"Target Marketing and the Use of Internet Shopping Agents"

26 September 2005

Prepared by:

Cullen F. Goenner, PhD*
Department of Economics
University of North Dakota
Grand Forks, ND 58201
Tel: 701-777-3353
E-mail: cullen.goenner@und.nodak.edu

* The author would like to thank Dave Chuc, owner of American eSuperstore, for generously providing the data used in this project in addition to helpful conversations. This work was funded in part by a grant from the Small Business Development Center of North Dakota

"Target Marketing and the Use of Internet Shopping Agents"

Abstract:
In order to succeed, entrepreneurs in North Dakota must seek out new markets and better serve those they currently operate within. One way to increase demand for a good or service is through marketing. Marketing targeted at potential customers not only makes individuals aware of the availability of the product, but may also differentiate in a positive manner the product from those of competitors. This report demonstrates some ways in which entrepreneurs can conduct market research that helps them to understand the key characteristics of their target market based on the geography of their customer base. Armed with this information, I discuss ways in which entrepreneurs can focus their marketing and advertising presence to identify promising markets as well as more effectively reach potential customers in the information age.

Introduction:

According to the US Small Business Administration (SBA) website, the key to successful marketing for a small business is to: [1]

1. Determine the needs of their customers through market research
2. Analyze their competitive advantages to develop a market strategy
3. Select specific markets to serve by target marketing
4. Determine how to satisfy customer needs by identifying a market mix

For many small businesses these activities may seem like a challenging task as they involve data collection, analysis, and finally interpretation that offer unknown utility to those without experience. For firms that operate exclusively in a local market such tools are most likely already implemented in an informal manner as the business may share a relationship with the customer base that reveals their customer's attitudes, behaviors, and demographic characteristics. Firms operating in larger markets though often do not know their customers and potential customers' attitudes and needs. By identifying where customers live as well as their demographic and socio-economic characteristics,

[1] http://www.sba.gov/starting_business/marketing/basics.html

businesses can target marketing efforts at the most productive markets and design promotions to more effectively reach targeted customer groups.

Market research requires the collection and analysis of data. The purpose of which is to segment the market into groups of individuals that will behave similarly so as to use targeted marketing. Firms may attempt to obtain this information through surveys directly or indirectly via consulting services, which for small businesses can be an excessive cost. Most firms though already collect data that can be utilized for these purposes. I demonstrate that the zip codes of one's customers contain a wealth of demographic information that can be readily used to improve marketing efforts.

The idea is to utilize tools from geodemography. Geodemography is the process of attaching demographic characteristics with geographic characteristics. The often-stated notion is that birds of a feather flock together, which is to say that people living in the same neighborhood tend to have similar characteristics (income, education, occupations, and family size) and thus behave in similar patterns. It is this predictability in behavior that one can exploit to segment the market through predictive modeling and cluster analysis. While consultants often use proprietary household data and charge large fees for such services, information obtained from aggregated US Census data provides actionable results.

Using the mapping software Microsoft MapPoint 2004 one is able to visualize where one's customers are geographically located. This allows one to determine if customers are concentrated in certain areas or regions, which can be exploited by firms in their marketing plans. The software also contains a large amount of aggregated demographic and behavioral data that describe individuals within different zip codes.

When combined with the zip codes of one's customers, this data can provide an idea as to the general characteristics of one's current customer base. A large number of customers, or customers that are geographically dispersed, though require more sophisticated analysis methods to determine patterns in the data. Predictive modeling is one tool that allows marketers to quantitatively predict a consumer's behavior based on their individual characteristics. Below we demonstrate how predictive modeling can be used to target marketing efforts on particularly promising geographic areas. Cluster analysis is also used here to better understand the combined characteristics of customers. The method involves segmenting customers into different types, such that customers in the same cluster are similar to each other and dissimilar to those of other clusters. The idea is that by understanding the complex associations between customers one is able to create promotions that more effectively reach different groups.

