POLICY STUDIES

Competition and Innovation in the Consumer e-Payments Market? Considering the Demand, Supply, and Public Policy Issues

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Address any correspondence about this paper to Brian J. Mantel, Federal Reserve Bank of Chicago, 230 S. LaSalle Street, Chicago, Illinois 60604 or e-mail Brian at brian.mantel@chi.frb.org**.** **Requests for additional copies should be directed to the Public Information Center, Federal Reserve Bank of Chicago, P.O. Box 834, Chicago, Illinois 60690-0834 or telephone (312)-322-5111. This paper is available at http:/www.chicagofed.org/publications/publicpolicystdies.**

Executive Summary

Significant debate has occurred over the last several decades regarding whether there is adequate competition and innovation in the non-recurring consumer payments segment of the banking industry. The Department of Justice and some retailers have sued Visa and MasterCard for limiting competition and innovation. There has also been a host of high profile product "failures" in the consumer e-payment market place (e.g., e-cash and smart card products). Meanwhile, some researchers have suggested that consumers are irrational and unresponsive to marketplace incentives (for instance, see Ausubel (1991)).

Despite anecdotal reports which imply to some that "there's something wrong" in this market, we find strong, though not yet scientifically conclusive evidence, that there is increasing competition, strong innovation, and customers who respond to market stimuli in the non-recurring consumer payments market. As a result, this paper argues that going forward, public sector involvement in the consumer non-recurring payment market will be less warranted. Based on the analysis of a unique 1,300 person survey, documentation and analysis of recent private sector-led developments, and a Federal Reserve payments benchmarking study, this paper discusses several of the demand-side, supply-side, consumer protection, and competition policy dimensions influencing this market. Four general lessons may be of particular interest to public policy makers and private sector firms.

First, this paper provides strong support for Hirschman (1982)'s "bundle of attributes (consumer rationality)" theory. It also provides strong evidence that there are important supply-side phenomena such as differences amongst community and national banks and the importance of market-size which influence market incentives.

Second, the paper proposes the beginning of a model of substitution and innovation, which helps not only to explain but also predict where innovations might or might not occur. It also helps to explain which types of firms might have an advantage in pioneering these innovations, and why. The article goes on to apply this model, discussing changes in consumers' propensity to use credit cards, debit cards, electronic benefits transfer cards, e-cash, stored value, and smart cards.

Third, drawing on well known academic literature, this paper argues that efforts by the public sector to influence the practices of incumbents might actually adversely impact innovation by reducing the expected pay-outs that are currently motivating significant investment in innovation by non-traditional providers. In this vein, the paper analyzes several consumer e-payment infrastructures currently in place – some owned by banks, some owned by independent third parties and provided to banks, and some owned by non-banks – which provide a platform for innovation by both financial institutions and non-traditional providers. The presence and viability of these alternative payment platforms are making these markets increasingly competitive and contestable, at least at the margins. We assert that, at a minimum, the ongoing formation of what we call "product-independent payment networks" currently underway, as documented by this study, may require anti-trust authorities to reconsider how they define the relevant market for evaluating competition policy objectives.

Fourth, the paper considers the role of public sector involvement in consumer protection policy, arguing that the public sector should increasingly focus on moving current systems from rules-based models to more disclosure-based models. Should this prove too difficult technically or politically to implement, the authors advocate the public sector facilitate multiple levels of consumer protection standards. This would have the net effect of improving disclosure while allowing market participants to determine what level of business practices are required in different situations. The authors also discuss the evolving consumer protection policy around debit-based transactions as a case study.

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"If a problem has no solution, it may not be a problem, but a fact, not to be solved, but to be coped with over time." Shimon Peres[1]

"Through their common control of both Visa and MasterCard, the largest banks have stifled competition…. This reduction in competition…has hindered…the development…of improved network products and services, and has lessened consumer choice….the anti-competitive structure and practices of the associations will threaten competition in the development and marketing of new general purpose card products, such as products that integrate credit, debit, and stored value functions."
U.S. Department of Justice vs. Visa and MasterCard Complaint[2]

"First Data Net [referring to First Data Corporation's acquisition of the NYCE ATM network] will be able to bypass the major credit card companies 'because when you own the point of sale devices, you have a lot of control of the routing of the transactions,' said Charles T. Fote, president and chief operating officer of First Data, 'greed will help drive the best economics here. All the type of instruments (at the point of sale) can flow through that network. If all the politics and all the rules line up right, in the perfect world, we'll go through a third party as a last resort.' "
Charles T. Fote, President, First Data Corporation[3]

"Star Systems, Inc….is processing the first debit card transactions ever authorized with digital signatures on the Internet…. STAR and the other participating organizations have developed…technical standards and business practices that will enable consumers to purchase goods and services over the Internet using their ATM/debit cards, secured by digital signatures instead of personal identification numbers (PINs)."
Star Systems (U.S. ATM Network) press release[4]

"Under [NACHA's] new rules, a consumer can verbally authorize an e-check by telephone. [This] is an electronic debit to a checking account that is initiated on the Internet, at the point-of-sale, over the telephone, or even by a bill payment sent through the mail. [It] is processed using the Automated Clearing House (ACH) Network, and typically takes 1-2 business days to be posted…."
NACHA (U.S. payments association) press release[5]

"Amazon.com…has joined forces with Citigroup, Inc.'s Citibank unit and is offering an online payment service that doesn't require a credit card…Analysts said the payment service is a sign that Amazon is using its influence as the largest online retailer to find lower-cost alternatives to credit cards."
Wall Street Journal[6]

"Visa, Nokia, and Nordea Bank will pilot a dual-chip mobile payment system in Finland. Nokia's handsets will serve as readers for chip cards, regardless of whether it is a Nordea-issued plug-in chip card, or a Visa Electron card."
Epaynews.com[7]

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[1] See "Rumsfeld's Rules," Wall Street Journal, January 29, 2001.
[2] U.S. Department of Justice. "United States versus Visa U.S.A., Visa International, and MasterCard International, Inc." [Accessed at http://www.usdoj.gov/atr/cases/f1900/1973.htm on November 5, 2001].
[3] Breitkopf (2001).
[4] Star Systems, "Star Systems Processes First Internet Debit Payments Authorized with a Digital Signature." December 21, 2000. [Accessed at http://www.star-system.com/cfm/news-press.cfm?id=41 on November 5, 2001].
[5] NACHA. "NACHA Rules for E-Checks by Telephone Become Effective September 14." September 20, 2001. [Accessed at http://www.nacha.org/news/news/pressreleases/2001/PR092001/pr092001.htm on November 5, 2001].
[6] Wingfield and Merrick. "Amazon Sets Citibank Deal." Wall Street Journal, November 6, 2001.p. B8.
[7] Epaynews.com. "Visa, Nokia, Nordea to run m-payments pilot." September 25, 2001. [Accessed at http://www.epaynews.com on September 26, 2001].

I. INTRODUCTION

Is there a problem with innovation in the non-recurring consumer payments segment of the banking and payments marketplace? Although the cash-less society has been predicted for decades, paper-based payment instruments such as cash and checks continue to remain a dominant form of payment in the United States. Furthermore, innovations, such as e-cash, micro-payments, and smart cards – which have introduced potentially powerful new technology in the banking industry – have not yet gained significant commercial adoption. Meanwhile, decades of debate have occurred in the academic literature surrounding the theoretically problematic design of institutional arrangements in these markets.

Despite the visibility of the subject, little is known about consumers', merchants' and financial institutions' willingness to adopt electronic payment innovations,[8] the economics of substitution of electronic payments from traditional payments,[9] the role that technology will play in altering the financial services infrastructure,[10] or the future implications for evaluating public policy objectives.[11] Meanwhile, the financial services industry faces significant uncertainty regarding potential investments in debit cards, smart cards, stored value, and other e-payment products and infrastructures. Will adoption of e-payment products grow significantly? What factors will influence their growth? How important are business and regulatory practices? What types of organizations are in the best position to lead in these segments and do markets allow alternative providers to compete effectively? What do technology and the blurring line between banking and commerce mean for e-payment innovations and for public policy makers?

[8] See Hancock and Humphrey (1999). Nonetheless, this subject is receiving increasing attention. For instance, see Allen and Strahan (2001) and Mantel (2000).
[9] For a notable exception see Humphrey, Vale, and Kim (1998).
[10] See Mantel (2001)
[11] See Bresnahan (2001) and Shapiro and Varian (1998)

The goal of this paper is to provide insight into the interplay between key demand-side (consumer and merchants), supply-side (financial institutions, payment network providers, and payment associations), and public policy-related factors[12] that influence adoption of e-payments for non-recurring (point of sale) transactions. We also identify the implications for commercial providers and public sector leaders. This paper may also be of particular value to researchers as they design future studies, as it notes several important distinctions relating to research design.

Briefly, the paper finds strong support for the theory that consumers are in fact quite rational and responsive to incentives. Furthermore, we find that some supply side-factors relating to banking market structure and historical regulatory design do influence adoption. This paper articulates a theory for assessing substitution of alternative payment products for non-recurring transactions that will help inform both private and public sector decision-making. This study also documents the formation of payment product-independent networks[13] that are promoting greater competition and innovation through easier entry into this market. As a result, we argue that public sector involvement in promoting competition will not only be less needed going forward, but increasingly risk becoming counter-productive or unnecessarily susceptible to influence.

Lastly, this paper comments on future challenges the public sector will face in crafting consumer protection policy and recommends authorities continue to move from rule-based consumer protection policy to disclosure-based policies. Should this prove too difficult to implement technically or politically, the authors recommend authorities foster a reasonably small group of different standards. The article then discusses the emerging challenges associated with the growing use of debit-based payment products by consumers.

[12] For instance, Evans and Schmalensee (1993) outline past public sector involvement regarding pricing regulation, information and liability regulation, and cost-benefit of regulatory proposals.

II. LITERATURE REVIEW[14]

A. Market Adoption Rates

Despite anecdotal reports that little has changed in the non-recurring consumer payments market, a recent Federal Reserve survey suggests that significant inroads are being made in terms of substitution of emerging electronic payments for traditional paper-based transactions. As one example, while there were approximately ten credit card transactions for each debit card transaction in 1995 in the United States, in 2000 there was approximately one debit card transaction for every two to three credit card transactions.[15] [16] The substitution of checks or credit cards for debit cards is not absolutely clear at this time, yet there is evidence of a willingness of consumers to change payment behavior.

Furthermore, while early e-cash and micro-payment pilots did not see significant usage or commercial viability, recent advances around online marketplaces have established small yet important niches for these services.[17] In a similar way, while stored value cards have been labeled failures during much of the late 1990's,[18] stored value cards have shown incremental usage in closed environments like mass transit systems and unattended point of sale. Furthermore, anecdotal reports that significant adoption of stored value cards had occurred in Europe have been over-stated according to recent research.[19] In conclusion, while consumer e-payment adoption in the United States has occurred slowly, data released in November of 2001

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[13] See section VI.C for a description and discussion of "product-independent payment networks."

[14] This literature review covers a broad range of topics as an introduction to non-recurring consumer payments business and public policy issues. It is meant to be an illustrative rather than exhaustive listing.

[15] See Table 1 and the Federal Reserve System's Retail Payments 2000 Benchmarking Study. [Accessed on November 14, 2001 at www.frbservices.org].

[16] Note, over the last five years, the compound average growth rate for debit cards has been about 40% on average while credit card CAGR is closer to 6% and checks are about 1%. Note that this Federal Reserve Survey found significant differences in volumes of checks and credit cards compared to what had been commonly reported in the trade press for the last several years, so these growth rate calculations need to be taken in this context.

