Online Appendix

Detailed Solution of the Model

We provide the details of solving the model via a standard Lagrange technique. We suppress the subscript i that denotes individuals to simplify notation. The Lagrangian is $L = \alpha^1 \ln Q^1 + \alpha^2 \ln Q^2 + \mu \ln(T - T^Y - T^1 - T^2 - T^0) + \lambda[Y(T^Y) - P^1Q^1 - P^2Q^2]$, and the first order conditions (FOCs) with respect to (wrt.) consumption are:

$$\frac{\alpha^c}{Q^c} = \lambda P^c\,;\ c = 1, 2\,. \tag{1}$$

This implies that $\frac{Q^1}{Q^2} = \frac{\alpha^1 P^2}{\alpha^2 P^1}$; that is, a higher α^1 (higher weight on good 1) increases Q^1 over Q^2. A higher relative price of good 2 has the same effect. Substituting into the budget constraint, (2), we find that expenditure shares for the two goods are constant: $P^1Q^1 = \alpha^1 Y(T^Y)$ and $P^2Q^2 = \alpha^2 Y(T^Y)$.

The FOCs of the Lagrangian wrt. T^c, $c = 1, 2$ are:

$$-\mu(T - T^Y - T^1 - T^2 - T^0)^{-1} - \lambda Q^c \frac{dP^c}{dT^c} = 0;\ c = 1, 2\,. \tag{2}$$

Combining the conditions, we find that the marginal gain from search time is equalized across goods:

$$\frac{dP^2}{dT^2}Q^2 = \frac{dP^1}{dT^1}Q^1, \quad \text{or} \quad \frac{\frac{dP^2}{dT^2}}{\frac{dP^1}{dT^1}} = \frac{Q^1}{Q^2}.$$

Given that $Q^c = \alpha^c/\lambda P^c$, from FOC (1), and that $dP^c/dT^c = P^h\beta(T^c + \eta)^{-\beta-1}$, we can rewrite the previous expression as:

$$\frac{-\beta(T^2+\eta)^{-\beta-1}}{-\beta(T^1+\eta)^{-\beta-1}} = \frac{\alpha^1}{\alpha^2}\frac{(T^2+\eta)^{-\beta}}{(T^1+\eta)^{-\beta}} \quad \text{or} \quad \frac{T^1+\eta}{T^2+\eta} = \frac{\alpha^1}{\alpha^2}\,.$$

That is, relative time allocated to searching for goods is proportional to their relative preferability.

The FOC of the Lagrangian wrt. T^Y is $-\mu(T - T^Y - T^1 - T^2 - T^0)^{-1} + \lambda\frac{dY}{dT^Y} = 0$, and combining this FOC with FOC (2), we obtain $-Q^c\frac{dP^c}{dT^c} = \frac{dY}{dT^Y}$. That is, the marginal gain from a unit increase in shopping time is equal to the marginal loss of income.

Substituting for the price derivative, we obtain $Q^c\frac{dP^c}{dT^c} = Q^c(-\beta P^c(T^c+\eta)^{-1}) = -\beta(P^cQ^c)(T^c+\eta)^{-1}$, and as $Q^cP^c = \alpha_i^c Y(T^Y)$, we find $\beta\alpha_i^c Y(T^Y)(T^c+\eta)^{-1} = \frac{dY}{dT^Y}$ or $T^c + \eta = \beta\alpha_i^c\frac{Y(T^Y)}{\frac{dY}{dT^Y}}$, implying that $T^c = \beta\alpha_i^c\left(\frac{W^0}{W^1} + T^Y\right) - \eta$ and $T^1 + T^2 = \beta\left(\frac{W^0}{W^1} + T^Y\right) - 2\eta$. FOC (1) and the fact that $Q^cP^c = \alpha_i^c Y(T^Y)$ imply that $\lambda = 1/Y(T^Y)$. Given that $\frac{dY}{dT^Y} = W^1$ and substituting for λ, we can rewrite the FOC wrt. T^Y as:

$$\mu(T - T^Y - T^1 - T^2 - T^0)^{-1} = \frac{W^1}{W^0 + W^1T^Y}.$$

Substituting for the value of $T^1 + T^2$, we can solve for T^Y :

$$T^Y = \frac{T - T^0 + 2\eta - (\beta+\mu)\frac{W^0}{W^1}}{1+\beta+\mu}\,. \tag{3}$$

Plugging the value of T^Y into the solution for T^c, we obtain:

$$T^c = \beta\alpha^c \frac{T - T^0 + 2\eta + \frac{W^0}{W^1}}{1 + \beta + \mu} - \eta. \tag{4}$$

Leisure is

$$T - T^1 - T^2 - T^Y - T^0 = \frac{\mu}{1 + \beta + \mu}\left(T - T^0 + \frac{W^0}{W^1} + 2\eta\right).$$

Assume with no loss of generality that good 1 is the preferred good and consider a consumer who searches only for prices of good 1, because the non-negativity constraint on search time is binding for good 2. In this case, optimal work time is

$$T^Y = \frac{T - T^0 + \eta - (\beta\alpha^1 + \mu)\frac{W^0}{W^1}}{1 + \beta\alpha^1 + \mu}. \tag{5}$$

