On the Inefficiency of Item Pricing Laws*

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On the Inefficiency of Item Pricing Laws

Abstract

In this paper we study item-pricing laws (which require that every item sold at a retail store have a price label attached to it) and examine and quantify the primary effects the item-pricing requirements have on retail prices. We argue that item pricing laws increase the retailers' variable costs, giving the retailers incentive to raise their prices. We test this prediction by using data on retail prices collected at large supermarket chains in the tri-state area of New York, New Jersey and Connecticut. The tri-states offer a unique setting—almost a natural experiment—to study this issue because they vary in their use of item pricing laws, but otherwise offer similar markets and chains operating in a close proximity to each other in a relatively homogenous socioeconomic environment. We collected two data sets, both manually, by physically traveling to the Tri-State areas, going to retail supermarket chains, and recording selected product price information. The first data set emphasizes the breadth in coverage across products for a limited number of carefully selected stores. The second data set was collected to supplement the first by emphasizing the breadth in coverage across stores while limiting the number of products sampled. We find consistent evidence across products, product categories, stores, and sampling periods, that retail prices are higher at stores facing item-pricing laws in comparison to the stores that do not face these laws. The price difference per item amounts to about $0.25 or 9.6 percent of average retail price. We also explore the benefit side of the law by examining the evidence on the magnitude of supermarket pricing errors, which item pricing laws are supposed to prevent. We find that the costs incurred by consumers because of the item pricing laws are at least an order of magnitude higher, and perhaps as much as 27 times higher, than the benefits these laws provide. We conclude, therefore, that item pricing laws appear to be inefficient, not only from the perspective of retailers, but especially from the perspective of consumers: item pricing laws seem to harm the consumers greatly, even though the primary reason for creating these laws is to protect them.

"As Michigan's Attorney General, I want you to know that every time you open your wallet, my office will be there to protect your transactions. Our state law requires that most items on store shelves be clearly marked with a price tag. If those price tags don't match the price scanned at the register, the law gives you specific rights (see other side). Keep this card in your wallet or purse and refer to it whenever you have a question about your item pricing rights. Mike Cox, Attorney General."

Item Pricing Wallet Card, "Item Pricing Bill of Rights," August 28, 2002[1]

"Having been a retailer in Michigan since '47, we are well aware of the item pricing laws here [in Michigan], and its expense. It takes 3 times or more to price and then stock shelves in our store… We also spend 50 hours a week, having someone scan each item making sure it agrees with the computer… this may have been one of the reasons Michigan has not seen tremendous growth in competition from those same national retailers. Our overhead is way out of line with the rest of the country."

Marv Imus, a Michigan Retailer, July 17, 2002[2]

"Chains in these [item pricing law] states don't make less money, yet we know their costs are higher, so it would follow that their prices must be higher, ceteris paribus… they try to avoid the costs by changing fewer prices, although this is only partially feasible, as much of the cost is unavoidable, as every item sold incurs the cost."

Bob Venable, Industry Expert

I. Introduction

Item pricing laws (IPLs) are an interesting, albeit understudied, form of pricing regulation. These laws require that in addition to putting price labels on shelves, every item sold in a supermarket must have a price label attached to it, with some exceptions.[3] Currently, nine states in the U.S. have IPLs: California, Connecticut, Illinois, Massachusetts, Michigan, New Hampshire, New York, North Dakota, and Rhode Island.[4]

IPLs first became a topic of public debate over two decades ago when electronic checkout scanning devices became widespread. As retail supermarket stores moved from item pricing to using only shelf price labels and checkout scanners, states debated on the merits of this transition and many considered IPLs. This debate continues on today in states which have adopted these laws. For example, the Michigan State Assembly is currently considering a revision of the state's

[1] Source: the Attorney General's Office, Michigan (www.michigan.gov/ag).
[2] Source: www.morningnewsbeat.com.
[3] There are three different, although related, pricing laws: *Shelf price laws* require that a price tag be displayed on the shelf for each product sold. All states require shelf price display. *Unit price laws*, also in effect in most states and localities, require that besides the regular price information per package, per item, or just per product, the retailer must display the product price per standard measurement unit such as per oz, per liter, per gallon, per gram, per pound, etc. The purpose of unit price laws is to help the shoppers in comparison-shopping by making it easier for them to compare prices of similar products (e.g., the same product, but of two different manufacturers) that come in different sizes. *Item pricing laws* require that a price tag be attached to every single item the retailer offers for sale.

IPL, which is one of the oldest and perhaps the most demanding in comparison to the IPLs of other states, because it requires item pricing at *all* retail establishment, regardless of their nature.[5] In contrast, the IPLs in other states apply to few types of retail establishments, most often to retail food stores. The currently proposed bill would make price tags on merchandise optional in Michigan stores, and would instead allow the retailers to use electronic shelf labels.[6] In the same spirit, a recent modification to the law in the province of Quebec in Canada, which also has IPL, grants retailers exemption from item pricing in lieu of a minimum number of hand-held scanners available for use by consumers.[7]

In this debate the arguments in support of item-pricing laws are based on protecting consumers. Among the supporters of these laws are various consumer advocate groups and consumer associations, legislators, labor unions (such as Michigan AFL-CIO and the United Food and Commercial Workers), various chapters of the American Association of Retired Persons, and similar groups. The primary and the most commonly cited reason in support of the IPLs is that without item pricing the public would be unable to detect pricing mistakes, and especially price overcharges, which occur when the price charged at the cash register exceeds the price indicated on the shelf price tag.[8] The proponents of IPLs also mention other benefits the laws provide. For example, they argue that without item pricing price comparison would be difficult and therefore it would be easier for stores to raise prices because consumers cannot remember the price of every item they buy. In addition, they argue, shelf price labels are often difficult to read, and misplaced items make shopping difficult because of the difficulty of identifying their price. These benefits, however, are secondary, in comparison to their primary concern about retailers' pricing inaccuracy and consumers' inability to notice them without IPLs.[9]

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[4] In Appendix I, we provide a detailed description of the New York and Connecticut IPLs.
[5] As the opening quotation indicates, the Attorney General of the State of Michigan, on August 28, 2002 has even issued the "Item Pricing Wallet Card" which describes the Michigan consumers' "Item Pricing Bill of Rights."
[6] Source: "Legislators to consider changes in item pricing law," *Holland Sentinel*, Online edition, Monday, January 27, 2003 (www.hollandsentinel.com).
[7] Source: "Price Marking in Quebec – New Regulatory Rules," January 2001, (www.opc.gouv.qc.ca/programmes/LettreAffPrice_Marking.pdf) visited October 10, 2002.
[8] Source: "Farewell to Item-Pricing?" p. 11.
[9] For example, Richard Gamber, executive director of the Michigan Consumer Federation stated in an interview to *Detroit News*: "They say we're behind the times. I say we're ahead of the times. Without a price tag on an item, a consumer is powerless to spot scanner errors" (Source: "The Battle Over item Pricing, Michigan Style," www.nacsonline.com, July 16, 2002). "We're opposed to any change in the item pricing law. It's a law that protects the consumers by allowing them to know when they are being charged the wrong price," says Ken

On the other side of the debate are the retailers represented by numerous local and state-level retailers' associations, supermarket industry and other trade groups, and numerous trade publications. The opponents of the IPLs contend that the item pricing requirements are inefficient and too costly, consuming too much of the retailers' resources.[10] They say requiring price tags on individual items leads to more human error because new tags are needed on every item every time the price changes. They argue that allowing retailers to substitute electronic shelf label systems for labor-intensive, hand-held "price guns" would save on labor costs, which they would pass on to consumers. Some have even suggested that the high item pricing costs may be preventing the opening of retail stores by national chains. For example, according to a 1998 report by Deborah Moore of the *Albany Business Journal*, "… Aldi, a German company with U.S. headquarters in Batavia, Ill., will not open stores in areas where grocers must place a price sticker on each article for sale. The company maintains that the labor costs for item pricing are too high to maintain profit margins."[11]

It appears, therefore, that item-pricing laws impose substantial costs on retailers, which theory predicts will likely be passed on to consumers in the form of higher retail prices. Although IPLs have not been studied, other studies of "consumer protection" laws often find that they provide few if any benefits, and often have substantial costs. A well known example is Peltzman's (1972) study of the Food and Drug Administration, finding that increased regulation in the 1960's had few benefits and substantial costs. This finding has been duplicated numerous times. Many studies have also found that laws regulating information provision often have large costs; see for example Benham (1972) and Gerstner and Hess (1990). This literature is summarized in Beales, Craswell and Salop (1981) and Rubin (1991). We might expect similar results for IPLs.

Fletcher, legislative director for the Michigan AFL-CIO (Source: "Legislators to consider changes in item pricing law," *Holland Sentinel*, Online edition, January 27, 2003, www.hollandsentinel.com). Consider also the titles of typical articles published in various publications addressing this topic: "UPC Scanner Pricing Systems: Are They Accurate?," "Don't Get Cheated by Supermarket," "What's the Price? Chains Get Into Trouble Over Not Using Price Tags," "The Price is Right," "Is Precision Pricing Possible?" While suggestive, these and numerous similar articles published in trade and popular publications try to address the public's concern with retail pricing accuracy.

[10] For example, according to one retailer, "I have been in retail for over 15 years in 8 different states… The pressure that is put on the employees to price the items, and the time and labor invested to comply with the laws could be better used to provide the customer service the consumers complain they do not have." Posted on the web page of www.MichiganVotes.org by an anonymous citizen, on 12/10/2002.

[11] See article on the grocery's plans for Rensselaer county, NY in *The Business Review* (Albany), July 13, 1998, available at www.albany.bizjournals.com/.

Despite the fact that the IPLs have been around for almost 30 years, there are no studies that measure the costs incurred by consumers as a result of the laws. The purpose of this paper is to fill this gap in the literature by examining the primary effect the item-pricing requirements have on consumer prices. Specifically, we try to quantify the impact of IPLs on retail prices of goods sold in large US supermarket chains. Economic theory suggests, we argue, that the item-pricing laws give the retailers incentives to raise retail prices because item-pricing laws increase the retailers' variable costs.[12] This would be true even if the supermarket industry is competitive, since all stores in the market with item pricing laws will be subject to the same cost increase. To test this hypothesis, we collected unique retail price data at large supermarket stores facing IPLs and stores not facing those laws, with the restriction that all sampled stores be operating in similar markets and similar socioeconomic environments.

We are fortunate to have almost a natural experiment in the tri-state area of New York, Connecticut and New Jersey. This is because these states vary in their use of IPLs—New York has an IPL, New Jersey does not, and Connecticut has an IPL that can be waived if the stores adopt an electronic shelf label system—but otherwise they offer a remarkably similar supermarket chains, markets and socioeconomic environments.

We went through two rounds of data collection, both labor-intensive. In the first round, we collected data from three supermarket chains, one located in Tarrytown, New York, which has an IPL, the second in Greenwich, Connecticut, also with IPL, and the third in Clifton, New Jersey, which does not have IPLs. The New York and the New Jersey stores belong to the same chain (Stop & Shop). The Connecticut store belongs to Food Emporium. We have randomly selected 11 product categories, and in each category, we have randomly selected 15 brand-name products, yielding a total of 165 products. We paid 4 visits to each store during January-April, 2001, with one-month intervals between the visits, and on each visit at each store, we hand-recorded the actual selling price of the sampled 165 products. This price collection process yielded 1,980 price observations (3 stores $\times$ 4 visits $\times$ 11 categories $\times$ 15 products).

In the second round of data collection, we focused on only two product categories, and expanded the number of stores sampled. The decision to consider a smaller number of categories

[12] Some industry experts we talked to (who also included a senior manager at a company that manufactures electronic shelf label systems), have made a similar prediction, as the third leading quotation suggests.

was driven partly by the uniformity of the results in the first study and partly by feasibility considerations. We found that the first set of results were in general true for most product categories, and for all four trips. For each one of the 11 product categories sampled, the prices were systematically higher in stores that were subject to IPLs in comparison to the stores that were not subject to the laws. The pattern was consistent across the four trips. Moreover, we discovered that the average price difference was also stable, about $0.25 per product on average. Focusing on a smaller number of categories and restricting the data collection to a single trip, enabled us to look at a larger sample of stores, therefore. The decision to consider a wider selection of stores was driven by our desire to check if the results were robust across different retail chains and stores. For this we added 14 new stores to our sample. On the second round, therefore, we went to 17 stores to collect price data for the 30 products included in the two categories. Of the 17 stores, 12 are subject to IPLs (10 in New York and 2 in Connecticut), and 5 (all in New Jersey) are not. The second price collection process, therefore, yielded 510 price observations (17 stores $\times$ 1 visit $\times$ 2 categories $\times$ 15 products). We find that the results of the analysis of the second round data are similar to the results of the first round data.

To briefly summarize our findings, we find that the prices in stores facing item-pricing laws are indeed higher than in stores that are not subject to these laws. This pattern is fairly consistent across products, product categories, stores, and data samples. We find that the average price difference per product is about $0.25 or about 9.6 percent of average retail price, which is substantial. We also explore the benefit side of the law by examining the existing evidence on the size and the frequency of mistakes that occur in the retail supermarket industry. This enables us to quantify the potential benefits of the IPLs, assuming that they successfully accomplish their mission of “preventing price mistakes.” We find that price overcharges in large supermarket stores average $0.009 per item. In contrast, our price data suggest that the IPLs lead to a $0.25 increase in price per item on average. When average undercharges are factored in, then the benefit of item pricing is reduced to a mere $0.0013 per item. Thus, we find that the costs incurred by consumers because of the IPLs are at least an order of magnitude higher (when a more conservative measure of IPL benefits are used), and perhaps as much as 27+ times higher, than the benefits these laws provide. We conclude, therefore, that the IPLs are inefficient, not only from the perspective of retailers, but especially from the perspective of consumers: the IPLs seem to harm consumers

greatly, even though the primary reason for creating these laws is to protect them. In light of these findings, we conclude that policy makers and the regulators should reconsider the usefulness and practical efficacy of these laws.

