Banks' Payments-Driven Revenues

Lawrence J. Radecki

Although banks' lending activities draw the attention of supervisors, lawmakers, researchers, and the press, a very substantial and growing portion of the industry's total revenue is received in the form of fee income. The amount of fee, or noninterest, income earned by the banking sector suggests that the significance of payments services has been understated or overlooked. A lack of good information about the payments area may partly explain the failure to gauge the size of this business line correctly. In reports to supervisory agencies, banking organizations provide data relating primarily to their safety and soundness. By the design of the reports, banks transmit information on profitability, capital, and the size and condition of the loan portfolio. Limited information can be extracted from regulatory reports on individual business lines; in fact, these reports imply that banks receive just 7 percent of their net revenue from payments services.

A narrow definition of payments, or transactions, services may also contribute to a poor appreciation of this banking function. While checking accounts are universally recognized as a payments service, credit cards, corporate trust accounts, and securities processing should also be treated as parts of a bank's payments business. The common but limited definition of the payments area reflects the tight focus of banking research on lending and deposit taking. In theoretical studies, economists explain the prominence of commercial banks in the financial sector in terms of these two functions. First, by developing their skills in screening applicants, monitoring borrowers, and obtaining repayment, commercial banks became the dominant lender to relatively small-sized borrowers. Second, because investors demand protection against the risk that they may need liquidity earlier than anticipated, bank deposits are a special and highly useful financial instrument. While insightful, neither rationale explains why

Lawrence J. Radecki is an assistant vice president at the Federal Reserve Bank of New York.

commercial banks provide payments services on a large scale, or why they perform payments services together with deposit taking and information-intensive lending.[1]

The purpose of this article is to develop a clearer picture of the importance of payments services to the banking industry. This goal is served by taking a broad view of the payments business and analyzing information provided by large bank holding companies (BHCs) in their annual reports. BHCs have made concerted efforts to improve their financial disclosures. They now furnish material on sources of noninterest income and the amounts earned that is much more detailed than the information filed in regular reports to supervisors. This information is used to estimate the size of the payments area.

In the first section of the article, we clarify our definition of the payments area. In the second section, we review aggregate data on noninterest revenue. We also examine the categories of noninterest income used in supervisory reporting to better understand what each category captures. In the third section, we classify and measure sources of payments-driven revenue. Information appearing in the annual reports of BHCs is employed to estimate the amounts that payments services contribute to the industry's revenue stream. Our estimates show that aggregate payments-driven revenue is considerably larger than commonly appreciated and that the production and distribution of payments services form one of the core activities of commercial banking. In the last section, we explore how the greater than expected importance of payments services might affect the identification and measurement of the banking sector's output and theories of the fundamental nature of commercial banking.

Definition of Payments Services

In order to analyze banks' sources of revenue and to establish the importance of revenue derived from transactions services, we take a broad view of the payments business. At its core are those services that everyone is most familiar with: the safekeeping, administering, reporting on, and transferring of money held in a deposit account. It should be emphasized that this definition implies that all of the customer support and transfer capabilities furnished to a transactions account owner are considered part of the service. In other words, payments services involve many more bank activities than just the actual transfer of currency or federal funds to execute a Fedwire instruction, to clear and settle a personal check, or to meet a cash withdrawal at the teller window. In the future, the definition of payments services will probably need to be expanded to include new systems that are currently under development or going through market tests. These new systems include multipurpose stored-value cards and electronic forms of currency and checks for use over the Internet.

Also considered to be in the payments area are transactions services performed outside a deposit account relationship. These payments services fall into two basic categories: securities-handling and credit cards. Banks furnish a set of securities handling services to their corporate and institutional customers, including pension funds, mutual funds, and endowments. These services involve safekeeping, administering, and reporting on financial and real assets held in a trust department account and transferring ownership and settling trades of such assets. Additional services are performed on behalf of an issuer of debt or equity securities. Because of the essential similarities to deposit account services, we consider these trust department services as part of the payments business. Likewise, because of the essential similarities to payments initiated electronically from a deposit account, credit card transactions must be counted among the payments services that banks perform for retail customers. In effect, we include in payments services the transfer of money held in a deposit account, the transfer of money and assets held in a custodial account, and the transfer of money in accord with the terms of a credit agreement.

Payments Services versus Liquidity Services

Setting the boundaries of the payments area broadly requires that we make a clear distinction between liquidity services and payments services. Because liquidity and payments services are related and complementary, for the most part people do not think of them as separate services. In order to distinguish payments from liquidity services, we compare a short-term time deposit with a transaction account, which is any deposit account featuring check

writing or other capabilities to move funds deposited in the account. To highlight the difference between these two types of deposits, we employ a standard definition of liquidity: the ability to convert an asset into the medium of exchange speedily, with little uncertainty of value and with low transaction costs, even if the dollar amount involved is relatively small.

By this definition, a small-denomination time deposit with a very short maturity (as short as seven days) provides a retail customer with near-perfect liquidity. This bank deposit can be converted into currency with no uncertainty of value and no transaction fee assessed to the customer. If the depositor cannot wait until maturity, the withdrawal can be made immediately by incurring a negligible interest penalty. Because a bank incurs costs by producing liabilities with near-perfect liquidity, a customer normally earns an interest rate somewhat below wholesale money market interest rates (for example, the one-month Treasury bill rate). While liquidity is an extremely desirable feature of an asset, producing liquidity in today's highly advanced U.S. financial system is not that costly. Judging by the expense ratio of a general-purpose money market mutual fund, it costs a financial intermediary about 30 basis points (net of regulatory burden) to create liabilities of near-perfect liquidity out of various short-term wholesale financial instruments—the "raw material" out of which shares in a money fund are produced.

Payments services involve many more bank activities than just the actual transfer of currency or federal funds to execute a Fedwire instruction, to clear and settle a personal check, or to meet a cash withdrawal at the teller window.

What distinguishes a deposit in a transactions account from a short-term time deposit is payment capabilities. A deposit in a transaction account is indeed more liquid than a seven-day or one-month time deposit, but the difference is slight—there is little gain with regard to certainty of value, transaction cost, or conversion speed. The notable feature of a transaction account is the array of methods that a customer can employ to move funds into or out of the account. These transactions can be conducted in many different ways: by using personnel at a branch office, by writing a personal check, by initiating a transaction electronically from a remote location, or by preauthorizing a debit or credit by a third party. In other words, banks provide an account owner with the means to conduct transactions virtually anywhere at any time. Deposits and transfers can even be made automatically.

