

Evaluation of the Off-Line Electronic Benefits Transfer Demonstration

Summary of Findings



May 1994

Prepared by Phoenix Planning & Evaluation, Ltd., Rockville, MD,
under Contract with the
Food and Nutrition Service, U.S. Department of Agriculture



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Analysis and
Evaluation

Summary of Findings

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The Evaluation of the Off-line Electronic Benefits Transfer Demonstration is presented in three volumes and a Summary of Findings. Volume I provides an analysis of the economic impact of the system on food stamp operations. Volume II describes the costs and other impacts of the system on recipients, retailers, and financial institutions. Volume III describes the design, development and implementation process.

For more information on this summary report or the complete reports on which it is based, write to the Office of Analysis and Evaluation, Food and Nutrition Service, U.S. Department of Agriculture, 3101 Park Center Drive, Alexandria, VA 22302

BACKGROUND



The Food Stamp Program is a federally sponsored nutrition program that is administered through state and local welfare agencies. Each month, over 12 million households receive nearly \$2 billion of benefits in the form of paper food coupons. These coupons, distributed in \$1, \$5, and \$10 denominations, are used to purchase eligible food items at over 200,000 authorized retailers. After being redeemed and processed through the banking system, the coupons are destroyed by the Federal Reserve. Since 1980, the Food and Nutrition Service of the U.S. Department of Agriculture (FNS) has aggressively sought ways to reduce the administrative burdens and costs associated with printing, distributing, processing and reconciling coupons. Electronic benefits transfer (EBT) is a paperless food coupon delivery method. FNS recognized not only the opportunity to achieve the reduction of paper, but the potential to reduce the current level of program fraud and abuse.

EBT provides benefit access through point-of-sale (POS) and card access technologies not unlike those commonly used for debit and credit card purchases. FNS has been a strong proponent of EBT and has sponsored many demonstrations to test its cost effectiveness, feasibility, and impact on participants including recipients, food retailers, and financial institutions. The first demonstration, conducted in Reading, Pennsylvania, indicated that while participants preferred EBT to food coupon benefit delivery, EBT was more costly. To determine whether EBT could be cost effective, FNS entered into cooperative agreements with three state agencies and one county agency to conduct additional EBT demonstrations. These state-initiated demonstrations were larger in scale than the Reading project and included cash assistance programs, as well as the Food Stamp Program. Given these economies of scale, the state-initiated demonstrations indicated that EBT can be more cost-effective than paper, and is favored over paper by all participants. These EBT systems, and in particular, the New Mexico project, demonstrated for the first time, the long articulated view that EBT would be more cost effective if piggybacked on the commercial infrastructure.

Each of these demonstrations utilized *on-line* technology in which recipients are provided magnetic stripe cards containing basic identifying information. These cards are used in POS terminals that communicate with a central database with each transaction. Every day, each participating retailer is credited for the net value of purchases and other transactions performed in their stores. Alternatively, using *off-*

line technology, recipients are issued "smart cards" (cards containing a microcomputer chip with processing and memory capabilities) which maintain benefit balance, transaction history and other information in addition to the basic identifying information common with on-line technology. These cards are used in POS terminals that do not require a separate communication with a central database to authorize each transaction. Instead, the identity of the user and the value of the transaction is validated against the data maintained in the card. Similar to on-line systems, each participating retailer is credited for the net value of their transactions every day.

On-line and off-line EBT systems appear to function in virtually the same way from the recipient's point of view. The recipient takes their food items to the checkout counter at an authorized food retailer, they place their card in the card reading device, enter their personal identification number (PIN), and approve the purchase amount. The system verifies that there are sufficient funds available to complete the purchase, verifies the PIN, and approves or denies the transaction.

