownership in driving the diffusion of modern (large) retail formats in developing countries. Atkin, Faber and Gonzalez-Navarro (2015) document the large consumer welfare gains from retail FDI in Mexico, which they argue are driven by the entry of low-price, high-variety foreign firms and the pro-competitive impact on the prices charged by domestic firms.

**Table 6: The Rise of Walmart and the National Chains**

Year	Top 4	Top 8	Top 20	Walmart SCs
1992	16.8	26.4	39.2	30
1993	16.8	26.5	39.9	68
1994	16.7	26.1	41.1	97
1995	17.1	27.3	40.6	237
1996	17.5	28.7	42.2	340
1997	19.0	31.3	45.9	410
1998	28.0	39.0	50.3	487
1999	27.6	39.9	54.0	650
2000	28.8	42.6	54.7	833
2001	31.9	46.8	58.7	1046
2002	29.8	44.4	56.2	1226
2003	32.9	47.4	58.8	1449
2004	33.8	46.7	58.8	1700
2005	35.5	49.0	61.6	1960
2006	34.7	47.8	59.6	2225
2007	37.5	50.4	63.7	2262
2008	38.1	50.8	65.1	2453
2009	37.9	50.9	64.3	2620
2010	36.7	49.5	62.9	2755
2011	36.2	49.2	62.2	2907
2012	36.1	48.1	61.8	3029
2013	36.4	48.1	63.8	3158

Source: Author's calculation from Trade Dimensions TDLinx data and ERS data.

Dobson and Waterson (1999) and Dobson (2005) discuss the structure of the supermarket industry in Europe and the U.K., which is broadly similar to the U.S. Most European nations are dominated by large chains, although the increase in concentration (and escalation in chain and store size) occurred much later there than in the U.S. (mainly in the 1980s and 1990s).

Several European markets are highly concentrated at the national level. For example, in the U.K., the top five grocery firms accounted for about 69% of the grocery market in 1999 (Dobson, 2005). If you include only one-stop shopping markets, the figure is closer to 90%. By comparison, the share of the top five grocery firms in the U.S. was about 33% in 1999 (author's own calculation). Of course, the

U.S. is much larger geographically than either the U.K. or the nations of western Europe. The share of the top five retailers in California, Texas, and Florida were 62%, 64% and 49%, respectively. In France and Germany, the top five firms control 56% and 52% of sales, whereas in Germany and Italy the figures are more modest, namely 36% and 26% respectively (Dobson, 2005). Dobson notes that Germany and Italy have much larger fractions of limited assortment stores and consumers visit stores almost twice as frequently as those in the U.K., France and the U.S., where large footprint stores (e.g. supercenters and hypermarkets) are much more prevalent. As in the U.S., concentration is a cause for concern to European competition authorities, who have also taken an active approach to regulation.

### 3. The Determinants of Market Structure

Supermarkets, like other retailers, are distinguished by the fact that they primarily sell other firms' products. Therefore, their uniqueness (and market power) mainly stems from other forms of differentiation than brand, at least in terms of access to unique products. There are few significant proprietary technologies and most innovations are both observable and easily replicated. Spatial location is clearly a key factor that distinguishes one store from another, as is the particular set (and quantity) of products they choose to carry. Scale is also critical. Larger chains are able to obtain greater quantity discounts and take advantage of density economies arising from operating a network of stores. Firms can also distinguish themselves based on format (gourmet, limited assortment) or the frequency with which they have sales.<sup>8</sup> Each of these aspects, tackled in various academic studies, play a key role in driving structure. I turn to these topics now.

#### *Scale and Scope*

Given the escalation in both store and chain size in the 1980s and 1990s and the constant movement toward consolidation, it seems natural to start by discussing the role of scale and scope in driving competitive structure. This aspect of differentiation also has the benefit of being fairly straightforward to quantify.