While banks have worked hard to execute transactions efficiently and have employed sophisticated equipment extensively, payments services continue to be costly to produce. Consider the average cost of a transaction (or service request related to a transaction account) reported by banks: at the automated teller machine (ATM), $0.27; by telephone, $0.54; and with the help of branch personnel, $1.07. By contrast, the customary practice among banks is to waive explicit account maintenance and activity fees if a customer meets a minimum balance requirement. This pricing policy fosters a perception that payments services are inexpensive to produce.

Liquidity and Convenience

Because of the complementary nature of liquidity and payments services, it could be argued that these two bank services cannot be distinguished conceptually. And if separating payments features from liquidity is problematic, developing an estimate of banks' payments-related revenues—the main purpose of this article—may not be feasible. According to this way of thinking, a better approach to analyzing the revenues generated by banks' business lines would be to focus only on the provision of liquidity services, broadly defined to encompass accessibility to deposited funds. Under this approach, the liquidity of a particular type of deposit is a function not only of its certainty of value, the cost of converting the deposit into the medium of exchange, and the speed of converting, but also of the convenience provided to the account holder.

Applying this definition, we see that the various types of accounts fall along a spectrum of liquidity. For example, three-month time deposits are more liquid than one-year time deposits because of shorter maturity. And a transaction account is more liquid than a time account because a checkable deposit is more readily available to the account owner: funds on deposit can be conveniently accessed by writing a check, by using an ATM, or by paying at the point of sale with a debit card. But if convenience augments liquidity in this way, payment capabilities are precisely what give a transaction account additional liquidity. Thus, payments services are distinguishable from credit services, and the remaining issue is whether to recognize payments services as a component of liquidity services or as a separate service.

Data Sources

Our starting point for assessing the importance of the payments business is information on noninterest income conveyed through regulatory reporting. The supervisory agencies collect data from BHCs through Consolidated Financial Statements for Bank Holding Companies (FR Y-9C), which are filed quarterly with the Federal Reserve System. According to these reports, the twenty-five largest BHCs earned a combined total of $62.4 billion of noninterest income in 1996. (See the appendix for a list of the top twenty-five bank holding companies.[2])

Besides reporting the total amount earned, a BHC records the composition of its noninterest income by following a schedule of six categories:[3]

1. Service charges on deposit accounts in domestic offices
2. Income from fiduciary (trust department) activities
3. Trading revenue
4. Net gains from foreign currency transactions conducted outside the trading account
5. Other fee income
6. All other noninterest income.[4]

For the twenty-five largest BHCs, Table 1 shows the breakdown of noninterest income for these six components. Out of total noninterest income, only $9.5 billion was collected from fees on deposit accounts in domestic offices. At first glance, it appears that the largest BHCs derive just 15.3 percent of noninterest income—and a mere 6.8 percent of operating revenue (the sum of net interest income and noninterest income, less loan loss provisions)—from payments services. On closer inspection, however, we find that the amount recorded in the first category understates payment-related revenues.

Table 1
COMPOSITION OF OPERATING REVENUE FOR THE TWENTY-FIVE LARGEST BANK HOLDING COMPANIES DURING 1996

Category of Income	Combined Totals (Billions of Dollars)	Combined Totals as a Percentage of Operating Revenue	Combined Totals as a Percentage of Assets
Total noninterest income	62.4	44.5	2.32
Service charges on deposit accounts (in domestic offices)	9.5 (15.3 percent of total noninterest income)	6.8	0.36
Income from fiduciary activities	10.2	7.3	0.38
Trading revenue	7.9	5.6	0.30
Other foreign currency gains	-0.08	-0.06	-0.003
Other fee income	23.8	17.0	0.89
All other noninterest income	10.9	7.8	0.41
Gross interest earned	181.2	129.3	6.75
Gross interest paid	94.2	67.2	3.51
Net interest income: gross interest earned - gross interest paid	87.0	62.0	3.24
Provisions for loan losses	9.2	6.5	0.34
Net-net interest income: net interest income - provisions for loan losses	77.8	55.5	2.90
Operating revenue: total noninterest income + net-net interest income	140.2	100.0	5.22
Memo:			
Total assets	2,686.0	—	—

Source: Consolidated Financial Statements for Bank Holding Companies.

ADDITIONAL REVENUE FROM PAYMENTS SERVICES

According to the instructions to the filers of the Y-9C report, "deposit account fees" captures only those maintenance and activity fees that a bank collects directly from an owner of a deposit account at the same bank. But a bank can receive remuneration for payments services in ways that cause the associated revenues to appear in other categories of income:

- *Some fees triggered by deposit account activity are not reported in the category "deposit account fees."* Although banks are correctly following the instructions for filling out the schedule for noninterest income, some activity fees wind up in the "other fee" category. Such "misclassifications" can occur when someone other than the account holder actually pays the activity fee or when an institution other than the one providing the customer's deposit account collects the activity fee.

- *Some payments services are performed outside a deposit account relationship.* Some payments services are linked to a credit card account or a trust account instead of a deposit account; or, in some cases, the payments service is separate from any account held at the bank. Thus, banks do not report these revenues as deposit account fees.

- *Compensation for payments services takes the form of net interest income instead of noninterest income.* Banks receive a portion of their payments-related revenue as foregone interest on deposits or extra interest on loans, rather than as a fee, commission, or other charge to the customer. This revenue would never appear on a schedule reporting noninterest income.

In sum, the figures collected quarterly for revenue earned through fees on deposit accounts are potentially misleading. On the surface, the schedule for noninterest income developed by supervisory agencies implies that this category represents the bulk of payments-driven revenue. But the Y-9C report delineates this category too narrowly to capture all noninterest income earned from payments services, and by definition it does not capture remuneration in the form of interest income.

BANK HOLDING COMPANY ANNUAL REPORTS

To measure the amount of payments-driven revenue earned by the largest BHCs, we rely on information disclosed in their annual reports. During the past several years, BHCs have taken significant steps to improve their financial disclosures.[5] Their efforts have been made in concert with initiatives by the Securities and Exchange Commission, the Financial Accounting Standards Board, the Federal Reserve System, and other entities, both public and private, to promote advances in accounting, reporting, and disclosure practices. Consequently, BHCs are providing more meaningful information on sources of noninterest revenue as well as off-balance-sheet activities, risk measurement and management methods, and results by line of business.

