Market Structure Determinants of Performance for Independent Supermarkets

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Abstract:

Introduction

For decades, supermarkets have been losing ground to both food-away-from home options (e.g. restaurants) as well as nontraditional formats. Examples of such formats include largescale supercenters and club stores as well as smaller limited assortment stores and superettes. According to USDA-ERS (2016), the share of grocery sales at traditional supermarkets fell from 77% to 70% between 2000 and 2011. Perhaps more strikingly, the grocery share of food sales in the U.S. fell from 74% in 1960 to 51% in 2011. Relatively little is known specifically about independent supermarkets and how their position in food retailing has changed in recent decades, despite their economic importance. Evidence suggests, however, that the number of independent supermarkets is on the decline. The Nielsen TDLinx data, used in this study, demonstrate that across 27 major metropolitan areas in the U.S., the grocery revenue share of independent supermarkets fell by an average of 33% between 2004 and 2014.[1]

Independent supermarkets, defined as those operating under an ownership banner with four or fewer total stores, play an important role in the food retail industry. In 2015, independent supermarkets were responsible for about 25% of all grocery sales in the U.S. and they supported over one million jobs. The Nielsen TDLinx data show that independent stores tend to be smaller than chain supermarkets, and as such they are more likely to operate in sparse rural or dense urban areas. Accordingly, independents likely play an important role in food access (e.g. Bonanno and Li, 2014). Smaller, independent retailers also tend to have higher percentages of their food sales attributed to food assistance programs such as SNAP (King et al., 2004) and WIC (Saitone et al., 2015). Therefore independent stores play a key role in measuring and understanding food security in certain markets.

[1] The share of independent retailers is calculated as a proportion of total revenues for all varieties of supermarkets and supercenters. Club stores and convenience stores are not included in these calculations due to data limitations.

We use a novel dataset, consisting of managerial responses to store-level surveys on store characteristics and performance for independent supermarkets merged with the proprietary Nielsen TDLinx data. Our goal is to measure the associations between local market structure and the operating performance of independent retailers. Our motivation is to inform the economic understanding of the competitive drivers of independent supermarkets in an effort to provide insights into the directions that the independent sector may be heading, as the U.S. grocery industry continues to evolve and change. This in turn has implications for a number of economic outcomes and may inform policy with respect to the food retail environment, particularly in areas underserved by large chain supermarkets and supercenters.

The grocery industry in the U.S. has become increasingly concentrated over time. This has been driven largely by a wave of mergers and acquisitions that continues to this day. For example, in 2014 Albertsons, then the 10th largest food retailer by revenues in the U.S., acquired Safeway, then the 5th largest. Though data on the topic are scarce, surely many of the stores acquired by larger chains over time have been independent. Such acquisitions likely go a long way in explaining the decline in independent sales share noted above. For example, much of the growth of the natural/health supermarket chain Whole Foods has taken place through the acquisition and assimilation of independents and smaller chains (Wells and Haglock, 2005). The same can be said for Safeway in the 1980s and 1990s, particularly in the western U.S. (Poole et al., 2003).

While much is known about mergers and acquisitions in food retail, for example their association with higher food prices (Ashenfelter and Hosken, 2008), little to no research has been conducted on the impacts of the acquisition of independents. To be sure, the likelihood of independent supermarkets being acquired is related to store performance. And once acquired,

questions abound as to the subsequent impacts on prices, product and service offerings, food assistance redemptions, and more. The nature and circumstances of such transactions in food retail can directly impact the outcomes, as Chevalier (1995) has shown for leveraged buyouts, and Hosken et al. (2012) demonstrated by comparing mergers and acquisitions in concentrated versus unconcentrated geographic markets.

With respect to market structure, we are primarily interested in the impact of market concentration on independent supermarket performance. Theory and evidence lead to ambiguous expectations in this regard. It is widely understood that in the U.S. food industry, price and concentration are related (e.g. Stiegert and Sharkey, 2007). That is, markets with fewer, larger food retailers exhibit higher grocery prices, on average. Economists generally ascribe this finding to the exercise of market power by larger firms, reflecting wider profit margins and greater performance (Cotterill, 1986; Aalto-Setälä, 2002). However the relationship between market structure and performance or viability for smaller, independent grocers is less clear. As food markets, at the city- or county-level, continue to increase in concentration, independent retailers may reap benefits via increased revenues and profitability. If this is the case, there may be implications for consumers in terms of higher prices and other factors. Alternatively, in more concentrated markets, independent supermarkets may experience adverse competitive conditions against larger firms with significantly more buying power and geographic scope. This would lead to the exit of independent retailers, which would have implications for food access, food security, and other factors.

