JSPS Grants-in-Aid for Creative Scientific Research
Understanding Inflation Dynamics of the Japanese Economy
Working Paper Series No.49

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November 16, 2009

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Incumbent's Price Response to New Entry: The Case of Japanese Supermarkets

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August 2009

Abstract

Large-scale supermarkets have rapidly expanded in Japan over the past two decades, partly because of zoning deregulations for large-scale merchants. This study examines the effect of supermarket openings on the price of national-brand products sold at local incumbents, using scanner price data with a panel structure. Detailed geographic information on store location enables us to define treatment and control groups to control for unobserved heterogeneity and temporary demand shock. The analysis reveals that stores in the treatment group lowered their prices of curry paste, bottled tea, instant noodles, and toothpaste by 0.4 to 3.1 percent more than stores in a control group in response to a large-scale supermarket opening.

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1. Introduction

The retail sector has been regarded as one of Japan's least productive industries. In 2000, the McKinsey Global Institute issued a very influential report, which found Japan's overall retail productivity is half of the US's; in particular, the productivity of small-scale retail stores is only 19 percent of that in the US. The report points out that the large share of unproductive small retail shops was the main cause of overall low productivity. The report claims that this lower productivity hurt Japanese consumers through high prices.

Since the report's issuance in 2000, the structure of Japanese retail industries has changed dramatically. Figure 1 displays the recent changes of the share by medium- and large-scale food stores, as well as total sales in Japan.[3] The figure clearly shows that medium- to large-scale food stores increased their presence in Japan. The numbers of large food stores and mom-and-pop shops are reported in Figure 2, which indicates that since 1991, the number of small food stores has decreased by about 50 percent, while medium-large stores have increased by about 20 percent.

Although there are various reasons for the changes, one of the most influential causes was the deregulation of store locations at the national level. Small retail shops in Japan had been protected from competition with large retail shops by governmental regulation. Under the large-scale retail store law (*Daikibo Kouri Tenpo Ho*), which was enacted in 1974, potential supermarkets entrants with a floor area of 500 or more square meters had to obtain permission from local incumbent merchants, as well as confirmation from local authorities. That is, the entry of large retail shops that would

[3] In Figure 1, medium-large food shops include food stores that are larger than 250 square meters. In the total sales (solid line), we did not include sales by large department stores because we could not separate sales of foods from sales of other items. The data come from the Current Survey of Commerce, The Ministry of Economy, Trade and Industry.

compete with local stores was heavily regulated. In 2000, the Large-Scale Retail Store Location Law (*Daikibo Kouri Tenpo Ricchi Ho*) replaced the Large-Scale Retail Store Law. This new law dropped the requirement for the local merchant union's agreement for approval, and local authorities almost automatically approved new stores if the applications could prove that the new stores would not harm the local community's environment, for example, by causing excessive noise or traffic jams, through an environmental assessment report. In response to this deregulation, openings of new large retail stores increased dramatically. Whether this rapid expansion of large retail shops benefited consumers through lower prices remains an empirical question.

Studies on the effect of large supermarket entry on local pricing are rapidly emerging. Basker (2005) examines the effect of Wal-Mart openings on the pricing of local incumbents, using a city-level, quarterly panel price survey from the US. She selected 10 national brand items and found that Wal-Mart openings reduced the city's average price of several products by 1.5 to 3 percent. A follow-up study by Basker and Noel (2007), based on panel data, again reports a price reduction effect of 1 to 2 percent. Hausman and Leibtag (2005) report that Wal-Mart sells identical food items 15 to 25 percent lower than traditional supermarkets. Lira, Rivero and Vergara (2007) examine the effect of opening new supermarkets on the local price index of 15 food-related items and find that local prices are reduced by 7 to 11 percent, based on Chilean data. Manuszak and Moul (2008) examine the case of office supply stores in the US and report that a higher density of store locations in a local area results in lower prices, after controlling for the endogeneity of store locations. They identify the endogeneity of local store density because stores are located in areas with higher demand and correct for this endogeneity using distance from the supply chain headquarters as an instrumental variable.

Matsuura and Motohashi (2005) document the establishment-level dynamics of entry and exit for the Japanese retail sector and report the exit of establishments with lower labor productivity and the entry of establishments with higher potential for growth in labor productivity between 1997 and 2002. Their study clearly suggests that deregulation was efficiency enhancing, but it does not address its effect on prices that could lead to consumer welfare improvement, because their data set does not contain detailed information on prices. Ariga, Matsui and Watanabe (2001) report very frequent price changes of curry pastes sold at a supermarket in Japan and propose an original model of dynamic price discrimination, in which the supermarket discriminates among its customers with heterogeneous reservation prices by varying selling prices over time. Their empirical findings suggest the strategic nature of pricing among Japanese supermarkets, while their study was limited to the consideration of monopolist behavior. Our study explicitly considers the effect of competition on Japanese supermarkets' pricing strategies.

This study examines the effect of supermarket openings of two national chain stores on incumbents' pricing of national-brand products based on weekly scanner data compiled by a marketing company that precisely records the name of each product with a scanner bar code, the time of sale, the price, and the number of units sold. The sales information is accompanied with the exact address of the store location. These features of the data enable us to implement the study without paying too much attention to measurement error of the price, timing, and product, which is a major concern in previous studies. In addition, the detailed geographic information enables us to control for unobserved market heterogeneity across regions over time. Stores located within 1.5

kilometers are defined as treatment stores, while those located within a 15-minute driving distance but further than 3 kilometers are defined as control stores. This fine definition of treatment and control groups presumably controls for common unobserved local demand shocks.

The examination of scanner data clearly shows a drastic price decline between 1999 and 2007 for all six items in the analysis sample: curry paste, bottled tea, instant noodles, instant coffee, detergent, and toothpaste. The analysis results reveal that stores in the treatment group reduce the prices of national brand curry paste, bottled tea, and instant noodles by 0.4 percent to 3.1 percent after the opening of a new supermarket compared with stores in the control group. In contrast, we find very limited or no effects on detergent or toothpaste. The magnitude of incumbents' price reduction is larger in markets where preexisting conditions were not competitive (i.e., there was only one supermarket in the market area) than markets where it was competitive (i.e., there were 3 or more supermarkets in the market area). Also, the entry reduces incumbents' prices only when the entrants are similar in terms of floor area; when general merchandise stores (GMS) enter the market, existing large-scale supermarkets do not reduce their prices. These empirical results are consistent with the theoretical prediction that entry promotes competition in markets where preexisting conditions were not competitive, and the entry is competition-promoting where entrants are close substitutes for incumbents.

The rest of the paper is organized as follows. Section 2 describes the data and introduces descriptive statistics. Section 3 explains the empirical method used to identify the causal effect of new supermarket opening on the prices of incumbent stores. Section 4 introduces the basic results and discusses additional results. The last section provides conclusions and proposes possible extensions for future research.

2. Data

We use two data sources for this study. The first source relates to new store openings. The Large-Scale Store Location Law requires potential supermarket entrants to obtain the city office's permission for store openings. The application-related information is accessible to the public and available from the Ministry of Economy, Trade and Industry's webpage. This information includes the street addresses of new supermarkets, as well as the dates of application and planned opening, which enable us to identify the presumable dates of new store openings and their street addresses.

Since there are too many store openings in this data set, this study focuses on new store openings of two large supermarket chains: Ito-Yokado and the Eion group. Founded in 1920, Ito-Yokado is the largest supermarket chain in Japan and is characterized as a mega-scale shopping mall. The Eion group holds several medium- to large-scale supermarket chains, such as Jusco, Yaohan, and Maxvalu. There are 20 new store openings by Ito-Yokado and 206 by Eion between the enactment date of the Large-Scale Retail Store Location Law (June 1, 2000) and the last week of 2007.

Among these 226 stores, 60 of Eion and 6 of Ito-Yokado have at least one treatment store and one control store. All of the Ito-Yokado are GMSs, while 36 out of 60 in the Eion group are GMSs. The other 24 Eion group stores are large supermarkets. Panels A and B in Figure 3 show the geographic distributions of these stores. In our analysis sample, the median sales floor area of Ito-Yokado is 30,977 square meters and that of Eion is 6,650 square meters.

The second data source is price information from the incumbent stores collected through the scanner record compiled by the INTAGE Corporation. These data are designed for marketing purposes, and item name, price, and sales timing are precisely recorded. Store-level weekly average prices of national brand items are available from this data set. The street address of the store location, also included in the data set, is used to determine the stores that are affected by new supermarket openings (treatment group) and the stores located nearby but arguably not directly affected by new store openings (control group). For this purpose, we have obtained information for stores that are located within a 15-minutes driving distance from each new entrant.