Particularly valuable to this study is detailed information on the business activities that bring in noninterest income and the amounts earned. For example, the BankAmerica Corporation shows figures on twenty categories of noninterest income in its annual report and thereby names

Table 2
DISCLOSURE OF SOURCES OF NONINTEREST INCOME: BANKAMERICA CORPORATION

Category of Noninterest Income	Amount Earned in 1996 (Millions of Dollars)
Deposit account fees	
Retail	1,057
Commercial	342
Credit card fees	
Membership	29
Other	326
Trust fees	
Corporate and employee benefit	18
Personal and other	211
Other fees and commissions	
Loan fees and charges	336
Income from credit card securitizations	28
Off-balance-sheet credit-related instrument fees	345
Financial services fees	216
Mutual fund and annuity commissions	100
Other	358
Trading income	
Interest rate exposures	56
Foreign exchange exposures	316
Debt instruments	258
Other noninterest income	
Venture capital activities	427
Net gain on sale of loans, premises, and equipment, and certain other assets	197
Net gain on sale of subsidiaries and operations	180
Gain on issuance of subsidiary's stock	147
Other	404
Total noninterest income as defined in the Y-9C report	5,351
Memo:	
Net gain on available-for-sale securities	61
Total noninterest income as shown in the annual report	5,412

Source: BankAmerica Corporation, *1996 Annual Report*.

a source for 86 percent of its total noninterest income of $5.4 billion (Table 2). Similarly, the Chase Manhattan Corporation shows figures for twenty-one categories and names a source for 88 percent of its $7.5 billion of noninterest income (Table 3). Both firms supplement quantitative disclosures with definitions and other qualitative information. The combination of data and supporting material makes it possible to estimate the amounts of payments-related revenue included in the categories "fiduciary fees," "other fee income," and "all other noninterest income."[6]

In preparing a disclosure, each BHC chooses categories that correspond to its main sources of noninterest income. In addition, each BHC exercises its own judgment to determine the types of information and level of detail that would help shareholders, analysts, and others interested in understanding the performance of the company and its strategy. Because each BHC has a different mix of business lines and makes an independent judgment regarding what is genuinely useful, the formats of the disclosures are not uniform across BHCs. Consequently, disclosures of noninterest income are not strictly comparable across the industry, which introduces some additional imprecision to our estimates.

Furthermore, because each BHC is free to set its own income categories, we encounter an additional complication. The categories of noninterest income appearing in an annual report do not necessarily bear a direct correspondence to categories defined by the Y-9C report. In several cases, a category used by a BHC spans more than one category in the Y-9C report. Nevertheless, we believe that sufficient information can be extracted from annual reports to serve the purpose of this study.

Table 3
DISCLOSURE OF SOURCES OF NONINTEREST INCOME: CHASE MANHATTAN CORPORATION

Category of Noninterest Income	Amount Earned in 1996 (Millions of Dollars)
Corporate finance and syndication fees	929
Trust, custody, and investment management fees	909
Mutual fund fees	83
Other trust fees	184
Credit card revenue	
Securitized receivables	318
All other	745
Service charges on deposit accounts	394
Fees for other financial services	
Commissions on letters of credit and acceptances	330
Fees in lieu of compensating balances	295
Mortgage servicing fees	204
Loan commitment fees	120
Other fees	580
Trading income	
Interest rate contracts	535
Foreign exchange contracts	444
Debt instruments and other	994
Net interest income impact	-703
Other noninterest income	
Gains from equity-related investments	726
Net losses on emerging market securities sales	-80
Residential mortgage origination/sales activities	63
Loss on sale of a building in Japan	-60
Credit card securitizations	23
All other revenue	344
Total noninterest income as defined in the Y-9C report	7,377
Memo:	
Securities gains	135
Total noninterest income as shown in the annual report	7,512

Source: Chase Manhattan Corporation, *1996 Annual Report*.

ESTIMATING THE VOLUME OF PAYMENTS-DRIVEN REVENUES

In this section, sources of payments-driven revenues are examined in the order outlined above. First, we estimate misclassified deposit account activity fees and fees for payments services performed outside of a deposit account relationship. We then measure interest income earned as compensation for payments services. For some types of payments services, the amount of revenue received is determined directly from the annual reports by adding up figures shown for a specific category of noninterest income. For other types, the amount earned is estimated by taking information on a subset of the twenty-five BHCs and extrapolating a combined total for the group.

DEPOSIT ACCOUNT FEES PLACED IN THE "OTHER FEE" CATEGORY

The figure reported for "deposit account fees" does not capture all the revenue that a bank receives in the form of account maintenance and activity fees. In addition to those fees that a bank collects directly from its own deposit account customers, a bank charges fees for transactions initiated by customers of other banks or from the receivers of payments. Examples of these sources of fee income include the following:

- *Interchange and merchant discount fees generated by use of an off-line debit card.* A card-issuing bank collects an interchange fee from a merchant rather than the customer who initiates the transaction. In addition, the bank handling, or "acquiring," a debit-card transaction on behalf of a merchant collects a discount fee from the merchant.

- *ATM interchange fees and point-of-sale (POS) interchange and acquirer fees.* When a bank's ATM is used by a deposit account customer of another bank, the owner collects an interchange fee from the card-issuing bank. Similarly, when a bank's POS device is used by a deposit account customer of another bank, the owner collects both an interchange fee and a merchant's fee for handling the transaction.[7]

- *ATM surcharge fees.* These fees are imposed on ATM users who are deposit account holders at another bank.[8]

Although all large banks with retail operations collect revenue from ATM and POS transactions, information on this type of noninterest income is relatively sparse in annual reports. Only six of the twenty-three banks with substantial retail operations identify a specific amount of revenue brought in by debit/ATM card transactions or electronic banking. Although several other banks cite a rise in electronic banking fees to explain an increase in noninterest income from the previous year, they simply record the revenue in the residual subcategory "other fee income." For the BHCs that do disclose a specific figure, these fees are on average equal to 28 percent of deposit account fees. To approximate what the twenty-three BHCs earn in aggregate from electronic banking, we assume that the other seventeen BHCs earn proportional amounts of revenue from fees for electronic banking services. Therefore, we estimate that during 1996, these fees amounted to $2.6 billion, a healthy supplement to the $9.5 billion of deposit account fees. This estimate, however, could be biased if only those banks that earn a disproportionate share of noninterest income from electronic banking fees reveal the amount. Taking this effect into account, we arrive at a conservative estimate of electronic banking revenue of $1 billion, a figure that is based on the smallest amount earned among the six banks reporting a figure for electronic banking fees.

