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Journal of Business Research 55 (2002) 655–663

JOURNAL OF BUSINESS RESEARCH

Consumer response to the Internet: an exploratory tracking study of on-line home users

Fareena Sultan*

College of Business Administration, Northeastern University, Boston, MA 02115, USA

Abstract

This exploratory descriptive research examines consumer behavior for the Internet over time. We focus on Internet use by consumers at home in the initial phases of the introduction of this technology into US households. The key research questions to be examined in this study are the following: Who are the early adopters of Internet services? How is Internet consumer behavior changing over time? How are awareness, preference, and choice of Internet services evolving over time? We present an exploratory empirical examination of these questions using a consumer-tracking panel to examine household Internet behavior. The significance of this research is that it tracks Internet consumer behavior for a technological innovation, viz. the Internet, over time. It tracks awareness, preference, and purchase of Internet services by household consumers over time. The study uses a longitudinal panel of consumers to examine Internet behavior in different segments of consumers over time. It explores consumers' preference in terms of their willingness to pay and actual amount spent for Internet services over time. This study allows us to see how the initial adoption of the Internet took place in homes by examining preferences for specific services and features of the Internet. We explore how consumer Internet preference is related to explanatory demographic and psychographic variables. We present a set of propositions related to consumer Internet behavior over time. We also discuss methodological issues in tracking consumer behavior for home technologies over time, present managerial implications, and suggest directions for future research.

Keywords: Internet Consumer Behavior; Consumer preferences over time; Longitudinal Internet Behavior

1. Introduction

The Internet is a phenomenon that cannot be ignored. Each day the popular press is filled with statistics of the ever-growing impact of this new medium. Forrester Research estimates that Worldwide Internet Commerce will be US$3.2 trillion in 2003 (www.forrester.com). The general consensus is that this medium is here to stay. While many firms have adopted this medium as a marketing tool, consumer behavior related to this medium is still in its initial adoption stages. To be effective marketers in the new millenium, it is imperative to have an understanding of consumer behavior related to this medium. While it is important to study consumer behavior at a particular point in time, what is perhaps more important for evolving technologies such as the Internet, is the examination of consumer behavior *over time*.

This research investigates the early adoption of the Internet by US household consumers over time. The key research questions are as follows: Who are the early adopters of Internet services? How is Internet consumer behavior changing over time? How are awareness, preference, and choice of Internet services evolving over time?

From a consumer's view, the Internet can be thought of as an innovation to be adopted for household use. As such, classical theories of the adoption and diffusion of innovations (Rogers, 1995) can provide frameworks to study the adopters of this innovation. For an individual adopter, the sequence of stages that consumers go through, from awareness of an innovation to its adoption, would change over time. One area we investigate in this research is how consumer awareness, preference, and choice of the Internet change over time.

Diffusion theory suggests that perceived characteristics of the innovation, as well as characteristics of the adopters, such as innovativeness, would affect the diffusion of an innovation such as the Internet. The diffusion effect (defined as the cumulatively increasing pressure on individuals to adopt given that others have adopted) would also affect the

* Tel.: +1-617-373-8555; fax: +1-617-373-8366.
E-mail address: fsultan@cba.neu.edu (F. Sultan).

0148-2963/02/$ – see front matter
PII: S0148-2963(00)00206-X

rate of adoption of an innovation. However, before we can develop formal adoption and diffusion models of the Internet, it seems useful to examine patterns of consumer behavior for the Internet over time.

The bulk of industry Internet research initially concentrated on estimating the size of the Internet in terms of the numbers of users. These estimates can vary in part because of the difference in the definition of a user (Strauss and Frost, 1999). The types of consumer variables that have been studied include demographic variables and usage variables such as the proportion of time spent on the Internet in various activities (www.cyberatlas.com). Pioneering academic Internet research in marketing has examined consumer navigation behavior on the Internet, using the concept of ''flow'' (Hoffman and Novak, 1996). Hoffman and Novak have also investigated consumer privacy and trust issues (www2000.ogsm.vanderbilt.edu). The potential for consumer interactive shopping behavior and behavioral information processing has also been investigated (Alba et al., 1997). Recent years have shown an increase in the number of marketing academic researchers pursuing Internet research. However, these studies have not attempted to track a panel of household consumers over time in terms of their overall orientation towards technology in general and the Internet in particular.