We set up an empirical model to these between these two possibilities using our novel dataset. The results show limited evidence that concentration is associated with decreased performance among independents, which is in line with models showing independents as the

competitive fringe in food markets. We discuss potential policy implications, shortcomings, and extensions of our work.

Data and Statistics

Our data on store characteristics and performance come from the 2012 Supermarket Panel (henceforth "the Panel") of The Food Industry Center (TFIC) at the University of Minnesota. The Panel is a survey distributed to store managers, mostly of independents, asking a large number of questions about operating practices, store characteristics, and the competitive environment. TFIC has conducted the Panel previously in 1998, 2000-2003, and 2007. Information on earlier editions of the Panel are available in the annual reports (King *et al.*, 2001, King *et al*., 2002, Kinsey *et al.*, 2003, Chung *et al.*, 2010).

To conduct the Panel, TFIC distributes written surveys to store managers. This is followed by a phone interview with respondents to input missing answers. A total of 986 retailers were contacted in 2012 to participate in the study. The survey included questions asking store size in square feet and annual revenues, which enabled us to calculate sales per square foot, a common performance metric in retailing (Banker et al., 1998; Gomez et al., 2004). Sales per square foot, henceforth SalesSqFoot, is a measure of operating efficiency and it is not subject to accounting measures.

The TFIC data are rich with additional store features, characteristics, and descriptors. We draw on the literature, much of which was reviewed by Volpe (2011), on retail store performance to create a number of controls to aid with our identification strategy. For example, we include a binary for stores practicing the everyday low pricing (EDLP) pricing strategy because of the impacts that may have on store sales and performance (Olbrich et al., 2017). We also recognize the burgeoning trends of consumer demand for local foods and the use of social

media for advertising and communication, and we include binary variables to account for stores engaging in both of these practices. Table 1 lists and defines our variables and provides summary statistics.

Table 1 here.

To measure market structure, we use the Nielsen TDLinx data, for which we have the years 2004-2014. In our baseline and reported estimated, we use the 2012 data, though we have experimented with lag structures. The TDLinx dataset consists of store-level records for the universe of food retailers in the U.S. Attributes included in the data include geocoded physical location, hierarchical ownership structure, categorical annual revenues, store format, and open/close dates where applicable.

We use the revenues reported in TDLinx to measure market concentration at the zip code level, using the Herfindahl-Hirschman Index (HHI). The HHI, in its various incarnations, is probably the most commonly-used metric for measuring market concentration in industrial organization studies (e.g. Hovhannisyan and Bozic, 2016). It is a unitless index calculated as the sum of squared market shares, by firm. It ranges from 0 (perfect competition) to 1 (monopoly).[2]

Our data exhibit meaningful variation in HHI values, which is encouraging, but it is important that we discuss two caveats with respect to the calculation of this value. The first is the categorical nature of revenues, as reported in TDLinx. There are 19 categories of revenues in the data, and to enable the calculation of the HHI, we report the midpoint of the category for each chain, by market. The highest revenue category consists of those stores reaping more than

[2] As an index, the HHI can be problematic to interpret. The U.S. Department of Justice and the Federal Trade Commission have published guidelines for using the HHI to assess competitivess. Markets with HHI values below 0.15 are classified as "unconcentrated," HHI values between 0.15 and 0.25 are classified as "moderately concentrated," and those above 0.30 are "highly concentrated." More details are available from USDOJ (2010).

$100,000,000 annually, and for those stores we simply report the cutoff value.[3] Appendix A reports the revenue categories in the data.

The second caveat to calculating HHI is the limitation on the availability of grocery revenues in the data. TDLinx categorizes all stores by format and we have food revenues, or all-commodity volume, for supermarkets of all varieties (limited assortment, warehouse, specialty, etc), supercenters, and smaller superettes. However we only have all revenues, including general merchandise, for the remaining formats in the data. This means that we are unable to include club stores or convenience stores in our HHI calculations, both of which are major players in U.S. food retail. Below we discuss our approach to circumventing this issue, but practically this means we must assume no systematic variation in the market share of these formats in our data.

In order to inform our expectations, we calculated correlation coefficients for selected key variables in our data. These are reported in table 2. Most of our correlations are weak, considerably smaller than 0.5 in magnitude. SalesSqFoot and HHI share a very small inverse correlation, suggesting that the performance of independent supermarkets is weaker in concentrated markets. Performance is also negatively correlated with low access among households. This is potentially meaningful as it suggests that smaller independent stores, which may have effective spatial monopolies in rural areas, are not reaping performance gains as a result.