Search time for good 1 is

$$T^1 = \beta\alpha^1 \frac{T - T^0 + \eta + \frac{W^0}{W^1}}{1 + \beta\alpha^1 + \mu} - \eta,$$

and leisure time becomes

$$T - T^1 - T^Y - T^0 = \frac{\mu}{1 + \beta\alpha^1 + \mu}\left(T - T^0 + \frac{W^0}{W^1} + \eta\right).$$

Without search, consumers will pay the higher price for each good, and work and leisure time will be

$$T^Y = \frac{T - \mu \frac{W^0}{W^1}}{1+\mu}, \tag{6}$$

and

$$T - T^Y = \frac{\mu}{1+\mu}\left(T + \frac{W^0}{W^1}\right).$$

Plugging the full solutions into the utility function for various values of the parameters allows us to determine which of these discrete choices is preferred.

To illustrate the empirical implications of the model, we select certain parameter values and plot optimal search times, prices, and quantities in Figure A.1. We vary the relative preference for good 1, captured by the parameter α^1 (i subscript omitted), and the efficiency of the search function, β—the higher β, the lower the prices paid for the same level of search. All other parameters are kept constant and are detailed in the notes to the figure. Note the fixed cost of search, T^0, is set to zero in both cases.

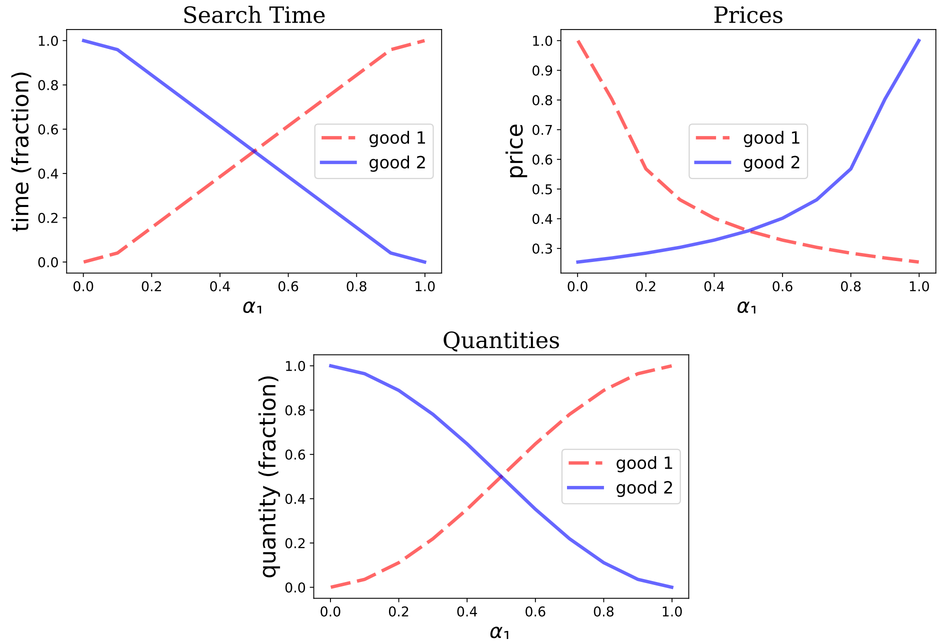
Panel A displays the case of relatively high search efficiency, $\beta = 0.5$. Search time for good 1 (2) increases (decreases) with α^1. The price paid for good 1 declines with α^1 due to the higher search intensity, and the consumer shifts the basket towards higher consumption of good 1 as his or her preference for good 1 increases. *Ceteris paribus*, the model implies an inverse relationship between the prices paid and the quantities consumed of a given good, because consumers vary their search intensity across goods in accordance with their relative preferences. We lower search efficiency in Panel B to illustrate that when search efficiency is relatively low, the consumer optimally chooses not to search for one of the goods even when the search fixed cost is zero ($\beta = 0.1$ in this case).

We highlight the importance of search fixed costs in Figure A.2. The figure depicts (restricted) utility under three scenarios, each represented by a line in the figures: (1) the consumer does not search for better prices at all, (2) the consumer searches only for his or her preferred good (that with the highest α^c), and (3) the consumer spends time to obtain better prices for both goods. The consumer will evaluate the utility under these three scenarios and rationally choose the one delivering the highest utility. In the figure, we illustrate three cases: (a) the search fixed cost is zero; (b) the search fixed cost is positive and the same when searching for one or two goods ($T^0 = 5$); and (c) the search fixed cost is higher when searching for two goods ($T^0 = 10$ vs. $T^0 = 5$). We further vary the level of search efficiency ($\beta = 0.25$ or $\beta = 0.5$) and, in all figures, the relative preferences for good 1, α^1. Consider the case where the consumer cares for both goods equally ($\alpha^1 = 0.5$, in the middle of each figure), and the search fixed cost is low and/or the search efficiency is high. In these scenarios, the consumer is better off searching for lower prices of both goods. In contrast, when fixed costs are high and search efficiency is low, the consumer optimally decides not to search at all (see the left figure of Panel C). When the consumer has differential preferences for the two goods, he or she may optimally decide to spend time searching for low prices of just one good. In this illustration, this situation occurs for extreme relative preferences in Panel B, but also if the search for a second good entails an additional fixed cost, see Panel C.