In a series of papers, Ellickson (2006, 2007, 2013) examines the role of endogenous fixed investment in determining the equilibrium structure of the supermarket industry. The endogenous fixed cost (EFC) model, originally developed by Sutton (1991) in the context of advertising, posits a minimum efficient scale that increases with the extent of the market – rather than inviting additional entry, larger markets simply invite additional sunk investment by the same set of incumbent firms. The relevance of the EFC model to grocery competition stems from the stylized fact that geographic markets in the U.S. (as well as the U.K., Europe, and Latin America) are consistently dominated by a handful of large chains, but never one chain. The fact that it is always more than one suggests that the mechanism of

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<sup>8</sup> Many of these features of stores and chains are also discussed in Betancourt's chapter on distribution services; see Chapter 4 of this handbook.

competition is more complicated than simple (exogenous) scale economies, which should instead yield monopoly, at least in those markets that are well below the overall minimum efficient scale. Ellickson (2007) adapts Sutton's model to retail competition by interpreting the outcome of those investments as product variety. In particular, firms make sunk investment in IT and distribution systems aimed at efficiently stocking and replenishing an ever-increasing breadth of products, facilitating one-stop shopping and increasing the likelihood of providing a consumer's preferred set of products. Ellickson interprets product variety as a "vertical" model of quality meaning that consumers always prefer an increase in its level, holding price fixed.

The empirical test of the model focuses on its implications for market structure: markets both large and small should be served by roughly the same number of firms. A key challenge is to define markets in such a way that sunk investments are distinct across markets. Ellickson does so by focusing on distribution markets, which he argues are both geographically distinct from each other and coincide for spatially proximate firms. Exploiting a detailed, store-level census for 1998, he argues and empirically demonstrates that supermarkets in the U.S. are indeed a natural oligopoly in which a small number of firms (between four and six) capture the majority of sales, regardless of market size. He finds that the number of firms does scale up with the size of the market, but the expansion consists solely of low quality stores.

The two-tiered structure uncovered in Ellickson (2007) suggested a second method of testing the EFC model of retailing: the contrast between different types of players, firms that invest heavily in distribution and vertical product quality and those who do not, with product variety as the key positioning aspect by which the chains differentiate themselves from their smaller scale competitors. Ellickson (2006) focuses explicitly on this proposed mechanism of competition. He first formulates an EFC model with two segments of consumers, only one of which cares about variety, giving rise to a two-tiered structure in which a small set of high-quality chains competes with an expanding fringe of "mom and pops" offering low variety at minimal price. He then tests this model empirically, first documenting a large quality wedge between the tiers and then directly demonstrating the expansion in quality that the theoretical model posits. He argues that variety is indeed a key principle of differentiation for these firms, and plays a central role in explaining market structure.

The importance of product variety (and store size) is also a key aspect of Messinger and Narasimhan's (1997) model of retail formats. The authors are motivated by the rapid increase in assortment and store size that occurred in the 1980s and 1990s (as documented in Messinger and Narasimhan (1995)). To explain this, they build a model of endogenous assortment in which consumers choose where to shop based on the trade-off between time-saving shopping convenience and price. In their model, larger stores with greater assortment offer the convenience of one-stop shopping, which lowers the cost of shopping. They calibrate the model using aggregate U.S. supermarket data spanning 1961 to 1986. They find that a major driver of the growth in one-stop shopping formats is a contemporaneous increase in the value of consumers' time (via higher wages and

greater female labor force participation), rather than a change in the technology of distribution.

Oi (1992) proposed a complementary explanation for the increase in store size (and the earlier displacement of grocery stores by supermarkets) that emphasizes the importance of the “economies of massed reserves” in characterizing the production of retail services. These scale economies are realized by the coordination and synchronization of activities within a large firm. In particular, higher arrival rates of consumers lead larger stores to have lower unit costs. Therefore, as consumers’ storage costs and transportation costs improve (via larger houses and the mass diffusion of the automobile), transaction sizes and consumption rates increase, which then fosters the development of larger retail outlets.

