Bricks or Clicks? Consumers' Adoption of Electronic Banking Technologies[1]

The use of electronic banking technologies (ATMs, direct deposit, electronic funds transfers, online banking and bill paying) is growing rapidly. We explore factors associated with consumers' use of e-banking technologies with an emphasis on capturing the effects of consumer attitudes in the adoption process. We find that, controlling for other factors, consumers with positive attitudes toward e-banking are two to ten times as likely to use selected electronic banking services.

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The use of electronic banking (e-banking) technologies has grown rapidly in the U.S. In 1999, 85 percent of households had one or more EFT features on their accounts; the number of ATM transactions stood at 907 million per month; the number of point of sale transactions stood at 202 million a month; and 7 million U.S. households used online banking (about one-fifth of households with online capabilities use e-banking). Thanks in part to the U.S. Department of Treasury's EFT '99 initiative, nearly three-fourths of Social Security recipients have their benefits deposited directly into their bank accounts and one-half of employees use direct deposit for their paychecks. E-banking is no longer just for the few "techno-savvy" consumers.

E-banking is often associated with saving time and money. Although electronic bill presentment and payment is attractive to businesses and financial institutions (an average electronic bill costs $0.30 to $0.50 compared with $0.60 to $1.50 for traditional presentment), consumers have not embraced this technology. Only about half of the households that bank online use electronic bill payment (Snel, 2000), and this proportion is not expected to rise much over time (Morris, 2000). Phone banking is also attractive to financial service firms – the average cost of a phone transaction is only 40 percent of the cost of a similar transaction inside the bank branch. Phone banking accounts for between 10 and 30 percent of financial product distribution (Abbate, 1999).

In the policy arena, issues of privacy, security, being in the financial mainstream, and the digital divide call out for answers to the questions of who uses e-banking technologies, what factors are associated with using these technologies, and how can and should educators and policy makers respond to these issues. This paper explores some answers to these questions, with a special emphasis on capturing the effects of consumer attitudes in the adoption process.

Previous Research

The adoption process has been well-studied in the field of marketing (Busch, 1995; Dabholkar, 1996; Shimp & Beardon, 1982; Childers, 1986; Price & Ridgway, 1983; Raju, 1980; Rogers, 1995; Prendergast, 1993). In these studies, demographics (education, income, age, gender) and various attitudes are associated with adoption of new technologies. Attitudes related to perceived usefulness, ease of use, control, reliability, convenience, and willingness to take a risk are all deemed important in enabling consumers to adopt new products. In addition, product features such as trialability, observability, and compatibility have been found to be important. Some studies also have shown general attitudes (e.g. about technology) are important in adopting new products and technologies.

Learning theory suggests that consumer's experience with a particular product lead to an increased familiarity with other products within the same product category. This increased familiarity is associated with reduced cognitive effort required to comprehend the new product or service and an increased willingness to adopt ,Hirschman 1980; Dickerson & Gentry, 1983). Familiarity can also lead to favorable attitudes (Schumann et al., 1990).

Less is known about the adoption process specific to electronic banking technologies. There is some evidence that adoption of online banking is related to the growth in personal computer ownership rather than to a growing interest in online banking, per se (Snel, 1999).

Over time, the banking industry has introduced a variety of technology-based electronic banking services to consumers and each of these electronic financial services is at a different stage of the diffusion process. For example, Automated Teller Machines (ATMs) are the most diffused and at the late majority stages of adoption

while electronic fund transfers such as direct payments and electronic billing are relatively new to financial customers. Telephone banking, while an older technology, is still at the early stages of diffusion.

In this study, consumers' use of selected e-banking services is expected to be a function of both demographic and attitudinal characteristics of the user. Furthermore, we hypothesize that attitudes play a greater role in adoption of the newer, more highly technical services (direct bill paying, electronic funds transfers, PC banking) than in the older, more mature services (direct deposit, phone banking, ATMs).

Data and Methodology

Data for this study are from a Federal Reserve Board-commissioned set of questions on the September and October 1999 University of Michigan's Surveys of Consumers. For these surveys, 1,000 households were interviewed by telephone. In addition to demographic information, respondents were asked about their use of ATMs, direct deposit, phone banking, direct bill paying, electronic funds transfers (EFT) and PC banking.

Respondents also answered a set of 11 questions about their attitudes toward various aspects of electronic banking technologies. These questions were on a 5 point Likert scale, from strongly disagree to strongly agree. Statements related to the perceived ease of use, convenience, financial risk, and relative advantages of electronic banking. For example, respondents were asked to whether or not they agreed with the statement: "I have seen how others use electronic banking." A score was created for each respondent by aggregating their responses for the eleven items using a Likert Summated-Scale approach (Likert, 1967). The resulting distribution of scores has a minimum of 11 and a maximum of 55.

Having created this distribution of scores, we partitioned the scale into three segments. Respondents in the upper quartile, scores of 40 and above, were labeled "technophiles" – indicating that their scores represent highly positive feelings toward electronic banking. Respondents in the lower quartile of the scale, scores of 28 and below, were labeled "technophobes" – indicating that their scores denote negative feelings toward electronic banking. The remaining 50 percent, with scores greater than 28 but less than 40, were labeled the "in-between".