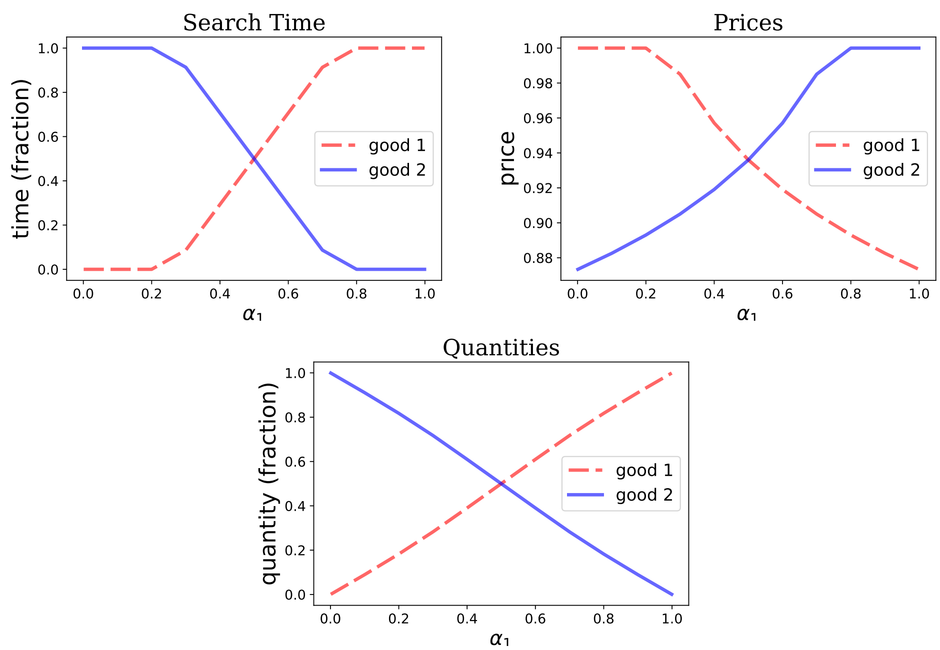
Figure A.3 illustrates one additional implication of our model: improvements in search efficiency, while lowering prices on average, may not result in lower price dispersion across consumers. As preferences differ, search efforts vary and price dispersion may not decrease.

Figure A.1. Search Time, Price and Quantity by Preference for Good 1

Panel A: High Search Efficiency



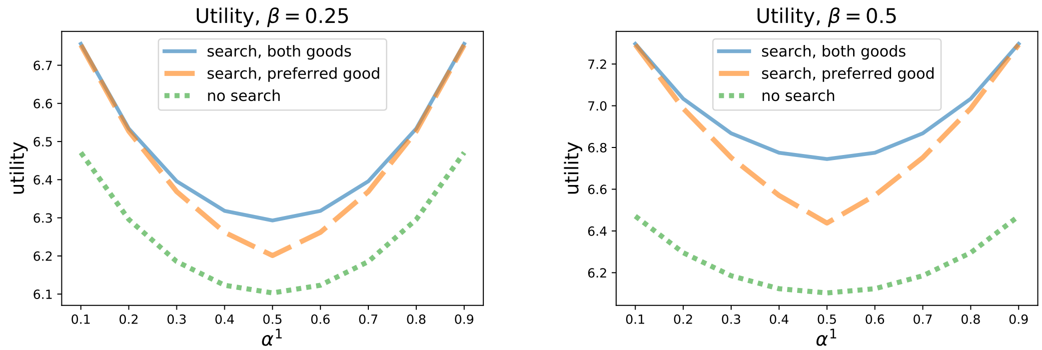
Panel B: Low Search Efficiency



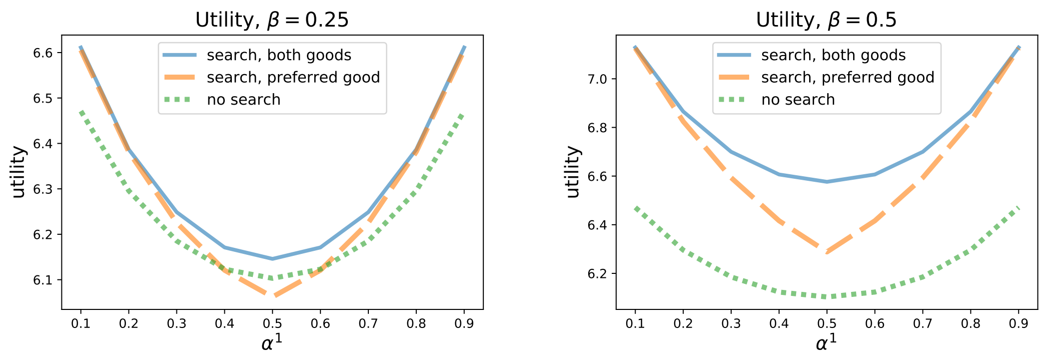
Notes: The figure depicts optimal shopping times, prices and quantities according to the model of Section 2. The model parameters are as follows: $T = 50,\ P^H = 1, \eta = 1,\ \mu = 0.5,\ T^0 = 0,\ W^0 = 50,\ W^1 = 5$. Search efficiency, β, is 0.5 in Panel A and 0.1 in Panel B. In the plots, search time for good c is reported as fraction of the total shopping time $T^c/(T^1 + T^2)$, and similarly for quantity, $Q^c/(Q^1 + Q^2)$. α^1 measures the relative preference for good 1, as $\alpha^1 + \alpha^2 = 1$.