This exploratory study describes Internet behavior of household consumers over time. We examine characteristics of early adopters of the Internet and assess their awareness, preference, and choice behavior over time. We explore how consumer Internet preference is related to explanatory variables. The methodology used to address the key research questions is a tracking study via a longitudinal consumer panel. The significance of this research is fourfold: (1) It tracks household consumer behavior over time for a new technology viz. the Internet; (2) It uses a longitudinal panel of consumers covering approximately 5 years of quarterly data; (3) It examines Internet behavior in different segments of consumers over time; (4) It explores consumers' preference in terms of their willingness to pay and actual amount spent for Internet services over time. We also present a set of propositions related to consumer Internet behavior, discuss methodological issues in tracking consumer behavior, present managerial implications, and suggest directions for future research.

2. Exploratory empirical examination

The author collaborated with Techtel, a market research firm in Emeryville, CA, for a 5-year time period. Techtel had constructed a consumer technology tracking panel from US households to study a variety of new high-tech products and services for use at home such as TVs, PC hardware and software, and Internet services. Respondents were selected from a mailing list provided by survey sampling to represent US households. Respondents were mailed questionnaires to be returned in postage-paid envelopes. Questionnaires were given to the person in the household who was most knowledgeable about home technology products. Data were collected on a quarterly basis and is available from the second quarter of 1995 (2Q95), till the second quarter of 1999 (2Q99), for most of the variables. However, for some variables, the data stream is available only till the third quarter of 1996 (3Q96). Techtel discontinued or restarted data collection at a later stage for some variables. Thus, the set of variables tracked in this panel varied over time.

3. Types of data collected

In this study we focus on ''on-line home users''. We define this as respondents in the panel who stated that they access the Internet at home either via on-line service providers or via direct Internet service providers (ISP). The sample size for each quarter is displayed in Table 1. This table shows that the percent of on-line users in the panel grew over time.

The panel tracked awareness, preference, trial/use, and purchase of existing, new, and proposed technologies, including the Internet. The panel also tracked such variables as consumers' willingness to pay for on-line services, and the amount of money actually spent for on-line services. In addition, demographic and psychographic variables were also measured. Information was collected at the product category level for existing technological products and for new or proposed products such as HDTV that were not available in the market when the tracking was initiated. The products and services tracked in the panel varied over time.

Table 1
Sample size

	Total	On-line home users	Percent of sample
1st = 2Q95	823	179	21.7
2nd = 4Q95	1025	256	25.0
3rd = 1Q96	1001	289	28.9
4th = 2Q96	1004	264	26.3
5th = 3Q96	1011	298	29.5
6th = 4Q96	1047	411	39.3
7th = 1Q97	979	377	38.5
8th = 2Q97	1150	474	41.2
9th = 3Q97	1178	511	43.4
10th = 4Q97	1169	572	48.9
11th = 1Q98	997	520	52.2
12th = 2Q98	973	560	57.6
13th = 3Q98	1070	637	59.5
14th = 4Q98	1107	680	61.4
15th = 1Q99	1075	693	64.5
16th = 2Q99	1285	849	66.1

2Q95–3Q96: for home use only; 4Q96–2Q99: home or business use from the home.

4. Analysis

For the analysis, we focus on those variables for which a consistent stream of data is available from on-line home users. We examine: (1) demographics, (2) psychographic variables, (3) consumer awareness of on-line services, (4) consumer preference for on-line services, (5) consumer choice behavior related to on-line services, and (6) how behavior varies by consumer segments, over time. We also present some exploratory analysis to relate consumer preferences to explanatory variables.

4.1. Demographics

Demographics such as gender, age, and income distribution were tracked in the panel. At the beginning of the data collection (2Q95), there were 47% females and 53% males in the panel. However, by the last quarter for which data were made available (2Q99), the percentages had switched, with 60% of the panel being female and 40% male. The average age of panel respondents also increased from 41.8 to 42.8 years during this period. The overall trend in this panel is for a mature respondent with the average age increasing over time. Trends in household income (measured by annual gross household income) show that approximately one-third of the respondents have annual household income over US$75,000 in this panel. The percentage of people in the lower income brackets declined, and in the higher income brackets, it increased over time. Thus, these longitudinal panel data show that the early adopters of Internet services for household purposes were mature and relatively affluent. It also shows that women form an increasing number of users of the Internet for household use.

4.2. Psychographics

In terms of psychographic variables, a scale was developed to measure the innovativeness of the early adopters of the Internet. Multiple measures were used. The measures used were based on diffusion theory and prior research. The four items used were as follows: (1) I am the first person on the block to use new technologies; (2) I consider technology products fun to use; (3) I try out new products without having to read a manual; (4) I am more likely to buy a new product than my friends and relatives. Each item was measured on a five-point (1 = *strongly disagree* to 5 = *strongly agree*) scale. The results are shown in Table 2. On average, the early adopters of the Internet for home usage consider technology products as fun. They are more likely to buy new technological products than their peers (average approximately 4.0). However, they are not necessarily the first person on the block to buy new products and their level of technological expertise is about average. They are not very technical; on Item 3 "Trying out new products without having to read a manual," they scored about three points.