The analysis sample constructed from INTAGE scanner data covers the period between the first week of 1999 and the last week of 2007 and supermarket stores with sale floors of 100 square meters or more. The treatment and control groups comprise 192 stores. Among these, 90 serve as treatment stores, 86 serve as control stores, and 16 serve as both treatment and control stores corresponding to different new openings. The stores are classified into one of four categories by size: GMSs have a sales floor of 3,000 or more square meters with more than 50 employees (with food, clothing, and household items, respectively, consisting of 10 to 70 percent of the total floor area); large supermarkets have more than 1,000 square meters; small supermarkets have between 500 and 999 square meters; and mini supermarkets have between 100 and 499 square meters.[4]

An examination of the effect of new supermarket entry on incumbent supermarkets' pricing requires careful control for local market conditions, because new

[4] The definition of large, small, and mini supermarkets excludes specialty stores or department stores, and are identified by the following criteria: The food floor takes up more than 50 percent of the total floor or the food or clothing and household-item floor should each consist of less than 50 percent of the total floor area. Among the 192 incumbent stores in our dataset, 30 are GMS, 52 are large supermarkets, 57 are small supermarkets, and 53 are mini supermarkets.

supermarkets are presumably more likely to be located in areas with growing demand (Manuszak and Moul (2008)). To deal with this potential endogeneity of new store location, two groups of incumbent stores are defined based on the distance from the new supermarkets. Figure 4 shows the distribution of incumbent's distance from the new entrants in our data, which includes all INTAGE sample stores located within a 15-minute driving distance from new entrants. Panels A-F in Figure 5 show the relation between the price response of incumbent stores to the new opening and the incumbent stores' distance from new stores for each of the six commodities. Except for detergent and toothpaste, the prices after the new entry are lower than those before the entry.

In addition, we can observe that the before and after price differentials decrease with distance. Based on Figures 4 and 5, we define the treatment and control groups as follows. The treatment group consists of stores located less than 1.5 kilometers from a new supermarket; this group of stores is called the treatment group because these stores' pricing is presumably affected by the entry of a new supermarket. The 1.5-kilometer distance is selected because it takes about 20 minutes to walk, and stores located within this distance are arguably competing for the same customers. The control group consists of stores that are located within a 15-minute driving distance, but also located at least 3 kilometers away from the new supermarket. This control group presumably shares the local market demand condition with the treatment group, but its pricing strategy is not directly affected by new store openings. One could argue that the treatment group and control group may not share the same local market demand condition, or, that the control group is also affected by new store openings. Thus, the choice of control group is critical to the success of our research design. To address this concern, we check the robustness of our results by utilizing direct information of a continuous distance measure without relying on difference-in-difference estimators.

Table 1 tabulates the items used for this study, and Table 2 reports descriptive statistics of supermarkets' prices by treatment status of the stores and timing before and after the opening of new stores. The six commodities we use in this paper are popular national brands that are sold throughout Japan.[5] The means of prices clearly indicate a price drop in the "after" period, reflecting that the sample period covers a deflation period in the Japanese economy. The declining trend is clearly depicted in Figure 6, which shows the prices of our sample and the corresponding official Consumer Price Index.[6] The question is: How much of this price reduction can be attributed to competition induced by deregulation?

3. Empirical Methodology

Our empirical strategy is a difference-in-differences approach that compares the price changes of stores in the treatment and control groups before and after new supermarket openings. Because there are 54 observations of new supermarket openings and 469 sample weeks, there are 25,326 (=54×469) pairs of treatment and control groups.

To deal with this many observations in a systematic way, we model the price

[5] There is a possibility that the prices of popular items react to competitors' prices more than those of less popular items because of large advertisement effects. In this case, our estimates of price elasticity should be interpreted as upper bounds. However, it is also possible that to attract customers, a retailer does not have to cut the prices of popular items as much as those of less popular items because many people know the market level. Therefore, it is not certain whether our estimates have upper or lower biases.

[6] According to the Statistical Bureau, from 1999 to 2007, the prices of curry paste, instant noodles, instant coffee, beverages, detergent, and toothpaste dropped by 11.5%, 11.6%, 21.1%, 12.9%, 23.3%, and 5.9%, respectively. Please note that the commodities chosen by the CPI might be different from the ones we use in this paper. Also note that the bargain price is not included in the CPI, while our price is the average of all the weekly prices, which might include temporary bargain prices.

of a good sold at an incumbent store *i* in a market *j* in week *t* as:

$$\ln(p)_{ijt} = \alpha T_i + \beta \left(T_i \times A_{jt}\right) + c_{jt} + u_{ijt}. \qquad (1)$$

The dummy variable T_i takes one if a new supermarket opens at week *t* within 1.5 kilometers of store *i*. The dummy variable A_{jt} takes one after a new supermarket opening in region *j*. If the new entry of a supermarket reduces the prices of treatment group incumbent stores, but does not affect those of the control group, parameter β is expected to have a negative sign. The fixed effects c_{jt} capture the region-week-specific shock or heterogeneity common across all stores in market *j* in period *t*. The linear term of A_{jt} is not included in the specification because its effect is already captured by c_{jt}. It is worth noting that allowing for the region-specific nonparametric trend in Equation (1) enables us to obtain an unbiased estimate of β, even if the new opening date is an endogenous variable that depends on regional economic states.

We have imposed several assumptions to identify β in Equation (1). The key assumption is that the price shock u_{ijt} is not correlated with T_i and $T_i \times A_{jt}$ conditional on region-week-specific shock, more explicitly, $E(u_{ijt} \mid T_i, A_{jt}, d_{jt}) = 0$. Price shock typically includes demand or marginal cost shocks. If stores in the treatment and control groups share the systematic part of these shocks, then the systematic shocks are captured by the dummy variables c_{jt} and the remaining shocks become uncorrelated with T_i and $T_i \times A_{jt}$; thus the exogeneity assumption holds. In addition, we must have at least one treatment store and one control store in each market so that we can take the difference between the two stores. Finally, we have to assume that the prices in stores in the same region share the same trend.[7]

4. Results

4.1. Basic Specification

Table 3 reports the regression coefficients of price equation (1). Except for detergent, we find negative coefficients on the (Treatment×After) dummy variables, which implies that supermarket openings decrease neighborhood incumbent supermarket prices. Although the statistical significance is weak for instant coffee and toothpaste, we can observe that the prices of stores located close to newly opened supermarkets are reduced by 0.4 percent to 3.1 percent compared with other stores in the same region. The positive and significant effect of new store openings on detergent price and little effect on the price of toothpaste can be expected from Panels E and F of Figure 5. According to Panel E, the price of detergent *increased* after the new openings, while Panel F shows little change in toothpaste price during the period before and after the opening. Table 3 also shows that the prices of detergent and toothpaste are lower in GMSs than in other stores. We suspect that these commodities are mostly sold at GMSs or drugstores, not in supermarkets, so that our dataset, which covers no drug stores and has only 30 GMSs out of 192 incumbent stores, cannot capture the exact price effects of the new openings on incumbent stores.

The choice of control group stores, which are within a 15-minute driving distance but further than 3 kilometers from the newly opened store, and treatment group

[7] In Section 4.6., we generalize the assumption and allow for different linear trends between control and treatment stores.

stores, which are located within a 1.5 kilometer distance, could be arbitrary, and thus the results obtained in Table 3 could be sensitive to the choice of these groups. To address this concern, Table 4 estimates the identical price equation with an inverse of distance from the new entry instead of a treatment dummy variable. The results are essentially unchanged from Table 3. All but detergent and toothpaste have negative, significant coefficients for the interaction term, which implies the further away the incumbent stores, the smaller the price effects become. The predicted values for large supermarkets are plotted in the Panels of Figure 5. The stability of the results regardless of how the control group is defined assures that the previous results are not driven by an arbitrary choice of control group.

4.2. Heterogeneous Demand

The analysis thus far assumes that treatment and control stores face the same demand shock as long as these stores are located within the same market. It is possible, however, that narrowly defined, location-specific demand shock, such as the construction of large-scale residential and commercial complex, may induce the new opening of supermarkets within the complex. In this probable scenario, unobserved positive demand shock and new entry are positively correlated, which makes the OLS estimator subject to upward bias. Thus our estimates reported in the previous subsection should be regarded as the lower bounds in their magnitude, and this bias is rather innocuous.

A more harmful scenario is that of a new large-scale supermarket entering the location where demand is declining and market competition becomes slack. Entry into a market of declining demand is still profitable for the entrant as long as it has a cost advantage. A more efficient entrant will survive even in an adverse market condition and will eventually capture the whole market. If this is the real scenario, then the lowered price by incumbents is more a response to weakening demand rather than a response to the entry. To capture the effects of different trends within a market between control and treatment groups, we estimate a specification that includes the different time trends between the two groups. The estimation results are reported in Table 5. Note that the linear time trend is not included because it is completely a function of area × week fixed effects. The results are both qualitatively and quantitatively similar to the results in Table 3, except that there is no longer a negative and significant coefficient for bottled tea. This result implies that heterogeneous demand trends for control and treatment groups do not drive the results in Table 3.