[17] See Morton (2001)

[18] See Souccar (1999)

[19] See Van Hove (2001).

by the Federal Reserve's Retail Payments Product Office now suggests that, at a minimum, debit cards have become a mainstream payment product.

TABLE 1[20]
ESTIMATES OF HISTORICAL U.S. PAYMENT VOLUMES (BILLIONS OF TRANSACTIONS)
Sources: Board of Governors' Annual Reports, Bank for International Settlements, Faulkner & Gray, Nilson, and NACHA (various issues)

PAYMENT	1995	1996	1997	1998	1999	2000 (OLD)	2000 (FED STUDY)[21]	CAGR
Currency	35.40	36.32	37.42	42.75	46.62	49.64		6.99%
Postal Money Orders	0.203	0.206	0.204	0.213	.226	0.230		2.53%
Check	63.0	64.7	66.0	67.0	68.0		49.1	1.93%
Credit Card	14.9	16.1	16.9	17.5	18.83	20.13	15	6.20%
EFT	10.5	11.8	12.6	13.2	13.3	16.3		9.19%
ATM	9.7	10.7	11.0	11.2	10.9	13.2		6.36%
Online Debit	0.7	1.1	1.6	2.0	2.4	3.1	3.1	34.66%
Offline Debit	0.7	1.2	1.9	2.9	4.1	5.3	5.3	49.91%
EBT Cards	0.14	0.15	0.18	0.32	0.39	0.46	.54	26.86%
Stored value	0.4	1.0	1.4	0.7	0.9	1.28		26.19%
ACH	3.4	3.9	4.5	5.3	6.1	6.9	5.62	15.21%

B. Demand-side

In terms of consumer behavior, while Ausubel (1991) suggests that credit card consumers act in ways that appear to be unresponsive to market incentives[22], a significant and robust literature exists supporting the view that consumers are responsive to incentives ("rational"). Hirschman (1982) provides the early foundation for much of this, finding the following attributes to be positively associated with credit card usage: security, prestige, acceptability, transaction time, documentation, leverage potential, and transaction record. Hirschman (1982) also concluded that the perception of low levels of ability to control spending and a perceived lack of security lead to lower levels of credit card use. Caskey and Sellon, the Bank Administration

[20] Payment volumes include payments initiated by business and government, in addition to those by consumers. As a result, significant care must be taken in interpreting these numbers.
[21] The Federal Reserve Benchmarking Study found that credit card, ACH, and check use estimates have all been too high. This column presents the study's findings in comparison to the old estimates.
[22] At least in the pricing of credit card interest rates where consumers may not expect to revolve balances.

Institute/PSI-Global (1998), Carow and Staten (1999), and Mantel (2000) find similar results and also discuss the role of situational (e.g., type of purchase, nature of risks, dollar amount, beliefs about merchant customer service commitments, etc.) and banking market related factors (e.g., legal differences). Canner and Luckett (1992) and Cargill and Wendel (1996) extend this literature, arguing that consumers are sometimes rationally unresponsive to market stimuli, in those cases where the benefits for change may be low or where consumers value other factors besides price, such as convenience or control over dispute resolution. In summary, there is a strong and growing literature supporting the theory that consumers are responsive to market-based signals.

C. Supply-side

In terms of merchants and financial institutions, Good (1997) investigates the history of electronic money and stored value initiatives, including the risks, inadequate consumer protections, and lack of business cases that plagued early efforts in this field. Stavins (1996) outlines critical supply-side phenomena where financial institutions are not able to target incentives effectively because of an adverse selection problem. Humphrey, Vale, and Kim (1998) document the influence of price changes on adoption of electronic payments in Norway. This is a case where the banking industry coordinated price changes across an entire market, a practice that could gain attention from anti-trust officials in some countries. Van Hove (2000) evaluates a number of electronic purse implementations in Europe and finds that a variety of demand and supply-side factors influence adoption. He also finds that initial expectations for these implementations were unrealistic and clearly have not been met. Chakravorti (2000) looks at the evolution of credit cards to explore why stored value has not yet caught on, noting that a coordination challenge may occur where consumers, merchants, and financial institutions all

must be convinced simultaneously of an innovation's merits. On net, while a more comprehensive model of supply-side phenomena has not been developed, a growing literature does exist.

D. Substitution and Innovation Theory

There is a growing and important literature on innovation and substitution, though the literature has not been extended to touch on substitution in the consumer e-payment market per se. Tushman and Anderson (1986), Christensen (1997) and Downes and Mui (1998) blend introductory reviews of the academic literatures around innovation with analysis of industry specific innovation leading to a broader theory of when, where, how, and why innovations occur. Their research provides both descriptive and proscriptive frameworks for evaluating innovation policy-related decisions. In terms of potential viewpoints on innovation in the consumer e-payments segment, there are at least three general theories:

(1) There are significant institutional design, anti-trust, and/or customer irrationality challenges that require public sector involvement to correct (for instance, see Ausubel (1991). A variant of this theory postulates that improperly aligned pricing structures (e.g., decision-makers do not bear the full costs and benefits of their decisions) are limiting change (for instance, see Dunkelberg and Smiley (1975), Humphrey, Vale, and Kim (1998), and Chakravorti and To (1999)).

(2) Markets will work as long as solutions are identified where consumers, merchants, and financial institution providers are all convinced at the same time of the value of an innovation and where the launch of innovations are carefully

timed, particularly for general purpose instruments. This suggests important work needs to be done around coordination mechanisms, particularly in markets with network effects (for instance, see Caskey and Sellon (1994), Chakravorti (2000), and Van Hove (2000)).

The case of markets with network effects is particularly important since it is possible that a market could be competitive, but yet be dominated by an inefficient standard (for instance, see David (1985). Goldfinger (2000) calls these results "predatory network effects." In this case, arguments could be made that some public sector involvement could be efficiency enhancing, when the public sector agent is expected to have nearly perfect information and have its incentives aligned with maximixing long-term social welfare. A detailed treatment of this argument is beyond the scope of this paper.

(3) Markets are working and decentralized markets can yield efficient results, even if consumers, merchants, and financial institutions do not all perceive a superior product at the same point in time and where network effects may exist, but where alternative providers or networks exist or could exist (for instance, see Mantel (2001)[23]). This point of view also postulates that while the economics of change may not be compelling enough to justify change at a certain point in time, change ought to be thought of over a continuum of time and in a multi-generation product context (for instance, see Goldfinger (2000)).[24] A further thread of this theory postulates that, even in the presence of mis-aligned incentives over some intermediate time period, markets will correct this by motivating competitive response through

[23] See Sections VI.B and VII.C in this article for a more detailed discussion of this.

traditional and/or non-traditional competitors (See Darubala and Stephenson (1998))[25].

It should be noted that this paper advances the third theory. We focus on the role that various payment platforms like the Automated Clearing House (ACH) network, automated teller machine (ATM) debit networks, credit card networks, third party providers who connect corporations and financial institutions, and telephone operators' networks are or could be playing in promoting competition and innovation. See Section VI.C for the discussion.

E. Competition Policy

There are several important literatures regarding competition policy. Specifically, in consumer non-recurring payments, there is a growing and vibrant literature modeling the institutional arrangements in the credit card market and the resulting competitive implications (for instance, see Dunkelberg and Smiley (1975), Baxter (1983), Evans and Schmalensee (1993), Chakravorti and To (1999), and Gans and King (2001)). Nonetheless, there has been little research around the broader consumer non-recurring payments market where multiple products may substitute for credit cards (e.g., alternative forms of debit cards using ATM networks, credit card networks, and the ACH; smart cards; stored value; telephone-based or mobile payments, cash, and checks).

In terms of evaluating competition policy on a broader scale, there are several important literatures. First, the market structure-performance literature suggests that the ex ante presence of market power, adversely high levels of concentration, and/or various types of contracting relationships may lead to lower efficiency (for instance, see Bain (1956) and Martin (1988)). A

[24] See Section VI.B for a more detailed discussion of the interplay between network-based products, the presence of switching costs, and the influence that generation-skipping technologies or competitors play in innovation.

[25] Also see Green and Porter (1982) who provide a theoretical analysis of market and situational-based factors which keep firms with some degree of market power from exercising that market power.

second portion of this literature focuses on contestability (for instance, see Demestz (1973) and Baumol, Panzar, and Willig (1982)). Here the ex ante presence of market power, concentration, and/or some types of contracting relationships does not necessarily lower efficiency, depending on whether other firms are still able to enter and exit the market and whether there are other factors influencing market structure such as the presence of economies of scale.

Lastly, another set of critical literature focuses on the stakeholder capture theory, noting that various agents can, under certain conditions, influence public policy decisions to their own advantage (for instance, see Kroszner and Strahan (1999)). Futhermore, the literature shows regulatory uncertainty has the effect of adversely influencing firm expectations and willingness to enter new markets (for instance, see Oster (1994)).

F. Consumer Protection Policy

Perritt (1996), Hughes (1999), Mann (2000), and Spiotto (2001) discuss the public policy implications of the differing rights afforded to consumers in dispute resolution for different payment instruments. Using time series information from the Survey of Consumer Finances, Durkin (2000) finds that since the passing of the Truth In Lending Act, consumers' awareness of annual percentage rates has risen noticeably. While the above research outlines the issues surrounding design of consumer protection policy, limited research exists evaluating the efficiency implications of alternative models of consumer protection (e.g., rules-based systems where public sector entities individually or jointly mandate certain business practices versus disclosure-based systems where public entities simply require reporting of rights and warranties versus market-based approaches which do not make any requirements on the terms of service).

III. ANALYSIS

A. Description of data and variables

This analysis uses a unique data set 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. The household's primary bill payer served as the survey respondent. The survey collected data pertaining to consumer demographic characteristics, payment behaviors, self-reported payment preferences, and evaluations of different payment options. See Appendix I for definitions of alternative payment options. Appendix II provides descriptions and summary statistics of the variables included in the analysis. These factors are proposed to influence the likelihood of card-based payment instrument use generally and/or the likelihood of high usage. For ease of interpretation in Appendix III, the factors have been grouped into the following broad categories: demographic, consumer financial, new product adoption, control, convenience, incentives, privacy and security, and personal involvement.

B. Model

We analyze why consumers choose card-based payment instruments, specifically debit cards and credit cards. The analysis uses a series of binomial logistic regressions, [26] a statistical technique that allows one to examine the extent to which factors[27] influence the likelihood of

[26] Recall that the binomial logistic model takes the functional form where the probability that a consumer uses payment cards = $e^{BX} / 1 + e^{BX}$, where X is a vector of variables proposed to be related to the probability of payment card usage. Note, this analysis reports the results for variables with both "yes/no" responses alongside responses to questions with scales 1-10. Care should be taken in interpreting the relative magnitude of different variables. See Greene (1993) for additional background on interpreting the results of logistic regression models.

[27] The data set used in this analysis contains variables pertaining to payment card usage which were in some cases highly correlated. A correlation matrix was used to discern the relationship between responses across questions. The variables included in the final model are the responses to those questions emphasized by theory.

card-based payment usage. First, the analysis explores the factors that affect the initial choice of whether or not to use credit cards and ATM/debit cards. Second, the analysis investigates the factors that influence the frequency of use of ATM/debit cards and the use of credit lines. For the purpose of this analysis, "high-users" of credit cards are those consumers with balances over $2000 and "high-users" of debit cards are those consumers who use debit cards more than four times per month.

