Special Studies on Technology and Banking

Who Offers Internet Banking?

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1. Introduction

Banking over the Internet has attracted increasing attention over the past several years from bankers and other financial services industry participants, the business press, regulators, and lawmakers, both in the United States and in other countries. In part, this is due to the rapid and significant growth in electronic commerce ("e-commerce"), and the notion that electronic banking and payments will likely advance more or less in tandem with e-commerce. In addition, industry analyses outlining the potential impact of Internet banking on cost savings, revenue growth, and increased customer convenience have also generated considerable interest and speculation about the impact of the Internet on the banking industry. The public policy issues emerging with the development of Internet banking are also generating increased attention from banking regulators and other government officials. To date, however, because there is little systematic information on the nature and scope of Internet banking, much of the analysis of the benefits and impact of Internet banking has been based on anecdotal evidence and conjecture.

The main purpose of this article is to help fill significant gaps in existing knowledge about the Internet banking landscape. Using information drawn from a survey of national bank examiners, we present data on the number of national banks offering Internet banking and the products and services being offered. In addition, we project the extent of Internet banking at the beginning of 2001 implied by the survey. We also investigate how national banks offering Internet banking perform relative to other national banks with respect to profitability, cost efficiency, and other characteristics. We separately examine *de novo* (newly chartered) national banks to investigate the extent to which new entrants are embracing Internet banking technology to a different degree than existing banks.

Our main findings are:

- Only 20 percent of national banks offered Internet banking in the third quarter of 1999. However, as a group, these "Internet banks" accounted for almost 90 percent of national banking system assets, and 84 percent of small deposit accounts.[2]
- All of the largest national banks offered Internet banking, but only about 7 percent of the smallest size banks offered it. Among institutions offering Internet banking, large banks are much more likely than small banks to offer a broader range of services via the Internet.
- Banks in all size categories offering Internet banking tend to rely less on interest-yielding activities and core deposits than do non-Internet banks.
- Institutions with Internet banking outperformed non-Internet banks in terms of profitability. However, small *de novo* banks offering Internet banking performed more poorly than non-Internet *de novos*.
- Projecting from banks' plans as of the third quarter of 1999, 45 percent of all national banks will be offering Internet banking by the beginning of 2001. Those banks will account for 95 percent of the assets and 93 percent of the small deposit accounts at national banks.
- Most of the growth in new Internet banking will be due to small banks coming on-line. At the same time, almost half of all national banks had no plans to offer Internet banking.
- Customer use of Internet banking is disproportionately concentrated among a few large banks. Based on our analysis of data from private sector studies, we find that the five banks with the greatest number of on-line customers account for almost 36 percent of all Internet banking users. By comparison, these same five banks account for only 20 percent of small deposit accounts.

[1] The authors thank Steven Egli for excellent research assistance and Rebecca Miller for expert editorial advice. This article is based on Furst, Lang, and Nolle (2000). The data on Internet banking activities of national banks was compiled based on responses to a questionnaire OCC examiners completed between mid-August and mid-September 1999. We thank Bernard Locey for his help with that data.

[2] In this paper, we use the term "Internet bank" to mean a bank offering its customers the ability to transact business with the bank over the Internet. We do not confine the term to Internet-only or "virtual" banks. Customer transactions of Internet banking can be as simple as on-line balance inquiry or credit application, but also include such services as electronic bill presentment, insurance, and brokerage. "Non-Internet banks" refer to those banks that do not offer transactional Internet banking, even if they have a Web site.

The next section of this article defines Internet banking and provides context for our analysis. The third section describes our database and gives a description of the number and size distribution of national banks offering Internet banking. That section also provides information on the particular nature of Internet banking products and services offered by national banks. The fourth section compares the structure and performance of banks offering Internet banking with other banks, and the fifth section projects the extent of Internet banking at the beginning of 2001 based on the stated plans of national banks. The fifth section also discusses current and potential future demand for Internet banking using bank and industry estimates of customer use. The concluding sixth section summarizes our major findings.

