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# A Method for Improving the Benchmarks Used to Monitor ACH Returns

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## A Method for Improving the Benchmarks Used to Monitor ACH Returns

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*Abstract:* Close to 2 percent of consumer debits processed in the automated clearinghouse (ACH) payments system are returned to the financial institution that submitted the transaction, for reasons such as insufficient funds, incorrect account information, or lack of authorization (as reported by the consumer). A returned debit transaction can lead to loss at the financial institution that originated the debit, as when the institution has given its customers use of the funds sought in the debit but then is unable to obtain repayment from the customer. Concerns about financial institutions' ACH return-item risks have grown over the past decade, as the volume of ACH transactions has grown rapidly and expanded into relatively anonymous and one-time types of transactions thought to be more vulnerable to fraud than the more traditional ACH transactions like prearranged, ongoing consumer bill payments. We show that the management of return-item risks associated with ACH consumer debits may be improved by analysis of return-rate distributions, such as the distribution of return rates across ACH originators for all consumer debits as well as distributions conditioned on a specific type of consumer debit forward transaction. Examples of these types of distributions, computed from a broad sample of ACH data, have not been published before, to our knowledge. We tabulate several such distributions, using data on all consumer debit forward and return items processed by the dominant U.S. ACH operator (Federal Reserve Automated Clearinghouse, or FedACH) during a three- (forwards) to six- (returns) month period in 2006 and an algorithm to match about 90 percent of returns to their corresponding forward items. Our matched data show that the distribution of return rates across originators is highly skewed (a distinct minority of originators account for the majority of returns), is not strongly related to the volume of originations or the deposit size of the originating institution, and varies depending on the type of forward transaction, with the distributions of telephone- and web-initiated returns different both from each other and from the overall distribution of returns in ways that may have implications for risk managers. Insufficient funds are the dominant reason items are returned, but in the cases of telephone- and web-originated transactions, some originators are more successful at avoiding this type of return than their peers. These findings, which only illustrate the types of analysis that can be done by using our methods, imply that the limited ACH return-risk benchmarks currently in use, which are mostly simple return-rate averages at high levels of aggregation, are not sufficiently detailed to support optimally effective ACH return-rate monitoring and risk control.

### Introduction

The ACH in the United States is an electronic network by which depository financial institutions (*banks*, for simplicity) transmit and settle batches of certain types of payments in which a customer of the originating depository financial institution (ODFI) wishes to credit (pay) or debit (be paid by) a customer of the receiving depository financial institution (RDFI). The vast majority of ACH transactions are transmitted and settled successfully, but a small fraction (under 2 percent for the consumer debit transactions we study) are returned, either unpaid or for a refund, to the ODFI by the RDFI. Typical reasons include insufficient funds in the receiving customer's account (for debit transactions), an incorrect account number, or the receiving customer's assertion that he or she had not authorized the debit. The return of a debit item can result in loss for the ODFI, if it has already credited its customer with the payment and that customer cannot be debited to return the funds, such as when the customer's account balance is too low or the account has been closed.

Traditionally, most ACH payments involved large batches of small transactions submitted by an established and familiar bank customer on an ongoing basis and with the verified approval of the customers involved. Examples include regular payroll deposits, in which an employer's bank processes credits to the accounts that employees maintain at other banks; monthly Social Security deposits to recipients' accounts; and ongoing utility bill payments, in which customers allow the utility company's bank to send a debit to be collected from the customer's account at the RDFI.[1] In recent years, however, much of the double-digit rate of growth in the ACH system has been driven by new types of one-time, as opposed to recurring, debit transactions, which inherently allow less time to confirm an affected customer's identity, account information, and consent. Examples include transactions initiated by conversion of a paper check to an ACH transaction at the point of sale and one-time payments initiated by telephone (TEL transactions) or over the Internet (WEB transactions).

These newer ACH services elevated the level of ACH return-item risk. This was partly a transitory problem that was naturally corrected as banks learned how to more effectively control and manage the nontraditional sources of payment information and authorization involved in the

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[1] Direct deposits and recurring bill payments are both examples of the Prearrange Payment and Deposit Entry type of ACH transaction. Each industry-recognized type of ACH transaction is assigned an official Standard Entry Class (SEC) code. For example, the code for Prearranged Payment and Deposit Entry transactions is PPD. See Table 1 for a summary, including codes and definitions, of the ACH transaction types we analyze.

new types of payments.[2] However, some of the new risks were more fundamental, because the new types of ACH consumer debits were intended to open the system to one-time and thus less established, more anonymous debit-initiating customers, such as telephonic or online retailers. The tremendous and predominantly successful broadening of the ACH system into these new forms of business is testimony to the demand for and benefits of the new ACH consumer-debit transactions introduced over the past decade. At the same time, the openness and flexibility of the new transaction types has raised concerns about a growing risk to banks from irresponsible or fraudulent consumer debits, such as those submitted by abusive retailers or outright scam artists using call centers or web sites to obtain consumers' account information and/or less-than-fully informed consent.

To limit and manage these and other risks associated with ACH consumer debits, banks and payments providers have responded with enhanced controls. Over time, these have reduced the rate at which the new ACH transactions are returned for administrative errors or lack of proper authorization, an indicator of potential fraud (Braun, McAndrews, Roberds, and Sullivan 2008). Nonetheless, among the types of transactions typically used by American businesses, ACH debit items remain second (after checks) in reports of attempted or actual payments fraud (Association for Finance Professionals 2008).

Monitoring ACH return volumes has emerged as one of the key ACH risk controls, but the lack of detailed benchmarks limits its effectiveness. After first reviewing the rationale for monitoring returns, we present a three-part argument that a method to analyze ACH return data in more detail can provide better benchmarks and thereby improve the effectiveness of return-item monitoring as an ACH risk control. We begin our argument by explaining that current benchmarks are ineffective. They consist mainly of high-level average return rates. What is

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[2] Return rates were initially quite high when the new nonrecurring telephone- or Internet-initiated ACH transaction types emerged between 2000 and 2002 (Furst and Nolle 2005; Gerdes and Walton 2005; Braun, McAndrews, Roberds, and Sullivan 2008; Thomas 2007; Holcomb 2003). With support from industry associations and ACH service providers, banks responded by enhancing the controls applied to the new transaction types, cutting return rates on telephone and Internet-initiated ACH transactions by factors of 4 and 8, respectively, between 2002 and 2004 (Furst and Nolle 2005). Nonetheless, average return rates on telephonic and some other new transaction types have remained above the overall ACH consumer debit return rate.

needed are expanded benchmarks that give information about the entire distribution of ACH return rates and reasons. These distributions should be computed for all banks and transactions as well as for selected subcategories of transaction types or bank peer groups. Next, we explain and illustrate a method for computing these expanded benchmarks. The illustrations use data on FedACH consumer-debit items from mid-2006. Using these data, we match ACH returns to their forwards and compute detailed information on the distribution of banks by return rates as well as the distributions of banks and returns by return reasons. We compute these distributions both overall (for all ACH consumer debits) and conditional on the type of debit.[3] Finally, we examine these distributions and confirm that they provide more informative benchmarks, due to the wide return-rate and return-reason disparities they reveal across ODFIs and transaction types. Based on the magnitude of these disparities, we conclude that "one size fits all" benchmarks, such as the commonly used 2.5 percent overall threshold or the 1.0 percent threshold for unauthorized returns, do not fully support efficient monitoring of ACH returns. More detailed return-rate distributions like those we compute would significantly improve the ability of banks and bank supervisors to conduct their respective roles in the management of ACH return-item risk.

**Return Rate Monitoring Is Recognized as a Critical ACH Risk Control**

Ex-post monitoring of return rates is an important part of the ACH risk control tool kit.[4] It does not eliminate the need for controls such as careful due diligence before agreeing to process debits for a customer, but it has its own important role. Up-front due diligence is never perfect, and customers with no obvious initial risk factors may turn out to be problematic after a relationship has been initiated. Other controls, such as automated edits of transactions and diligent staff training, can mitigate risks that are already well-known, but they lag behind emerging types of fraud and error. Monitoring of customer returns by financial institutions is thus an essential backstop for spotting fraud when prevention fails and for identifying new types of fraud and

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[3] Although we do not present distributions by type of originating customer or third-party processor, the methods we illustrate could be expanded to also provide this information.
[4] Other return-risk controls include thoroughly applying know-your-customer (and your customers' customers) principles, requiring customers to adhere to ACH industry rules, improving staff training, automating blocks and edits of certain transactions, and requiring certain customers to set aside funds to cover returns.

nonfraud risks as they emerge. Without monitoring, a specific ACH customer might originate a large volume of unauthorized, possibly fraudulent consumer debits over an extended period of time. This could easily give rise to a large dollar amount of subsequent returns, which could result in significant losses for the financial institution if it is unable to successfully charge them back to the customer. More broadly, lack of monitoring could allow multiple customers to perpetrate a new type of fraud on a large scale for an extended period, multiplying the financial institution's exposure to ACH return-item losses. Similarly, monitoring of financial institution return rates by industry organizations and regulators can identify institutions whose management of ACH return risks is deficient, as evidenced by an inexplicably high level of returns that indicate that the institution is unacceptably vulnerable to potential ACH return losses.

