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# Emerging Issues Series

## **Why Has Stored Value Not Caught On?**

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# Why Has Stored Value Not Caught On?

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## Abstract

Why have general-purpose stored-value cards been unsuccessful in penetrating the U.S. market? Three necessary conditions for a payment instrument to be successful are discussed: consumers and merchants need to be convinced of its advantages over existing payment alternatives for at least some types of transactions; payment providers must convince consumers and merchants *simultaneously* of its benefits to achieve critical mass; and assure them that adequate safety and security measures have been implemented. This article discusses the credit card industry's success in meeting these necessary conditions and stored-value issuers' failure to meet these conditions to date.

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Advances in computing power, electronics, and telecommunications have improved the way we live. Now such advances have started to change the way we pay. Technological advancements now make it possible for consumers to purchase goods with electronic bits of information representing money, commonly referred to as stored value. The value may be stored on microchips embedded in plastic cards that look similar to credit cards. This type of stored value device is called a smart card. According to an article three years ago, “Smart cards are set to revolutionise payment systems and provide a plethora of new opportunities” (Talmor and Timewell 1997). Another article in the popular press stated that “Cash is dirty, inefficient and obsolete. ‘Smart cards,’ digital cash and a host of electronic currencies will soon replace pocket money” (Gleick 1996).

Financial analysts have predicted the death of cash and other paper-based payment instruments for many years. Although usage of electronic payment instruments has increased in the past few years, cash and checks still remain the preferred payment instruments by consumers in the United States. However, some observers suggest that we may finally be close to making most payments electronically. “After decades of unfulfilled promise, electronic payments are tantalizingly close to achieving critical mass. The logjam has broken and we’re starting to see a flood of new products, providers, and users” (Federal Reserve Bank of Chicago 1998).

This article focuses on the reaction of consumers and merchants to smart cards. Smart card issuers along with producers of the technology have made sizable investments to establish smart cards as a viable payment instrument. The move to chip cards is aided by the reduction in the cost of producing them. Payment card organizations such as MasterCard and Visa along with banks and nonfinancial institutions have invested significant amounts of money into stored-value technology in an effort to provide electronic substitutes to government-issued physical cash.

MasterCard reportedly had invested over \$150 million to purchase 51 percent of Mondex International, an electronic cash system developed in the United Kingdom by National Westminster Bank (Hansell 1996). National Westminster spent more than \$100 million to develop Mondex (Stouffer 1996).

Stored-value issuers hope to benefit from float resulting from outstanding stored-value balances, gaining merchants not currently served by other payment products, and the potential advertising on the physical card. However, issuers will have to convince consumers and merchants why they should use stored value. Issuers argue that their product would be more convenient for consumers and reduce costs of processing payment for merchants. Furthermore, stored value may offer a less expensive payment alternative for small-value Internet purchases.

Most analysts agree that the two largest U.S. stored-value trials— the Atlanta Olympic Games and the Upper West Side of Manhattan— failed in convincing consumers and merchants of the benefits of using stored value over existing payment alternatives. *The Economist* (1998, 73) concluded that, “Electronic money has thus turned out to be a solution in search of a problem.” However, new payment instruments usually require a sufficient amount of time before consumers and merchants recognize their benefits and become comfortable in using them.

### **The Necessary Conditions**

Consumers and merchants are reluctant to change their preferences towards payment instruments. Economic scholars from the nineteenth century had identified the reluctance to adopt new forms of payment. In the context of the issuance of new coinage, Jevons (1875, 75) wrote, “No one can possibly understand many social phenomena unless he constantly bears in mind the force of habit and social conventions. This is strikingly true in our subject of money.” Furthermore, Evans and Schmalensee (1999) observe that in the last 4000 years there have been

only four major innovations in the way we pay. These four major innovations are: coins (4,000 years ago), checks (800 years ago), paper money (more than 100 years ago) and the payment card (over 50 years ago).

This article identifies three conditions that must be met before stored value is widely used. First, consumers and merchants need to be convinced why stored value is superior to existing payment instruments. No one payment instrument may be ideal for all transactions. For example, cash is preferred by consumers for relatively small purchases because noncash transactions such as checks and credit cards take longer to process and may allow others to track spending habits. However, cash is not the preferred instrument when making large purchases primarily due to safekeeping concerns. Furthermore, issuers may need to provide incentives to promote the use of stored value and convince consumers and merchants of its benefits.

Second, as with the introduction of any new payment instrument, to achieve critical mass, consumers and merchants need to be convinced *simultaneously*. That is, consumers will not use stored value unless a sufficient number of merchants accept it and merchants will not accept it until a sufficient number of consumers use it. Many credit card analysts describe this obstacle as the chicken-and-egg problem (Nocera 1994 and Evans and Schmalensee 1999).

An example of the inability of a payment instrument to overcome the chicken-and-egg problem is the Susan B. Anthony dollar coin.<sup>2</sup> Because coins remain in circulation much longer than bills, they are less expensive for currency issuers in the long run. Unlike most countries, the United States has been unsuccessful in replacing lower denomination bills with coins. A popular use of dollar coins would be vending-machine purchases. However, some have argued that operators of vending machines were reluctant to invest in new machines that accepted dollar

coins partly because they felt that consumers would not use them (Caskey and St. Laurent 1994).<sup>3</sup> McAndrews (1997b) notes that Canada was eventually successful with its dollar coin because the Bank of Canada started to withdraw notes from circulation which in turn forced vending machine operators to make the necessary modifications to accept the dollar coins.