None of the aforementioned papers address the economies that derive directly from operating a multi-store chain or the pricing power enjoyed by these retailers. Smith (2004) examines the impact of retailer concentration in the U.K. on price-cost markups by proposing and estimating a structural model of store choice and retailer competition. He begins by noting that, like in the U.S., the U.K. supermarket industry is highly concentrated and closely scrutinized by the competition authorities. He notes that concern was particularly high in the U.K. due to the fact that the high concentration appears to result in especially high markups, relative to comparable European nations.

To assess the role of market power in sustaining these markups, Smith develops a model of store choice and expenditure in which consumers’ indirect utility is a function of both price and store characteristics (including location and size), as well as the overall (unobserved to the researcher) quality of the chain. Market power stems from a chain’s ability to account for the cross-effects between its own stores when setting prices, as well as the perceived quality of the overall brand. Smith estimates the structural parameters of this model using customer survey data from 1995 and an auxiliary dataset on store characteristics from the same time period. To quantify the pricing advantage associated operating multiple stores, Smith performs simulations in which all stores set prices independently (demerger) and in which the four largest firms set prices jointly (merger). He does not attempt to quantify the importance of brand or store quality. He finds that demerger would reduce prices amongst the largest firms by 2-3.8% (depending on local concentration), while mergers of the four largest firms would increase prices by 1.2-4.4% on average and up to 7.4% in some local markets. Based on these calculations, he cautions against allowing additional mergers and notes a potential role for divestiture.<sup>9</sup>

### *Space and Taste*

The next natural aspect of differentiation to consider is spatial. To what extent do firms benefit from being more isolated, and how does this impact the

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<sup>9</sup> Section II of this handbook includes several chapters on vertical relationships between retailers and their suppliers; see especially Chapter 5 (by Smith) and Chapter 6 (by Dukes and Geylani).

resulting economic geography? Like scale, physical location is easy to quantify, which helps facilitate detailed empirical work. There are several datasets containing the physical location of stores both in the U.S. and abroad, and various authors have examined them in great detail. Aguirregabiria and Suzuki provide a general discussion of location and entry games played by retailers in Chapter 9 of this handbook; my discussion focuses on research specific to supermarkets.

Smith (2006) uses the same data and a similar consumer model as Smith (2004) to analyze the location and size decisions of the firms, rather than prices. He is motivated by the tension between two regulating motives in the U.K.: the desire to promote competition (on the part of the Competition Commission) and the desire to protect town centers (on the part of various local interest groups lobbying the government for greater protections). In principle, government regulation could be beneficial if firms fail to internalize the effects of their decisions on consumers and rival retailers.

To explore these issues, Smith estimates a consumer choice model and performs counterfactuals in which stores are opened, resized and relocated. He then computes the benefits to consumers and producers of various alternative configurations in an experimental fashion. Smith finds that overall industry profits are maximized by opening or expanding large stores (thereby increasing overall expenditures) whereas the benefits to individual firms are maximized by attracting consumers from rival stores, which would lead to better located, medium sized stores. This latter outcome coincides closely with consumer interests, suggesting limited consumer-protection justification for imposing regulations on size and location. He finds that the stricter planning regulations put into place in 1993 led to lower consumer and firm benefits than the earlier regime would have, due in part to the greater proportion of small stores that were opened ex post. Schiraldi et al. (2012) revisit the issue of site selection from a dynamic perspective. Yang (2012) develops a similar model that focuses on entry in small Dutch municipalities and considers counterfactuals that decrease the sunk cost of entry.<sup>10</sup>

Orhun (2013) examines the choice of spatial location of U.S. supermarkets using a static discrete game framework. Using the same census of supermarket locations as Ellickson (2007), she finds that supermarkets are shielded by geographic differentiation and that different firms target different consumer segments. Supermarkets of the same type exert higher competitive pressure on each other than competitors of different types. This type of localized competition is a feature of many geographic studies of the industry and represents one clear stylized fact.