We do notice that, overall, even though in the initial phases (2Q95) more innovative buyers were on-line users (average score = 3.6 on "More likely to buy"), by the end of the data stream (4Q97), the average value has gone down somewhat to 3.3. However, in general, there is a relative stability in these innovativeness measures over time.

4.3. Awareness and purchase of new and proposed products

As early as 1995, more than 90% of the on-line users in this panel were aware of such products as portable PCs, CD ROMs, and satellite TV dishes. In addition, more than 40% of these respondents in each time period were aware of relatively newer products, such as ISDN services. Also, more than 50% of these respondents were aware of such services as phone companies offering cable and cable companies offering phone services, which was a relatively new phenomenon at that time. Techtel also tracked some future products. HDTV was tracked from 2Q95 to 2Q96 with more than 70% of the people being aware of HDTV in this time period. Techtel stopped tracking HDTV for a time and has only recently in 1999 once again started tracking this product. By 2Q99 once again, awareness of HDTV was around 70%. Thus, this panel of on-line users is quite aware of new and proposed technological products. This shows that early adopters of on-line services for household usage have a technological orientation.

Table 2
Psychographics/innovativeness

Quarters	First person on the block	Technology fun to use	Try without manual	More likely to buy
2Q95 (n = 179)	2.6	4.0	2.9	3.6
4Q95 (n = 256)	2.9	4.2	3.1	3.7
1Q96 (n = 289)	2.7	4.0	3.1	3.0
2Q96 (n = 264)	2.6	4.0	3.3	3.5
3Q96 (n = 298)	2.9	4.2	3.1	3.5
4Q96 (n = 411)	2.9	4.0	3.1	3.5
1Q97 (n = 377)	2.8	4.1	3.0	3.5
2Q97 (n = 474)	2.8	4.1	3.1	3.4
3Q97 (n = 511)	2.7	4.0	3.1	3.4
4Q97 (n = 572) not tracked after 4Q97	2.8	4.1	3.1	3.3

Average values: 1 = *strongly disagree*, 5 = *strongly agree*.

Table 3
Awareness of on-line services (percent of respondents)

	2Q95	4Q95	1Q96	2Q96	3Q96	4Q96	1Q97	2Q97	3Q97	4Q97	1Q98	2Q98	3Q98	4Q98	1Q99	2Q99
n	179	259	289	262	298	411	377	474	511	572	520	560	637	680	693	849
America Online (AOL)	97	97	99	98	98	97	98	97	96	95	96	94				97
CompuServe	87	93	95	90	88	89	87	86	85	84	84	79				
Microsoft Network (MSN)	46	64	67	67	70	72	72	73	79	75	82	72				77
Prodigy	87	93	95	91	89	91	85	86	86	84	84	83				84
Other ISP	36	30	38	38	41	52	47	47	54	53	58	64				

Awareness of on-line service providers/ISPs.
Blank cells: data were not collected in that time period.

In terms of purchase of technological products, more than 15% of the sample had a portable PC in this time frame. Also, more than 65% had CD ROMs with figures in the 70% range by the end of the time period. However, purchase of many of the new products tracked remained under 10% for the entire time period. Interestingly enough, 2% of the sample reported owning HDTV in 1995 when this product did not exist in the US market at that time! This again suggests that the respondents are not necessarily "techies" who are familiar with the technical details of all the latest and future products but rather that they are more representative of those interested and aware of technological products, and who consider these products fun to use.

4.4. Awareness and purchase of on-line services

As shown in Table 3, the percent of respondents aware of various on-line service providers was quite high, above 90% even as early as 2Q95 for such providers as AOL. This remained high throughout the time period from 2Q95 to 2Q98. The available data indicate that MSN had awareness of only 46% in 2Q95, which increased to 72% by 2Q98. Similarly, tremendous growth was observed in awareness of other direct ISPs, growing form 36% awareness in 2Q95 to 64% in 2Q98. Techtel did not track on-line service awareness after that and only started again reporting these in 1999. They report that in 2Q99 AOL awareness in the panel was 97%, MSN was 77%, and Prodigy 84%. This shows that, at least, for on-line home users, awareness of the dominant on-line service providers is fairly high.

