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Why do consumers pay bills electronically? An empirical analysis

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Introduction and summary

Although the checkless society has been predicted for decades, checks remain the most frequently used noncash payment method in the U.S., contrary to trends in a number of other countries. Despite the debate over why consumers do or do not adopt new payments technology, little is known about the subject. Given unsuccessful efforts to induce a shift away from checks, some industry observers have even suggested that consumers are "irrationally" wedded to their checks. As a result, the financial services industry faces significant uncertainty regarding potential investments in electronic bill payment technologies as well as in debit cards, smart cards, stored value, e-cash, check imaging, and check conversion technologies. The goal of this article is to provide some insight into the consumer's decision to use electronic payments technology—What factors influence this decision and what might financial industry leaders do to encourage greater numbers of consumers to make the transition to electronic payments?

The study of payment methods is of interest for several reasons. First, technology is enabling new payment methods to be introduced more easily and frequently. As a result, the very characteristics of what constitutes a payment instrument are changing over time. Second, recent research highlights the importance of payment-related revenues to financial institutions.[1] Consequently, payment providers will continue to look for ways to increase the value of payment products to customers, thereby enhancing potential revenue streams. Likewise, companies will continue to look for ways to reduce the costs of payments (for example, by reducing the fees they pay to payment providers). For instance, checks are being converted from paper into electronic items and cleared via the automated clearinghouse (ACH) at the point of sale.[2] Firms are also considering new ways to leverage current electronic payment networks to make payments electronically, for instance, experimenting with the ACH network to make debit transactions at the point of sale[3] or using automated teller machine (ATM) networks to make debit transactions for Internet payments.[4]

Ultimately, some combination of consumers, corporations, and financial service providers will determine the success of various payment instruments. These innovations will put increasing pressure on the structure of the rights, warranties, and incentives associated with different payment instruments. Therefore, in order to make better forecasts for business planning and enhance public policy decision-making, we need to better understand the factors influencing consumer choice among alternative payment options.

This article analyzes the extent to which various factors influence consumers' willingness to use electronic bill payment. I review the economic, marketing, consumer decision-making, and payments literatures. Then, I analyze a unique 1,300-person survey to evaluate the factors associated with usage of electronic bill payment. I find that several broad factors influence the consumer's preference for electronic bill payment:

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1) wealth; 2) personal preferences for control, record keeping, convenience, incentives, personal involvement, and/or privacy; and 3) transaction-specific factors associated with different types of payments. I also find that certain demographic factors are significantly associated with the use of electronic bill payment services. My findings are consistent with new product adoption theories, supporting the idea that some consumer segments are natural "first adopters" of electronic bill payment services. However, while new product diffusion theories assume that consumers will begin to experiment and adopt innovations as they learn more about the product's features, my analysis suggests that fundamental consumer needs still must be addressed before a broader portion of consumers will adopt electronic bill payment services.

As a result, I find that an important portion of consumers do not perceive checks and some electronic bill payment services as substitutes at this time. Some analysts suggest that many consumers are likely to remain reluctant to adopt new payment technologies.[5] However, my analysis suggests that a larger fraction of consumers would adopt these new technologies if important product features such as error resolution, service level guarantees, customer service, the ability to make partial payments, and more convenient sign-up were bundled with electronic bill payment services. My results suggest that the next stage of migration towards electronic bill payment may depend more on firms' willingness to fund the development of these new product features than on overcoming consumer resistance to change. This article also highlights the need for policymakers to better understand the diversity of consumer preferences when considering public policy questions relating to consumer protection.

Overview of the payments marketplace

The payments mechanism, like the electricity power grid, is an important piece of the foundation that supports our economy. Today's payment instruments have evolved from barter to commodity-based, to currency and coin, to card-based and, more recently, to electronic network-based systems. The introduction of commodity money reduced the costs and risks associated with trade. Coins and paper currency brought greater standardization, broader acceptance, and lower transaction costs than previous commodity-money or barter-based economies. Card-based systems have extended the reach of one's wealth and creditworthiness, lowered costs, and improved access to customer information. Recent advances in technology now make further improvements possible when consumers value them and when providers have a clear business case to offer the improvement.

According to McKinsey and Company research (Stevenson, 1997), consumers initiate approximately 90 percent of all transactions. Table 1 provides an overview of the mix of different payment instruments across the U.S. economy. See MacKie-Mason and White (1996) for a detailed comparison of the different attributes associated with different payment instruments.

Two theories of how new products are adopted

There are two general, complementary theories of how new products are adopted. The first theory, the *new product diffusion model*, assumes that the primary determinant of new product adoption is the time it takes consumers to learn about a product, to experiment with it, and then ultimately to use it.[6] This theory assumes that consumers view a new product or service as a clear and valuable substitute

TABLE 1

Estimates of historical U.S. payment volumes
(Items in billions)

Payment	1995	1996	1997	1998	1999	CAGR
Currency	500	—	—	—	—	—
Postal money order	0.2	0.2	0.2	0.2	.2	1.5%
Check	63.0	64.7	66.0	67.5	68.8	2.3%
Credit card	14.9	16.1	16.9	17.5	NR	11.9%
Electronic funds transfer	10.5	11.8	12.6	13.2	13.3	6.3%
ATM	9.7	10.7	11.0	11.2	10.9	3.1%
Debit at point of sale	0.7	1.1	1.6	2.0	2.4	14.8%
ACH	3.4	3.9	4.5	5.3	6.2	16.0%

Notes: Volumes include payments initiated by business and government, in addition to those by consumers.
NR indicates not reported. Columns may not total due to rounding.
Sources: Hancock and Humphrey (1997); Federal Reserve Bank of St. Louis, *Annual Report*, Green Sheet, various years; Faulkner & Gray; National Automated Clearinghouse Association; and Bank for International Settlements.

for past products or services and that risks associated with trial can be managed by some combination of consumers, distributors, and producers. According to the new product diffusion model, if consumers perceive the new product to be a substitute for a product they currently use and understand, providers can more easily leverage existing distribution and communications channels to generate awareness and demand for the innovation.