The small business examined here is American eSuperstore (AeS hereafter), which is an internet retailer of electronics, computer software, home appliances, portable air conditioners, and other general merchandise.[2] The business has been in operation for four years and has generated 1.6 million dollars in revenues during this period. In terms of marketing their products, AeS has utilized comparison shopping engines that include NexTag.com, Shopping.com, BizRate.com, and PriceGrabber.com. These websites allow potential customers to quickly compare products, prices, reviews, and merchant ratings. The service is free for consumers, though sellers such as AeS pay a fee each time a consumer clicks on their store's link from that provided by the shopping engine. This fee ranges from $.15 to $1.00 per click at Shopping.com, depending on the type of product,

[2] American eSuperstore is solely an internet business. Their website is http://www.americanesuperstore.com

and is paid regardless of whether the consumer ultimately purchases the good. Conducting market research utilizing AeS's sales data will allow them to more effectively target their marketing efforts.

Geographic Segmentation

Market research involves analyzing data in order to segment one's market into different groups that can be targeted with marketing in different ways. In this analysis customers are segmented based on their geography, i.e. where they live. A simple way to segment the market geographically is to examine where one's sales originate. This allows firms to determine areas that are strong and those that are weak. Figure 1, which was generated using Microsoft MapPoint 2004, depicts the total sales by state for American eSuperstore. From Figure 1, one can see that sales on both coasts are relatively higher than in the Midwest. This analysis can be further refined to show sales by zip code (Figure 2). Examining Figure 2, one may wonder why sales are concentrated in some areas of Washington and not others.

In order for a customer to buy from AeS they must shop online. Thus one might reasonably assume that sales are associated with regions that contain a large number of online shoppers. Fortunately for our purposes, Microsoft MapPoint 2004 contains a large amount of aggregated demographic data that describe each zip code. For example, included in the data set is a variable that measures the fraction of adults that shop online. Using Microsoft MapPoint one is able to generate a map (Figure 3) that depicts AeS's sales relative to regions where online shopping is common. In the state of Washington, one can see a high correlation between the fraction of adults that shop online and sales.

This information allows the firm to concentrate their marketing efforts on a smaller geographic region.

Other factors though also contribute to AeS's sales. While the fraction of adults who shop online is informative, it does not tell us what kind of products consumers are buying or how much they are spending. Factors such as household income and size are also likely to influence AeS's sales. One could separately look at the relation between each of these factors and sales, though this fails to capture the shared relationships among the factors. To incorporate multiple factors in the analysis requires the use of predictive modeling. Predictive modeling uses multiple regression analysis to evaluate customer behavior when conditioning on their individual characteristics. In this instance we will examine how the amount a customer spends at AeS is related to several characteristics of their zip code.

Geodemography is based on the idea that where someone lives reveals something about their attitudes and behavior. The notion is that neighborhoods tend to be composed of relatively homogenous individuals (income, education, occupations, and family size) who behave in similar patterns. Individuals need not be identical within a zip code for segmentation to work, as sociologically individuals tend to be influenced in their decisions by those of their neighbors. For marketing purposes knowledge of the characteristics of one's neighborhood reveals characteristics of the individual, which can be used to identify marketing opportunities. Table 1 provides a summary of the characteristics that describe the neighborhoods where AeS currently sells their products. These characteristics were chosen as they are believed to be likely factors that influence

AeS's sales. As one can see the typical customer lives in a neighborhood where the median age is 36, household size is 2.5, and average income is $71,000.