The paper is organized as follows. In section II, we discuss the existing literature on IPLs. In section III, we discuss the effect of IPLs on retail prices. In particular, we demonstrate that these laws increase the retailers' variable costs, giving them incentives to increase prices. In section IV, we describe the data collection methodology and the two data sets we collected for this study. The results obtained from the analysis of the first data set are reported in section V. The results obtained from the analysis of the second data set are reported in section VI. In section VII, we compare the costs of IPLs to their measurable benefits. Section VIII concludes. A detailed description of various item-pricing laws is included in appendix I. Appendix II provides additional details on the supermarket chains included in our sample.

II. Existing Literature on Costs and Benefits of Item Pricing Laws

Much of the literature on IPLs comes from the trade press due to the lack of academic literature on this matter. These articles typically focus on various "price check" and "price accuracy" surveys of retail checkout scanners conducted by some federal, state, and local government agencies and sometimes also by retail trade groups and publications. These surveys report the size and the frequency of pricing errors, both overcharges and undercharges, and indirectly try to assess the benefits of IPLs as these laws supposedly help the consumers notice the pricing mistakes at the cash register and thereby avoid their cost by alerting the cashier. Much less is known on the cost side of the IPLs.

There have been several studies of the accuracy of checkout scanners and pricing practices in retail supermarket stores. Earlier studies have had a more narrow scope and breadth in comparison to more recent studies. One main conclusion that emerges from these studies is that since early eighties the pricing error rates as well as the sizes of both overcharges and undercharges have been continuously decreasing.[13]

[13] See, for example, a report on a recent pricing accuracy survey of the State of Michigan, "Few Scanner Errors in State's Pricing Survey," by Dee-Ann Durbin of the Associated Press, December 4, 2002, *Detroit Free Press*. According to the report, "Five national retail chains had a relatively low error rate in this year's survey of price

One study to assess the accuracy of checkout scanner was conducted by *Money* magazine in 1993. In the survey, a sample of 10 randomly selected items were checked in 27 major supermarket chain stores in 23 states over the course of two months. According to the survey, when a mistake in a scanned price was made, electronic scanners at registers were found to overwhelmingly favor the retailer over the consumer. The survey showed that 30 percent of stores overcharge, while only 7 percent undercharge. In case of an overcharge, a consumer may be overcharged for one out of every ten items, on average.[14]

Goodstein (1994) sampled 30 items in 3 categories (10 items in each category), in 15 stores belonging to three chains (5 stores from each chain) in a California county. He also found the accuracy of electronic scanners to be less than favorable to consumers, although only on certain classes of products. Goodstein found that overall the errors tended to favor the retailer more than the consumer, but not as universally as was indicated in the *Money* magazine study of the previous year. The amounts of both overcharges and undercharges were found to be significant. In fact, on regularly priced items Goodstein found that consumers were undercharged 4.8 percent of the time while they were overcharged 3.6 percent of the time. On sale items, however, consumers were on average overcharged 7.3 percent of the time and undercharged only 1.8 percent of the time. In addition, Goodstein found that for promotional items located at the end of aisles, the shoppers were on average overcharged 6.0 percent of the time and undercharged 3.6 percent of the time. As Goodstein notes, while undercharging means a small loss of profit for the retailer, overcharging means increased consumer mistrust and legal pressure for redress.

The most comprehensive studies in terms of their scope and the breadth of their coverage were conducted in 1996 and 1998 by the Federal Trade Commission. The two studies, called "Price Check" and "Price Check II," respectively, produced very different results in comparison to the earlier studies. The 1996 study, "Price Check," was conducted by the FTC, the National Institute of Standards and Technology, and the states of Florida, Massachusetts, Michigan, Tennessee, Wisconsin, and Vermont.[15] The purpose of "Price Check" was to report on the accuracy of checkout scanners in retail stores. It inspected the pricing accuracy of 17, 928 items

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scanners… The average error rate was 3.2 percent, the same as last year's and significantly lower than other recent years."

[14] Vanessa O'Connell, "Don't Get Cheated By Supermarket Scanners," *Money* 22 (April 1993): 132.

[15] The Federal Trade Commission, *Price Check: A Report on the Accuracy of Checkout Scanners* (1996).

in 294 department, drug, food, and other retail stores. 113 of these stores were food retailers. Scanned prices were compared with the lower of the posted or advertised price of a sample of randomly selected items. Overall, the results of the study were positive for consumers, because the results showed that the total number of undercharges exceeded the total number of overcharges. The error rate of the 17,928 items inspected was only 4.82 percent. Of these, 2.58 percent scanned lower than the posted or advertised price, and 2.24 percent scanned higher than the posted or advertised price. In addition, the total dollar amount of undercharges exceeded the total dollar amount of overcharges.

The study also found that food stores as a group had a lower error rate than non-food stores. According to the study, 1.92 percent of the items checked in food stores were overcharges, and 1.55 percent were undercharges. Total dollar value of the undercharges exceeded by approximately $10.00 the total value of overcharges. The average overcharge per item was $0.53 while the average undercharge per item was $0.76.

The 1998 study, "Price Check II," was a much larger follow-up to "Price Check." State and local officials in 37 jurisdictions conducted the study, which was five times larger than the 1996 study that was conducted by inspectors in 7 jurisdictions. In the 1998 study, 107,096 items were checked in 1,033 stores while in the 1996 study, 17,928 items were checked in 294 stores.[16] According to this survey, one of every 30 items checked in the 1998 study was mis-priced. Of these errors, half were undercharges and half were overcharges, while in the 1996 study, one of every 21 items checked was mis-priced and slightly more than half of these errors were undercharges and the remainder were overcharges. One thing the 1998 study did that the 1996 study did not do was to examine whether there was a difference in pricing accuracy between sale and non-sale items. For sale items, pricing errors were found in one of every 28 items checked, and almost 2/3 of the errors were overcharges. For non-sale items, pricing errors were found in one of every 32 items checked, and slightly more than 1/3 of the errors were overcharges. Once again, the study in 1998 found that among the types of stores inspected, food stores as a group had the highest pricing accuracy.

[16] The Federal Trade Commission, *Price Check II: A Follow-up Report on the Accuracy of Checkout Scanner Prices* (1998).

The study also reported that the lowest error rates were found in the retail food stores. Further, the study indicated that the error rates decreased further since the previous survey. For example, it reports that in retail supermarket stores 1.36 percent of the price mistakes found were overcharges and 1.06 percent were undercharges. The average overcharge per item was $0.66 and the average undercharge per item was $0.73.

We have less information on the costs that IPLs impose on various market participants. According to Weinstein (1991, p. 21), the annual costs of item pricing for the average supermarket in 1991 was about $154,000.[17] A remarkably similar figure was reported independently by the management of *Giant*, a large supermarket chain operating in the North Eastern US. According to the October 1981 issue of *Consumers' Research Magazine*, "Giant estimates its savings from the removal of item pricing per se at close to 1 percent" of its revenues (p. 12)[18]. According to Levy, et al. (1997, Table IV, Footnote a, p. 812) and the *Supermarket Business* (1993, p. 52), the annual revenue of a large US supermarket chain is $15,052,716 per store on average. Using this figure as a rough estimate of *Giant*'s revenues, 1 percent saving translates to $150,527.16 total annual saving per store.

Another measure is reported by James Gillette, an executive of *Gillette's Food Market*. According to him, "… a full 6 percent of his labor costs go toward complying with the item price law as prices go up and down on individual items in his supermarket."[19]

Levy, et al. (1997) were able to study the impact of IPLs on the costs of price adjustment, and the frequency of price change activity, in the grocery industry. They report that item-pricing laws increase the marginal costs of price adjustment, and at the same time cause stores to decrease their price change frequency. Specifically they measure the cost of physically adjusting prices (also known as "menu cost" in the macroeconomics and IO literature) at five large US supermarket chains, one of which operates in a locality with IPLs. They found that the marginal cost of price change in chains subject to the IPL was $1.33, while the marginal cost of price change in the other four chains was only $0.52. Thus, the menu costs per price change of the chain facing IPLs was more than two and one half times the amount of the menu costs per price

[17] As the source of this figure, Weinstein (1991) cites a Cornell University study, which was commissioned by the New York State Food Merchants Association.
[18] "Farewell to Item Pricing? What 'Scanning' Means for Supermarket Shoppers," Vol. 64, pp. 11–13.
[19] Source: "Opponents Check Out Views on Item-Price Law," March 11, 1999 (www.rny.com).

change of the other four chains. Moreover, in the chain subject to IPLs, the average weekly frequency of price changes was only 1,578, while the average weekly frequency of price changes in the other four chains was 3,916. Thus, the chain with item pricing changed its prices only forty percent as frequently as did the other four chains, on average.

III. Item Pricing Laws and Retail Prices

The effect of IPLs on retail prices is not as obvious as it may seem at first. As Levy, et al. (1997, 1998) have shown, IPLs increase the costs of price adjustment by forcing firms to put a new price tag on every item they plan to sell rather than simply changing one price label on a shelf. These higher costs lead to less frequent price changes, as Levy, et al. (1997) demonstrate. In total, however, it is not obvious whether the total costs of price adjustment (which makes up the overwhelming majority of the costs of pricing in grocery chains) will go up or down in this setting. Price changes are more costly, but done less frequently. In their sample, Levy, et al. (1997) find that the total costs of price adjustment are very similar at the stores that face IPLs and stores that do not. Therefore, if IPLs merely create larger menu costs, this will not necessarily imply higher retail prices—it may simply mean that retailers use pricing less often as a marketing activity.

We argue that IPLs do more to costs of price adjustment than just making them larger. We believe that IPLs actually change the nature of these price adjustment costs because they cause them to change as the volume of the products sold changes. The traditional menu costs are treated as fixed costs paid when a firm decides to change a price (Mankiw, 1985). The larger these costs, the less frequently a firm will change its prices. Alternatively, these menu costs are sometimes treated in the literature as convex (Rotemberg, 1982; Cecchetti, 1985), which means that the menu cost changes with the size of the price change: the bigger the price change the larger the cost of adjustment.

Menu costs are all the costs incurred to change the prices of goods. These include the labor costs of changing shelf labels, the printing and delivering costs of new price tags, the costs of mistakes made during price changes, and the cost of in-store supervision during price changes. IPLs increase menu costs. During the price change process, stores subject to IPLs have to change the price on each individual item, and not just on the shelves. This increases the amount of labor

and materials needed to carry out a price change and the amount of mistakes that can be made, which bear their own cost.

Thus, IPLs add another dimension to the cost of price adjustment: they make the price adjustment costs depend on how many units of the product are sold, because the seller is legally required to put a new price tag on every item sold. For example, if a firm only plans to sell 4 units of an item and has them on the shelf, it only incurs IPL costs for 4 prices. But if the firm is planning to sell 4,000 units, then its menu costs will be the cost of changing the price tags on all 4,000 units. This is a dimension of menu costs that has not been suggested before in the existing menu cost literature.[20]

Once we recognize that the cost of price adjustment depends on the sales volume, then it is clear that it is a variable cost—a cost per unit sold. As such, therefore, price adjustment costs would directly factor in to a firm's pricing decisions, and create incentives for retailers to raise prices when item-pricing laws are in effect. IPLs make pricing and price management more expensive by increasing variable costs. We argue that supermarkets will try to pass these higher costs unto consumers in the form of higher prices, ceteris paribus. Even if the supermarket industry is competitive, prices will increase, since all stores in a market will be subject to the same cost increase. Thus, we predict that the prices will be higher in stores that are subject to IPLs in comparison to the stores that are not subject to the law. In sections V and VI of the paper we report the empirical test results of this hypothesis.

IV. Data Collection Methodology

We use data on prices of a randomly selected group of goods from supermarket stores, some of which are affected by IPLs while others are not. To do this, we choose localities with and without IPLs that are geographically close, demographically and socio-economically similar, and have the same and/or similar supermarket chains in size, type, etc. It is necessary for the stores to be geographically close so that the customers who shop in the stores come from the same part of the economy and so that any shipping costs are constant across stores. In order to control for other variables as much as possible, it is also necessary that the cities or the towns

where the supermarkets are located have as much as possible a homogeneous population demographically as well as socio-economically. The sampled supermarket chains should ideally belong to the same or to a similar chain. The fact that only nine states in the country have IPLs narrowed our choices. New York, New Jersey, and Connecticut, which make up a region known as the tri-state area, met all the necessary criteria and had other advantages as well. New York and Connecticut both have IPLs while New Jersey does not. All three states have upscale suburban neighborhoods of New York City that are equidistant from the city. We chose to collect data from these suburbs in New York, New Jersey, and Connecticut. In Chart 1 we present a small map of the Tri-State area.

The suburban towns of New York City located in northern New Jersey, Westchester County in New York, and southern Connecticut, are amazingly similar. They share similar population size and density, socio-economic levels, demographics, and distance from New York City. Moreover, they are not geographically far from each other. A drive from northern New Jersey through Westchester County to southern Connecticut can take as little as half an hour. Many people who live in these towns are business owners, executives, and professionals who work in New York City or in surrounding suburban towns. Most of these towns have quality public schools, quiet suburban roads with nicely sized houses, and one or two downtown areas with a mix of small mom and pop businesses, and larger businesses like Starbucks. The parallelism of these suburban neighborhoods in these three states makes the tri-state area a natural place to conduct the research for this study.[21] For more details on the stores selected for the first round of data collection, their locations, and the surrounding areas, see Appendix II.

Choice of Stores for Data Set I

We next had to determine which supermarket chains to collect price data from, and we used two basic criteria. The first criterion was that the chain has stores located in the suburban areas of New York, New Jersey, and Connecticut. The second criterion was that the chain uses

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[20] We should note that pricing mistakes will also depend on the quantity sold: the greater the sales volume, the more pricing mistake are likely to occur (Levy, et al., 1998). This places the benefit-side of the IPL on equal footing with the IPL cost-side, in our cost-benefit analysis of the IPLs.