Because of its important role, the monitoring of ACH consumer debit returns is already a well-established risk-control practice. Individual banks have willingly incorporated it into their controls,[5] and banking associations have stressed its importance to their members.[6] The National Automated Clearing House Association (NACHA), an industry association and private rule-making organization, has endorsed monitoring and requires steps to be taken when 1 percent or more of a firm's originations are returned as "unauthorized."[7] The Electronic Payments Network (EPN), a leading private-sector ACH operator, has identified monitoring of ACH returns as one of its six recommended ACH risk management tools[8] and provided a service that notifies an ODFI when its unauthorized ACH payments exceed certain thresholds. (Furst and Nolle 2005; FedACH offers a similar service.) NACHA itself receives data periodically from the two major ACH operators (EPN and the Federal Reserve Banks) and has used the data to identify banks with unusually high ACH return rates. NACHA rules also require ODFIs to

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[5] As in Wells Fargo's 2002 "war" on ACH fraud; see http://www.nacha.org/achnetwork/ach_quality/wellsfargo_db.doc.

[6] The view that "Monitoring return activity is critical" and "can supply an early notification that there are problems with the business practices of an originator that may have slipped through the initial screening process" was put forth to bankers in Thomas (2007).

[7] For example, NACHA gives monitoring an explicit role in "ongoing requirements" and "ACH operator tools," two of the five components of its recommended ACH risk management strategy. See NACHA (2007). For NACHA's rule on unauthorized returns exceeding 1 percent, see the March 21, 2008 entry at http://www.nacha.org/ach_rules/Rule_Making_Process/Recent_Ammendments_to_Rules/recent_ammendments_to_rules.htm.

[8] Memo from George F. Thomas, President of EPN, to EPN participants, entitled "A Critical Issue: Managing the Risk of ACH Debit Entries." The memo's language closely paralleled an earlier letter to banks from the Federal Reserve Bank of Dallas; see Holcomb (2003).

provide NACHA with detailed explanations when returns on a merchant customer's TEL transactions exceed 2.5 percent (Furst and Nolle 2005).

Perhaps most broadly, in 2006 the Office of the Comptroller of the Currency (OCC) published guidance that national banks should report ACH return-rate information to their boards of directors.[9] This guidance, which has since been extended to all federally insured banking institutions by the Federal Financial Institutions Examinations Council, includes the following specific recommendations (underlining added, one footnote omitted):

> To oversee management's execution of the ACH program effectively, the board of directors, or a committee thereof, should receive periodic reports that allow the board to determine whether ACH activities remain within board-established risk parameters and are achieving expected financial results. Such reports generally include:
>
> - <u>Metrics and trend analysis on</u> ACH volume, <u>returns</u>, operational losses, and transaction types, with explanations for variances from prior reports; …
> - <u>A summary of return rates</u> by originator, and, as applicable, third-party senders;
> - <u>Unauthorized returns</u> that exceed board-established thresholds; …
> - Risk management reports, including a comparison of actual performance to approved risk parameters.

The guidance goes on to recommend that "Banks that engage in high-risk ACH activities should … monitor the level of unauthorized returns … In addition, transactions with higher-risk elements, such as TEL and WEB, should be monitored to ensure that they are within the institution's risk tolerance. A high level of unauthorized returns is often indicative of fraudulent activity." The guidance then cites NACHA's operating guidelines, noting that "a return rate of 2.5 percent is well above the acceptable rate for normal business purposes."[10]

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[9] See "Automated Clearing House Activities: Risk Management Guidance," OCC Bulletin 2006-39.

[10] A 2005 ACH risk management white paper notes "Other than for unauthorized TEL transactions (2.5% unauthorized data reporting requirement), the current *NACHA Operating Rules and Guidelines* are silent on exception (returns) level thresholds and related monitoring/reporting requirements." See "A New Strategic ACH

**Crude Benchmarks Currently Limit Effective Monitoring**

Although the monitoring of ACH return rates is widely endorsed, the data currently available on actual ACH return rates provide very limited information. Institutions can look at their own data in whatever detail they choose, but they have to rely on a few broad measures of average return rates to assess whether their own experience is normal or unusual. As noted above, the OCC cites NACHA's 2.5 percent threshold as a benchmark for high-risk transactions generally, specifically including WEB as well as TEL, even though the actual return rates for WEB are much lower than for TEL (Furst and Nolle 2005). NACHA's *Risk Management News* periodically provides more information on average return rates by transaction type and return reason. For example, the December 2006 issue of NACHA's *Risk Management News* provided average return rates by three reason codes (Insufficient Funds, or NSF; Unauthorized; and Administrative) for all ACH items and nine additional subcategories.[11] To the best of our knowledge, these data are among the most detailed available.

Averages provided by NACHA are helpful, but they tell very little about the variation of return rates across institutions. As a result, averages allow fully effective monitoring only under some restrictive conditions. First, since an individual institution will only know its own return rates and NACHA's industry average return rates, this information must be enough for it to know how to respond. In particular, an institution that is 10 percent above average should respond more or less the same as an institution that is 25 percent above average, since neither will know how relatively far above average its own return rate is. Second, institutions should be very similar in the type of ACH businesses they do, at least within the subcategories NACHA reports on. Under these two conditions, all institutions need to know are industrywide averages by the subcategories NACHA provides. They would have little use for information about their relative position or for data on a more narrowly defined peer group. In short, unless banks are very similar to each other in the types of ACH services they provide and the extent or significance of

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Rules Framework for Risk Mitigation in the 21st Century," a May 2005 White Paper prepared for NACHA by Two Sparrow Consulting (p. 15).

[11] All credits, all debits, Corporate Cash Disbursement credits, PPD debits, ARC, POP, RCK, TEL, and WEB. (For descriptions of the last six subcategories listed here, see Table 1.)

their deviation from average return rates, average return rates by major categories provide only very limited information to bank management about the relative level of ACH return risk the bank is facing.[12]

In the next section, we compute and analyze more detailed information about return rates than is currently available (to our knowledge), for two purposes. First, we want to show that it is practical to provide such information, which can be done by jointly analyzing transaction-level data on forwards and returns and using the results to tabulate how ODFIs are distributed by ACH return rates and return reasons. We tabulate results for all ACH return items as well as for returns of only specific types of forwards, which results in *conditional* (on type of forward) return distributions. Second, we argue that these overall and conditional distributions are valuable for managing ACH risk. They show that banks differ greatly in both the types of ACH services they provide and the extent to which their return rates exceed industry averages, even within fairly precise subcategories. As just discussed, this implies that risks vary across institutions and that average return rates are not sufficient for optimal ACH return-risk monitoring. Instead, what is needed for more effective monitoring by and of ODFIs is information of the type we provide, showing the entire distribution of ACH return rates by transaction/return-reason categories and sometimes for specific peer groups as well. Jointly analyzing extensive microdata on returns and forwards allows us to compute more complete ACH return rate benchmarks that can be customized to meet a variety of ACH risk management needs.

**More Detailed Benchmarks Can Be Computed**

The remainder of this paper summarizes our analysis of an extensive sample of ACH debit transactions from mid-2006. We begin this section with a little background on the ACH consumer debit business, including the types of transactions and returns we will analyze. Then we describe our data, which include both forwards and returns, and explain why and how we matched return items to forward items. Using the matched returns and forwards, we tabulate a

[12] In principle, industry associations and regulators might aggregate individual institution data so as to develop more detailed assessments of how a given institution's return rates compare to industry and peer group performance, but in practice this would be difficult.

set of return-rate distributions for several categories and subcategories of forwards and returns, to illustrate the detailed information that could be provided for more effective ACH return-rate monitoring. In the subsequent "Results…" section, we argue that these distributions confirm that monitoring based on average return rates alone is suboptimal, in part because return rate distributions are highly skewed and return rates and return reasons differ significantly by financial institution as well as by transaction type. We conclude with some thoughts on possible further analysis.

Background. The ACH supports several types of consumer-debit transactions, as shown in Table 1. In a typical case, the ODFI creates a forward item, on behalf of one of its customers, for the purpose of collecting funds from a consumer who banks elsewhere. The ACH system routes this debit item to the RDFI thought to hold the account of the customer being debited. When the transaction is successfully completed, payment is debited from the consumer's account at the RDFI and credited to the appropriate ODFI customer account.

However, somewhat less that 2 percent of time the process fails and the RDFI creates an ACH return transaction, which notifies the ODFI that the debit has not been collected or needs to be reversed. Each returned transaction must be classified using one of a large number of standard NACHA return-reason codes. To condense the return-reason distribution we present below, we have combined some of the detailed reason codes into broader categories, as shown in Table 2. Typically, an Unauthorized return occurs because the consumer being debited reports that he or she did not agree to the transaction; a low account balance causes an NSF return; a coding error causes an Administrative return; and something about a Suspicious return suggests it might be fraudulent.

Data. The data analyzed in this paper were initially drawn from two very large samples—all consumer debits sent for collection through the Federal Reserve Banks' FedACH processing application from April 3, 2006, through June 30, 2006 (*forwards*), and all consumer debits returned through FedACH from April 3, 2006, through September 29, 2006 (*returns*). This sample provided 1.2 billion ACH transactions to analyze, which represent approximately three-fourths of the total interbank ACH network volume of consumer debits during those periods (and about five-eighths of all ACH consumer debits, including on-us and directly exchanged items not processed through the interbank network).[13] With the exceptions noted below, we believe that this is a representative sample.

Virtually all interbank ACH transactions in the United States flow through FedACH or EPN, the two organizations that currently serve as ACH operators under the rules of NACHA. The Federal Reserve Banks, using the FedACH application, process ACH transactions originated by, delivered to, or returned to/by FedACH customers. When transactions are originated by customers of one operator but destined for customers of the other operator, the two operators exchange those transactions (called *interoperator transactions*). As a result, transactions originated by EPN customers for delivery to FedACH customers flow through FedACH as well as EPN, and vice versa. Consumer debits originated in EPN but bound for an RDFI in FedACH are included in our data on forwards, as are forwards originated in FedACH but bound for an EPN RDFI. We also capture returns crossing between FedACH and EPN. Because our sample included all consumer ACH debit transactions in the FedACH daily transaction log during the selection period, the only transactions omitted are those (1) where the ODFI and RDFI are both EPN customers or (2) that do not enter the interbank system.[14]

Our sample contains two parts: data from (1) 64 consecutive business-days of consumer debit transactions forwarded in FedACH and (2) 127 consecutive business-days of consumer debit transactions returned in FedACH.[15] Transactions can be returned as soon as the day they are

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[13] We thank Amanda Dorphy of the Federal Reserve Bank of Minneapolis for these estimates.