In terms of subscribing to various services, Table 4 shows that roughly a third of the panel subscribed to AOL throughout the time horizon from 2Q95 to 2Q98. MSN had less than 5% subscribers from the home. There was a noticeable decline in CompuServe and Prodigy subscribers in this period. Growth seemed to be most apparent in other direct ISPs growing from 13% to 30% in this time period. These trends are also confirmed by industry patterns in which direct ISPs continue to play an increasing role in providing Internet access. In 1999, 31% of the Techtel panel subscribed to AOL and 6% to MSN. Figures are not available for direct ISPs beyond 2Q98.

4.5. Preference for on-line services

Consumer preference for on-line services was measured in terms of their willingness to pay for various on-line service features. This was tracked from 2Q95 till 3Q96 and is displayed in Fig. 1. On average, the greatest preference is for the e-mail feature, with consumers willing to pay between US$5 and US$6 per month for this feature alone. The willingness to pay for research capabilities and for financial services shows a declining trend from 2Q95 to 3Q96. Paying for shopping services on the Internet scored lowest with consumers willing to pay about a US$1 per month although this shows somewhat of an increasing trend by 3Q96. From this, we can conclude that of the various Internet features available, e-mail is the service most preferred by consumers for household usage in the early stages of the adoption of the Internet.

Total willingness to pay for on-line services across the following features: e-mail, financial services, research, shopping, and discussion groups, dropped from US$13.00 to US$10.75 per month during this period. The reluctance of consumers to pay for specific features on the Internet has been confirmed by recent observed consumer behavior. The

Table 4
Purchase of on-line services (percent of respondents)

	2Q95	4Q95	1Q96	2Q96	3Q96	4Q96	1Q97	2Q97	3Q97	4Q97	1Q98	2Q98	3Q98	4Q98	1Q99	2Q99
n	179	259	289	262	298	411	377	474	511	572	520	560	637	680	693	849
AOL	39	41	33	25	33	31	29	23	24	24	29	31				31
CompuServe	13	17	13	10	10	6	5	4	3	2	3	3				
MSN	2	4	3	3	3	3	5	4	4	2	2	4				6
Prodigy	8	11	10	6	5	5	6	3	2	3	3	4				3
Other ISP	13	14	11	17	16	20	21	12	14	19	21	30				

Now paying/now subscribing to on-line services/ISPs.
Blank cells: data were not collected in that time period.

trend indicated in these data seems to have continued. This consumer behavior seems to suggest an "advertising-based" revenue model for firms on the Internet, rather than a "subscription-based" model. Firms would need to generate revenues from other companies advertising on a site, rather than from subscriptions from consumers.

4.6. Consumer choice behavior

Actual choice behavior of on-line users was measured in terms of the amount of money paid for on-line services. At the time this data collection was initiated, most of the on-line services were charging fees based on time used. Flat rates had not become prevalent. Since respondents could have more than one on-line service, the total sum of money paid for all on-line services was also calculated in terms of total money paid per month. The trends in amount spent for commercial on-line services including direct Internet providers is shown in Fig. 2. We see that the amount being spent on average was around US$20 per month by 3Q96. Several of the direct Internet providers had started flat fee type of services by the end of the time period studied. This is also reflected in the downward trend in the amount spent. By 1999, most of the commercial providers were also charging flat monthly fees for on-line services.

4.7. Consumer segmentation

A segmentation analysis was conducted to examine whether consumer choice behavior, in terms of the amount of money spent for on-line services, varied by demographics and psychographic characteristics such as age, income, innovativeness, or gender. The available data covered the time period 2Q95 to 3Q96. Difference in segments by age, (Fig. 3) income (Fig. 4), and innovativeness (Fig. 5) narrowed by the end of the time horizon investigated. The one exception is in gender (Fig. 6). At least till 1996, the gap between male and female respondents was growing in terms of the amount of money being spent for on-line services, with female respondents reporting that they spent more than male respondents did during this time period. Techtel did not track the amount of money being spent on on-line services after 3Q96. It would be interesting to observe whether this gap also narrowed in subsequent years. However, this is not available in this panel.