Hoping to find ways of further improving service and reduce costs, FNS authorized the demonstration of this new technology. While widely adapted in some European countries, smart card technology was relatively new and untested in the United States. Thus, this demonstration was designed to answer some key technological as well as cost questions. In September

THE OFF-LINE EVALUATION

The evaluation compared the impacts of the off-line EBT system to the paper coupon system it replaced and to the state-initiated, on-line demonstrations. The primary evaluation objectives were:

- ✓ *Estimate and compare the costs of the off-line EBT system to the preceding coupon system and to on-line EBT systems and explore the feasibility of continuing or expanding the off-line EBT system.* This analysis is presented in Volume 1.
- ✓ *Describe and compare the impact of the off-line system on each group participating in the demonstration.* This analysis is presented in Volume 2.
- ✓ *Describe the design, development, implementation, and operation of the off-line EBT system.* This description is provided in Volume 3.

EVALUATION RESULTS

At \$8.21 per case month, the administrative costs of the off-line EBT demonstration were substantially higher than the

Exhibit 1

Summary of Off-line EBT Evaluation Results

	Coupon	EBT	Difference
Administrative Cost per Case Month	\$2.89	\$8.21	\$5.32
Recipient Cost per Case Month	13.39	2.52	(10.78)
Benefit Loss & Diversion per Case Month	4.06	1.08	(2.98)
Retailer Cost per \$1,000 Sales	24.73	15.21	(9.52)
Financial Institution Cost per \$1,000 Redeemed	3.50	(0.23)	(3.73)

comparable costs of the paper-based coupon system. The coupon system in Montgomery County costs \$2.89 per case month to operate and administer. However, *the EBT system substantially reduced costs for recipients, retailers, and financial institutions and resulted in a decline in benefit loss and diversion.* Similarly, the administrative costs of the off-line demonstration were higher than either of the state-initiated, on-line systems.

As a measure of cost-effectiveness, retailer and financial institution costs, which are normally reported per \$1,000 redeemed, were converted to a cost per case month basis. The results, shown in Exhibit 2, indicate that the bottom line impact of EBT for all system participants is a decrease of \$8.90 per case month.

Exhibit 2
The Impact of Off-line EBT
 (cost per case month)

	Coupon	EBT	Difference
Administrative Cost	\$2.89	\$8.21	\$5.32
Net Benefit & Diversion	1.53	0.52	(1.01)
Recipient Cost of Participation	13.39	2.61	(10.78)
Retailer Cost of Participation	4.67	2.94	(1.73)
Financial Institution Cost of Participation	0.66	(0.04)	(0.70)
Total	\$23.14	\$14.24	(\$8.90)

Off-line EBT Administrative Costs are Higher than Coupon and On-line EBT Costs

A primary objective of the evaluation of the off-line EBT demonstration was to estimate and compare the costs of the off-line EBT system to the paper food coupon system it replaced and to on-line EBT alternatives. Of principal interest to all parties was to learn whether off-line technology could deliver food stamp benefits more efficiently by minimizing telecommunications and other costs traditionally associated with on-line EBT systems. Administrative costs include all costs borne by the state, local, and federal governments in

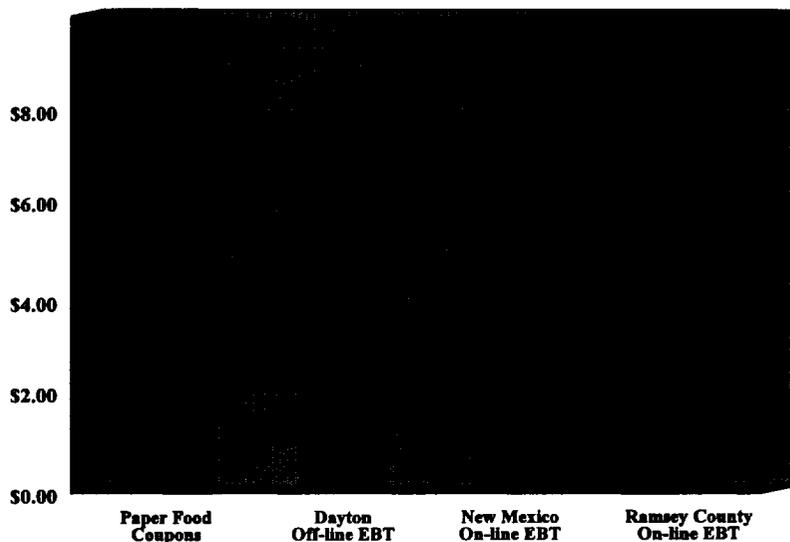
issuing and redeeming food stamp benefits.