C. Limitations of analysis

This analysis focuses solely on consumer decision-making pertaining to cards-based payment instruments and does not address the perspective of financial institutions or merchants. Although modeling the other perspectives are critical, this analysis focuses on the role consumer preference and some banking institutional design factors play in the evolution of electronic payment systems. This study uses self-reported data and consequently results are subject to the accuracy with which consumers recall and report behavior. This survey samples primary bill payers and does not account for all consumers (for instance, teenagers). This survey also does not distinguish between offline and online debit cards.[28] This research does not consider how consumer behavior has changed over time nor does it provide insight on what specific factors—price, product attributes, promotions—seem to induce changes in direct payment use.

IV. EMPIRICAL RESULTS

A. Debit card results

Appendix III provides the results of binomial logistic regressions comparing non-users with users and low users with high users for debit cards. Overall, demographic characteristics such as age, lifestage, and market size were associated with debit usage. Holding other factors

[28] See American Bankers Association and Dove (2000) for a review of consumers views on online and offline debit cards.

constant, older individuals were 7% less likely to use debit cards. We also found that when looking specifically at lifestage variables, "middle single" consumers and "retired couples" were three times more likely to use debit cards than "young single" consumers.[29] Compared to consumers in markets smaller than 100,000 people, ceteris paribus, those in markets with more than 500,000 people were twice as likely to use debit cards. High intensity of debit card use was almost twice as likely in a market of 100,000-499,999 people compared to populations with less than 100,000 people.

Consumer financial characteristics were found to influence debit card usage, with usage more likely among higher income levels. Relative to consumers with incomes below $20,000, those with incomes between $40,000 and $74,999 were 89% more likely to use debit cards and 93% more likely to be "high" users.

New product adoption theories typically hold that the new products or technology will typically be first adopted by a segment of the population, typically young and affluent, that has a certain affinity to trying new products. "New product adoption" factors, such as cellular phone ownership and using the Internet to make purchases, were not statistically significant factors influencing debit use. Convenience preferences, such as frequent travel and saving time, were not found to influence the likelihood of debit card use. Yet, a preference for convenience when paying bills was associated with an 18 percent greater likelihood of using a debit card. It is not clear what is driving these results around convenience. Perhaps the "frequency of travel" and "preference for time savings" questions did not adequately distinguish between consumers.

Of the control factors included in the model, several were found to be statistically significant. Self-reported "use of toll-free numbers to check account balances" increased the likelihood of being a user of debit cards by 13% but was not related to the probability of being a

[29] This may be the result of the confounding influence of age and wealth

"high" user. Among the factors that influenced "high" debit card use is the extent of self-reported "financial discipline," which reduced the likelihood of "high" debit card use by 9%. Some incentive dimensions, such as using coupons when shopping and concern about credit ratings, were found to explain the likelihood of debit card use. Self-reported "use of coupons when shopping", which can be used as a proxy for price-sensitive consumers, was associated with a 10% greater likelihood of debit card use, which could have interesting implications in terms of the significance and length of incentive campaigns launched to motivate usage.

Of the privacy elements included in the model, the extent to which a consumer "distrusts ATMs" reduced the likelihood of debit card use by 20%, but did not influence the frequency of use. This result suggests that trust and privacy issues are important to overcome in order to influence the initial decision to use debit cards. Lastly, preferences for personal involvement were important determinants of the likelihood of debit card use. Contrary to expectations, self-reported preference for "cash and checks over cards" did not influence the likelihood of debit card use.

B. Credit card results

Appendix III also provides a description of the binomial logistic regression comparing users with non-users and low users with high users for credit cards. While demographic variables did not influence the initial decision to use a credit card, they did have an impact on the level of usage. Race was found to have a statistically significant association with the likelihood of "high balance" credit card use, as non-Caucasians were twice as likely to be "high balance" credit card users than Caucasians. Although lifestage factors did not distinguish between non-users and users of credit cards, individuals in "middle single" and "older single" lifestages were 70% less likely to be high balance credit card users. Market size was not found to influence

credit card ownership suggesting that the market is potentially reaching maturity or that there are other differences in how credit and debit cards are marketed.

Consumer financial characteristics were also found to influence both credit card ownership and level of usage. As expected, consumers with incomes over $20,000 were more than twice as likely to use credit cards than were low-income consumers ($20,000 annual income or less). When examining the factors that influence the intensity of credit card use, it was found that consumers with incomes between $20,000 and $39,999 were 50% less likely to be "high balance" credit card users than lower-income consumers. Although checking account ownership was associated with a 6 times greater likelihood of credit card use and savings account ownership increased the likelihood of credit card use by 37 percent, account ownership did not influence the probability of "high balance" credit card use.

Like debit cards "new product adoption" factors, such as telephone and cellular phone ownership and Internet purchasing, were not statistically significant factors in distinguishing credit card use. Of the "new product adoption" factors included in the model, personal computer ownership was associated with a 40% reduced likelihood of "high balance" credit card use.

Of the proxies for preferences for control included in the model, factors pertaining to financial discipline, monitoring, and restraint were found to influence the likelihood and extent of credit card use. Self-reported "financial discipline" reduced both the likelihood of initially choosing to use credit cards over other payment instruments and the likelihood of "high balance" credit card use by approximately 10%.

For the most part, incentive factors were not associated with credit card use. While self-reported "use of coupons when shopping" negatively influenced the probability of high balance credit card use by 8%, this factor had no association with the initial credit card decision. Privacy

factors were not found to influence either the initial decision to use a credit card or the intensity of use. Of the personal involvement factors included in the model, self-reported preference for one-to-one contact over machines was the only variable associated with an increased likelihood of being a credit card user.

V. DISCUSSION

A. Demand-side: Hirschman's "bundle of attributes theory"

These results support the view that consumers maximize utility based on a variety of desired attributes, which include a host of factors beyond simply cost and convenience, within constraints relating to wealth, time, importance, and the availability of payment instruments and related infrastructure. Consistent with Hirschman (1982), Kennickell and Kwast (1997), Durkin (2000), and Mantel (2000a), this analysis provides support for the theory that consumers make rational choices (are responsive to market signals) regarding payment instruments. The implication is that consumers are not arbitrarily predisposed to cash, checks, or credit cards or arbitrarily disposed against debit cards, e-cash, and smart cards. Rather, consumers are driven by the relative attractiveness of the "bundle of attributes" associated with alternative payment instruments. As a result, to the degree that payment providers and recipients of payments bundle more attractive features with new and emerging forms of payments, one would expect consumers to continue increasing their usage. This is being observed anecdotally with person-to-person payments and mobile payments, as was the case several years ago with debit cards. Nonetheless, while consumer preferences play a critical role in influencing the choices of providers, we do not suggest that in the short or mid-terms these preferences will single-handedly drive innovation. See Section VI.B for a discussion of some of the supply-side technology and competitive factors that may limit the ability or willingness of firms to innovate in the near-term.

B. Supply-side Dimensions

1. Latent Segmentation

One key finding relates to the relationship between market size, the type of banking institution used by consumers, and debit card usage. Table 3 below illustrates the penetration rates for debit and credit cards across market size and choice of banking institution.[30] For both community bank and national bank account holders, the share of consumers using debit cards were about twelve percent greater in larger markets (markets with greater than 500,000 people). For a given market size, national banks tended to see fifteen to twenty percent more of their consumers using debit cards than consumers of community banks. The fact that credit card adoption does not vary the same way that debit card adoption suggests that consumer preferences alone may not be the explanation (e.g., consumers of community banks do not necessarily have difference financial preferences and behaviors than consumers of national banks, based on this survey). This survey instrument does not allow for a more detailed analysis of the broader financial and payment portfolios of consumers nor does it explore differences in product market strategies of alternative types of financial institutions or levels of consumer education efforts across institutions. From the supply-side, this finding is consistent with Hannan (2001). Using the Federal Reserve's Survey of Retail Fees and Services of Depository Institutions, he found that multi-state institutions (97%) are more likely to offer ATM services than single-state institutions (85.8%). Multi-state institutions are also more likely to charge for these services – in this context, charging for a premium, value-added service.

[30] Note, only debit card penetration rates vary significantly across market size and institution type classes, while credit card usage does not. A variety of explanations might exist including differences in market maturity, differences in national credit card campaigns versus more local debit card campaigns, for instance.

Table 3
Payment Card Penetration by Choice of Bank and Size of Market

	Under 100,000	100,000-499,999	500,000-1,999,999	Over 2 million
National (36%)	ATM/Debit =57.97% -low users =39.13% -high users =18.84% Credit Card =64.29% % of total = 5.37%	ATM/Debit=63.55% -low users =39.25% -high users =24.30% Credit Card=71.03% % of total = 8.21%	ATM/Debit =61.33% -low users =37.33% -high users =24.00% Credit Card =68.00% % of total = 5.75%	ATM/Debit=69.01% -low users =41.78% -high users =27.23% Credit Card=64.02% % of total = 16.41%
Community (54%)	ATM/Debit=36.89% -low users =29.61% -high users =7.28% Credit Card =58.25% % of total = 15.80%	ATM/Debit =48.28% -low users =35.86% -high users =12.41% Credit Card =62.33% % of total = 11.19%	ATM/Debit=42.45% -low users =26.42% -high users =16.04% Credit Card =66.98% % of total = 8.13%	ATM/Debit=46.96% -low users =32.79% -high users =14.17% Credit Card =64.66% % of total = 19.10%
Savings and Loan (20%)	ATM/Debit =29.79% -low users=25.53% -high users=4.26% Credit Card =57.45% % of total = 1.84%	ATM/Debit =45.45% -low users =32.73% -high users=12.73% Credit Card =60.00% % of total = 2.30%	ATM/Debit =40.00% -low users =23.33% -high users=16.67% Credit Card =60.00% % of total = 1.46%	ATM/Debit =50.41% -low users =38.21% -high users =12.20% Credit Card =68.55% % of total = 5.29%
Credit Union (41%)	ATM/Debit =53.33% -low users =35.24% -high users =18.10% Credit Card =64.76% % of total = 8.05%	ATM/Debit=64.66% -low users =44.83% -high users =19.83% Credit Card =79.49% % of total = 8.97%	ATM/Debit=55.56% -low users =32.41% -high users =23.15% Credit Card =65.74% % of total = 8.28%	ATM/Debit =57.79% -low users =40.70% -high users =17.09% Credit Card =68.84% % of total = 15.26%

2. Regulatory Regimes and Infrastructure Deployment

While this data set does not provide enough observations to assess econometrically how card usage differs across states, Appendix IV does illustrate that there are potentially important differences across states. To the degree that different states make it easier or more difficult for new providers to enter the market, this may be a critical issue to consider in assessing market adoption. Nonetheless, given the presence of ATM networks that span multiple states and states that have multiple ATM networks serving them, it will be quite difficult to evaluate this influence. Furthermore, this survey does not allow us to control for ATM and point-of-sale deployment, a critical potential driver of adoption.