There are two reasons to believe that the actual amount earned is even higher than the seemingly generous $2.6 billion figure indicated above. First, the figure is not based predominantly on information from the more retail-oriented banks. Second, banks may not be forthcoming about this source of revenue because they do not want to draw attention to the amount they charge customers for electronic banking. The industry has been criticized for setting what are thought to be excessively high fees for basic banking services and for electronic access. The public finds ATM surcharges to be especially irksome because the installation of ATMs is supposed to cut operating expenses and allow banks to lower, not raise, deposit account fees.

Credit Card Fees

As argued earlier, transactions executed through credit cards must be included among the payments services performed for retail customers. But the dual nature of a bank-issued general-purpose credit card—which combines a source of credit with a means of payment—makes it difficult to isolate the revenue earned specifically for transaction services. Nevertheless, we feel we can separate the revenues covering the cost of payments services from the revenues covering the cost of credit.

A credit card essentially combines a charge card, where the balance must be paid in full monthly, and a revolving line of credit.[9] Keeping in mind the distinction between these two types of card services, we conclude that nearly all of the noninterest revenue generated by credit cards can be attributed to their use as a payment device rather than to their use as a line of credit. In other words, noninterest revenue brought in by credit cards would still flow to banks if the cards were transformed into charge cards and a customer made separate arrangements to secure a revolving line of credit. We estimate credit card revenues under this assumption.

The noninterest revenue derived from the use of credit cards is recorded in the category "other fees" and takes several forms:

- *Fees for handling transactions on behalf of merchants.* A bank charges a merchant for obtaining payment from a card issuer and transferring funds into a deposit account designated by the merchant.

- *Fees for handling transactions on behalf of cardholders.* A card-issuing bank receives an interchange fee for settling a transaction with a merchant, extending credit to a cardholder during the grace period, and supporting a cardholder's account.[10]
- *Fees for late payments, for exceeding the account's limit, and for annual account maintenance.* A card-issuing bank collects these fees from cardholders.

A card-issuing bank may also earn fee income for servicing securitized credit card receivables (see the section "Interest Income Earned in Return for Payments Services").

Among the twenty-five largest BHCs, twenty-two report an amount for credit card receivables outstanding.[11] These loans, which appear on a bank's balance sheet, totaled \$101.6 billion for 1996. A larger amount, \$156.1 billion, is reported for the group's combined managed credit card receivables and includes securitized receivables. Eighteen BHCs out of the twenty-two showing credit card loans disclose an amount of noninterest revenue that comes specifically from credit cards. In four cases, however, the figure includes an amount for servicing securitized receivables that cannot be broken out.

We will work with data on credit card fees provided by the fourteen BHCs that either do not securitize any of their receivables or exclude revenue earned by servicing their securitized receivables. In 1996, these fourteen BHCs held \$62.6 billion of credit card receivables on their balance sheets and securitized an additional \$25.8 billion of receivables. Together, they earned \$3.1 billion of fee income, or 3.46 percent of total managed receivables. By applying this percentage to the total volume of managed credit card receivables held by all twenty-five BHCs, we estimate that the group earned \$5.4 billion from credit card fees, more than half as much as the \$9.5 billion earned through fees on deposit accounts. To judge the sensitivity of this point estimate, we focus on just the largest issuers, whose disclosures on credit card revenues are clearer and more detailed. For each of these banks, revenue from credit card fees falls in the range of 3 to 4 1/2 percent of receivables. According to these figures, the combined revenue earned from credit card fees is likely to be in the range of \$4.7 billion to \$7.0 billion.[12] This estimate suggests that fees collected on credit card transactions generously supplement deposit account fees.

Fee Income for Securities Handling and Other Processing Services

The securities-handling services performed by a bank's trust department can be classified as follows:[13]

1. *Master trust and custody:* acting as custodian or safekeeper, recordkeeper, and administrator (involving disbursements, tax payments, and accounting services) of securities and other assets and providing trade execution, settlement, cash management, foreign exchange execution, and information services (including investment performance measurement and customized reporting) for private pension plans, public pension plans, and institutional trust funds.
2. *Global custody:* acting as custodian for foreign assets, a role that requires multicurrency reporting, accounting, and cash management.
3. *Corporate trust:* acting as trustee, fiscal agent, paying agent, registrar, and defeasance escrow agent for the issuer of bonds, commercial paper, or other debt instruments.
4. *Stock transfer:* acting as transfer agent and dividend-paying agent for an equity issuer. Mutual fund services are a type of stock transfer service.

In addition to securities processing, BHCs provide wholesale or institutional customers, including depository institutions, with other processing services through subsidiaries. These services include the processing of checks; airline coupons; remittances with their accompanying documents; and ATM, POS, and credit card transactions.

Nineteen BHCs in the group state an amount of noninterest income earned by handling securities and performing related services. (The others may earn some revenue this way but do not disclose an amount.) Eight BHCs specialize in wholesale payments services, produce them on a large scale, and earn more from these services than they do from deposit account fees. For the nineteen BHCs, this business line brings in \$6.5 billion of

noninterest revenue, almost three-quarters the amount of revenue from deposit account fees.

Interest Income Earned in Return for Payments Services

An estimate that takes only noninterest income into account understates the total amount of revenue brought in by payments services. An important component of *net interest* income is compensation for payments services, rather than for intermediation services. Depositors compensate banks by foregoing interest on their balances in addition to paying explicit account maintenance and activity fees. In fact, one banking company carefully acknowledges implicit interest as compensation for payments services in a recent annual report:

> Service charges on deposit accounts, paid in fees, decreased $0.7 million, or 0.3%, [to $243.7 million] in 1996, compared to an increase of $4.6 million, or 1.9%, in 1995. After adding the value of service charges paid through the maintenance of deposit balances by commercial and correspondent customers, which is included in net interest income, total service charge compensation for 1996 was $470.4 million, up $19.6 million, or 4.4%, from 1995 reflecting growth in transaction volume.[14]

Customers earn no interest on demand deposits and earn below-market rates on deposits in negotiable order of withdrawal (NOW), savings, and money market accounts. Interest revenue substitutes for higher explicit fees. In an analogous way, credit card customers compensate banks for transaction services by paying interest on their balances that is above the cost of just the loan. Again, interest revenue substitutes for explicit maintenance and activity fees. Therefore, to construct a comprehensive figure for the contribution of payments services to operating revenue, the amount of net interest revenue generated by payments services must be broken out of total net interest income.[15]