The administrative costs of the off-line system were compared to the administrative costs of the state-initiated, on-line systems in Ramsey County, Minnesota and Bernalillo County, New Mexico. The reader is cautioned that comparing the administrative costs of the off-line system to the on-line systems provides a preliminary basis for decision-making; however, the costs incurred in each of the two state-initiated, on-line systems represent costs of more mature operating systems. The off-line system is, in many ways, experimental. In addition, the two state-initiated, on-line systems deliver multiple program benefits and are integrated with the existing commercial infrastructure, thus resulting in greater economies of scope.

The off-line system in Montgomery County was more costly than either of these two on-line demonstrations. As shown in Exhibit 3, the total administrative cost per case month in New Mexico and Ramsey County at \$3.07 and \$4.39, respectively, was approximately one-third to one-half the \$8.21 cost per case month for the off-line EBT system in Montgomery County.

Exhibit 3

The costs of the off-line EBT demonstration were higher than either the paper food coupon system or the on-line alternatives



The higher cost of off-line versus on-line EBT results from:

- ✓ **Card Costs.** The smart card used for off-line EBT is much more expensive than the magnetic-stripe card used in on-line EBT. The TB100 smart cards initially purchased for the off-line demonstration had a unit cost

of \$9.50 compared to an average unit cost of about \$0.25 for magnetic stripe cards.

- ✓ **Account Reconciliation.** Because the recipient's account balance is carried on the card, an off-line system requires daily reconciling between card balances and the host mirror database of recipient account balances.
- ✓ **Single Program System.** The Montgomery County off-line system delivers only food stamp benefits, while the New Mexico and Ramsey County on-line systems deliver benefits for food stamps and cash benefit programs. Thus, card and operational costs in the two on-line systems are shared among multiple programs, whereas the card and operational costs of the Montgomery County off-line system are apportioned over caseloads only for the Food Stamp Program.
- ✓ **Terminal Deployment.** The cost of deploying and maintaining the POS network is approximately \$1.164 per case month, which is less than the comparable cost

Exhibit 4
Summary of Administrative Cost per Case Month of Alternate Food Stamp Delivery Systems

Function	Dayton Food Coupon	Dayton EBT	New Mexico EBT	Ramsey County EBT	Average NM & Ramsey EBT
Authorizing Access to Benefits	\$0.33	\$2.05	\$0.75	\$0.58	\$0.66
Delivering Benefits	2.27	3.34	1.80	2.71	2.25
Crediting Retailers	0.17	0.90	0.03	0.04	0.03
Reconciling Accounts	0.08	1.64	0.33	0.87	0.60
Managing Retailer Participation	0.04	0.28	0.16	0.19	0.17
Total	\$2.89	\$8.21	\$3.07	\$4.39	\$3.73

in Ramsey County of \$1.41 and more than the cost in New Mexico of \$0.06. The relatively low cost in New Mexico reflects the fact that the EBT system piggybacks on the existing commercial infrastructure, whose cost is borne by the participating retailers and third parties.