Multiple regression analysis is used to understand how multiple factors influence the pattern of AeS's sales. In this application we seek to predict how much a consumer will spend (dependent variable), while conditioning on the characteristics described above (independent variables). Four dummy variables are also included as independent variables that indicate whether different comparison shopping engines were used. Regression techniques allow us to evaluate the marginal effect of each factor as well as their combined contribution to an individual's purchase. Table 2 displays the regression estimates. From this table one can see which factors increase/decrease sales and by what amount. For example increasing median age of the population in a neighborhood from the mean (35.8 years old) by one standard deviation (4.98 years) increases average sales by 4.98*.89 = $4.43, where .89 is the estimated coefficient for median age from Table 2. The results also indicate that individuals in neighborhoods with higher incomes and expenditures on personal care products spend more at AeS. Individuals in neighborhoods with a larger household size and higher expenditures on entertainment and gifts spend less as do neighborhoods with a higher percentage of adults who went to college.

Customers typically find out about AeS's products by using an internet search engine. Search engines are of two general types. Comparison shopping engines (BizRate.com, NexTag.com, Shopping.com, and PriceGrabber.com) allow consumers to quickly compare prices at several different sellers. For example, a search using PriceGrabber.com on September 26, 2005 for Philips' DVP642 DVD player revealed 19 sellers offering the product. Figure 5 provides a partial screen view of the information

found on PriceGrabber for the Philips DVP642 DVD player. A click of the mouse further reveals that the lowest price including shipping and handling is $60.15. The webpage also provides merchant ratings, product reviews, and a link to the merchant's website. Sellers pay a fee each time a customer clicks from the engine over to their site. The other type of search is a key word search, which uses a search engines such as Froogle, MSN, AltaVista, and Excite. The latter type of search engine does not involve a fee, but may be less useful to consumers as prices are not easily compared and sellers may have their products lost among those of other sellers.

Of AeS's 16,000 orders, approximately 10% have come from comparison shopping engines, while the other 90% have been from natural search engines. The regression estimates from Table 2 indicate that customers that use the comparison shopping engines BizRate, NexTag, and PriceGrabber spend less than those who use natural searches. Only in the case of BizRate is the effect statistically different than zero. The effect is that customers using BizRate spend $23.95 less on average. For Shopping.com the effect is positive though not statistically different than zero. While comparison search engines generate sales, they also involve substantial costs. These results suggest that AeS's marketing efforts should emphasize the use of Shopping.com relative to the other comparison shopping agents. The results also indicate the importance of optimizing one's website so as to maximize placement in natural search engines.

While the coefficients of the regression model are of interest by themselves, they can also be combined with our data to quantitatively evaluate which markets are the most promising in terms of sales. An example will be informative. Consider our decision to

advertise in one of two geographic areas. Table 3 describes each of the two areas.[3] Using the estimated coefficients and these characteristics one is able to "score" each of the areas. To determine an area's score, take the sum of the coefficients multiplied by the corresponding characteristic for the area. For Area A the calculation is 58.36*1 + .89*35 – 5.35*2.5 +.0006*70,000 - .13*2,800 - .29*1,500 +.85*850 + 140.95 * .5 + 19.66 * .25 -165.95*.15 = $92.13.[4] A similar calculation for Area B indicates average sales of $413.71. Based on this evaluation, Area B is clearly the preferred location for additional marketing.

Given the demographic data in Microsoft MapPoint and the estimated coefficients in Table 2, one is able to similarly score each zip code in the United States. Grouping the resulting scores into quartiles, one will see that while certain areas in Washington are more promising than others, in general the state of Washington is a good area for marketing efforts as only a handful of zip codes are in the lowest quartile. See Figure 4. Accounting for the combined effects of several variables relevant to AeS's sales indicates several additional areas relative to Figure 3 to consider for marketing efforts.

Characterizing Customers

An important reason to conduct market research is to gain a better understanding of one's customers. Individuals though by their very nature are complex as they differ across a wide array of attributes and attitudes. Cluster analysis is an analytical method that allows one to see similarities in the face of such complexity. The idea of cluster analysis is to group objects together such that objects within each group are similar to

[3] Here it is assumed that a comparison shopping engine is not used.
[4] The constant is always equal to one.

those within the group and dissimilar to those of other groups.[5] For marketing purposes this can be used to segment customers into relatively homogenous groups that will respond similarly. Here we segment customers into five groups based on how much they spend and the characteristics of their zip code examined above.