VI. Implications for innovations

A. Substitution framework

Based on the survey of the literature, analysis of a unique 1,300 person survey, and review of the results from recent payment pilots reported in the press, we now explore the potential for emerging electronic payments to substitute for credit cards, checks, and currency in non-recurring payments. Appendix I provides an overview of several payment innovations alongside several traditional payment instruments. Appendix V extends MacKie Mason and White (1996)'s attribute-based model, laying-out the next step of a substitution framework and identifying which e-payment products are well positioned to meet the various consumer payment preferences for making different types of purchases. This framework could also be used to assess which types of organizations were in the best position to innovate in different segments of the market. While a detailed treatment of this substitution framework is beyond the scope of this paper, it is important to note that this framework illustrates how various payment instruments could substitute for one another – based on adjustments providers make in the relative attractiveness of various attributes bundled with a particular payment product.[31] [32] Section VI.C details the evolution of several of these e-payment products and how economic, technology, and competitive forces are motivating substitution of different payment products, driven not by changing consumer preferences, but by adjustments to the relative attractiveness of different products.

[31] See MacKie-Mason (1996) for one of the clearest treatments of this subject.

[32] See Brown Shoe Co., Inc. v U.S. (1962) for a detailed discussion of how courts sometimes evaluate relevant markets and which products are substitutes for another. While theoretical and formulaic analytical tests can be performed to test for substitute products, a stream of pragmatism seems to emerge from the ways that courts many times evaluate this decision. This section and Appendix V lay-out a model of substitution for consumer payments, which prior to Mantel (2000) had not been clearly specified for this segment of the industry.

B. Networks, switching costs, generation-skipping technologies and the limitations of customer preferences in motivating change

Several studies have noted the importance of network externalities in the adoption of emerging forms of e-payments.[33] Yet we argue that, for many forms of emerging consumer non-recurring e-payments, it is not the network nature of these markets that is limiting adoption,[34] but rather the presence of significant, irreversible, and interconnected investments leading to an installed base.[35] New innovations, such as stored value cards or micro-payments, while potentially ground breaking, may need to not only be better than current products, but overwhelmingly better than current solutions. As a result, these innovations when they do occur, will likely succeed at the margins of commercial relationships, be pioneered by non-traditional firms, and/or gain acceptance by leaping the current generation of technology several years into the future.[36] For example, some successes have occurred: stored value cards have proven effective for some unattended locations, mobile payments have leveraged the telecommunications network infrastructure to offer improved convenience, and retailer-based debit card systems have been introduced which leverage the ACH network. In these cases, new solutions have leveraged core infrastructure or focused on small niche needs rather than attempting to be broad-based, independent solutions. This highlights three critical points.

First, it is absolutely imperative to consider electronic payment innovations in the context of the developing commercial environment's needs. For instance, while some e-cash implementations did not reach commercial success, they were pioneered at a point in time when consumer Internet adoption remained in its infancy and at a time when it was reasonable to

[33] For instance, see Good (1997), Chakravorti (2000), and Van Hove (2001).

[34] We argue here that there are several critical and viable alternative electronic payment networks which are increasingly allowing for easier entry into this market. A particularly critical network is the ACH network. While the ACH network has clear and well-documented limitations, its low cost and open access make it an ideal platform for some early innovation. Section VI.C and VI.D will discuss several of these innovations in greater detail.

[35] In a seminal treatment of the subject, Goldfinger (2000) called these predatory network goods.

presume that information providers might want to sell access to content using micro-payments.[37] In contrast, recent person-to-person payment innovations have succeeded and filled emerging commercial needs in the online auction environment. It is not clear which product had "better" technology or functionality, but what is clear is that fuller development of the online market brought about new product needs which were not readily apparent in the early 1990's.

Second, even products that do not reach commercial success may be absolutely critical in building the case for new innovations. These products may have pioneered technology that was in its infancy and raised broader customer awareness. As Nathan Rosenberg notes, technology innovations are better thought of in terms of the hundreds of small improvements and innovations that, in sum, led to the innovation rather than as one discrete innovation.

Third, customer preferences alone may not always motivate adoption, particularly when an installed base of products exist and where the switching costs for change do not warrant investment by customers or providers. For instance, consider the case of the QWERTY personal computer keyboard, where superior keyboard designs have been available for decades, yet a variety of factors including a broad installed base of users and keyboards exist which would require significant transition costs to be born by a significant customer population.[38]

C. The evolution of "product-independent payment networks"

When competition and innovation policy in the credit card market was just beginning to be explored several decades ago, there was essentially just one product – the credit card – and one type of network for non-recurring consumer payments – the credit card network (with several competing providers of credit card networks). However, over the last two decades payment networks have evolved into what we term "product-independent payment networks."

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[36] For instance, see Mantel (2001)
[37] For instance, see Stock (2000)

Over the last few decades, there are several examples of payment networks that have evolved and expanded beyond their initial product-driven focus. First, the banking industry and national credit card associations have expanded the use of the credit card network to include signature-based debit cards. These networks are also being used to conduct electronic person-to-person payments.[39]

Another example of the evolution to "product-independent payment networks" can be seen in the evolution of ATM/EFT (electronic funds transfer) networks. EFT networks, which were previously regionally-based, now extend across the country both through direct ownership and through sharing arrangements. Like credit cards, their use is evolving beyond their initial product design. The largest P2P provider in Canada plans to use the EFT networks to process P2P payments and has expressed interest in extending its product internationally.[40] Meanwhile, the nation's largest credit card processor has taken an equity interest in one network and plans to use the network to bypass the Visa and MasterCard authorization networks for some transactions.[41] Lastly, ATM networks are also being used for PC bill payment.[42]

End users have also expanded and changed the primary uses of the ACH network, which was initially developed to handle direct deposits. For instance, several merchants have introduced retailer-debit card programs that leverage the ACH network, bypassing the online (ATM networks) and offline (credit card networks) debit card networks. Pre-authorized debits, electronic check conversions, and PC bill payments are already being processed through the ACH network. At the same time, industry groups are looking into ways to use the ACH network

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[38] See Paul (1985).
[39] See http://www.epaynews, 12/11/01 for description of a joint venture between MasterCard and Certapay.
[40] See http://www.certapay.com/newsEvents/release101201.cfm.
[41] See Breitkopf (2001).
[42] See Lawlor (2000).

for Internet payments.[43] As a result, it is increasingly clear that the clearing and settlement business is increasingly becoming a commodity business that can be transacted over a variety of networks and clearing arrangements.[44]

Table 4.
Evolution of "product-independent payment networks" (Source: authors' analysis)

	1970's		2000		
	Network Uses	**Ubiquity**	**Network Uses**	**Ubiquity**	**Percent of use outside of original intent for network**
ACH Network	Direct Deposits	National but modest	Direct Deposit Pre-authorized debits PC Bill Payment Check converted to EFT Retailer debit cards	National and broad.	52.1%[45]
ATM Networks	ATM withdrawals	Regional but modest	PIN-based debit Credit cards P2P payments PC Bill Payment	Increasingly national and broad (selectively international)	19.0%[46]
Credit Card Networks	Credit cards	National but modest	Credit card Debit Card w/ signature P2P payments Smart cards Purchasing Cards	International and broad	26.1%[47]

D. Implications for innovations

1. Credit and debit cards

The increasing use of debit cards might appear surprising to some individuals. After all, debit cards appear, ceteris paribus, to offer less utility than other payment instruments (i.e. credit

[43] See http://www.project-action.org.
[44] Special thanks to Alden Hart for discussions on this subject.
[45] This represents the share on total ACH payments, as reported by NACHA, used for any means other than direct deposit in 2000.
[46] This represents the percentage of EFT transactions conducted at the point of sale as reported by Faulkner and Gray and the Federal Reserve's recent benchmarking study.
[47] This reflects the percent of offline debit card payments as a fraction of total volume on credit card networks (offline debit card transactions plus credit card transactions).

cards that offer a short-term, interest free loan coupled with superior customer service and checks that offer modest float and some record-keeping advantages). Yet, a closer analysis of the evolution of the debit card for point of sale payments suggests that the increase in debit cards usage is consistent with the decision-making framework articulated in this paper. Here, a fraction of convenience users migrate from checks, cash, and credit cards to debit cards as debit cards become comparatively more attractive. For instance, financial institutions and/or merchants have reduced credit card grace periods; increased credit card fees (penalties for late payment)[48]; offered additional consumer protection to debit cards[49]; and offered incentives tied to using debit cards.[50] [51] [52] In this context, debit cards are increasingly attractive to convenience-driven consumer segments. These consumers value the new consumer protections given to debit cards, as well as the fact that they may no longer need to write a check to the credit card company if they make payments via debit card. In a similar manner, as debit cards become more widely accepted by merchants, financial institutions continue to provide better transaction information on consumer bank statements. At the same time, as financial institutions explore potential debit-based loyalty programs, convenience and control-seeking consumers are finding debit cards a more attractive option.[53]

[48] For example, see Souccar (1999b).
[49] For example, see Fickenscher (2000)
[50] For example, see CardLine, "U.S. Bank offers debit card incentives." 3/27/01
[51] For example, see Hood (1999)'s discussion of a retailers use of loyalty and customer service functionality which have led some merchants to see from one fifth to one third of consumers adopt merchant-based debit cards cleared via the ACH network.
[52] It should be noted that many debit card enhancements and incentives are linked to offline debit card programs which carry a higher interchange fee. Thus, while offline debit is potentially being encouraged over credit cards, offline debit is still more expensive to merchants than online debit. This case study is an excellent illustration of the complex calculations needed to compare net social costs and benefits of alternative consumer e-payment models.
[53] For instance, see Stock (2000).

2. Stored value cards

The modest increase in stored value card use in the United States, even in case of more successful implementations in closed communities, is consistent with the theory advanced in this paper. After all, a significant fraction of consumers already have an assortment of successful payment options available to them, including cash, credit cards, debit cards, and checks. Stored value cards require consumers to carry one more card with, in many situations, only an incremental benefit because of limited retailer acceptance.[54] They did, however, find success in situations where they could offer increased security and convenience and lower cost over the current use of cash and coins.[55] It has also became clear that the "smart" technology associated with stored value cards is not necessarily a substitute for credit and debit cards per se, but rather for the electronic authorization networks that financial institutions have built up over the last several decades.[56] As a result, stored value cards might be expected to become more heavily used in circumstances where the local telecommunications and electronic authorization networks are slow or expensive or where authorization is less important (e.g., very low dollar transactions such as with mass transit and vending systems).

3. E-cash, mobile payments, and emerging internet payments

One area of significant interest is e-cash, person-to-person payments, and mobile payments. Past e-cash pilots have received significant attention for failing to gain critical mass. Nonetheless, this analysis points out one area where innovation is now underway and where emerging online payments may offer significant new incremental value. P2P payments initially

[54] See Van Hove (2000), Chakravorti (2000), and Good (1997)'s discussions of the chicken-and-egg question associated with this technology being rolled-out to a large enough base of merchants to gain consumers' interest.
[55] See Souccar (1999)
[56] Nocera (1994) reports that in 1972 National BankAmericard Inc. (the credit card organization spun-off by Bank of America, introduced a nationwide network linking computers via telephone lines to authorize credit card transactions at the point of sale. Although the system cost $3 million to implement, it saved NBI members an estimated $30 million in the first year.

succeeded by meeting the needs of online auctions through increased convenience, customer service, dispute resolution, and insurance against fraud. Here, innovations are leveraging current payment systems, such as credit cards, debit cards, ACH, and checks, to offer consumers increased convenience, customer service, recourse, and incentives. While past e-cash implementations perhaps lacked the compelling business case[57] and many times required entirely new and expensive payment infrastructures to be built[58], newer forms of online payments are appearing to make significant inroads by increasingly leveraging installed payment infrastructures. This is perhaps best illustrated in recent pilots of mobile payments in Europe where consumers are able to pay for merchandise via their cell phone and where payment is charged either to a bank account or to the telephone operator's billing system.[59] In this case, providers are able to leverage an installed base of telephones in retail locations along with the installed accounting systems of telephone operators and/or financial institutions.