Figure A.2. To Search or Not To Search. Utility under Different Scenarios

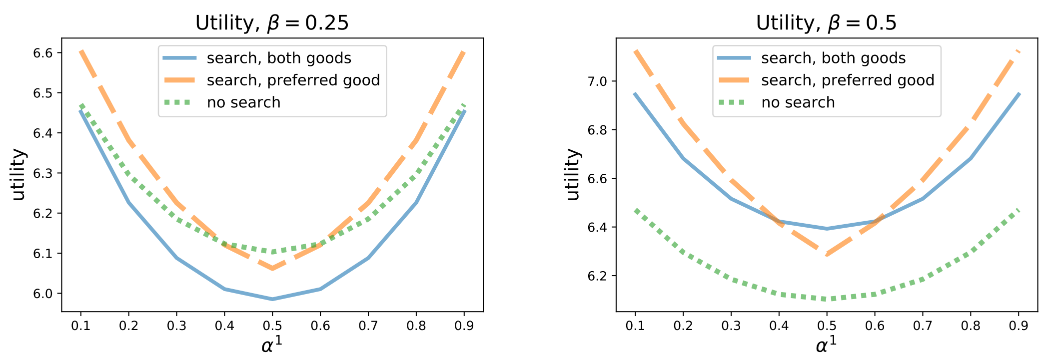
Panel A: No Fixed Search Cost



Panel B: Positive Search Fixed Cost

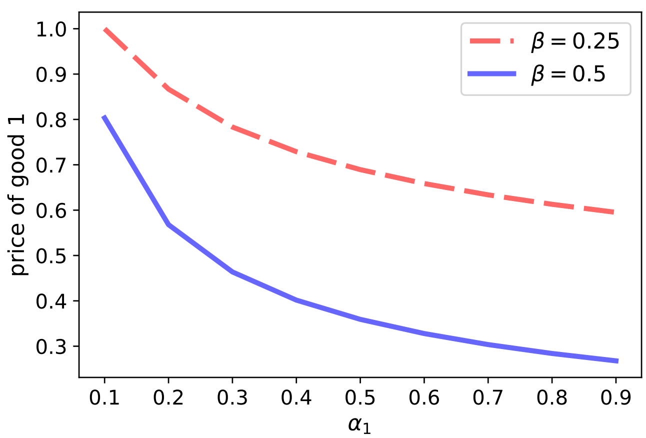


Panel C: Positive Search Fixed Cost, Higher for Two Goods



Notes: Each plot depicts utility under three scenarios: No search, search only for the most preferred good (highest α^u), and search for both goods. The model parameters are as follows: $T = 50$, $P_H = 1, \eta = 1$, $\mu = 0.5$, $W^0 = 50$, $W^1 = 5$. Searching efficiency, and relative preference for good 1 (β and α^1) vary as indicated in each subplot. In Panel A, the search fixed cost is zero, $T^0 = 0$. In panel B, $T^0 = 5$ when searching for one or two goods. In Panel C, $T^0 = 5$ when searching for one good, and $T^0 = 10$ when searching for two goods.

Figure A.3. Search Efficiency, Average Prices, and Price Dispersion



Notes: This figure illustrates that price dispersion may not decrease with improvements in search efficiency. Mean (SD) [CV] of prices with $\beta = 0.25 : 0.73$ (0.13) [0.18]. Mean (SD) [CV] of prices with $\beta = 0.50 : 0.42$ (0.16) [0.38].

Store Pricing When Consumers Search For Only Some Goods

Sellers rationally differentiate prices across stores and/or over time. Authors, going back to at least Salop and Stiglitz (1977), have constructed models where different prices for the same good across stores persist when some consumers are informed and others are not. Different prices can be rationalized from our consumer model as well. Intuitively, some consumers behave as if they are uninformed about prices because the value of work time (or leisure) is too high to search, while some consumers behave as if they are informed about prices because they rationally search for low prices for all goods they consume. In the literature, price setting when consumers vary in their (overall) search intensity has been shown to imply price differentiation, and it is intuitive that the pattern that we document can also rationalize price differentiation.

In this sub-section, we outline a store-pricing model, which can rationalize price dispersion. Economists have previously developed models for why stores may post different prices for identical goods. For example, Chevalier and Kashyap (2019) assume three types of consumers and two goods (1 and 2) that can be stored. Some consumers have an inelastic demand for good 1, other consumers have an inelastic demand for good 2, and the rest are bargain hunters. This last group will shop for low prices and store goods. Such a model can rationalize why stores have periodical sales.

Kaplan et al. (2019) document price dispersion across stores. Different stores tend to sell different goods at different prices, and store prices are quite persistent. Based on these facts, they develop a model, matching price persistence, where some agents are shoppers and some are inattentive in order to explain pricing patterns.