Third, with any payment instrument, consumers, merchants, and financial institutions are concerned with credit and fraud risk. For our purposes, credit risk is the risk that the payee is unable to convert a payment into good funds. The inability to acquire good funds may result from the payor, a payment intermediary, or the issuer's inability to process or make good on its obligation to deliver good funds. Fraud risk is the risk that an unauthorized user is able to use the payment system for financial gain or a participant in the payment process presents a monetary claim that is not backed by the value stated.

An important issue with credit and fraud risk is the allocation of monetary losses when it occurs. Consumers and merchants generally prefer if the liability is with the payment service provider. Payment instruments with this characteristic may also penetrate the market quicker. In the case of credit cards, government regulations determine the maximum liability to the consumer if the card is used by an unauthorized user. Some observers of debit cards argued that because consumers faced more liability initially with debit cards than other payment instruments, they were reluctant to use them (Caskey and Sellon 1994).

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<sup>2</sup> This year the United States Mint introduced a new "golden dollar" coin carrying the image of Sacagawea, Lewis and Clark's Indian guide. The Mint is spending close to \$45 million to encourage public acceptance (Vinciguerra 2000).

<sup>3</sup> Others have argued that the similarity with the quarter led consumers to shun the coin. However, consumers have accepted the difference between different denominations of paper bills of the same size.

## **Is It Better?**

New payment products should provide benefits to both consumers and merchants to succeed and be profitable to payment providers in the long run. Issuers of new payment instruments usually target a segment of the payment services market where their product is superior to existing alternatives. The market for payment services can be divided by amount, location, or type of purchase made by consumers. Consumers may prefer to use cash for small-value purchases at the point-of-sale whereas checks may be preferred for remote transactions such as bill payment. Merchants in certain industries may limit the payment options that they offer to consumers. For example, fast food vendors may be reluctant to accept credit cards because of the time required to process transactions and generally assume that consumers usually carry sufficient cash to make the relatively small-value transaction.

### Credit-Cards

In the early 1970s, some financial observers predicted that credit cards were not viable in the long run. One such observer described “credit cards, bank originated or other, as a temporary but probably unavoidable retreat in the campaign to develop an efficient domestic payments mechanism” (Hester 1972). Today, credit-card transactions rank third behind cash and checks in terms of the number of transactions. There were 10.04 billion general-purpose charge and credit card transactions accounting for \$985.57 billion in the United States in 1998 and the number of transactions is predicted to be 14.68 billion valued at \$1.86 trillion in 2005 (*Nilson Report 1999*).

General-purpose charge and credit cards have existed for over 40 years. General-purpose charge cards, a precursor to credit cards, extend short-term credit, i.e. consumers had to pay their charges when billed. In 1949, Diners Club introduced the first general-purpose charge card (See Appendix A: titled Diners Club). In 1958, Bank of America issued the first general-purpose

credit card, the BankAmericard, the precursor to Visa (See Appendix B: The BankAmericard). Unlike charge cards, credit cards allowed consumers to pay their monthly charges in installments.

Today, credit cards benefit consumers and merchants and are profitable to payment providers.<sup>4</sup> Credit cards serve two primary functions for consumers: (1) they allow consumers to purchase goods and services (serves as a payment instrument) and (2) they extend credit to consumers lacking sufficient funds even if they choose to pay their balances in full (serves as a credit instrument). Furthermore, consumers can use them almost anywhere in the world as easily as they do in the United States. The number and types of merchants accepting credit cards continues to grow.

Although the most expensive payment instrument to accept, merchants benefit from credit cards as well. For charge and credit card purchases, most merchants enjoy payment guarantees from card issuers if they take the proper authorization steps. Merchants also benefit from greater sales and profits. In a survey of retailers, 83 percent thought accepting credit cards increased sales and 58 percent thought their profits increased from accepting them (Ernst and Young 1996). These greater sales are generated in part because consumers may not have sufficient cash on hand. In other cases, consumers may prefer to use their credit cards exclusively because of frequent-use awards or dispute-resolution services. As a result, these consumers would prefer to frequent merchants that accept credit cards.

Financial institutions earn revenue from the merchant discount, interest income from consumers who borrow beyond the payment cycle, and other fees from additional services provided. However, there are risks that financial institutions take when issuing credit cards.

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<sup>4</sup> Chakravorti and Emmons (1999) and Chakravorti and To (1999) model the incentives for consumers to use credit cards and merchants to accept them.



Investment into new payment products may not immediately generate a positive return. In the case of Bank of America, fifteen months after launching its BankAmericard, it officially lost \$8.8 million dollars but if hidden costs such as advertising and overhead were included, the loss was closer to \$20 million (Nocera 1994).