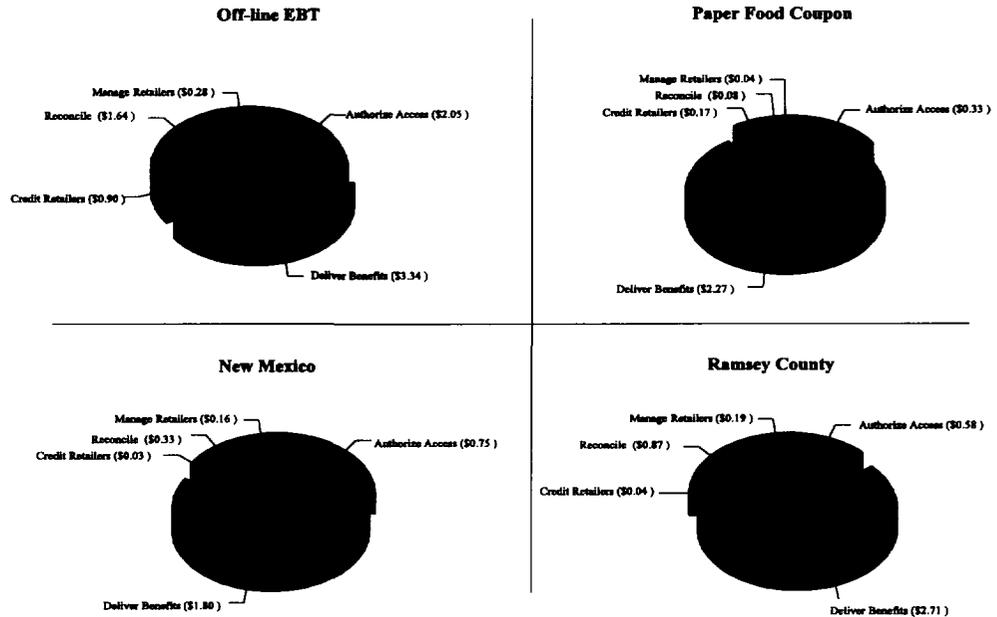
A discussion of the distribution of costs within each system provides an insight into how each type of system impacts costs. The difference in the distribution of costs between the off-line system and the on-line systems, is indicative of the procedural and system-generated differences between on-line and off-line systems. Note that in the off-line system, costs are more evenly distributed between all functions except managing retailers than in either of the two on-line systems or the paper system. This distribution is a result of the functional differences between off- and on-line systems. For example, in the on-line system, crediting retailers is a passive activity. Settlement is initiated by the processor at a pre-set cut-off time that does not require any additional communications from the retailer to the host. In the off-line system, crediting retailers requires that the retailer establish a communications link to the host and upload the day's transaction activity. Therefore, the higher proportion of costs for crediting retailers in the off-line system (10.8 percent) versus the on-line systems (1.1 percent) is caused by the incremental communications costs associated with related settlement activities. On the other hand, delivering benefits in an on-line system requires that a communications link be established between the retailer terminal and the host to authorize each transaction. The same function in the off-line system is performed without an outside telecommunications link, thus resulting in a lower proportionate share of total costs (40.1 percent for off-line, 60.5 percent for on-line). Similarly, reconciliation in the off-line system requires a greater proportion of expense than in an on-line system. This expense is due in part to the additional reconciliation required between the card balances and the host balances and to retailer out-of-balance conditions that occurred during the demonstration period.

The total operational cost of \$8.21 per case month includes administrative costs incurred by all system participants, as shown in Exhibit 4. Of the \$8.21, 73.3 percent or \$6.02 of the cost is incurred through demonstration contractor operations. Montgomery County costs represent a significant proportion of the total costs (18.8 percent) primarily because the county established a separate EBT office which required full time staff. State costs (4.8 percent) can be attributed to the operation of the eligibility system interface and to management and reporting. The remainder of the cost was incurred by FNS regional, field, and headquarters operations for monitoring, management, and reconciliation activities. A comparison of costs for paper food coupons, Dayton off-line and the on-line systems is depicted in

Exhibit 5.

Exhibit 5

In the off-line system, costs are more evenly distributed between all functions as a result of the use of the card as the portable benefit database



The Cost Effectiveness of the Off-line EBT System can be Greatly Improved

Based on continuation of the operational efficiencies implemented early this year, e.g., new cards and retailer terminals, the cost of continued operations could be reduced to between \$5.22 and \$6.69 per case month. This cost is still higher than the \$2.89 per case month cost of the coupon system, but is 19 to 36 percent lower than the demonstration cost of \$8.21.

An expansion of the off-line system to the other zip codes in Montgomery County would increase the number of households served by 125 percent to approximately 25,000. The number of authorized retailers would increase from 95 (25 of which are border stores that were equipped during the demonstration) to 267 retailers. Of the 267 stores, 71 are single-lane retailers that would be equipped with the new single-lane configuration. The remaining 196 stores account for 450 additional lanes. The net effect of the increased caseload is to reduce the cost per case month to a range of \$3.66 to \$4.94.