4.3. Market Structure

The analysis so far assumes that the incumbent treatment stores respond to a new store entry by reducing their prices by the same amount. However, their price responses could be heterogeneous depending on preexisting market conditions. If the market is not competitive before the opening of a new store, then the incumbent store is expected to have charged high prices and to significantly reduce prices in response to the new store entry. However, if the new store opens in a competitive market, incumbent stores are expected to have had near-marginal cost pricing and are less likely to change prices in response to the new entry. In particular, if we assume Cournot competition among stores in a market with a linear demand function and a constant marginal cost, then the Nash equilibrium prices are inversely related to the number of stores in the market. The marginal effect of an additional store on equilibrium price declines at quadratic speed. Thus, the theory predicts a significant, marginal effect of a new store opening on price in monopolistic markets, but a trivial effect in markets with many existing stores. Tables 6 and 7 test these predictions.

Table 6 restricts the analysis sample to markets with only one store in the treatment group, which are presumably monopolistic markets. We can observe larger coefficients for the (Treatment × After) dummy variables for curry paste, bottled tea, and instant noodles. These estimates are smaller in Table 7, in which we restrict the markets with more than two treatment stores. In Table 7, we can find that only curry paste has significant, negative effects. We can also observe that the coefficients for the (Treatment × After) dummy are generally smaller in Table 7 than in Table 6, which partially confirms the prediction that price responses are larger in monopolistic markets than in competitive markets.[8]

4.4. GMSs versus Large Supermarkets

The newly opened stores of Ito-Yokado and Eion are either GMSs or large supermarkets. GMSs are different from large supermarkets in various respects. By definition, GMSs sell various items other than foods, and the share of food sales of GMSs is smaller than that of large supermarkets. In addition, GMSs are generally larger than large supermarkets. In our sample, the average floor space of GMSs is six times larger than that of large supermarkets, which implies that there might be strongly positive scale effects to the local markets. Unfortunately, we cannot obtain the actual sales share from foods from each new GMS. It is possible that in some markets, the new

[8] Note that there may be other stores not listed in our dataset near the newly opened store, which implies that we underestimate the market effects in Table 5. Therefore, we should regard the coefficients as upper bounds.

GMS is not a real threat to incumbent supermarkets because (1) food might not be important items for the GMS, and (2) positive scale merits might affect the entire local market positively.

Among the 66 new store openings in the analysis data, 24 were large supermarkets that mainly sell food items. The opening of large supermarkets is expected to have a stronger influence on prices of incumbent supermarkets, which respond the most to new supermarket openings. Tables 8 and 9 test this prediction by splitting the sample into GMS openings and large supermarket openings.

Table 8 shows that the price responses to new GMSs are positive but mostly nonsignificant. In contrast, Table 9 exhibits very large, negative, significant effects, except for detergent. We can interpret the positive effects of GMS openings in various ways. Newly opened GMSs might attract new customers, which would cause an upward shift in the demand function in the area. Or, it is also possible that the new GMS enters a market in which the market demand function that the treatment stores are facing is shifting upward, but the demand for control stores is unchanged.[9] We need additional information to identify the cause of the positive price effects.[10]

4.5. Dynamics of Price Responses

The main finding of this paper, a decrease in prices after new store openings, could be caused by temporary price cuts, rather than permanent price reductions. The

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[9] In our dataset, we cannot allow for heterogeneous trends among stores inside the same markets. We will discuss this issue in a later section.

[10] We could allow for heterogeneous price responses among incumbents by the type of incumbent stores. A regression with additional interaction terms among three variables, treatment dummy, after opening dummy, and store type dummies, does not yield stable results, probably because of an insufficient number of treatment and control stores of the same type in each market.

analysis results heretofore, however, have been limited to popular commodities, such as Nissin Cup Noodles, which are likely to be loss leaders, because bargain sales of popular items can attract many potential customers. If the negative price response among incumbents is only temporary, then the welfare effects of increasing competition on the market is very limited. Table 10 addresses this concern by including several lead and lag terms from the new opening date. Although we cannot estimate the coefficients of lag and lead terms sharply, the interaction terms between the treatment dummy and lag dummies with more than 50 days are generally negative, indicating that the negative price effects are not temporal.

4.6. Why Price Responses are Different by Items

The results presented thus far exhibit the heterogeneity of price responses to new entry by items. The new entry into a market almost surely reduces the price of food items sold at incumbents' stores, but its effects on the prices of glossary items are not clear. In particular, the price of detergent increases in response to the new entry in all the specifications in Tables 3-10. If large-supermarket chains have particular negotiation power over wholesale price of detergent from manufacturers, then incumbent supermarkets may give up price competition with the entrants and turn to a strategy to exploit consumer surplus from "foot-fixed" consumers. If this is the case, then the amount sold at incumbent stores should drop significantly for detergent in response to the price increase. Table 11 reports the change of quantity sold per week in response to the new entry. Consistent with the prediction, detergent is the only item for which the quantity sold decreased, by around 24 percent with statistical significance.

While the discussion in this subsection is a mere speculation backed by sparse evidence, further investigation into the structure of bargaining power between retail stores and wholesale/manufacturers and efforts to incorporate this information into the analysis of pricing decisions is warranted.

5. Summary and Conclusion

This paper reports evidence on how the entry of new supermarkets in a local market changes the prices of selected national brand items, such as processed food and groceries, at incumbent stores. We have contrasted the price changes of supermarkets that are closely located to the entrant and ones at a distance, based on scanner data with detailed geographic locations of supermarkets. We have found that stores located within 1.5 kilometers reduce prices of curry paste, bottled tea, instant coffee, instant noodles, and toothpaste by 0.9 to 3.1 percent. These results suggest that the entry of new supermarkets in a geographic region cuts the market power of incumbent supermarkets and leads them to lower prices. The degree of price reduction is greater when there is only one treatment store, which is consistent with Cournot's monopolistic competition model. The negative price effects of the new opening are not temporary, but last for a long time, which implies that the welfare gain for consumers is not negligible. We also found that it is large supermarket stores, not GMSs, that bring competition to incumbent food stores. This result suggests that GMSs might have positive spillover effects for an entire region.

Although our data contain rich information on prices and entry, to evaluate the total welfare effects of the new entry, we need additional data, such as precise exit information for each store, as well as quantity information for each product at the market level. A data set with a wider coverage of stores would enable us to quantify the consumer surplus. This would be a useful extension of this paper to derive implications for merchandise location policy, as in recent British studies by Griffith and Harmgard (2008).

There are many remaining issues to be pursued. In this paper, we have not estimated a structural model of monopolistic competition. To evaluate the welfare effects of the policy change, we need a rigorous structural model, such as those of Salop (1979) and Jia (2007). Other topics to be investigated include the effects on local labor markets, the effects on the productivity of incumbent stores, and regional productivity.

Acknowledgment

This paper is part of a research project, “Understanding Inflation Dynamics of the Japanese Economy” (PI: Tsutomu Watanabe), supported by JSPS Grants-in-Aid for Creative Scientific Research. We are grateful to the INTAGE Corporation for providing us with the scanner data. We would like to thank Richard Blundell, Thomas Crossley, Rachel Griffith, Anil Kashyap, and participants at the seminars at RIETI, the NBER/CEPR/TCER Trio conference, and the Institute of Fiscal Studies for their helpful comments. We also thank Akiko Togawa for her research assistance.

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Table 1: Items for Analysis

Item	Brand and Product	Description	JAN code
Curry Paste	S&B Food Incorporation, Golden Curry	Medium Hot, 240g	4901002011604
Bottled Tea	Coca-Cola (Japan), Sokenbi Cha	Pet Bottle, 2000ml	4902102016513
Instant Coffee	Nestle Japan Limited, Nescafe gold blend	100g	49681123
Instant Noodles	Nisshin Food Products, Cup Noodle	Regular size, soy sauce flavor	49698114
Detergent	Kao Corporation, Attack	Powder, 1.1kg	4901301463111
Toothpaste	Sunstar Incorporation, GUM	180g	4901616007673 4901616008250

Note: The JAN code is the abbreviation for Japanese Article Number code, which is compatible with the Universal Product Code (UPS).

Table 2: Descriptive Statistics

Item	Curry Paste	Bottled Tea	Instant Coffee	Instant Noodles	Detergent	Toothpaste
Control						
Before	196.23	206.21	603.81	103.29	376.81	411.32
	(39.52)	(30.68)	(131.91)	(19.02)	(57.3)	(41.03)
After	194.37	185.03	554.01	102.5	343.18	413.84
	(32.92)	(21.14)	(125.66)	(19.96)	(58.41)	(47.08)
Treatment						
Before	205.72	207.5	645.47	106.21	368.59	415.57
	(42.43)	(32.2)	(133.88)	(21.51)	(51.3)	(43.83)
After	196.92	183.98	567.58	102.88	337.67	414.2
	(35.89)	(17.45)	(121.65)	(19.35)	(45.98)	(47.39)
Total	198.12	195.69	591.3	103.65	359	413.78
	(37.97)	(28.44)	(133.07)	(20.01)	(56.2)	(45.61)

Note: Means are reported, and standard deviations are reported in parentheses.