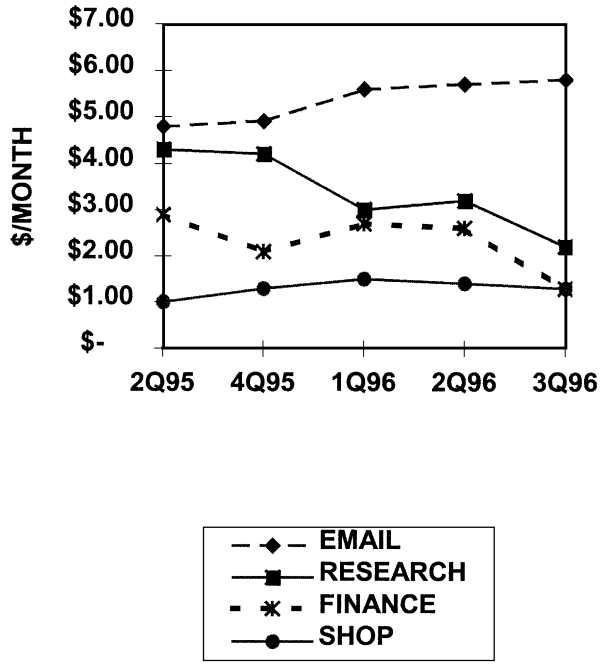

Fig. 1. Willingness to pay for on-line features over time (US$ per month).

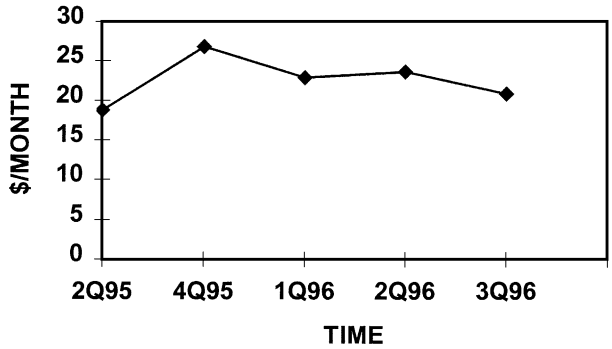

Fig. 2. Actual total amount spent for commercial on-line services (US$ per month).

5. Exploratory models

For selected time periods, we explored the relationship between willingness to pay and such independent variables as income, innovativeness, household size, and consumers' technological orientation (measured in terms of ownership of high-tech products). Using correlation analysis, we found that consumers' willingness to pay was related positively to ownership of high-tech products, and negatively to income and innovativeness. We also examined the correlates of actual amount of money spent on on-line services. We found that amount spent was related positively to income, innovativeness, and household size. Presumably, with larger number of users, a greater amount of time was spent on the Internet, and with a variable fee structure, greater amounts of money would be spent on-line services. We consider these exploratory relationships to be directional rather than definitive.

6. Conclusions

This exploratory research concludes that early adopters of on-line services for home use in the US were more innovative than average. They considered technological products as fun to use but were not necessarily familiar

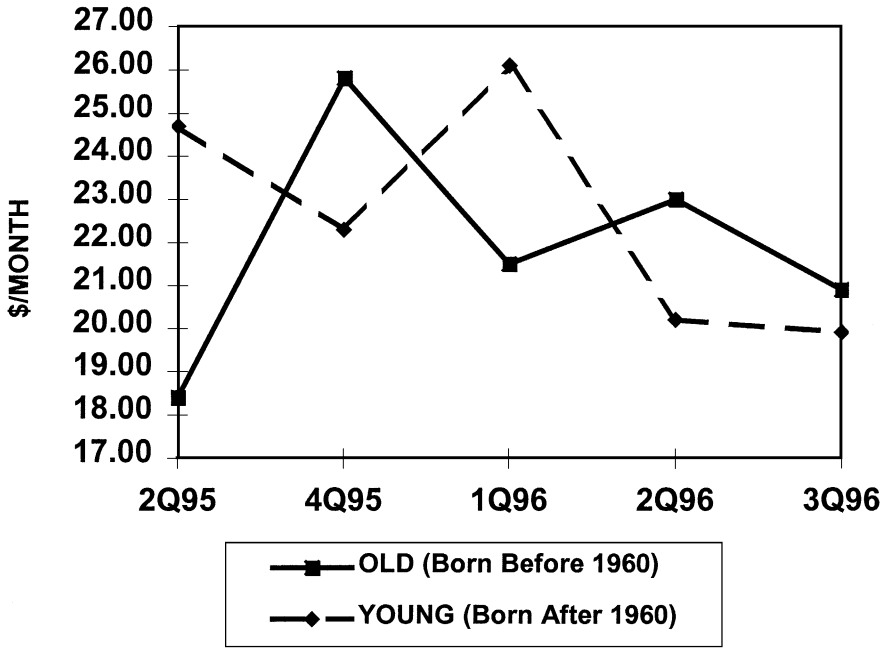

Fig. 3. Actual amount spent monthly by age (US$ per month).

with technical details of new technologies and products. These on-line users were also relatively affluent and quite aware of a variety of new technologies. Thus, in the early stages of Internet adoption, the average US household consumer was not being brought in.