[14] In 2006, an estimated 16.9 percent of ACH debit transactions were *on-us*, that is, between customers of a single bank and processed by that bank independently of EPN or FedACH. This level was down from an estimated 20.6 percent on-us payments in 2003, but on-us transactions may have increased since 2006 due to bank consolidation. In addition, in 2006, a very small number of interbank transactions—estimated at 0.3 percent—may have been exchanged directly between banks (that is, not through any ACH operator). For the 2003 and 2006 data, see, respectively, Dove Consulting 2004 (p. 17) and Dove Consulting 2008 (pp. 20–21).

[15] ACH debit transactions have codes that indicate whether they are intended to draw funds from consumer accounts, or whether they are intended as business-to-business transactions. Our sample included all debit transactions that were intended to draw funds from consumer accounts, and excluded business-to-business transactions. We did not get any information from FedACH that would permit identification of individual consumers, nor did we have access to such confidential information.

presented or as much as 90 days later.[16] The returned-transaction sample was designed to cover the period during which transactions from the forward sample were most likely to be returned.

Table 3 presents summary statistics on the volume of forwards and returns in our data. During the roughly three months of the forward sample period, transactions amounting to almost $580 billion were debited to consumers' accounts. Daily transaction values varied from $5 billion to almost $20 billion. The daily number of transactions ranged from 11 million to 36 million, averaging 19 million per day. The average value of a forward transaction was $478.

Although we collected returns for twice as long, the low fraction of items returned made the volume of returned debit transactions much smaller, $18 billion. On a daily basis, return transaction values varied from $100 million to just over $1 billion. The daily number of returned transactions ranged from 200,000 to 700,000, averaging 400,000 per day with an average value of $353.

Matching. The key to computing detailed, customized return-rate distributions is to jointly analyze detailed data on forwards and returns. We do that by matching as many return items as possible to their corresponding forward item.[17] This is challenging, because ACH file formats do not ensure a unique identifier to link forwards and returns. NACHA rules specify the data items and formats for ACH transactions, with some fields mandatory and others optional. Neither a return nor its forward contains the full record of a returned transaction. We collected

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[16] According to the Federal Reserve Board's Regulation E (Section 205.11), consumers can notify their depository institution of the need to return a forward within 60 days after they receive their periodic (monthly) statement. This means that forwards can be returned up to 90 days from the original processing date.

[17] An alternative approach to computing the many ratios we analyze would be to use the same detailed transaction data to compute statistics on forwards and returns separately, without matching individual returns to their forward item. (For example, the numerator for a specific conditional return rate could be computed from the appropriate group of return items, and the denominator could be computed from the appropriate group of forward items, without matching items.) The no-matching approach has the advantage of including all forward and return items, whereas in our approach we drop about 10 percent of the returns from our analysis because we are unable to match them to a forward. However, there is also a positive side to dropping unmatched returns, since one reason some returns fail to match with a forward is inaccurate data on the return, which our procedure weeds out. In addition, matched data is essential for some purposes, such as analysis of how return rates are affected by the type of sending point (since sending-point data only appears on forward items, not returns) or micro-econometric analysis of factors affecting return rates. Since we don't undertake these tasks in this paper, our use of matched data is primarily to expedite computation of distributions and ratios and to weed out inaccurately coded and duplicate return items.

nine fields that are common to forwards and returns, in order to match them. We collected additional fields (six from forwards and nine from returns) that provide information useful for our analysis, such as the date of and reason for a return. We refer to the information from the set of matched forwards and returns as the *matched data set*.

Some of our returns cannot be matched to forwards in our data due to discrepancies in data and timing. According to FedACH staff, data discrepancies often arise from inaccurate coding of returns, due to either manual entry errors or poorly designed software that fails to accurately transfer information from the forward to the return.[18]

With regard to timing, returns can be made for up to 90 days after a forward is processed.[19] Returns in our sample that occurred from April through June 2006 could therefore correspond to forwards processed before April 3, 2006, the first date in our sample of forwards. Also, any of the returns in our sample from July to September 2006 could correspond to forwards processed after we stopped collecting forward transactions on June 30, 2006.

Forward items contain an effective entry date field intended to specify the date on which the ODFI requests the forward item to settle.[20] This date should be, and usually is, copied from the forward item to the return item.[21] We use it to delete return items whose entry dates do not match any forward item in our data set. Eliminating returns whose effective entry date has no match reduces the number of returns from an initial total of 51.9 million to a more relevant subsample of 26.1 million. [22]

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[18] We especially thank Joseph Fahnhorst of the Federal Reserve Bank of Minneapolis for his help in understanding why returns and forwards may not match up.

[19] As a practical matter, a small percentage of returns is processed beyond 90 days as well.

[20] The information in the effective-date field on the forward item may depend on a manually entered date, and this is thought to be one reason why effective entry dates are sometimes erroneous. We see this in our data. Some of our forward items had effective entry dates before April 3, 2006, including as far back as 2001. We note, also, the actual settlement sometimes occurs after the date requested in the effective entry date field.

[21] However, according to Joseph Fahnhorst of the ACH staff of the Federal Reserve Bank of Minneapolis, manual or software errors in transferring the effective entry date to the return are a common type of return item data error and probably account for a large share of the returns that we were unable to match to forwards.

[22] We know that many of the returns in our full dataset will not have a matching forward item in our data. We collected returns for three month after we stopped collecting forwards, to capture items returned up to 90 days after their entry date. Since most returns occur within the first week after the entry date, most of the returns during this period did not match any of our forwards.

We then further restrict our sample to entry dates from April 4 to June 30, 2006, a period beginning one day after we began collecting forwards.[23] Over the April 4 to June 30 period of entry dates, where we have the best chance of uniquely matching a return to its forward, we have a sample of 24.4 million returns.

From these 24.4 million returns, we use eight more data fields to seek unique matches. After eliminating duplicates (returns with identical information in our nine data fields), we work with 24.2 million returns. Of these, 21.6 million match uniquely with forwards, for an overall match rate of 89.4 percent. The match rate varies slightly from one entry date to the next, from a low of 86.6 percent on April 11 to a high of 95.7 percent on April 15. The unweighted average of the daily match rates is 90.4 percent, and the standard deviation is 0.025. We consider these match rates adequate for computing informative distributions of ACH return rates.

**Results Confirm the Relevance of More Detailed Benchmarks for ACH Risk Management**

<u>Overview.</u> The matched data computed with the method described above allow us to compute a wide range of return-rate distributions. Here we review some of those distributions and argue that the wide range of ODFI experience they show, their skewness, and the differences between them imply that they provide much more useful ACH risk management benchmarks than the simpler measures currently in use, such as average return rates. Our specific conclusions regarding our 2006 data include:

1. Overall and for most transaction types, return-rate distributions showed a wide range of ODFI return rates and were significantly skewed. In particular, high return rates among a minority of ODFIs caused average (mean) return rates to lie well above typical (median) return rates. [See the remainder of this Overview subsection for discussion of this point, with additional details in the other subsections below.]

[23] This one-day initial lag reflects the fact that, due to ACH processing schedules and rules, many ACH consumer-debit items are processed at least one day in advance of their desired settlement date (the entry date). For this reason, we would not expect our data to include the full population of FedACH forwards corresponding to returns with a 04-03-2006 entry date.

2. Overall and for most major transaction types, the majority of returns was originated by a minority of ODFIs with well above-average return rates. [See the remainder of this Overview subsection for discussion of this point, with an exception noted in the ARC Results subsection and additional details in the other subsections below.]
3. Overall and for transaction types with a large number of participating ODFIs, return rates were not especially high at medium-volume, and to some extent small-volume, originators. Similarly, overall and for most transaction types with widespread ODFI participation, return rates differed little by the deposit size of the ODFI or, if anything, were often somewhat lower at smaller institutions. That is, our results do not support concerns that have been expressed about ACH return risk management being relatively lax at typical small- or medium-sized ODFIs. [See the PPD Results subsection for the primary discussion of this point, the ARC Results subsection for an exception, and other subsections and Appendix Two for further details.]
4. TEL transactions seemed to have generally greater return risk than most other transaction types, across the full distribution of TEL originators. [See the TEL and WEB Results subsection.]
5. By contrast, WEB transactions had low to normal return risks for most originators but appeared somewhat riskier overall due to high return rates at a minority of originators, many of whom originated in large volume. [See the TEL and WEB Results subsection.]
6. When a consumer debit item was returned, insufficient funds were the reason 60 to 80 percent of the time, for most transaction types and usually also for ODFIs of all levels of return rates. The next most common reasons involved administrative problems (about 10 to 15 percent) or potentially suspicious activity (about 10 to 12 percent). [See the Results for Return Reasons subsection.]
7. There were some exceptions to the general pattern of return reasons, notably that TEL and WEB originators with low return rates had an unusually small percentage of items returned for insufficient funds. [See the Results for Return Reasons subsection.]