### Stored Value

Stored value has been successfully adopted for transportation systems such as the Bay Area Rapid Transit system in the San Francisco Bay Area and the Metro in the Washington D.C. area. These stored-value systems are closed systems and use magnetic stripes. Smart cards have been implemented as stored value devices in closed systems in the United States such as universities and military bases. Two notable general-purpose trials have been conducted in the United States— Upper Westside of Manhattan and the 1996 Atlanta Olympics (See Appendix C, titled Atlanta Olympic Trial, and Appendix D, titled New York City Trial).

Similar to credit cards, for stored value to be successful, consumers and merchants along with financial institution must all perceive a benefit from its use. Consumers should benefit from the ease in loading monetary value onto their cards via telephone or personal computer versus making trips to acquire cash from ATMs, bank tellers, or supermarkets. They may also find it easier to carry and store than cash. In addition, consumers may perceive greater security in using stored value because they may be protected by a personal identification number (PIN) or the issuer may guarantee the unused value if lost or stolen. However, in most stored-value systems, consumers lose the value on their cards if they are lost or stolen.

Consumers are unlikely to use stored value for purchases where they use checks, credit or debit cards because they risk losing monetary value if the stored value is lost or stolen and forgo

the opportunity to earn interest on their funds before they spend them.<sup>5</sup> Furthermore, the opportunity for consumers to make purchases with noncash instruments continues to grow. Thus, stored value may only replace a shrinking number of cash transactions.

Merchants may benefit from a lower volume of cash transactions because cash transactions are more prone to safekeeping concerns and on average take longer than stored-value ones. Lucas (1994) states that employee theft can account for up to 4 percent of cash sales for primarily cash-based transit systems. In addition, merchants benefit from not needing an online authorization unlike with credit and debit cards, thereby reducing costs. Furthermore, some merchants would benefit from quicker transactions because the transfer between the merchant's stored-value machine and the consumer's smart card would be faster than alternative payment forms (Authers 1997). For example, consider two coffee shops that are crowded with customers on their way to work, and one accepts stored value and the other does not. The one that accepts stored value may attract more customers than the other coffee shop because customers may be served faster since stored value transactions are faster than those involving cash that require change or credit and debit card transactions requiring online authorizations. Such gains may not be realized immediately because cashiers may require some time to become accustomed to the new payment medium especially if few customers use it.

However, merchants may be the most reluctant to use stored-value technology. Merchants face large transition costs in acquiring the necessary hardware to accept stored value and training their staff. Some analysts argue that the initial investment may be relatively small compared to the potential cash savings. Sheehan (1998) calculates the cost savings over the next ten years would be sufficient to finance a \$24 billion capital investment of which \$2 billion

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<sup>5</sup> For a general discussion about the preferred payment instrument by consumers and merchants, see Chakravorti (1997) and Humphrey, Pulley, and Vesala (1996).

would cover the cost of providing the payment cards to consumers, \$1 billion to \$7 billion would cover the cost of replacing the 150,000 ATMs, and \$15 billion to finance the purchase of up to 30 million new cash registers. Furthermore, DePrince and Ford (1997) argue that some hardware would need to be replaced over time anyway. Thus, the additional cost to convert existing terminals that accept credit and debit transactions may be relatively small.

Financial institutions should also benefit from the shift to stored value from cash. According to the U.S. Department of the Treasury (1997), cash transactions cost merchants and financial institutions \$60 billion annually. In addition, financial institutions may benefit from income generated from issuing and distributing the stored value and the interest income from outstanding stored value.<sup>6</sup>

Stored value should offer a relatively inexpensive alternative to checks and credit cards for small-value Internet purchases with the potential of better security measures.<sup>7</sup> Currently, credit cards are the most used payment instrument for online purchases. However, Internet credit card transactions may be risky and carry high merchant fees.<sup>8</sup> Value stored on smart cards because of its superior security measures could be the ideal payment instrument for such transactions. In addition, stored value may offer consumers anonymity unlike other existing noncash payment instruments used for online purchases. Thus, stored value has the potential to offer benefits not provided by other instruments especially for low-value Internet payments.

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<sup>6</sup> In the United States, regulators have not restricted the issuance of stored value to financial institutions.

<sup>7</sup> For a discussion about Internet payments, see McAndrews (1997a).

<sup>8</sup> In fact, credit-card issuers have started to embed microchips in their cards to improve the security of Internet transactions.

## Can It Achieve Critical Mass?

Payment instruments have two distinct sets of users—consumers and merchants—that simultaneously demand payment services. Consumers benefit more from an increase in the number of merchants that accept the payment instrument than from an increase in the number of consumers that use it. Similarly, merchants benefit more from an increase in the number of consumers that are willing to use it than the number of merchants that accept it. In other words, the consumer’s demand and the merchant’s demand for the payment service are interrelated.<sup>9</sup>

Payment services can be viewed as network goods. A good is defined as a network good if a user of the good benefits from an increase in the number of users of that good (See Farrell and Saloner 1985, Katz and Shapiro 1985, and McAndrews 1997b). For example, telephones and fax machines are network goods because existing users benefit from an increase in the number of people that they can communicate with. Furthermore, a sufficient number of users is required for the network good to survive. Economists define this sufficient number as a critical mass.<sup>10</sup> Both credit cards and stored value exhibit characteristics of network goods.