VII. Evolving approaches to evaluating competition policy

A. Analyzing competition: economic rents and "per se" behavior tests

Mainstream economics postulates that efficient markets are ones where profits over the longer term recover risk-adjusted rates of return on invested capital. These theories are sometimes interpreted to mean that positive abnormal economic profits should not exist, and if they are found, that this is important potential evidence of inadequate competition. An example of this is the question of competition in the payment card market at the point of sale. According to this theory, the inability of firms to successfully enter the market over the longer term may

[57] David Weisman noted that one reason electronic coins have not come to fruition is that many low dollar products are given away for free on the Internet or are bundled in other monthly service charges which consequently make the business case for e-coins smaller. See Proceedings from the Workshop on Promoting the Use of Electronic Payments: Assessing the Business, Technological, and Legal Infrastructures. October 1999.

[58] Eddie Zeitler also noted that past e-cash innovations many times required building entirely new and sophisticated electronic payments infrastructures. See Proceedings from the Workshop on Promoting the Use of Electronic Payments: Assessing the Business, Technological, and Legal Infrastructures. October 1999.

suggest that barriers to competition exist and that some sort of intervention, in some cases by the public sector, may be required to ensure market efficiency.

B. Analyzing competition: the contestability criterion

An alternative test for assessing the effectiveness of competition and efficiency as identified in the literature is the contestability criterion. The contestability criterion focuses on the ability of firms to enter and exit a market rather than the measurement of economic profits. Under this theory, even if longer-term profits persisted or if some market-induced behaviors that could appear to limit competition did occur, the threat of entry or actual entry would lead to competitive market outcomes. In this case, the threat would lead current providers to internalize the cost of these non-efficiency enhancing behaviors and as a result adjust their behavior in efficient ways.

Furthermore, under this view of the market, some behaviors that might otherwise be deemed as anti-competitive are actually a result of natural barriers to entry or exit. Some providers could also be exercising some form of limit pricing or pricing services at the level to achieve the highest rate of economic profit for firm shareholders within the constraint of not excessively encouraging new entrants (for instance, see Oster (1994)). Here, economic theory describes the firm's behavior as a potentially rational form of gambling – trading-off marginally higher returns against the risk of loss of market share and firm franchise value.

In a variant of the above argument, one could consider a world where the natural industry structure is best characterized as "successive monopoly." In this framework, firms compete primarily through investment in the development of new technologies. Periodically, one of these firms "wins" the investment battle and becomes a monopoly, enjoying a monopoly for a period of time until another firm or innovator "wins." These successive monopoly cases are in theory

[59] See Power (2001)

similar to patent races and provide another model for thinking about how competition may evolve for different markets.[60]

We will argue in the next section that recent evidence from competitors actions in the consumer point of sale market provides some case study evidence – though not yet scientifically conclusive – that the retail payments segment of the industry is not only contestable theoretically, but in practice, at least at the margin. This study and a more detailed forthcoming study document and analyze several of these current market developments, place them in the context of mainstream economic theory, and then consider their implications for the evolution of competition and innovation in this market.

C. Evaluating Competition

1. Proliferation of new potential substitutes

Recently online and offline debit cards have emerged as suitable and widely accepted alternatives for merchants and consumers at the point of sale. Consolidation amongst EFT networks has led to the formation of national EFT point of sale networks for the first time. During 2000, PIN-based transaction levels actually grew at a larger pace than signature-based transactions, growing at 35 percent and 31 percent respectively. Meanwhile, telecommunication providers, especially in Europe, have also stepped forward recently to offer payment capabilities over mobile phones.[61] In many cases, providers are attempting to adapt their networks to process payment transactions either in conjunction with financial institutions or separately from them. These two cases are examples of clear and important increases in choice being offered to consumers and merchants alike.

[60] For further discussion, see Machlup and Taber (1996). Thanks to Victor Stango for suggesting the notion of successive monopolies being built into this section.

2. Forward integration by third party suppliers to financial institutions

The contestability criterion suggests that new competitors, suppliers, distributors, or other vendors will enter a business when the market potential and risk-adjusted returns justify the investment cost. While this phenomena clearly did not occur in the 1980's and early 1990's, the enormous take-off of credit and debit cards is now providing fertile ground for suppliers of payment processing services to banks and credit card associations to enter these markets. For instance, First Data has recently unveiled aggressive plans to offer comprehensive consumer payment card services which in some cases will not only compete with but also disintermediate incumbent credit card associations and banks.[62] Thus, while this market, characterized by high fixed costs, has not seen a significant number of completely new entrants, it has seen important entry by suppliers and other third parties – firms in an ideal location to evaluate when market conditions will support profitable entry.

3. Backward integration by customers (retailers)

For years, some merchants have been offering retailer-sponsored debit cards that are cleared via the ACH network for certain segments of their customers. In these cases, merchants backwards integrate into the payments marketplace, as they offer the payment card, customer service, and risk mediation services that were beforehand provided by banks and/or credit card associations. On the Internet, building on the experience of large retailers offerings of store-based credit cards, Amazon.com has pledged to develop its own credit-based payment option, again internalizing a service previously provided by financial institutions or payment associations.[63] As another example of this trend, there have also been pledges by retailers to work with card associations to co-develop new risk management products, which allow

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[61] For example, see Power (2001)

[62] See Breitkopf (2001). "First Data Taking Major NYCE Stake," American Banker, 166 (115), 1.

merchants to take on some of risk-mitigation services in exchange for lower fees. Specifically, Internet-based retailers have both made investments to reduce fraud if the investments would result in lower discount rates.[64] Risk mitigation is a valuable service provided by banks and credit card associations and is now increasingly being provided by merchants or at least being bargained for by merchants as part of fee negotiations. In some cases, merchants may be in a superior position to provide these risk mediation services. To the degree this trend continues, it may have a very significant impact on the negotiating position of credit card associations.

4. Active retailers and retailer-led coalitions

First, merchants have taken a proactive role in encouraging the entrance of new market competition and the negotiation of pricing terms. In August 1999, retailers and trade associations selected Concord EFS to develop a means of accepting non-cash payments using the ACH network. In turn, Concord worked to develop electronic check initiatives and the development of debit cards that are processed over the ACH network (see Stock (1999)). Second, Wal-Mart has stepped forward to lead a fight against Visa's and MasterCard's "honor all cards" rules. Perhaps equally important, the discount retailer also became the first merchant to switch from Visa's Interlink EFT network, after Visa's threatened to double its interchange fees. Third, merchants, government agencies collecting taxes from consumers, and other firms are increasingly finding ways of bundling value-added services around the acceptance of credit cards and instituting fees for accepting this form of payment.[65]

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[63] See Wingfield amd Merrick (2001). "Amazon Sets Citibank deal." *The Wall Street Journal*, 11/6/01, p. B8.

[64] For instance, consider Ebay's development of consumer buyer and seller feedback rating systems.

D. Summary comments – better definition of the relevant market

1. Relevant Market

Despite news reports of slow change in the industry, the above section documents the emergence of important underlying change in this market of the banking industry. Yet despite this critical trend, much of the recent debate around competition policy is still built around the assumption that the relevant market is the credit card market at the point of sale. A solid academic literature exists which suggests that the key criterion should be contestability – the condition under which potential entrants can feasibly enter and exit the market – rather than "economic rents" or "per se behavior rules." In the late 1970's and early 1980's, credit cards were the primary payment card product (making it quite natural and very appropriate for public sector authorities to be monitoring conditions). However, recent developments in this market, spurred in many cases by large and sophisticated market participants acting based on self-interest, suggest that competition in this segment is not only increasingly vibrant, but also leads to a real innovation where there is a business case. Refer back to Sections VI.A and VI.D for a discussion on substitution of alternative payment products, and Sections VI.C and VII.C for discussions of how various payment networks and stakeholders are increasingly competing with each other. Furthermore, the academic literature reminds us that we ought to be particularly watchful of using imperfect regulatory tools which influence firm behavior and expectations (for instance, see Oster (1994)), particularly when these tools can be used for purposes counter to what they were intended (for instance, see Krozner and Strahan (1999)).

In conclusion, regardless of which criterion one uses to evaluate the competitiveness of a market, it continues to be absolutely clear that the preeminent question is the more careful and thoughtful definition of the relevant market. Surprisingly, this is a subject that has received little

[65] Source: authors' discussions with industry.

attention in the academic literature as well as in the prosecution of recent anti-trust cases. This paper outlines several developments that have occurred in the last two to four years that suggest that the relevant market ought to be broadened. We find that competition in the point of sale payment market is not only increasingly contestable theoretically, but in practice, at least at the margin.[66] [67]

2. Value of Relying on Market Forces

As stated earlier in this paper, there are at least three theories about competition and innovation in the non-recurring consumer payments. Each one of these theories can claim supporting evidence from various points in time. However, we have argued that there is significant and growing evidence that innovation can and is occurring in this market. This innovation has occurred in part because of several decades where government and other public authorities have abstained in many important ways from getting unnecessarily involved with regulating or managing investment and strategy decisions in these and related markets. Thus we argue that the payment industry serves as an example of how innovation can develop at the fringes of an industry, even when there may be anecdotal support for mid-term obstacles to innovation. As such, we believe this paper provides at least case study support for the growing contention that the best way to regulate many markets is to increasingly favor solutions based on market forces. This case study, while just one isolated example, might provide evidence supporting the contention that at certain times it is critical for public authorities to resist the

[66] By contestability at the margin, we suggest that while new entrants may not have yet entered the market, there are large and sophisticated providers in related markets who stand ready to forward or backwards-integrate into a related market. While these firms may not ever plan to become providers to the larger market, they do typically have access to customer segments or distribution channels. As a result, they stand in an ideal position to enter and exit and may have unique insight into the changing economics of a particular market, even if they do not anticipate becoming a key provider in the larger market.

[67] Another point arguing for contestability is that prices in these markets tend to be set over multi-year periods and as a result, incumbent providers attempting to protect market share may have a hard time lowering prices in time to

natural (and sometimes important) need to closely monitor and engage industries on developments. This is especially important given that these actions may unnecessarily influence potential competitors, potential new entrants', and potential capital providers' expectations in ways that unintentionally limit investment in competition and innovation.

VIII. Discussion: evolving models of consumer protection

Public sector involvement surrounding the rights, warranties, consumer protections, and incentives associated with different payment instruments may have significant implications for the adoption of electronic payments.[68] One of the keys to the future development of emerging payment systems will continue to be developing appropriate risk management structures and policies. On the one hand, risk management policies that are too weak could limit adoption. On the other hand, risk management policies which are too strong (more expensive than justified by the market need) could negatively impact business cases for investments in emerging payment systems, as well as unnecessarily impede potentially innovative private sector solutions to risk management challenges.

A. Consumer Protection Policy Design: Alternative Approaches

Clearly, there are a variety of approaches public authorities can use to addressing these types of risk management questions including:

1. Extending similar levels of risk management protection to new classes of payments products (recognizing that this may forestall investment in new innovations and that this may unnecessarily subject new, lower-risk products to the costs of current systems).

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limit entry by these firms in related markets. See Heywood and Pal (1993) and Cairns (1994) for a discussion of price setting activities in contestable markets.

[68] See Hughes (1999), Mann (2000), and Perritt (1996) for an overview several views of the inter-relationship between consumer protection policy and the evolution of the e-payments market.