We build on these models and suggest a model of price dispersion across stores and goods where some consumers are bargain hunters (searchers or shoppers) only for the goods for which they have relatively strong demand. We will consider this model for the simplest case of two goods.

Consider two goods, indexed by the numbers 1 and 2. Assume stores can set a price P_H, which is the highest price that a consumer who does not search for that good will pay—for simplicity, we assume this price is constant. For the good a consumer wants in large quantities (his/her preferred good), he or she will search until the marginal value of further search is nil. Assume that consumers who search pay a low price P_L^s, which differs by store s. We assume that the price P_L^s is set competitively such that stores with a higher price provide more amenities. For example, it could be that it takes longer to get to stores with the lower prices due to location (which would literally fit into our framework).

Consumer may search for good 1, good 2, both goods, or not search at all. In this illustration, we assume half of consumers search for good 1 only and half search for good 2 only. When consumers go to the store, they purchase a smaller amount of their less preferred good, if any. A consumer who prefers good 1 searches until he or she finds the lowest price P_L^s that is consistent with optimal time spent searching, buying an amount M_L^s. S/he also buys an amount M_H ($M_H < M_L^s$) of the less preferred good 2 at price P_H. A consumer who prefers good 2 searches until he or she finds the optimal price for good 2 (symmetric to good 1), and buys a smaller amount of good 1 at the higher price. Further assume that there are a large number of stores so that other stores will not respond to a given store's change in pricing. A store may set a price P_L^s for good 1 and P_H for good 2. The store pays a constant cost c^s for goods. The store's profit, where the factor reflects that half the potential purchases go to another store, is:

$$\frac{1}{2}[(P_L^s - c^s)M_L^s + (P_H - c^s)M_H] \ .$$

Due to competition, P_L^s is set at a minimum that allows a normal profit. An alternative pricing strategy would be to charge P_L^s for both goods to attract both types of purchases—at any price higher than P_L^s, consumers will go elsewhere to find their more preferred good. In this case, the store's profit is:

$$\frac{1}{2}[(P_L^s - c^s)M_L^s + (P_L^s - c^s)M_H] + \frac{1}{2}[(P_L^s - c^s)M_H + (P_L^s - c^s)M_L^s] = (P_L^s - c^s)(M_L^s + M_H) \ .$$

A store cannot charge more than P_L^s without losing all the purchases of consumers who prefer good 1, and it cannot charge more than P_H without losing all sales. A store has no incentive to charge less than P_H unless it lowers the price to P_L^s.

For a store to differentiate prices the following condition must hold:

$$\frac{1}{2}[(P_L^s - c^s)M_L^s + (P_H - c^s)M_H] > (P_L^s - c^s)(M_L^s + M_H),$$

or

$$(P_H - P_L^s)M_H > (P_L^s - c^s)(M_L^s + M_H).$$

That is, the extra gain from charging a high price for the inelastic demand M_H outweighs the profit from selling the amount $M_L^s + M_H$ at a lower price.

Data

In our dataset, age is reported in categories, and the age distribution by category in January of 2017 is as follows: 22 percent are younger than 45 years old; 25 percent are aged 45 to 54; 22 percent are aged 55 to 64; and 31 percent are 65 or older. Household income is reported by category: 16 percent have income that is less than $20,000; 22 percent earn $20,000 to $35,000; 25 percent earn $35,000 to $55,000; 18 percent earn $55,000 to $75,000; 11 percent earn $75,000 to $100,000; and 8 percent have income that is more than $100,000. Education categories have the following distribution: 5 percent of panelists have not completed high school; 32 percent are high school graduates; 39 percent have some education beyond high school without a college degree, while the rest have graduated from college. Relative to the U.S. population, the IRI sample is somewhat older and poorer, and spending in the IRI categories represents roughly 20 percent of PSID food-at-home expenditure.

Table A.1. Summary Statistics for Panelist in January of 2007

	Count	Mean	SD	Min	Max
Years of Education	4,434	13.76	2.01	6	18
Age	4,740	55.34	12.73	21	70
Household Income	4,738	52,537	36,662	5,000	150,000
Old (65+)	4,740	0.31	0.46	0	1
Expenditure (monthly)	4,740	79.47	63.93	5	1,015

Notes: Authors' calculations using all IRI panelist data for January of 2007.

Table A.2. Summary Statistics for Regressions

	Count	Mean	SD	Min	Max
Bargain Hunting Index (BHI)	551,438	7.45	9.29	–12	34
BHI (demeaned)	551,438	–0.00	8.72	–27	32
BHI (demeaned), 65+	190,607	0.62	9.21	–27	32
BHI (demeaned), age<65	360,831	–0.33	8.44	–27	32
BHI (demeaned), exp. < median exp.	275,596	0.50	9.78	–27	32
BHI (demeaned), exp. ≥ median exp.	275,842	–0.50	7.49	–27	31
Category-Specific BHI	3,728,872	0.00	14.33	–68	63
Category-Specific Quantity Index	3,728,872	0.99	0.74	0	4
Expenditure (monthly)	551,438	69.51	55.32	5	2,281
Old (65+)	551,438	0.35	0.48	0	1
# trips (monthly)	551,438	8.96	6.39	1	126
# stores visited (monthly)	551,438	2.97	2.01	1	34