The problem of a network good achieving critical mass can be described as a chicken-and-egg problem. An example of a good that required a long time to overcome the chicken-and-egg problem is the debit card. Although the first debit card pilot was conducted in 1966, only recently have debit card transactions started to gain popularity.<sup>11</sup> Initially, debit cards used ATM networks to process transactions at the point of sale. Issuers were initially unsuccessful in convincing a sufficient number of merchants to participate primarily because the additional cost of installing card readers and the lack of interoperability among the different ATM networks.

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<sup>9</sup> For a discussion about the interrelated demand for payment services, see Baxter (1983) and Osterberg and Thomson (1998b).

<sup>10</sup> See Economides and Himmelberg (1995) for a discussion of critical mass in the context of network goods.

Today, one in three merchants have point-of-sale personal identification number-based terminals needed to process online debit cards (Orr 1998). Furthermore, consolidation of ATM networks and the introduction of shared networks also increased the appeal of online debit cards to merchants.<sup>12</sup>

Another innovation that allowed greater market penetration was the introduction of the offline debit cards issued by the credit card associations. Offline debit cards use credit card networks as opposed to ATM networks. Because these networks were already extensive and merchants faced no new setup costs, these cards were able to penetrate the market much quicker. Today, offline transactions outnumber online ones.

To overcome the chicken-and-egg problem, debit card providers used existing technologies that were familiar to both merchants and consumers. To increase consumer usage many financial institutions started to issue ATM cards that were both online and offline debit cards. Thus, with the ATM customer base and the use of the existing credit card network by offline debit cards, debit cards were able to overcome the chicken-and-egg problem.

### Credit Cards

Charge and credit card issuers used various techniques to overcome the chicken-and-egg problem. To achieve a critical mass of consumers, Bank of America mailed “active” cards to their existing customers. Not having a customer base to solicit, Diners Club initially handed out leaflets door to door and issued cards to applicants if they had a job. Because, cardholders initially did not incur any of costs associated with credit card transactions, they were easier to convince to use the cards.

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<sup>11</sup> For an excellent discussion on why the debit card has been slow to penetrate the marketplace, see Caskey and Sellon (1994).

<sup>12</sup> For a discussion of shared ATM networks, see McAndrews (1991).

Card issuers had more difficulty bringing merchants on board because they were charged a fraction of the purchase price. Diners Club managed to convince twelve restaurant owners to accept their card at the time of launch. Bank of America started with 300 merchants. Larger merchants were unwilling to pay the merchant discount.<sup>13</sup> Often card issuers used creative strategies to enter a given market. For example, the restaurant association in the state of Washington tried to prevent the Diners Club card from entering their market by having all of its members boycott the card (Mandell 1990). To enter this market segment and end the boycott, one of the founders of Diners Club purchased a restaurant in Seattle. Travelling businessmen began choosing this restaurant instead of others because it was the only one to accept Diners Club. Eventually, restaurants in Washington abandoned their ban on Diners Club.

To increase the number of consumers and merchants that were part of the network, credit-card issuers began to form credit card networks where financial institutions were partners as opposed to competitors. In 1966, credit card associations such as Master Charge and the Interbank Card emerged to compete with Bank of America.<sup>14</sup>

To expand the geographic coverage of its cards, Bank of America began to license the BankAmericard through Bank America Service Corporation to out-of-state banks. Banks would pay a \$25,000 entry fee to Bank of America and a small royalty to support a national advertising campaign to become members of the network. Each bank would enlist its own merchants and customers. The main goal of these licensing agreements was to increase the number of consumers using the card and the number of merchants accepting the card. Bank of America

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<sup>13</sup> The first large department store chain to accept third-party credit cards was J.C. Penney in 1979 and widespread acceptance by grocery stores has only occurred recently. On the other hand, smaller merchants that granted their customers credit were willing to pay the fee to reduce their accounting, collection, and billing costs.

<sup>14</sup> Master Charge and the Interbank Card Association soon merged and today, this organization is known as MasterCard.

benefited from BankAmericard holders from other states making purchases from their merchants and from their customers making purchases from merchants of their licensees.

Card issuers used innovative ways to simultaneously convince consumer and merchants of the cards' benefits. The more consumers that card issuers convinced, the more merchants were willing to accept it. Although credit cards were eventually successful in overcoming the chicken-and-egg problem, Osterberg and Thomson (1998b) suggest that critical mass was only achieved for the credit card market in the late eighties when its growth exploded.

### Stored Value

To promote usage, payment instrument providers entice both consumers and merchants with incentives. In some U.S. stored-value trials, issuers have given consumers monetary value to promote its use.<sup>15</sup> At the Atlanta Olympic games, some stored-value cards were given away with five dollars of purchasing power, but cardholders preferred to keep them as souvenirs. Merchants also received the necessary equipment at subsidized rates and may not have paid the full merchant discount.

To increase awareness of smart card technology, some financial institutions in other countries have started to use existing payment instruments such as ATM and credit cards to piggyback stored value by placing microchips on these cards. For example, financial institutions in Belgium and Finland have started to put microchips on ATM cards. In these countries, consumers must use stored value to pay for parking meters, calls from public phones, and bus tickets (*The Economist* 1998). These uses of stored value may increase consumers' awareness and comfort level with stored value.