The five groups indicate some distinct characteristics. See Table 4. Group A is characterized as the oldest group, with the highest income, highest spending, and the largest commute times. This group is the most prone to internet shopping (31%), though makes up less than 3% of AeS's sales. The vast majority of AeS's sales come from groups B (32%), C (34%), and E (21%). These groups tend to be younger, less affluent, spend less, more likely to use comparison shopping engines, and work closer to home. Together these findings indicate that AeS may wish to review its product offerings so as to better serve this more affluent and older customer base. In order to improve marketing to this group, AeS should consider alternatives to their current use of comparison shopping engines as older and more affluent customers are the least likely to respond to this form of marketing. Alternatives, such as optimizing the code in their website, will help to improve their ranking in key word searches and generate additional traffic by this group to their website.

Conclusion

Market research is often viewed as a difficult task, particularly for small businesses. In this project I demonstrated several ways in which businesses can gain a basic understanding of the characteristics of their customers based on where they live. All businesses, with the use of Microsoft MapPoint 2004 are quickly able to view the

[5] A thorough discussion of cluster analysis is beyond the scope of this project. The interested reader is referred to Anderberg (1973) and Kaufman and Rousseew (1990) for an introduction to the technique.

geographic locations of their customers to determine areas where customers are concentrated. In addition one can combine the demographic data built into the program to determine new markets that appear promising as well as summarize the characteristics of one's customers. For more detailed analysis, quantitative techniques including predictive modeling and cluster analysis were used in this report. These methods demonstrated the complex relationship between where customers live and their spending patterns as well as indicating unique groupings of individuals that can be targeted differently with marketing efforts.

References

Anderberg, M. R. (1973). *Cluster Analysis for Applications.* New York: Academic Press

Kaufman, L., and P. J. Rousseeuw. (1990). *Finding Groups in Data: An Introduction to Cluster Analysis*. New York: Wiley.