To estimate foregone interest on deposit accounts, we first assume that deposits in all accounts with payment capabilities, primarily check-writing privileges and immediate remote withdrawal or transfer, implicitly earn the federal funds rate. We also assume that the sum of foregone interest and explicit fees equals all maintenance and activity costs incurred by a bank. Under these assumptions, the twenty-five BHCs earned $15.5 billion of foregone interest on $295.5 billion of demand deposits and $13.3 billion of foregone interest on deposits of $502.6 billion in NOW, money market, and conventional savings accounts. (Because some owners may make limited use of

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the transaction capabilities of their savings accounts, the estimate of $13.3 billion foregone interest may overstate this subcomponent of payments-driven revenue.) By comparison, the $28.8 billion of interest foregone is almost three times as large as the fees collected on deposit accounts.[16]

Foregone interest from deposit accounts may seem extraordinarily large, but this revenue must cover the sizable expenses of running a bank's branch network, whose primary purpose today is to handle the transaction needs of household and small business customers. In analyzing banks' retail operations, industry sources estimate that a large BHC bears annual noninterest expenses at a typical branch on the order of $1.0 million to $1.5 million. Half of these expenses are incurred at the branch itself and half at headquarters and centralized operating facilities. If a branch holds $50 million of retail deposits, the implied noninterest expense ratio is 2 to 3 percent of deposits. Some expenses are recovered by collecting fees on deposit accounts and for ancillary services offered at the branch office and by processing information for certain personal and small business loans. The remainder must be recovered through foregone interest. Because demand deposits earn no explicit interest, these deposits earn a high rate of foregone interest (equal to

the federal funds rate, which averaged more than 5.00 percent during 1996); however, they also have high maintenance and activity expenses. Although savings, money market, and NOW accounts have lower maintenance and activity costs, they bring in less foregone interest per dollar of deposit because some interest is paid on the balances held in each of these accounts.

Credit Cards

As noted above, foregone interest earned on deposits is calculated by applying a market-based interest rate uniformly to all core deposits. A parallel calculation to determine the extra interest revenue collected from credit card holders cannot be carried out for two reasons. First, no readily observable consumer loan rate is available to serve as a benchmark. Second, a benchmark rate would vary across households because some borrowers are much better credit risks than others.

We use a substitute method to estimate the amount of extra interest paid on credit card balances. This method relies on information on revenue earned for servicing securitized credit card receivables. In a securitization, most of the interest paid by cardholders passes to the owner of the security, who funds the loans and bears the credit risk. A smaller portion of the interest paid by cardholders is retained by the card-issuing bank. The card issuer's revenue from securitized receivables is used to estimate the extra interest paid for payments services rendered through the card. In other words, the retained portion of interest paid is, in theory, the amount the cardholders would be assessed in explicit activity fees and maintenance charges on their accounts if interest were not used instead.[17]

Ten of the twenty-two BHCs offering credit card accounts securitized part of their receivables. Six of these ten disclose detailed information on the volumes of their securitization programs and on the impact of the programs on net interest income, provisions for loan losses, and noninterest revenue.[18] On average, securitization reduces net interest income by an amount equal to 8.33 percent of the dollar volume securitized. More than half this reduction, 5.50 percent of the dollar volume securitized, reflects provisioning for loan losses. The card issuer pockets the remainder (plus a small residual) of 3.05 percent and records it as noninterest income. This percentage serves as our estimate of extra interest paid on all credit card receivables. Applying the estimate of 3.05 percent to the entire $156.1 billion of managed credit card receivables implies that the group of twenty-five BHCs collected

By adding up all the pieces of revenue identified . . . we find that payments services contribute as much as $59.2 billion, or 42.2 percent, to the combined operating revenue of $140.2 billion earned by the twenty-five largest BHCs.

$4.8 billion of extra interest from cardholders as compensation for payments services. Among the banks with the clearest disclosures on the effects of their securitization programs, the extra interest earned from credit cards is in the range of 2.6 to 3.2 percent of receivables. This estimate indicates that the extra interest earned by the group is likely to be between $4 billion and $5.0 billion.

Because extra interest paid on credit card balances is determined from a residual, our estimate probably captures more than just the interest paid to cover the costs of performing payments services. The residual may pick up excess profits from credit card operations, an implicit charge for the unused portion of a cardholder's credit line, the cost of maintaining a loan account, and compensation for any residual credit risk retained by a card issuer. For this reason, it is proper to consider the estimate of $4 billion to $5.0 billion as the upper bound of extra interest paid by cardholders.

Summing Up

By adding up all the pieces of revenue identified above, we find that payments services contribute as much as $59.2 billion, or 42.2 percent, to the combined operating revenue of $140.2 billion earned by the twenty-five largest BHCs (Table 4). Payments services bring in $21.7 billion

to $25.6 billion in the form of fee income, which is roughly one-third to two-fifths of the group's combined noninterest income. A larger amount, between $28.8 billion and $33.6 billion, is received as interest revenue, accounting for about 40 percent of the group's combined net-net interest income. Among categories of payments services, deposit accounts yield the most revenue, about $40 billion, although only about $11 billion comes from service charges. Credit cards bring in between $4.7 billion and $11.8 billion, and securities handling and other processing services yield another $6.5 billion.[19]

The very substantial amount of revenue derived from payments services indicates that the production and distribution of these services constitute one of the main business activities of commercial banks. The size of payments-related income also implies that lending contributes less revenue to banks than is commonly believed. The income from payments services together with fee income from other noncredit services—including insurance, securities underwriting, brokerage, advisory services, equity investments, and portfolio management—may account for half or more of combined operating revenues. Income earned by extending credit probably makes up the single largest share of operating revenue, but it is clearly an oversimplification to characterize banking organizations as financial institutions that take in deposits in order to make loans.

The significance of payments-driven revenue helps explain the intense intra-industry and inter-industry competition that has broken out in the payments area. Large banks are working hard to promote electronic payments media despite projections of slow consumer acceptance and the uncertainty of cost effectiveness. The objective appears to be to take business away from competitors as well as to create new demand for transaction services. Furthermore, efforts to develop new payments systems are not only an offensive maneuver but also a defensive stratagem. The payments business has attracted the attention of firms outside the industry, in particular, technology firms committed to building new electronic systems.[20] Banks are fighting to hold on to their position in the payments area and to keep nonfinancial firms from encroaching on this essential business line.