Ellickson et al. (2014) develop a model of individual store choice that exploits U.S. census tract level consumer demographics and a census of supermarkets revenues. The goal is to distinguish the role of location from the impact of brand/quality and the spatial distribution of tastes. They estimate their model using store level data on revenue, location, size and chain affiliation from 1996 and 2006. They find evidence of both spatial and brand level differentiation that has increased over time, possibly in response to Walmart. In particular, they

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<sup>10</sup> See Chapter 11 by Schivardi and Pozzi for a general discussion of entry regulation in retail markets.



find that the share of revenue attracted from consumers in the wealthiest markets expanded markedly over this period and the role of brands became much stronger, consistent with a shift toward greater horizontal differentiation.

Finally, it is interesting to consider the role of e-commerce in the grocery industry. The failure of Webvan in 2001, the purchase of Peapod by Royal Ahold (a “brick and mortar” supermarket firm) in 2000, and the fact that web-based grocery services seem to thrive in only the richest and densest markets suggest that a pure internet based grocery shopping service is not viable in most markets. However, many traditional grocery firms are experimenting with online/delivery offerings to complement physical sales. Pozzi (2013) examines the introduction of an online shopping service by a large incumbent (brick and mortar) supermarket chain that was already operating a large network of physical stores. He finds that the new online channel led to a 13% increase in revenue, with little encroachment on traditional sales. He attributes the increase in new business to a reduction in travel costs. He also finds that revenues increase more in markets in which the firm faces more rivals, consistent with an element of business stealing vis a vis competing chains. It seems likely that we will continue to see web-based shopping play a complementary role to traditional brick and mortar sales.<sup>11</sup>

### *Price and Format*

Having discussed the role of scale (in both firm and store size) as well as the importance of geographic location, I now turn to the other, less tangible, aspects of product differentiation. Since these features are less quantifiable, the existing literature is somewhat thinner than that of the previous topics. The two aspects that have received the most academic attention are pricing strategy and store format.

In marketing parlance, “pricing strategy” is not the level of prices per se, but rather the extent to which goods are occasionally offered on deep discount. Discounts are clearly a mechanism with which to clear excess inventory, but perhaps more importantly a way to price discriminate between different consumer segments (e.g. cherry pickers and time constrained shoppers who are less sensitive to price). The segmentation motive has been studied extensively in the academic marketing literature. In that literature (as well as in practice), the choice is often framed as a simple dichotomy between “every day low pricing” (EDLP) and “promotional pricing” (PROMO). Lal and Rao (1997) view the choice of pricing strategy as part of an overall *positioning* strategy that also sets differing levels of service in order to better segment the market. This is the sense in which pricing format is a mechanism for differentiation. In their framework, PROMO pricing is paired with higher service (to target time constrained consumers) and EDLP with lower service (to target cherry pickers). Bell and Lattin (1998) instead frame the segmentation strategy around basket size (and shopping frequency), with EDLP aimed at large basket shoppers and PROMO at small basket shoppers, and present empirical evidence consistent with this prediction. More broadly, differing pricing

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<sup>11</sup> See Chapter 19 by Smith and Zentner for a discussion of online and offline competition in other retail sectors.

strategies may simply be a way for firms and consumers to jointly solve an inventory problem, by shifting the storage problem between home and store.<sup>12</sup>

The recent empirical literature does not offer much evidence that pricing is used to segment the market (at least not geographically). Rather, it seems to be more of an operational decision and one that responds to the nature of consumer demand, and the aforementioned inventory problem. In particular, Ellickson and Misra (2008) examine the choice of pricing format empirically, exploiting a store-level census in which the store managers themselves report the strategy they have chosen to follow. Framing the decision as a static discrete game, they use structural estimation to recover the parameters that govern pricing strategy, in a way that accounts for the strategic reaction of rival firms. They find that firms choose strategies to match both market demographics and rivals' decisions. In terms of demographics, they find that PROMO pricing is associated with smaller households, higher income, fewer autos per capita and less racial diversity, which is consistent with the Bell and Lattin "basket size" hypothesis (and the shifting of inventory onto consumers who have the capacity to hold it). Most notably, they find that firms cluster by strategy, choosing strategies that accord with those of their rivals. This is consistent with Shankar and Bolton's (2004) analysis of actual price dispersion, which showed that competitor factors were the most dominant predictor of retail pricing. Such clustering is not consistent with a simple segmentation story.