Over time, consumer awareness, preference, and choice behavior related to Internet services continues to evolve. Awareness of new technologies is very high among these initial adopters of on-line services for the home. Awareness of on-line services for such providers as AOL continues to remain above 90%. During the period investigated, an increasing number of these on-line users became aware of newer services such as Microsoft's MSN and direct ISPs.

The research finds that consumer preferences for on-line services, in terms of willingness to pay for these services, vary by feature. For example, e-mail is the most preferred of on-line features with consumers willing to pay US$5–6 per month for this feature alone. However, consumers' willingness to pay for Internet services in general shows an overall declining trend over time.

We find that over time, consumer behavior in terms of money spent for on-line services varies by provider and

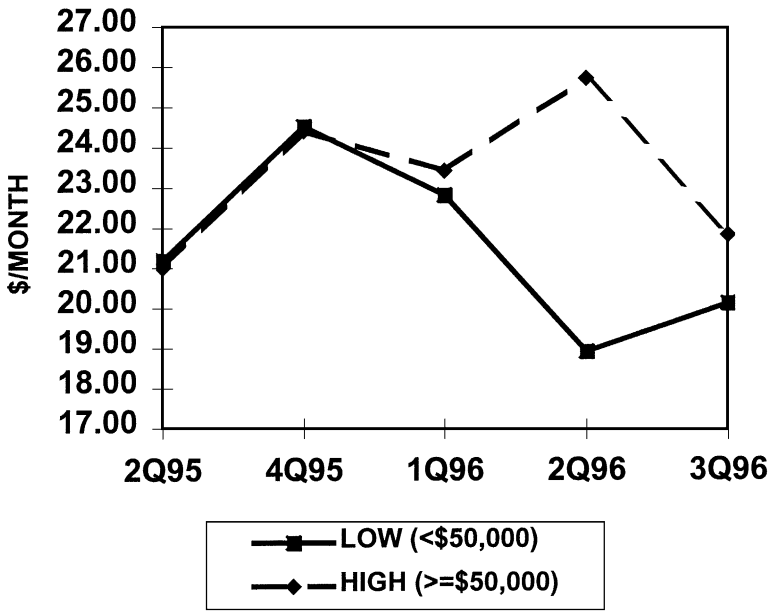

Fig. 4. Actual amount spent monthly by income (US$ per month).

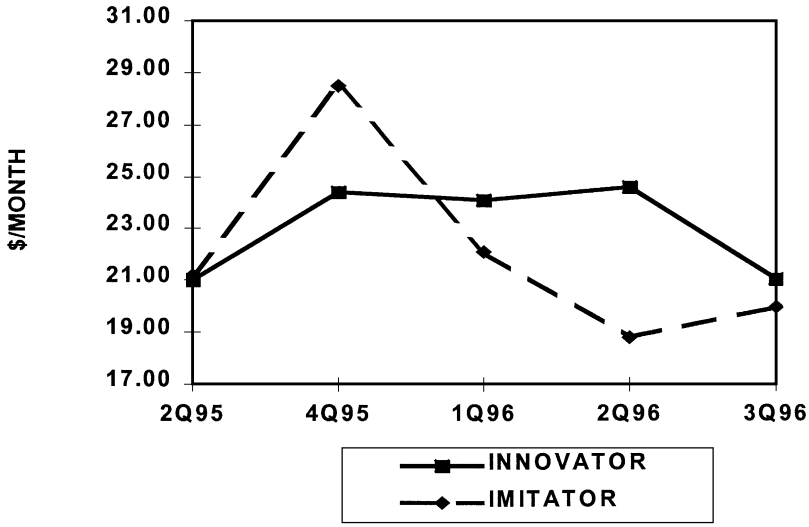

Fig. 5. Actual amount spent monthly by innovativeness (US$ per month).

consumer segments. The gap between various consumer segments in terms of the amount spent on on-line services seemed to narrow over time, except for gender differences, with females in this panel reporting paying more than men over time.

The research gives preliminary indication that preference for on-line services, in terms of willingness to pay, is positively related to ownership of high-tech products and negatively to income and innovativeness. However, the amount of money actually spent on on-line services is positively related to consumer innovativeness, income, and household size. We consider these relationships to be directional and not definitive. One would need additional data and more formal models to test whether these relationships are conclusive. Nevertheless, we can postulate some propositions based on our exploratory descriptive analysis.