The second theory, the *new market development model*, suggests that a new product by itself will have a limited market potential. In order to reach mass consumer markets, firms need to offer additional product features, services, and/or infrastructure over time, tailoring the product to new customer segments and/or to new uses, as well as making products interoperable.[7] Under this theory, new products are introduced and evolve, new features are added, and over time the product reaches a mass and mature stage of acceptance.

The first model suggests a heavy focus on building awareness and trial while the second theory suggests staged introduction of new product features to new and different customer segments. Thus, it is critical to assess whether consumers perceive new payment innovations to be substitutes for past products or whether new innovations are viewed as fundamentally new products, requiring significantly more resources to promote adoption.

Literature review

Consumer payments decision-making

In an extensive survey of the payments literature, Hancock and Humphrey (1997) provide an overview of the factors associated with electronic banking adoption, including incentives, the nature of a country's financial infrastructure, and the role of network economics in electronic banking adoption. Using a longitudinal Norwegian survey (1989–95), Humphrey, Kim, and Vale (1998) conclude that efficient payment instrument pricing would induce greater electronic payment use because of its lower cost relative to paper-based payments.

Using the Federal Reserve's 1995 *Survey of Consumer Finances*, Kennickell and Kwast (1997) analyze the influence of demographic characteristics on the likelihood of electronic payment instrument usage. As shown in table 2, higher levels of education and financial assets increase the likelihood of electronic payment usage. Carow and Staten (1999) investigate consumer preferences among debit cards, credit cards, and cash for gasoline purchases. Higher levels of education and income and having more than one credit card are associated with greater use of credit cards than cash. However, convenience, rather than borrowing capacity, was the greatest determinant of a credit card user. Lastly, Carow and Staten find that a consumer's ownership of credit cards and use of credit cards are related, because having a certain type of account reveals payment preferences. The American Bankers Association and Dove Associates (1999) analyze a survey of 1,400 consumers to investigate the factors motivating consumer payment instrument choice between online and offline debit. They find that consumers exhibit strong and distinct payment preferences, with different segments of consumers valuing different debit attributes.

Wells (1996) finds that check float does not explain the persistence of consumer check use; alternative explanations include the consumer perception of checks and ACH as dissimilar payment instruments, market failure, and measurement errors. Using 1997 data to investigate consumer responsiveness to changes in checking account costs, Stavins (1999) finds that the supply of bank deposits to checking accounts is sensitive to banks' per item fees and check return, teller, and foreign ATM restrictions. Using the Federal Reserve Board's *Terms of Credit Card Plans Survey* to investigate consumers' willingness to pay for credit card service, Stavins (1996) finds that consumers respond to product offerings that bundle other services. Research suggests that despite the fact that banks could earn higher revenues by lowering

TABLE 2

Factors in use of payment technology

	Income	Financial assets	Age	Education
In person	–	+	0	0
Mail	+	+	–	+
Telephone	+	+	0	+
Electronic transfer	0	+	–	+
ATM	0	+	–	+
Debit card	0	+	–	+
Automatic deposit/withdrawal	–	+	+	+
Direct deposit	–	+	+	+
Pre-authorized debit	0	+	–	+
Computer	0	+	–	+
Smart card	0	0	0	+

Note: Statistically significant positive/negative factor (+/–); not statistically significant factor (0).
Source: Kennickell and Kwast (1997).

the price of services, they would not necessarily maximize the profit from each account.

MacKie-Mason and White (1996) provide a detailed review of the characteristics that are important to consider when designing new payment innovations. Mantel (2000) surveys the literature on consumer payment decision-making and proposes a framework in which three factors explain consumer electronic banking usage: 1) wealth; 2) personal preferences, such as incentives, convenience, control, budgeting, privacy, security, and personal involvement; and 3) transaction-specific factors. Including this broad list of factors helps explain sometimes hard-to-explain or inconsistent behaviors. For instance, Mantel's (2000) framework helps explain why consumers are increasingly choosing to use debit cards, based on the changes in the attributes financial institutions have begun bundling with debit cards, although credit cards are well known for providing convenience and short-term, "interest-free" loans. Similarly, this framework helps explain why consumers in different countries have adopted smart cards at significantly different rates, again based on the nature and/or importance of the attributes bundled with these payment products.

Consumer awareness

New product diffusion theories point to the important role of consumer awareness in promoting adoption. There is relatively little public data on consumer awareness and perceptions of electronic bill payment. A 1998 Federal Reserve Bank of St. Louis study finds that 99 percent of consumers say they understand direct deposit and 97 percent of current users report satisfaction with the system. However, only 55 percent of consumers feel they understand electronic bill payment and ACH well, while 84 percent of electronic bill payment users report satisfaction with this type of payment instrument. A study for the New York Clearing House (1997) conducted by Wirthlin Worldwide measures direct deposit usage before and after a marketing campaign was employed from September 1996 to February 1997. Roughly half of all nonusers surveyed remembered the principal messages of the campaign, including the ideas that direct deposit is convenient (18 percent), easy to use (17 percent), and available (16 percent). However, the study does not find evidence that communication efforts increase usage.