Table 2 here.

Methodology and Results

We use a linear regression model to identify the association between concentration and independent supermarket performance. The performance for store *i* is thus given by:

[3] As shown in Appendix A, these stores constitute a very small share of the data. Removing them from the analysis does not affect our results qualitatively.

$$\text{SalesSqFoot}_i = \beta_1 + \beta_2\text{HHIFood}_i + \beta_3\text{Supercenter}_i + \beta_4\text{LocalFood}_i + \beta_5\text{HomeDelivery}_i + \beta_6\text{LoyaltyCard}_i + \beta_7\text{EDLPi} + \beta_8\text{SocialMedia}_i + \beta_9\text{AvgCheckouts}_i + \quad (1)$$
$$B_{10}\text{NumEmployees}_i + \beta_{11}\text{NumBanners}_i + \beta_{12}\text{PctLowAccess}_i + \beta_{13}\text{PctSnap}_i + \beta_{14}\text{PctWIC}_i + \beta_{15}\text{PctObeseAdults}_i + \beta_{16}\text{FoodInsecure}_i + \beta_{17}\text{DirSales}_i + \beta_{18}\text{FarmersMarkets}_i + \beta_{19}\text{MilkPrice}_i + \beta_{20}\text{MilkSodaPrice}_i + \beta_{21}\text{FoodTax}_i + \beta_{22}\text{PopChange}_i + \beta_{23}\text{PctNoCar}_i + \boldsymbol{\beta}_S\mathbf{Shares} + e_i.$$

The **shares** vector in (1) represents our effort to account for the key store formats we are unable to include in HHI. These are the shares of physical establishments, or stores, accounted for by each respective format. Therefore we include the share of stores are conventional supermarkets and supercenters, as well as those formats excluded from HHI, including club stores and convenience stores. Naturally, depending on market conditions, there may be a disconnect between market share and store shares, even within formats. However if we assume a correlation across zip codes between store presence and market share, by format, then these variables should ameliorate potential measurement error stemming from format exclusion in the HHI.

We estimate (1) both with and without the shares vector, mainly to investigate the potential for measurement error in HHI. The results are reported in table 3. Comparing the results both estimations of (1), the store count shares seem both important in determining store performance and influential on the key results. Notably the convenience store share is positive and highly significant, suggesting that independent store performance improves in areas with higher shares of small convenience stores, place that are likely to be food deserts. As a result, we henceforth discuss the full results, including the store count shares.

Table 3 here.

The coefficient on HHI is negative in both estimations. It is nearly significant at the 0.10 level in the full estimation and indicates that an incremental increase in market concentration is associated with a $104 decrease in SalesPerSq. Given that the average SalesPerSq in the dataset

is approximately $327, this is a substantial decrease. Also in terms of market structure impacts, we find conflicting evidence with respect to the impact of supercenter competition. Supercenters are large, big box retailers that combine full grocery stores with discount department stores within single operations. There is a wealth of research on the competitive impact of supercenters. Supercenters have been shown to be associated with lower prices and profitability among smaller, competing stores (e.g. Courtemanche and Carden, 2014) and even higher concentration owing to store closures (Mertens, 2008).

We measure supercenter presence in two ways. First, we use a binary drawn from the TFIC survey, based on a question asking managers if they compete directly with a supercenter. This coefficient is negative and significant, indicating that direct competition with supercenters reduces revenues by an average $55 per square foot. Interestingly, however, the supercenter share of stores within markets is positive and significant. More research is called for on this distinction. It stands to reason that supercenter impacts on performance are more salient when measured based on store manager perceptions. Certainly supercenters can operate within cities, towns, or zip codes and have little competitive influence on independent stores, depending on geography and other factors. A positive coefficient in this case is harder to explain, however, and may related to the competitive impact that supercenters have on other nearby competitors.

A few of the other estimated coefficients are worth discussing. We find that SNAP and WIC participation are both positively associated with performance, SNAP significantly so. This is in line with the understanding that independent retailers play a large role in the redemption of food assistance benefits in the U.S. However the rate of food insecurity is negatively associated with independent store performance, further solidifying the narrative that even small, independent supermarkets are unable to thrive in food deserts and other areas of limited food

access. Social media use is positively and significantly associated with performance, and this should motivate smaller retailers to engage in creative efforts on Facebook, Twitter, and elsewhere to advertise, especially with younger shoppers. Performance is also significantly stronger in areas showing population growth, and it would be interesting to examine if population growth disproportionately favors selected players in the food retail landscape, i.e. independents versus chain stores.