[21] A senior manager at one of the companies that manufactures electronic shelf label systems has also suggested to us (in a personal email communication) that Connecticut and "… New York provide some of the better 'neighboring counties' scenarios" for studying the effect of item pricing laws on retail prices.

the Everyday Low Price Strategy (EDLP). In contrast to High/Low (HL) pricing strategy chains, the EDLP chains provide cleaner data for our purpose because they change their prices less frequently.[22] Steadier prices over time make it easier for us to compare the prices of goods across stores without having to discern if the price of an item changed one week because of a sale or for some other reason.

One supermarket chain we chose is Stop & Shop. Stop & Shop is a long-standing and successful chain that operates supermarkets in New York, New Jersey, Connecticut, and all over New England. The other retailer was Food Emporium. The corporate structures of Food Emporium and Stop & Shop are similar. Both are large chains that are prevalent in the tri-state area and have stores of similar structures and sizes that sell thousands of products. In addition, both use the EDLP pricing strategy.

We collected price data from two Stop & Shop stores, one in Tarrytown, New York, which has an IPL, and the other in Clifton, New Jersey, which does not have an IPL (see Table 1.1). The Food Emporium store we collected price data from is in Greenwich, Connecticut, which has an IPL. The choice of these locations was deliberate. All three towns are suburbs of New York City and are approximately similar in their linear distance from the city. Likewise, their demographic and socio-economic characteristics are similar. Tarrytown, New York is part of the river town area of Westchester County, which is an affluent area where many professionals live. Clifton, New Jersey is also an affluent suburb of New York City, as is Greenwich, Connecticut.

Choice of Products for Data Set I

We established the following criteria for choosing the products. First, the majority of products had to be subject to IPLs (if the store was located in an area with IPL). In other words, most had to be products that could have an individual price tag put on them. So, for example, a

[22] HL and EDLP refer to the general pricing strategy followed by the retail chain. Under the EDLP strategy, the retailer's prices are low for extended periods of time and therefore, it will offer less promotional sales or discounts. Under the HL pricing strategy, in contrast, the prices are higher, and the retailer tends to offer more frequent discounts through sales and promotions. (See Levy, et al., 1997 and 1998, and Dutta, et al., 1999, for more details.) Menu costs may be playing a role in the observed movement toward pricing strategies, which rely on fewer price changes, such as EDLP (Blattberg and Neslin, 1989; Lattin and Ortmeyer, 1991; and *Marketing News* of April 13, 1992, p. 8). According to *Progressive Grocer* (November, 1992, p. 50), "A growing number of operators say they have switched from high-low pricing [to EDLP]. They cite the inefficiencies of making frequent price changes..." Similarly, Hoch, Drèze, and Purk (1994, p. 16), state that EDLP lowers operating costs by lowering "... in-store labor costs because of less frequent changeovers in special displays."

can of tuna fish was acceptable while a bunch of grapes was not.[23] Second, the item had to be standard and common enough so that it could be found in the supermarkets of all chains. Thus, for example, we did not choose private label products as they would not necessarily be comparable across stores because of the likely differences in their features such as quality, taste, packaging, etc. (Hoch and Banerji, 1993; Barsky, et al., 2003). Instead, we used only brand name products because they are most likely to be sold in most large supermarkets. In order to make the data collection effort practically feasible, we have decided to limit our analysis to 11 product categories, and in each category we chose 15 products. These product categories are (1) beverages, (2) breakfast cereal, (3) frozen foods, (4) dairy and juices, (5) soup and canned foods, (6) condiments, sauces, and spreads, (7) candy and snacks, (8) paper products, bags and pet supplies, (9) health and beauty aides, (10) baby products and food, and (11) households (see Table 1.2). These categories cover a broad range of goods making up a high percentage of the products supermarkets sell, and most of the products in these categories are subject to IPLs.

The choice of the specific goods within each category was made randomly. We did not discriminate against size (in terms of weight or volume), quantity (in terms of how many items were bunched together to be sold as one product), or brand (as long as it was a national brand). The specific products were selected by randomly pointing at goods up and down the shelves going from left to right along the aisles. The list of the products sampled by each category is provided in Table 1.2.

Price Information Collection Process for Data Set I

We collected the data by having one of the paper's co-authors physically go to each supermarket, and write down the price of each item on a note card with a chart attached.[24] We went to each store at set times, with one month in between each visit, and on the same time and day of the week. Since different supermarkets change their prices on different days, although it is usually done late at night, we needed to go to each store on the same day in order to maintain

[23] Indeed, most IPLs exempt the stores from the item pricing requirement on goods and products that come in variable weight (e.g., fruits and vegetables, baked goods, floral, etc.), some dairy products, eggs, and products alike with a shelf-life of two weeks or less, etc. In addition, if the store has under three employees or grosses less than three million dollars in revenue annually, then it is exempt from the law.

[24] To ensure the consistency throughout the entire study and avoid possible biases, all price data we use in this paper were collected by the same co-author.

consistency with the supermarkets' weekly pricing cycle (Dutta et al., 1999). The data collection schedule was as follows: Saturday mornings we went to collect data from the Stop & Shop in Clifton, New Jersey. Then between 1:00 and 2:00 o'clock in the afternoon on Saturdays we went to collect data from the Stop & Shop in Tarrytown, New York. Sunday mornings we went to collect data from the Food Emporium in Greenwich, Connecticut.

We made 4 separate trips to the 3 stores to collect and record prices, waiting an interval of one month in between trips. The data collection process took place over the four-month period from January 2001 to April 2001, as follows. The first trip took place on January 14–15, 2001, the second trip took place on February 11–12, 2001, the third trip took place on March 11–12, 2001, and the fourth trip took place on April 8–9, 2001.

We only recorded the price that was printed on the shelf price label. If the store was subject to IPLs, then we recorded the price that was on the individual price sticker of each item. Thus our prices do not reflect any manufacturer or newspaper coupon discount, or any other kind of promotional offer.[25]

The price collection process for the first data set yielded 1,980 price observations (3 stores $\times$ 4 visits $\times$ 11 categories $\times$ 15 products).

Data Collection Process for Data Set II

The methods we used for collecting the second data set are identical to the methods we used in collecting the first data set. In the second round of data collection, however, we have decided to focus on two product categories only, and instead expand the number of the stores sampled. We made this choice because the analysis of the first data set revealed that for each one of the 11 product categories sampled, the prices were with very few exceptions higher in stores that were subject to IPLs in comparison to the stores that were not. (See the discussion in section V below.) Further, the pattern was consistent across the four trips, with a quite stable price difference of about $0.25 per product on average.

[25] While in the supermarkets, there was a real need to be clandestine in our recording of the price information. Stores do not welcome "price collectors" and other kinds of spies. To record the prices, therefore, we used note cards that look like a regular grocery list. We simply walked up and down the aisles with a grocery cart that we filled with products (which we actually purchased!). When we saw an item in our sample, we recorded its price quickly and moved on looking for the next item. The only noticeable difference between us and the other customers in the store were that we spent over two hours doing the shopping.

In order to make the data collection manageable and cost-effective, therefore, we have decided to reduce the number of categories sampled in the second round to two, and instead cover a wider selection of stores and chains. For this we have added 14 new stores to our sample. On the second round, therefore, we went to 17 stores to collect price data for the 30 products included in the two categories. Of the 17 stores, 12 are subject to IPLs (10 in New York and 2 in Connecticut), and 5 (all in New Jersey) are not. Table 2.1 lists these stores along with their location. In Table 2.2 we list the 30 products included in the second data set. In total, the second price collection process yielded 510 price observations (17 stores $\times$ 1 visit $\times$ 2 categories $\times$ 15 products) which means that in the two data sets together we have 1,980+510=2,490 observations. Samples of this size would be typical of studies that collect data by physically visiting the establishments and literally writing the data by hand. Generally this type of data collection method requires multiple visits, which was the case in our study as well. For example, in Bergen et al. (1996) who studied variation between manufacturer brands at retail stores, they collected and used 446 observations. Warner and Barsky (1995) have also used hand collected data of a similar size.

V. Findings from Data Set I

We first discuss the results of the analysis of the data obtained on the first round of data collection. In Table 1.3 we compare the overall average price at the two IPL stores (Stop & Shop and Food Emporium) to the overall average price at the non-IPL store (Stop & Shop), where by "overall" we mean average over 15 product, 11 categories, and 4 visits. The figures indicate that the average price at the IPL stores exceeds the average price at the non-IPL stores by 25.2¢ with a 95 percent confidence interval of [20¢–30¢]. This figure is statistically significant at the 1% level.[26]

In Table 1.4 and Figure 1.1 we compare the average price at the two IPL stores to the average price at the non-IPL store, by product categories. Here the averages are computed over 15 product and 4 visits. According to the figures, the average price at the IPL stores exceeds the average price at the non-IPL store in each one of the 11 categories. Moreover, the difference is statistically significant for all categories with the exception of the category of Baby Products and Food. For 8 of the 11 categories, the average price gap exceeds 20¢, and for two categories,

Health and Beauty Aid products and Household products, the average price gap between the IPL and non-IPL stores exceeds 40¢.

In Table 1.5 and Figure 1.2, we compare the average price at the Stop & Shop's IPL store to the average price at the Stop & Shop's non-IPL store, by product categories. Here we are excluding the second IPL store (Food Emporium), which enables us to control for possible cross-chain variation. The price difference figures we obtain here are slightly smaller than what we report in Table 1.4 (with the exception of the Baby Products and Food category), but otherwise, the pattern is quite similar. As before, the average price difference between the IPL and non-IPL stores is statistically significant with two exceptions, Frozen Foods and Dairy and Juices.

Finally, in the 11 panels of Figure 1.3, we compare the average price at the IPL and non-IPL stores by individual products. Here, we do not conduct a formal statistical test because the sample sizes are very small: for each product; the average price is computed using 8 observations for the IPL stores (4 visits, 2 stores) and 4 observations for the non-IPL store (4 visits, 1 store). Nevertheless, the figures on the diagram indicate that the average price in the IPL stores is higher than in the non-IPL store for 148 of the 165 products, that is, for 90 percent of the products included in our sample. Thus, our results hold for the overwhelming majority of the individual products as well.[27]

VI. Findings from Data Set II

The analysis of the first data set gave us a consistent, and we believe quite convincing evidence, that prices are systematically higher in IPL stores in comparison to non-IPL stores. As discussed in section IV, after completing the analysis of the first data set, we went back in the field to see if the pricing patterns found in data set I held across a wider variety of stores. Because we found that the first set of results were in general true for most product categories and for all four trips, and also in order to make the second round of the data collection process budget-wise

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[26] All the statistical tests we employ are two-sided, which yield more conservative *p*-values.

[27] The most notable exception was *Kraft Shake n' Bake Classic Italian Dressing*. It was priced at the Clifton, NJ, Stop & Shop 10¢–50¢ higher than at the Tarrytown, NY, Stop & Shop or at the Greenwich, CT, Food Emporium, across all 4 trips, even though the Greenwich Food Emporium and Tarrytown Stop & Shop face the IPL, while the Clifton Stop & Shop does not. The remaining exceptions are less remarkable in magnitude. We also found some variation in the pricing pattern for few products during one trip, but on the next trip the pattern reverted back to the predicted pattern.

feasible, we decided to reduce the number of the product categories sampled to two—condiments and household products – and to limit the number of visits to one. This enabled us to visit a wide variety of stores in the tri-state area of New York, New Jersey and Connecticut. During the second round of the data collection, we visited a total of 17 stores belonging to 7 different chains. Of the 17 stores, 10 are located in NY and are subject to an IPL, 2 are located in CT and also are subject to an IPL, and 5 are located in NJ and are not subject to IPL. Thus, we have 12 IPL and 5 non-IPL stores. See Tables 2.1 and 2.2. For details on these stores, their locations, and the surrounding areas, see Appendix II.

In Table 2.3 we compare the overall average price at the 12 IPL stores to the overall average price at the 5 non-IPL stores, where by overall we mean average over 15 products and 11 categories. The figures indicate that the average price at the IPL stores exceeds the average price at the non-IPL stores by 24.5¢ with a 95 percent confidence interval of [4.4¢-44.5¢]. This figure is statistically significant at the 5% level.[28]

In Table 2.4 and Figure 2.1 we compare the average price at the IPL stores to the average price at the non-IPL stores, by product categories. Here the averages are computed over 15 products. According to the figures, the average price at the IPL stores exceeds the average price at the non-IPL store in both categories, with 27.2¢ in the Condiments category and 21.8¢ in the Households products category. The difference is statistically significant for both categories, at 1% for Condiments and at 5% for Household products.

In Table 2.5 and Figure 2.2, we compare the average price at the IPL stores to the average prices at the non-IPL stores that belong to the same chain, by product category. We have four chains that operate stores in both, IPL and non-IPL areas. Thus, here we are excluding the stores that belong to chains that operate only one type of store (C Town, Food Emporium, and Shaws), which enables us to control for possible cross-chain variation. As in the data set I, the price difference figures we obtain here are smaller than what we report in Table 2.4, but again, the pattern is quite similar. Unlike the first data set, however, here the average price difference between the IPL and non-IPL stores is not statistically significant. Note here that the second sample, although useful for assessing the generalizability of our first round findings, has the usual

[28] The confidence interval here is much wider than in data set 1. The reason is a smaller sample: dataset 2 contains 510 observations in comparison to 1,980 observations in data set 1.

"small sample" limitations, making a formal statistical testing of some of our hypotheses practically impossible.[29]

Finally, in the 2 panels of Figure 2.3, we compare the average price at the IPL and non-IPL stores by individual products. As before, we do not conduct here a formal statistical test because the sample sizes are very small: for each product; the average price is computed using 12 observations for the IPL stores (12 stores) and 5 observations for the non-IPL stores (5 stores). Nevertheless, the figures on the diagram indicate that the average price in the IPL stores is higher than in the non-IPL stores for all 30 products, without exception.