Table 4

SOURCES OF OPERATING INCOME DERIVED FROM PAYMENTS SERVICES OF THE TWENTY-FIVE LARGEST BANK HOLDING COMPANIES

Category	Estimates of Revenue Earned	Comment
Fees on deposit accounts	$9.5 billion	Fees recorded in the Y-9C reports.
Interest foregone by deposit account holders	$28.8 billion	We arrive at this estimate by imputing foregone interest of $15.5 billion from demand deposits and $13.3 billion from NOW, savings, and money market accounts.
Fees on deposit accounts recorded in "other fees"	$1.0 billion to $2.6 billion	The estimate is based on the amounts disclosed in the annual reports of six of the twenty-three BHCs with retail operations.
Securities handling and processing fees	$6.5 billion	The estimate is the sum of amounts disclosed in annual reports by nineteen BHCs.
Credit card fees	$4.7 billion to $7.0 billion	The estimate is based on the amounts disclosed in annual reports of fourteen of the twenty-three BHCs that make credit card loans; the estimate excludes securitization revenue.
Extra interest paid by credit card holders	Up to $4.8 billion	The estimate is based on the amounts disclosed by six BHCs on revenue earned from the securitization of credit card receivables.
Total	$50.5 billion to $59.2 billion	The estimate suggests that 36.0 to 42.2 percent of operating revenue comes from payments services.
Memo:		
Amount of payments-related revenue earned in the form of:		
Noninterest income	$21.7 billion to $25.6 billion	The estimate suggests that 34.8 percent to 41.0 percent of total noninterest income comes from payments services.
Net interest income	$28.8 billion to $33.6 billion	The estimate suggests that 37.0 percent to 43.2 percent of total net-net interest income comes from payments services.
Amount of payments-related revenue earned from:		
Deposit accounts	$39.3 billion to $40.9 billion	
Securities handling	$6.5 billion	
Credit cards	$4.7 billion to $11.8 billion	

Source: Author's calculations.

Implications

Surveys of research on financial intermediation highlight many interesting but unresolved issues. This article's findings on the amount of revenue derived from payments services point to three topics that deserve a closer look: 1) the specification and measurement of bank output, 2) the contribution of off-balance-sheet activities to bank output and operating revenue, and 3) characteristics that distinguish commercial banks from other financial intermediaries.

Measurement of Banking Output

Commercial banking is a service industry for which it is especially difficult to identify and measure output. One approach researchers take to this problem is to stress a bank's role as an intermediary between borrowers and savers and to measure output by the dollar volume of loans or assets recorded on the balance sheet. Deposits are treated as an input. An intermediation approach is appealing because of its simplicity, but such an approach is not in keeping with the main findings of this article. The vital contribution made by payments services signifies that this approach to banking is too narrow, at least for the group of institutions studied here.

Some researchers have taken a value-added approach, which in principle treats both asset and liability categories as outputs. This flexibility leads to a better theoretical model of a banking firm because payments services can be recognized as outputs. A value-added approach, however, may still be inadequate when put in practice. Researchers generally conduct econometric studies by forming a short list of outputs—for example, demand deposits, savings and small time deposits, real estate loans, commercial and industrial loans, and consumer installment loans. Implicit in this specification is the restriction that payments services are supplied in proportion to the volume of core deposits. This constraint makes the value-added model too limiting, given the heterogeneity in both the amount and mix of payments services produced by the top twenty-five BHCs.

The variation in payments-driven revenue across individual banks is illustrated in Table 5. The top twenty-five banking organizations in the table are ranked not by size but by share of operating revenue contributed by the payments business. The bank that is most dependent on the payments business earns three-quarters of its operating revenue from this business line. The magnitude of payments-driven revenue at this bank reflects its specialization in both credit cards and securities processing. Several other banks among the top twenty-five also earn more than 10 percent of their operating revenue from either credit cards or securities processing. The outputs generating these revenues are not highly correlated with the dollar volume of any asset or liability reported on the balance sheet. Nor will these outputs be correlated with figures for categories of off-balance-sheet instruments. Consequently, a value-added approach remains problematic even if more balance-sheet items or instrument categories are specified.

Against this background, studies of productivity, economies of scale and scope, and the effects of consolidation and technological change appear less reliable than

Table 5

Sources of Payments-Driven Revenues across Bank Holding Companies

Top Twenty-Five BHCs Ranked by Share of Payments-Driven Revenues	Payments-Driven Revenue	Deposit Account Revenue	Credit Card Revenue	Securities Processing Revenue	Operating Revenue (Billions of Dollars)
	As a Percentage of Operating Revenue				
1	74.9	39.1	10.4	25.4	3.4
2	58.3	33.5	22.0	2.8	5.2
3	56.1	40.2	3.6	12.3	3.0
4	54.9	40.4	14.5	—	2.2
5	49.6	44.7	4.8	0.1	6.7
6	49.0	39.5	3.7	5.8	2.8
7	47.6	34.7	12.9	—	6.2
8	47.4	43.3	4.1	—	2.5
9	46.8	40.2	5.9	0.7	9.4
10	46.1	31.8	6.7	7.6	2.6
11	44.4	21.0	10.4	13.0	14. 8
12	44.0	29.1	4.4	10.6	3.3
13	43.5	41.0	2.5	—	2.5
14	43.4	37.4	6.0	—	6.9
15	42.5	37.9	3.9	0.7	5.3
16	42.4	37.8	4.4	0.1	13.6
17	39.7	37.5	1.7	0.5	2.3
18	37.6	32.6	2.0	3.1	3.8
19	37.0	32.3	3.1	1.6	3.8
20	33.9	12.6	15.3	6.0	18.3
21	33.0	29.9	2.6	0.6	3.6
22	29.3	26.4	1.7	1.2	5.9
23	28.4	7.9	0.0	20.5	3.9
24	20.3	20.3	0.0	—	1.4
25	4.5	1.9	0.0	2.6	6.8

Source: Author's calculations.

Note: The point estimates of credit card revenue and electronic banking fees are used to derive the figures shown in the table.

previously thought. Similarly, studies comparing the efficiency of different banking organizations look questionable. Findings of high and variable degrees of inefficiency across a sample of banks may actually reflect differences in the amount and mix of the payments services that they produce. In addition, studies assessing the effects of investment in new systems and equipment may not find efficiency gains if they occur predominantly in the payments area and if payments services are not recognized as bank outputs.