The first conclusion above is evident in Table 4, whose first row shows key points in the distribution of total consumer debit return rates across the population of over 8,500 ODFIs in our matched data set.[24] Note that the average, or mean, rate of forwards that were returned was 1.8 percent in our data, very much in line with other estimates of overall ACH return rates. However, also note that the mean rate was well above the median rate of 0.7 percent and essentially equals the 75th percentile of the distribution. Thus, the distribution of overall return rates across ODFIs was significantly skewed, with about 75 percent of ODFIs experiencing below-average return rates. The minority of ODFIs with above-average return rates lifted the overall mean to more than twice the median rate of return. In the tails of the distribution, return rates became quite high. More than 5 percent of ODFIs had overall return rates in excess of 6 percent, and at least some ODFIs (generally those with a very small number of forwards) had 100 percent of their forwards returned.

Because many of the extremely high and low return rates reflected in Row 1 of Table 4 were associated with ODFIs that originated only a small number of forwards, we also show, in Row 2, the overall distribution limited to ODFIs that originated, for at least one transaction type, 100 or more forward items.[25] We refer to this more limited but perhaps more meaningful sample as our *baseline data*. Using these data, the distribution was somewhat less skewed but nonetheless reconfirmed the first conclusion above. The mean rate of return, 1.6 percent, remained well above the median, 0.9 percent, and extreme results were not eliminated. Five percent of this population of ODFIs had return rates of 4.9 percent or higher, and the highest single ODFI had over 80 percent of its 100+ forwards returned. This diversity of performance suggests we should look in more detail at what might have given rise to such different outcomes.

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[24] ACH transactions are initiated through a depository institution's (DI) account as referenced by an ABA (routing-transit) number. Individual DIs may have more than one such account. In our analysis, we aggregate all transactions across all accounts owned by the topmost holder, either a chartered DI or a bank holding company. These institutions encompass multiple charter types including commercial banks, credit unions and thrifts. All counts of ODFIs in our results, including the 8,500 total referenced here, are of topmost holders only.

[25] To a tenth of a percent, Row 2 would be exactly the same if we instead used the set of all ODFIs with 100 or more total forwards of any kind. The two sets of ODFIs are nearly identical; as nearly all ODFIs with 100+ total forwards also originated 100+ PPD forwards. In fact, either set omits fewer than 0.01 percent of all the forwards in our matched dataset; the two sets differ only by 0.0001 percent of the total forwards. This is convenient, because Table 5 is based on groups of ODFIs with 100+ forwards of a specific type. Using the same set of ODFIs to construct Table 4 facilitates comparisons between these two tables without changing the results, up to a tenth of a percent.

Table 5 provides some of the relevant detail. Panel A repeats (for reference) the second row of Table 4 and provides further details of the overall distribution of ACH consumer-debit returns. Row 3 in Panel A substantiates the second conclusion above, by showing that the lowest half of the distribution—ODFIs with return rates at or below the median return rate of 0.9 percent—accounted for only 9.9 percent of all the ACH returns in our baseline data. By contrast, the upper 25 percent of the distribution—ODFIs with return rates above 1.8 percent—accounted for just over half of all returns (50.8 percent, or 100-49.2 percent). The highest 5 percent of the ODFIs in the overall return-rate distribution accounted for over one-fourth (27.8 percent) of all the returns items in our baseline data.

By substantiating our first two conclusions, the overall return rate distribution illustrated in Panel A of Table 5 already provides improved benchmarks for ACH return-risk managers. With percentiles tabulated in fine detail (a simple matter but not undertaken here to save space), this distribution would show how far a given bank's return rate lies above or below industry norms. For banks with above-average return rates, both management and banking supervisors could quickly see whether a bank's return rate is merely slightly or quite distinctly higher than normal. This capability could guide decisions about how quickly and forcefully to examine and possibly address the underlying causes. These distinctions are much more difficult to make when average return rates are the only common benchmark of ACH return risk.

To further illustrate the advantages of tabulating detailed return-rate distributions and substantiate our other five conclusions, we rely mainly on Panels B through E of Table 5 and, to some extent, on Appendix Three. They provide detailed information (in the same format as Panel A) about ten *conditional* return rate distributions. That is, each of these distributions is conditioned on (takes as its universe) a specific type of forward. To eliminate outliers caused by ODFIs with minimal activity, in each panel we use include only ODFIs that originated at least 100 of that panel's forwards in our matched data. For example, in Panel B (rows 9–16), we examine return rates for Prearranged Payment and Deposit (PPD) forwards by ODFIs with at least 100 PPD forward transactions in our matched data. For each type of consumer debit transaction, we show not only the conditional distribution of return rates but also, in the last five rows of each block, information about the reason codes associated with these returns. The interpretation of the panels is further clarified in the discussion below.

PPD Results. PPD transactions are the most common type of ACH consumer debit transaction, both generally and in our data. As shown by the count of ODFIs in each panel of Table 5 or in Appendix Three, the 6,050 ODFIs with 100 or more PPD originations are also by far the majority of the ODFIs whose return rates we analyze. For that reason, the overall ACH return-rate distribution was similar to the PPD return-rate distribution, as seen by the fact that rows 1 and 10 of Table 5 are nearly identical. Rows 10 and 11 show that our first and second conclusions hold for PPDs as well. The mean return rate was well above the median, and ODFIs in the lowest 75 percent of the return-rate distribution collectively originated less than 22 percent of all PPD items returned. The remaining 25 percent of the PPD ODFIs accounted for over 78 percent of returned PPD items, and only 5 percent of the PPD ODFIs originated over 35 percent of PPD items returned.

Row 11 suggests that PPD return rates were not especially low among high-volume originators, in keeping with our third conclusion and contrary to concerns that have been expressed about lax risk management at small- and medium-size originators. A closer look at return rates by volume bears this out. We compared 4,073 medium-volume ODFIs (defined as originating between 100 and 2,000 PPD items in our matched data set) with 1,977 large-volume ODFIs (originating more than 2,000 such items). The typical (median) ODFI in the medium-volume group had only a moderately higher return rate than the median ODFI in the large-volume group, 1.0 compared to 0.9. The gap widened somewhat at the 75th percentile (1.9 versus 1.5) but reversed at the 95th percentile (4.7 versus 4.9). A few of the 2,463 small PPD originators (ODFIs with fewer than 100 PPD forwards in our matched data set) had very high return rates, up to 100 percent, but this is not surprising, given their small volumes. Nonetheless, the median small PPD originator had no items returned, and its average return rate of 2.3 percent was not exceedingly higher than the average return rates of 1.5 percent and 1.7 percent, respectively, among medium-volume and large-volume PPD originators. Since PPD originators are by far the most common type of originator we analyze, the same rough equality between smaller-volume and larger-volume originators holds for the overall distribution of return rates for all ACH consumer debits, in Row 1.

Appendix Two shows that the same conclusion holds when banks are sorted by deposit size rather than PPD volume. In fact, to the extent that return rates varied by bank size, small- and medium-size banks often had somewhat lower rates, especially for transaction types with widespread bank participation. For overall return rates, for example, the median rate for small banks (under $500 million in deposits) was 0.9 percent, compared to 1.2 percent for large banks. This is not just a compositional effect, as could arise if small banks are relatively less likely to originate transaction types with higher return rates. For example, the median small-bank return rates for TEL and WEB transactions were 4.0 percent and 0.3 percent, respectively, while the corresponding large-bank figures were higher, 4.7 percent and 1.4 percent, respectively.

ARC Results. Accounts Receivable Entry (ARC) transactions arise when data from a paper check received in the mail is used to create an ACH debit item. Specialized "lockbox" processors typically perform this service, for example on checks that consumers have mailed to pay their credit cards or utility bills. ARC transactions were the second most common type of forwards in our benchmark data, after PPDs. Table 5 shows that, quite unlike PPD, the ARC business was highly concentrated, with only 148 ODFIs originating 100 or more ARC forwards in our three-month sample of forwards. ARC return rates (Row 18) were generally low to moderate, at least compared to overall ACH return rates (Row 1). ARC is an exception to our second conclusion, that a minority of originators with high return rates generally accounted for the majority of returns. Row 19 of the table shows that, by number, over 93 percent of ARC returns came from ODFIs whose return rates were at or below the median return rate of 0.6 percent.[26] As this suggests, ARC was also an exception to our third conclusion, that return rates for many transaction types did not vary significantly with ODFIs' volume of transactions. For ARC, larger volume was associated with lower return rates. Medium-size (100 to 2,000 forwards) ARC originators had mean and median return rates of 2.2 percent and 1.3 percent,

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[26] Appendix Three shows that POP transactions (point-of-purchase debits based on the customer's written authorization, as for a check conversion) are a similar exception.

respectively, whereas the mean and median return rates for large (more than 2,000 forwards) ARC originators were less than half as high, 0.9 percent and 0.5 percent, respectively.

TEL and WEB Results. Table 5 shows some risk-relevant differences between the return rate distributions of two newer ACH transaction types, TEL and WEB. These transactions serve a similar function—permitting one-time debits to be created from the same information as on a check but instead provided by the account owner via telephone (TEL) or over the Internet (WEB). Both had above-average return rates—their mean return rates exceeded the overall mean return rate for ACH consumer debits—and due to this tendency, and because they both accommodate one-time, consumer-initiated transactions, they are often lumped together in discussions of ACH return risks. However, our analysis of their full return-rate distributions suggests differences in the nature of their risks and in how those risks might be reduced.

The elevated mean return rate for TEL was part of a broader pattern summarized in our fourth conclusion above—the distribution of TEL returns (Row 26) was higher than the overall distribution (Row 1), at least through the 95th percentile. The median TEL ODFI experienced a 4.0 percent return rate, more than four times higher than the median ODFI return rate for overall ACH transactions, and return rates for TEL were similarly higher at the 25th, 75th, and 95th percentiles of the distribution.[27] In other words, TEL transactions appeared to be inherently riskier than most ACH consumer debit transactions.

