How Much Are You Paying? Grocery Store Price Disparities and Potential Solutions at the University of Illinois Urbana-Champaign

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Abstract

In the perfect competition economic model, all firms in a market sell their goods for the same price at which the average cost to produce the goods is minimized. Consumers would not buy from any firm selling above this price point as other firms would be selling at the lower price, and firms would not operate below this price as doing so would result in an economic loss. While this model is helpful, it relies on assumptions that simplify real-world conditions, one of which is the absence of transaction costs: consumers know the prices at all firms and can switch buying between firms at no cost. This paper examines how transaction costs create price disparities in grocery stores in the Urbana-Champaign area. The results find that local grocery stores set prices at statistically significantly higher levels than their non-local competitors, most likely due to consumer transaction costs. This study considers how this disparity could be remedied through local government intervention as a means to increase incentive in the market and how new policy can be implemented effectively.

Introduction

For many University of Illinois Urbana-Champaign students, shopping is a local endeavor: some do not have a car to drive elsewhere, while others do not have the time. This paper will explore how this consumer trait affects the grocery market in the Urbana-Champaign area. The analysis will consider one non-local and two local grocery stores and their pricing for a specific basket of common food goods. The researcher of this paper believes that local firms in this market charge higher prices than non-local firms due to considerable consumer transaction costs, and this paper seeks to find out the validity of this belief via a statistical analysis. What can be done should there be a disparity is then discussed.

Research Methodology

The test for this belief requires proof of significant price differences in the market for food, along with reasoning for transaction costs being the source of said price differences.

To test for significant price differences, 30 goods that represent a broad selection of grocery store items that students would reasonably expect firms to sell in this market (common goods) were analyzed. Given this, the selection process for these goods was not entirely random, which is necessary for conducting statistical analyses with a normal distribution model. However, normal probability plots of these data (see fig. 1 and fig. 2) imply a normal enough set with which one can conduct statistical analyses.[1] Similarly, although the data all fit the category of "common goods," this should not impact independence in the statistical analysis; each

[1] A normal probability plot is an informal way to test for the assumption of normality before running statistical tests. In general, a plot that follows a positive, roughly linear path implies a normal distribution. Fig. 1 and fig. 2 show slight curves, but ones not extreme enough to prevent statistical analyses in the opinion of the researcher.

observation of price is not influenced by, nor does it influence the sampling of, any other observation of price. Another assumption is that the 30 goods make up less than 10% of all goods sold at these firms. There are also no extreme outliers. With these assumptions met, a hypothesis test is appropriate. The prices for all goods from all firms were checked on the same day to avoid confounding factors. The sale or temporary discount prices were collected. However, to measure prices consumers generally pay, only the lowest non-sale prices of these goods were used for statistical tests. A list of these goods and their lowest prices is in table 1.

The Campustown Target on Green Street (Target), the County Market on Stoughton Street (County Market), and the Meijer on Prospect Avenue (Meijer) are the firms analyzed in this paper. Target and County Market are close to the UIUC campus, in residential zones, and within walking or biking distance for many students; therefore, they are considered local in this analysis. Meijer is further away from campus, serves the broader Champaign community, and is situated in a commercial district; it is therefore considered non-local. These three firms were selected because they offer representation for local and non-local firms, are all in Champaign, and are all relatively well-known by students based on interpersonal interactions.[2]

Results

The raw data and normal probability plots are provided in this section. Table 1 provides the goods and the lowest prices from each firm. Table 2 shows the difference in prices as a percent increase in decimal form between the firms listed in said table. Figure 1 and figure 2 are the normal probability plots associated with the data from table 2.

[2] These traits are important in keeping independence and limiting confounding variables.