The expansion to state-wide operations would result in further economies of scale. The total number of households

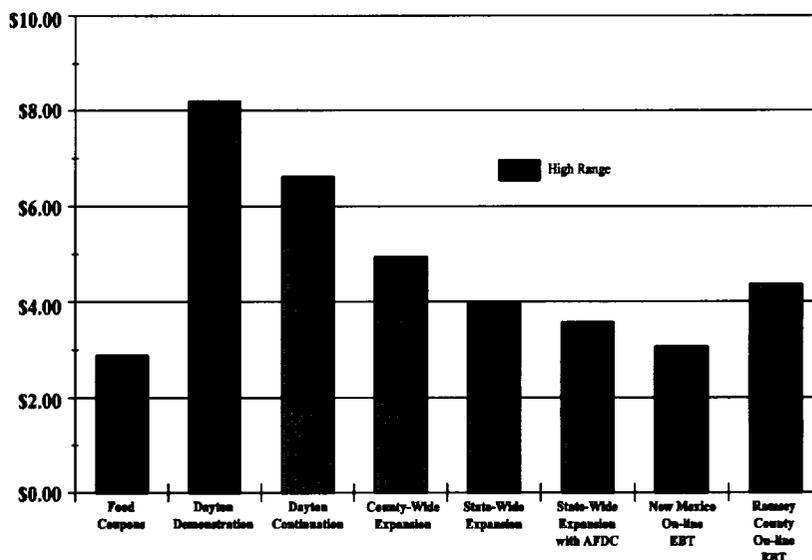
would increase to over 532,000, and retailers to 7,508. Of this number, 6,119 would be equipped as single-lane retailers. The rest would require 5,381 lanes to be equipped. Cost per case month would decrease to somewhere between \$2.39 and \$3.98, which brackets the coupon cost of \$2.89. Including the costs of amortizing design and development, operations, retailer installation and a 20 percent contingency lowers the range to \$2.54, which is still less than the coupon cost of \$2.89, and a high estimate of \$4.13.

Adding Aid to Families with Dependent Children (AFDC) to the state-wide model reduces the costs of cards and terminals for the Food Stamp Program based on the proportion of recipients that participate in both programs and a pro-rated share of transactions. This share is based upon three AFDC cash back transactions per month and 10 food stamp transactions per month

Adding AFDC to the state-wide model reduces the cost per case month to a range of \$2.16 to \$3.58. Including amortization of the design, development, and implementation costs increases the range to between \$2.31 and \$3.73. These costs compare favorably to the cost of both the coupon and state-initiated, on-line systems. The administrative costs under these scenarios are depicted in Exhibit 6.

Exhibit 6

The administrative costs of the off-line EBT system could be greatly reduced

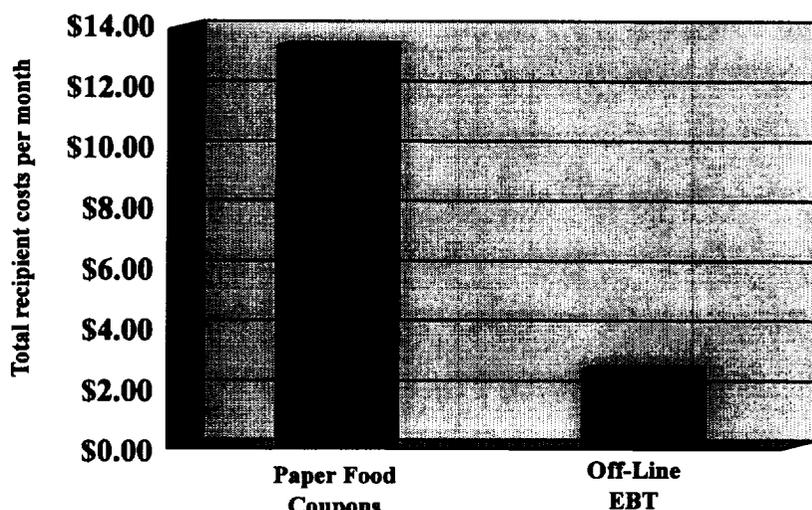


EBT is Preferred by Food Stamp Recipients

EBT significantly reduces recipient costs of participation. Coupon recipients were required to travel to one of the three available issuance sites. In addition to transportation expenses, many recipients also incurred child care expenses and lost wages for time away from work. With EBT, recipients could obtain benefits at any one of three selected food stores in their