By contrast, the lower three-fourths of the WEB distribution (in Row 34) displayed somewhat lower return rates than the overall ACH return rate distribution. However, in the upper fourth of the WEB distribution, return rates were higher than in the overall ACH return-rate distribution, so that at the 95th percentile WEB originators experienced almost a 50 percent higher return rate than at the 95th percentile of the distribution of all ACH consumer debits. This was the basis for our fifth conclusion above—that WEB transactions were not inherently more risky, as TEL transactions appeared to be, but rather experienced an above–average mean return rate because a

[27] This is not true at the 100th percentile, due to an outlier in the distribution of PPD returns.

small minority of WEB originators failed to match the generally low return rates of the vast majority of WEB originators.

Obviously, from a risk management perspective, both TEL and WEB ODFIs with high return rates might benefit from emulating ODFIs with lower TEL and WEB return rates. However, the net results might differ. For WEB, adoption of better practices by a minority of high-return-rate ODFIs might make WEB a below-average return rate transaction type overall. Based on our data, this would not be the case for TEL, as most of the TEL originators in the lower half of the TEL return-rate distribution experienced TEL return rates above the overall mean ACH return rate. These insights are easily seen in the distributions we have tabulated but cannot be derived from simple summary statistics such as average return rates.

Results for Other ACH Consumer Debits. Appendix Three provides similar details about the distribution of returns for six more transaction types. We invite the reader to confirm that, for the most part, Appendix Three supports the conclusions above, although there are some exceptions. We note, however, that only a small number of financial institutions originate some of these types of transactions, so that their conditional return distributions may not be very precise or indicative of what would prevail if participation expanded significantly.

Results for Return Reasons. Table 5 also shows the main reasons why ACH consumer debits were returned and how the reasons varied across transaction types and ODFIs. For all ACH consumer debits, Rows 4 to 8 substantiate part of our sixth conclusion above—that insufficient funds were the main reason for returns overall and that the prevalence of the insufficient funds reason was more or less the same among ODFIs with low, medium, or high return rates.[28] Insufficient funds account for about 70 percent of all returned items in our matched data, and this percentage does not vary much with return rates. The next most common return reasons involve either administrative problems (10 to 15 percent of returns across low- to high-return-rate

[28] Although many items returned for insufficient funds were authorized by the account holder, this category can also include unauthorized or fraudulent debits that exceeded the account balance.

ODFIs) or a set of reasons we have labeled “suspicious” (10 to 12 percent across low- to high-return-rate ODFIs).[29]

The pattern of return reasons for most of the individual consumer debit transaction types in Table 5 or Appendix Three was similar to the overall pattern. However, we also see the pattern summarized in our conclusion seven—for TEL and WEB transactions initiated by ODFIs with relatively low TEL or WEB return rates, respectively, insufficient funds explained less than half of the items returned, and administrative errors explained over 40 percent. However, among higher-return-rate TEL and WEB originators, a more typical pattern, dominated by insufficient funds returns, prevailed. This further illustrates the potential utility of examining full return-rate and reason-code distributions, for an analysis of why TEL and WEB originators with low return rates were relatively less prone to insufficient-funds returns might shed light on how these originators achieved their lower TEL and WEB return rates.

**Concluding Remarks**

The results highlighted above show how conditional return distributions can provide insights beyond what can be inferred from simple summary statistics like the mean return rate. Most importantly, this study shows that the typical summary statistics do not adequately summarize the diversity of return experiences across transaction types and ODFIs. Accordingly, ACH return-monitoring systems based on overall mean return rates or even mean return rates for selected transaction types cannot be fully efficient. Too many details about the range and skewness of the return-rate distributions, behaviors in the upper and lower extremes of the distributions, and the relationships between return rates and forward volumes or return reasons are ignored in systems that focus only on mean return rates. By utilizing more detailed overall and transaction-specific distributions, such as those in Table 5, individual ODFIs and their

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[29] The fact that over 1 percent of consumer debit returns were unauthorized does not mean that the typical ODFI exceeds NACHA’s 1 percent threshold for unauthorized returns. That threshold applies to all forwards, whereas the reason-code percentages in Table 5 are only for returns. For example, for the median ODFI in Panel A, only about 900 of every 100,000 consumer debit forwards are returned. Of those, less than two percent, or about 17, are returned as unauthorized. Thus, the rate of forwards returned as unauthorized for the median ODFI in Panel A is about 17 per 100,000, or 0.017 percent, far less than NACHA’s threshold.

regulators and industry associations would have a much clearer picture of how an ODFI's ACH return-risk exposure compares to that of its industry peers and possibly also see clues into the factors that allow some ODFIs to achieve low rates of return.

Our methods could be used to generate many other customized tables of return-rate and reason-code distributions. One can, for example, tabulate charts and tables showing the distributions of return rates and reason codes by ODFI or RDFI charter type, location (and the demographics of the local area), and regulatory rating as well as by transaction size and timing (day of the week or month). As one final example from our data, Table 6 shows both the distribution of the timing of ACH returns (for all types of consumer debit forwards) and how the mix of reason codes shifted toward Unauthorized as time passed. Over 98 percent of all returns were processed within 5 days, and over 80 percent of these returns were due to insufficient funds or administrative problems. The remaining returns were mostly processed between 6 and 60 days after their forward item was processed, and mostly because they were unauthorized. Very few returns took more than 60 days, but the small fraction processed after 90 days included an unusually high percentage returned for the miscellaneous reasons grouped in the "Other" category. If desired, we could also compute how the percentage of returns processed within 5 days is distributed across ODFIs, so that ODFI management or regulators could be alerted if an institution's returns tended to be much later than its peers or more tilted toward Unauthorized or other unusual reasons. This could also be done by type of forward, for customized ODFI peer groups, and more. The relevant criteria should be whatever statistics provide useful comparisons for ACH return-item risk managers at ODFIs, RDFIs, and their regulators.

More broadly, we have shown, using FedACH data on consumer debits from mid-2006, that it is possible to match most returns to their unique forward item. The resulting dataset of matched forwards and returns can efficiently provide a rich array of benchmarks for ACH return-item monitoring, including detailed, customized conditional distributions of return rates and reasons. Such benchmarks would support more efficient and informative ACH return monitoring than is possible with the relatively crude benchmarks in common use today.

Although our procedures and statistics took considerable time to develop and compute, we think that they could be replicated quickly and efficiently on an ongoing basis if desired. This would allow benchmarks such as those illustrated here to be updated frequently. In addition, regulators or ACH operators would be able to identify, nearly in real time, ODFIs and RDFIs whose return activity was well outside of appropriate peer-group norms. Finally, we have not attempted, so far, to provide benchmarks for the return rates of the individual payments originators or third-party processors served by the ODFIs and RDFIs in our sample, but our methods could also be applied to these entities to support monitoring of their activity. In general, our procedures could be tailored and customized to provide the detailed ACH return-rate benchmarks needed for improved monitoring of existing and emerging ACH return-item risks.

**Table 1: The Types of ACH Consumer Debit Transactions Analyzed in this Paper**

| Consumer Debit TransactionType | SEC Code | SEC Code Description |
|---|---|---|
| Prearranged Payment and Deposit | PPD | Pre-authorized debits to a consumer's account, such as for payment of one-time or recurring bills. |
| Accounts Receivable Truncated Check | ARC | An ACH debit of a check received in the U.S. Mail and converted to an electronic item. One prominent use is in "lockbox" operations that process checks that consumers mail to pay credit card and other bills. (The definition of U.S. Mail includes mail delivered by the United States Postal Service as well as mail delivered via courier service, including but limited to Federal Express, United Parcel Service, or other local courier service and does not include items personally delivered or deposited in a merchant's night drop.) |
| Telephone-Initiated Entry | TEL | Single-entry debit transactions to a consumer's account pursuant to an oral authorization obtained from the consumer via telephone. (This type of transaction may only be used when there is no standing authorization for the origination of ACH entries to the receiver's account and may only be originated when there is either (1) an existing relationship between the originator and the receiver, or (2) no existing relationship between the originator and the receiver, but the receiver has initiated the telephone call.) |
| Internet-Initiated Entry | WEB | A debit entry to a consumer account initiated by an originator pursuant to an authorization that is obtained from the receiver via the Internet. |
| Point-of-Purchase | POP | Non-recurring debit entries initiated by the originator based on a written authorization and account information drawn from the source document (a check) obtained from the consumer at the point of purchase. Also known as ECC (Electronic Check Conversion). |
| Point-of-Sale Entry | POS | Point-of-sale debits in a non-shared network. These transactions are most often initiated by the consumer via a plastic access card. |
| Machine Transfer Entry | MTE | ACH debits authorized at ATMs. |
| Re-presented Check | RCK | An ACH debit used by originators to re-present a check that has been processed through the check-collection system and returned because of insufficient or uncollected funds. |
| Shared Network Transaction | SHR | Point-of-sale debits in a shared network. These transactions are most often initiated by the consumer via a plastic access card. |
| Destroyed Check Entry | XCK | A debit for the collection of certain checks, when those checks have been destroyed. |

Source: "ACH SEC Code Reference" web page, Alliance Payment Technologies, Inc. (APT). Accessed at www.allianceach.com on January 21, 2009. The contents of the page are based on information published in NACHA's annual *ACH Rules* guides. (Note: As of March 2010, the APT web site is no longer available.)