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<sup>15</sup> Recently, PayPal.com, an internet company that allows individuals to send monetary value to one another by using their credit cards, has offered consumers \$10 for signing up and sending monetary value (Sapsford 2000). Such a strategy they claim is less expensive than advertising during the Super Bowl and better in establishing market share.

Like debit cards, the success of stored value may require issuers to establish a uniform standard allowing for interoperability among smart card systems. Today, merchants are reluctant to invest in a specific stored-value standard that may disappear in the future. However, cooperation does exist between stored-value issuers as evidenced by various smart card industry groups. Until merchants are convinced about a viable stored-value standard, they may be reluctant to invest in stored-value technology.

As with the adoption of other payment instruments, consumers and merchants are frequently offered incentives by payment providers to achieve critical mass. However, as seen with credit cards, critical mass is not gained overnight and may require various creative strategies and sufficient time.

### **Is It Safe and Secure?**

The sustainability of a new payment instrument is critically dependent on the containment of credit and fraud risk. The success of any payment system is related to the faith and confidence that participants have in it. Payment providers should convince consumers and merchants that they can convert their claims into good funds with minimal risk. If the payment provider becomes bankrupt and has payment obligations outstanding, consumers and merchants may face significant losses. Often such losses are guaranteed if they are deposits in government-insured depository institutions. To limit credit risk, some European regulators have argued that stored value should be only provided by regulated financial institutions.

Along with credit risk, payment providers are concerned with containing fraud risk. Roberds (1998) describes two major forms of fraud. In the first case, the buyer presents a monetary claim that is not backed by the value stated. For example, in a check transaction, the consumer may write checks with insufficient funds in his account. The other type of fraud



involves the buyer using a monetary claim belonging to someone else or in the case of stored value, creating it.

While credit and fraud risks are difficult if not impossible to eliminate, adequate disclosure of which participant bears the loss is critical to the sustainability of any payment instrument. If payment providers cannot adequately guard against unauthorized use, resulting losses may lead them to leave the industry and lead consumers and merchants to lose confidence in using that type of payment instrument. Furthermore, if consumers and merchants perceive that they are more liable for payments made with a new instrument, they may be less willing to use it.

### Credit Cards

Historically, credit and fraud risks have been challenging for credit-card issuers to contain and have led to a number of issuers leaving the business. Technological advancements along with government regulations significantly reduced these risks. However, credit card networks continue to improve and introduce new measures to contain these risks.

Credit risks are contained by guidelines and rules at various levels in the credit card network. The risk that a financial institution is unable to meet its payment obligation is controlled primarily by the card associations. Because the cost of losing their reputation is so high, the associations may impose guidelines governing the distribution of losses if a member institution is unable to meet its obligations. Credit risk at the consumer and merchant level is primarily contained by policies of the financial institutions involved. Today, financial institutions use more rigorous methods to determine creditworthy consumers. In addition, part of the interchange fees charged by card-issuers to merchant banks covers the credit risk the issuer faces from consumers unable to pay their obligations.

Fraud was a major factor in the early years of charge and credit cards. Evans and Schmalensee (1993) report that in 1960, Bank of America's losses from fraud and defaults were nearly \$9 million or 15 percent of their volume. Fraud was committed in various ways including consumers using cards to make purchases that they did not intend to pay, cards being stolen from the mail and used to make purchases, and merchants sending in credit slips for nonexistent purchases.

Banks implemented several policies to limit fraudulent uses. Banks required that merchants call their financial institution's credit centers when purchases were above a certain amount, known as floor limits. Many banks provided merchants with hot lists that identified delinquent accounts. Eventually, Congress outlawed the mailing of unsolicited credit cards by financial institutions in an effort to limit fraudulent use. However, these measures were not sufficient.

The use of computers and telecommunications in the authorization process allowed credit card organization and their members to contain fraud. In 1972, National BankAmericard Inc. (NBI), 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 build and implement, it saved members of NBI at least \$30 million in the first year (Nocera 1994). The initial authorization system still involved humans checking computer screens for the status of the customer's account. Today, the process is completely automated and most transactions are authorized prior to purchase. Further improvements to the physical card, the network, and the monitoring of charges have led to significant reduction in losses from fraud.

Although credit and fraud risk have not been eliminated, sufficient steps have been taken to assure consumers and merchants that they face minimal liability when using and accepting credit cards. The adoption of systemwide guidelines along with the aid of real-time online processing have greatly reduced these risks in the credit card network.

### Stored value

Some financial analysts have compared the issuance of stored-value to the issuance of private money during the U.S. Free Banking Era.<sup>16</sup> During this period, banks issued their own currency. Consumers and merchants accepting private currency absorbed the risk that the currency could not be redeemed for metallic species or exchanged for other currency. Similarly, the confidence that consumers and merchants have in stored value will depend on their perceptions about the viability of the issuer.

