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# The Electronic Purse

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*The electronic purse, a new payments instrument offering advantages to both consumers and merchants, may soon replace currency in many routine transactions. Widespread use of the electronic purse could, however, raise concerns about consumer protection and the safety and soundness of the instrument.*

Today a U.S. consumer making a purchase can choose from as many as five principal means of payment: check, cash, credit card, debit card, or automated clearing house (ACH) debit. In recent months, several major financial institutions have announced plans to develop yet another payments instrument—the electronic purse, or stored value card. The electronic purse is a multipurpose prepaid card the size of a credit card. If successful, it might fundamentally alter the way in which people spend money, much as automated teller machines (ATMs) have changed the way that individuals conduct business with banks.

This edition of Current Issues explores how an electronic purse system might work, why such a system should prove attractive to consumers, merchants, and issuers, and what difficulties it might present. The article also reviews several interesting policy issues raised by the introduction of the electronic purse in the marketplace.

## How an Electronic Purse Works

For more than a decade, prepaid cards have been used in the United States in a variety of single-purpose and limited-purpose applications. The mass transit systems of New York, San Francisco, and Washington all use prepaid cards. Prepaid cards are common on college campuses, where students use them for copying machines and at cafeteria checkout lines. Many regional telephone companies have begun selling prepaid calling cards. Applications such as these, which offer only one or a few possible uses, are known as "closed systems." An "open system," by contrast, allows consumers to use a single card in a variety of locations for a broad range of purchases. When used in an open system, a prepaid card is commonly known as either an electronic purse or a stored value card.

An electronic purse system might work as follows. A bank issues stored value cards to its customers, who then transfer value from their accounts to the cards at an ATM, a personal computer, or a specially equipped telephone. The electronic purse card might also function as an ATM card or a credit card. When making purchases, customers pass their cards through a vendor's point of sale terminal. No credit check or signature is needed; validation, when required, is by personal identification number. Funds are deducted directly from the cards and transferred to the vendor's terminal. Merchants can transfer the value of accumulated transactions to their bank accounts by telephone as frequently as they choose. When the value on a card is spent, consumers can load additional funds from their accounts to the card.

Although no electronic purse system currently exists in the United States, several such programs are under way in other countries. Denmark's DANMONT card is now used in vending machines, phones, trains, buses,

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and parking meters. Finland's Avant card, in operation in some cities for two years, is being phased in to cover the entire country.

Because of their modest data processing requirements, closed systems can generally operate using a magnetic stripe card such as those now used for credit cards and ATM cards. An open system is different. To provide sufficient flexibility and protection against fraud, open systems will probably need to employ smart card technology. A smart card is a plastic card, with or without magnetic stripe coding, that has one or more computer chips embedded in it. Capable of storing, retrieving, and manipulating data, smart cards are used in a variety of applications such as health care and security systems.

***To succeed, an electronic purse system will need to offer enough features of value to its three constituencies —consumers, merchants, and issuers— to induce them to bear its costs.***

It is not yet clear what standards fledgling electronic purse systems will adopt. System designers must choose, for example, between two distinct types of smart card representing incompatible technologies: contact cards, which touch a card reader when registering a transaction, and contactless cards, which need only come in proximity to a card reader. Another issue under discussion is whether electronic purse transactions should be traceable. Keeping a record of each transaction would help law enforcement officials track down fraudulent or black market uses of electronic purses. Some maintain, however, that the record keeping would be unduly burdensome and expensive, and could represent an invasion of privacy. They argue that for an electronic purse to be an attractive alternative to currency, it must mimic currency's main attributes—ease of use and anonymity.

## What the Electronic Purse Offers

To succeed, an electronic purse system will need to offer enough features of value to its three constituencies—consumers, merchants, and issuers—to induce them to bear its costs.

In several market studies, consumers have expressed enthusiasm for the electronic purse concept and a general willingness to pay either a per transaction fee of 2 to 5 cents or annual user fees. The major attraction for consumers is convenience: using the card for small-ticket purchases such as newspapers, coffee, and various vending machine items would reduce the need to carry loose change and would speed transactions because consumers would always have "exact change." The electronic purse would also be more convenient than checks or debit cards for smaller transactions. Because it functions independently of a bank account, the electronic purse would afford users both greater privacy and freedom from the need to record expenditures in a checkbook. The electronic purse could even promote budgeting because a user can spend only the amount on the card.