Notes: Authors' calculations using all IRI panelist data from 2003 through 2012. The BHI computation is described in equation (7). The index measures how much a consumer saves (positive values), in percent, or overpays (negative values) relative to buying his or her consumption bundle at average prices. The BHI is broken up by age group and expenditure group. The category-specific BHI is described in equation (7) and focuses on savings in a specific category. The category-specific quantity index, which measures whether a consumer purchases more or less of that category than does the average consumer, is computed according to equation (5). The other variables are used in our regressions: (1) Expenditure is total dollars spent in a given month by a panelist in IRI transactions; (2) Old (65+) is a dummy variable for whether consumers are 65 or older; (3) # trips to store (monthly) is the total number of trips to stores by a panelist in a given month; (4) # stores visited (monthly) is the number of different stores that a consumer visits in a given month.

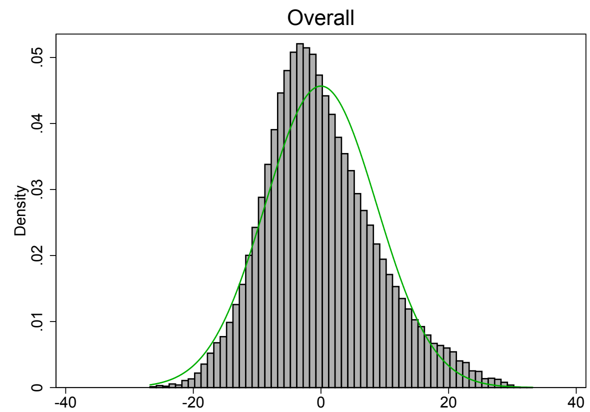
Additional Figures

In Figure A.4, we use a histogram to display the dispersion of the (demeaned) overall BHI. The BHI is slightly leptokurtic (kurtosis is 3.3) and skewed to the right (skewness is .43). The bottom two panels split the sample into 65-plus and younger panelists, and into panelists with below- and above-median expenditure in a given period. As our model predicts, the older individuals pay lower prices on average than do the younger panelists, and the poorer panelists (as proxied by expenditure) also pay relatively lower prices.

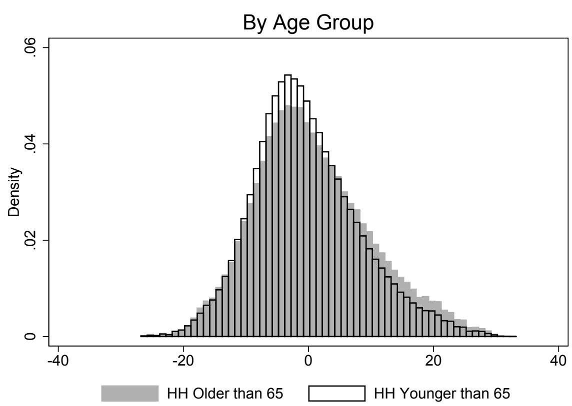
Figure A.5 depicts histograms for the overall BHI and the store BHI. The histograms indicate savings from both store selection (consumers' purchasing products in stores where they are relatively cheaper) and the timing of purchases within a given store.