Thus, we find that the results of the analysis of the second round data are similar to the results of the first round data. We conclude, therefore, that the IPL stores do in fact charge higher prices, on average, than the non-IPL stores, as the theory predicts. The average price difference per item between the two types of stores is $0.25.

Is a 25¢ difference big? As an absolute measure, a 25¢ difference per product may appear small. Consider, however, the fact the average product prices in our sample of non-IPL stores are $2.71 in data set I (see Table 1.3) and $2.50 in data set II (see Table 2.3). This implies that the percentage price difference between the two types of stores is about 9.2%–10.0%, which is substantial. If we use the average price based on a larger sample, we obtain similar figures. For example, the average product price in large US supermarket chains, during 2001 was about $2.08, which yields the price difference of about 12 percent between the two types of stores.[30]

To see one implication of this magnitude, consider the following – In 2002, food represented 14% of total Personal Consumption Expenditures (Council of Economic Advisers,

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[29] To see the differences between the two data sets and the implication of the sample size differences, compare the figures for the Condiments category in Tables 1.5 and 2.5 (for Stop & Shop). The average price difference between the IPL and the non-IPL stores in both happens to be the same, 0.167, yet it is statistically significant only in Table 1.5. To see the reason for this, note that In Table 1.5, the average IPL and the average non-IPL prices are computed using 60 observations each (averaged over 15 products and 4 visits). On the other hand, the average IPL and the average non-IPL prices in Table 2.5 are computed using only 15–30 observations each, depending on whether the chain operates one or two stores of the particular type. From Table 2.1, we can tell that A&P averages are computed using 30 observations each, Shop Rite averages—with 15 observations each, Path Mark averages—with 30 and 15 observations, respectively, and Stop & Shop—with 15 observations each. Thus, in the first data set, we computed these averages using at least twice as many observations (or even more) as in the second data set. This explains the lack of statistical significance

[30] The average price of $2.08 is based on the average price figure reported by Levy, et al (1997, p. 813, footnote 29). They report that during the 1991–1992 period, the average price in large US supermarket chains was $1.70, which, after adjusting for the 22.4 percent increase in the price level, as measured by the GDP deflator, from 1991 to 2001, yields $2.08.

2003). While grocery sales do not represent all food expenditures, they include some items that are not food, such as household goods and health and beauty items. If we take 14% as an approximation for grocery expenditures, then IPL laws reduce real incomes of residents of states with such laws by 1.4%, which is a significant amount.

VII. Costs-Benefit Analysis of the Item Pricing Laws

Now that we have measured the costs of IPLs in terms of the price increases they seem to cause, we next want to briefly compare them to the benefits of IPLs. Our major finding is that the costs we report in this study are at least an order of magnitude higher than the benefits that are reported in existing studies.

Recall that the primary benefit of the IPLs is that they supposedly help consumers notice price mistakes and prevent their occurrence. The main concern of consumers seems to be price overcharges at the cash register without knowledge of the overcharge. In order to assess the benefits of the IPLs, therefore, we will rely on the price accuracy studies, which were discussed in section II above.

We will consider two surveys of pricing accuracy. The first is the 1993 survey of the *Money* magazine, and the second is the 1998 "Price Check II" of the FTC. We choose these two because they report the extreme values of the total overcharges. The *Money* magazine study reported the highest amount of overcharge while the FTC's study reported the lowest amount of overcharge per item purchased (amongst the four studies we discussed in section II). By choosing the two extreme values we can provide a range for the IPL benefit by bounding it from above and below.

We should note, however, that the FTC's "Price Check II" study is the most relevant for our case. This is because it was conducted in 1998 while the other studies date further back. We collected our data in 2001. Therefore, given the finding that the pricing accuracy has been increasing over time across the board and especially in the retail supermarkets industry, the 1998 study of the FTC appears most relevant for us.

We nevertheless conduct the analysis using the two extreme findings. As a measure of the cost of IPL, we will use the finding that the law leads to a $0.25 price increase per item.

In the *Money* magazine survey run in 1993,[31] a sample of 10 randomly selected items were checked in 27 major supermarket chain stores in 23 states over the course of 2 months. The study found that 30 percent of the stores overcharged, while only 7 percent undercharged. At the stores that overcharged, 10% of the sample was overcharged. The *Money* article did not give the average size of the overcharges, but it did mention three separate examples of overcharges that ranged from $0.30 to $1.08, which implies an average overcharge of $0.069 (the average of $0.30 and $1.08, times 10%). According to our cost calculations, IPL stores charge $0.25 more per item, on average. Assuming that the item pricing protects the consumers from ever being overcharged, then it gives them a net benefit of $0.069 per item, while it costs them $0.25 per item. Combining these two figures leads to a net loss to consumers of $0.181, or 18.1¢ per item. Thus, the cost of IPL exceeds its benefit by a factor of 3.6, and that is a conservative estimate. If we factor in the undercharges, then the net loss will increase further.

In "Price Check II" run in 1998,[32] a sample of 107,096 items were checked for pricing accuracy in 1,033 stores, of which 303 were retail food stores where 32,753 items were checked. According to "Price Check II," 1.36% of the items checked in food stores were overcharges and 1.06% undercharges. The average overcharge per item was $0.66 and the average undercharge per item was $0.73. Thus, according to "Price Check II," in a sample of 100 items, 1.36 items are overcharged, on average. At $0.66 per overcharge, that is a total overcharge value of $0.90 per 100 items, or $0.009 per item, which represents the maximum benefit consumers can gain from item pricing according to this study, assuming that the IPL is 100 percent effective in preventing price overcharges. Comparing it to the cost of IPL, $0.25, we conclude that the IPL yields the consumers a net loss of 24.1¢ per item. In other words, the cost of the IPL exceeds its benefit by a factor of over 27! Again, if we factor in the 1.06 percent undercharges, then the IPL's benefit is wiped out almost completely. This would eliminate the ability to garner any benefits from item pricing altogether.[33]

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[31] O'Connell, "Don't Get Cheated," 132-138.
[32] FTC, "Price Check II," p. 9.
[33] Three of the four studies discussed in section II, showed that, on average, undercharges exceeded overcharges in total value. Note also that if we believe that consumers are honest and dislike any price mistake, even if it is in their favor, then total benefit of the IPL would at most reach 0.009+0.0077 = 0.017 (where 0.0077 is obtained by multiplying 1.06 by 0.73). *Money* magazine study does not report average undercharge. However, if we assume that average undercharge equals the average overcharge, and we again assume that the shoppers are 100 percent

We infer that the costs incurred by consumers because of the item pricing laws are at least 3.6 times higher at best, and perhaps as much as 27 times higher, than the benefits these laws provide. We believe the latter is closer to the truth. But even the more conservative estimate points towards the need to seriously reconsider the IPL's efficacy and usefulness.

Moreover, all consumers in localities or counties with IPLs pay the costs of the laws in the form of higher prices, but only a few will ever reap their intended benefits. Not all consumers are overcharged at cash registers, and not all consumers will catch overcharges even with a price label on an item. Further, the consumers are not equally sensitive to price mistakes, especially if they are small.[34] But all consumers will pay higher prices for item pricing. If item pricing protects consumers from overcharges, and stores overcharge between 1–2 percent of the time (as the "Price Check" studies find), then 98–99 percent of the time consumers are not overcharged. They, therefore, cannot benefit from item pricing, but they still have to pay the higher prices caused by item pricing.

Before concluding, we should mention an important caveat due to the incomplete nature of our measurements. In conducting the cost-benefit analysis of the IPLs, we have completely focused on the IPL's primary costs and primary benefits. For example, on the benefit side of the IPL, we have focused only on what the proponents of the law claim to be the IPL's primary benefit: prevention of pricing overcharges. As mentioned in the introduction, however, people have cited other, secondary, benefits of the law. For example, they have argued that without item pricing, price comparison would be difficult and therefore, it would be easier for stores to raise prices because consumers cannot remember the price of every item they buy.[35] In addition, it has been argued, shelf price labels are often difficult to read, and misplaced items make shopping difficult because of the difficulty of identifying their price.

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honest (by say correcting the cashier even if the pricing error favors them), the expected benefit of the IPL will double to about 0.138. The cost of the IPL in this case will still be twice as much as the benefit.

[34] See, for example, Chen, et al. (2001), Levy, et al. (2002), and Sims (2003).

[35] However, Dickson and Sawyer (1986) find that item-pricing requirement does not lead automatically to better price recall. Also, various consumer advocate groups often make statements suggesting that the retailers will have incentives to take advantage of consumers without item pricing requirements by frequent overcharging. However, there are also incentives not to overcharge. Consider the following report: "When Payless Drug Store and Eagle Hardware & Garden in Seattle were criminally cited recently because scanner prices didn't match shelf prices, the story made the front page of the Seattle Times. The fines facing the stores were minimal, ranging from $20 to $200, but the damage from a public relations standpoint was considerable" Hennessy (1994).

It is worthwhile noting here, that although the proponents of the IPLs are clearly motivated by consumers' best interest, it is not obvious that they are representing all consumers' opinion when it comes to the IPLs. For example, the Washington Post reported that "… out of 60 shoppers questioned, a majority of three to one favored elimination of item prices as long as prices stayed lower. Only one-sixth of the people surveyed preferred individual item pricing even if prices were not lowerred."[36]

We agree that these are all potential benefits of IPLs. Our inability to measure these secondary benefits, therefore, must have likely biased downward our measure of the IPL's benefit. On the other hand, we have only focused on the primary costs of the IPLs ignoring various secondary costs the laws impose. State and local governments spend substantial amount of resources monitoring the retailers' compliance with the item pricing requirements. For example, in the State of Massachusetts the cost of monitoring pricing accuracy exceeds $600,000.[37] Similarly, the State of Michigan has been devoting a substantial amount of money to monitoring the pricing accuracy of Michigan retailers. For example, the state has been conducting annual price check surveys for several years in a row.[38] Other states and localities have been similarly conducting costly surveys and monitoring activities. In addition, the regulators need to devote resources to prosecuting violators of the IPLs.

From a practical point of view, we do not know how we could measure some of these secondary costs of the IPL. The measurement of the secondary benefits of the IPL seems to be even harder.

From the conceptual point of view, it is unclear how the exclusion of these secondary costs and benefits may have biased our findings. It likely depends on the relative magnitude of unmeasured costs and benefits. We believe, however, that as a first approximation, our analysis

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[36] Source: "Farewell to Item Pricing?" p. 11.

[37] According to the Massachusetts Government home page, its "Division of Standards is responsible to enforce the item pricing law and the unit pricing regulations… The division administers and awards grants to local agencies for the purpose of enforcing scanner and item pricing accuracy in retail stores. This year the item pricing scanner accuracy grants will exceed $600,000 dollars, which doubles the amount of money allocated for this purpose by the legislature the previous year. Grants for this purpose last year resulted in 18 agents being authorized for enforcing scanner accuracy laws. These agents inspected over 1,800 stores. Source: www.state.ma.us/standards/aboutus.htm.

[38] "Few Scanner Errors in State's Pricing Survey," by Dee-Ann Durbin of the Associated Press, December 4, 2002, *Detroit Free Press*.

and the resulting figures are reasonable, assuming that we have correctly identified the primary costs and benefits of the law.

VIII. Conclusion

Taken together, our findings offer consistent evidence that stores facing IPLs charge higher prices in comparison to the stores not facing these laws. We believe this is the first direct evidence on the inefficiencies inherent in IPLs. We conclude, therefore, that the item pricing laws may be very inefficient, not only from the perspective of retailers, but especially from the perspective of consumers: the item pricing laws seem to harm the consumers greatly, even though the primary reason for creating these laws is to protect them. We suggest, therefore, that the economic inefficiencies caused by IPLs should be more carefully considered in the public policy debates on these laws. This is particularly important now, as several states and counties are in the midst of discussing the renewal (with or without revisions) of the existing IPLs., There are other questions that can be asked about such laws. It may be useful to explore the theoretical implications of price adjustment costs that vary with quantity sold. Further, more empirical work can be done using data from other stores, products and markets. This will be useful for determining whether or not our findings generalize to other localities and counties with item pricing laws.

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Appendix I. Item Pricing Laws in New York and Connecticut

A) New York's Item Pricing Law

New York's item pricing law is defined in Section 214-i of Article 17 of the Agriculture and Markets Chapter in the New York State Consolidated Laws. The law begins by stating that although scanning technology is efficient and might make it economically advantageous for supermarkets to remove price markings on individual items, the legislature finds "that price constitutes an indispensable ingredient to a consumer's right to all reasonable information in order to make an informed purchase choice." The law finds that item pricing is necessary to protect consumers even while electronic universal product code check out systems are further developed. It goes on to require that any store that sells food at retail is required to clearly label each consumer commodity it sells with its selling price. Certain goods, like milk, eggs, produce, and single packs of gum, are excluded from the item-pricing requirement. In addition, if the store has under three employees or grosses less than three million dollars in revenue annually, then it is exempt from the law. The law also says that a store cannot charge a price for an item that is higher than any item, shelf, sale, or advertised price of the item.