Figure 1: American eSuperstore.com Total Sales by State

Figure 2: American eSuperstore.com Total Sales by Zip Code - Washington

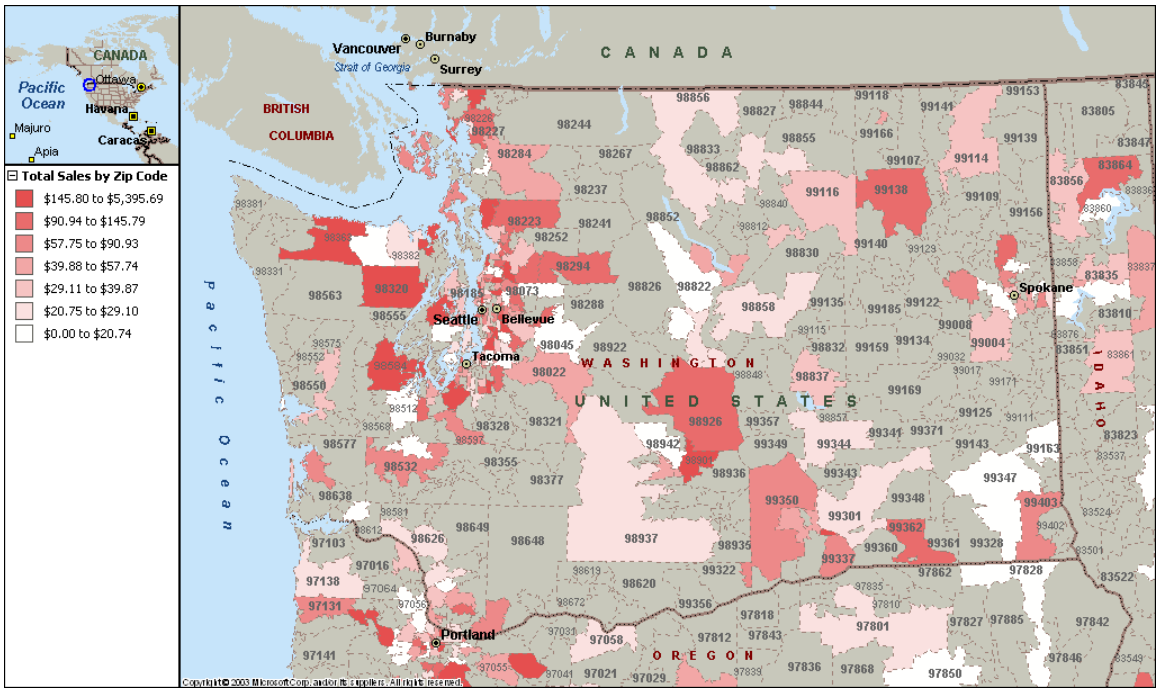

Figure 3: American eSuperstore's Sales relative to % of Adults who Purchased Online Last Year - Washington