Conclusions

We examine the drivers of performance among independent supermarkets, a large and economically important sector of the U.S. food retail landscape. Given the structural changes sweeping through the grocery sector in recent decades, particularly the marked increase in concentration, we study how local market concentration affects the performance of independent supermarkets. We find limited evidence that concentration and performance are inversely related. We see the potential to refine our model and better identify potential impacts. Direct competition with supercenters, which are much larger than most independent supermarkets, is associated with significantly decreased performance.

Many of our empirical findings motivate additional research on their own. Market structure us defined by more than concentration, and we find evidence that heterogeneity in store formats also drives independent supermarket performance. Additionally we are able to measure a number of associations connecting performance to food access, food security, and food assistance, all of which likely have the potential to inform policy. Much more research is needed on the economic impacts of store characteristics and services, as well.

Table 1: Variable Descriptions and Summary Statistics

Variable	Description	Mean	Std Dev
SalesSqFoot	Store-level sales per square foot of selling space	327.343	291.808
HHIFood	The Herfindahl-Hirschman Index of market concentration, calculated at the county level using Nielsen TDLinx data	0.277	0.203
Supercenter	Dummy =1 if a supercenter is present	0.743	0.437
SupermarketShare	The share of stores that are conventional supermarkets	0.132	0.062
SmallFormatShare	The share of stores that are smaller format grocery stores, e.g. superettes	0.053	0.058
WarehouseClubShare	The share of stores that are warehouse supermarkets and club stores	0.006	0.007
SupercenterShare	The share of stores that are supercenters	0.017	0.015
ConvShare	The share of stores that are convenience stores, with and without gas stations	0.652	0.079
MilitaryShare	The share of stores that are military commissaries	0.041	0.033
NaturalShare	The share of stores that are natural/gourmet supermarkets	0.010	0.017
LocalFood	Dummy = 1 for supermarkets emphasizing the sale of local produce and other foods	0.126	0.332
HomeDelivery	Dummy = 1 for supermarkets offering home delivery of groceries	0.044	0.206
LoyaltyCard	Dummy = 1 for supermarkets utilizing a customer loyalty or rewards card, without a fee	0.661	0.474

EDLP	Dummy = 1 for supermarkets utilizing the everyday low prices strategy	0.070	0.255
SocialMedia	Dummy = 1 for supermarkets engaging in social media to advertise	0.087	0.282
AvgCheckouts	Average number of checkouts across stores within firms	7.149	2.559
Employees	Number of employees per store	66.797	47.204
NumBanners	Number of banners, or names, under which stores within firms operate	2.295	1.624
PctLowAccess	Percent of the population with low income and low access to supermarkets, 2010[a]	6.604	4.765
PctSnap	Percent of the population receiving SNAP benefits, 2014	13.577	4.000
PctWic	Percent of the population receiving WIC benefits, 2009	2.916	0.671
PctObeseAdults	Percent of adults in the population that are obese, 2009	28.663	4.844
FoodInsecure	Three year average of the share of households that are food insecure, 2010-2012[b]	14.432	3.025
DirSales	Direct farm sales per capita, 2007	5.779	9.061
FarmersMarkets	Farmers markets per 1,000 population, 2007	0.046	0.063
MilkPrice	Ratio of the average retail price of low-fat milk to the national average[c]	0.962	0.108
MilkSodaPrice	Ratio of the average retail price of low-fat milk to the average price of soda	0.885	0.112

FoodTax	General food sales tax at retail stores, 2011	1.379	2.215
PopChange	Percentage of population change, 2007-2012	0.032	0.051
PctNoCar	Percent of households lacking access to private vehicles	2.274	1.779

a: The USDA Economic Research Service defines a low-income household as one with annual income at or below 200 percent of the federal poverty threshold for family size. Low access households are defined as being more than one mile from the nearest supermarket in urban areas, or more than 10 miles from the nearest supermarket in rural areas.

b: The USDA Economic Research Service defines a food insecure household as one that lacks access to enough food for an active, healthy life for all members. Within a calendar year, households may alternate between food security and insecurity. Households that are food insecure at any point in a given year are recorded as such as are included in these percentages.

c: Retail prices in the Food Atlas are drawn from the Quarterly Food-at-Home Price Database, which in turn consists of prices calculated from transactions in the Nielsen Homescan data.