Table 3: The Effect of New Entry on Incumbent Pricing

Dependent Variable: Log Price

	(1)	(2)	(3)	(4)	(5)	(6)
	Curry Paste	Bottled Tea	Instant Coffee	Instant Noodles	Detergent	Toothpaste
Treatment×After	-0.031	-0.004	-0.009	-0.009	0.019	-0.004
	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.003)
Treatment	0.030	0.003	-0.002	0.012	-0.014	0.011
	(0.003)	(0.002)	(0.004)	(0.003)	(0.002)	(0.003)
Large supermarket	-0.038	0.011	-0.033	0.027	0.048	0.025
	(0.004)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)
Small supermarket	-0.005	0.031	-0.021	0.040	0.089	0.030
	(0.003)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)
Mini supermarket	0.027	0.082	0.017	0.085	0.167	0.026
	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.003)
Area×Week Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	47443	53336	47449	51125	42017	24887
Number of Groups	22354	23632	22105	22887	19635	12720
R-squared	0.024	0.074	0.008	0.023	0.163	0.011

Note: Standard errors are in parentheses. The group used in the fixed effect transformation is the product of shopping area for the newly opened store and time (Area×Week), which enables us to control for time-varying regional effects. Treatment takes unity when the store is within 1.5 kilometers of the newly opened store. "After" is a fixed effect that takes unity when it is after the opening of the new large store. The base category for store size is a general merchandise store that has 3,000 square meters or more for sales floors with more than 50 employees (each area of food, clothing, and household items, respectively, should consist of 10 to 70 percent of the total floor area). Large supermarkets are between 1,000 and 2,999 square meters; small supermarkets have between 500 and 999 square meters; and mini supermarket have between 100 and 499 square meters (the food area should consist of more than 50 percent of the total floor or food, clothing, and household item area, respectively, should consist of less than 50 percent of the total floor area).

Table 4: Regression Using Continuous Distances from Entrants

Dependent Variable: Log Price

	(1)	(2)	(3)	(4)	(5)	(6)
	Curry Paste	Bottled Tea	Instant Coffee	Instant Noodles	Detergent	Toothpaste
(1/Distance) ×After	-14.117	-5.885	-12.502	-30.923	11.044	-0.239
	(2.469)	(1.332)	(2.860)	(2.339)	(1.771)	(1.825)
(1/Distance)	15.195	-0.649	17.859	24.247	-9.565	5.402
	(1.986)	(1.026)	(2.289)	(1.872)	(1.293)	(1.531)
Large supermarket	-0.015	0.030	-0.045	0.012	0.055	0.014
	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Small supermarket	0.013	0.047	-0.033	0.035	0.094	0.026
	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Mini supermarket	0.039	0.099	0.004	0.071	0.159	0.042
	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
Area×Week Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	124153	139617	125257	134574	107856	65436
Number of Groups	50348	52824	50307	51978	44268	28618
R-squared	0.012	0.086	0.011	0.022	0.158	0.020

Note: Standard errors are in parentheses. Mean distance for the analysis sample is 2,706 meters. See the footnote for Table 3 for details.

Table 5 : The Effects of Different Trends between Control and Treatment

	(1)	(2)	(3)	(4)	(5)	(6)
	Curry Paste	Bottled Tea	Instant Coffee	Instant Noodles	Detergent	Toothpaste
Treatment×After	-0.035	0.003	-0.029	-0.008	0.020	-0.010
	(0.006)	(0.003)	(0.006)	(0.005)	(0.004)	(0.004)
Treatment Status	0.025	0.015	-0.037	0.013	-0.013	-0.011
	(0.007)	(0.004)	(0.008)	(0.007)	(0.005)	(0.008)
Treatment×Trend	0.000	-0.000	0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Large supermarket	-0.038	0.011	-0.034	0.027	0.048	0.025
	(0.004)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)
Small supermarket	-0.005	0.032	-0.022	0.040	0.089	0.030
	(0.003)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)
Mini supermarket	0.026	0.082	0.015	0.085	0.167	0.025
	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.003)
Area×Week Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	47443	53336	47449	51125	42017	24887
Number of group	22354	23632	22105	22887	19635	12720
R-squared	0.024	0.075	0.009	0.023	0.163	0.012

Note: Standard errors are in parentheses. Treatment×Trend is an interaction term between the treatment fixed effects and the linear trend.

Table 6: The Impact in a "Monopolistic" Market

Dependent Variable: Log Price

Sample: Market with Two or Less Stores

	(1)	(2)	(3)	(4)	(5)	(6)
	Curry Paste	Bottled Tea	Instant Coffee	Instant Noodles	Detergent	Toothpaste
Treatment×After	-0.038	-0.027	-0.014	-0.040	0.033	0.004
	(0.007)	(0.004)	(0.008)	(0.007)	(0.005)	(0.006)
Treatment Status	0.000	0.018	-0.006	0.028	-0.000	-0.019
	(0.005)	(0.003)	(0.005)	(0.005)	(0.003)	(0.005)
Large supermarket	-0.083	-0.003	-0.024	-0.021	0.019	-0.011
	(0.007)	(0.004)	(0.008)	(0.007)	(0.005)	(0.006)
Small supermarket	-0.057	0.019	-0.019	-0.006	0.074	0.023
	(0.007)	(0.003)	(0.007)	(0.006)	(0.005)	(0.006)
Mini supermarket	-0.052	0.067	0.029	0.046	0.135	0.005
	(0.008)	(0.004)	(0.008)	(0.007)	(0.005)	(0.009)
Area×Week Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21537	23986	21309	22925	19489	9698
Number of Groups	15206	16327	14973	15738	13537	7223
R-squared	0.0253	0.0093	0.0093	0.0212	0.1384	0.0493

Note: Standard errors are in parentheses. The sample consists of the markets where only one treatment store is found.

Table 7: The Impact in a “Competitive” Market

Dependent Variable: Log Price

Sample: Market with Three or More Treatment Stores

	(1)	(2)	(3)	(4)	(5)	(6)
	Curry Paste	Bottled Tea	Instant Coffee	Instant Noodles	Detergent	Toothpast e
Treatment×After	-0.036	0.008	-0.007	0.006	0.014	-0.009
	(0.005)	(0.003)	(0.006)	(0.005)	(0.004)	(0.004)
Treatment Status	0.049	-0.005	-0.001	0.005	-0.021	0.024
	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.003)
Large supermarket	-0.017	0.016	-0.035	0.043	0.055	0.036
	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.003)
Small supermarket	0.019	0.037	-0.021	0.057	0.091	0.032
	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.003)
Mini supermarket	0.053	0.087	0.013	0.101	0.177	0.027
	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.004)
Area×Week Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	25906	29350	26140	28200	22528	15189
Number of group	7148	7305	7132	7149	6098	5497
R-squared	0.035	0.082	0.008	0.028	0.178	0.019

Note: Standard errors are in parentheses. The sample consists of the markets where three or more treatment stores are found.

Table 8: The Effects of New Openings of GMSs

	(1)	(2)	(3)	(4)	(5)	(6)
	Curry Paste	Bottled Tea	Instant Coffee	Instant Noodles	Detergent	Toothpaste
Treatment×After	0.004	0.030	0.030	0.019	0.012	0.006
	(0.009)	(0.004)	(0.010)	(0.008)	(0.006)	(0.008)
Treatment Status	-0.010	-0.023	-0.026	0.001	0.008	-0.025
	(0.006)	(0.003)	(0.007)	(0.006)	(0.003)	(0.006)
Large supermarket	-0.018	-0.006	0.092	0.014	-0.033	0.026
	(0.009)	(0.004)	(0.011)	(0.009)	(0.006)	(0.008)
Small supermarket	0.019	0.010	0.070	0.037	0.003	0.020
	(0.010)	(0.004)	(0.012)	(0.009)	(0.006)	(0.009)
Mini supermarket	0.046	0.020	0.081	0.094	0.038	0.044
	(0.009)	(0.004)	(0.011)	(0.009)	(0.006)	(0.009)
Area×Week Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13758	15327	14149	15200	12695	6357
Number of group	7573	7974	7554	7952	6812	4057
R-squared	0.026	0.029	0.013	0.042	0.083	0.024

Note: Standard errors are in parentheses. The sample consists of the markets where the newly opened store is a General Merchandise Store.

Table 9: The Effects of New Openings of Large Supermarkets

	(1)	(2)	(3)	(4)	(5)	(6)
	Curry Paste	Bottled Tea	Instant Coffee	Instant Noodles	Detergent	Toothpaste
Treatment×After	-0.043	-0.014	-0.013	-0.018	0.022	-0.007
	(0.005)	(0.003)	(0.005)	(0.005)	(0.004)	(0.004)
Treatment Status	0.043	0.016	-0.001	0.017	-0.015	0.018
	(0.004)	(0.002)	(0.004)	(0.004)	(0.003)	(0.003)
Large supermarket	-0.036	0.016	-0.058	0.032	0.055	0.027
	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.003)
Small supermarket	-0.004	0.038	-0.028	0.040	0.098	0.033
	(0.004)	(0.002)	(0.004)	(0.004)	(0.003)	(0.003)
Mini supermarket	0.029	0.104	0.017	0.080	0.195	0.022
	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.004)
Area×Week Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	33685	38009	33300	35925	29322	18530
Number of group	14781	15658	14551	14935	12823	8663
R-squared	0.026	0.102	0.018	0.019	0.200	0.016

Note: Standard errors are in parentheses. The sample consists of the markets where the newly opened store is a large supermarket.