The most powerful deterrent against fraud in stored-value systems is the technology. Smart card technology may be more secure than cash for merchants and offer greater protection from counterfeiters than magnetic stripe technology for issuers. To prevent theft of coins from public phones in France, callers were required to use smart cards. The major credit card companies are considering smart card technology as a replacement for magnetic stripes to reduce credit card fraud.

Stored-value issuers want to limit or perhaps eliminate the possibility that outsiders can replicate the underlying value and inject it into the system. One of the largest known cases where a stored-value system was compromised occurred in Japan involving Pachinko parlors where the less secure magnetic stripe technology was used. Criminal organizations were able to create stored value that they did not purchase. As a result stored-value issuers are said to have lost at least \$600 million (Pollack 1996).

Realizing that the most sophisticated technology to prevent fraud may not be impenetrable, stored-value issuers are considering other preventive measures. While online real-time verification would defeat the purpose of stored value, most issuers require redemption of the underlying value after each use.<sup>17</sup> In these systems, fraud could be detected sooner than in systems where stored value is redeemed less frequently. However, given the relatively small amount of monetary value transacted with stored value, there may be little incentive to commit fraud.

### **Will Stored Value Succeed?**

Given the comfort and convenience that consumers have with existing payment instruments and ongoing improvements to reduce the cost of accepting these instruments, consumers and merchants in the United States may perceive little benefit from stored value as a stand alone payment instrument especially at the point of sale. Thus, unless consumers are forced to use it by merchants, the wide use of stored value as a stand alone point-of-sale payment instrument is unlikely in the United States. However, microchips are being added to identification cards or existing payment instruments where value can be stored and used to make purchases. Such types of cards exist in closed settings such as university campuses where students may use the stored-value feature to make photocopies where other alternatives are not as convenient. Alternatively, merchants using stored value in closed systems such as transportation systems could enter into agreements with other merchants to broaden the acceptance of the payment instrument.

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<sup>16</sup> For a discussion about this issue, see Lacker (1996) and Osterberg and Thomson (1998a).

<sup>17</sup> A notable exception is the Mondex system which allows consumers to exchange value among themselves without third-party intervention.

Experiences in Europe suggest that government mandates may increase the acceptance of smart cards. However, even with such intervention, usage rates of the stored-value component remain small as a percentage of total transactions. As with the introduction of other payment instruments, smart cards will require some time before they achieve critical mass.

The Internet may be the ideal medium for smart cards since the exchange of physical cash is not possible and they may be the least expensive and most secure option for very small transactions. Furthermore, few noncash payment alternatives that maintain the consumer's anonymity exist today. However, similar to transactions in the physical world, consumers would prefer credit and debit cards for higher value transactions.

Given that stored value is able to find the right market segment, its acceptance may be faster than that for credit cards. Today, consumers and merchants are more comfortable with electronic payments such as credit and debit cards. Similarly, merchants have started to make substantial investments in promoting e-commerce and such transactions may require alternative forms of payment such as stored value especially for small-value transactions.

## **Conclusion**

This article explored three necessary conditions for the viability of a new payment instrument. As is the case with most innovations, sufficient time is required before consumers incorporate it in their daily lives. A new payment instrument may take longer for consumers to accept because of the complex set of interactions that occur among participants. It must provide benefits not provided by existing ones for at least certain types of transactions. Consumers and merchants must be convinced simultaneously of its benefits and may require incentives to

change their behavior. Finally, the payment instrument should be relatively safe and adequate measures against credit and fraud risk should be adopted.

So far, stored-value issuers have not convinced consumers and merchants why stored-value should be used to make payments. Perhaps, the best marketing of stored value would be as an enhancement to existing debit and credit cards. Similar to the debit card, where issuers used the existing ATM and credit card networks, by piggybacking on existing payment cards, stored value could benefit from economies of scope. In addition, as the market matures, the necessary security measures would need to develop. Although stored value shows promise as a new payment instrument, like other payment instruments such as credit and debit cards, sufficient time along with meeting these three necessary conditions is required before it will become a widely-used form of payment.

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## Appendix A: Diners Club

Founded by Alfred Bloomingdale, Frank McNamara, and Ralph Snyder, Diners Club introduced its general-purpose charge card in 1949.<sup>18</sup> As the name suggests, the Diners Club card was initially targeted at businessmen as a means to pay their restaurant bills. Restaurants were willing to accept the card and pay a commission to Diners Club because cardholders were more likely to frequent their restaurants. In addition, consumers found the card particularly useful when travelling away from home because out-of-town checks were not often accepted and carrying large sums of cash posed security concerns. Initially, tenants in the Empire State Building in New York City were solicited with leaflets that were slid under their office doors. Interested tenants would visit the Diners Club office and if they had a job and looked trustworthy, they were given cards at no charge. At the same time, they signed up around twelve restaurants that agreed to accept the card. In the first month, Diners Club earned revenue of \$140. A few months later, Bloomingdale started his own charge card called Dine and Sign in Los Angeles. After three months, Dine and Sign merged with Diners Club resulting in a nationwide general-purpose charge card. Soon after, Diners Club acquired a similar operation in Boston started by former partners in Dine and Sign.