Electronic purses also offer advantages to recipients of government benefits. Several local government agencies have begun using electronic transfers (direct deposit) to issue benefits, and many others are exploring the possibility. To assist recipients without bank accounts, an agency could set up a master account at a bank with subaccounts for its beneficiaries. Smart cards issued to the beneficiaries would serve as both account access devices and electronic purses. Rather than cash a check for the full amount of their benefits once a month at a check cashing establishment, often for a high fee, beneficiaries could use their cards to withdraw funds as needed. This would reduce their exposure to loss or theft of benefits. In providing a safe and convenient store of value and medium of exchange, electronic purses could also help benefit recipients in other ways. Specially programmed ATMs could eventually offer these cardholders new payment options, such as low-cost money orders and the payment of routine bills by ACH.

The electronic purse should also prove attractive to merchants. It saves time and money in the handling of cash. Prepaid cards will likely have lower transaction fees than on-line debit cards and, unlike checks, offer assured payment. In addition, the electronic purse can reduce theft, open new markets (for example, pay-per-view television or vending machines selling $4.98 items), facilitate the collection of market data, and serve as the backbone of customer affinity programs such as frequent flier miles.

Issuers of electronic purses can reduce cash handling costs and combat fraud, save on-line network charges, and gain new sources of fee income from merchants and consumers. Of potentially greater significance, issuers can collect "float," the right to invest and earn interest on the balances their customers hold on electronic purses. As the uses for electronic purses and the number of cards issued multiply, so too will the aggregate balances that consumers carry on the card. The income from float could therefore be substantial.

Float is effectively paid by consumers and the U.S. government. To the extent that the balance on an electronic purse substitutes for demand deposits, cardholders forgo interest on their checking accounts. To the



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extent that the balance replaces currency, the float comes at the expense of the U.S. Treasury. The reason is that the Federal Reserve holds U.S. government securities corresponding to the dollar value of currency in circulation and returns the interest income to the Treasury (more on this later). Over time, however, competitive forces in the banking industry may reduce the value of float to banks as banks lower fees or expand service to attract consumers and merchants to their prepaid card programs.

### Some Drawbacks

As with any new technology, potential pitfalls abound. The cards or the terminals could malfunction, inconveniencing consumers and merchants. Customers might balk at having to tie up funds and pay fees in order to spend their own money. The treatment of lost and stolen cards could be another point of contention. Finally, the market might fragment, creating a hodgepodge of incompatible systems requiring consumers to carry several different cards.

If required to pay transaction fees and to buy new card readers or retrofit existing ones, merchants could be reluctant to accept electronic purses as a mode of payment unless their use generates enough new business to justify the costs. System malfunctions could pose additional problems. A failure to process transactions as rapidly as promised would be especially troublesome for businesses such as fast food chains and gas stations.

Issuers also face risks, of which fraud is the greatest. If criminals learn how to counterfeit electronic purses, the issuing banks might suffer heavy losses. Unlike debit and ATM cards, whose transactions are conducted on-line, electronic purse systems are off-line, making it difficult to detect or track stolen or forged cards. If this problem proves widespread, it could destroy the profitability of issuing electronic purses. Issuers are studying sophisticated cryptographic techniques as well as the periodic recall and replacement of cards as methods to prevent, detect, and contain fraud.