Table 10: The Effect of New Entry on Incumbent Pricing with Leads and Lags

Dependent Variable: Log Price

	(1)	(2)	(3)	(4)	(5)	(6)
	Curry Paste	Bottled Tea	Instant Coffee	Instant Noodles	Detergent	Toothpaste
Treatment× Lead(51:100)	-0.004	-0.019	-0.000	-0.011	0.014	-0.016
	(0.014)	(0.007)	(0.016)	(0.013)	(0.009)	(0.010)
Treatment× Lead(11:50)	-0.019	-0.016	0.022	-0.022	-0.008	0.013
	(0.016)	(0.008)	(0.018)	(0.015)	(0.010)	(0.011)
Treatment× Lead(1:10)	-0.029	-0.018	0.005	0.021	0.013	-0.009
	(0.030)	(0.016)	(0.034)	(0.028)	(0.020)	(0.022)
Treatment× Lag(0:10)	-0.034	-0.014	-0.020	-0.033	0.032	0.034
	(0.029)	(0.016)	(0.034)	(0.028)	(0.020)	(0.023)
Treatment× Lag(11:50)	-0.022	-0.004	-0.003	-0.018	0.023	-0.015
	(0.016)	(0.008)	(0.018)	(0.015)	(0.010)	(0.011)
Treatment× Lag(51:100)	-0.031	-0.004	-0.006	-0.040	0.012	-0.006
	(0.014)	(0.007)	(0.016)	(0.013)	(0.009)	(0.010)
Treatment× Lag(101~)	-0.032	-0.004	-0.009	-0.007	0.020	-0.004
	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.003)
Treatment	0.030	0.003	-0.002	0.012	-0.014	0.011
	(0.003)	(0.002)	(0.004)	(0.003)	(0.002)	(0.003)
Large supermarket	-0.038	0.011	-0.033	0.027	0.048	0.025
	(0.004)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)
Small supermarket	-0.005	0.031	-0.021	0.040	0.089	0.030
	(0.003)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)
Mini supermarket	0.027	0.082	0.017	0.085	0.167	0.026
	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.003)
Area × Week Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	47443	53336	47449	51125	42017	24887
Number of Groups	22354	23632	22105	22887	19635	12720
R-squared	0.024	0.074	0.008	0.023	0.163	0.012

Note: Standard errors are in parentheses. Lag(x:y) takes unity when the time is between after x days and after y days from the new opening date. Lead(x:y) takes unity when the time is between before x days and before y days from the new opening.

Table 11: The Effect of New Entry on Quantity Sold

Dependent Variable: Log Quantity

	(1)	(2)	(3)	(4)	(5)	(6)
	Curry Paste	Bottled Tea	Instant Coffee	Instant Noodles	Detergent	Toothpaste
Treatment×After	0.167	-0.07	0.073	0.015	-0.235	0.032
	(0.023)	(0.017)	(0.031)	(0.026)	(0.028)	(0.027)
Treatment	-0.212	-0.013	-0.07	-0.137	0.105	-0.115
	(0.017)	(0.013)	(0.024)	(0.020)	(0.020)	(0.022)
Large supermarket	-0.58	-0.529	-0.426	-0.655	-1.014	-0.924
	(0.020)	(0.015)	(0.028)	(0.023)	(0.024)	(0.022)
Small supermarket	-1.118	-1.056	-0.858	-1.224	-1.74	-1.256
	(0.019)	(0.014)	(0.027)	(0.022)	(0.023)	(0.021)
Mini supermarket	-1.326	-1.59	-1.189	-1.666	-2.118	-1.376
	(0.021)	(0.016)	(0.030)	(0.024)	(0.026)	(0.027)
Area×Week Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	47443	53336	47449	51125	42017	24887
Number of Groups	22354	23632	22105	22887	19635	12720
R-squared	0.182	0.299	0.078	0.176	0.278	0.255

Note: Standard errors are in parentheses. The same footnote applies as in Table 3.

Figure 1: Annual Sales of Retail Food Shops

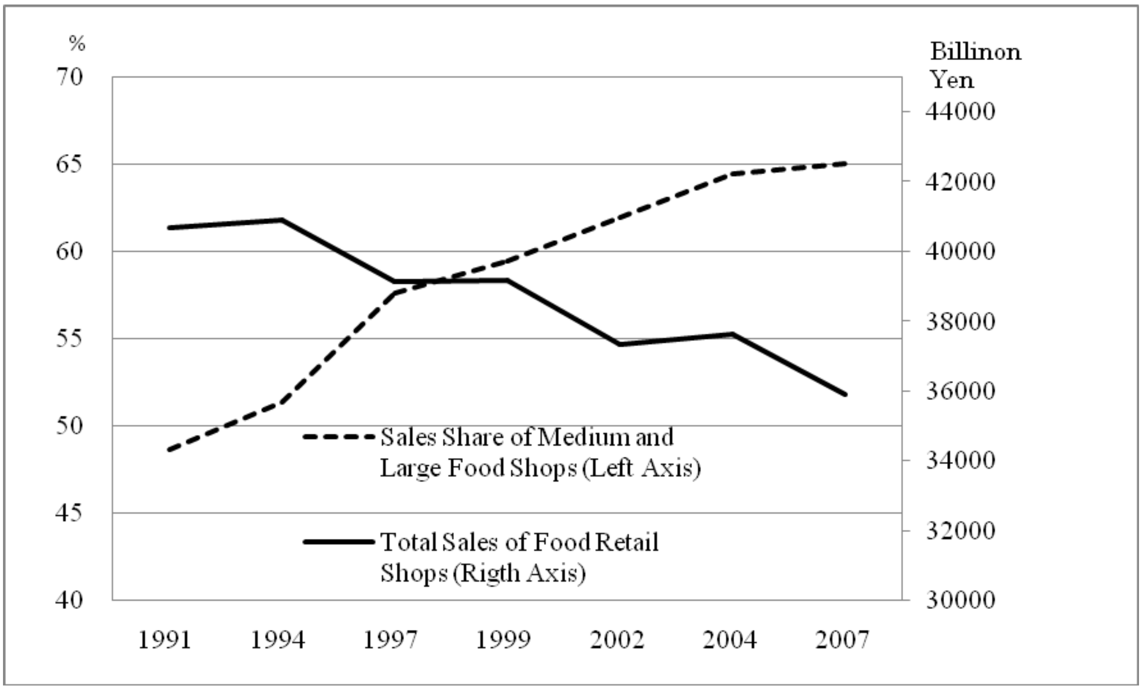


Figure 2: Number of Food Retail Shops

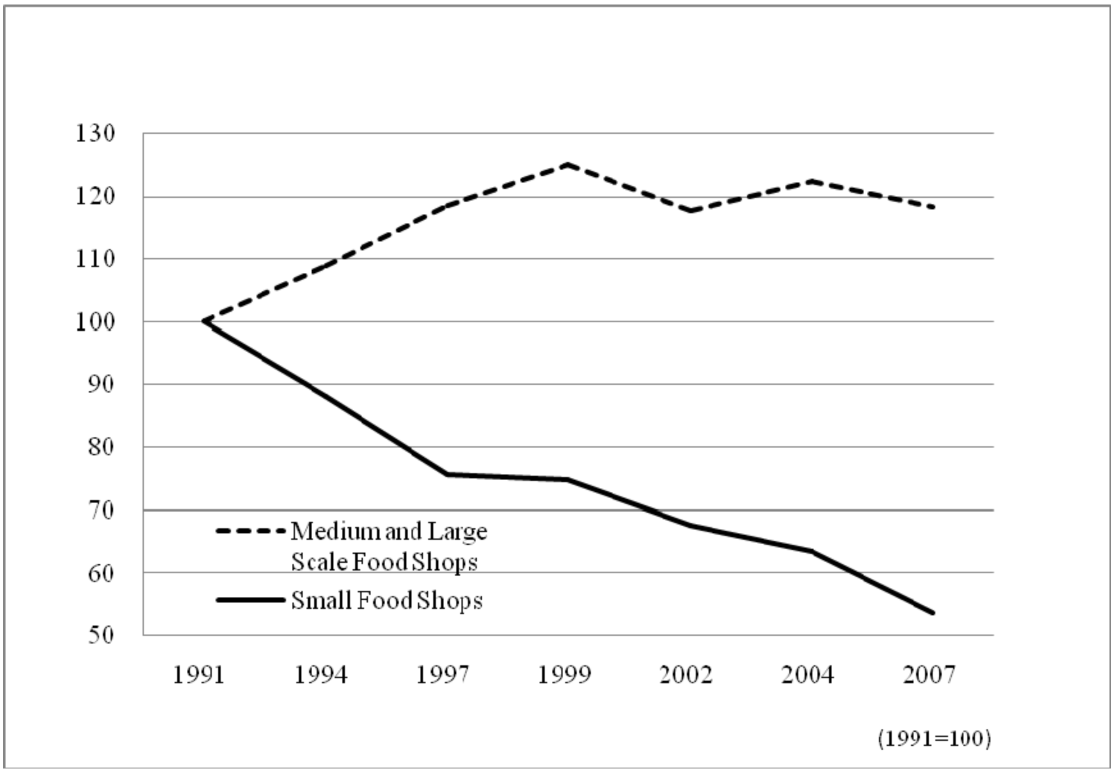


Figure 3: The Location of New Openings of Eion and Ito-Yokado Groups, 2000-2007

Panel A: Large Retail Shops that belong to the Eion group (60)