**Table 2: Broad ACH Return Reason Categories**

| **Broad Return Reason Label** (As designated by the authors) | **NACHA Code** | **NACHA Return Reason Description** |
|---|---|---|
| *Unauthorized* | | |
| | R05 | Unauthorized debit to consumer account using corporate SEC Code |
| | R07 | Authorization revoked by consumer |
| | R10 | Customer advises not authorized |
| | R29 | Corporate customer advises not authorized |
| *Administrative* | | |
| | R03 | No account/unable to locate account |
| | R04 | Invalid account number |
| *Insufficient Funds (NSF)* | | |
| | R01 | Insufficient funds |
| | R09 | Balance exists for current transaction but value of transaction in process brings balance below the debit entry |
| *Suspicious* | | |
| | R02 | Account closed (by customer or RDFI) |
| | R16 | Account frozen |
| | R20 | Non-transaction account |
| | R51 | Item is ineligible, notice not provided, signature not genuine, item altered, amount of entry not accurately obtained |
| *Other* | All other codes | |

Source of NACHA codes and return reason descriptions: *2006 ACH Rules: A Complete Guide to Rules & Regulations Governing the ACH Network,* NACHA, 2006, p. OR 92–OR 98.

**Table 3: The Volume of Transactions in Our Sample**

| | Forwards | Returns |
|---|---|---|
| Number of days | 64 | 127 |
| Volume (in millions of transactions) | | |
| Total volume | 1,210.4 | 51.9 |
| Daily average volume | 18.9 | 0.4 |
| Highest volume day | 35.6 | 0.7 |
| Lowest volume day | 11.0 | 0.2 |
| Value | | |
| Total value ($billions) | 578.1 | 18.3 |
| Daily average value of transactions ($millions) | 9.0 | 0.1 |
| Highest value day ($billions) | 19.5 | 1.3 |
| Lowest value day ($billions) | 5.1 | 0.1 |
| Average transaction value ($) | 477.6 | 352.6 |
| Maximum value ($millions) | 100.0 | 100.0 |
| Minimum value ($) | 0.01 | 0.01 |

**Table 4: Overall Return Rates for FedACH Consumer Debits**
(Based on 21.6 million returns matched to forwards with entry dates 4/4/06 to 6/30/06.)

| | Distribution Moments and Percentiles | | | | | |
|---|---|---|---|---|---|---|
| | Mean | 25th | Median | 75th | 95th | 100th |
| All ODFIs | 1.8% | 0.0.% | 0.7% | 1.8% | 6.1% | 100.0% |
| ODFIs with 100+ Forwards | 1.6% | 0.4% | 0.9% | 1.8% | 4.9% | 80.2% |

**Table 5: Distribution of Return Rates for ODFIs with 100+ Forwards, for All ACH Consumer Debits and Selected Transaction Types and Return Reasons**

(Based on 21.6 million returns matched to forwards with entry dates 4/4/06 to 6/30/06.)

| Row No. | Forward Item Categories | | | Mean | 25th | Median | 75th | 95th | 100th |
|---|---|---|---|---|---|---|---|---|---|
| | **Panel A: All Forwards** | | | | | | | | |
| 1 | Overall return rate (%) | | | 1.6 | 0.4 | 0.9 | 1.8 | 4.9 | 80.2 |
| 2 | Total forwards | | | 190,144 | 297 | 929 | 3,679 | 40,339 | 309,187,477 |
| 3 | % of all returns by banks with overall return rates at or below specified moments or percentiles of the distribution | | | 24.9 | 0.6 | 9.9 | 49.2 | 72.2 | 100.0 |
| 4 | Return reason percentages, for banks with overall return rates at or below specified moments or percentiles of the distribution | | Unauthorized | 1.8 | 1.6 | 1.9 | 1.9 | 1.9 | 2.1 |
| 5 | | | NSF | 69.7 | 73.7 | 69.4 | 71.1 | 71.8 | 72.2 |
| 6 | | | Administrative | 15.8 | 10.2 | 15.8 | 14.8 | 13.0 | 11.1 |
| 7 | | | Suspicious | 10.4 | 12.6 | 10.5 | 10.2 | 11.3 | 12.7 |
| 8 | | | Other | 2.3 | 1.9 | 2.5 | 2.0 | 2.0 | 1.9 |
| 9 | **By SEC Code** | **Panel B: PPD Returns** | | | | | | | |
| 10 | | PPD | Conditional return rate (%, for 6,050 banks with PPD forwards) | 1.6 | 0.4 | 0.9 | 1.8 | 4.8 | 80.2 |
| 11 | | | % of PPD returns by banks with PPD return rates at or below specified moments or percentiles | 19.5 | 1.0 | 5.6 | 21.4 | 64.9 | 100.0 |
| 12 | | | Return reason percentages, for banks with PPD return rates at or below specified moments or percentiles (5,462 banks with PPD returns): Unauthorized | 2.6 | 2.1 | 2.3 | 2.6 | 2.4 | 2.3 |
| 13 | | | NSF | 67.1 | 74.7 | 68.4 | 67.3 | 72.3 | 73.2 |
| 14 | | | Administrative | 12.9 | 7.0 | 12.7 | 12.8 | 10.2 | 8.3 |
| 15 | | | Suspicious | 14.4 | 13.6 | 13.8 | 14.3 | 12.8 | 14.1 |
| 16 | | | Other | 3.0 | 2.6 | 2.7 | 3.0 | 2.4 | 2.1 |
| 17 | | **Panel C: ARC Returns** | | | | | | | |
| 18 | | ARC | Conditional return rate (%, for 148 banks with ARC forwards) | 1.4 | 0.3 | 0.6 | 1.5 | 4.4 | 18.0 |
| 19 | | | % of ARC returns by banks with ARC return rates at or below specified moments or percentiles | 97.8 | 73.8 | 93.3 | 97.8 | 99.9 | 100.0 |
| 20 | | | Return reason percentages, for banks with ARC return rates at or below specified moments or percentiles (143 banks with ARC returns): Unauthorized | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| 21 | | | NSF | 66.9 | 65.2 | 66.0 | 66.9 | 66.5 | 66.4 |
| 22 | | | Administrative | 23.2 | 24.8 | 24.0 | 23.2 | 23.4 | 23.4 |
| 23 | | | Suspicious | 5.2 | 5.5 | 5.3 | 5.2 | 5.2 | 5.2 |
| 24 | | | Other | 3.8 | 3.5 | 3.9 | 3.8 | 4.0 | 4.0 |
| 25 | | **Panel D: TEL Returns** | | | | | | | |
| 26 | | TEL | Conditional return rate (%, for 339 banks with TEL forwards) | 5.5 | 2.3 | 4.0 | 6.3 | 17.0 | 41.4 |
| 27 | | | % of TEL returns by banks with TEL return rates at or below specified moments or percentiles | 58.8 | 0.2 | 3.2 | 72.8 | 86.3 | 100.0 |
| 28 | | | Return reason percentages, for banks with TEL return rates at or below specified moments or percentiles (335 banks with TEL returns): Unauthorized | 1.7 | 2.0 | 2.2 | 1.7 | 1.8 | 2.0 |
| 29 | | | NSF | 71.6 | 47.8 | 61.9 | 71.3 | 70.8 | 70.3 |
| 30 | | | Administrative | 19.5 | 44.8 | 27.8 | 19.6 | 19.6 | 18.0 |
| 31 | | | Suspicious | 5.9 | 3.9 | 6.4 | 6.0 | 6.3 | 7.8 |
| 32 | | | Other | 1.3 | 1.5 | 1.8 | 1.4 | 1.5 | 1.8 |
| 33 | | **Panel E: WEB Returns** | | | | | | | |
| 34 | | WEB | Conditional return rate (%, for 452 banks with WEB forwards) | 2.0 | 0.1 | 0.6 | 1.7 | 7.1 | 73.6 |
| 35 | | | % of WEB returns by banks with WEB return rates at or below specified moments or percentiles | 59.4 | 0.0 | 15.4 | 25.5 | 76.1 | 100.0 |
| 36 | | | Return reason percentages, for banks with WEB return rates at or below specified moments or percentiles (362 banks with WEB returns): Unauthorized | 2.2 | 0.0 | 1.4 | 1.6 | 2.5 | 3.2 |
| 37 | | | NSF | 66.6 | 38.7 | 74.3 | 69.4 | 67.5 | 67.0 |
| 38 | | | Administrative | 17.4 | 48.4 | 12.4 | 17.6 | 16.6 | 15.5 |
| 39 | | | Suspicious | 12.6 | 8.1 | 10.7 | 10.2 | 12.1 | 12.9 |
| 40 | | | Other | 1.3 | 4.8 | 1.2 | 1.2 | 1.4 | 1.5 |

**Table 6: ACH Consumer Debit Returns by Time and Reason**

(Based on 21.6 million returns matched to forwards with entry dates 4/4/06 to 6/30/06.)

| Days Before Return | % of Total Returns Within Time Frame | Return Reason | Share of Time Frame Returns for Given Reason (%) |
|---|---|---|---|
| **1 Day** | 19.04 | Unauthorized | 1.00 |
| | | NSF | 68.99 |
| | | Administrative | 15.82 |
| | | Suspicious | 12.36 |
| | | Other | 1.84 |
| **2–5 Days** | 79.58 | Unauthorized | 0.78 |
| | | NSF | 74.09 |
| | | Administrative | 10.25 |
| | | Suspicious | 12.98 |
| | | Other | 1.90 |
| **6–10 Days** | 0.41 | Unauthorized | 85.61 |
| | | NSF | 7.93 |
| | | Administrative | 1.39 |
| | | Suspicious | 2.05 |
| | | Other | 3.02 |
| **11–30 Days** | 0.61 | Unauthorized | 96.69 |
| | | NSF | 0.97 |
| | | Administrative | 0.25 |
| | | Suspicious | 0.33 |
| | | Other | 1.76 |
| **31–60 Days** | 0.33 | Unauthorized | 96.07 |
| | | NSF | 0.54 |
| | | Administrative | 0.15 |
| | | Suspicious | 0.20 |
| | | Other | 3.05 |
| **61–90 Days** | 0.02 | Unauthorized | 91.69 |
| | | NSF | 1.64 |
| | | Administrative | 0.25 |
| | | Suspicious | 0.39 |
| | | Other | 6.03 |
| **> 90 Days** | 0.00 | Unauthorized | 58.86 |
| | | NSF | 0.95 |
| | | Administrative | 0.14 |
| | | Suspicious | 0.41 |
| | | Other | 39.65 |