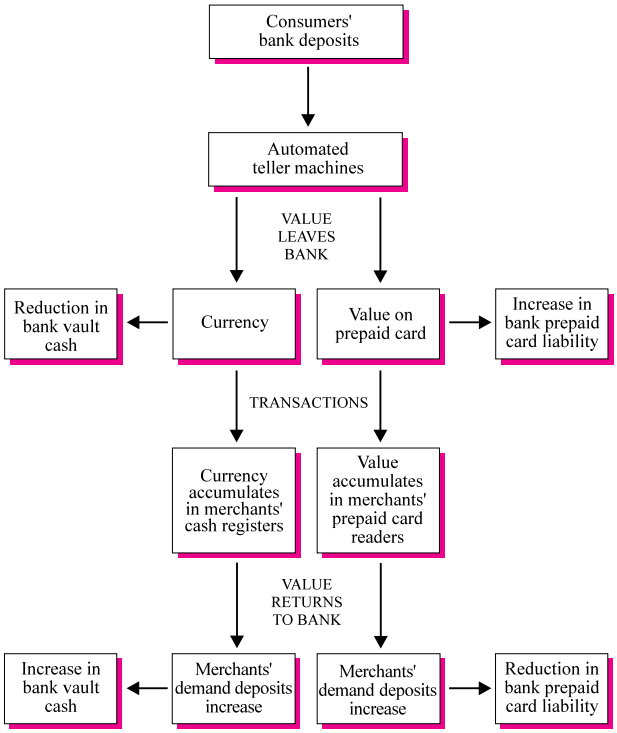
### Comparison of Value Flows

The advent of the electronic purse raises the question of how bank regulators will view the instrument. Will the bank liabilities corresponding to the value held on the card be reservable? Will they be subject to deposit insurance? The accompanying figure clarifies these issues by examining the flows of value that occur when consumers withdraw funds from their bank accounts either as cash or as value added to an electronic purse.

These two types of withdrawal affect a bank's balance sheet in different ways. A cash withdrawal reduces the bank's assets (vault cash) and its liabilities (demand deposits) by an equal amount. Because the reduction in vault cash constitutes a dollar-for-dollar reduction in reserves, and the lower level of demand deposits reduces required reserves by just 10 percent (the current reserve ratio), the bank will need to acquire additional reserves. A withdrawal of funds into an electronic purse, by contrast, merely substitutes one liability for another—an electronic purse liability for a demand deposit liability. Thus, the transaction will have no effect on the bank's reserve management operations provided that both liabilities are subject to the same reserve requirements.

From the consumer's perspective as well, the two types of withdrawal differ conceptually. In both cases, the value withdrawn leaves a government-insured demand deposit. With the currency withdrawal, however, the consumer receives legal tender issued by the Federal Reserve and backed by its holdings of U.S. government securities. The value on an electronic purse, by contrast, is not legal tender for all transactions. It is backed not by securities, but by the promise of the issuer to honor its value. If balances held on bank-issued electronic purses were covered by deposit insurance, however, they would be more equivalent to cash because their value would ultimately be backed by the U.S. government.

**Comparison of Value Flows:**
**Currency and Prepaid Cards**



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Consider next the perspective of vendors. When accepting cash payment, a merchant must take reasonable care not to accept counterfeit currency, because the bank will refuse to accept counterfeit bills for deposit. In contrast, the value of payments made by electronic purse accumulates in a card reader provided to merchants by their banks. Once a bank's card reader accepts a card as valid, the transferred value becomes the bank's liability to the merchant, and the merchant need not worry whether the card was counterfeit.

When the merchant finally deposits cash proceeds in the bank, the bank experiences a simultaneous increase in assets (vault cash) and in demand deposit liabilities. Because the bank's required reserves rise only by the amount of the reserve ratio multiplied by the increase in deposits, the cash deposit creates excess reserves. When the merchant deposits electronic purse value, however, the bank merely substitutes one liability (demand deposit) for another (electronic purse), with no reserve management implications if both liabilities are reservable at the same rate.

***A May 1994 report by the Working Goup on European Payment Systems proposes that only banks be allowed to issue electronic purses. The report cautions that cards issued by nonbanks would not be subject to the banking regulations, supervision, and deposit insurance schemes that have traditionally protected consumers.***

## Other Issues

***Clearing and settlement***. From the perspective of the banking system, an additional issue must be resolved—the clearing and settlement of transactions. Cash withdrawals from ATMs require clearing and settlement because the machine from which funds are withdrawn often belongs to a bank different from the one at which the cardholder has an account. Thus, banks settle daily over networks for the net amounts they owe each other because of the ATM transactions of their customers. Electronic purse payments will create the same need for clearing and settlement since merchants and their customers often bank at different institutions.

***Issuance by nonbanks***. Organizations other than banks might also want to issue electronic purses. Telephone companies and mass transit systems, for example, could expand the use of the single-purpose prepaid cards they now issue by arranging to have them accepted by other service providers. A more open system of this sort could arrange clearing and settlement through an affiliated bank.

Nonbank issuance has been explored by policymakers in other countries. A May 1994 report by the Working Group on European Payment Systems proposes that only banks be allowed to issue electronic purses. The report cautions that cards issued by nonbanks would not be subject to the banking regulations, supervision, and deposit insurance schemes that have traditionally protected consumers. The absence of such safeguards is important because the failure of an electronic purse scheme could undermine public confidence in other electronic purse schemes, possibly causing a run on them. Another issue the report discusses is fairness: because banks are subject to regulations that do not bind other firms, banks might be unable to compete on an equal footing with nonbank issuers of electronic purses.