Next, the law details violations, penalties, and enforcement. Enforcement is left to municipal consumer affairs offices or to the municipal directors of weights and measures. If a store is inspected, then a sample of no less than fifty of the commodities subject to the law in a store are to be checked. For the first four violations, each penalty will be $50; $100 for each of the next twelve violations; and $150 for each subsequent violation, but the maximum penalty for the first inspection of the year can be no more than $5,000. However, if in subsequent inspections in a twelve month period more violations are found, then the penalties will be doubled and there will be no maximum penalty. Failure to have a clearly readable price on three identical items of the same commodity is considered a violation. The law also allows the enforcement agent to compare the item, shelf, sale, or advertised price of an item with the price that is displayed in the computer at check out. In the case of overcharges, penalties ranging from $50 to $300 will be levied depending on the number of violations, and there is no maximum penalty. In subsequent inspections in a twelve-month period, the fines will double for violations. An inspector also has

the authority to issue a "stop-removal order," which would prohibit the store from selling particular items until it can correct the violations it has with those items.[39]

B) Connecticut's Item Pricing Law

Connecticut's item pricing law is similar to New York's, although it is less detailed. Section 21a-79 of the General Statutes of Connecticut defines the state's item pricing law. Currently, there is a bill being considered in the Connecticut General Assembly that would update its item pricing law. A consumer commodity is defined by Connecticut as "any food, drug, device, cosmetic or other article, product or commodity of any other kind or class, except drugs sold only by prescription, which is customarily produced for sale to retail sales agencies or instrumentalities for consumption by individuals, or use by individuals for purposes of personal care or in the performance of service ordinarily rendered in or around the household, and which usually is consumed or expended in the course of such consumption or use."[40]

Connecticut's item pricing law states that any establishment that utilizes universal product coding in totaling a retail customer's purchases of consumer commodities, shall mark each consumer commodity with its retail price. It has the same product exceptions as New York's law, but also adds to its list of exceptions alcoholic beverages and carbonated soft drinks. It goes on to state that the item pricing requirements will not apply if the Commissioner of Consumer Protection allows a store to use an electronic pricing system.

Connecticut's penalty for price accuracy errors is not as severe as New York's. It states that if an item is advertised as being on sale, then each item does not need to be remarked at the new price, but a sign indicating the sale price needs to be put adjacent to the items. If at the checkout counter a consumer is overcharged for the item on sale, then it will be given to the consumer for free.

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[39] New York State Consolidated Laws, "Item Pricing," Agriculture and Markets Chapter, Article 17, Section 214-I, Bill SO3847 (2001).

[40] Connecticut General Assembly, "Unit Pricing Statutes and Regulations," General Statutes of Connecticut, Section 21a-73.

The Commissioner of Consumer Protection is given the authority to enforce Connecticut's item pricing law. Penalties for violations of the law can be either a warning citation, a civil penalty, or a fine. For the first offense, the civil penalty can be no more than $100 and the fine no more than $200, and there is no minimum specified. For subsequent offenses, the civil penalty can be no more than $500 and the fine no more than $1000, and there is no minimum specified. There are also no maximum amounts of penalties and fines specified.[41]

Connecticut's item pricing law does not have strict penalties for price accuracy errors in stores, while New York's item pricing law does. Connecticut's law also does not exempt certain businesses that gross under a certain amount in sales, like New York's law does. Connecticut's law simply says that any establishment that uses universal product coding is subject to the item pricing law. New York gives enforcement authority to municipalities, while Connecticut gives enforcement authority to a central state office. Penalties specified in both laws are severe for violations, but only New York specifically allows the enforcing agent to put an immediate stop on the sale of goods. New York's law details a structured penalty scheme, while Connecticut's law gives the enforcement agent more discretion.

Perhaps the most significant difference between the item pricing laws in each state though is that Connecticut has the electronic pricing system exception while New York does not. In fact, Connecticut is a unique state regarding item-pricing laws. In 1992, the Connecticut legislature exempted stores from its item pricing law if the stores installed electronic pricing systems. The idea is that electronic pricing systems eliminate errors. Electronic labels that appear beneath goods on shelves are connected to the central computer of the supermarket. So when the price of an item is changed in the central computer, the new price is automatically displayed in the electronic label beneath that item. Besides saving thousands of labor hours and label and printing costs each year, supermarkets that use this system reduce the chances of human and scanning price errors that cause consumer mistrust and fines levied by the state. Supermarkets all over the country are increasingly using electronic pricing systems as the technology improves and its costs

[41] Connecticut General Assembly, "An Act Requiring the Display of Prices on Retail Items," General Statutes of Connecticut, Section 21a-79, Committee Bill No. 5135 (2001).

go down. However, in Connecticut especially, supermarkets are installing this technology to be exempt from item pricing laws which otherwise increase their annual costs by thousands of dollars.

Appendix II. Information on the Stores Sampled

A) Data Set 1

Stop & Shop, NY, NJ – In 1996, Stop & Shop became a wholly owned subsidiary of Royal Ahold NV, the fourth largest food retailer in the world. Headquartered in the Netherlands, Royal Ahold NV has supermarket companies in the United States, Europe, Latin America and Asia. Worldwide, the company employs more than 300,000 people and owns 4,000 stores with annual sales of approximately $35 billion. Today, Stop & Shop is a multibillion-dollar corporation and the largest food retailer in New England, operating two hundred and seventy-four supermarkets in five states: Connecticut, Massachusetts, New Jersey, New York, and Rhode Island. Stop & Shop employs 41,000 associates in its network of stores, distribution centers, manufacturing plants, and offices, which stretch across more than 180 communities.[42]

Food Emporium, CT – With forty-two stores in Manhattan and upscale neighborhoods in Westchester, Long Island, Northern New Jersey, and Connecticut, Food Emporium is a preeminent supermarket in the tri-state area. Food Emporium's parent company is The Great Atlantic & Pacific Tea Company, or A&P for short. The Great Atlantic & Pacific Tea Company, based in Montvale, New Jersey, operates combination food and drug stores, conventional supermarkets, and limited assortment food stores in sixteen U.S. states, the District of Columbia, and Ontario, Canada, under the A&P, Waldbaum's, Super Foodmart, Food Emporium, Super Fresh, Farmer Jack, Kohl's, Sav-A-Center, Dominion, Ultra Mart, and Food Basics trade names. By February 26, 2000, the Company operated 750 stores and served 65 franchised stores.[43]

Tarrytown, New York and the surrounding Hudson Valley river towns in southern Westchester County are quiet upper class suburbs of New York City. See Chart 1. The Stop & Shop in Tarrytown is located right on the border between Tarrytown and Irvington (another small upper class town). There are also lower income parts of Tarrytown, and residents from these areas may

[42] Stop & Shop, About Us, http://www.stopandshop.com.
[43] The Great Atlantic and Pacific Tea Company, "Our Company," http://www.aptea.com.

shop at the Stop & Shop along with residents from the higher income areas of Tarrytown and Irvington.

Clifton, New Jersey is a small suburban city of New York City that is surrounded by many high-income towns. It is located in southern Passaic County, New Jersey, right near the border of Bergen County, New Jersey. Bergen County, like Westchester County in New York, has many upper class towns and cities that are less than twenty miles from New York City. Due to the location of the Stop & Shop in Clifton, New Jersey, customers of the store most likely reside in these surrounding suburbs of Passaic County and Bergen County.

Greenwich, Connecticut, where the Food Emporium supermarket is located, is the most upper class and prestigious location of all the others. Greenwich is located in southwestern Connecticut and is approximately the same distance out of New York City as Tarrytown. It has many areas of extreme wealth, where rich families have lived for generations. In fact, the Food Emporium in Greenwich is settled snuggly in between a Porsche and a Ferrari dealership with a Rolls Royce and a Mercedes dealership directly across the street.

B) Data Set 2

Stop & Shop in Tarrytown, NY – From study 1

C Town in Ossining, NY – Located in a solo building in a small commercial area of a residential suburban community in northeastern Westchester County. The store is of a relatively small size for a large chain. Ossining, while suburban, has lower income neighborhoods that are more predominant than in an area like Tarrytown, NY.

A&P in White Plains, NY – Located in a strip mall in a heavy commercial area of the small city of White Plains. The store is large. While many of the residents of White Plains are of lower income, we suspect that due to this store's location near higher end suburban communities,

shoppers may come from these areas as well. White Plains is an urban city similar in size and look to Buckhead (Atlanta), but not as fancy.

Path Mark in Hartsdale, NY – Located in a strip mall in a heavy commercial area off of a busy main road that goes through southern Westchester. The store is of an average size. Hartsdale is a suburban, middle income town that is near high income and low income communities.

A&P in Scarsdale, NY – Located in a solo building on the same main road that the Path Mark in Hartsdale is on, but much farther down. The store is of an average size and is in a very commercial area. Scarsdale is a very high-income community, one of the highest, in Westchester County. Scarsdale is also large, and this store is not very near to all of the higher income areas of Scarsdale. It is close to Yonkers, NY, and we suspect that the shoppers are a mix of a few high income, mostly middle income, and a few lower income people.

Path Mark in Yonkers, NY – Located in a part of a strip mall in a heavily commercial area just off of the same main road that the last 2 stores are on, but much farther down. The store is of an average size. Yonkers is relatively large and has a mix of middle and low-income neighborhoods, in an urban environment. This store is near both of these types of neighborhoods, and we suspect it gets an equal number of shoppers from both.

Food Emporium in Hastings, NY – Located in a large solo building in a small and light commercial area of a small residential and suburban town in the southern part of Westchester. Hastings is a high income, small town on the Hudson River, with many quiet suburban areas, and while close to Yonkers, Hastings is a good distance away from lower income neighborhoods.

Shop Rite in Monsey, NY – Located in a strip mall in a medium commercial area that is right in the middle of many suburban areas. Monsey is in Rockland County, which is on the other side of the Hudson River from Westchester County. Monsey, which is mostly middle income, has a mix of communities from blue collar workers to retired senior citizens to an African American neighborhood to an ultra-orthodox Hassidic Jewish community. This supermarket seemed to be

the largest one and the main one in the area, so we suspect its shoppers come form all of these areas.

Food Emporium in New York City – Located in the Upper East Side (Sutton Place) – This is one of the most expensive places to live in the entire world (Sutton Place). Many of the apartment buildings here have apartments worth as much as tens of millions of dollars. Many celebrities who live in NYC on the Upper East Side are known to frequent this store. It is located on 1st Avenue right underneath the 59th Street Bridge, and is large in size (it is the biggest supermarket in NYC that we have ever seen, and just might be the biggest in size). Needless to say, most of the shoppers are rich New Yorkers.

Food Emporium in Armonk, NY – Located in a small solo store in a small commercial area. Armonk is a small, affluent, suburban town in northwestern Westchester right near the Connecticut border. Not near any low-income areas.

A&P in Montvale, NJ – Located in a medium sized solo building off of a main road in a residential and suburban area. This is a middle to high income town. It is right near the New York border (Rockland County) in northeastern New Jersey in Bergen County. Bergen County is one of the most high end counties in New Jersey, if not the highest end, and is the closest county to NYC.

Shop Rite in Rochelle Park, NJ – Located in a small building in a mixed commercial and residential suburban town. It is part of a strip mall. The area seems to be more middle income and with smaller homes than many of the other areas of Bergen County.

A&P in Pompton Lakes, NJ – Located in a very large, solo building. It is located off of two main roads/highways, but is in a very suburban and residential area. Pompton Lakes is in the central part of northern New Jersey, which is Passaic County, and is not close to NYC. The area seems to be higher than middle income, but lower than high income. While suburban, the area is more spread out than the tighter suburban areas of southern Westchester County, NY.

Path Mark in Montclair, NJ – Located in a medium sized building in an underground commercial mall. Montclair is an urban neighborhood that is almost entirely lower income. In fact the area resembles an inner-city ghetto. There is graffiti on all of the buildings and many burned and abandoned buildings around. Montclair is in Essex County, NJ. The store itself seemed to be in need of repair and had chipped paint and an unsightly ceiling with low hanging pipes. We don't think any of the shoppers here are of high income, with maybe a few being middle income, and most being low income.

Stop & Shop in Clifton, NJ – From study 1.

Food Emporium in Greenwich, CT – From study 1.

Shaws in New Canaan, CT – This store is very small for a supermarket (the smallest we went to). Shaws is also the smallest chain of all the chains we went to, having the fewest number of stores and being exclusively in CT. This store is in a small, quaint commercial area. It is actually a very pretty store in a quiet shaded location. New Canaan is a very high income and small and quiet suburban town, and is around 10 miles north of Stamford.

Chart 1: The Tri-State Area of New York, New Jersey and Connecticut

Note: Clifton, New Jersey, is in the bottom left, Tarrytown, New York, is in the top middle, and Greenwich, Connecticut, in the top right.
(Scale 1 inch=13.5 KM)

Table 1.1: Stores from which prices were collected for data set 1

IPL	NO-IPL
S1: Stop & Shop, Tarrytown, NY – 4 trips S16: Food Emp., Greenwich, CT – 4 trips	S15: Stop & Shop, Clifton, NJ – 4 trips