We first used descriptive and bivariate analyses (that is, the relationships between technology use and demographics, technology use and attitudes, and attitudes and demographics). Then, to determine if bivariate relationships held in a multivariate setting, we ran logit regressions and tested for the possibility that that attitudes play an intervening role in the effect of demographic characteristics on the adoption of electronic banking technologies. The dependent variables were whether or not consumers used a given technology (direct deposit, ATMs, phone banking, direct bill paying, EFT, and PC banking). Independent variables included a vector of demographics: less than high school was omitted), race/ethnicity (minority omitted), home ownership, age (under 35 omitted), marital status, region (western region omitted), gender, presence of children, income; the attitudinal variables representing technophile or technophobe, and an expectation variable (if respondent thinks household income will rise faster than prices). To test whether attitudes act as slope shifters in that they change the effect that demographic characteristics have on the adoption of electronic banking technologies, we use the method of restricted regression and a Chow-like test.

Results

Among the respondents, 57 percent use direct deposit, 55 percent use ATMs, 36 percent use phone banking, 29 percent use some form of direct bill paying, 22 percent use other EFTs, and 11 percent use PC banking. E-banking users have higher incomes and education, are more likely to be white, to be married, and to live in the western region than others in the sample (Table 1).

Attitudes

The technophiles, technophobes and in-betweens have distinctly different profiles. While the demographic profile of our in-between group mirrors the profile of the overall sample, the profile of our technophiles resembles that of our electronic banking users. When segmented by attitudes, the bivariate relationships between attitudes and demographics reflect the same relationships between e-banking use and demographics. That is, technophiles are younger, with higher income and education, and they are more likely to live in the western region; they are, however, more likely to be single. Technophiles are more likely than others to use any of the e-banking technologies studied (Table 2).

Table 1
Profile of Sample

Variable	Overall	Direct Deposit	ATM	Phone Banking	Direct Bill Payment	EFT	PC Banking
N	1000	571	551	365	290	227	111
Age							
Mean	46.7	48.8	41.3	42.0	46.8	42.7	39.9
Median	44	46	40	41	45	41	39
Income							
Mean	$58,072	$59,674	$66,373	$69,235	$65,881	$75,944	$79,280
Median	$45,000	$50,000	$55,000	$55,000	$55,000	$56,000	$67,500
Education							
Mean	13.6 years	14.0 years	14.4 years	14.5 years	14.4 years	14.7 years	14.7 years
Median	14	14	14	14	14	15	15
% Male	45.7%	44.3%	47.5%	42.2%	46.9%	53.3%	52.2%
% Married	57.3%	61.3%	62.6%	66.3%	65.9%	59.9%	68.5%
% Home owner	71.0%	76.0%	69.0%	70.0%	81.0%	74.0%	65.0%
Race/ethnicity							
White	78.1%	80.6%	78.9%	80.5%	82.4%	78.0%	82.0%
Afr. Amer	10.5	9.5	9.1	8.8	7.9	10.1	6.3
Hisp. & other	8.0	7.0	8.5	7.3	7.9	7.0	8.1
Region							
North	17.9%	15.9%	18.1%	16.4%	12.4%	16.7%	13.5%
South	35.3	37.3	35.0	36.7	35.9	35.2	37.8
Midwest	25.4	24.7	22.0	20.3	30.0	22.0	19.8
West	21.4	22.1	24.9	26.6	21.7	26.0	29.7

Table 2
Profile of Sample by Attitude

Variable	Overall	Technophiles	In-Between	Technophobes
N	1000	250	386	222
Age				
Mean	46.7	41.3	45.7	52.2
Median	44	41	43	51
Income				
Mean	$58,072	$76,561	$55,335	$47,403
Median	$55,000	$59,750	$47,500	$40,000
Education				
Mean	13.6 years	14.7 years	13.8 years	13.1 years
Median	14	15	14	12
% Male	45.7%	45.6%	48.4%	40.5%
% Married	57.3%	59.2%	60.9%	63.5%
% Home owner	71.0%	68.0%	73.0%	79.0%
Race/ethnicity				
White	78.1%	84.4%	78.2%	84.2%
Afr. Amer	10.5	5.6	11.7	7.7
Hisp. & other	8.0	8.6	7.8	5.0
Region				
North	17.9%	18.0%	17.4%	18.0%
South	35.3	30.8	37.8	36.0
Midwest	25.4	23.6	27.2	24.3
West	21.4	27.6	17.6	21.6

Variable	Overall	Technophiles	In-Between	Technophobes
Use direct deposit	57.1%	72.8%	61.9%	59.9%
Use ATMs	55.1	88.4	60.9	41.0
Use phone banking	36.5	64.0	39.9	22.5
Use direct bill paying	29.0	43.2	31.6	24.3
Use EFT	22.7	38.4	27.5	9.9
Use PC banking	11.1	31.6	6.7	2.7