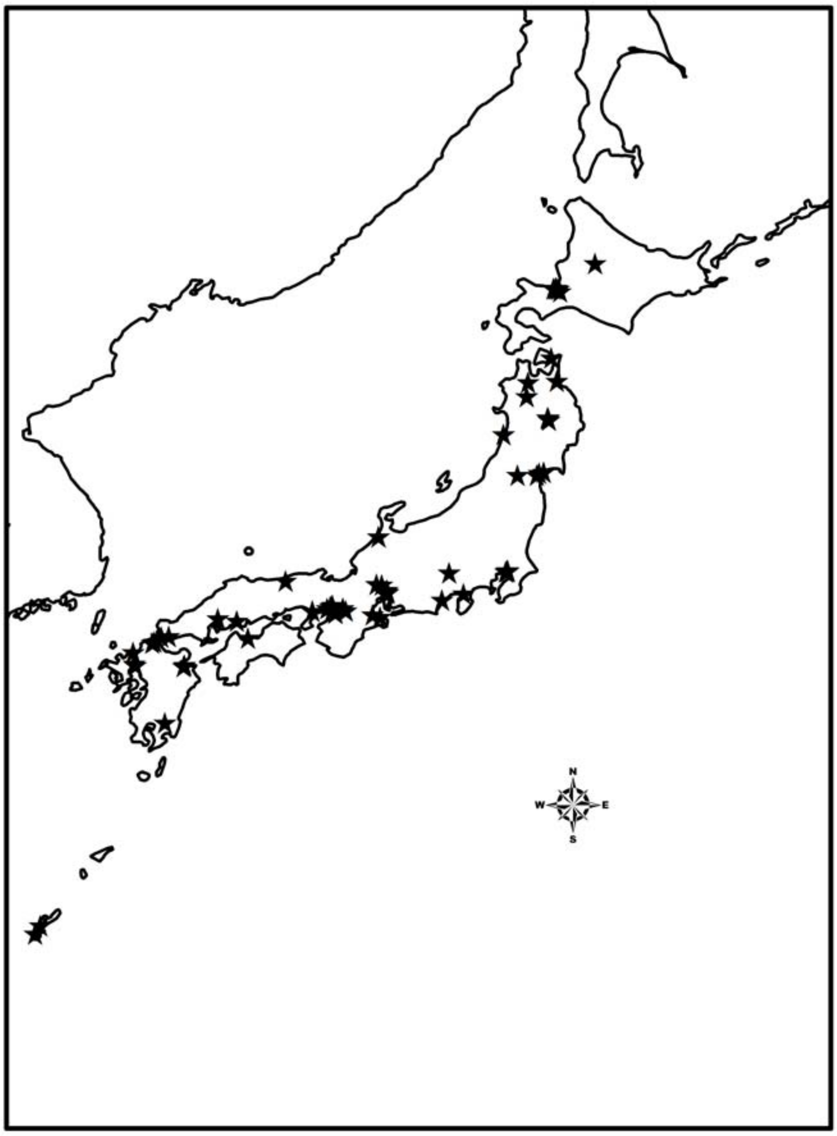


Figure 3: The Location of New Openings of Eion and Ito-Yokado Groups, 2000-2007

Panel B: Large Retail Shops that belong to the Ito-Yokado group (6)