An important issue for both charge and credit card issuers is the timing between when the merchants are paid and when the consumers pay their charges. In the case of charge cards, consumers should pay their bills in full each month. Diners Club used two techniques to essentially receive interest-free short-term credit. First, it collected from its customers at the end of the month and it paid its merchants 30 days after that. Second, it used the nationwide check float to its advantage. It would pay merchants in California with New York bank checks and

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<sup>18</sup> Most of the history of Diners Club is taken from Mandell (1990).

merchants in New York with California bank checks. However, with improvements in check collection the float game was essentially ended.

Another issue was how to attract creditworthy consumers. In addition to attracting businessmen in surrounding establishments, Diners Club offered its cards to high-wealth individuals. One ploy used to attract consumers was to send cards to Cadillac owners from a list that it bought. However, consumers thought that the card offered purchases for free and often gave it to friends to use. Diners Club eventually had to hire detectives to stop fraudulent use.

To expand the business beyond restaurants, Diners Club needed to sign up various types of merchants. Larger merchants resisted accepting Diners Club cards largely because of the seven percent merchant discount and because they thought their own proprietary charge and credit cards would better serve their needs. To attract more merchants, Diners Club lowered its discount rate for some merchants such as airline companies where consumers on average made high-dollar purchases.

Diners Club's monopoly in the travel and entertainment business lasted seven years until American Express and Carte Blanche entered the market. In 1980, Citibank acquired Diners Club. Although Diners Club in 1997 accounted for less than .25 percent of the number of charge and credit card transactions and less than 1 percent of charge and credit card dollar volume, it was a pioneer in the general-purpose credit and charge card market (Nilson Report 1999, Issue 705).

## **Appendix B: BankAmericard**

The BankAmericard was the product of a small internal think tank at Bank of America.<sup>19</sup> Bank of America, being a leader in consumer loans, especially those used for the purchase of durable goods, used its extensive branch network in California to launch the BankAmericard. The card extended credit to consumers at 18 percent a year with a one-month grace period. These were the same terms that Sears, one of the largest merchant credit card issuers, gave its customers. Bank of America's first test was in 1958 and took place in Fresno, California with a population of 250,000 where it had banking relationships with 45 percent of the households. Each of its customers received a BankAmericard free of charge with a credit limit between \$300 and \$500. The card was heavily advertised to encourage its use.

Merchants had to pay 6 percent of their BankAmericard receipts and a \$25 monthly fee for imprinters, these were used by merchants to make an imprint of the customer's card on the credit card receipt. The promoters of the card explained to merchants that 60,000 individuals would want to use the card and if they did not accept the card they would go to merchants that did. In addition, small merchants that extended credit to their customers could save on back office expenses and receive the funds in a few days versus months. More than 300 small merchants were willing to accept the card at the time of the launch. However, as in the case of Diners Club, larger retailers were not easy to convince because they saw Bank of America's entrance into the business as "a form of poaching" (Nocera 1994, 27).

Although the Fresno test was a success, some assumptions made about consumer behavior led to problems when the card was expanded to other areas. Bank of America assumed that collection would not be a problem and unlike installment loans, credit card loans were not collateralized. They were so confident that they did not even have a collections department.

Fraud and issuing cards to uncreditworthy customers led to large losses. Fifteen months after the launch estimates of total credit card losses were \$20 million. The team that established the credit card was dismissed and replaced by staff experienced in the loan side of the business. In addition a collection department and an antifraud unit was established. By April 1960, the card was finally profitable.

From 1958 to 1966, Bank of America had a monopoly in the California credit card business. Other banks were reluctant to enter the credit card market because they had heard about the losses. Each year the credit card's popularity grew. In 1960, there were \$59 million worth of sales and in 1968 that grew to \$400 million. Bank of America's credit card profits increased from \$179,000 in 1961 to \$12.7 million in 1968.

In 1970, the BankAmericard was spun off into National BankAmericard Inc. (NBI), an independent company owned by member banks. In 1976, NBI became Visa U.S.A. and IBANCO, the organization that administered BankAmericards outside the United States became Visa International. In 1999, there were 970 million Visa cards issued by over 21,000 financial institutions that were accepted in more than 18 million merchant sites around the world. For the twelve-month period ending September 1999, Visa cards were used to pay for nearly \$1.5 trillion of goods and services worldwide (Visa 2000).

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<sup>19</sup> Most of the history of the BankAmericard is taken from Nocera (1994).

## **Appendix C: Atlanta Olympic Trial**

In July 1996, Visa International, First Union, NationsBank and Wachovia announced a plan to issue 4 million to 6 million stored-value cards in the Atlanta area. Two types of cards were issued: a disposable card with an embedded microchip in denominations of \$10, \$20, or \$50 and a reloadable card with a magnetic stripe (used to access an ATM) and a microchip (used for storing the monetary value). The disposable cards were sold at card dispensing machines and bank tellers. Banks distributed the reloadable cards to their customers. Around 5,000 merchants were targeted to accept the cards (Weaver 1996).

Issuers hoped that Atlanta would set the stage for general-purpose stored value in the United States and that they would be used nationwide within 4 years. Stored-value promoters thought that the influx of Olympic visitors from countries where stored-value systems already existed would allow for greater usage (Lunt 1996). Trials in Washington, New York, Philadelphia, and San Francisco were scheduled to follow Atlanta.