While the fact that a significant fraction of consumers may not fully understand electronic bill payment services might indicate a problem to some, the new market development model might suggest that this is not a problem per se. After all, if the evidence continues to suggest that an important fraction of consumers do not yet perceive electronic bill payment and checks as clear substitutes, it may be that the electronic bill payment market is still developing. In this case, a significant fraction of consumers will likely continue to report a lack of familiarity, even as significant improvements are made over time, until the product's functionality is fully developed. When future studies find evidence that a larger portion of consumers see electronic bill payment and checks as clear substitutes, then firms then may be better able to target their communications campaigns to consumers' unique needs. Clearly, communications efforts in the early stages of a product life cycle will continue to be important; nonetheless, they will likely serve different purposes than communications efforts used for more mature products.

Analysis

Description of data and variables

I use a dataset collected by Vantis International on behalf of the Federal Reserve Bank of St. Louis and the Federal Reserve Bank of Atlanta that consists of responses to a national 1,300-person survey on consumer decision-making among competing bill payment instruments. The household's primary bill payer served as the survey respondent. The survey collected data pertaining to consumer demographic characteristics, payment behaviors, and self-reported payment preferences and evaluations of different payment options. The survey focused primarily on consumers' experiences with checks and electronic bill payment, but also considered other payment instruments such as debit cards, credit cards, and money orders. The appendix provides descriptions and summary statistics of the variables included in the analysis.[8] I expect these factors to influence the likelihood of electronic bill payment use generally and/or the likelihood of high usage. For ease of interpretation, I group them into the following broad categories: demographic, new product adoption, control and budgeting, convenience, incentives, privacy and security, and personal involvement.

Model

In this article, I analyze why consumers choose among alternative payment instruments for bill payment. This analysis uses a series of *binomial logistic regressions*, a statistical technique that allows one to examine the extent to which various factors influence the likelihood of direct bill payment usage. First, I explore the factors that affect the initial choice of whether to use electronic bill payment. Second, I investigate the factors that influence the extent or frequency of electronic bill payment use among users of these

types of services. For this part of the analysis, I classify consumers as "low users" if they pay fewer than 20 percent of their bills electronically and "high users" if they pay more than 30 percent of bills with direct bill payment technology.[9] Third, I examine the factors that influence the use of electronic bill payment for specific types of bills—mortgage, loan, lease, telephone, cable, credit card, and insurance.

The regression model analyzes consumer C_i's choice of payment instrument for bill payment P_i (for example, mortgage payment, credit card payment, or telephone bill).[10] The consumer has two payment options—1) paper-based payment instruments such as cash, checks, or money orders and 2) electronic-based payment instruments such as electronic bill payment and ACH.[11] I impose several simplifying assumptions on the analysis. First, I assume that all payments initiated electronically by the consumer are paid electronically by the payment intermediary. This assumption allows the analysis to focus only on consumers' willingness to choose electronic payments. Next, I assume that consumers have access to all payment options. Therefore, findings are applicable only to the 90 percent of consumers who have checking accounts. This article does not address the important issue of identifying the needs and preferences of unbanked consumers.

Limitations of the analysis

First, my analysis focuses solely on consumer decision-making pertaining to electronic bill payment and does not address the perspective of the payment provider or the entity receiving the payment. I am primarily interested here in whether consumer preferences are a significant limiting factor to the migration towards electronic payments. Second, because this model evaluates the attributes of desirable payment instruments using self-reported data, my results depend on the accuracy with which consumers recall and report actual behavior. Third, the survey focuses on the primary bill payer rather than households in general. As a result, one must exercise care in extending these results to the general population. Finally, this research does not consider how consumer behavior has changed over time nor does it provide insight into how and when a specific factor (such as price, product attributes, or promotions) induces changes in electronic bill payment use.

Empirical results

Table 3 provides the results of binomial logistic regressions comparing nonusers of electronic bill payment with users and low users with high users. Table 4 provides the results of binomial logistic regressions comparing nonusers and users by type of bill (that is, cable, credit card, insurance, loan, mortgage, telephone, and utility). Overall, four general findings emerge. First, there are important and significant differences between nonusers, low users, and high users of electronic bill payment. Second, consumer demographic and financial characteristics are important in influencing whether consumers use electronic bill payment. However, these factors do not strongly distinguish high users from low users, lending support for the idea that there are certain natural first adopters of electronic bill payment technology. Third, several consumer preferences, including the desire for control, convenience, incentives, privacy, and personal involvement, are also significant in whether consumers use electronic payments. Furthermore, these factors distinguish low users from high users. At a more detailed level, this analysis suggests that incentives may be a valuable tool to induce introductory usage of electronic bill payment, although they may not be needed to increase usage. Similarly, services that promote greater consumer recourse and control may be important in inducing some consumers to adopt electronic bill payment and others to expand the number of bills they pay electronically. Finally, payment-specific factors, such as the dollar size of a payment and whether a payment amount varies, are also important in explaining why certain consumers choose electronic bill payment or paper checks to pay for certain bills.