Table 1

Goods and Lowest Prices: Collected November 15th, 2023[a]

Good (Qualifiers)	County Market	Target	Meijer
Bananas (1 lb.)	0.59	0.56	0.56
Bread (White, 20 oz.)	1.69	1.39	1.39
Buns (Hamburger, 8)	1.59	1.49	1.39
Buns (Hot Dog, 8)	1.59	1.49	1.39
Butter (Any, 1 lb.)	6.49	4.39	3.99
Cheese (Any Block, 8oz)	3.79	2.19	2.29
Chicken Noodle Soup (Condensed, Not Family Size)	0.79	1.39	0.79
Eggs (Large, Dozen)	1.99	1.19	1.19
Flour (All Purpose, 5 lb.)	3.09	2.49	2.49
Fries (Steak, 28 oz.)	3.69	4.69	3.99
Ground Beef (73/27, 1 lb.)	4.79	5.79	4.79
Hot Dogs (Any, 8)	2.49	1.49	1.19
Ice Cream (Vanilla, 48 oz.)	5.49	3.49	2.99
Jelly (Grape, 18 oz.)	2.79	2.19	1.99
Ketchup (20 oz.)	1.99	1.49	1.79
Marinara Sauce (24 oz.)	2.29	1.79	1.59
Milk (Any, Gallon)	2.99	2.59	2.62
Mustard (Yellow, 8 oz.)	1.59	0.85	0.69
Onion (White, 1 lb.)	1.49	1.59	1.19

Good (Qualifiers)	County Market	Target	Meijer
Oranges (1)	1.39	0.99	1.09
Pancake Mix (Plain, 32 oz.)	2.59	3.19	2.19
Peanut Butter (16 oz.)	1.89	2.19	2.15
Pepper (Ground Black, 3 oz.)	3.99	3.69	3.59
Pizza (Cheese, Not Single Serve)	3.99	3.99	3.49
Potatoes (Russet, 1 lb.)	0.99	1.98	1.4
Salt (Iodized, 26 oz.)	0.89	0.69	0.79
Spaghetti (Regular, 16 oz.)	1.25	0.99	1.09
Strawberries (1 lb.)	5.99	4.99	4.49
Sugar (White Granulated, 4 lb.)	3.39	3.69	3.29
Syrup (Any, 24 oz.)	3.19	2.29	2.39

a. Note: All data collected via in-person observations from Target, County Market, and Meijer.

Table 2

Percent Increase Between Local and Non-Local Firms

Good (Qualifiers)	Meijer, County Market[a]	Meijer, Target
Bananas (1 lb.)	0.0536[b]	0.0000
Bread (White, 20 oz.)	0.2158	0.0000
Buns (Hamburger, 8)	0.1439	0.0719
Buns (Hot Dog, 8)	0.1439	0.0719
Butter (Any, 1 lb.)	0.6266	0.1003
Cheese (Any Block, 8oz)	0.6550	-0.0437
Chicken Noodle Soup (Condensed, Not Family Size)	0.0000	0.7595
Eggs (Large, Dozen)	0.6723	0.0000
Flour (All Purpose, 5 lb.)	0.2410	0.0000
Fries (Steak, 28 oz.)	-0.0752	0.1754
Ground Beef (73/27, 1 lb.)	0.0000	0.2088
Hot Dogs (Any, 8)	1.0924	0.2521
Ice Cream (Vanilla, 48 oz.)	0.8361	0.1672
Jelly (Grape, 18 oz.)	0.4020	0.1005
Ketchup (20 oz.)	0.1117	-0.1676
Marinara Sauce (24 oz.)	0.4403	0.1258
Milk (Any, Gallon)	0.1412	-0.0115
Mustard (Yellow, 8 oz.)	1.3043	0.2319
Onion (White, 1 lb.)	0.2521	0.3361
Oranges (1)	0.2752	-0.0917
Pancake Mix (Plain, 32 oz.)	0.1826	0.4566
Peanut Butter (16 oz.)	-0.1209	0.0186
Pepper (Ground Black, 3 oz.)	0.1114	0.0279
Pizza (Cheese, Not Single Serve)	0.1433	0.1433
Potatoes (Russet, 1 lb.)	-0.2929	0.4143
Salt (Iodized, 26 oz.)	0.1266	-0.1266

Spaghetti (Regular, 16 oz.)	0.1468	-0.0917
Strawberries (1 lb.)	0.3341	0.1114
Sugar (White Granulated, 4 lb.)	0.0304	0.1216
Syrup (Any, 24 oz.)	0.3347	-0.0418

a. Note: Headers should be interpreted like this: “Meijer, County Market” as “Percent Increase (in Decimal Form) from Meijer to County Market.” For example, a pound of butter at County Market is priced 62.66% higher than a pound of butter at Meijer.

b. Note: Values rounded to four decimal points.