***Consumer protection***. Electronic purses also raise the issue of consumer protection under Regulation E, which limits consumer liability resulting from the fraudulent use of ATM and debit cards. Would Regulation E be applied to electronic purses? Like ATM and debit cards, the electronic purse would serve as an account access device when downloading value from the checking account to the card. This use would appear to fall under Regulation E. Less clear is whether Regulation E would apply when routine transactions are made: it could be argued that the bank's liability to the consumer has ended, leaving the consumer subject to the same risks posed by carrying cash.

Issuers of electronic purses will also need to deal with state escheatment laws. These laws require that the funds in inactive bank accounts revert to the state after a period of time if the depositors or their heirs cannot be found. Hence, banks could be required to trace the ownership of the cards they issue and to pay state governments the value of the funds on those cards that are inactive for several years.

Money laundering. Currency is used extensively in the underground economy and in illegal activities to evade taxes and the recording of transactions. Participants in these activities, however, face logistical challenges in moving bulky currency from one place to another and depositing the funds in the banking system, where the money is safer, earns interest, and can be used in check transactions. It was to make such operations even more difficult that the Treasury stopped printing currency in denominations over $100.

Some fear that electronic purses would undercut such efforts and make it easier to launder money. Value on these cards would be easier to move from one place to



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another because a card could be more easily concealed than a suitcase of currency. Nevertheless, it would still be difficult to deposit large sums undetected if federal laws requiring the reporting of large cash deposits could be extended to deposits of value from electronic purses. In that case, those involved in these activities would only escape notice if they laundered the value through businesses that could justify large deposits of electronic purse value. The situation might be different, however, for card systems that would allow person-to-person transfer of value and transfers over specially equipped phone lines. These features would allow holders of prepaid card value to move funds rapidly to remote locations where they could make several smaller, undetected deposits. Under these circumstances, electronic purses could facilitate money laundering.

***Displacing currency***. Electronic purses could eventually affect the amount of currency and coin outstanding (see table), particularly the smaller denominations used in routine transactions. Consider an extreme case: Were electronic purses to displace all coins and currency denominations $10 and under, they would substitute for more than half of physical currency outstanding but less than 13 percent of its dollar value, or roughly $50 billion. As the currency was retired, the Federal Reserve would have to sell $50 billion of government securities, thereby losing the interest income on the securities that it normally turns over to the Treasury. At a 7 percent rate of interest, the sale of securities would cost the Treasury about $3.5 billion of in-terest income each year. This loss would be offset, in small part, by a reduction in the costs of maintaining the stock of currency. In practice, this $3.5 billion can best be viewed as an upper limit because electronic purses are only likely to displace a fraction of the smaller denomination currency and coins used in routine transactions, at least for the foreseeable future. Hence, the impact of the electronic purse on currency is more likely to take the form of somewhat slower growth than an outright reduction.

**Composition of U.S. Currency Outstanding As of December 31, 1994**

| | Number of Units (In Billions) | Percentage of Total Number | Dollar Value (In Billions) | Percentage of Total Value |
|---|---|---|---|---|
| Coin | N.A. | N.A. | 21.8 | 5.4 |
| $1 | 5.8 | 36.8 | 5.8 | 1.5 |
| $2 | 0.5 | 3.1 | 1.0 | 0.2 |
| $5 | 1.4 | 8.7 | 6.8 | 1.8 |
| $10 | 1.3 | 8.3 | 13.1 | 3.4 |
| $20 | 3.8 | 24.2 | 76.3 | 19.9 |
| $50 | 0.8 | 5.3 | 41.9 | 10.9 |
| $100 | 2.2 | 13.7 | 215.7 | 56.8 |
| **Total** | 15.8 | 100.0 | $382.5 | 100.0 |

Note: Taken together, all coins and currency in denominations of $10 and under account for more than half of units but only about 13 percent of the total dollar value.

## Conclusion

Rapidly advancing technology is stimulating the growth of electronic forms of payment. Observers of retail banking refer to credit card transactions as "electronic loans" and to debit card transactions as "electronic checks." The next year or two will likely witness the introduction of a complementary instrument, an electronic analogue to cash known as the electronic purse. This newsletter has described how an electronic purse system might work, examined its advantages and drawbacks, and explored the issues that it will raise for policymakers. Although we cannot predict how rapidly and widely this new technology will be accepted and just what forms it will assume, dramatic changes are clearly possible over the next several years in the ways that consumers make payments.

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*The views expressed in this article are those of the author and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System.*



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