Comparison of users and nonusers

Referring to table 3, I find that several demographic factors influence the initial decision of whether to use direct payment methods. Holding other factors constant, older individuals are more likely to use direct electronic payments than younger individuals. For instance, a 40-year-old is 2.3 percent more likely to use electronic bill payment than a 39-year-old. Women are 49.2 percent more likely to use electronic bill payment. Neither college education nor market size variables are statistically significant factors in influencing the use of direct electronic payment. The absence of a statistically significant education variable differs from Kennickell and Kwast's (1997) findings, but is attributable to the inclusion of other nondemographic factors, such as personal preferences, income, and lifestage (for example, single, married with children, or retired), that are related to education level.[12]

New product adoption factors do play a role in influencing the likelihood of electronic bill payment usage across the proposed factors. Consumers who

TABLE 3

Binomial regression results, odds ratio

	Nonusers vs. users	Low vs. high users
Demographics		
Age	1.023*** (0.007)	1.031*** (0.008)
Female	1.492** (0.196)	0.623** (0.235)
Race	1.013 (0.259)	1.570 (0.331)
College	0.910 (0.193)	1.031 (0.219)
Market size: under 100,000[a]	1.441 (0.233)	0.741 (0.278)
Market size: 100,000–499,999	1.241 (0.231)	0.914 (0.271)
Market size: 500,000–1,999,999	1.121 (0.251)	0.864 (0.303)
New product adoption		
Understand direct payment	1.768*** (0.135)	0.767 (0.199)
Understand set-up of direct payment	1.122*** (0.033)	1.029 (0.036)
PC owner	2.106*** (0.195)	1.085 (0.217)
Cellular phone owner	1.159 (0.204)	0.762 (0.234)
Internet purchase	0.902 (0.285)	0.997 (0.340)
Consumer financial		
Household income: $20,000–$39,999[b]	2.144*** (0.239)	1.257 (0.312)
Household income: $40,000–$74,999	1.836** (0.257)	1.088 (0.324)
Household income: over $75,000	2.038** (0.352)	2.382** (0.432)
Homeowner	1.439* (0.208)	1.268 (0.276)
Savings account	1.264 (0.214)	1.492 (0.266)
Credit card	1.485** (0.179)	0.671* (0.222)
Regional/national bank account[c]	1.154 (0.186)	0.878 (0.216)
Credit union account	1.630*** (0.183)	0.708 (0.215)
Brokerage account	0.984 (0.269)	0.794 (0.302)
Savings and loan account	0.755 (0.220)	0.913 (0.262)
Control		
Control when bill is paid	0.898* (0.061)	0.873** (0.067)
Option to stop payment	1.093** (0.041)	1.001 (0.050)
Receipt for payment	0.891*** (0.036)	0.989 (0.041)
Balance checkbook once/month	1.050 (0.033)	0.929* (0.042)
Disciplined about finances	0.988 (0.034)	1.047 (0.043)
Use toll-free number to check balances	0.951* (0.027)	1.031 (0.032)
Person available	0.989 (0.046)	0.879** (0.056)
Convenience		
Bill paid when out of town	1.065* (0.037)	1.099* (0.051)
Saving time	1.061 (0.047)	0.980 (0.066)
Banks not open convenient hours	1.007 (0.031)	1.106*** (0.038)
Incentives		
Least expensive payment method	1.025 (0.046)	1.065 (0.064)
Use shopping coupons	1.071** (0.033)	1.042 (0.040)
Avoid penalties for late payments	0.977 (0.055)	1.098 (0.074)
5% discount	1.882*** (0.241)	1.060 (0.379)
Privacy/security		
Not comfortable giving account number to salesperson	0.984 (0.027)	1.039 (0.224)
Dislike automatic withdrawal	0.806*** (0.031)	0.914** (0.013)
Credit card on Internet is secure	0.965 (0.037)	0.900** (0.044)
Personal involvement		
Enjoy talking with bank teller	1.082** (0.031)	1.069* (0.036)
Number in sample	956	556
Likelihood ratio	387.6***	120.4***

[a]Market size reference variable baseline characteristic: under 100,000.
[b]Income reference variable baseline characteristic: $20,000 and under.
[c]Financial institution reference variable baseline characteristics: local bank.
*Indicates 0.10 statistical significance level; ** indicates 0.05 significance level; and *** indicates 0.01 significance level.
Notes: Standard errors are in parentheses. Of the 956 cases, 400 are nonusers. Of the 556 users of electronic payments, 236 are low users and 320 are high users. See appendix for description of variables.

TABLE 4

Statistically significant results by bill type

	Cable	Credit card	Insurance[c]	Loan[d]	Mortgage[e]	Telephone	Utilities[f]
Demographic factors							
Age		+**	+***		+***		+*
Race				+***		–*	
Lifestage				+**	–*		+**
Market size			+*				+*
New product adoption							
Understand direct payment	–**		+***				
Understand set-up of direct payment		+**	+*		+**	+**	+***
PC owner			+***				
Purchase on Internet		+***					
Consumer financial							
Household income: $20,000–$39,999[a]						+*	
Household income: $40,000–$74,999						+**	
Household income: over $75,000					+**		
Homeowner	+*			+**		+**	+**
Savings account				+***			
Regional/national bank account[b]				–**			+*
Credit union account	–*						
Control							
Control when bill is paid					–**	–***	–**
Option to stop payment			+*				
Receipt for payment			–***				
Balance checkbook once/month				+*			
Disciplined about finances						–*	+***
Use toll-free number to check balances						–*	
Person available				–**	–***		
Convenience							
Bill paid when out of town			+*		+*	+**	+***
Saving time							
Banks not open convenient hours		+*		+**			+**
Incentives							
Least expensive payment method							
Use shopping coupons							
5% discount	–**		+**	+*			
Privacy/security							
Not comfortable giving account number to salesperson	–***	–***				–**	
Dislike automatic withdrawal	–**		–***	–***		–***	–***
Credit card on Internet is secure			–**				
Personal involvement							
Enjoy talking to bank teller	+*	+***	+*	+*		+**	+**

[a]Income reference variable baseline characteristic: $20,000 and under.
[b]Account reference baseline characteristic: local/community bank.
[c]Market size is under 100,000 people.
[d]Lifestage is young couple, retired couple, or middle parent.
[e]Lifestage is middle-aged single.
[f]Lifestage is middle-aged single, older single, or retired couple. Market size is 100,000–499,999.
*Indicates 0.01 significance level; ** indicates 0.05 significance level; and *** indicates 0.10 significance level.
Notes: "+" Indicates variable increased odds of electronic payment use; "–" indicates variable decreased odds.
See appendix for description of variables. Lifestage denotes period in life. For example, young single, middle-aged married with children, or elderly with a roommate are lifestage categories.