IPL = Item Pricing Law stores; NOIPL = Non Item Pricing Law stores

Table 1.2: Categories and products included in data set 1

Category and products in the category	Index	Category and products in the category	Index
Beverages		Breakfast/Cereals	
Coca Cola Classic – 2L bottle	B1	Kellog's Apple Jacks – 15oz	BF1
Diet Sprite – 2L bottle	B2	Kellog's Corn Pops – 15oz	BF2
Vintage Seltzer Water – 2L bottle	B3	Kellog's Special K – 12oz	BF3
Pepsi Cola – 12/12oz cans	B4	GM Cheerios – 15oz	BF4
Barq's Root Beer 12/12oz cans	B5	GM Cocao Puffs – 13.75oz	BF5
Dr. Brown's Cream Soda 6/12oz cans	B6	GM Lucky Charms –20oz	BF6
Poland Spring – 1 gallon container	B7	Post Raisin Bran – 20oz	BF7
Evian – 1L bottle	B8	Post Fruity Pebbles – 13oz	BF8
Lemon Lime Gatorade – 64oz bottle	B9	Nature Valley Granola Oats 'N Honey – 8.9oz	BF9
Arizona Iced Tea (boxed drinks) – 3/12oz	B10	Kellog's Nutri Grain Blueberry Bars – 8 bars	BF10
Fruit Punch Capri Sun – 10/6.75oz	B11	Kellog's Variety Pack – 10/1.5oz	BF11
V8 Vegetable Juice – 46 oz can	B12	Kellog's Pop Tarts Frosted Strawberry – 14.7oz	BF12
V8 Splash Tropical Blend – 64oz bottle	B13	Nestle Quick Drink Mix – 15oz can	BF13
Juicy Juice Fruit Punch – 46oz can	B14	Aunt Jemima Original Pancake Mix – 2lb box	BF14
Tropican Twisters Tropical Fruit – 1.75L bottle	B15	Aunt Jemima Pancake Syrup – 24oz bottle	BF15
Frozen Foods		Dairy and Juices	
Swanson Turkey (white meat) – 11.75oz	FRZ1	Farmland S.R. 1% Plus Lowfat Milk – ½ gallon	DR1
Swanson Salisbury Steak – 13oz	FRZ2	Lactaid 100 Fat Free Milk Lactose Free – 1 quart	DR2
Weight Watchers Smart Ones Basil Chicken – 9.5oz	FRZ3	Nesquick Chocolate Milk – 64oz	DR3
Weight Watchers Smart Ones Mac & Cheese – 10oz	FRZ4	Dannon Light Yogurt Cherry Vanilla – 8oz container	DR4
Healthy Choice Medly's Roast Turkey Breast – 8.5oz	FRZ5	Dannon Rasberry – 8oz container	DR5
Haagen Dazs Vanilla Ice Cream – 1 pint	FRZ6	Breakstone's Fat Free Cottage Cheese – 16oz	DR6
Stouffers Lean Cuisine Swedish Meatballs – 10oz	FRZ7	Land O' Lakes Salted Whipped Light Butter – 8oz	DR7
Stouffers Hearty Portions Salisbury Steak – 16oz	FRZ8	Kraft Fat Free American Cheese Singles – 16 slices	DR8
Green Giant Frozen Niblers Corn on the Cob – 4 ears	FRZ9	Philadelphia Cream Cheese – 8oz	DR9
Ego Blueberry Waffles – 16 count – 19.8oz	FRZ10	Nestle Carnation Coffemate – 16oz	DR10
Lender's Plain Bagels – 6 count	FRZ11	Breakstone's Fat Free Sour Creem – 16oz	DR11
Original Tombstone Supreme – 22.85oz	FRZ12	Tropicana Pure Premium Homestyle OJ – 64oz	DR12
Celentano Manicotti – 14oz bag	FRZ13	Welch's Fruit Cocktail White Grape Peach – 64oz	DR13
Ore Ida Golden Twirls – 28oz	FRZ14	Dole 100% Pineapple Juice – 64oz	DR14
Bird's Eye Mixed Vegetables – 10oz	FRZ15	Tropicana Pure Premium Grovestand OJ – 96oz	DR15

Table 1.2 (contd.): Categories and products included in data set 1

Category and products in the category	Index	Category and products in the category	Index
Condiments, Sauces & Spreads		**Soup/Canned Foods**	
Grey Poupon Dijon Mustard - 8oz jar	C1	Campbell's Chicken Noodle Soup - 10.75oz	SP1
Hellmann's Mayonnaise - 32oz jar	C2	Progresso Chicken & Wild Rice - 19oz	SP2
Heinz Ketchup - 24oz squeeze bottle	C3	Progresso Minestrone Soup - 19oz	SP3
Skippy Creamy Peanut Butter - 18oz	C4	Campbell's Cream of Broccoli - 10.75oz	SP4
Smucker's Concord Grape Jelly - 12oz Jar	C5	Campbell's Family Size Tomato Soup - 18.7oz	SP5
Kraft Thousand Island Dressing Free - 8oz	C6	Progresso New England Clam Chowder - 19oz	SP6
Wish Bone Fat Free Ranch Dressing - 8oz	C7	Campbell's Vegetarian Vegetable - 10.75oz	SP7
Domino Granulated Sugar - 2lb box	C8	Goya Black Beans - 15.5oz can	SP8
Equal Sugar Substitute - 50 count	C9	Ortega Thick & Chunky Medium Salsa - 16oz	SP9
Jello Cherry - 3oz box	C10	Dole Sliced Pineapple - 20oz can	SP10
Heinz Distilled White Vinegar - 32oz	C11	Del Monte Pear Halves - 29oz can	SP11
Pam Lemon Fat Free Cooking Spray - 6oz can	C12	Bumbe Bee Solid White Tuna in Water - 6oz can	SP12
A1 Steak Sauce Bold & Spicy - 10oz jar	C13	Starkist Chunk Light Tuna in Oil - 6oz can	SP13
Heinz Barbecue Sauce - 18oz bottle	C14	Chef Boyardee Beef Ravioli - 15oz can	SP14
Kraft Shake 'n Bake Classic Italian - 5.75 oz	C15	Mott's Homestyle Chunky Apple Sauce - 23 oz jar	SP15
Baby Products & Foods		Health & Beauty Aides	
Huggies Pull Ups for Boys 32 - 40lb's - 26 count	BBY1	Crest Multi Care Fresh Mint Toothpaste - 6.2oz tube	HLT1
Huggies Natural Care Scented Wipes - 80 count	BBY2	Scope Peppermint - 33oz	HLT2
Pampers Diapers Newborn to 10lb - 48 count	BBY3	Right Guard Sport Deodorant Gel Cool Scent - 3oz	HLT3
Luvs Diapers Ultra Leakguards #3 - 72 count	BBY4	Sudafed Max Nasal Decongestant - 24 tablets	HLT4
Beechnut Stage 2 Apples & Bananas - 4oz	BBY5	Halls Cough Drops Black Cherry - 25 count	HLT5
Earth's Best Organic Apples - 4oz	BBY6	Tylenol Extra Strength Gelcaps - 100 count	HLT6
Gerber 100% Apple Juice - 32oz bottle	BBY7	Johnson & Johnson Band Aids - 60 count	HLT7
Gerber Stage 1 Pears - 2.5oz	BBY8	Pepto Bismol - 12oz	HLT8
Enfamil Lactofree Infant Formula - 13oz can	BBY9	Bausch & Lomb Saline Solution - 12oz	HLT9
Johnson & Johnson Baby Shampoo - 15oz	BBY10	Oxi Max Cleansing Pads - 55 count	HLT10
Johnson & Johnson Baby Powder - 15oz	BBY11	Thermasilk Moisturizing Shampoo - 13oz	HLT11
Gerber Cereal for Baby Rice with Banana - 8oz	BBY12	Head & Shoulders Dandruff Shampoo Normal - 15.2oz	HLT12
Beechnut Cereal for Baby Oatmeal - 8oz	BBY13	Barbasol Original Shaving Cream - 11oz can	HLT13
Gerber Graduates Veggie Crackers - 4oz	BBY14	Dial Liquid Antibacterial Soap Refill - 15oz bottle	HLT14
Beechnut Table Time Mac & Cheese - 6oz	BBY15	Lever Soap 2000 - 2/4.5oz bars	HLT15

Table 1.2 (contd.): Categories and products included in data set 1

Category and products in the category	Index	Category and products in the category	Index
Candy & Snacks			
		Paper Products, Bags & Pet Supplies	
Planter's Mixed Nuts - 11.5oz can	CND1	Brawny Towels Thirsty Roll - 3 rolls	PAP1
Sun Maid Raisins - 9oz	CND2	Kleenex Cold Care Ultra - 70 count	PAP2
Sunsweet Pitted Prunes - 24oz	CND3	Vanity Fair 2 Ply Napkins - 100 count	PAP3
Hershey's Kisses Milk Chocolate - 8oz bag	CND4	Charmin Big Squeeze - 9 rolls	PAP4
Trident Original Sugarless Gum - 8/5 stick packs	CND5	Hefty Cinch Sak Trash Bags - 20 bags	PAP5
Rold Gold Pretzels Fat Free - 15oz	CND6	Glad Tall Kitchen Bags Quick Tie - 15 bags	PAP6
Wise B.B.Q. Potato Chips - 5.5oz	CND7	Ziploc Sandwich Bags - 100 bags	PAP7
Chips Ahoy Chocolate Chip Cookies - 12oz bag	CND8	Reynolds Wrap Aluminum Foil - 50 sq. feet	PAP8
Oreo Cookies - 1lb bag	CND9	Ziploc 1 Gallon Freezer Bags - 30 bags	PAP9
Pepperidge Farm Milanos - 6oz bag	CND10	Dixie Flatware Spoons - 50 count	PAP10
Pepperidge Farm Goldfish Cheddar - 6oz bag	CND11	Dixie Printed Bathroom Cups - 100/5oz	PAP11
Wheat Thins Original - 10oz box	CND12	Purina Dog Chow - 4.4lb bag	PAP12
Nabisco Ritz Bits Sandwich Crackers - 10.5oz box	CND13	Milk Bone Small - 24oz box	PAP13
Quaker Chocolate Chip Granola Bars - 10 bars	CND14	Purina Cat Chow - 56oz box	PAP14
Orville Redenbacher's Light Popcorn - 3/3.5oz bags	CND15	Fresh Step Cat Litter Scoop - 7lb bag	PAP15
Households			
Tide Ultra Liquid Detergent - 50oz	H1		
Downy Fabric Softener Mtn. Spring - 40 count	H2		
Clorox Liquid Bleach - 1 quart	H3		
Palmolive Original Dishwashing Liquid - 28oz bottle	H4		
Glade Rainshower - 9oz	H5		
Drano Build Up Remover - 32oz	H6		
Tilex Mildew Stain Remover - 32oz spray	H7		
Clorox Cleanup with Bleach - 32oz	H8		
Brillo Steel Wool Soap Pads - 18 count	H9		
Lysol Disinfectant Original - 12oz spray	H10		
Pledge Clean and Dust - 12.5oz spray	H11		
Fantastic All Purpose - 22oz	H12		
Windex Glass Cleaner - 26oz	H13		
Mr. Clean and Top Job with Ammonia - 40oz	H14		
Old English Lemon Polish - 12.5oz spray	H15		

Table 1.3: Comparison of the average prices of IPL and NOIPL stores in data set 1 (all stores)

	Mean (Std. Err.)	Mean Diff. (Std. Err.)	Lower Bound	Upper Bound	t
IPL	2.965 (0.020)	0.252 (0.021)	0.203	0.300	11.721***
NOIPL	2.714 (0.008)				

***p≤0.01; Confidence interval calculated at 95%

Table 1.4: Comparison of average category prices of IPL and NOIPL stores in data set 1 (all stores)

Category	Mean	(Std. Err.)	Mean Diff	(Std. Err.)	Lower Bound	Upper Bound	t
Beverage							
IPL	2.431	(0.025)	0.298	(0.032)	0.227	0.369	9.411***
NOIPL	2.133	(0.020)					
Breakfast							
IPL	3.389	(0.020)	0.311	(0.032)	0.236	0.385	9.836***
NOIPL	3.078	(0.025)					
Frozen							
IPL	2.916	(0.026)	0.074	(0.031)	0.005	0.142	2.397**
NOIPL	2.842	(0.017)					
Dairy							
IPL	2.593	(0.031)	0.102	(0.034)	0.026	0.177	3.034**
NOIPL	2.492	(0.013)					
Condiments							
IPL	2.304	(0.035)	0.259	(0.036)	0.175	0.343	7.159***
NOIPL	2.045	(0.008)					
Soup							
IPL	1.497	(0.016)	0.242	(0.019)	0.200	0.283	13.055***
NOIPL	1.255	(0.009)					
Baby							
IPL	4.373	(0.072)	0.090	(0.076)	-0.083	0.264	1.191
NOIPL	4.283	(0.024)					
Health							
IPL	3.854	(0.039)	0.432	(0.046)	0.329	0.535	9.337***
NOIPL	3.422	(0.025)					
Candy							
IPL	2.736	(0.062)	0.262	(0.062)	0.116	0.409	4.245***
NOIPL	2.474	(0.002)					
Paper							
IPL	3.355	(0.051)	0.297	(0.056)	0.170	0.423	5.252***
NOIPL	3.058	(0.025)					
Households							
IPL	3.172	(0.033)	0.402	(0.050)	0.286	0.517	8.074***
NOIPL	2.770	(0.037)					

*** p≤0.01, ** p≤0.05, * p≤0.10; Confidence interval calculated at 95%

Table 1.5: Comparison of average prices by categories from 4 trips,
between Stop & Shop, Tarrytown NY (IPL) and Stop & Shop, Clifton NJ (NOIPL)

Category	Store	Mean	(Std. Err.)	Mean Diff.	(Std. Err.)	Lower bound	Upper bound	t
Beverage	IPL	2.388	(0.241)	0.255	(0.076)	0.092	0.418	3.347***
	NOIPL	2.133	(0.268)					
Breakfast/Cereal	IPL	3.375	(0.197)	0.297	(0.077)	0.132	0.461	3.871***
	NOIPL	3.078	(0.201)					
Frozen Foods	IPL	2.860	(0.238)	0.018	(0.076)	-0.145	0.182	0.241
	NOIPL	2.842	(0.238)					
Dairy & Juices	IPL	2.524	(0.285)	0.033	(0.073)	-0.124	0.190	0.446
	NOIPL	2.492	(0.301)					
Condiments, Sauces & Spreads	IPL	2.213	(0.251)	0.167	(0.063)	0.033	0.301	2.672**
	NOIPL	2.045	(0.245)					
Soup/Canned Foods	IPL	1.470	(0.147)	0.215	(0.046)	0.116	0.313	4.673***
	NOIPL	1.255	(0.138)					
Baby Products & Foods	IPL	4.552	(1.487)	0.270	(0.080)	0.098	0.441	3.363***
	NOIPL	4.283	(1.437)					
Health & Beauty Aids	IPL	3.778	(0.526)	0.356	(0.117)	0.105	0.607	3.042***
	NOIPL	3.422	(0.515)					
Candy & Snacks	IPL	2.578	(0.196)	0.104	(0.027)	0.046	0.162	3.820***
	NOIPL	2.474	(0.203)					
Paper Products, Bags, & Pet Supplies	IPL	3.227	(0.333)	0.169	(0.096)	-0.036	0.373	1.763*
	NOIPL	3.058	(0.304)					
Households	IPL	3.115	(0.258)	0.345	(0.084)	0.164	0.526	4.083***
	NOIPL	2.770	(0.232)					