Importance of Off-Balance-Sheet Activities

Reacting to the growing contribution that noninterest income makes to operating revenue, some researchers have sought to refine the measurement of bank output. Specifically, researchers have developed two methods of recognizing off-balance-sheet activities. The first method takes into account the credit exposure that off-balance-sheet instruments present to a bank. The potential credit exposure from unused credit lines and other lending commitments and the implicit credit exposure from interest rate swaps and other derivative contracts are added to loans recorded on the balance sheet. The resulting quantity is interpreted as an augmented measure of credit intermediation and bank output (Boyd and Gertler 1994; Edwards and Mishkin 1995). The second method treats off-balance-sheet instruments as a separate bank output. The quantity of output embodied in off-balance-sheet instruments is approximated by a volume of hypothetical on-balance-sheet loans—the volume needed to yield net interest income equal to a bank's reported noninterest income. The volume of hypothetical on-balance-sheet assets is then considered to be a component of bank output along with volumes of loans and deposits (Clark and Siems 1997).

Our review of noninterest income earned through payments services reveals weaknesses in both approaches. The problem with the first approach is that off-balance-sheet instruments that present credit risk are not the main source of noninterest income. Many other bank products besides derivative contracts and loan substitutes bring in noninterest income, and we have identified several of these as payments services. Consequently, important outputs are still unrecognized, although adding off-balance-sheet credit exposure to loan volumes may be a valid adjustment to make in pursuit of a comprehensive measure of bank lending. The problem with the second approach is that it assumes that all noninterest income is generated by off-balance-sheet instruments that present credit risk. Converting all noninterest income earned into a balance-sheet-equivalent volume of loans overstates lending and understates the size of other business lines.

Derivative Contracts and Loan Substitutes

Because a surprisingly large portion of noninterest income is payments-driven, the contributions made by loan commitments and derivatives trading may be less than generally assumed. To find the amount of revenue earned from these activities, we again turn to BHC annual reports. Three BHCs among the largest twenty-five disclose a comprehensive figure for fee income earned from off-balance-sheet forms of lending: BankAmerica, Chase Manhattan, and J.P. Morgan. BankAmerica states that during 1996 it earned $345 million of noninterest income from fees collected for "off-balance-sheet lending activities." Chase Manhattan identifies $330 million in revenue from "letters of credit and acceptances" and $120 million from "loan commitment fees." J.P. Morgan reports $156 million earned primarily from "commitments to extend credit, standby letters of credit, and securities lending indemnifications." For these three BHCs, the amounts disclosed represent 6 percent (BankAmerica), 6 percent (Chase Manhattan), and 3 percent (J.P. Morgan) of total noninterest income.[21] These small shares indicate that off-balance-sheet credit instruments do not bring in sufficient fee revenue to be a major factor behind the rising long-term trend in noninterest income.

Measuring trading revenue is straightforward because figures are presented in regulatory reports and shareholders' annual reports. But BHCs do not typically separate revenue earned by trading derivatives from revenue earned by trading conventional securities. If we assume arbitrarily that half of total trading revenue is obtained from derivative contracts, the twenty-five BHCs earned almost $4 billion from dealing in off-balance-sheet instruments. This figure represents 6 percent of the total noninterest income earned by the group. In light of the shares of noninterest

income brought in by trading and loan commitments, we conclude that the contribution that these off-balance-sheet activities make to operating revenue has been exaggerated.

The Essence of Commercial Banking

The sizable contribution made by payments services to the revenue stream of large BHCs also leads us to reconsider the problem of delineating the essential features of commercial banks. What is called for is an integrated theory of commercial banking, one that explains why commercial banks provide payments services on a large scale and that identifies the characteristics needed to succeed in payments services as well as in deposit taking and credit intermediation.[22] In an attempt to understand why a single financial intermediary offers both credit and payments services, we offer the following explanation: the skills required to succeed in the lending business—the ability

What is called for is an integrated theory of commercial banking, one that explains why commercial banks provide payments services on a large scale.

to control losses efficiently—are also necessary for success in payments. Losses from payments activities can arise from fraud, operational glitches, systemic breakdowns, and failures of counterparties to fulfill obligations because of bankruptcy or other reasons. The skills necessary in the lending area encompass both preventing losses and recovering funds in the event of a loss. This requirement means that a bank's personnel must be able to prevent fraud, write contracts that offer legal protection, assess credit risk, get back funds that should not have been sent out, and claim compensation for damages. These skills would seem to carry over to the payments business, where a bank must also know how to prevent losses and make recoveries. The common set of skills required by these two business lines may largely explain why commercial banks provide both lending and payments services, a feature that distinguishes banks from other classes of financial intermediaries.[23]

Conclusion

This article explores the importance of the payments business to the banking industry by gauging the revenue generated by payments services. Our first step was to define the payments area broadly to include not only deposit accounts, but also securities processing and credit cards. We then used BHC annual reports to supplement information collected through supervisory reporting on the revenues earned from payments services.

By adding up all the components of fee income and interest income earned as compensation for transactional services, we find that the payments business generates between one-third and two-fifths of the combined operating revenue of the twenty-five largest BHCs. Thus, payments services make a significant and surprisingly large contribution to the industry's revenue stream.

In the future, the payments area may produce an even greater proportion of banks' operating income. First, if current trends persist, the trading of financial instruments will expand and banks will handle larger volumes of transactions and earn more fee income. Second, as higher proportions of household-to-business and business-to-business payments are converted to electronic forms, bank customers will make and receive payments faster and more conveniently. As payments services are improved, banks should be able to raise their fees.

According to our revenue estimates, payments services constitute one of the essential activities of the banking industry. Indeed, net revenues from payments services may be comparable to net revenues from credit services. Because of the importance of this business, the lack of analysis of the payments services in theoretical and empirical literature on the banking sector points to the need for further research. By excluding payments services in a model of a banking firm, a researcher may be overlooking one of banking's defining characteristics.