Figure A.4. The bargain-hunting index

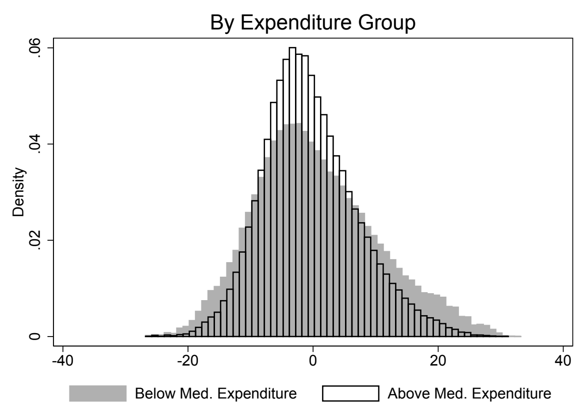
Panel A: Overall



Panel B: By Age Group



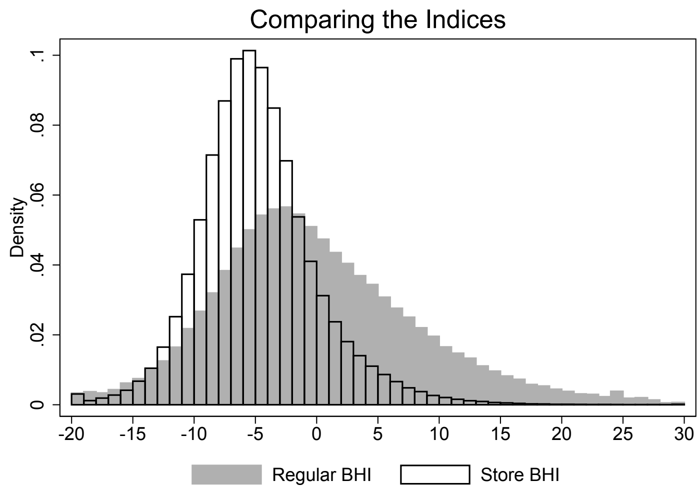
Panel C: By Expenditure Group



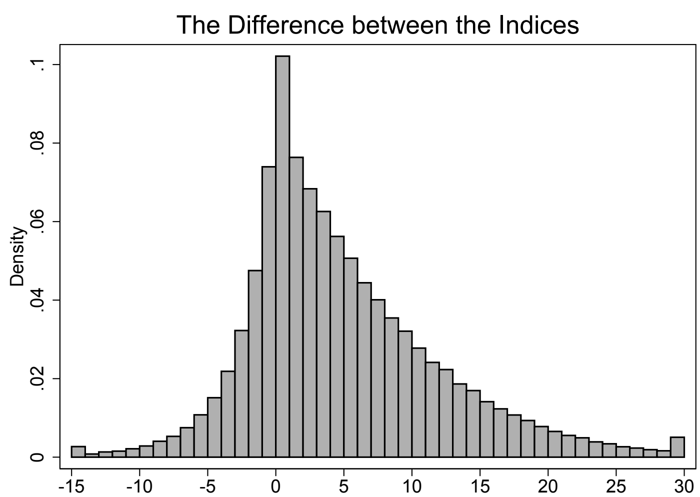
Notes: The BHI index shows how much a consumer saves, in percentages, relative to the counterfactual of buying his or her consumption bundle at average prices. The BHI index has been normalized to have a mean of 0 every month-year by market. *Source:* IRI, all panelist data from 2003 through 2012.

Figure A.5. The BHI vs. the Store BHI

Panel A: Comparing the Indices



Panel B: The Difference between the Indices



Notes: The regular BHI index is defined in equation (7) and represents how much a consumer saves relative to buying at average prices across stores. The store BHI is defined in equation (9) and measures how much a consumer would save if he or she paid average prices in the store relative to buying the consumption bundle at average prices across all stores. Panel B plots the distribution of the difference between the indices (individual by individual). *Source:* IRI, all panelist data from 2003 through 2007.

Further Robustness

To test whether our results are robust across categories, we estimate the regression separately for each category c, using the average category-specific quantity index as an instrument. The data in each regression form an individual $\times$ time panel, and all coefficients, including dummies, can take different values for the different categories.

$$\text{BHI}_{i,t}^{c} = \mu^{c} + \gamma_{m,t}^{c} + \beta^{c}\,\text{QI}_{i,t}^{c} + X_{i,t}\,\alpha^{c} + \epsilon_{i,c,t}$$

Table A.3 shows the regressions category-by-category.[1] We will not discuss each category in detail, but together the results reveal that our main qualitative result is remarkably robust—the coefficient to the quantity index is positive and highly significant in almost all categories. The exceptions are beer, for which the estimated coefficient is virtually 0, and cigarettes for which the coefficient is negative and insignificantly different from 0. These two categories are the ones with the lowest price dispersion and, therefore, the lowest return to bargain hunting. The size of the coefficients to the quantity indices vary by category, with the smallest coefficients found for categories with relatively less price variation at the UPC level. In particular, all categories with a coefficient less than unity are among those with the lowest price variation. The largest coefficient is for hot dogs, the category with the second highest price variation. In sum, while the variation in the size of the coefficients is not one-to-one with price dispersion, the variation in the coefficients reflects the potential gains from bargain hunting as captured by the price variation.

[1]The quantity indices in these regressions have been standardized to have a mean 0 and a standard deviation of 1 by category for an easier comparison across the 30 regressions.

Table A.4 shows that the results are qualitatively similar to those obtained at the monthly frequency when aggregating purchases and averaging prices to the quarterly frequency, which supports the causal interpretation of the results.

Table A.3. The BHI and the QI by Category. Separate IV-Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Quantity Index	0.01	0.78**	1.92***	–0.23*	1.87***	3.47***	5.33***	1.45**	3.00***	1.69***
	(0.04)	(0.35)	(0.13)	(0.13)	(0.26)	(0.23)	(0.65)	(0.59)	(0.36)	(0.30)
Log. Expenditure	–0.14***	–0.96***	–1.85***	0.16	–1.21***	–2.10***	–2.10***	–1.45***	–1.78***	–1.75***
	(0.03)	(0.23)	(0.09)	(0.13)	(0.14)	(0.13)	(0.19)	(0.33)	(0.15)	(0.17)
Old (65+)	–0.11**	0.35	0.64***	–0.39	1.34***	–0.68***	0.78**	1.30***	0.31	0.70***
	(0.05)	(0.35)	(0.14)	(0.27)	(0.21)	(0.18)	(0.31)	(0.46)	(0.23)	(0.21)
Observations	86504	17228	354994	25430	153068	301697	42551	11575	110072	164925
F-test excl. inst.	65883	3705	199769	24933	45308	115289	9021	1705	37443	48932