In follow-on work, Ellickson et al. (2012) revisit the determinants of pricing strategy from a dynamic perspective. In particular, they find that PROMO pricing yields significant revenue advantages, but that these advantages are often outweighed by the cost side economies that accrue to the stores that choose EDLP instead. Both also depend critically on complementary investments. However, they find that the costs of adopting EDLP are very large. While these costs may be mitigated by the overall pricing focus of the chain, in most cases they simply overwhelm the benefits. They interpret these substantial switching costs as reflecting the heavy positioning component of pricing strategy, which typically involves a host of complementary (but difficult to quantify) investments.

Another way supermarket firms differentiate themselves is through the focus of the store. For example, are they targeting high-income consumers with organic foods or the urban poor with private label staples? The recent expansion of both high and low-end firms (e.g. Whole Foods and Aldi) in the wake of Walmart's expansion into groceries suggests that this may be a key aspect of differentiation. Store format also played a central role in the recent Whole Foods/Wild Oats merger challenge by the FTC. In particular, the FTC argued in part that these firms were insulated from competition by targeting a unique niche of "premium natural and organic supermarkets." Unfortunately, there is not a lot of empirical research quantifying the degree of substitution between supermarket formats (as opposed to across different retail formats). This is likely driven by the fact that, in practice, format is less well-defined and more poorly documented than one might think. For example, many chains now operate multiple formats, but the format of the store is often recorded at the level of the chain. As such, the extant literature on formats has

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<sup>12</sup> Variable prices may also be used as an obfuscating device, as explained by Ellison in Chapter 13.

focused on overall retail format (e.g. mass merchandiser versus supermarket) instead (since this is a firm, or at least nameplate, level distinction).

Fox et al. (2004) examine store choice by an IRI panel of 96 consumers over a two-year period. The competitive set of stores includes grocery stores, drug stores and mass merchandisers and the research question involves consumers' store and expenditure decisions. Interestingly, they find that price is the weakest predictor of shopping and spending, though this is likely due to a lack of relevant variation in the specific dataset they use. Instead, they find that assortment is the biggest driver of choice, particularly at grocery stores. With respect to cross format competition, they find little evidence of direct substitution. Instead, they find that substitution within the grocery format is much stronger than across formats. In fact, they find some evidence of complementarity between grocery and mass merchandisers.

Courtemanche and Carden (2014) examines the competitive response by supermarkets to competition from club stores, focusing on store-level entry by Costco and Sam's Club between 1994 and 2006. Controlling for a rich array of fixed effects (bolstered by clever falsification tests), they find that Costco entry results in higher prices amongst incumbent supermarkets, while competition from Sam's Club has no statistically significant effect. Consistent with prior literature (discussed later), they find a negative impact from increased competition with Walmart supercenters. They argue that the Costco result is consistent with a model in which firms compete along non-price dimensions (such as service or variety) and the incumbent grocery firms are thereby shifting upmarket in response to Costco (and serving consumers with less elastic demand), while the null result for Sam's Club is consistent with its focus on small business customers.

Hanner et al. (2015) examine data comprising a census of supermarkets, supercenters, and club stores in operation between 2004 and 2009. They find a significant amount of turnover and churn. While the number of big-box grocery outlets remained relatively constant over this period, each year roughly 7% of these stores either open or close. While clubs and supercenters expanded over this period at the expense of traditional supermarkets, those traditional firms continued to open new stores each year. They also find that most of the churn amongst chains is due to expansion or contraction by incumbent brands, as opposed to *de novo* brand entry. The majority of brand entry is due to small chains and independents.

#### 4. The Impact of Concentration

Two stylized facts that emerge from the study of market structure in the grocery industry are 1) markets are very concentrated, especially locally and 2) supermarkets enjoy a significant degree of spatial differentiation, at least within a small radius of a few miles. A natural follow-on question is whether these stylized facts translate into non-competitive behavior or conditions that otherwise harm consumers.