7. Propositions

Based on our initial explorations we suggest the following propositions related to on-line household consumer behavior. (1) At any specific point in time, preference for Internet services is positively related to income, household size, and innovativeness, and negatively related to age. (2) Over time, differences in preferences for Internet services, in consumer segments based on age, income, innovativeness, and gender will merge as more "average" households start

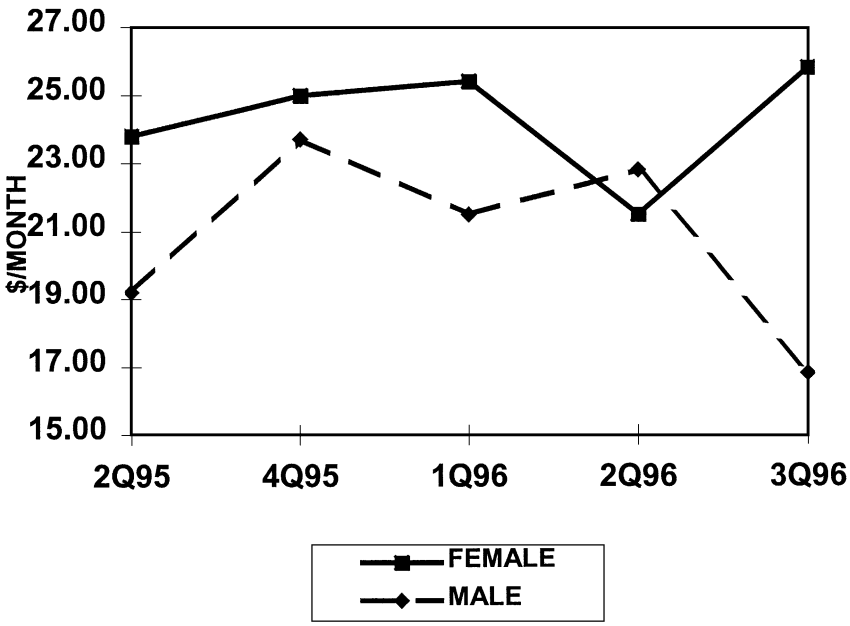

Fig. 6. Actual amount spent monthly by gender (US$ per month).

using the Internet for home use. (3) Those who are more technologically oriented are more likely to use the Internet at home. Ownership of high-tech products can act as an indicator of technology orientation, and Internet preference and usage. The greater the ownership of such products over time in a population, the greater will be the Internet usage. (4) Overall willingness to pay for Internet services will decline over time. This can be related to expectations of price declines generally associated with technological products. (5) Using the Internet as a communication medium is the most preferred usage among household consumers. Consumers are more willing to pay for this than for other Internet services. (6) Over time, consumers will be less willing to pay for other Internet services such as shopping or financial services. There will be an expectation that these should be free services. Thus, advertising-based revenue models will be more acceptable than subscription-based models as new services are offered on the Internet.

We conclude from this study that tracking panels are useful in understanding consumer response to new technologies such as the Internet. They allow us to generate propositions about consumer behavior. However, these panels also raise several methodological issues that need to be addressed.

8. Methodological issues

8.1. Conceptual

At a conceptual level, this exploratory research raises several issues. First and foremost, it raises the issue of what is the best way to examine the adoption of a technological innovation over time, particularly in the early stages of the its introduction? Second, what are the best variables to track over time? Third, what are the best ways to track and how should panels be constructed and maintained? Clearly, the answers to these questions would depend upon the objectives of the study. If the intent is to examine the progress from awareness to adoption, the sample should be chosen to represent both sets of consumers, those that have and those that have not adopted the Internet, and observing their respective progression over time.

8.2. Measurement

This research also raises a variety of measurement issues. First, there is the issue of panel stability. Respondents may drop out of panels and need to be replenished. Techtel uses a proprietary methodology to replace panel members that leave. One question that needs to be examined is whether there is a difference between those that stay vs. those that leave a panel. For this, a comparative study should be done to compare these two groups on key measures such as preference and choice variables. Another important issue is related to the nonresponse bias that can occur in such a panel. Researchers need to estimate and calculate the extent of nonresponse bias that exists.

8.3. New surveys

In 1999, Techtel updated its consumer household survey. The questionnaire is briefer than the original ones. Respondents are asked such questions as to whether they subscribe to Internet/on-line services for use at home, for either home or business purposes, or whether they plan to subscribe, the number of sessions per week to access the Internet, and use of search engines. The panel continues to track awareness, consideration, trial, purchase, and opinion of technological products. It also tracks the search engines that consumers use at home, and their opinion of certain technology companies. Currently, data are also being gathered to see the evolution of consumer behavior toward specific websites and search engines. Some products that had been dropped from tracking have been reintroduced, such as HDTV. These new surveys raises a methodological issue viz. the ability to track the same variables over time. Industry interest evolves over time, as do technology and consumer behavior. What is tracked over time in a commercial panel varies over time, depending upon industry interests. Thus, there is a tradeoff to be made between consistency and currency of information. While it may be ideal to track the same variables over time for academic research purposes, changes are needed in commercial panels to keep the information current and interesting to firms in the industry.