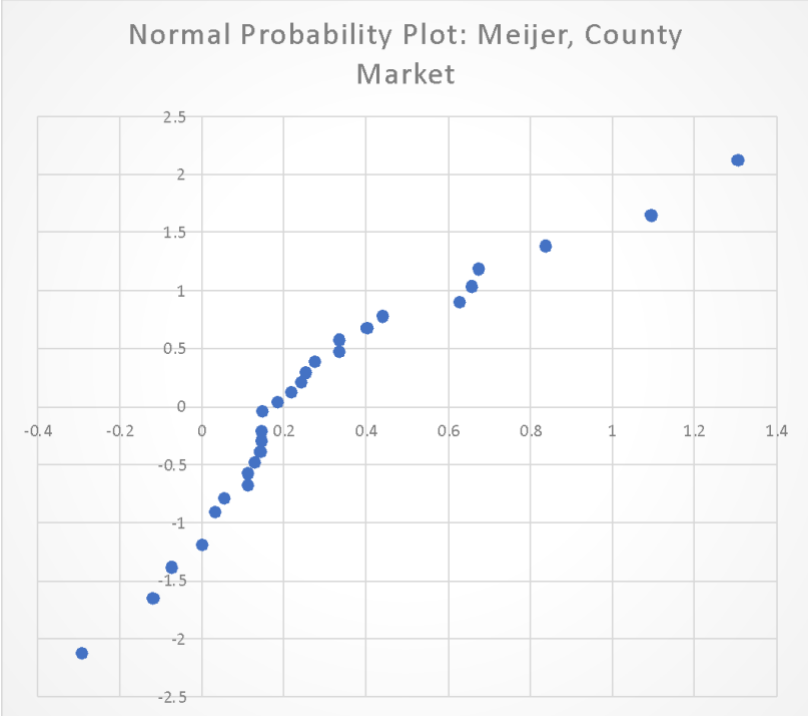

Figure 1: Normal probability plot: Meijer, County Market

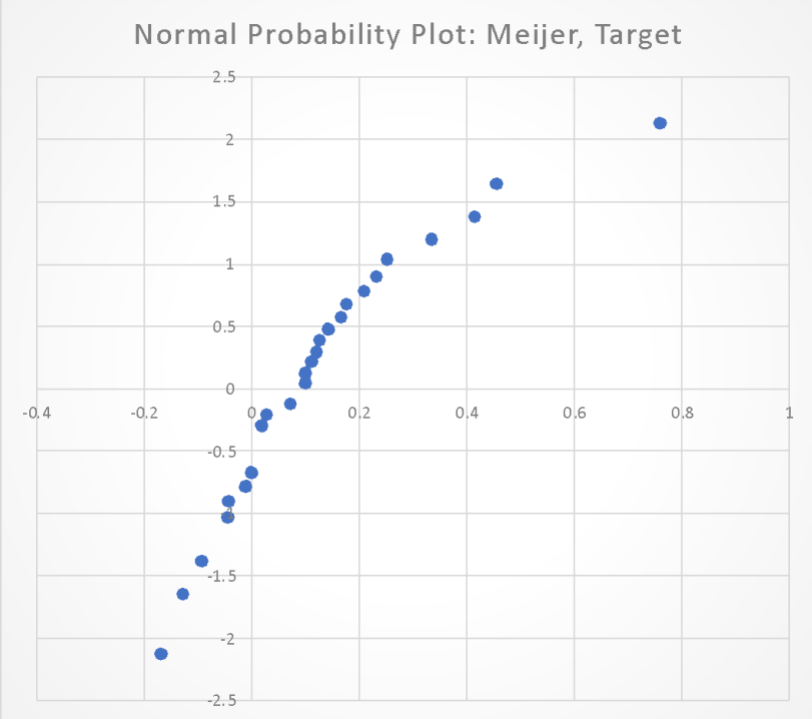

Figure 2: Normal probability plot: Meijer, Target

Given that the population variance was unknown, the appropriate test statistics were t-statistics and, therefore, hypothesis tests based on t-tests were conducted. One test was for a significant price increase between Meijer and County Market ($H\text{-}Test_{CM}$), while the other was for a significant price increase between Meijer and Target ($H\text{-}Test_{T}$).[3] Table 3 includes these hypothesis tests' null and alternative hypotheses, their conclusions, and other relevant statistics.

Table 3

Hypothesis Tests

	$H\text{-}Test_{CM}$	$H\text{-}Test_{T}$
Null Hypothesis (H_0)	$\mu \leq 0$	$\mu \leq 0$
Alternative Hypothesis (H_a)	$\mu > 0$	$\mu > 0$
Significance Level (α)	0.01	0.01
Sample Size (n)	30	30
Sample Variance (s_x)	0.3489	0.1932
Sample Mean ($\bar{x}$)	0.2832	0.1107
Test Statistic (t_{29})	4.45	3.14
Critical Value (t_α)	2.462	2.462
P-Value	0.0001	0.0019
95% Confidence Interval	(0.158, 0.408)	(0.042, 0.180)
Conclusion	Reject H_0	Reject H_0

[3] Since we are testing for a positive difference (increase) between firms, one-tail tests were used as opposed to two-tailed tests (used when there may be a positive or negative difference).

Discussion

H-Test$_{CM}$ and H-Test$_{T}$ found test statistics t_{29} greater than their respective critical values t_{α}. Accordingly, the p-values found in both tests were smaller than their significance levels α. Given these results, both tests reject the null hypothesis H_0 that prices are the same or lower at County Market and Target than at Meijer. Likewise, the alternative hypotheses H_a are statistically likely and regarded as plausible conclusions of the tests; there are statistically significant price increases at County Market and Target compared to Meijer.

Confidence intervals for H-Test$_{CM}$ and H-Test$_{T}$ confirm the conclusions made and act as estimates for the mean percent price increase between Meijer and County Market and Target, respectively. Based on the collected data, it can be said with 95% confidence that the mean price increase at County Market compared to Meijer is between 15.8% and 40.8%. Similarly, these results imply with 95% confidence that the mean price increase at Target compared to Meijer is between 4.2% and 18%.