##### *Concentration and Prices*

One concern, relevant to anti-trust authorities, is whether the increases in concentration that occurred at the regional level in the 1980s and the national level more recently are likely to facilitate the abuse of market power on the part of incumbent grocery retailers.

In an early study of a single market in Vermont in 1981, Cotterill (1986) examined the relationship between prices and market structure, controlling for observable firm characteristics. He finds that grocery prices increase with retailer concentration, which is consistent with the exercise of market power. He also finds that independent supermarkets charge higher prices and that prices fall with store size, consistent with the importance of both scale and scope, and lending credence to the notion that heterogeneous firms serve distinct consumer niches (i.e. that differentiation is effective).

Cotterill and Haller (1992) analyze entry by large supermarket chains in geographically defined U.S. markets (MSAs) between 1972 and 1981. They find that entry is positively related to growth, negatively related to market concentration and the total number of large chains already present in the market, and positively related to geographic proximity and the potential entrant's return on capital. The impact of concentration and proximity are consistent with the presence of entry barriers, although the largest and most aggressive firms continued to enter distant and concentrated markets. These papers helped inform FTC policy in the 1980s and 1990s.

More recently, Hosken et al. (2012) combine data from the ACCRA cost of living index with a census of store locations to examine the price impact of fourteen grocery mergers that occurred between 2004 and 2009. Consistent with the presumption underlying the Horizontal Merger Guidelines, namely that mergers in highly concentrated markets are presumed likely to enhance market power, they find that five mergers resulted in estimated price increases of more than 2%, and four of these were in highly concentrated markets. They also find that five mergers resulted in estimated price *decreases* of over 2%, and only one of these was in a highly concentrated market. The remaining four mergers had relatively little impact on prices.

Together with the Smith (2004, 2006) papers documenting market power in the U.K., these studies are consistent with the notion that supermarket firms are indeed able to exploit market power in both setting higher prices and constraining entry.

### *Buyer power*

A second concern is whether increased retailer concentration (as buyers) can lead to anti-competitive practices with respect to upstream suppliers and an unfair advantage with respect to smaller retailers. This has been a particular concern in the U.K., where retailers are especially concentrated relative to upstream suppliers. This was a key focus of the Competition Commission inquiry in 2000 and led to enhanced guidelines regarding conduct. Dobson (2005) notes that the problem is especially acute in the U.K. due to the relative strength of private labels and the high level of store loyalty exhibited by British consumers. The expansion in the number

of products is another potential source of bargaining power vis a vis suppliers who only carry a small fraction of those items. A large retailer can afford to drop a few product lines but a small supplier cannot afford to lose an entire chain. Dobson argues that buyer power partly explains the large cost advantages enjoyed by the top five U.K. firms, as documented in the Commissions report. The widespread use of slotting allowances is also seen as a symptom of this power and a potential area for concern.

Messinger and Narasimhan (1995) examine whether the increase in product variety and the expansion of large-scale formats in the U.S. in the 1980s and 1990s resulted in a shift of market power toward retailers. They argue that it did not. They find that accounting profits fell for both retailers and manufacturers, and that financial data show no clear increase in retailer profit at the expense of manufacturers. Instead, they suggest that many of the benefits of these investments in information technology and assortment may have accrued primarily to consumers.

### *Access to Healthy Food*

Another potential benefit to understanding the competitive structure of the supermarket industry is to better inform policy-making with regards to access to affordable and healthy food. Over the past couple of decades, researchers in several areas of social science have authored papers concerning the existence of “food deserts” both in the U.S. and abroad. The term “food desert” refers to a geographic area with “insufficient quantity or quality of food or where healthy food is available only at relatively high prices” (Bitler and Haider, 2001). Bitler and Haider provide a comprehensive overview of the topic from an economic perspective, highlighting several important considerations. First, they note that sufficient data may not yet exist to definitively establish the existence of food deserts in the first place. Second, there exist several important definitional (e.g. what ‘healthy’ means) and geographic (e.g. how close is ‘close enough’) issues that are yet to be resolved. They note that the existing literature has made little progress on why food deserts may exist, but point to a variety of possible demand and supply side factors. For example, if, as in the EFC model of retail competition, there are 1) large fixed costs required to support an equilibrium of high quality stores, and 2) sufficient scope economies driving firms to offer the same set of products in all stores, then there may well be markets that are left un-served in equilibrium. In particular, as tastes and technology evolve toward larger and more diffuse store networks, many consumers may find themselves quite distant from the nearest outlet.