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## Appendix One: A Method for Matching ACH Forwards and Returns

Under NACHA rules, the following nine fields should be copied without modification from the forward to the return:

| Forward | Return |
| --- | --- |
| Amount | Amount |
| Standard Entry Class (SEC) code | Standard Entry Class (SEC) code |
| Company ID | Company ID |
| Company Name | Company Name |
| DFI Account | DFI Account |
| Effective Entry Date | Effective Entry Date |
| ODFI ABA | RDFI ABA |
| RDFI ABA | Original Recipient |
| Trace Number | Original Forward Trace Number |

Using standard methods for joining tables in relational databases on multiple fields, we match forwards and returns on these nine fields. Even the combination of these nine fields did not always yield unique matches. In a relatively small number of cases, a return appears to match multiple forwards, multiple returns appear to match a forward, or multiple returns appear to match multiple forwards. Forwards and returns for which we could not ascertain a “proper” match were excluded from the matched set.

**Appendix Two: ACH Return Rates by Bank Deposit Size**
(See Table 1 for definitions of the SEC codes shown below.)

Part 1: Return Rates for Small Banks (under $500 million in Deposits) with More Than 100 Forwards for at Least One SEC Code

| Forward Item Categories | | | Distribution Moments and Percentiles | | | | | |
|---|---|---|---|---|---|---|---|---|
| **All Forwards** | | | **Mean** | **25th** | **Median** | **75th** | **95th** | **100th** |
| Overall Return Rate | | | 1.5 | 0.3 | 0.9 | 1.8 | 4.8 | 80.2 |
| Total Forwards | | | 9,238 | 251 | 646 | 2,069 | 11,549 | 5,333,866 |
| % of all returns by banks with overall return rates at or below specified moments or percentiles of the distribution | | | 3.1 | 0.5 | 1.4 | 3.5 | 16.5 | 100.0 |
| **By SEC Code** | PPD | Conditional return rate (%, for 4,883 banks with > 100 PPD forwards) | 1.5 | 0.4 | 0.9 | 1.8 | 4.7 | 80.2 |
| | | % of PPD returns by banks with PPD return rates at or below specified moments or percentiles | 4.1 | 0.4 | 1.9 | 5.1 | 15.6 | 100.0 |
| | ARC | Conditional return rate (%, for 51 banks with > 100 ARC forwards) | 1.9 | 0.4 | 0.9 | 2.0 | 7.8 | 18.0 |
| | | % of ARC returns by banks with ARC return rates at or below specified moments or percentiles | 82.9 | 33.7 | 55.5 | 83.2 | 99.4 | 100.0 |
| | TEL | Conditional return rate (%, for 162 banks with > 100 TEL forwards) | 5.2 | 2.3 | 4.0 | 6.9 | 13.0 | 34.3 |
| | | % of TEL returns by banks with TEL return rates at or below specified moments or percentiles | 10.7 | 0.4 | 0.6 | 58.8 | 78.6 | 100.0 |
| | WEB | Conditional return rate (%, for 247 banks with > 100 WEB forwards) | 1.8 | 0.0 | 0.3 | 1.1 | 6.6 | 73.6 |
| | | % of WEB returns by banks with WEB return rates at or below specified moments or percentiles | 3.2 | 0.0 | 0.0 | 0.8 | 29.0 | 100.0 |
| | POP | Conditional return rate (%, for 8 banks with > 100 POP forwards) | 2.6 | 1.5 | 2.1 | 3.6 | 5.6 | 5.6 |
| | | % of POP returns by banks with POP return rates at or below specified moments or percentiles | 95.0 | 0.5 | 92.9 | 95.2 | 100.0 | 100.0 |
| | POS | Conditional return rate (%, for 2 banks with > 100 POS forwards) | 1.2 | 0.9 | 1.2 | 1.5 | 1.5 | 1.5 |
| | | % of POS returns by banks with POS return rates at or below specified moments or percentiles | 38.9 | 38.9 | 38.9 | 100.0 | 100.0 | 100.0 |
| | MTE | Conditional return rate (%, for 157 banks with > 100 MTE forwards) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| | | % of MTE returns by banks with MTE return rates at or below specified moments or percentiles | 4.2 | 0.0 | 0.0 | 0.0 | 44.1 | 100.0 |
| | RCK | Conditional return rate (%, for 28 banks with > 100 RCK forwards) | 49.2 | 41.8 | 49.4 | 60.9 | 72.3 | 91.9 |
| | | % of RCK returns by banks with RCK return rates at or below specified moments or percentiles | 13.7 | 0.2 | 13.7 | 77.3 | 99.7 | 100.0 |
| | SHR | Conditional return rate (%, for 12 banks with > 100 SHR forwards) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | % of SHR returns by banks with SHR return rates at or below specified moments or percentiles | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 100.0 |
| | XCK | Conditional return rate (%, for 1 bank with > 100 XCK forwards) | 17.9 | 17.9 | 17.9 | 17.9 | 17.9 | 17.9 |
| | | % of XCK returns by banks with XCK return rates at or below specified moments or percentiles | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Appendix Two (continued)

Part 2: Return Rates for Medium-Sized Banks ($500 million to $2 Billion in Deposits) with More Than 100 Forwards for at Least One SEC Code*

| Forward Item Categories | | | Distribution Moments and Percentiles | | | | | |
|---|---|---|---|---|---|---|---|---|
| **All Forwards** | | | **Mean** | **25th** | **Median** | **75th** | **95th** | **100th** |
| Overall Return Rate | | | 1.7 | 0.6 | 1.0 | 1.8 | 5.0 | 41.3 |
| Total Forwards | | | 47,300 | 1,917 | 5,621 | 14,736 | 75,514 | 7,280,753 |
| % of all returns by banks with overall return rates at or below specified moments or percentiles of the distribution | | | 24.5 | 1.9 | 15.9 | 24.7 | 45.7 | 100.0 |
| **by SEC Code** | PPD | Conditional return rate (%, for 801 banks with > 100 PPD forwards) | 1.6 | 0.6 | 1.0 | 1.7 | 4.6 | 38.5 |
| | | % of PPD returns by banks with PPD return rates at or below specified moments or percentiles | 31.7 | 3.2 | 25.6 | 42.1 | 61.4 | 100.0 |
| | ARC | Conditional return rate (%, for 30 banks with > 100 ARC forwards) | 1.5 | 0.5 | 0.8 | 1.6 | 6.4 | 9.3 |
| | | % of ARC returns by banks with ARC return rates at or below specified moments or percentiles | 97.1 | 7.0 | 28.9 | 97.1 | 99.9 | 100.0 |
| | TEL | Conditional return rate (%, for 83 banks with > 100 TEL forwards) | 4.7 | 2.1 | 3.3 | 5.1 | 17.0 | 25.9 |
| | | % of TEL returns by banks with TEL return rates at or below specified moments or percentiles | 10.4 | 0.5 | 5.6 | 10.6 | 78.3 | 100.0 |
| | WEB | Conditional return rate (%, for 90 banks with > 100 WEB forwards) | 1.8 | 0.2 | 0.8 | 2.0 | 7.1 | 33.3 |
| | | % of WEB returns by banks with WEB return rates at or below specified moments or percentiles | 17.4 | 0.1 | 0.9 | 18.0 | 80.5 | 100.0 |
| | POP | Conditional return rate (%, for 7 banks with > 100 POP forwards) | 3.1 | 1.0 | 2.9 | 4.0 | 7.1 | 7.1 |
| | | % of POP returns by banks with POP return rates at or below specified moments or percentiles | 19.2 | 0.3 | 19.2 | 94.9 | 100.0 | 100.0 |
| | POS | Conditional return rate (%, for 1 bank with > 100 POS forwards) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| | | % of POS returns by banks with POS return rates at or below specified moments or percentiles | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| | MTE | Conditional return rate (%, for 3 banks with > 100 MTE forwards) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | % of MTE returns by banks with MTE return rates at or below specified moments or percentiles | 31.0 | 1.4 | 25.5 | 66.1 | 66.1 | 100.0 |
| | RCK | Conditional return rate (%, for 19 banks with > 100 RCK forwards) | 52.6 | 46.3 | 55.6 | 60.0 | 69.9 | 69.9 |
| | | % of RCK returns by banks with RCK return rates at or below specified moments or percentiles | 70.8 | 1.7 | 88.6 | 98.0 | 100.0 | 100.0 |
| | SHR | Conditional return rate (%, for 1 bank with > 100 SHR forwards) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | % of SHR returns by banks with SHR return rates at or below specified moments or percentiles | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

*Note: No medium-sized banks in our matched data set processed more than 100 XCK forwards.