Despite substantial promotional efforts, the Atlanta trial failed to convince consumers about stored value's benefits. Only 5 percent of Atlanta residents surveyed by Britain Associates reported buying the card (*Credit Management* 1996). Smart cards did not significantly reduce transaction times as expected. The authorization process for Visa's debit card takes about 20 seconds while Visa's stored-value cards took less than three seconds (Lunt 1996). Furthermore, they did not provide any additional security over cash. Just like cash, if the smart cards were lost or stolen, consumers would lose the monetary value associated with the card. Finally, instead of using the cards to make purchases, many Olympic spectators found the cards more valuable as souvenirs.

A key factor for merchants was not only the fees being charged during the trial but also the fees that would be charged after the trial, if they chose to accept stored value smart cards permanently. Similar to credit cards, financial institutions charged merchants per-transaction fees, which ranged from 2.5 percent to 4 percent (Weaver 1996). In addition, many merchants found the card readers (which ranged from a few hundred dollars to \$1,000) too expensive especially given the uncertainty that stored value was viable payment alternative (Murphy 1996). Issuers argued that the merchant fees were offset by a reduction in the businesses' cash-management costs and the increased business resulting from speeding up the transactions. While cash-management costs were reduced, some doubted the value-added from increased transaction speed.

In the end, this trial was generally unsuccessful with merchants because it did not provide significant benefits over existing payment instruments and was almost as expensive as credit cards, the most expensive instrument for merchants to process. The volume and usage data suggest that stored value was unable to significantly penetrate the payment services market. According to Visa, 98,961 stored value transactions valued at \$372,622 were conducted in July compared to 44,604 transactions totaling \$146,051 in June and 23,040 transactions totaling \$65,570 in May. Average transaction value increased from \$2.85 in May to \$3.27 in June to \$3.77 in July (*Credit Card Management* 1996). However, a part of the increase in average transaction size is due to higher prices during the Olympics.

However, smart cards were successful with certain types of merchants. Smart cards were able to penetrate merchants that had not accepted payment cards in the past, such as fast-food restaurants, convenience stores and gas stations (*Bank Systems & Technology* 1996). The



technology was also a big winner with the pilot cards, ATMs, transportation terminals, pay phones and POS terminals.

The Atlanta pilot provided the following lessons. First, marketing and advertising alone does not guarantee that critical mass will be attained. Second, consumers do not view stored value as a viable cash substitute. Third, if consumers cannot find merchants to use stored value, they will not be convinced of its benefits. Fourth, insufficient training of cashiers could hinder customer usage.

## **Appendix D: New York City Trial**

In April 1997, Citibank, Chase Manhattan, MasterCard and Visa started a smart card trial targeted at the Upper West Side of Manhattan in New York City. The Upper West Side neighborhood was chosen because of the promising combination of high pedestrian traffic, a diverse mix of merchants and consumers. In contrast to Atlanta, merchants accepting stored value were concentrated in a relatively small sector of Manhattan and training employees on how to process these types of transactions efficiently was emphasized.

At the beginning of the trial, 50,000 reloadable stored value smart cards were distributed and 500 retail vendors agreed to accept the cards. Issuers hoped to convince consumers and merchants of the benefits of stored value as a viable payment alternative. Unlike other pilots, the New York trial focused on consumer's adoption patterns and not the technology supporting the effort (Clark 1997).<sup>20</sup> Additionally, just like in Atlanta, the Manhattan trial was an open system, which allowed consumers to use their cards at multiple locations primarily for small transactions. Consumers could add value to their smart cards via an ATM or over phone lines. Another distinguishing feature of the New York trial was that the microchip was placed on existing debit or credit cards instead of on a new piece of plastic (*Marketing News* 1996).

Just like in Atlanta, the Manhattan trial failed in convincing consumers and merchants of the benefits of stored value. A key reason for the failure was that merchants were reluctant to support the new system. In contrast to Atlanta, the sponsoring companies installed and maintained the card readers that merchants used without charge, and there were no transaction fees (Foderaro 1998). In response to the Atlanta criticism of a lack of technical support for the machines, a foot patrol was even set up to roam the Upper West Side to solve any problems. In

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<sup>20</sup> The two main systems were Mondex operated by MasterCard and Visa Cash operated by Visa.

spite of these efforts, many merchants were dissatisfied with how the product was introduced and complained that the roll out of the system occurred too close to the holiday season (Silber 1998).

Like merchants, consumers were also not convinced of the benefits of smart cards. Several reasons why customers were reluctant to use the smart cards have been suggested. First, customers did not consider the cards secure and consequently did not want to store large amounts of money on them. Second, they did not want to spend the necessary time to understand how they worked. Lastly, even when consumers wanted to use the cards, they were often unable to use them to make purchases.

In late 1998, the Upper West Side trial ended. Only 96,000 cards were issued to residents and 600 merchants were able to accept them (Beckett 1998). According to Chase Manhattan, shoppers spent about \$1 million using smart cards over the course of the experiment's first year, which averages to less than \$1 a card for each month. The New York trial suggests that smart cards need to offer benefits not currently available with existing payment instruments.

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