More generally, in markets with both demand heterogeneity and increasing returns to scale, firms can face strong incentives to cater to local demand. In particular, as the size of a population with “minority” tastes increases (relative to the overall population), firms will introduce additional products aimed at this smaller subgroup, a mechanism Waldfogel (2003) refers to as a “preference externality.” These externalities tend to be large and positive within groups, but more muted across groups, and can have important implications for economic geography. Using the Nielsen HomeScan consumer panel from 2007, Handbury

(2013) finds strong evidence for preference externalities in the market for groceries. In particular, she finds large differences in how high- and low-income consumers perceive the prices and variety of products offered across cities in the U.S. For example, low-income households face significantly *higher* grocery costs in markets with relatively high per capita income, while high-income consumers face significantly *lower* costs in those same high-income markets. Moreover, she finds that these differences are driven by cross-city variation in assortment, as opposed to prices. High-income consumers face a wider variety of high-quality products in high-income cities. Extending this analysis to consider the size and location of food deserts would be an interesting area for future research.

## 5. The Impact of Walmart

Walmart's rapid rise to dominant grocery retailer is arguably the largest change in market structure since the rise and fall of A&P. Moreover, since it coincides with a sharp increase in the availability of large-scale, high quality datasets, it is also the most intensively studied. While Walmart is covered extensively in this volume already (see Chapter 18 by Carden and Courtemanche), it is worth reiterating some of this discussion here in the context of the market structure of the supermarket industry.

Walmart is unique in that its entry into grocery retailing was eased greatly by its already dominant position in discount retailing. It already had a extensive network of stores and a state of the art distribution system (although it developed a parallel system for groceries). Walmart's pivot into groceries represents an arguably exogenous shock to what was, at the time, a relatively stable and mature industry. Thus, how the incumbent firms reacted represents an interesting viewpoint on the nature of product competition. I focus first on the impact on sales, then discuss entry and exit. I conclude with the evidence on prices and quality.

In one of the earliest studies of Walmart's impact, Singh et al. (2006) provide a case study of entry by a Walmart supercenter on a single incumbent supermarket outlet. They have individual shopper data from the supermarket outlet in question covering 20 months between 1999 and 2001. They find that the incumbent supermarket lost 17% of its sales volume – roughly \$250 000 in monthly revenue – following Walmart's entry. They further demonstrate that the majority of these losses were due to fewer store visits, as opposed to a decrease in basket size per trip. Daytime shoppers were less likely to defect to Walmart while private label (price sensitive) consumers were more likely to. They note that geographic proximity also played an important role. Both the large impact on sales and the importance of distance are echoed in many subsequent studies. Overall, Walmart seems to have a deep, but relatively localized impact.

Ailawadi et al. (2010) analyze seven first time Walmart entries that occurred between 2000 and 2002 on incumbent response by supermarkets, mass merchandisers and drug stores using IRI store-level scanner data on 46 product categories. They find large and significant sales effects. In particular, matching the findings of Singh et al (2006) exactly, they find that supermarkets suffer a median sales decline of 17%. This is somewhat remarkable since this dataset is at the

retailer level (i.e. is based on information collected at registers) whereas the earlier one used panelist data (in other words, the unit of observation is at the store level here and at the individual shopper level in the earlier paper). Turning to the impact on other aspects of the marketing mix, namely price, promotion and assortment, they find very heterogeneous results, although the modal response is to not respond at all. This is surprising given the magnitude of the sales response, but may reflect a (fairly long) learning period on the part of the incumbent stores.