Exhibit 7

Recipient participation costs decrease dramatically with off-line EBT



own neighborhoods and then shop at any authorized retailer in the project area. Recipient costs declined from \$13.39 to \$2.61 per case month under EBT, a reduction of \$10.78 or 80.5 percent.

Recipient's perceptions about EBT were generally positive. The method of payment (food coupons versus EBT) did not appreciably change recipients' perceptions of their treatment by store employees. With food coupons, 86 percent of recipients felt they were treated the same as other customers, while 84 percent expressed this same sentiment under EBT. Seventy percent of the recipients felt that it was easier to determine the value of remaining benefits using EBT. Seventy-two percent of the recipients said that food coupons are stolen more than the EBT card, and 61 percent said that food coupons get lost more than the card. Overall, by a margin of 64 percent to 26 percent, recipients who had experienced both the coupon and EBT systems preferred the EBT system.

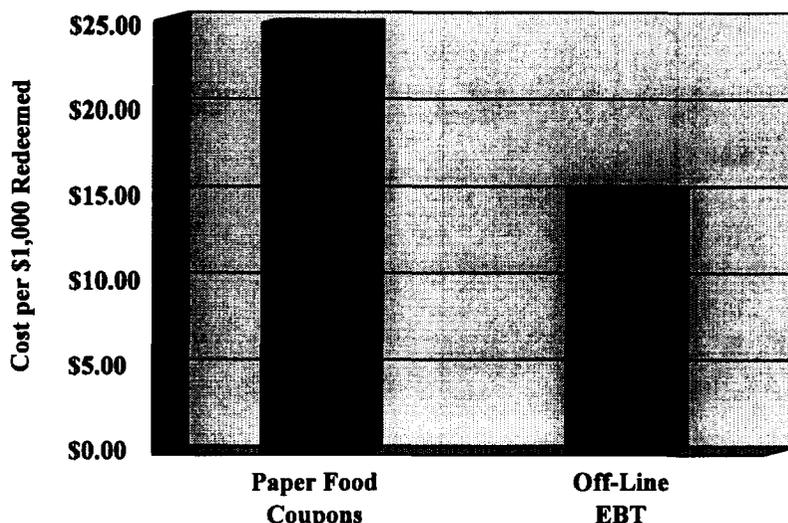
EBT is Preferred by Food Retailers

Retailers' perceptions of the impact of EBT on their operations were similar to those expressed in evaluations of on-line systems. They generally found it to be less expensive and easier

to use than the coupon system and believed that it substantially reduced fraud.

Exhibit 8

Retailer participation costs decrease dramatically with off-line EBT



Retailer costs to participate in the food stamp program under EBT were also compared to the cost to participate under the paper food coupon system. The costs that were identified included: checkout productivity, handling and reconciliation, accounting errors, reshelving, and employee training. The overall participation costs for retailers decreased from \$24.73 per \$1,000 redeemed under the coupon system to \$15.21 per \$1,000 redeemed under off-line EBT, a decline of 38 percent or \$9.52.