*** p≤0.01, ** p≤0.05, * p≤0.10; Confidence interval calculated at 95%
H0: price(IPL --Tarrytown, NY)-price(NOIPL --Clifton, NJ)=0;

Table 2.1: Stores from which prices were collected for data set 2

IPL	NO-IPL
NEW YORK:	NEW JERSEY:
S1. Stop & Shop, Tarrytown, NY	S11. A&P, Montvale, NJ
S2. C Town, Ossining, NY	S12. Shop Rite, Rochelle Prk., NJ
S3. A&P, White Plains, NY	S13. A&P, Pompton Lakes, NJ
S4. Path Mark, Hartsdale, NY	S14. Path Mark, Montclair, NJ
S5. A&P Scarsdale, NY	S15. Stop & Shop, Clifton, NJ
S6. Path Mark, Yonkers, NY	
S7. Food Emp., Hastings, NY	
S8. Shop Rite, Monsey, NY	
S9. Food Emp., NYC, NY	
S10. Food Emp., Armonk, NY	
CONNECTICUT:	
S16. Food Emp., Greenwich, CT	
S17. Shaws, New Canaan, CT	

Table 2.2: Categories and products included in data set 2

Category and products in the category	Index	Category and products in the category	Index
Condiments, Sauces & Spreads		Households	
Grey Poupon Dijon Mustard - 8oz jar	C1	Tide Ultra Liquid Detergent - 50oz	H1
Hellmann's Mayonnaise - 32oz jar	C2	Downy Fabric Softener Mtn. Spring - 40 count	H2
Heinz Ketchup - 24oz squeeze bottle	C3	Clorox Liquid Bleach - 1 quart	H3
Skippy Creamy Peanut Butter - 18oz	C4	Palmolive Original Dishwashing Liquid - 28oz bottle	H4
Smucker's Concord Grape Jelly - 12oz Jar	C5	Glade Rainshower - 9oz	H5
Kraft Thousand Island Dressing Free - 8oz	C6	Drano Build Up Remover - 32oz	H6
Wish Bone Fat Free Ranch Dressing - 8oz	C7	Tilex Mildew Stain Remover - 32oz spray	H7
Domino Granulated Sugar - 2lb box	C8	Clorox Cleanup with Bleach - 32oz	H8
Equal Sugar Substitute - 50 count	C9	Brillo Steel Wool Soap Pads - 18 count	H9
Jello Cherry - 3oz box	C10	Lysol Disinfectant Original - 12oz spray	H10
Heinz Distilled White Vinegar - 32oz	C11	Pledge Clean and Dust - 12.5oz spray	H11
Pam Lemon Fat Free Cooking Spray - 6oz can	C12	Fantastic All Purpose - 22oz	H12
A1 Steak Sauce Bold & Spicy - 10oz jar	C13	Windex Glass Cleaner - 26oz	H13
Heinz Barbecue Sauce - 18oz bottle	C14	Mr. Clean and Top Job with Ammonia - 40oz	H14
Kraft Shake 'n Bake Classic Italian - 5.75 oz	C15	Old English Lemon Polish - 12.5oz spray	H15

Table 2.3: Comparison of the average prices of IPL and NOIPL stores in data set 2 (all stores)

	Mean (Std. Err.)	Mean Diff. (Std. Err.)	Lower Bound	Upper Bound	t
IPL	2.745 (0.058)	0.245 (0.102)	0.044	0.445	2.403**
NOIPL	2.500 (0.083)				

**p≤0.05; Confidence interval calculated at 95%

Table 2.4: Comparison of average category prices of IPL and NOIPL stores in data set 2

Category	Mean	(Std. Err.)	Mean Diff	(Std. Err.)	Lower Bound	Upper Bound	t
Condiments							
IPL	2.300	(0.061)	0.272	(0.069)	0.125	0.420	3.936***
NOIPL	2.028	(0.033)					
Households							
IPL	3.190	(0.079)	0.218	(0.091)	0.024	0.411	2.400**
NOIPL	2.973	(0.044)					

*** p≤0.01, ** p≤0.05, * p≤0.10; Confidence interval calculated at 95%

Table 2.5: Comparison of average prices of categories by chain

Store Chain	Type	Mean	(Std. Err.)	Mean Diff	(Std. Err.)	Lower Bound	Upper Bound	t
(A) Condiments								
A&P	IPL	2.227	(0.172)	0.179	(0.235)	-0.292	0.650	0.762
	NOIPL	2.048	(0.160)					
Shop Rite	IPL	1.979	(0.254)	0.007	(0.360)	-0.731	0.744	0.019
	NOIPL	1.973	(0.255)					
Path Mark	IPL	2.219	(0.176)	0.125	(0.305)	-0.500	0.749	0.409
	NOIPL	2.094	(0.249)					
Stop & Shop	IPL	2.189	(0.221)	0.167	(0.339)	-0.528	0.861	0.492
	NOIPL	1.978	(0.234)					
(B) Household								
A&P	IPL	3.221	(0.183)	0.204	(0.256)	-0.309	0.717	0.795
	NOIPL	3.017	(0.180)					
Shop Rite	IPL	2.923	(0.256)	0.020	(0.353)	-0.703	0.743	0.057
	NOIPL	2.903	(0.243)					
Path Mark	IPL	3.083	(0.174)	0.007	(0.280)	-0.564	0.577	0.024
	NOIPL	3.077	(0.219)					
Stop & Shop	IPL	3.017	(0.247)	0.167	(0.339)	-0.528	0.861	0.492
	NOIPL	2.850	(0.232)					