Ellickson and Grieco (2013) employ a fourteen-year panel dataset of store level observations of the grocery industry to quantify the impact of Walmart's entry on the entry, exit, employment and sales volume of incumbent supermarkets. They find that Walmart's impact is extremely localized, affecting firms only within a tight, two-mile radius. Within this radius, the impact is quite heterogeneous, disproportionately affecting declining firms and larger chains. Entry of new firms is essentially unaffected and there is no effect on small firms.<sup>13</sup> This provides a sharp contrast to Walmart's earlier impact on general merchandisers, which was felt primarily by sole proprietorships and weaker rivals.

Arcidiacono et al. (2009) use the same data as Ellickson and Grieco (2013) to estimate a dynamic structural model of supermarket competition. They also find that Walmart's expansion came mostly at the expense of the large dominant chains. Moreover, they find that independent grocers actually thrive when Walmart enters, leading to a sharp reduction in market concentration. These effects are strongest in the largest markets and those in which Walmart expanded most aggressively, suggesting a diminishing role of scale and an increased importance of horizontal differentiation.

Turning to the impact on prices, Hausman and Leibtag (2007) examine the consumer benefits due to increased competition in the grocery channel from non-traditional outlets including supercenters, club stores, and mass merchandisers. Using Nielsen Homescan scanner panel data covering 1998-2001, they find that Walmart offers many identical food items at prices that average 15-25% below traditional supermarkets. Walmart creates a direct benefit from offering a low price alternative, but also an indirect effect through inducing a lower price response by incumbent firms. They find that food prices are 3% lower than otherwise due to the increased competition from these non-traditional formats. They compute the compensating variation that arises from both effects and find the average estimate to be 25% of food expenditures, an extremely large effect. Using a discrete choice model of demand, revenue data from Trade Dimensions and price data from ACCRA, Beresteanu and Ellickson (2005) find a more modest welfare increase of \$174 per household per year.

Basker and Noel (2009) examine the impact of Walmart's entry into groceries on prices of competing supermarkets using price data from ACCRA covering 24 grocery items collected in July of each year from 2001 through 2004. They find a price advantage for Walmart of approximately 10%. Using a combination of panel and IV techniques, they compute the causal effect of Walmart

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<sup>13</sup> Using a structural model of static entry, Grieco (2014) finds that in rural markets, entry by a Walmart supercenter is much less detrimental to the profits of small grocery firms than entry by another small local firm.

on rival prices. They find that, on average, competitors decrease prices by 1-1.2% in response to Walmart's entry. They find that the response is largest amongst the smaller scale and lower-end rivals. The response of the largest three chains is only half as large. Falsification tests lend additional credence to their results.

Using a novel dataset collected by the U.S. Bureau of Labor Statistics to comprise a key component of the Consumer Price Index, Matsa (2011) examines the effect of competition on a supermarket firms' choice of quality. The measure of quality he employs is product availability, as captured through an empirical stockout rate. He first demonstrates the importance of competition by measuring the conditional correlation between local retail competition and stockouts. In particular, he finds that stockouts are 5% lower at stores that face local market competition than at those that do not. Next, exploiting the entry of Walmart as a large and plausibly exogenous shock to competition, he shows that stockouts fall by 10% at supermarkets that face competition from Walmart. Moreover, he finds that the response is largest amongst the largest chains: average stockouts fall by 33% in these stores. Independent stores instead cut price or exit the market entirely. Note that the shift upmarket by the largest chains is consistent with the response to Costco uncovered by Courtemanche and Carden (2014).

## 6. Conclusion

For over a century, the grocery industry has been the source of many of the most important innovations in retail. The chain store revolution was led by A&P in the 1920s. The big box format was "invented" by grocers a few decades later. The first bar code scanner was installed in a supermarket and many of the earliest uses of "big data" were pioneered with supermarket scanner and panelist data.<sup>14</sup> Moreover, the combination of rich geographic variation, powerful chain supermarkets, and innovative independent grocers make this a fertile test-bed for economic research. This chapter provides an overview of current research that will hopefully serve as an inspiration for continued study.

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<sup>14</sup> Today, "big data" has a more precise definition, as explained by Hwang in Chapter 20.



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