2. Abstaining from extending broader risk management protections until clear and compelling reasons are identified (recognizing that private sector providers have an incentive to invest in current and new risk management policies).

3. A hybrid approach where safe harbors are implemented (e.g., transactions under $X or account balances under $Y do not require protections).

4. Promoting the development of a reasonable number of best practice standards (this approach could be viewed as attempting to promote improved transparency).

5. Promoting best practice principles among providers relating to reducing potential problems and improving the ability to successfully address problems when they occur.

6. Focusing on customer education of the risks associated with alternative transactions and payment instruments.

B. Comparing Approaches

Whether it is a financial institution, merchant, or a consumer who is in the best position to manage these types of risk in any given situation is an open question.[69] Nonetheless, we argue that the clear specification of rights and warranties is an efficiency enhancing undertaking. This paper does not argue for any particular set of incentive systems to be adopted, but rather notes that the dispute resolution system associated with debit cards may not lead to the same efficiency enhancing result, in the short run. Nonetheless, it should be noted that emerging payment systems have seen new creative forms of insurance-like contracts tailored to isolate and protect consumers against important types of risks. Thus, rather than extend regulatory regimes, it seems entirely possible and increasingly likely that the market will generate new approaches to

handling risk that perform better for consumers than more general, "one-size fits all" approaches.[70] [71]

Making this more complex is the increasing reality that risk management services can be supplied by a variety of sources, either financial institutions, merchants, third parties, or consumers (e.g., taking additional risk themselves and essentially choosing to self-insure).[72] While some consumer risk management models were developed decades ago when credit and debit card usage were in their infancy, it is possible that changes in the nature of commercial relationships might lead to changes in how essential risk management capabilities are provided to customers.

C. Policy case study: online credit card versus Internet debit card usage

One area of particular importance relates to the strategic role of the debit card product in the future. Mantel (2000) and this paper both propose that debit cards will become increasingly critical retail payment products for consumers and financial institutions, driven by the changing economics of the retail payment industry. Yet, as financial institutions and merchants increasingly promote debit cards, it will be important that critical and sometimes subtle differences between debit cards and credit cards be fully understood, as seemingly insignificant

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[69] Mann (2000) provides an extensive listing of a variety of reasons one might not expect consumers to be in the ideal position relating to inability to assess low probability events, events which have very high costs but infrequent occurrences, and negotiating position imbalances to name several.

[70] For an example of a review of general one-size fits all rules versus other alternatives, see Lave (1985), "Speeding, Coordination, and the 55 MPH Limit."

[71] While this article does not prescribe extending attributes commonly associated with credit cards to debit cards as proposed in Hughes (1999) and Mann (2000), we certainly concur in the overall goal of assuring that consumers are adequately protected. This article leaves it as an open question how to best this goal and to assess what level of protection is socially optimal. This is a complex question with many both theoretical and empirical sub-components. It will almost certainly be an interesting, critical, and fruitful future area for research.

[72] For instance, see Costanzo (2000). "Amazon, Seeking E-Pay Partners, Mulls Nonbanks;" PayMyBills.com (1999), ""PayMyBills.com To Increase Confidence In Online Financial Transactions With Safeweb® Insurance From Travelers Property Casualty;" Ptacek (2000)," eCharge Purchases a Charter For Its Fraud Protections;" and Rooney (2001), "Microsoft 'Hailstorm': One of First .Net Services."

differences in product policy may have critical effects on consumers. One such issue is clearly the difference between consumer protection policy for credit cards and debit cards.

Several financial services providers have taken the lead in addressing some of these concerns by offering consumers improved protection from liability[73] and improved business practices to assure adequate security.[74] Yet a series of product differences between credit and debit cards may still produce significant variations in the risk management profiles offered to consumers.[75] To the degree that the online debit market continues to grow at a modest rate, it seems reasonable to assume that the problems that do occur over time will be able to be addressed expeditiously and appropriately. It will, nonetheless, be particularly important to be watchful should this market grow at more significant rates. The following section describes several of the product and institutional differences between payment card products.

1. Formal dispute resolution mechanism

This article notes that strong liability protection and dispute resolution are bundled with the credit card product. Yet, there are important differences in the protections afforded to consumers in disputing billing and service delivery when paid via debit card. Not only is the dispute resolution mechanism for credit cards formalized (and broader in its coverage), the mechanism is set-up in a way that is advantageous to consumers. This certainly has a significant cost which financial institutions bear (indirectly if not directly). This may in some cases have the unintended consequence of allowing some consumers a "free ride" until a financial institution detects a pattern of problematic behavior. Nonetheless, this incentive system, as it is set-up for credit cards, has the indirect effect of aligning responsibility in the hands of the institution that is

[73] For example, see Fickenscher, "Visa Shores Up Web Position, Ends Fees on Theft of Card Numbers." *American Banker*. February 22, 2000.

likely in a strong position to manage it.[76] As a result, the organization is able to not only monitor problem users, but it can also monitor merchants and/or industries that generate more than typical levels of disputes. Anecdotal evidence suggests that financial institutions have played an implicit role in policing problem merchants.[77] Similar results may or may not occur naturally when consumers choose to use debit cards for purchases.

2. Partitioning of risk among accounts (Explicit and Implicit)

Not only do credit cards build in liability limits, they also implement natural firewalls between consumers accounts. For instance, the 20-30 day grace period with credit cards allows consumers incremental time for potential problems to be addressed. On the contrary, debit cards do not offer a similar period of time with which to limit the effects of potential billing disputes. While the consumer may quickly or eventually be made whole in these cases with a debit card, the consumer may initially bear the burden of the loss of funds.[78] The initial burden can weigh heavily on a consumer's ability to meet other financial commitments, as well as have significant emotional effects on the consumer. The credit card offers the opposite extreme of consumer protection from loss, in which a consumer still might not be wholly responsible for the purchase if the case is not settled after the end of the billing period. If a consumer is still disputing a

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[74] For instance, see Electronic Funds Transfer Association (2001), ""New Guidelines Developed by EFT Networks For Secure, Real-time Debit for Internet Purchases." and NACHA (2001), "NACHA Rules for Secure Internet Payments from Consumer Checking Accounts Become Effective Today."

[75] See Hughes (1999) and Mann (2000) for an overview of these differences.

[76] For theoretical and business treatments of this, see Coase (1960), "The Problem of Social Cost," and Hart (1988), "The Power of Unconditional Service Guarantees." Note, this does not imply that every payment card would have similar levels of protection. Rather, it simply suggests that clear delineation of rights, warranties, and incentives have efficiency-promoting benefits.

[77] Please find footnote on credit cards cracking down on some adult content or Napster type web sites.

[78] For instance, Catherine Johnston noted in discussion that that debit cards are more personal in nature. For example, small problems can dramatically influence a consumer's daily life, as recurring payments continue to be drawn from checking accounts or as consumers are unable to access checking accounts if problems were to occur. Federal Reserve Bank of Chicago and Illinois Institute of Technology (1999). See Spiotto (2001) for additional distinctions.

claim, he/she can make the minimum monthly payment on the account and extend the time period with which to rectify the potential problem.

Furthermore, consumers typically maintain multiple credit card accounts while they tend to maintain one principle checking/debit card account. This decentralized approach, while potentially being more costly, has a secondary effect of improving the ability to partition and manage risks. Our results suggest that consumers largely take these services provided by credit cards for granted. It does not necessarily imply that using debit cards for Internet purchases will or could be problematic, but rather that consumers and/or financial institutions may want to consider business practices which mimic that natural "sub-account" structure that credit cards have created for consumers' finances.

3. Other risk monitoring and management tools

Since controlling fraud was instrumental in the development of credit cards, the credit card industry has developed outstanding risk management and fraud control mechanisms. Card companies regularly monitor the transactions for abnormal usage. With a credit card, the card company may sight the problem and have it fixed even before the consumer receives the monthly statement. These same protections may not yet be fully built into debit card programs.

IX. CONCLUSION

This paper investigated the factors that influence consumers' choice of payment instrument. This analysis supports the theory that consumers exhibit rational payment preferences and that consumers' behaviors are consistent with their preferences. These preferences vary but generally appear to include combinations of budgeting, convenience, incentives, control, privacy, security, recourse, and personal involvement. Consumer's financial positions, the nature of a particular transaction or merchant relationship, and the availability of

convenient payment infrastructure also contribute to consumer decisions. The importance of these situational factors help to explain why consumers may appear "irrational," when in fact behavior was being driven by situational factors or when one time benefits may not justify other costs. This paper asserts that to the degree that electronic payment instruments carry broader features similar to those of checks and credit cards, consumers will migrate towards electronic payments at increasing rates out of self-interest.

The paper also outlines the important interplay between consumer preferences, market needs, and public policy, particularly relating to the increasingly important subject of Internet-based debit cards. There may be important consumer education work to do on this front, if not important public policy questions to consider, as outlined in VIII.C. Clearly, subtle differences between product and account structures can have important effects on market outcomes and on the nature of potential risks and problems that emerge. The growing momentum behind exploring the power of the debit card is an important development. Lastly, we analyze the allegations of monopolization within the credit card industry. We analyze these claims given recent innovations in substitutes and recent efforts by service providers and participants to integrate new product lines into the industry. This paper has also identified several potentially fruitful areas for future research, including more analytical models of substitution that account for both supply and demand-side factors, better understanding of the optimal design of consumer protection policy, and the balance between market-based and regulatory-based solutions.

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Appendix I. Definitions

INSTRUMENT	DEFINITION
Asset-based Accounts	
Checks	A written order from one party (the drawer) to another (the drawee, normally a bank) requiring the drawee to pay a specified sum on demand to the drawer or to a third party specified by the drawer.
Debit Cards	Card enabling the holder to have his purchases directly charged to funds in his account at a deposit-taking financial institution. Online Debit Card. Indicates that a direct connection is made to a centralized computer system for authorization or validation before a transaction can be executed. Offline Debit Card. May refer to the transmission of transfer instructions by users, through such means as voice, written, or telefaxed instructions, that must subsequently be input into a transfer processing system. The term may also refer to the storage of data by the transfer processing system on media such as magnetic tape or disk such that the user may not have immediate access to the data. Offline debit cards are cleared via credit card networks or the ACH network. Internet Debit Card: Special case of the online debit card where a transaction is initiated and authorized via the Internet using advanced cryptographic techniques to secure information electronically.
Electronic check	Use of a paper check as an access device which initiates an electronic debit via an ATM or ACH network against a consumer's account.
Money orders or travelers checks	A special case of the check which is purchased from a financial institution and backed by a financial institution that brings additional assurance that the payment will be accepted, that it can be revoked, and that it can be logged.
Credit-based Accounts	
General Purpose Credit Card	General Purpose Credit Card. A card indicating that the holder has been granted a line of credit. It enables the holder to make purchases and/or withdraw cash up to a prearranged ceiling; the credit granted can be settled in full by the end of a specified period or can be settled in part, with the balance taken as extended credit. Interest is charged on the amount of any extended credit and the holder is sometimes charged an annual fee.
Travel and Entertainment Card	Credit card issued by non-banks indicating that the holder has been granted a line of credit. It enables him to make purchases but does not offer extended credit, the full amount of the debt incurred.
Non-Account and/or Anonymous Systems	
Currency/coin	Paper (metal) money issued by government.
E-cash or e-money	Value stored electronically in a device such as a chip or a hard drive in a personal computer.
Stored Value	A prepaid card in which the record of funds can be increased as well as decreased. Open systems. A version of stored value implementations where monetary value can be transferred among a variety of locations (e.g., Visa stored value implementations). Generally, these transactions lead to records of transactions. Closed systems. A version of stored value implementations where monetary value can be transferred only among the issuer's locations (e.g., Mondex, retailer gift certificate cards, or select mass transit cards). These transactions may or may not lead to audited transaction logs.
Multi-application devices (front ends to payment systems)	
Electronic Purses	A reloadable multi-purpose prepaid card that may be used for small retail or other payments instead of coins. See multi-purpose prepaid card
Smart Cards	An integrated circuit card with a microprocessor, capable of performing calculations and multiple functions, including storing and transferring monetary value.
Mobile telephone payments	An access device used to effect payments in some markets using general purpose cell phones, where payment may be charged to a variety of accounts including telephone, credit card, or debit card accounts.
Person-to-person Internet Payments	An Internet access device used to effect payments where payment may be charged to a variety of accounts including credit card or debit card accounts or be pre-funded (stored value).