EBT Reduces Financial Institution Participation Cost

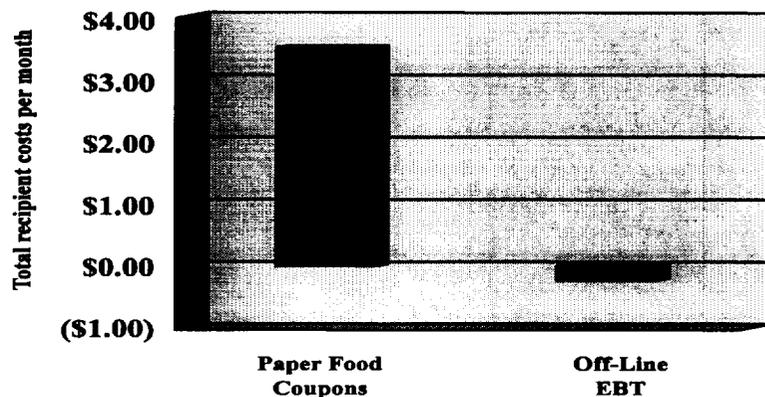
Exhibit 9

Financial Institution Net Cost/(Profit) on EBT Settlement

Cost Element	Dayton Off-line EBT	New Mexico On-line EBT	Ramsey County On-line EBT
Retailer Bank Cost	\$0.03	\$0.14	\$0.12
Retailer Bank Reimbursement	0.12	0.02	0.08
Retailer Bank Net Cost/(Profit)	(0.09)	0.12	0.04
Concentrator Bank Cost	0.09	0.12	0.21
Concentrator Bank Reimbursement	0.23	0.14	0.37
Concentrator Bank Net Cost/(Profit)	(\$0.14)	(\$0.02)	(\$0.15)

Montgomery County local banks reported costs of \$3.50 per \$1,000 of food coupons redeemed. The relatively high cost of food coupon processing reflects its labor-intensive nature. In an EBT environment, a concentrator bank receives an electronic file containing retailer credits from the EBT processor. Generally, the concentrator bank credits retailers for these transactions through the automated clearing house (ACH). Banks may charge the retailers fees for electronic deposits, although not all banks do so. Two of the banks used by Montgomery County retailers received fees for settlement services resulting in a net profit for all banks. The banks

Exhibit 10
Financial Institution participation costs decrease with off-line EBT



realized a net profit of \$0.09 per \$1,000 redeemed.

Off-line EBT Reduces Benefit Loss & Diversion

In New Mexico and Ramsey County, retailers' banks recoup some but not all of their costs. The net cost to retailers' banks in New Mexico is \$0.12 per \$1,000 in food stamp benefits redeemed and \$0.04 per \$1,000 redeemed for retailers' banks in Ramsey County.

EBT reduces benefit loss and diversion. The category has three components: program loss, participant loss, and benefit diversion. Program loss occurs when benefits reported by recipients as lost or stolen from the mail are replaced at program cost, and when duplicate issuances to recipients are not recovered. Participant loss occurs when participants have benefits that are lost or stolen and not reimbursed by the program. Benefit diversion occurs when food stamp benefits are not used for their intended purpose, but used instead to purchase non-food items or to obtain cash. Analogous to participant losses, benefit diversions have no impact on program costs.

As shown in Exhibit 11, off-line EBT benefit loss and

Exhibit 11
Benefit Loss and Diversion

Loss	Dayton Food Coupons	Dayton Off-line EBT	New Mexico On-line EBT	Ramsey County On-line EBT
Program Loss ^a	0.01%	0.03%	0.04%	0.05%
Participant Loss ^a	1.32	0.17	0.19	0.19
Benefit Diversion ^a	0.79	0.37	0.37	0.37
Total Percent of Benefits Issued ^b	2.12%	0.57%	0.60%	0.61%
Total Monthly Cost	\$35,839	\$9,529	\$22,853	\$18,187
Cost per Case Month	\$4.06	\$1.08	\$1.09	\$1.01

^a Represents percent of total benefits issued

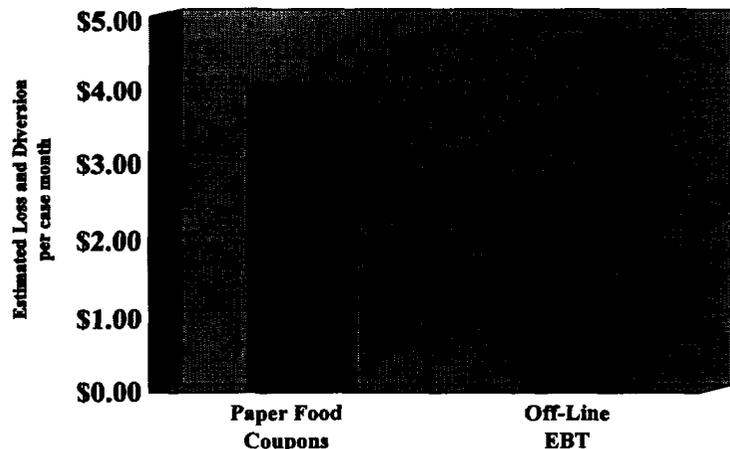
^b Excludes amounts recovered by participants