Table 2: Selected Correlations of Variables in the Dataset

	Sales SqFoot	HHI Food	Pct Low Access	Pct Snap	Pct Obese	Food Insecure	DirSales	Farmers Markets	Milk Price	Milk Soda Price
Sales SqFoot	1.00	-0.03	-0.06	-0.02	0.07	-0.16	-0.20	-0.07	-0.10	0.01
HHI Food		1.00	0.23	0.02	0.23	-0.04	0.24	0.39	0.00	-0.01
Pct LowAccess			1.00	0.17	0.30	0.14	0.06	0.12	0.03	0.03
PctSnap				1.00	0.53	0.77	-0.09	-0.14	0.38	0.46
Pct ObeseAdult					1.00	0.40	-0.11	-0.05	0.16	0.29
Food Insecure						1.00	-0.15	-0.14	0.34	0.35
DirSales							1.00	0.21	0.00	-0.15

Farmers Markets		1.00	-0.11	-0.16
Milk Price			1.00	0.88
MilkSoda Price				1.00

Table 3. Regression Results for Estimating (1).

Coefficient		
Intercept	318.41***	-53.52
	(85.55)	(186.50)
HHIFood	-13.19	-104.67
	(62.09)	(69.62)
Supercenter	-12.01	-55.10**
	(19.54)	(26.70)
SupermarketShare		413.37**
		(202.43)
SmallFormatShare		429.67**
		(183.81)
WarehouseClubShare		-740.72
		(880.44)
SupercenterShare		1505.25**
		(587.02)
ConvShare		414.61***
		(157.27)
MilitaryShare		-38.35
		(242.26)
NaturalShare		-944.83**
		(429.14)
LocalFood	-105.67***	-103.38***
	(17.77)	(18.01)
HomeDelivery	-4.62	-13.20
	(32.69)	(32.35)
LoyaltyCard	-9.00	-0.48
	(14.44)	(14.39)
EDLP	41.51	33.13
	(33.25)	(32.90)
SocialMedia	43.51*	51.69**
	(24.97)	(24.84)
AvgCheckouts	-5.40*	-4.72
	(2.96)	(2.96)
NumEmployees	1.68***	1.72***
	(0.19)	(0.19)
NumBanners	7.26**	6.39*
	(3.80)	(3.78)
PctLowAccess	-1.40	-2.30
	(1.44)	(1.63)
PctSnap	13.90***	14.01***
	(2.49)	(2.59)
PctWic	22.85**	16.76

	(10.95)	(11.21)
PctObeseAdults	5.02***	3.91**
	(1.68)	(1.94)
FoodInsecure	-26.31***	-23.99***
	(3.42)	(3.71)
DirSales	-2.88***	-3.63***
	(0.67)	(0.69)
FarmersMarkets	-226.66**	-204.92*
	(119.43)	(120.20)
MilkPrice	-75.26	-72.43
	(128.05)	(134.76)
MilkSodaPrice	-10.01	78.04
	(120.52)	(129.18)
FoodTax	-4.02	-3.21
	(2.98)	(3.02)
PopChange	334.23***	371.51***
	(118.86)	(120.00)
PctNoCar	2.09	1.66
		(5.03)
N	521	521
Model F	19.53	16.06
Adj. R^2	0.493	0.487

***: Significant at the 0.01 level. **: At the 0.05 level. *: At the 0.10 level.
Standard errors reported in parentheses.

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Appendix A: Annual Sales Categories

TDLinx Category	Store-Level Annual Sales Range	Frequency (Percent of Total Stores)
1	$1 to $500,000	36 (0.05)
2	$500,001 to $1,000,000	609 (0.87)
3	$1,000,001 to $1,500,000	11,544 (16.51)
4	$1,500,001 to $2,000,000	8,346 (11.94)
5	$2,000,001 to $4,000,000	23,468 (33.57)
6	$4,000,001 to $6,000,000	7,362 (10.53)
7	$6,000,001 to $8,000,000	4,028 (5.76)
8	$8,000,001 to $12,000,000	3,211 (4.59)
9	$12,000,001 to $16,000,000	2,243 (3.21)
10	$16,000,001 to $20,000,000	2,872 (4.11)
11	$20,000,001 to $25,000,000	2,414 (3.45)
12	$25,000,001 to $30,000,000	1,301 (1.86)
13	$30,000,001 to $35,000,000	496 (0.71)
14	$35,000,001 to $40,000,000	425 (0.61)
15	$40,000,001 to $45,000,000	272 (0.39)
16	$45,000,001 to $50,000,000	159 (0.23)
17	$50,000,001 to $75,000,000	461 (0.66)
18	$75,000,001 to $100,000,000	201 (0.29)
19	$100,000,001 and up	463 (0.66)

Source: Nielsen TDLinx, 2009-2012.