Source: Bank for International Settlements, Committee of Payment and Settlement Systems, *A glossary in payments and settlement systems*, January 2001 and author.

Appendix II: Description of Terms and Summary Statistics

FACTOR	DESCRIPTION OF FACTOR	SCALE	STATISTICS
Age	Age of Respondent	Continuous	Mean: 50.4
Female	Gender of Respondent	0: Male, 1: Female	34% Male 66% Female
Race	Race of Respondent	0: White, 1: Non-White	86% White 14% Non-White
College	College Education	0: No, 1: Yes	64% No College 36% College
Lifestage: Middle Single	One Member Household, Age 35-65	0: No, 1: Yes Ref.: Lifestage Young Single	7.2% Young Single 12.5% Middle Single 8.9% Older Single 5.9% Young Couple 11.7% Working Older Couple 12.0% Retired Couple 14.6% Young Parent 11.4% Middle Parent 15.9% Older Parent
Lifestage: Older Single	One Member Household, Over 65		
Lifestage: Young Couple	Multimember Household, Age of Head Under 45, No Children		
Lifestage: Working Couple	Multimember Household, Age of Head 45 and Over and Employed, No Children		
Lifestage: Retired Couple	Multimember Household, Age of Head 45 and Over and Not Employed, No Children		
Lifestage: Young Parent	Multimember Household, Age of Head Under 45, Child Under 6		
Lifestage: Middle Parent	Multimember Household, Age of Head 45 and Over, Child Over 6		
Lifestage: Older Parent	Multimember Household, Age of Head 45 and Over, Child At Home		
Market Size: Under 100,000	Market Under 100,000 People	0: No, 1: Yes Ref.: Market Size Over 2 Million	23% Under 100,000 16% 100,000-499,999 21% 500,000-1 Million 40% Over 2 Million
Market Size: 100,000 - 499,999	Market 100,000 – 499,999 People		
Market Size: 500,000 - 1,999,999	Market 500,000 – 1,999,999 People		
New product adoption			
Understanding of Direct Payment	"I understand direct payment."	1: No - 4: Yes	Mean: 3.5
Understanding of Set-Up of Direct Payment	"I would use direct payment if I knew how to set it up for my accounts."	1: Disagree Completely – 10: Agree Completely	Mean: 4.2
Personal Computer Ownership	Personal Computer Ownership of Respondent	0: No, 1: Yes	71% No Personal Computer 29% PC Ownership
Cellular Telephone Ownership	Cellular Telephone Ownership of Respondent	0: No, 1: Yes	75% No Cellular Telephone 25% Cellular Telephone
Internet Purchase	"Do you purchase items through the Internet?"	0: No, 1: Yes	88.9% No Internet Purchase 11.1% Internet Purchase
Consumer financial			
Household Income: $20,000 - $39,999	Household Income: $20,000 - $39,999	0: No, 1: Yes Ref.: Income Under $20,000	30% Under $20,000 29% $20,000 - $39,999 30% $40,000 - $74,999 11% Over $75,000
Household Income: $40,000 -$74,999	Household Income: $40,000 -$74,999		
Household Income: Over $75,000	Household Income: Over $75,000		
Home Ownership	Home Ownership Status of Respondent	0: No, 1: Yes	24% No Home Ownership 76% Home Ownership

Savings Account Ownership	"Do you maintain a savings account?"	0: No, 1: Yes	25% No Savings Account 75% Savings Account
Credit Card Ownership	"Do you maintain a credit card?"	0: No, 1: Yes	38% No Credit Card 62% Credit Card
Account: Regional/National Bank	"Indicate whether you have at least one account at a national bank."	0: No, 1: Yes Ref.: Account at Local Bank	54% Local Bank 36% Regional/National Bank 41% Credit Union 12% Brokerage Firm 20% Savings Loan
Account: Credit Union	"Indicate whether you have at least one account at a credit union."		
Account: Brokerage Firm	"Indicate whether you have at least one account at a brokerage firm."		
Account: Savings and Loan	"Indicate whether you have at least one account at a savings and loan."		
Control			
Receiving a Receipt of Payment	"Importance of receiving a receipt of payment."	1: Not Important - 10: Extremely Important	Mean: 7.8
Keep Credit Rating Good	"Importance of keeping my credit rating good."	"	Mean: 9.4
Credit Cards Only In Emergencies	"Credit cards should be used for emergencies only."	"	Mean:6.3
Disciplined About Finances	"I am disciplined about my finances."	"	Mean: 7.4
Use Toll-Free Telephone Number to Check Account Balances	"I frequently call automated 800 numbers to get information on my account balances."	"	Mean: 4.4
Person Available if Problem Arises.	"Having a person to talk to if there is a problem."	"	Mean: 8.4
Convenience		"	
Being a Convenient Way to Pay Bills	"Importance of being a convenient way to pay bills."		Mean: 8.1
Banks Hours Are Not Convenient	"Banks are never open during the hours that are good for me."	"	Mean: 4.6
Travel Frequently	"I frequently travel."	"	Mean: 4.2
Saving Time	"Importance of saving time."	"	Mean: 7.7
Incentives			
Least Expensive Method of Payment	"Importance of being the least expensive payment method."	"	Mean: 7.6
Payment System to Manage Funds/Budget	'Importance of using a payment system that helps me manage my funds/budget."	"	Mean: 7.6
Concerned About Credit Rating	"I worry about my credit rating."	"	Mean: 6.0
Avoid Late Fees	"Importance of avoiding penalties due to late payments."	"	Mean: 8.9
Use Coupons When Shopping	"I frequently use coupons when shopping."	"	Mean: 7.8
Importance of Keeping Account Private	"Importance of keeping account information private."	"	Mean: 8.8
Do Not Trust ATMs	"I don't trust ATMs."	"	Mean: 4.8
Believe Internet Purchases are Secure.	"Paying with a credit card or giving a checking account # over the Internet is secure."	"	Mean: 2.7
Prefer Cash/Checks over Credit Cards.	"I prefer to use cash or checks instead of credit cards."	"	Mean: 6.9
Deposit Cash at ATMs.	"I deposit cash at ATMs."	"	Mean: 2.6
Only Make Cash Withdrawals at Teller.	"I only make cash withdrawals at the teller."	"	Mean: 5.3
Prefer One-to-One Contact over Machines.	"I prefer one-to-one contact over automated machines."	"	Mean: 6.5
Enjoy Personal Attention from Bank.	"I enjoy the personal attention my bank has to offer."	"	Mean: 6.4

Appendix III: ATM/Debit Card and Credit Card Logistic Regression Results

	ATM/DEBIT CARDS: NON-USERS VS. USERS		ATM/DEBIT CARDS: LOW VS. HIGH USERS		CREDIT CARDS: NON-USERS VS. USERS		CREDIT CARDS: LOW VS. HIGH USERS	
	Odds Ratio	**Standard Error**	**Odds Ratio**	**Standard Error**	**Odds Ratio**	**Standard Error**	**Odds Ratio**	**Standard Error**
Demographics								
Age	0.9355 ***	0.0115	1.0045	0.0161	0.9965	0.0091	1.0171	0.0143
Female	0.8368	0.1800	0.7743	0.1952	0.7644	0.1285	1.2803	0.3008
Race	0.8229	0.2394	1.2691	0.4286	1.0384	0.2367	2.0051 **	0.6208
College Education	0.8495	0.1879	1.1403	0.2725	1.0622	0.1829	1.1969	0.2745
Lifestage: Middle Single [a]	3.3123 **	1.6693	0.6610	0.3548	0.9584	0.3622	0.3914 *	0.1957
Lifestage: Older Single	2.3218	1.6000	0.7604	0.8513	0.6454	0.3288	0.2396 *	0.1984
Lifestage: Young Couple	1.6467	0.9449	0.6622	0.3194	0.6732	0.2620	0.6448	0.3254
Lifestage: Working Couple	1.3808	0.7141	1.1854	0.6649	0.5322	0.2063	0.6909	0.3591
Lifestage: Retired Couple	3.1854 **	1.8778	0.4868	0.4006	0.5855	0.2626	0.4127	0.2601
Lifestage: Young Parent	0.7582	0.3401	1.2336	0.5145	0.8526	0.2880	0.7666	0.3187
Lifestage: Middle Parent	1.1132	0.5097	1.3501	0.6039	0.9053	0.3174	1.0695	0.4547
Lifestage: Older Parent	1.6763	0.8202	1.1732	0.6301	0.7932	0.2960	0.6846	0.3264
Market Size (# of people): 100,000 - 499,999 [b]	1.4575	0.4338	1.9908 *	0.7173	1.1106	0.2603	1.0811	0.3522
Market Size (# of people): 500,000 - 1,999,999	2.7003 ***	0.7676	1.7296	0.6104	1.2951	0.2867	0.9673	0.3002
Market Size (# of people): Over 2,000,000	2.3249 ***	0.6199	1.0814	0.3594	1.0469	0.2108	1.0146	0.2954
New Product Adoption								
IBM PC	1.2134	0.2694	1.1860	0.2736	1.0915	0.1884	0.6156 **	0.1369
Cell phone	1.2122	0.2798	0.9574	0.2352	1.1213	0.2043	1.1871	0.2875
Purchase on Internet	1.4574	0.4999	1.1218	0.3524	1.1825	0.3270	1.7796 *	0.5939
Consumer Financial								
Household Income: $20,000 - $39,999 [c]	1.2871	0.3541	1.7914	0.6524	2.3718 ***	0.4991	0.4796 **	0.1513
Household Income: $40,000 - $74,999	1.8979 **	0.5988	1.9387 *	0.7679	1.9870 ***	0.4713	0.6927	0.2421
Household Income: $75,000 and over	1.5638	0.6745	1.3313	0.6523	2.3151 **	0.7654	0.7855	0.3662
Home Ownership	0.9438	0.2339	0.6744	0.1766	1.1176	0.2092	1.4816	0.3955
Checking Account Ownership	2.2250 *	1.0165	1.0982	0.8484	6.7311 ***	2.8662	1.3358	1.2134
Savings Account Ownership	0.8842	0.2196	0.7428	0.2222	1.3739 *	0.2585	1.2630	0.3583
Account Ownership: National Bank [d]	2.1855 ***	0.4748	1.3827	0.3227	0.8922	0.1461	1.1427	0.2447
Account Ownership: Credit Union	1.4544 *	0.3049	1.4981 *	0.3682	1.2460	0.2033	0.7697	0.1775
Account Ownership: Brokerage Firm	0.6230	0.1897	0.9117	0.3074	0.8024	0.1873	0.9303	0.3167