own personal computers are twice as likely to use electronic bill payment. Consumers who report "understanding direct payment technologies" are 79 percent more likely to use electronic bill payment. Likewise, "understanding how to set up direct payment" is associated with a 12 percent greater likelihood of using electronic bill payment. However, these findings regarding consumer awareness are contrary to the results of the New York Clearing House (1997) study that finds no correlation between increased direct electronic payment use and consumers' understanding of key communication messages. Furthermore, I find that "cellular phone ownership" and a self-reported "perception that the Internet is secure for purchases" are not associated with greater usage of electronic bill payment. Clearly, we need to know more about how and why consumers choose to adopt new electronic payment technologies.

Consistent with Kennickell and Kwast (1997) and others, I find a significant relationship between consumer financial characteristics—income and home ownership as imperfect proxies for wealth—and increased electronic bill payment usage. Relative to households with incomes under $20,000, consumers at all other income levels are approximately twice as likely to use direct payment technologies. I also find that homeownership is positively related to the use of direct electronic payment methods, with homeowners being 44 percent more likely to use electronic bill payment. Consumers with credit cards are 49 percent more likely to be electronic bill payment users. Members of credit unions are 63 percent more likely to use direct electronic bill payment than other consumers. It may be worth exploring why this occurs. For instance, are there synergies between credit unions and their members' workplaces that promote better communication, make sign-up easier, or make customer service and error resolution more effective or credible? Are users of credit unions fundamentally different from other consumers?

I find that preferences for greater "control" over payments and household finances have a significant influence on the likelihood of direct electronic payment usage. As the importance placed on "having control over when a bill is paid" increases, the likelihood of electronic bill payment use decreases by 11 percent. Increased importance of "receiving a receipt of payment" is associated with an 11 percent lower likelihood of being a user of electronic bill payment methods. Consumers who report "using toll-free telephone numbers to check account balances" are 5 percent less likely to use electronic bill payment. These factors prevail over measures of financial behaviors such as "self-reported financial discipline" and the "frequency of checkbook balancing." I find one result to the contrary. The greater the importance consumers place on "the ability to stop a payment," the higher the likelihood of electronic payment use by 9 percent. While this is a surprising result, the survey instrument does not allow one to distinguish between consumers who pay bills electronically through automatic, preauthorized electronic debits and those who pay bills through electronic banking packages. The latter form of electronic bill payment gives consumers some improved ability to stop payments, which would be consistent with the above finding.

Contrary to a priori expectations, I do not find strong support for the importance of increased convenience in distinguishing users of electronic bill payment from nonusers. Only one hypothesis for this category is slightly significant (at the 10 percent level). Those who report a higher importance of "having bills paid when out of town" are 6.5 percent more likely to use electronic bill payment. These findings are not surprising, given that many bills offer grace periods of several weeks and convenience may be relevant only for intense electronic bill payment users. Indeed, preferences for convenience do influence the level of use of electronic bill payment, a topic I explore in the next section.

Some incentive factors influence the likelihood of electronic bill payment use. Consumer preference for "using the least expensive method of payment" and importance placed on "avoiding penalties due to late payments" do not influence the probability of electronic bill payment use. Consumers who report they "would use direct payment if offered a 5 percent discount on the monthly bill" are 88 percent more likely to use electronic bill payment. The heavier "use of coupons when shopping" is associated with a 7 percent greater likelihood of using electronic bill payment.

Self-reported preferences for privacy and security are generally not significant in determining the likelihood of choosing direct payments. Self-reported "dislike of the idea of someone automatically withdrawing money from one's bank account" is associated with a 20 percent decreased likelihood of electronic bill payment use. Consumer perceptions of "Internet transaction security" and self-reported "discomfort with giving account information to sales representatives" do not influence the decision to use electronic bill payment. Contrary to popular belief, other factors that reflect consumers' potential distrust of technology and security, such as "distrust of ATMs" and self-reported "preferences for account privacy," are not statistically significant determinants of direct payment

use. Nonetheless, I do find that privacy concerns influence the intensity of direct payment use, as discussed in the next section.

Preferences for personal involvement are associated with an increased probability of being a direct payment user. Contrary to prior expectations, consumers who report they "enjoy talking with bank tellers" are 8 percent more likely to be electronic bill payment users. However, this finding may be the result of segmentation across consumer choice of banking institutions. For instance, consumers who choose to use direct payment may have stronger relationships with their banks, making them more likely to report enjoying interactions with bank personnel. This finding warrants further investigation, given the importance of the related electronic banking product strategy, customer service, and branch infrastructure issues that financial services industry leaders face.

Comparison of low users and high users

Table 3 also highlights important differences between low and high users of electronic bill payment. As noted earlier, low users pay less than 20 percent of all bills using electronic bill payment and high users pay 30 percent or more of their bills electronically. Of the demographic variables included in the analysis, only age is statistically significant. A 38-year-old consumer is 3 percent more likely to be a high electronic bill payment user than a 37-year-old. While women are more likely to be direct payment users, they are 40 percent less likely to be high users of electronic bill payment. Race, educational attainment, and market size are not statistically significant factors.

The new product adoption factors proposed, a priori, to influence the likelihood of high electronic bill payment use are not statistically significant. This might suggest that new product adoption factors influence the likelihood one will adopt the technology in the first place, but do not affect how much one uses it upon adoption.