The likelihood ratio test indicates that we can not reject the null hypothesis that attitudes act only as intercept shifters. They appear not to effect the way in which demographic characteristics influence the adoption of electronic banking technologies. Thus, we provide the results for the restricted Logit regressions. Some clear patterns emerge (Table 3). First, attitudes matter; being a technophile was associated with increased likelihood of using any of the e-banking services relative to technophobes. Technophiles were 1.8 times more likely to use direct deposit, 2.5 times more likely to use direct bill paying, 3.2 times more likely to use phone banking, 7.9 times more likely to use ATMs, 8.3 times more likely to use EFT, and 10.7 times more likely to use PC banking. Second, age matters; people over 65 were 9.9 times more likely to use direct deposit, but this may be a function of receiving social security (three-fourths of social security recipients use direct deposit). In every other instance, younger persons (those under 35) were more likely to use these services than persons 35 and over. Third, education matters: consumers with college degrees were twice as likely to use direct deposit and EFT than consumers with less than a high school education. Although not always significant, consumers living in the west were more likely to use e-banking services than those living in the north or mid-west; they were about as likely as those living in the south to use these services.

Table 3
Logit Analysis on Use of E-Banking Technologies, Coefficients and Odd-Ratios

Variable	Direct Deposit		ATM		Phone Banking		Direct Bill Pay		EFT		PC Banking	
	Coeffi-cient	Odds ratio	Coeffi-cient	Odds ratio	Coeffi-cient	Odds ratio	Coeffi-cient	Odds ratio	Coeffi-cient	Odds ratio	Coeffi-cient	Odds ratio
Constant	-.865		**-3.875***		-2.137		**-3.422***		**-5.099***		**-7.344***	
Techno-phile	**.624***	**1.8**	**2.071***	**7.9**	**1.150***	**3.2**	**.903***	**2.5**	**2.124***	**8.3**	**2.372***	**10.7**
In between	.043	1.0	**.552***	**1.7**	.366	1.4	**.393***	**1.5**	**.569***	**1.8**	.537	1.7
Ln Income	.042	1.0	**.413***	**1.5**	.143	1.2	.162	1.2	.499	1.6	**.518***	**1.7**
Inc.> prices	-.145	0.8	.575	1.7	.321	1.4	.118	1.1	**.459***	**1.6**	-.206	0.8
Middle age	.102	1.1	**-.973***	**0.3**	-.118	0.9	**.531***	**1.7**	**-.885***	**0.4**	**-.643***	**0.5**
Over 65	**2.298***	**9.9**	**-1.844***	**0.2**	**-.944***	**0.4**	**.727***	**2.1**	**-1.819***	**0.2**	-.758	0.5
H.S diploma	.443	1.5	-.022	0.9	.207	1.2	.171	1.1	**.196***	**1.2**	-.783	0.5
College	**.895***	**2.4**	.447	1.6	.724	2.1	.315	1.4	**.749***	**2.1**	-.612	0.5
Married	.165	1.2	-.079	0.9	.337	1.4	.114	1.1	-.095	0.9	.100	1.1
Children	-.038	0.9	**.250***	**1.3**	.136	1.1	.055	1.1	**.237***	**1.3**	.190	1.2
Minority	.369	1.4	.428	1.5	.088	1.1	.043	1.0	.211	1.2	-.007	1.0
Male	-.143	0.8	.039	1.0	**-.619***	**0.5**	.001	1.0	-.022	1.0	.179	1.2
Midwest	-.124	0.8	**-.745***	**0.5**	**-.471***	**0.6**	.197	1.2	**-.721***	**0.5**	-.115	0.9
North	-.348	0.7	-.315	0.7	-.325	0.7	**-.562***	**0.6**	-.317	0.7	-.686	0.5
South	.194	1.6	-.111	0.9	.015	1.0	.098	1.1	-.191	1.2	-.034	1.0
Log like-lihood	839.52		718.63		716.96		802.56		751.02		374.78	
% correctly classified	69.2%		74.2%		67.2%		63.3%		74.7%		81.4%	

* Significant at 0.10 or better

Discussion and Conclusions

Although demographic characteristics play a role in the adoption of electronic banking technologies, attitudes toward e-banking services seem to matter more than anything else in determining whether or not consumers will use these services. Thus, if financial institutions want to attract customers to e-banking, it may be important to foster positive attitudes. And if e-banking is the wave of the future, policy makers may need to work to

establish an environment where more consumers can develop positive attitudes toward the technologies they will need to use in the financial marketplace. Specific target markets for efforts to change attitudes include older, less educated consumers, who are faced with time constraints. Attitude change may be fostered by providing information about the time and money cost savings of using electronic banking technologies, balanced by risk information outlining security issues.

Future studies might explore the significant factors or aspects of consumer attitudes that drive decision making. For example, policies that strengthen consumers' confidence in the security of their transactions and the privacy of their financial information may reinforce industry efforts to foster positive attitudes.

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Endnotes

[1] The analysis and conclusions set forth in this paper represent the work of the authors and do not indicate concurrence of the Federal Reserve Board, the Federal Reserve Banks, or their staff.

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