9. Managerial implications

This research shows that a longitudinal tracking study of a consumer panel can allow managers to have a better understanding of consumer adoption of new technologies such as the Internet. Tracking a panel of consumers allows a dynamic view of the evolution of awareness, preference, and choice of various Internet services and features. This is valuable to marketers for it gives a sense of the magnitude of the segments in various stages of the adoption process. It also gives an indication of appropriate marketing actions to be taken. For example, if awareness is low for a particular service or feature then by increasing marketing communications, marketers can monitor the change in awareness over time due to this increased communication. On the other hand, if awareness is high but consumers are not using particular features of the Internet service or website, then usage can be enhanced via more precise communication about these features, or by providing incentives to consumers to try out these features. The result of these marketing actions can be monitored by the change in behavior since behavior can be tracked over time via this panel.

Consumer panels can allow managers to address consumer privacy concerns to some extent. Since a panel of the type described in this study is a voluntary panel,

consumers themselves make a decision to join it. This can lead to more frank responses. Whereas tracking consumer behavior on-line via click streams may give a more detailed microlook at a particular household that has already adopted the Internet, such data cannot provide a sense of the movement from awareness to adoption over time for those not on the Internet.

We note that although there are several panels available for frequently purchased goods, there are very few panels available for studying consumer preferences for technological products over time. From a research point of view, the construction of such panels can aid in understanding consumer behavior for technological products that evolve over time, such as the Internet. These panels can also allow for understanding consumer-switching behavior over time. Data from such a panel can make it possible to build stochastic models of purchase incidence and timing in order to get a more dynamic and comprehensive view of consumer behavior.

10. Limitations and directions for future research

This study suggests that there is a need to gather additional consumer tracking data over time in order to assess how consumer response to the Internet is changing. Now that the Internet has become a much more prevalent phenomenon in US households, there is all the more a need to examine the adoption of this technology in a longitudinal manner.

The results reported in this study are unweighted statistics. In order to project this to the US household level, we need weighted data. For this, one needs to obtain such information as market penetration patterns. A consumer panel tracking study can be constructed that is weighted by an incidence survey. Techtel reports that it presents weighted proprietary information to its clients, where the data are weighted by such demographics as age, gender, and income, to reflect US demographic trends.

From a methodological viewpoint, this study suggests that there is a need to explore the differences between those that stay vs. those that leave a longitudinal panel. This is necessary in order to determine whether there is a fundamental difference in the on-line behavior of those consumers that continue to remain on the panel vs. those that leave the panel.

Additionally, studies are needed to build formal models of adoption and diffusion of the Internet by incorporating consumer response over time. One area to explore is how consumer preferences for specific services or features evolve over time. The area of preference over time for new technological products has been investigated in the marketing literature. Sultan and Winer (1993) have proposed ''rates of time preference'' for high-tech products. These rates of time preference capture a consumer's preference for a product at different points in time. The authors have shown that these rates of time preference are different from the time value of money and that they differ by product and by attributes of products. A study of time preference using such indices may be interesting for the case of the Internet. This is because the product itself continues to evolve rapidly over time. One area to investigate is how preference for a particular set of features related to the Internet or options available for a particular website can be captured by indices such as the rate of time preference. One can measure the stated consumer preference now vs. the future for the availability of a particular set of Internet features. These can then be compared with actual preference when these features become available. Longitudinal panels can also help in determining how consumers are responding to specific websites and specific features of websites over time. The data currently being gathered by Techtel could provide insights once enough data has been gathered to create such indices.

To address the methodological issues raised and to pursue some of the proposed future research, we suggest a collaborative effort between industry and academe. We recommend that a consortium of companies set up a nonproprietary, longitudinal, household consumer panel, with input from academics and firms on how to design the panel. This panel could be made available for academic and industry research. Additionally, if such panels are set in various regions of the world, they can allow for cross-country or cross-cultural comparisons. For example, one can study how consumer adoption of the Internet is taking place in different households of the world and compare the trends in the US vs. Europe or Asia. It is only with a thorough understanding of household Internet consumer behavior that firms can take maximum advantage of this new marketing medium.

Acknowledgments

This research updates the initial results from this study that were presented at the COTIM-97 Conference in Brussels, Belgium, in 1997. The author thanks Techtel for providing the proprietary data presented in this study. The author especially thanks Mike Kelly, CEO of Techtel, for the many discussions leading to this research and Graham Crowe of Techtel for technical assistance.

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