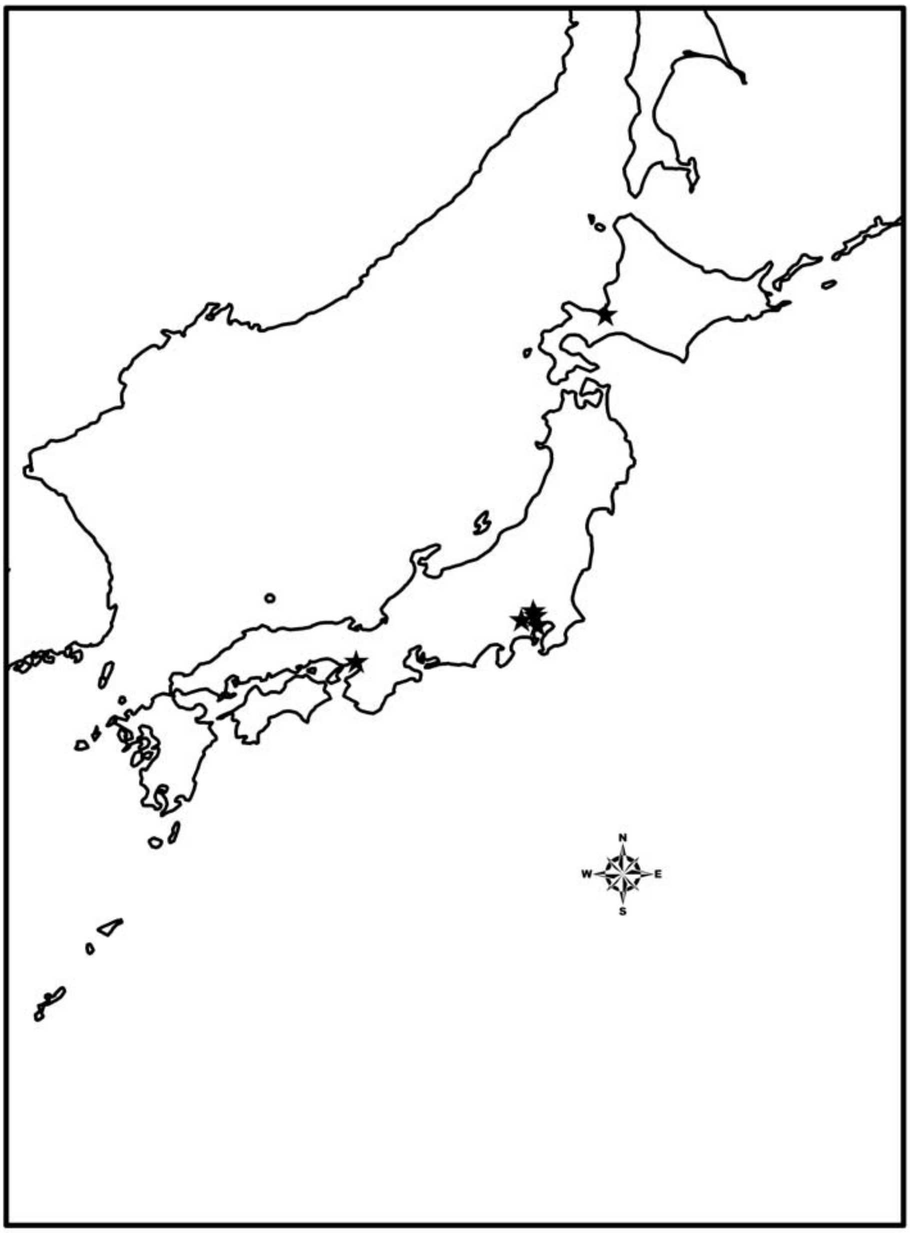


Figure 4: Distribution of Incumbent’s Distance from Entrant

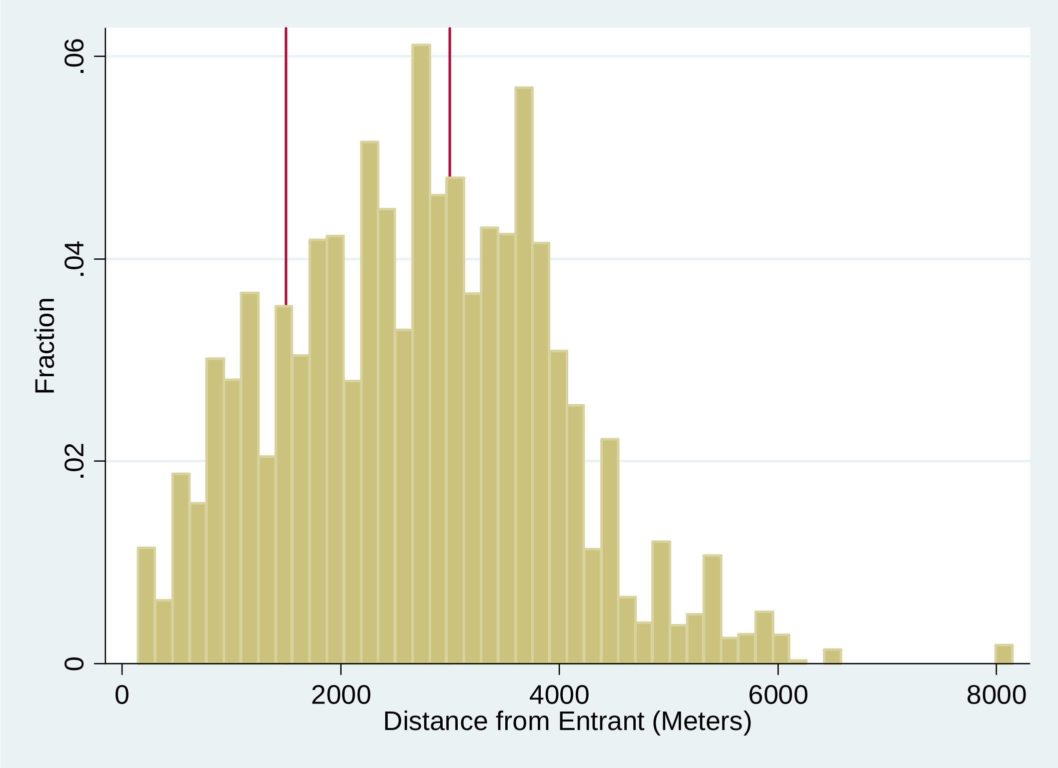
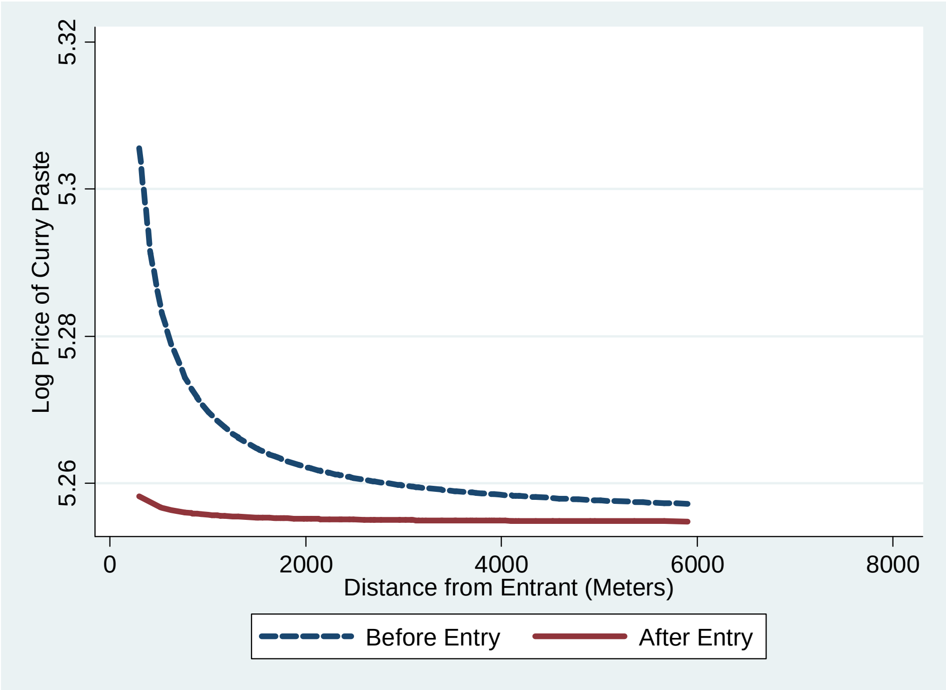
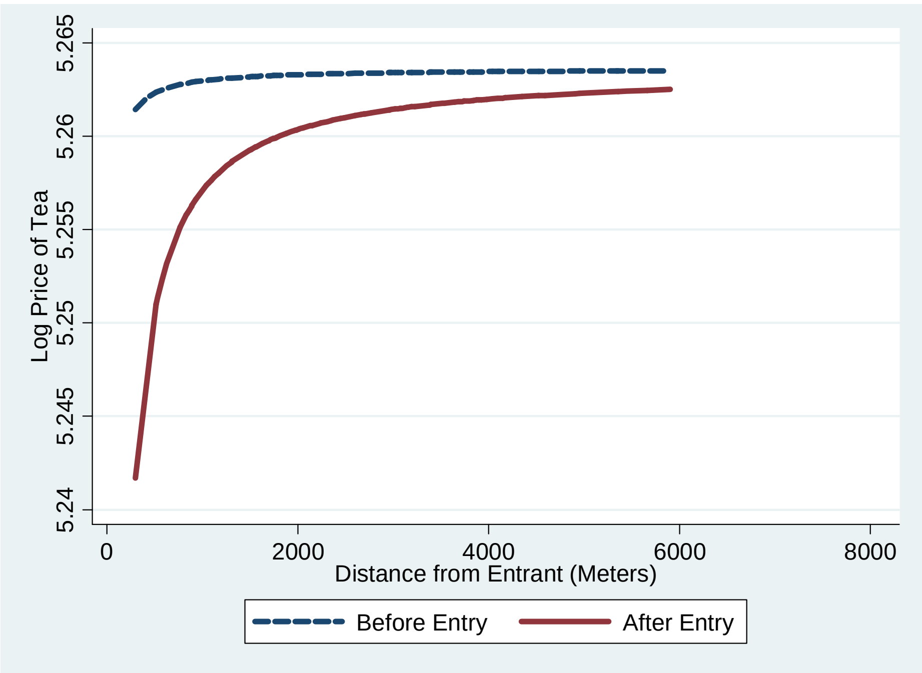