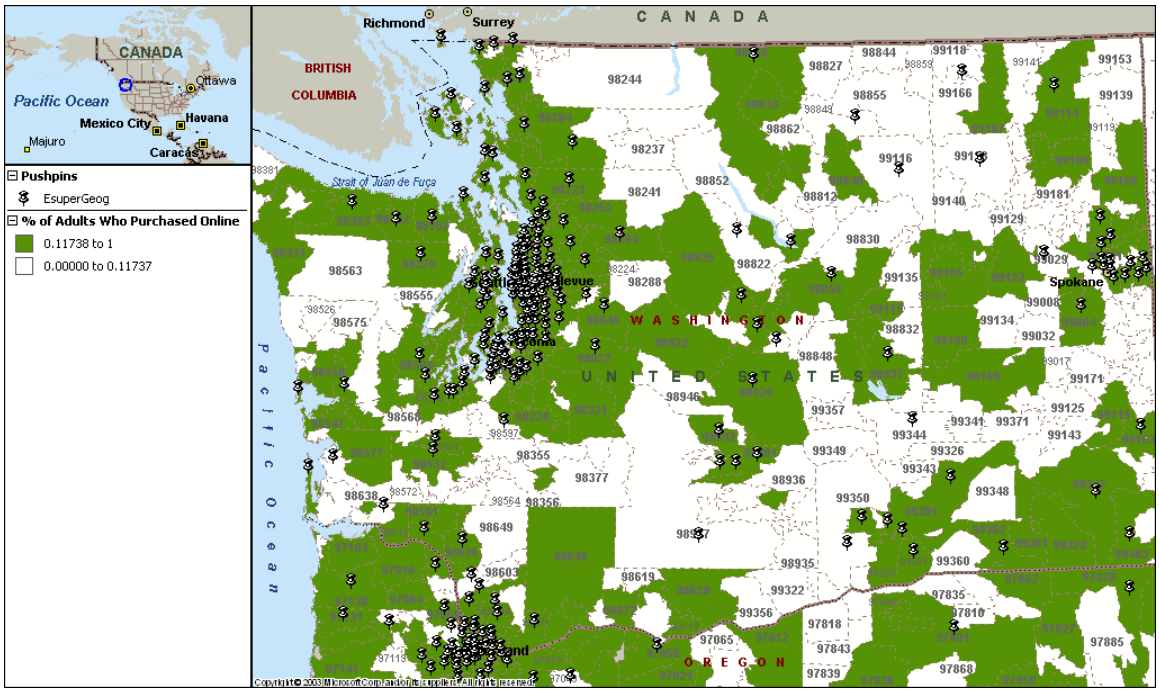

Figure 4: Estimated Scores of Zip Codes – Washington

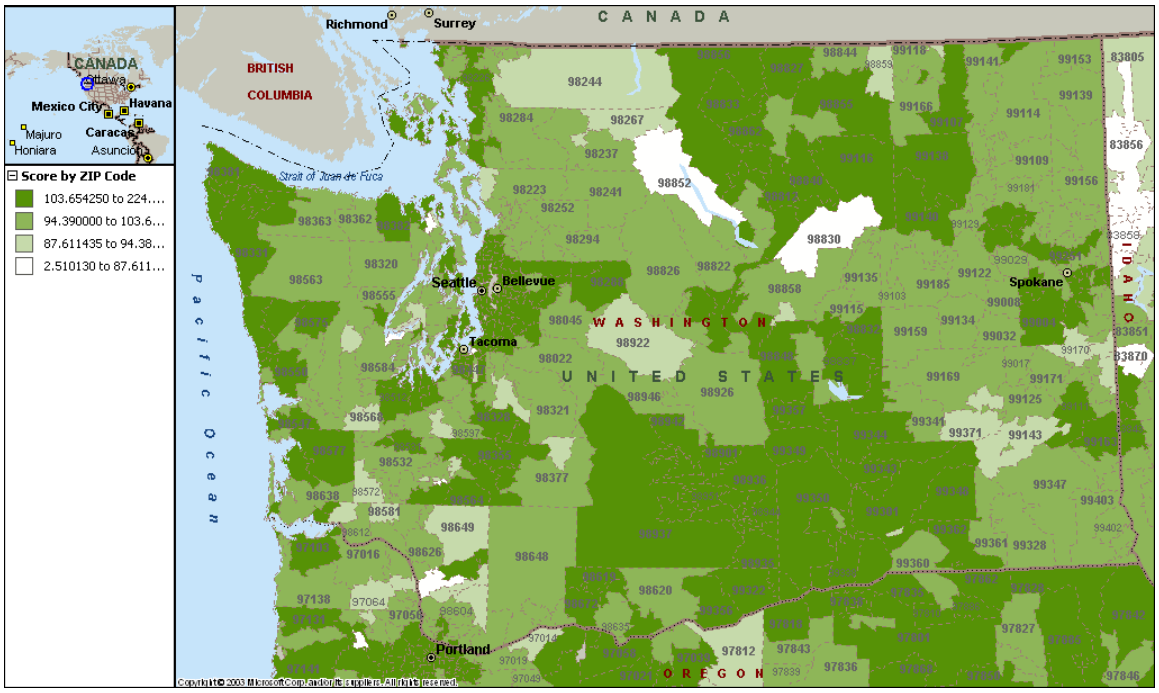

Figure 5: Partial Screen View from PriceGrabber.com

Philips DVP642 DVD Player

(Progressive Scan - SKU: DVP642)
Price Range: **$42.95 (Used & Refurbished) - $77.99** from 26 Sellers
Description: Dreaming of a player that plays practically any disc format? Do you want to enjoy flawless, true-to-life picture quality? With Philips DVD players, you can do just that. This model features Progressive Scan, which doubles the vertical reso.... Read More

User Reviews
(37 Reviews)

Expert Reviews
(1 Review)

- **Compare Prices**
- **Product Details**
- **User Reviews**
- **Expert Reviews**

New (19 Sellers from $45.50) | **Used & Refurbished** (7 Sellers from $42.95) Zip Code: 58201