This study could have been performed in ways that would better minimize bias and confounding variables. One possible change for replications of this study is to include a larger sample of goods. Here, 30 goods were chosen as this is the point after which the central limit theorem starts to apply, but a more significant number of goods would further increase the confidence in the study's results. In addition, the selection process for the goods sampled should be more thoroughly randomized. While the common goods selected provide figures of use as they are the items consumers are likely to purchase, they are not random. A truly randomized sample would eliminate any possible bias in the hypothesis tests. Another improvement would be to include more populations (here, firms) in the statistical analysis; a more thorough study could include several other grocery stores in the Urbana-Champaign area to show the difference in

prices in a broader light. If more firms are studied, then the hypothesis test format should also be changed to one that is more effective and applicable when multiple populations exist. All these improvements do not discount this analysis in full, but they are changes that should be implemented in any study replications.

Working under the results of the two hypothesis tests from the last section, the next objective is to consider why there is a difference in prices between local and non-local grocery stores. A strong reason as to why these differences exist is because of consumer transaction costs. In the perfect competition model, an assumption is that there are no transaction costs for consumers. For example, consumers in this model associate no external costs with seeking price information and switching from buying a good from one firm to another. While the model is helpful for market predictions and analysis, this is one of its limitations, as evidenced through this analysis.[4]

Outside the realm of the perfect competition model, transaction costs do exist. Students often opt to travel by foot, bike, or public transit instead of by car out of preference or other limitations.[5] Considering this, local firms like County Market and Target can charge higher prices while keeping their customers. One could imagine a consumer who, even after learning about the lower prices at Meijer, continues shopping at County Market or Target because the costs of traveling to the non-local firm make the more expensive local goods worth it. In other words, the price difference is less than the transaction costs of obtaining the cheaper goods, and shoppers at these local firms still experience consumer surpluses.