Appendix Two (continued)

Part 3: Return Rates for Large Banks (>$2 Billion in Deposits) with More Than 100 Forwards for at Least One SEC Code

| Forward Item Categories | | | Distribution Moments and Percentiles | | | | | |
|---|---|---|---|---|---|---|---|---|
| **All Forwards** | | | **Mean** | **25th** | **Median** | **75th** | **95th** | **100th** |
| Overall Return Rate | | | 1.9 | 0.8 | 1.2 | 2.0 | 4.9 | 34.6 |
| Total Forwards | | | 3,840,113 | 11,579 | 47,400 | 207,260 | 8,638,736 | 309,187,477 |
| % of all returns by banks with overall return rates at or below specified moments or percentiles of the distribution | | | 66.9 | 6.0 | 18.0 | 67.0 | 83.9 | 100.0 |
| **by SEC Code** | PPD | Conditional return rate (%, for 271 banks with > 100 PPD forwards) | 2.0 | 0.8 | 1.2 | 2.0 | 5.1 | 34.8 |
| | | % of PPD returns by banks with PPD return rates at or below specified moments or percentiles | 21.7 | 3.7 | 7.8 | 21.7 | 72.4 | 100.0 |
| | ARC | Conditional return rate (%, for 58 banks with > 100 ARC forwards) | 0.8 | 0.3 | 0.6 | 1.1 | 3.1 | 3.6 |
| | | % of ARC returns by banks with ARC return rates at or below specified moments or percentiles | 99.8 | 14.4 | 96.9 | 99.8 | 100.0 | 100.0 |
| | TEL | Conditional return rate (%, for 86 banks with > 100 TEL forwards) | 6.3 | 2.5 | 4.7 | 7.1 | 17.6 | 41.4 |
| | | % of TEL returns by banks with TEL return rates at or below specified moments or percentiles | 77.6 | 0.4 | 4.8 | 80.7 | 88.5 | 100.0 |
| | WEB | Conditional return rate (%, for 103 banks with > 100 WEB forwards) | 2.1 | 0.8 | 1.4 | 2.5 | 6.1 | 23.0 |
| | | % of WEB returns by banks with WEB return rates at or below specified moments or percentiles | 72.5 | 17.2 | 28.3 | 74.5 | 77.7 | 100.0 |
| | POP | Conditional return rate (%, for 26 banks with > 100 POP forwards) | 1.8 | 1.1 | 1.7 | 2.5 | 4.2 | 4.4 |
| | | % of POP returns by banks with POP return rates at or below specified moments or percentiles | 38.1 | 1.5 | 38.1 | 83.9 | 98.7 | 100.0 |
| | POS | Conditional return rate (%, for 7 banks with > 100 POS forwards) | 0.2 | 0.0 | 0.1 | 0.3 | 1.0 | 1.0 |
| | | % of POS returns by banks with POS return rates at or below specified moments or percentiles | 4.9 | 3.0 | 3.8 | 93.2 | 100.0 | 100.0 |
| | MTE | Conditional return rate (%, for 5 banks with > 100 MTE forwards) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | % of MTE returns by banks with MTE return rates at or below specified moments or percentiles | 4.8 | 2.4 | 4.8 | 50.0 | 100.0 | 100.0 |
| | RCK | Conditional return rate (%, for 31 banks with > 100 RCK forwards) | 53.1 | 49.0 | 53.3 | 59.7 | 64.4 | 85.2 |
| | | % of RCK returns by banks with RCK return rates at or below specified moments or percentiles | 35.0 | 7.2 | 35.0 | 91.8 | 99.6 | 100.0 |
| | SHR | Conditional return rate (%, for 1 bank with > 100 SHR forwards) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | % of SHR returns by banks with SHR return rates at or below specified moments or percentiles | 98.7 | 98.7 | 98.7 | 98.7 | 98.7 | 100.0 |
| | XCK | Conditional return rate (%, for 4 banks with > 100 XCK forwards) | 30.3 | 9.1 | 15.1 | 51.4 | 83.2 | 83.2 |
| | | % of XCK returns by banks with XCK return rates at or below specified moments or percentiles | 91.7 | 73.0 | 87.4 | 91.7 | 100.0 | 100.0 |

**Appendix Three: Return Rate Distributions for Additional SEC Codes**
(See Table 1 for definitions of these SEC codes)

| | | Mean | 25th | Median | 75th | 95th | 100th |
|---|---|---|---|---|---|---|---|
| **POP Returns** | | | | | | | |
| Conditional return rate (%, for 43 banks with POP forwards) | | 2.1 | 1.1 | 1.9 | 2.8 | 4.4 | 7.1 |
| % of POP returns by banks with POP return rates at or below specified moments or percentiles | | 79.2 | 1.5 | 78.7 | 90.1 | 99.9 | 100.0 |
| Return reason percentages, for banks with POP return rates at or below specified moments or percentiles (42 banks with POP returns) | Unauthorized | 1.5 | 2.3 | 1.5 | 1.5 | 1.5 | 1.5 |
| | NSF | 77.4 | 67.6 | 77.4 | 77.6 | 77.5 | 77.5 |
| | Administrative | 11.0 | 16.3 | 11.0 | 10.8 | 10.7 | 10.7 |
| | Suspicious | 8.9 | 11.8 | 8.9 | 8.8 | 9.0 | 9.0 |
| | Other | 1.2 | 2.0 | 1.2 | 1.3 | 1.3 | 1.3 |
| **POS Returns** | | | | | | | |
| Conditional return rate (%, for 10 banks with POS forwards) | | 0.5 | 0.0 | 0.2 | 1.0 | 1.5 | 1.5 |
| % of POS returns by banks with POS return rates at or below specified moments or percentiles | | 31.2 | 1.1 | 1.6 | 97.6 | 100.0 | 100.0 |
| Return reason percentages, for banks with POS return rates at or below specified moments or percentiles (10 banks with POS returns) | Unauthorized | 4.2 | 27.2 | 20.0 | 1.8 | 1.8 | 1.8 |
| | NSF | 79.3 | 55.6 | 58.3 | 74.3 | 74.6 | 74.6 |
| | Administrative | 3.5 | 0.0 | 7.8 | 9.2 | 9.2 | 9.2 |
| | Suspicious | 12.4 | 4.9 | 5.2 | 14.4 | 14.3 | 14.3 |
| | Other | 0.5 | 12.3 | 8.7 | 0.2 | 0.2 | 0.2 |
| **MTE Returns** | | | | | | | |
| Conditional return rate (%, for 165 banks with MTE forwards) | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| % of MTE returns by banks with MTE return rates at or below specified moments or percentiles | | 15.6 | 0.0 | 0.0 | 0.0 | 55.0 | 100.0 |
| Return reason percentages, for banks with MTE return rates at or below specified moments or percentiles (36 banks with MTE returns) | Unauthorized | 4.0 | 0.0 | 0.0 | 0.0 | 4.5 | 4.4 |
| | NSF | 52.0 | 16.7 | 100.0 | 100.0 | 68.2 | 79.4 |
| | Administrative | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 0.6 |
| | Suspicious | 4.0 | 0.0 | 0.0 | 0.0 | 9.1 | 6.3 |
| | Other | 40.0 | 0.0 | 0.0 | 0.0 | 17.0 | 9.4 |

Appendix Three (continued)

| | | Mean | 25th | Median | 75th | 95th | 100th |
|---|---|---|---|---|---|---|---|
| **RCK Returns** | | | | | | | |
| Conditional return rate (%, for 79 banks with RCK forwards) | | 51.8 | 45.8 | 52.8 | 60.0 | 72.2 | 91.9 |
| % of RCK returns by banks with RCK return rates at or below specified moments or percentiles | | 23.9 | 1.4 | 53.1 | 86.7 | 99.4 | 100.0 |
| Return reason percentages, for banks with RCK return rates at or below specified moments or percentiles (79 banks with RCK returns) | Unauthorized | 0.3 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 |
| | NSF | 82.1 | 84.0 | 83.3 | 81.7 | 79.5 | 79.4 |
| | Administrative | 1.9 | 1.9 | 1.5 | 1.8 | 2.1 | 2.1 |
| | Suspicious | 15.1 | 13.3 | 14.5 | 15.6 | 17.4 | 17.5 |
| | Other | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 |
| **SHR Returns** | | | | | | | |
| Conditional return rate (%, for 14 banks with SHR forwards) | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| % of SHR returns by banks with SHR return rates at or below specified moments or percentiles | | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 100.0 |
| Return reason percentages, for banks with SHR return rates at or below specified moments or percentiles (2 banks with SHR returns) | Unauthorized | 4.4 | 4.1 | 4.4 | 4.8 | 4.2 | 4.2 |
| | NSF | 67.3 | 63.3 | 67.3 | 71.4 | 64.3 | 64.3 |
| | Administrative | 1.7 | 0.0 | 1.7 | 3.4 | 3.0 | 3.0 |
| | Suspicious | 17.7 | 9.5 | 17.7 | 25.9 | 23.8 | 23.8 |
| | Other | 8.8 | 3.4 | 8.8 | 14.3 | 4.8 | 4.8 |
| **XCX Returns** | | | | | | | |
| Conditional return rate (%, for 5 banks with XCK forwards) | | 27.8 | 10.6 | 17.9 | 19.6 | 83.2 | 83.2 |
| % of XCK returns by banks with XCK return rates at or below specified moments or percentiles | | 91.9 | 85.8 | 87.6 | 91.9 | 100.0 | 100.0 |
| Return reason percentages, for banks with XCK return rates at or below specified moments or percentiles (5 banks with XCK returns) | Unauthorized | 15.1 | 12.9 | 13.6 | 15.1 | 20.6 | 20.6 |
| | NSF | 14.4 | 14.9 | 14.8 | 14.4 | 13.3 | 13.3 |
| | Administrative | 54.3 | 55.5 | 54.8 | 54.3 | 50.2 | 50.2 |
| | Suspicious | 7.1 | 7.4 | 7.3 | 7.1 | 6.6 | 6.6 |
| | Other | 9.1 | 9.3 | 9.5 | 9.1 | 9.3 | 9.3 |