	Seller	Price	Tax	Shipping	BottomLinePrice	Availability	Seller Rating
Shop	5starprodusa Storefronts	$49.95	No Tax	$10.20	Your Best Price **$60.15**	In Stock	Not Rated Write a Review
Shop	MaxxElectronics Storefronts	$45.50	No Tax	$14.99	**$60.49**	In Stock	14 Reviews
Shop	circuit city Featured Merchant Merchant Info	$59.99	$3.00	Free	**$62.99**	In Stock	39 Reviews
Shop	MacMall Merchant Info	$60.99	No Tax	$7.70	**$68.69**	In Stock	168 Reviews
Shop	X10 Merchant Info	$70.49	No Tax	Free	**$70.49**	In Stock	559 Reviews
Shop	J&R Music and Computer World Merchant Info	$64.88	No Tax	$6.65	**$71.53**	In Stock	675 Reviews
Shop	newegg.com Featured Merchant Merchant Info	$69.99	No Tax	$3.99	**$73.98**	In Stock	7851 Reviews
Shop	B&H Photo 800.947.7784 Featured Merchant Merchant Info	$64.95	No Tax	$10.47	**$75.42**	In Stock	2616 Reviews

Table 1: Neighborhood Characteristics of American eSuperstore's Customers.

Neighborhood Characteristics	Mean	Std. Dev.	Min	Max
Sales	94.24	150.79	0.00	5395.69
Median Age	35.80	4.98	18.75	76.50
Household Size	2.56	0.41	1.05	5.40
Household Income	71339.92	31129.64	1762.00	341334.00
HH Spending on Entertainment	2833.81	811.98	738.56	7826.59
HH Spending on Gifts	1630.13	460.84	428.34	4424.24
HH Spending on Personal Care	908.04	253.76	240.66	2476.00
% of HH with Computer	0.53	0.06	0.00	1.00
% of Adults who buy Online	0.24	0.12	0.00	0.87
% of Adults with Some College	0.16	0.04	0.00	0.36

Table 2: Regression Estimates of Individual Sales

Variable	Coefficient	Std. Err.	t-Stat
Median Age	0.89	0.31	2.87
Household Size	-5.35	3.94	-1.36
Household Income	0.0006	0.0003	1.72
HH Spending on Entertainment	-0.13	0.04	-3.16
HH Spending on Gifts	-0.29	0.05	-5.36
HH Spending on Personal Care	0.85	0.11	8.00
% of HH with Computer	140.95	25.33	5.56
% of Adults who buy Online	19.66	10.30	1.91
% of Adults with some college	-165.95	34.30	-4.84
BizRate	-23.95	6.37	-3.76
NexTag	-28.70	16.65	-1.72
Price Watch/Grabber	-9.09	22.95	-0.40
Shopping.com	1.48	5.26	0.28
Constant	58.36	21.50	2.71

Table 3: Example - Characteristics of Two Geographic Areas

	Area A	Area B
Median Age	35	40
Household Size	2.5	2
Household Income	70,000	$75,000
HH Spending on Entertainment	$2,800	$2,000
HH Spending on Gifts	$1,500	$1,200
HH Spending on Personal Care	$850	$1,000
% of HH with Computer	50%	45%
% of Adults who buy Online	25%	25%
% of Adults with some college	15%	15%

Table 4: Customer Classifications

	Group A	Group B	Group C	Group D	Group E
Sales	102.348	94.431	94.155	93.897	94.675
% Comparison Search Engine	0.079	0.10.4	0.095	0.090	0.091
% of Adults with some college	0.102	0.176	0.161	0.126	0.159
% of Adults who buy Online	0.314	0.248	0.209	0.282	0.276
% of HH with Computer	0.580	0.534	0.489	0.561	0.556
HH Spending on Personal Care	1731.146	860.153	675.074	1321.020	1059.298
HH Spending on Gifts	3132.291	1544.139	1207.919	2379.173	1901.422
HH Spending on Entertainment	5460.073	2682.403	2086.391	4152.546	3319.864
Household Income	182350.094	64751.540	44688.709	120139.931	87466.891
Household Size	2.584	2.557	2.522	2.552	2.596
Median Age	40.541	35.531	34.505	37.542	36.171
% of HH with Internet	0.508	0.442	0.391	0.485	0.472
% of Adults with 45+ minute commute	0.141	0.105	0.087	0.134	0.134
Frequency	467	5,233	5,588	1,499	3,447