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[4] If there were zero consumer transaction costs, the price disparity documented would not be present as consumers could instantly find and buy from the firm with the lowest price.

[5] Parking spot, maintenance, fuel, and leasing/loans are all costs associated with owning a car that deter car ownership.

Although this explanation and reasoning seem the most plausible to explain the price gaps, it is also worth considering other possibilities. For example, it would be equally effortless to imagine a consumer who prefers and trusts the County Market brand more than they do Meijer. The same could be said about Target, both partially explaining the price increases. Another preference might be in selection; a consumer may prefer Target or County Market for their specific selections of goods. An infinitely long list of potential reasons could be made to explain why there are higher average prices for the two local firms – those mentioned here are just a few – but this analysis will not explore these possibilities in depth. Given that the uniting trait of both County Market and Target is that they are local, the most plausible answer still seems to be that consumer transaction costs are the significant reason these local firms have higher prices than their non-local competitor; future replications of this study could include a survey of consumers to further verify this conclusion.

Regardless of the explanation, these tests show a real and statistically significant disparity in prices that primarily impacts college students which opens up a new area for discussion: is this disparity good and, if not, how can it be reduced? As mentioned earlier, this price difference does not exist in the perfect competition model at equilibrium. The fact that it does exist to such an extreme degree strongly implies that this market is not in equilibrium or that firms are not producing efficiently, which, in turn, implies that there are gains not realized from trade (a dead weight loss) that negatively impacts both producers and consumers. It would be better for all parties if this market was more efficient and closer to equilibrium. Therefore, something should be done in order to bring about this change. Doing so would be better for consumers, especially college students that tend to have smaller budgets, and potential new firms that may enter the market. Unfortunately, neither producers nor consumers are omniscient and despite the economic

incentive being there, it is apparent that this alone is not sufficient for eliminating this inefficiency.

To alleviate some of this price difference, one recommendation is for another party to act to increase competition, namely the city of Champaign. More competition would result in firms becoming more efficient, reducing prices for consumers. Accordingly, residents would benefit from resolving this issue, so government action seems appropriate. Although Champaign County and the city of Champaign have already created an Enterprise Zone wherein businesses can claim certain tax benefits – in addition to other districts offering financial incentives[6] – these policies are not enough to draw in new firms in this market. This demonstrates quite well why the study of political economy has taken a shift away from looking at policy alone; the implementation of these policies is equally important, along with the structure of the institutions that create them (Besley, F571). Perhaps the city of Champaign can create a new incentive or district with the specific goal of introducing a new grocer to the impacted community, thereby increasing competition and decreasing prices, and go about implementing this program differently. A more effective launch, possibly one paired with an outreach team to contact firms directly, could make this incentive bear more fruitful results. Alternatively, this team could act in a stand-alone capacity should it be easier on the city, especially considering how other incentives already exist and may just need effective and precise advertisement.[7]

The strategies discussed above are based on microeconomic and political economy theory; they would result in lower prices that would ultimately benefit college students and other

[6] See the city of Champaign's website for more details on these incentives. ("City Incentives")
[7] The Enterprise Zone reaches close to the University of Illinois Urbana-Champaign's campus. The zone roughly extends westward from the corner of Wright St. and Springfield Ave. which is nearby Target and County Market.

consumers in the Urbana-Champaign area. However, it must be noted that the community should be engaged in any future projects on this matter. These are the people who will ultimately be affected by the actions of their local government and other firms, so keeping their preferences, interests, and behaviors in mind is crucial. A survey or town hall to gauge these factors as they relate to this issue could make future policy more precise, effective, and well-executed.

References

Besley, Timothy. “The New Political Economy.” The Economic Journal, vol. 117, no. 524, 2007, pp. F570–87. JSTOR, http://www.jstor.org/stable/4625573.

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