*** p≤0.01, ** p≤0.05, * p≤0.10; Confidence interval calculated at 95%
H0: price(IPL)-price(NOIPL)=0

Figure 1.1: Average category prices in data set 1

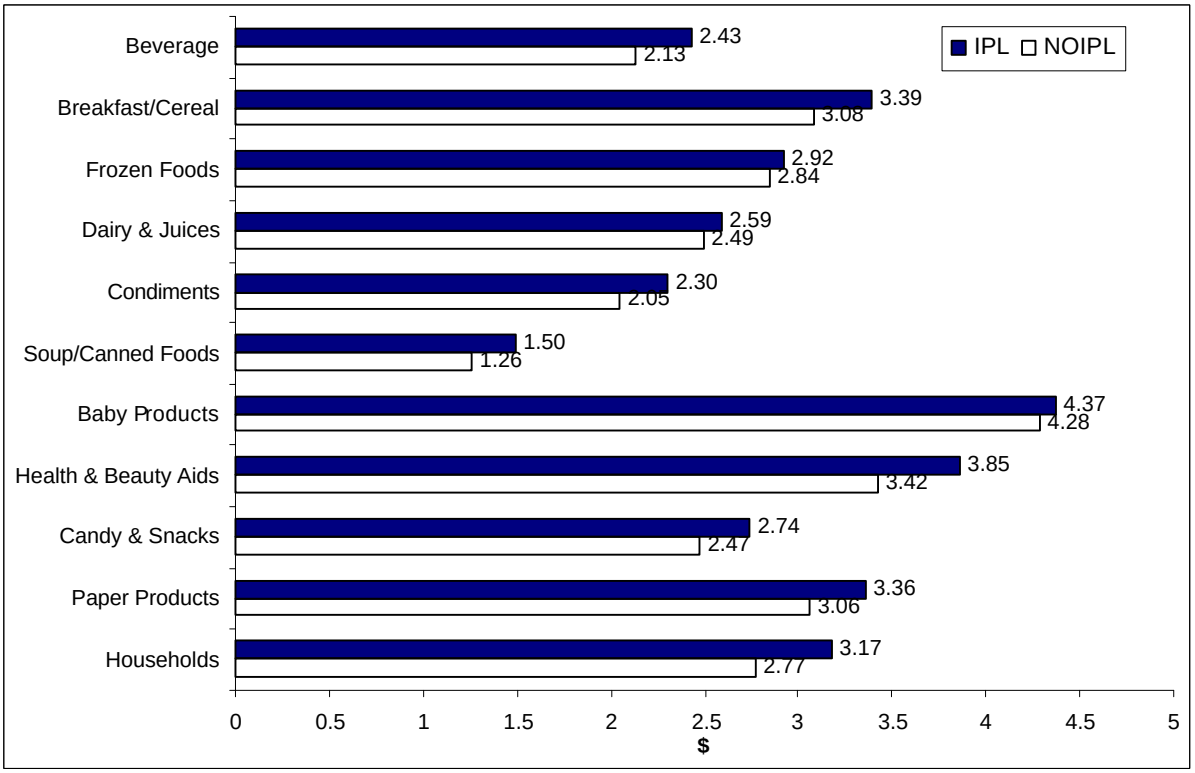


Figure 1.2: Comparison of category prices for Stop and Shop chain in data set 1

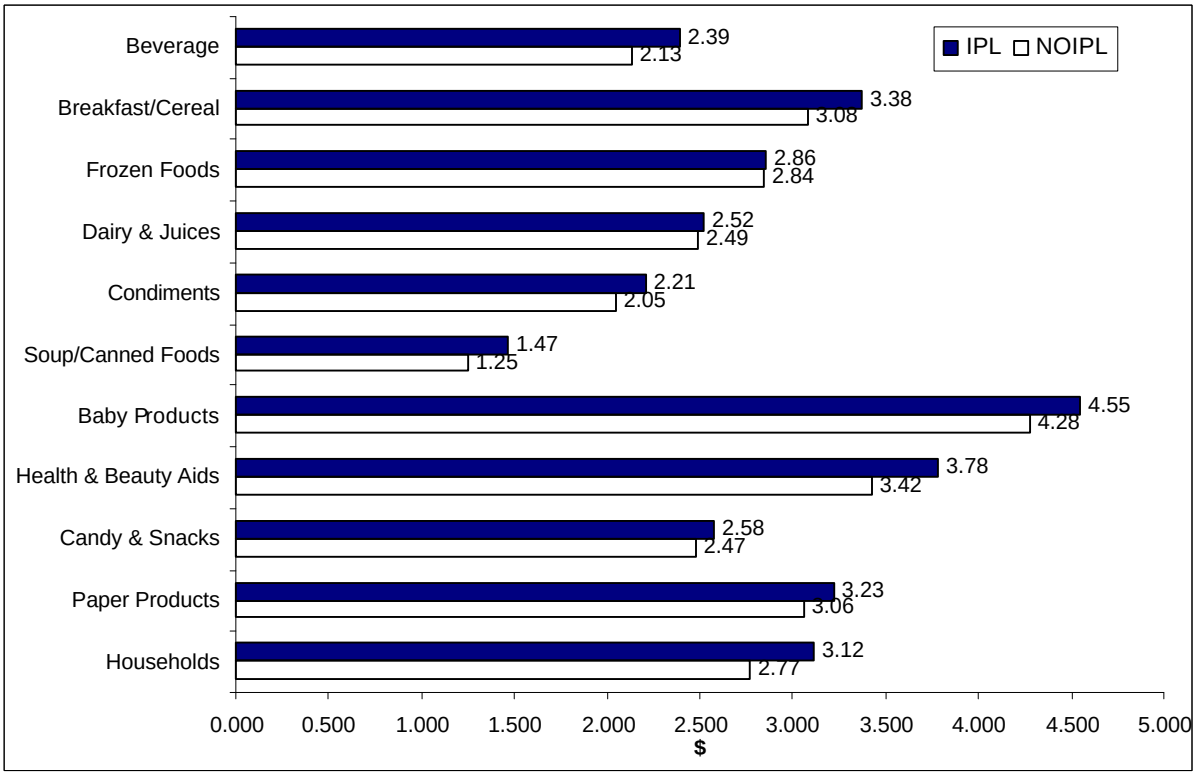


Figure 1.3: Average product prices in data set 1

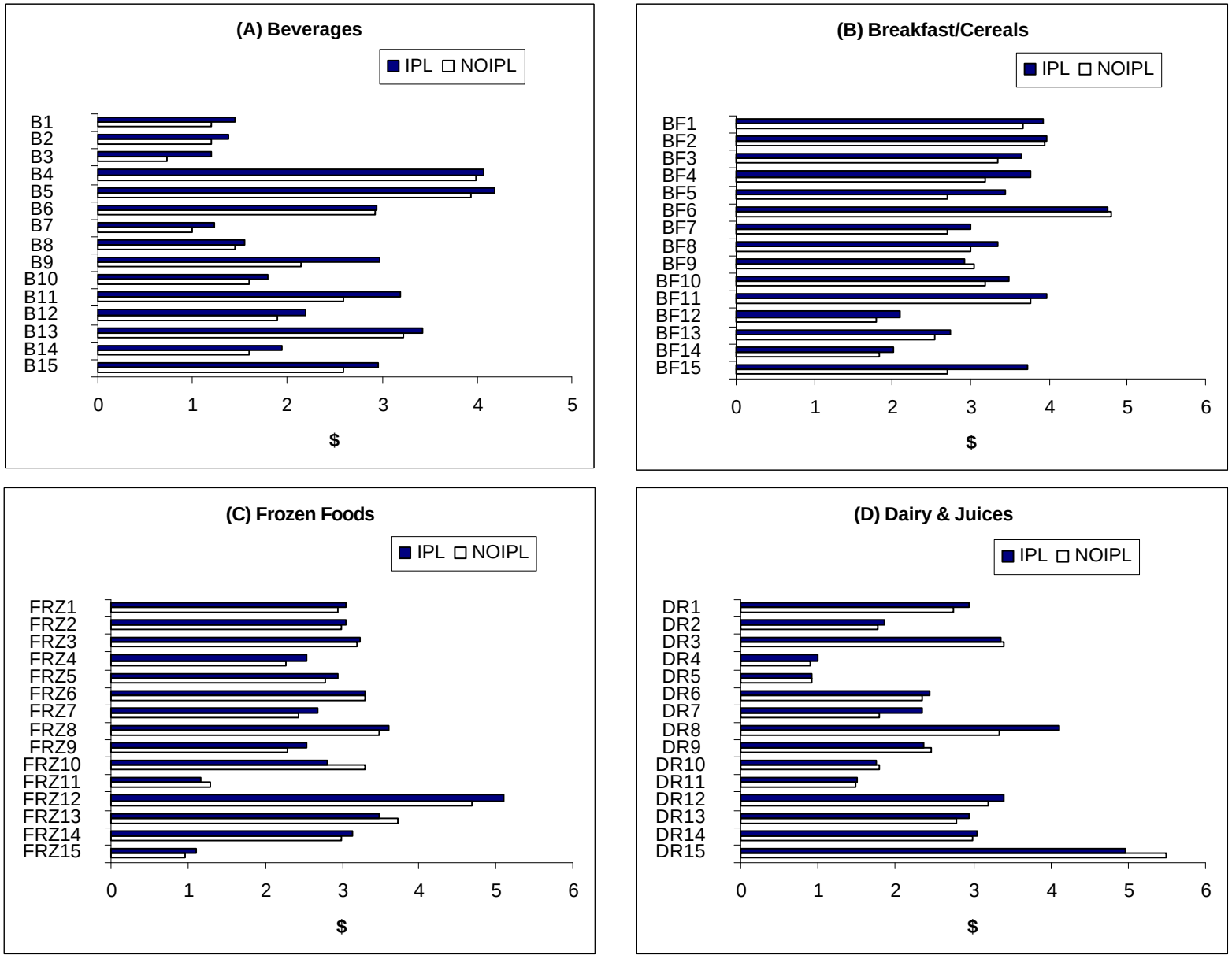


Figure 1.3 (contd.): Average product prices in data set 1

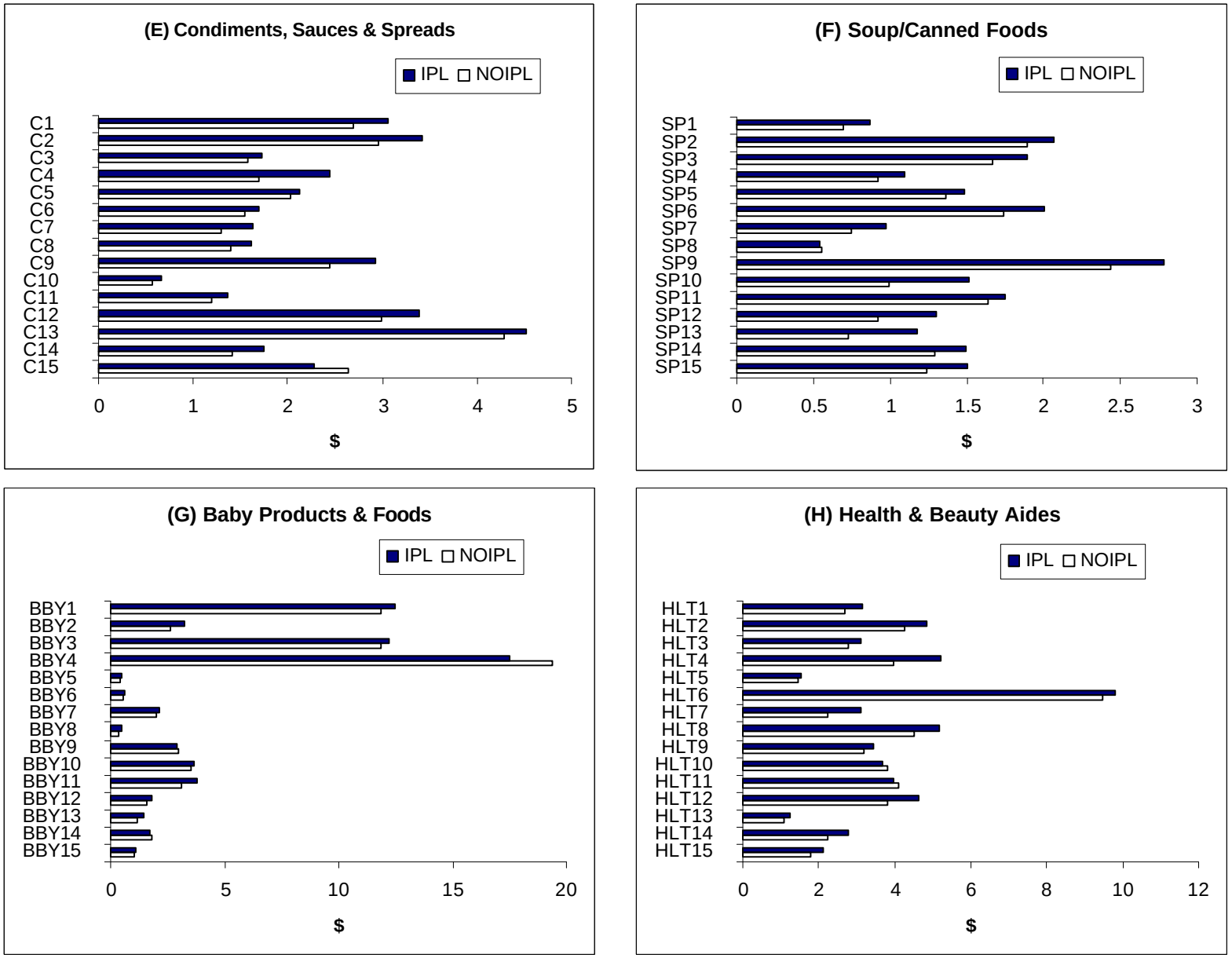
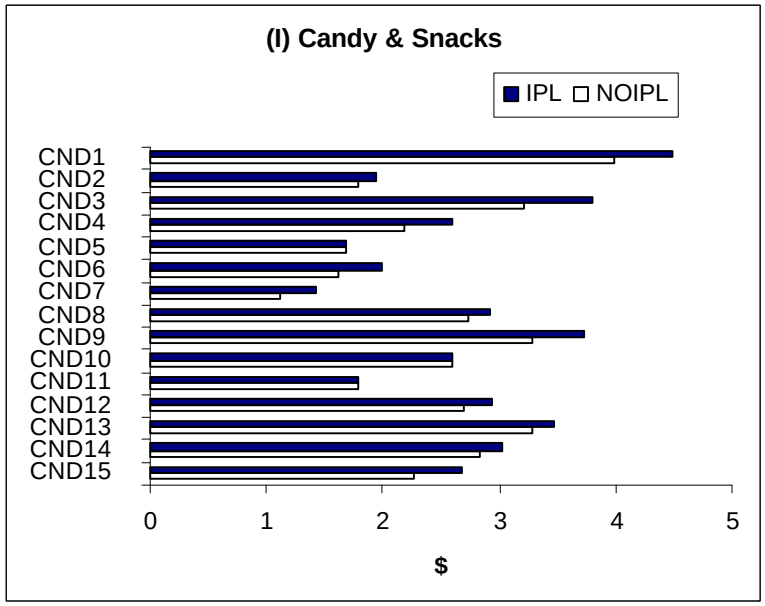
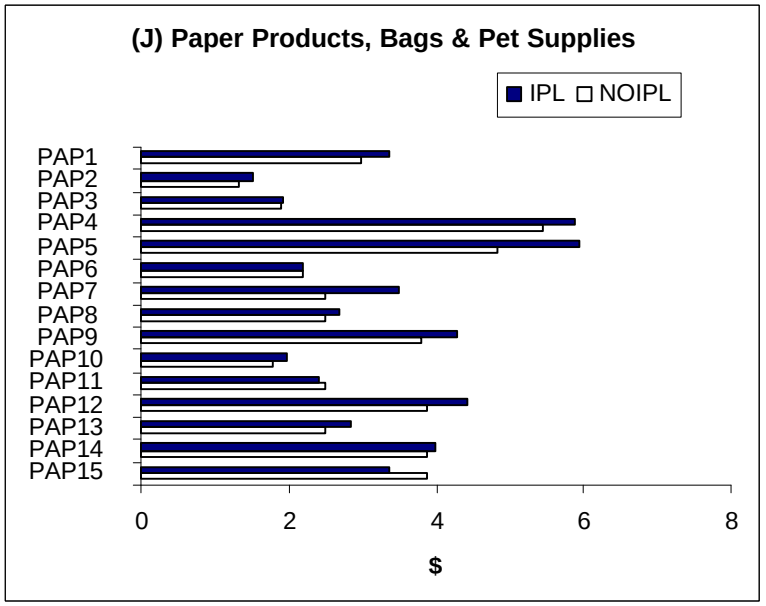


Figure 1.3 (contd.): Average product prices in data set 1





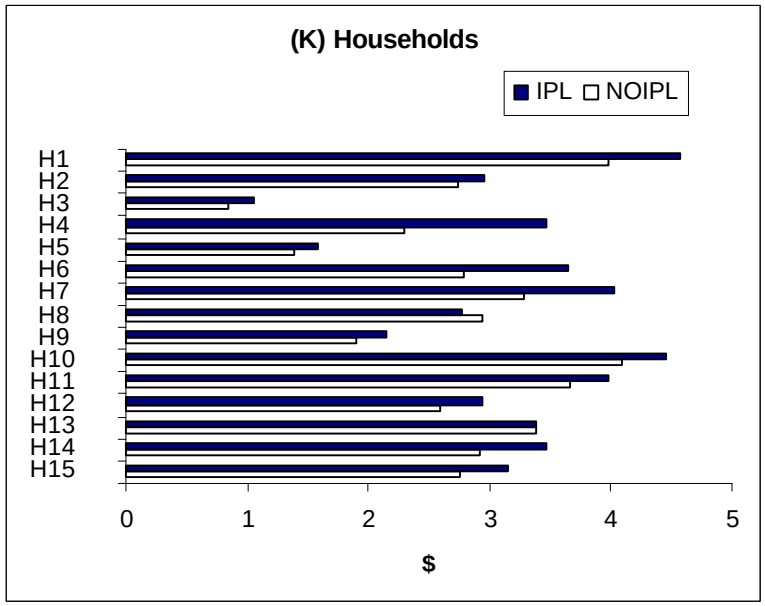


Figure 2.1: Average category prices in data set 2

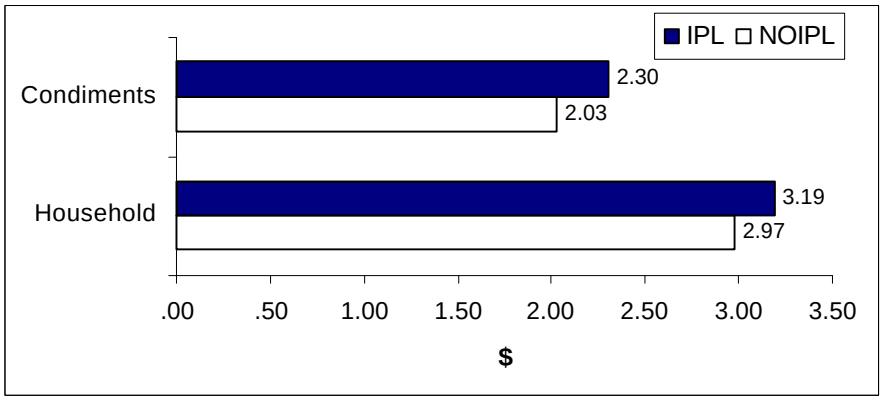
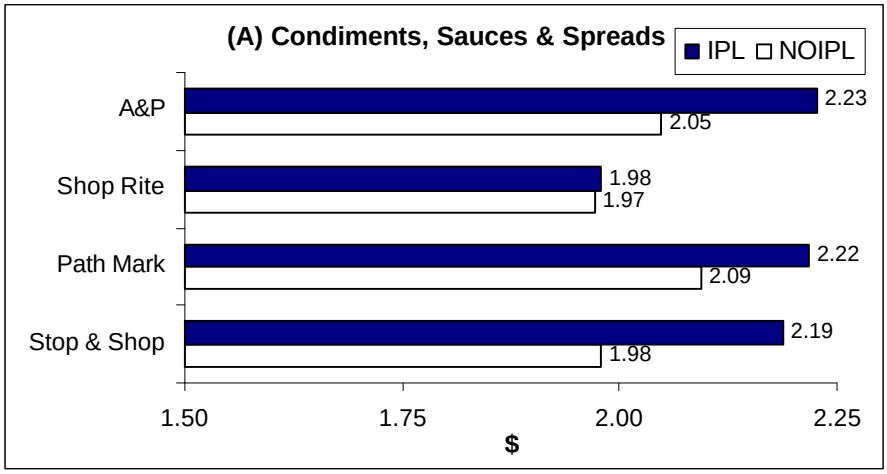


Figure 2.2: Comparison of Chain level average prices in data set 2



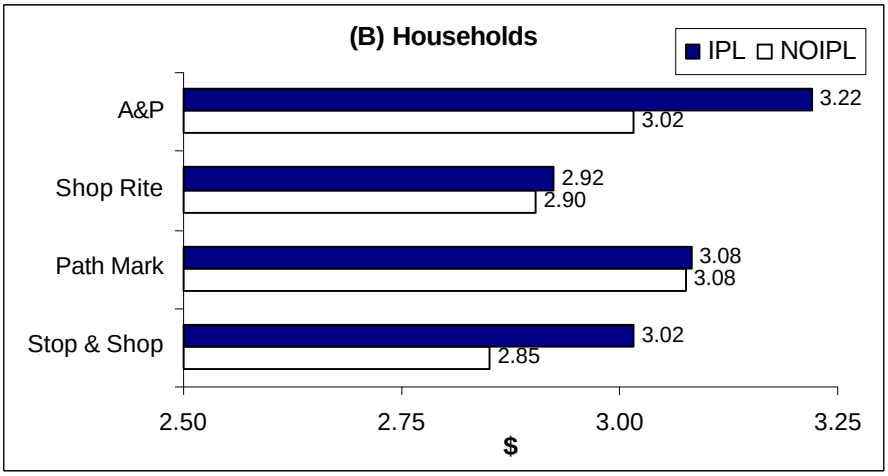


Figure 2.3: Average product prices in data set 2