Account Ownership: Savings and Loan	0.7161	0.1768	0.7439	0.2325	1.0947	0.2121	0.9768	0.2672
Control								
Receipt of Payment	1.0193	0.0395	0.9559	0.0371	0.9858	0.0297	0.9936	0.0394
Keep Credit Rating Good	0.8521 *	0.0737	0.9901	0.0899	0.9977	0.0634	1.0935	0.01165
Credit Cards Only In Emergencies	0.9827	0.0415	1.0055	0.0495	0.9850	0.0307	1.0923 *	0.0512
Disciplined about Finances	0.9768	0.0386	0.9131 **	0.0401	0.9137 ***	0.0280	0.9091 **	0.0374
Use Toll-Free Telephone to Check Balance	1.1330 ***	0.0355	1.0533	0.0360	1.0200	0.0245	1.0812 **	0.0345
Person Available If Problem Arises	1.0863	0.0566	0.9834	0.0591	0.9165 **	0.0386	1.0107	0.0556
Convenience								
Being a Convenient Way to Pay Bills	1.1819 **	0.0812	0.9339	0.0807	0.9337	0.0471	0.9323	0.0723
Bank Hours Are Not Convenient	1.0086	0.0357	0.9950	0.0394	0.9711	0.0263	0.9887	0.0367
Travel Frequently	1.0401	0.0360	1.0285	0.0409	0.9762	0.0260	0.9892	0.0380
Saving Time	0.9582	0.0615	0.9713	0.0778	1.0864 *	0.0520	1.1561 **	0.0838
Incentives								
Least Expensive Method of Payment	0.9483	0.0497	1.0395	0.0603	0.9666	0.0376	0.9279	0.0464
Payment System to Manage Funds/Budget	1.0456	0.0437	1.0287	0.0530	1.0385	0.0320	0.9880	0.0449
Concerned about Credit Rating	1.0651 **	0.0319	1.0278	0.0361	1.0597 ***	0.0235	1.0491	0.0343
Avoid Late Fees	0.9209	0.0662	1.0841	0.0920	1.0319	0.0529	1.0815	0.0935
Use Coupons When Shopping	1.1038 ***	0.0422	1.0031	0.0437	1.0288	0.0292	0.9293 *	0.0386
Privacy/security								
Importance of Keeping Account Private	0.9864	0.0585	0.9825	0.0607	1.0383	0.0469	1.0492	0.0658
Do Not Trust ATMs	0.8285 ***	0.0292	0.9532	0.0439	0.9779	0.0258	0.9734	0.0373
Believe Internet Purchases Are Secure	0.9471	0.0394	1.0105	0.0483	1.0267	0.0345	0.9448	0.0420
Prefer Cash/Checks Over Cards	1.0327	0.0446	1.0820	0.0536	0.9778	0.0315	1.0253	0.0478
Deposit Cash at ATMs	1.2506 ***	0.0572	1.0974 ***	0.0366	1.0189	0.0293	0.9784	0.0350
Only Make Cash Withdrawals at Teller	0.7863 ***	0.0221	0.9351 *	0.0373	1.0240	0.0234	1.0077	0.0324
Personal Involvement								
Prefer One-to-One Contact Over Machines	0.8427 ***	0.0321	0.9036 **	0.0401	1.0535 *	0.0315	0.9188 **	0.0388
Enjoy Personal Attention from Bank	1.0298	0.0393	1.0248	0.0453	0.9598	0.0278	0.9829	0.0395
[a] *Lifestage Reference: Young Single* [b] *Market Size Reference: Under 100,000* [c] *Income Reference: $20,000 and Under* [d] *Institution Reference: Local Bank* *** Statistically Significant $\alpha = 0.01$ ** Statistically Significant $\alpha = 0.05$ * Statistically Significant $\alpha = 0.10$	N = 988 LR chi2 (51) = 608.94 *** Pseudo R^2 = 0.4455 Log Likelihood = -378.9890		N = 520 LR chi2 (51) = 87.04 *** Pseudo R^2 = 0.1340 Log Likelihood = -281.3684		N = 990 LR chi2 (51) = 158.87 *** Pseudo R^2 = 0.1212 Log Likelihood = -575.89678		N = 551 LR Chi2 (51) = 70.24 ** Pseudo R2 = 0.1007 Log Likelihood - -313.72202	

Appendix IV: Credit and debit card use by state

State	Obs	ATM use				Credit Use		State	Obs	ATM use				Credit Use	
		Yes	No	High	Low	Yes	No			Yes	No	High	Low	Yes	No
Alabama	16	25.00	75.00	25.00	75.00	50.00	50.00	Nebraska	6	50.00	50.00	33.33	66.67	50.00	50.00
Arizona	21	57.14	42.86	41.67	58.33	80.95	19.05	Nevada	5	60.00	40.00	0.00	100.0	40.00	60.00
Arkansas	16	31.25	68.75	40.00	60.00	75.00	25.00	New Hampshire	11	36.36	63.64	25.00	75.00	72.73	27.27
California	112	60.71	39.29	32.35	67.65	66.96	33.04	New Jersey	32	59.38	40.62	26.32,	73.68	75.00	25.00
Colorado	12	25.00	75.00	66.67	33.33	41.67	58.33	New Mexico	7	57.14	42.86	50.00	50.00	57.14	42.86
Connecticut	15	53.33	46.67	62.50	37.50	60.00	40.00	New York	74	51.35	48.65	60.53	39.47	62.16	37.84
Delaware	5	40.00	60.00	50.00	50.00	60.00	40.00	North Carolina	52	53.85	46.15	28.57	71.43	53.85	46.15
DC	7	85.71	14.29	0.00	100.0	85.71	14.29	North Dakota	3	66.67	33.33	0.00	100.0	100.0	0.00
Florida	69	68.12	31.88	34.04	65.96	63.77	36.23	Ohio	62	58.06	41.94	47.22	52.78	72.58	27.42
Georgia	21	47.62	52.38	10.00	90.00	71.43	28.57	Oklahoma	15	26.67	73.33	25.00	75.00	53.33	46.67
Idaho	5	80.00	20.00	25.00	75.00	40.00	60.00	Oregon	27	44.44	55.56	33.33	66.67	44.44	55.56
Illinois	67	47.76	52.24	21.88	78.13	59.70	40.30	Pennsylvania	87	52.87	47.13	41.30	58.70	59.77	40.23
Indiana	30	53.33	46.67	12.50	87.50	46.67	53.33	Rhode Island	5	60.00	40.00	0.00	100.0	60.00	40.00
Iowa	15	26.67	73.33	25.00	75.00	73.33	26.67	South Carolina	17	58.82	41.18	30.00	70.00	52.94	47.06
Kansas	15	26.67	73.33	50.00	50.00	53.33	46.67	South Dakota	5	20.00	80.00	0.00	100.0	80.00	20.00
Kentucky	24	50.00	50.00	25.00	75.00	50.00	50.00	Tennessee	29	48.28	51.72	57.14	42.86	65.52	34.48
Louisiana	25	52.00	48.00	23.08	76.92	64.00	36.00	Texas	64	43.75	56.25	21.43	78.57	51.56	48.44
Maine	12	41.67	58.33	20.00	80.00	58.33	41.67	Utah	7	42.86	57.14	0.00	100.0	71.43	28.57
Maryland	32	62.50	37.50	30.00	70.00	68.75	31.25	Vermont	6	83.33	16.67	60.00	40.00	50.00	50.00
Massachusetts	24	62.50	37.50	46.67	53.33	66.67	33.33	Virginia	34	61.76	38.24	19.05	80.95	76.47	23.53
Michigan	46	50.00	50.00	30.43	69.57	58.70	41.30	Washington	36	41.67	58.33	40.00	60.00	61.11	38.89
Minnesota	26	53.85	46.15	28.57	71.43	61.54	38.46	West Virginia	11	54.55	45.45	50.00	50.00	72.73	27.27
Mississippi	10	40.00	60.00	25.00	75.00	60.00	40.00	Wisconsin	31	29.03	70.97	22.22	77.78	64.52	35.48
Missouri	43	41.86	58.14	33.33	66.67	58.14	41.86	Wyoming	7	28.57	71.43	0.00	100.0	57.14	42.86
Montana	3	0.00	100.0	0.00	0.00	66.67	33.33	Total	1304	51.00	49.00	32.18	67.82	62.04	37.96

Appendix V [79] [80]

Consumer e-Payment Substitution Framework

WEALTH	PREFERENCES	PAYMENT SCENARIO			
		Point of Sale			
		Merchant Staff Present		Merchant Staff Not Present	
		High $ / Important	Low $ /Less Important	Physical	Virtual
		Larger shopping trips	Incidentals, fast food, etc.	Vending, mass transit, etc.	Software, auctions, etc.
Low Resources	Convenience	CA, CH, CR	EBT, CA, CH	CA, SV	CR, CH, IC
	Incentives	CA, CH, CR	EBT, CH, CA	CA, SV	CH
	Control/Recourse	CA, CH, CR, MO	CH, CA, EBT	CA, SV	CH, MO
	Budgeting/Records	CA, CH, CR, MO	CA, CH, EBT	CA, SV	CH, MO
	Personal Involvement	CA, CH, MO	EBT, CH, CA	CA, SV	CH
	Privacy/ Security	CH	CA	CA, SV	MO, IC
Moderate Resources	Convenience	CR, DB	DB, CA	CA, SV	CR, CH, IC
	Incentives	CR, CH	CH, CA	CA, SV	CR, CH, IC
	Control/Recourse	CR, CH, ECC	CR, CA, DB, ECC	CA, SV	CH, MO, IC
	Budgeting/Records	CH, CR, ECC	CA, CH, ECC	CA, SV	CH, MO
	Personal Involvement	CH, ECC	CA, CH, ECC	CA, SV	CH, IC
	Privacy/Security	CH	CA	CA, SV	CH, MO, IC
High Resources	Convenience	CR, DB, ACHDB	DB, CA	CA, SV	CR, CH, IC
	Incentives	CR, DB, ACHDB	CR, CH, CA	CA, SV	CR, CH, IC
	Control/Recourse	CH, CR, ECC, ACHDB	CR, CH, DB, ECC, ACHDB	CA, SV	CH, MO, IC
	Budgeting/Records	CH, CR, ECC	CA, CH, ECC	CA, SV	CH, MO, IC
	Personal Involvement	CR, CH	CA	CA, SV	CH, IC
	Privacy/Security	CH	CA	CA, SV	CH, MO, IC

[79] This table (Mantel (2000a)) illustrates the types of instruments consumers might choose for different transactions. One implication is that different preferences may be best served by different types of organizations – sometimes by banks and at other times by merchants or non-banks (See Mantel (2001)). For example, financial institutions might theoretically be better situated to evaluate the control and risk implications of payments. This is evidenced by Visa's and MasterCard's extension of zero liability policies. Similarly, merchants might theoretically be better situated to provide convenience and incentives to consumers. Billpoint, a joint venture between eBay and Wells Fargo, is one example of how merchants can provide added layers of convenience.

[80] ACH = Automated Clearinghouse, CH= Check, CA = Cash, PC = PC Banking, CR = Credit Card, DB = Debit Card, MO = Money Order, SV = Stored Value, EBT=Electronic Benefits Transfer, ECC=Electronic Check Conversion, ACHDB –ACH-based debit card, EC=E-cash,

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