In terms of wealth and financial variables, households with incomes over $75,000 are three times more likely to be high users of electronic bill payment than households with incomes below $20,000. Households with incomes between $20,000 and $75,000 are not more likely than low-income consumers to be high users of electronic bill payment. This emphasizes the critical role that wealth and budgeting play in enabling electronic bill payment. Home ownership is not statistically significant in explaining the differences between low and high users. Account ownership at different types of financial institutions also does not influence the intensity of electronic bill payment use. While owning a credit card increases the likelihood that one uses electronic bill payment, perhaps as a proxy for financial activity, individuals who own at least one credit card are 33 percent less likely to be high users of electronic bill payment than low users. One explanation for this is that the analysis needs to account for the outstanding dollar value on credit cards as well. I tested the potential role of credit card debt levels, but found it to be insignificant. It is possible that consumers systematically misreport their level of credit card balances and/or that the survey instrument does not allow for adequate variation in responses. Clearly, we need to know more about this.

In terms of control-related factors, several variables are statistically significant in distinguishing low users from high users. The greater the importance placed on "control over when a bill is paid," the lower the likelihood that a consumer is a high user of electronic bill payment by 13 percent. A self-reported importance rating of "a person being available if a problem arises" is associated with a 13 percent lower likelihood of being a high user of electronic bill payment. Individuals who agree with the statement that they "balance their checkbooks at least once per month" are 9 percent less likely to be high users of electronic bill payment. While this finding points to the potential convenience, it may be important to better understand consumer budgeting practices in the context of using electronic banking services. To what extent do consumers rely on PC-based balancing of accounts? How much emphasis do consumers now place on managing traditional checking/transaction accounts?

Of the convenience factors in the survey, consumers who place higher ratings on the statement that "bank hours are inconvenient" are 11 percent more likely to be high users of electronic bill payment. Consumers who place importance on "having a bill paid when out of town" are 10 percent more likely to be high electronic bill payment users. Preferences for "saving time" do not influence the likelihood of high electronic bill payment use.

I find that incentive factors do not influence the likelihood of high electronic bill payment use. As with new product adoption factors, this might suggest that incentives influence the initial decision between traditional payment instruments and electronic bill payment, but do not affect the degree to which a consumer later uses electronic bill payment.

My results show that privacy concerns and preferences for personal involvement influence the likelihood of high electronic bill payment use. Self-reported "dislike of the idea of someone automatically withdrawing money from one's account" decreases the likelihood that a consumer is a high user of electronic

bill payment by 9 percent. The belief that the "Internet is secure for purchases" is associated with a 10 percent lower likelihood of high electronic bill payment use. This counterintuitive result is consistent with the findings that younger consumers, who are more likely to view the Internet as secure, are less likely to pay bills electronically because of lower incomes and other factors correlated with lifestage (for example, moving more often than older consumers and having to change payment relationships). Lastly, similar to the findings for the initial electronic bill payment choice, consumers who report that they "enjoy talking with bank tellers" are 7 percent more likely to be high electronic bill payment users.

Comparison of users and nonusers by bill type

Table 4 provides the statistically significant results of my binomial logistic regressions of nonusers versus users of electronic bill payment by bill type. The bill types I consider are cable, credit card, insurance, general consumer installment loan, mortgage, telephone, and utilities.[13] In terms of demographic and new product adoption factors, older consumers are more likely to use electronic bill payment than younger consumers for credit card, insurance, mortgage, and utility bills, though not for cable, loans, and telephone bills. Nonwhite consumers are significantly less likely to pay telephone bills electronically, but more likely to pay loan bills via electronic bill payment than white consumers. Lifestage factors prove to be significant in explaining the use of electronic bill payment for certain types of bills. Young and retired couples and middle-aged parents are more likely to pay loans electronically; middle-aged singles are less likely to pay mortgages electronically; and middle-aged and older singles and retired couples are more likely to pay utility bills electronically.

Consumers living in markets with fewer than 100,000 people are more likely to pay insurance bills electronically. Consumers in markets with population between 100,000 and 500,000 are more likely to pay utility bills electronically. Contrary to popular belief, in no case does living in a very large urban area increase the likelihood of electronic bill payment use. Future research will likely want to investigate such questions as whether institutions in smaller markets tend to promote electronic bill payment more frequently or whether consumers perceive that billing authorities in these markets provide better service. The extent to which a consumer understands how to set up direct payment positively influences the likelihood of paying credit card, insurance, mortgage, telephone, and utility bills electronically. Consumers who have made purchases over the Internet are also more likely to use electronic bill payment for credit card bills.

Relative to consumers with incomes below $20,000, higher income levels are associated with a greater likelihood of using electronic bill payment for mortgages and telephone bills. I find that homeowner status increases the probability of using direct payment for cable, loan, telephone, and utility bills. Savings account ownership increases the likelihood of making loan payments electronically.

Consumers' self-reported preference for "controlling when a bill is paid" decreases the likelihood of paying mortgage, telephone, and utility bills electronically. Control over when a bill is paid may be related to consumer budgeting concerns and a desire to minimize the risk of insufficient funds. This concern could also stem from a consumer's preference to review a variable bill and minimize the risk of errors. Having the "option to stop payment" increases the likelihood of electronic bill payment for insurance bills, while the importance placed on receiving a receipt of payment decreases the likelihood of electronic payment for insurance. This finding underscores the notion that consumers want receipts and control over bills they see as "critical," so as to avoid potentially larger bills in the future or the potential loss of insurance coverage. Higher self-reported scores for "financial discipline" and "use of toll-free telephone numbers to check account balances" decrease the likelihood of paying telephone bills electronically. This finding may be explained by the variable-dollar nature of some bills. Consumers who check account balances may be more likely to be financially constrained and less likely to use electronic bill payment if they worry about having sufficient funds to cover variable bills.