diversion was \$1.08 per case month compared to \$4.06 for the food coupon system in Montgomery County. The off-line EBT system also compared favorably with the on-line EBT systems in New Mexico and Ramsey County, where the benefit loss and diversion was \$1.09 and \$1.01, respectively.

The reduction in benefit loss and diversion is

Exhibit 12

The off-line EBT system significantly reduces program loss and diversion



primarily due to reduced participant loss and reduced benefit diversions. The reduction in participant losses results from the differences in the benefit instruments. Recipients reported that food coupons are much easier to lose or steal than the EBT card. The EBT card requires that the user key the secret personal identification number

selected by the recipient. The reduction in benefit diversion also results from differences in the benefit instrument. Retailers and recipients reported that it is much more difficult to convert electronic benefits to cash than it is to convert food coupons to cash. Coupons can routinely be sold on the street at a discount from their face value.

SUMMARY

Off-line Technology is Technically Viable

The demonstration system showed that off-line technology is technically viable. The measure of technical viability is the system's ability to authorize and deliver benefits accurately. Authorization and delivery of benefits was accomplished effectively in the off-line system. Benefits were accurately allotted to recipients and recipients had little trouble understanding that their benefit allotment would be

selected.

Transactions at the point-of-sale were equally effective. At the beginning of the demonstration, excessive response times resulted in negative feedback from both retailers and recipients. However, software and hardware modifications improved response time to a more acceptable level.

The off-line system does not rely on a central host computer for transaction authorization, nor does it rely on on-line telecommunications for each transaction. Therefore, system "down time" is usually the result of a faulty terminal, a faulty card or a faulty store controller. Only in the latter instance is the entire store "down".

process. Recipients who move could conceivably use the card to transfer benefit information. The Montgomery County off-line demonstration did not exploit these enhanced functions. Rather, it served to prove that off-line technology could effectively manage, at a minimum, the benefit authorization and delivery requirements of an EBT system.

Off-line Technology Has Both Advantages and Disadvantages Compared to On-Line

The primary advantages of the off-line system compared to the on-line system include improved system availability and potential increases in security.

On-line systems are susceptible to system-wide outages caused by a disruption of telecommunications or a host failure. Given that transaction authorization in an off-line system occurs between the card and the POS device, off-line systems are less susceptible to system-wide failures. However, smart card failure rates are greater than magnetic-stripe card failures. The cards initially used for the off-line demonstration experienced a failure rate of over 30 percent. A second generation of cards is now being used and is experiencing failure rates of over 10 percent.

There is a growing concern within the card services industry with card security. Magnetic-stripe cards are more susceptible to counterfeiting. In addition, an off-line transaction cannot be completed without the original card and PIN. On the other hand, on-line systems can put an immediate lock out on cards, but the off-line systems must wait until a negative file is downloaded to each participating retailer.

The primary disadvantages of the off-line system are the high cost of cards, the lack of an applicable standard that would allow multiple card and card reader/writer manufacturers to participate without significant software modifications, the previously mentioned high failure rate of the card, and the limited compatibility of the system with the commercial debit card and credit card infrastructure.

The POS infrastructure in the United States is based on an on-line system architecture. The results of the New Mexico evaluation indicate that substantial economies may result from piggybacking on the existing commercial POS infrastructure. Thus, in those areas where there is a prevailing on-line infrastructure, there is a strong argument for piggybacking. On the other hand, the banking industry is investigating off-line technology and some industry experts believe that ultimately, off-line technology will be adopted for new applications and for reasons of security and fraud prevention. Thus, further experimentation and evaluation of the application of off-line technology to EBT is warranted.