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Quantity Index	1.65***	1.24***	6.00***	3.23***	2.07***	6.82***	0.59***	5.33***	4.03***	4.45***
	(0.26)	(0.27)	(0.39)	(0.35)	(0.24)	(0.33)	(0.09)	(0.48)	(0.24)	(0.34)
Log. Expenditure	–1.72***	–0.52***	–2.77***	–3.34***	–0.56***	–1.81***	–0.38***	–1.37***	–2.01***	–1.20***
	(0.15)	(0.11)	(0.17)	(0.18)	(0.11)	(0.12)	(0.06)	(0.15)	(0.13)	(0.14)
Old (65+)	0.64***	0.03	0.28	0.57**	0.17	0.65***	0.04	0.24	–0.37*	0.85***
	(0.21)	(0.17)	(0.25)	(0.28)	(0.18)	(0.20)	(0.11)	(0.21)	(0.20)	(0.24)
Observations	159206	52823	112348	146606	138726	120653	423015	73911	115133	101725
F-test excl. inst.	30098	9631	18727	39901	50813	23369	297080	8467	52571	24106

	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
Quantity Index	4.19***	1.65***	2.21***	3.07***	3.87***	1.27***	4.85***	3.41***	5.25***	1.03***
	(0.83)	(0.52)	(0.17)	(0.41)	(0.30)	(0.26)	(0.25)	(0.88)	(0.39)	(0.16)
Log. Expenditure	–1.87***	–1.66***	–1.08***	–1.31***	–1.38***	–0.83***	–2.61***	–0.66**	–2.01***	–0.67***
	(0.42)	(0.53)	(0.10)	(0.17)	(0.13)	(0.18)	(0.12)	(0.27)	(0.15)	(0.09)
Old (65+)	0.58	0.62	0.78***	0.09	1.77***	0.67***	–0.10	–0.08	0.55**	0.70***
	(0.68)	(0.92)	(0.15)	(0.29)	(0.22)	(0.25)	(0.17)	(0.43)	(0.26)	(0.17)
Observations	4752	2159	345689	41029	134273	20863	199147	21116	67796	219417
F-test excl. inst.	870	425	111775	6322	26163	7575	54252	3235	13165	79723
Month-Year × Market FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Regression: $\text{BHI}_{i,t}^c = \gamma_{m,t}^c + \beta^c \text{QI}_{i,t}^c + X_{i,t}\alpha^c + \epsilon_{i,c,t}$, estimated category by category. The quantity index, $QI_{i,t}^c$, is standardized by category (mean 0, sd 1) for easier interpretation. All regressions include market × month FE and are estimated by IV. Our instrument is the average category-specific quantity index, defined more precisely in the notes to Table 2. Standard errors clustered by panelist. *** (**) [*] significant at the 1 (5) [10] percent level.
Categories as follows: (1) beer, (2) blades, (3) carbonated beverages, (4) cigarettes, (5) coffee, (6) cold cereal, (7) deodorants, (8) diapers, (9) facial tissue, (10) frozen dinners, (11) frozen pizza, (12) cleaning supplies, (13) hot dogs, (14) laundry detergent, (15) margarine/butter, (16) mayonnaise, (17) milk, (18) mustard/ketchup, (19) paper towels, (20) peanut butter, (21) photography, (22) razors, (23) salted snacks, (24) shampoo, (25) spaghetti sauce, (26) sugar substitutes, (27) toilet tissue, (28) toothbrushes, (29) toothpaste, (30) yogurt.

Table A.4. Rational Inattention. Pooled Regressions. Quarterly Frequency

	(1) All Years BHI	(2) All Years BHI	(3) Pre-2008 BHI	(4) Pre-2008 Store BHI
Quantity Index	1.70***	1.64***	1.65***	0.26***
	(0.06)	(0.06)	(0.06)	(0.02)
Log. Expenditure	–1.04***	–1.31***	–1.43***	–0.43***
	(0.06)	(0.06)	(0.06)	(0.03)
Old (65+)	0.51***	0.15	–0.11	–0.08*
	(0.12)	(0.11)	(0.12)	(0.05)
# stores visited (quarterly)		0.33***	0.53***	0.17***
		(0.02)	(0.02)	(0.01)
# trips (quarterly)		0.03***	0.03***	0.01***
		(0.00)	(0.00)	(0.00)
Quarter-Year × Market FE	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes
Observations	1600439	1600439	889316	889316
Adj. R-squared	0.02	0.03	0.04	0.01
F-test excl. inst.	873232	870518	519741	519741

Notes: Expenditure is aggregated at the quarterly level, and store-average prices are calculated at the same frequency. Regression: $\text{BHI}^c_{i,t} = \nu_c + \gamma_{m,t} + \beta \text{QI}^c_{i,t} + X_{i,t}, \alpha + \epsilon_{i,c,t}$, where $\text{BHI}^c_{i,t}$ is the category-specific bargain-hunting index for individual i in quarter t, ν_c denotes category fixed effects. $\gamma_{m,t}$ is a market × month FE, X is a vector of regressors, and $QI^c_{i,t}$ is the quantity index described in equation (5). The quantity index, which measures whether a consumer purchases more or less of a category than the average consumer, is standardized (mean 0, sd 1) for easier interpretation. In column (4), $\text{BHI}^c_{i,t}$ is replaced by a category-specific store BHI, $\text{BHI}^{c,s}_{i,t}$. All regressions are estimated by IV, using the average category-specific quantity index as an instrument, adapted to the quarterly frequency and defined more precisely in the notes to Table 2. Standard errors clustered by individual. *** (**) [*] significant at the 1 (5) [10] percent level.

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