The greater the importance placed on "having a bill paid when out of town," the greater the likelihood of using electronic bill payment for insurance, mortgage, telephone, and utility bills. The extent to which a consumer believes that "bank hours are not convenient" increases the probability of paying credit card, loan, and utility bills electronically. Incentives such as a "5 percent bill discount if electronic payment is used" positively influence the likelihood of paying insurance and loan bills electronically. Higher levels of "discomfort associated with giving one's account number to a salesperson" and "dislike of someone automatically withdrawing funds from one's account" decrease the likelihood of paying cable, credit card, insurance, loan, telephone, and utility bills electronically. Contrary to prior expectations, the more a consumer reports he or she "enjoys talking with bank tellers," the greater the likelihood of paying cable, credit card, insurance, loan, telephone, and utility bills electronically. The results for cable bills across

the board indicate that consumers view them differently from all other bill types.

Summary of model results

The results of the model suggest that there are important differences between nonusers, low users, and high users of electronic bill payment services. Heavy users of electronic bill payment tend to be wealthier and to place a higher premium on convenience. Moderate users of electronic bill payment have at least modest levels of wealth and tend to value convenience. Nonetheless, these individuals do not use electronic bill payment for a broad segment of bills because of the potential risk of errors, which could result in overdrawn checking accounts or require significant time and energy following up with financial institutions and merchants. More importantly, these consumers are also subject to periodic swings in incomes or expenses that create budgeting challenges. For this broad group of consumers, the choice not to use electronic bill payment is akin to the purchase of a low-cost insurance contract that limits the potential risk of payments-related problems.[14]

Why do other consumers not use electronic bill payment? Clearly, some consumers expect some sort of incentive to change. These consumers shop for the best deal and may not change until they receive a benefit, particularly if they believe their institution is benefiting by moving to a more efficient form of payment. There are also consumers who do not pay electronically because it is not convenient enough or because some bills cannot be paid electronically. But more importantly, there is a significant fraction of consumers who do not use electronic bill payment because they lack the financial resources to even consider paying electronically. Some low-income consumers may use the ability to avoid paying a bill on time as a short-term funding vehicle, sometimes at low cost if there are limited penalties associated with late payment. Other consumers prefer a personal involvement in bill payment or seek to limit potential risks to their privacy by avoiding the use of electronic bill payment. These groups, some of which are of potentially significant size, do not yet perceive checks and electronic bill payment services as clear substitutes.

Conclusion

This analysis highlights the importance for policymakers to understand consumers' varying preferences and needs.[15] After all, consumers' desires for "control" vary significantly and encompass concerns about the ability to review bills, initiate payments, and have errors resolved. Public sector involvement in the rights, warranties, consumer protections, and incentives associated with different payment instruments may have significant implications for the adoption of electronic payments. To some extent, legally mandated business practices and consumer protection may motivate increased adoption of electronic payments.[16] An argument can be made that there is a positive externality in setting standards or in developing common rules for consumer protection, particularly in an industry with significant fragmentation and perhaps uneven bargaining power between consumers and financial institutions.[17]

Yet, we must recognize that setting these types of rules may in some cases bring costs as well as benefits. For instance, rules on what firms must do to resolve errors may have the effect of implementing a price floor, which may lead to the unintended result that it is uneconomical or unprofitable to serve some consumer segments.[18] One potential alternative is to have public entities work to coordinate the development of a reasonably small number of standards rather than one standard. The net effect would be a greater emphasis on transparency and disclosure and less on public determination of the final outcome.[19] Clearly, more needs to be known about the costs and benefits of potential public policy decisions. At a minimum, frameworks like the one presented in this article help identify where public policy decisions may be expected to have an effect, as well as where unintended consequences may arise.

This analysis suggests that, despite speculation to the contrary, consumers may not be as resistant to new payment innovations as has been proposed in the past. My results show that consumers' choices are consistent with their preferences. These preferences vary across bills and depend on the consumer's level of wealth, but include elements of preferences for control, convenience, incentives, privacy, and personal involvement. Consumers' financial positions and transaction-specific characteristics clearly have a significant impact on their decisions. The importance of these factors may help explain why consumers sometimes appear to exhibit "irrational" behavior, that is, behavior that is not consistent with self-reported preferences. This behavior may be driven by situational factors. My work suggests that the next stage of migration towards electronic bill payment may be more dependent on establishing the business cases to justify investment in new product features that address consumer preferences than on overcoming consumer resistance to change.

There is an important need to perform this type of research on data representing actual consumer behavior rather than on self-reported data. There are many

unanswered questions for future research to address, some of which I raised earlier in this article. Researchers may also want to assess the links between consumer income, expenditures, savings, borrowing, and payment methods. How are consumers' payment preferences changing over time and, more specifically, how are they responding to market stimuli, such as pricing, advertising, and changes in product attributes? Which payment instruments are substitutes and for which consumer segments? How do consumers perceive the relative merits of different payment instruments and different account structures? Finally, how do public policy decisions influence the migration to alternative payment methods?