APPENDIX: THE TWENTY-FIVE LARGEST BANK HOLDING COMPANIES

The twenty-five largest bank holding companies, ranked in terms of total assets as of year-end 1996, were as follows:

The Chase Manhattan Corporation
Citicorp
BankAmerica Corporation
J.P. Morgan & Company, Incorporated
Nationsbank Corporation
First Union Corporation
Bankers Trust New York Corporation
Wells Fargo & Company
First Chicago NBD Corporation
Banc One Corporation
Fleet Financial Group, Incorporated
Norwest Corporation
PNC Bank Corporation
Keycorp
Bank of Boston Corporation
Bank of New York Company, Incorporated
Suntrust Banks, Incorporated
Republic New York Corporation
National City Corporation
Wachovia Corporation
CoreStates Financial Corporation
Mellon Bank Corporation
Barnett Banks, Incorporated
Boatmen's Bancshares, Incorporated
First Bank System, Incorporated

ENDNOTES

1. Recently, however, researchers have given greater attention to payments system issues. For surveys of the issues, see Berger, Hancock, and Marquardt (1996) and Hancock and Humphrey (1997).

2. Here the criterion used to determine the twenty-five largest BHCs is total assets at year-end 1996. Together, the top twenty-five BHCs control almost two-thirds of total assets held by all BHCs and a little more than half of all bank and thrift deposits.

3. A seventh category, net realized gains on transactions involving held-to-maturity securities and available-for-sale securities, could be added. The gains made on sales of securities held outside the trading account can be thought of as an additional source of noninterest income. In fact, several BHCs include these securities gains in the category "noninterest income" in their annual reports.

4. The Y-9C report provides additional information through a supplementary schedule in which a BHC identifies its largest sources of "all other noninterest income" and records a figure for each source.

5. See Bank for International Settlements (1994) and Edwards and Eller (1996).

6. Some additional information on payments-related revenue can be extracted from the line of business results disclosed in annual reports.

7. A card-issuing bank may assess fees on its own deposit account holders for use of an ATM or debit card. However, because a card issuer collects these fees directly from its customers, this portion of ATM and debit-card revenue would be recorded in the category "fees on deposit accounts."

8. A bank's ATM surcharge fee usually applies only to customers of other banks, but sometimes it applies to a bank's own customers for use of certain offsite ATMs.

9. It should be noted that the normal use of a charge card requires short-term extensions of credit by the card issuer. Because a merchant receives payment from a card-issuing bank well before a cardholder remits money to the card issuer, extensions of credit are triggered by normal usage.

10. Credit card associations also collect a fee on each transaction to pay for promotional activities, fraud prevention, and arrangement of interbank settlements.

11. One BHC reports a figure for credit card loans in the Y-9C and not in its annual report, but the amount is trivial. Overall, the total of credit card loans shown in the Y-9C report is about 30 percent larger than the total obtained from the annual reports. The Y-9C figures are larger for three reasons. First, the Y-9C data are reported as of the end of the year and tend to be swollen because of the holiday shopping season, whereas the annual report figures are usually an average for the year. Second, the category used in the Y-9C report is defined to include not only credit cards but also other revolving consumer credit plans. Finally, some of the largest credit card issuers bought portfolios from other issuers over the course of the year.

12. These estimates may be on the low side because some credit card fees are not identified and are left out of the calculations. For example, one bank states that late fees and charges for exceeding an account limit are recorded not in "credit card revenue" but in an unspecified component of the "other fee" category. This omission may be somewhat offset, however, by overreporting of merchant fees and interchange fees, which could include revenue from debit-card usage.

13. Other services offered through a trust department include portfolio management, securities lending, and financial advice.

14. CoreStates Financial Corporation, *1996 Annual Report*, p. 39.

15. Studies of the demand for money also recognize the phenomenon of implicit interest on deposit accounts. In these studies, researchers estimate the amount of implicit interest earned on demand deposits in order to calculate the opportunity cost of holding money.

16. Berger and Humphrey (1992) report comparable figures for all commercial banks. They estimate foregone interest on demand, savings, time, and other deposits to be $41.9 billion in 1988, compared with $9.4 billion of fees on deposit accounts.

17. Unlike issuers of general-purpose credit cards, issuers of charge cards cannot cover transactions costs by collecting interest. This difference may explain why charge card issuers set higher annual fees and higher merchant discount fees than credit card issuers.

18. These six BHCs hold nearly half of the top twenty-five BHCs' combined credit card receivables. Individually, each bank securitized between 5 and 45 percent of credit card receivables. On average, the banks securitized 35 percent of credit card receivables.

19. Industry consultants have also prepared estimates of payments system revenues, but these estimates have a wider scope than those in this study. Bowers and Devine (1995) placed total payments system revenues at $84 billion in 1993. This figure, however, appears to include all interest paid on credit card balances and mixes credit services with payments services. Together, the Bank Administration Institute and

Note 19 continued
Payment Systems, Inc., have completed a study, "Profiting from Change in the U.S. Payments System," which estimates that in 1996 the banking industry's fee income from payments services was $22 billion and interest income from payments services was $78 billion. (The study is summarized in Chambliss and Taylor [1997].) This estimate of total payments-driven fee income looks low compared with ours, which is based on the twenty-five largest BHCs. The interest income figure appears to include all interest paid on credit card balances and mixes credit services with payments services.

20. Given the contribution that payments-related income makes to operating revenue, BHCs are taking significant business risks whenever they make important decisions regarding the payments area. BHCs must decide which services to offer and on what scale, what hardware and software investments to make, whether to produce in-house or outsource some aspects of these services, and which partners to take on in joint ventures. The business risks in the payments area have different dimensions from those in lending or trading, but they are present nonetheless.

21. Three other BHCs disclose a figure that covers only fees earned from letters of credit and acceptances. Bank of Boston Corporation shows that it earned $68 million from "letters of credit and acceptance fees" (5 percent of its total noninterest income), KeyCorp earned $16 million from "letters of credit fees" (1 1/2 percent of its total noninterest income), and Wachovia Corporation earned $25 million from "bankers acceptances and letter of credit fees" (3 percent of its total noninterest income).

22. In the course of reviewing the development of the U.S. payments system, Goodfriend (1991) explored reasons why "payment services and information-intensive lending have been provided jointly by the same set of institutions, i.e., banks."

23. Fama (1985) conjectures that the ability to review a firm's deposit account activity gives the firm's bank an edge over nonbank financial intermediaries and other banks in lending to the holder of a deposit account. Nakamura (1993) collects quantitative information that supports the view that at least small banks have an advantage in lending because of their handling of a loan applicant's deposit accounts. Kashyap, Rajan, and Stein (1998) argue that lending and deposit taking are essentially the same function: both serve to provide liquidity to bank customers.

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