Figure 5: Price Response by Distance within a 15-Minute Driving Distance

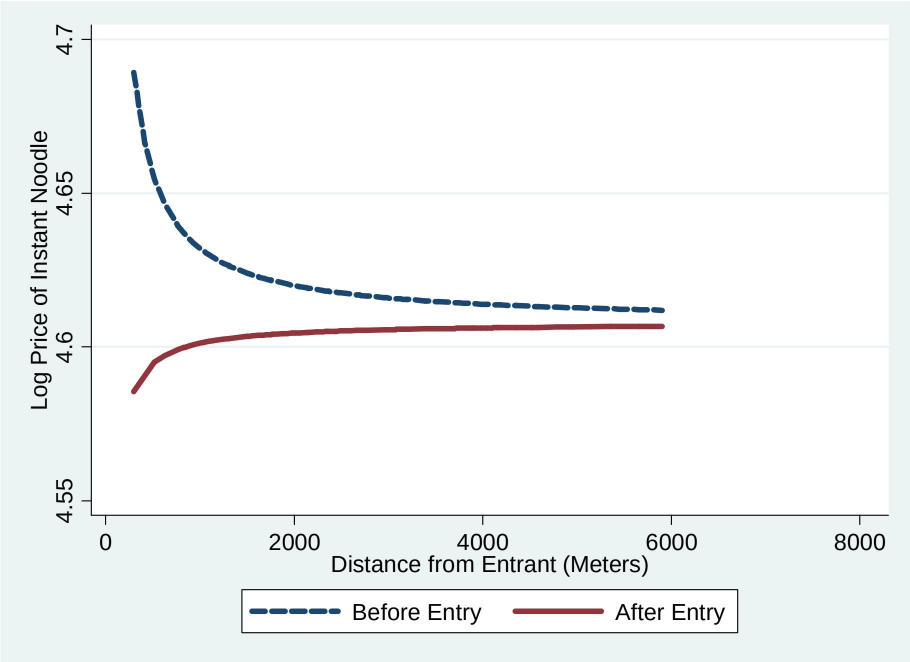
Panel A: Curry Paste



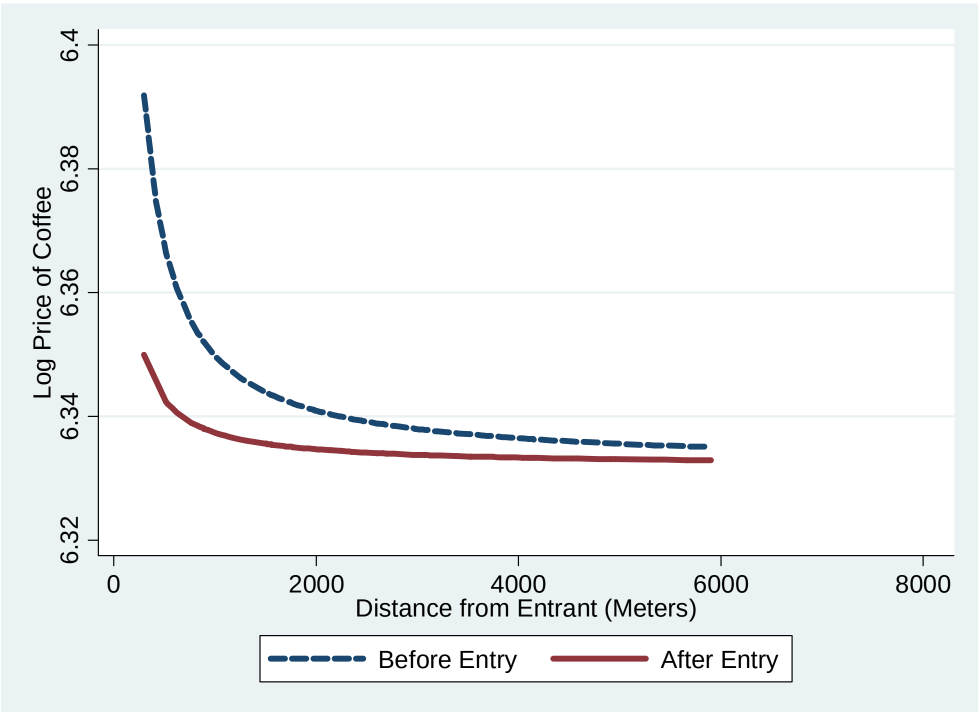
Panel B: Bottled Tea



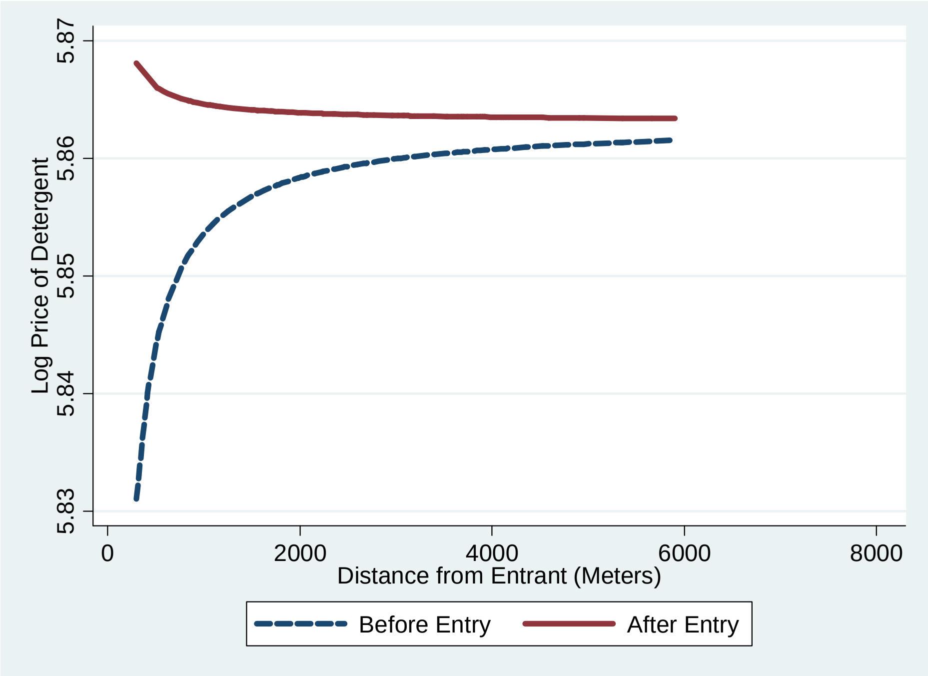
Panel C: Regular Instant Noodle



Panel D: Instant Coffee



Panel E: Detergent



Panel F: Toothpaste

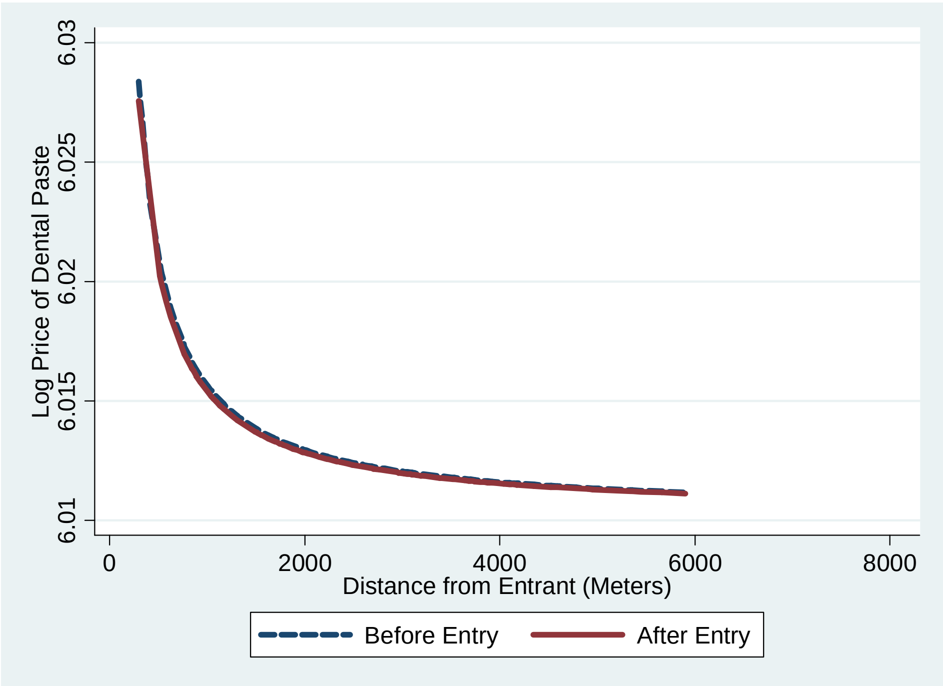
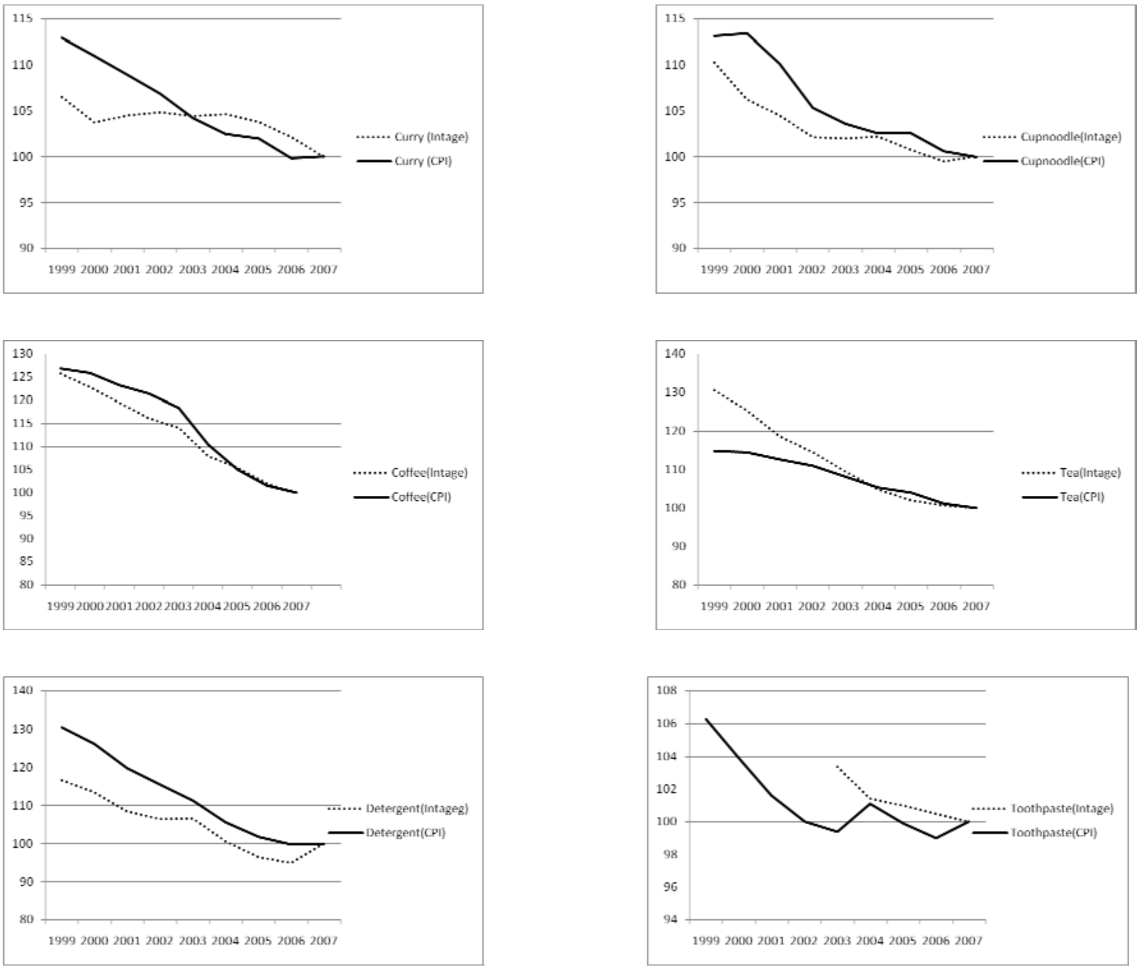


Figure 6: Time Series of Average Product Prices, Prices in Intage Stores, and Consumer Price Index



(CPI and Prices 2007 =100)

Note: Because toothpaste appeared in the market in 2003, the price series of toothpaste does not cover the whole period between 01 January 1999 and 31 December 2007. The Consumer Price Index is the annual average value reported by the Statistical Bureau. The CPI for tea is based on the price for other beverages.