APPENDIX: VARIABLE DESCRIPTIONS

Variable	Scale	Summary statistics
Demographics		
Age of respondent	continuous	Mean: 50.4
Female	0: male, 1: female	34% male 66% female
Race	0: white, 1: non-white	86% white 14% non-white
College	0: no, 1: yes	64% no 36% yes
Market size: under 100,000 people	0: no, 1: yes[a]	23% under 100,000
Market size: 100,000–499,999	0: no, 1: yes[a]	16% 100,000–499,999
Market size: 500,000–1.9 million	0: no, 1: yes[a]	21% 500,000–1 million
New product adoption		
Understand direct payment	1: no–4: yes	Mean: 3.5
Understand how to set up direct payment	1: disagree completely– 10: agree completely	Mean: 4.2
PC owner	0: no, 1: yes	71% no 29% yes
Cellular phone owner	0: no, 1: yes	75% no 25% yes
Purchase over the Internet	0: no, 1: yes	88.9% no 11.1% yes
Consumer financial		
Household income: $20,000–$39,999	0: no, 1: yes[b]	30% under $20,000 29% $20,000–$39,999
Household income: $40,000–$74,999	0: no, 1: yes[b]	30% $40,000–$74,999
Household income: over $75,000	0: no, 1: yes[b]	11% over $75,000
Homeowner	0: no, 1: yes	24% no 76% yes
Savings account	0: no, 1: yes	25% no 75% yes
Credit card	0: no, 1: yes	38% no 62% yes
Regional/national bank account	0: no, 1: yes[c]	36% regional/national bank 54% local bank
Credit union account	0: no, 1: yes[c]	41% credit union
Brokerage account	0: no, 1: yes[c]	12% brokerage
Savings and loan account	0: no, 1: yes[c]	20% savings and loan

Variable	Scale	Summary statistics
Control		
Control when bill is paid	1: not important– 10: extremely important	Mean: 8.9
Option to stop payment	1: not important– 10: extremely important	Mean: 8.1
Receipt for payment	1: not important– 10: extremely important	Mean: 7.8
Balance checkbook at least once/month	1: disagree completely– 10: agree completely	Mean: 8.3
Disciplined about finances	1: disagree completely– 10: agree completely	Mean: 7.4
Frequently use toll-free number to check account balances	1: disagree completely– 10: agree completely	Mean: 4.4
Person available to talk to if there's a problem	1: not important– 10: extremely important	Mean: 8.4
Convenience		
Bill paid even when I'm out of town	1: not important– 10: extremely important	Mean: 7.2
Saving time	1: not important– 10: extremely important	Mean: 7.7
Banks not open convenient hours	1: disagree completely– 10: agree completely	Mean: 4.6
Incentives		
Least expensive payment method	1: not important– 10: extremely important	Mean: 7.6
Frequently use shopping coupons	1: disagree completely– 10: agree completely	Mean: 7.8
Avoid penalties for late payments	1: not important– 10: extremely important	Mean: 8.9
Would use electronic payment if offered a 5% discount on monthly bill	0: no– 1: yes	21% no 79% yes
Privacy/security		
Not comfortable giving my account number to salesperson	1: disagree completely– 10: agree completely	Mean: 7.0
Dislike someone automatically withdrawing from my account	1: disagree completely– 10: agree completely	Mean: 6.6
Paying with credit card or giving checking account number on Internet is secure	1: disagree completely– 10: agree completely	Mean: 2.7
Personal involvement		
Enjoy talking with bank teller	1: disagree completely– 10: agree completely	Mean: 5.4

[a]The baseline for this variable is market size over 2 million.
[b]The baseline for this variable is income under $20,000.
[c]The baseline for this variable is account at local bank.

NOTES

[1]See Radecki (1999) and Ernst and Young (1999).

[2]See Janssen (1999).

[3]See Hood (1999).

[4]See Bank Systems Technology, Inc. (2000).

[5]For instance, see Snell (1999a).

[6]See Kotler (1994).

[7]See Jolly (1997) for an introduction to this subject and Ferguson (1998) for background on the role of infrastructure in new payment instrument adoption. One important issue that is beyond the scope of this article is to consider products with a network nature to their use, such as the cell phone, where the first products sold are of little value since customers value having the ability to reach many others. See Good (1997) for a discussion of network externalities relating to payments.

[8]The dataset contains variables pertaining to electronic bill payment usage that are in some cases highly correlated. I used a correlation matrix to discern the relationship between responses across questions. The variables included in the final model are the responses to the questions emphasized by theory.

[9]Note, I analyzed various cutoff points for low and high users and the choice of a given cutoff point did not significantly affect the outcome from the regression.

[10]Recall that the binomial logistic model takes the functional form where the probability that a consumer uses electronic bill payment = $e^{\beta x}/1+e^{\beta x}$, where X is a vector of variables proposed to be related to electronic bill payment usage. See Greene (1993).

[11]Electronic bill payments are defined as pre-authorized ACH debits or debits by personal computer banking. Nonelectronic payments include cash, checks, and money orders.

[12]Subsequent analysis confirmed this.

[13]While the survey also asked consumers about other bills, such as membership bills and tuition payments, I exclude them from my analysis because of the small sample size of individuals with these specific bills.

[14]See Mantel (2000) for an overview of the types of initiatives which might be undertaken to address consumers' concerns with the use of electronic bill payment. In general, they tend to promote services that are similar to the Giro systems common in some European countries (for example, consumer initiated, ability to easily build in partial payments, or access to customer service).

[15]For one perspective advocating the need to look actively at this, see Mann (1999). For a second perspective advocating monitoring these types of developments but being careful to act only when there is a clear and compelling reason to do so, see Perritt (1999).

[16]See Mann (1999).

[17]For instance, individual consumers may not have an incentive to negotiate for small dollar adjustments to their accounts, even if they are completely justified, if they expect this process to require significant cost and/or time.

[18]This is a particularly important question given the work underway to promote financial relationships for unbanked consumers as part of the EFT99 legislation.

[19]The approach of allowing multiple standards to flourish is clearly what many public entities do by abstaining from getting involved in these discussions. But, when public entities do get involved, it may still be worth considering advocating multiple standards rather than just one.

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