2. Internet Banking: Definitions and Background

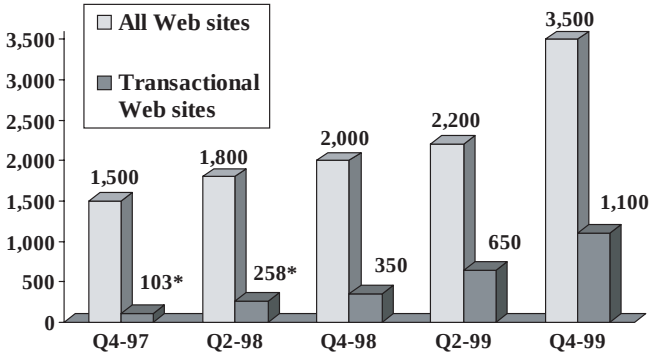
Internet banking refers to the use of the Internet as a remote delivery channel for banking services. Such services include traditional ones, such as opening a deposit account or transferring funds among different accounts, and new banking services, such as electronic bill presentment and payment, allowing customers to receive and pay bills via a bank's Web site.

Banks offer Internet banking in two main ways. An existing bank with physical offices can establish a Web site and offer Internet banking to its customers in addition to its traditional delivery channels. A second alternative is to establish a "virtual," "branchless," or "Internet-only" bank. The computer server that lies at the heart of a virtual bank may be housed in an office that serves as the legal address of such a bank, or at some other location. Virtual banks may offer their customers the ability to make deposits and withdraw funds via automated teller machines (ATMs) or other remote delivery channels owned by other institutions.

To date, it has been difficult to assemble comprehensive information on the Internet banking activities of commercial banks in the United States. In part this is because there are no special reporting requirements for a bank electing to reach customers via this new delivery channel, and hence there is no regularly compiled set of data about this attribute of banking.[3] In the recent past, at least two studies have appeared on the number of banks offering Internet banking, and some of their characteristics, but these relied on sampling methods for a banking industry profile, rather than an actual count of banks.[4] To our knowledge, only Egland, Furst, Nolle, and Robertson (1998), and Furst, Lang, and Nolle (2000) (from which this article is drawn) provide both an actual count of banks offering Internet banking and an analysis of major structure and performance characteristics of these banks.[5]

With this in mind, Figure 1 offers an approximation of the number of Internet banking sites from the end of 1997 through the end of 1999. During that time, according to estimates by the Federal Deposit Insurance Corporation (FDIC), and Couch and Parker (2000), the number of banks and thrifts with Web sites more than doubled from approximately 1,500 to 3,500; by year-end 1999, approximately one-third of the 10,000 U.S. banks and thrifts had Web sites. Approximately 1,100 of those Web sites were transactional, i.e., allowed customers to conduct business on-line, while the remainder were information-only sites.[6]

Figure 1—Estimated bank and thrift Web sites, and transactional Internet banking Web sites



*Actual.

Source: Office of the Comptroller of the Currency using data from the FDIC, Couch and Parker (2000), and bank and thrift Web sites

[3] Banks are also not required to report information about other delivery channels, such as ATMs and telephone banking. Note that beginning in 1999 the OTS has required prior notice for federally chartered thrifts, and in the third quarter of 1999 a line was added to the call report for all banks and thrifts to report their uniform resource locator (URL) (or Internet address).

[4] See United States General Accounting Office (1998), and the Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, Office of the Comptroller of the Currency, and the Office of Thrift Supervision (1999) (henceforth referred to as the "Interagency Web Site Privacy Report").

[5] As Egland, Furst, Nolle, and Roberston (1998) explain, there is an element of estimation even in that study. This is due to the fact that a single Web site may cover more than one bank that is a member of a multibank holding company. As a consequence, the authors distinguish between the number of Web sites and banks covered by those Web sites. See Egland, Furst, Nolle, and Robertson (1998), footnote 5.

[6] In the second quarter of 1998, Egland, Furst, Nolle and Robertson (1998) found that 223 Web sites represented 374 banks. Extrapolating from this ratio of 1.68 banks-per-banking company Web site, 18 percent of banks and thrifts offered true Internet banking as 2000 began.

While "virtual banks" have generated considerable attention in the press and within the banking industry, there were only nine separately chartered virtual banks at the beginning of 2000. Virtual banks are arising via several routes. One route is for new investors in the banking industry to obtain a charter from state or federal supervisory authorities to establish a new, independent virtual bank. Existing banking companies have also created virtual banks as separately capitalized subsidiary banks of a bank holding company. A third route that is beginning to be pursued by investors is to purchase the existing charter of a traditional bank, and then to recast the bank as a virtual bank under the existing charter.

As an alternative to seeking a separate charter for an Internet-only bank, "tradename" Internet banks have been established as separate divisions of an existing bank.[7] At the beginning of 2000, there were roughly 20 tradename virtual "banks" in the United States. A tradename virtual bank typically operates independently from the rest of the bank in terms of staffing, marketing, and integration of computer systems into the existing bank's legacy systems. This corporate strategy is based on a desire to capture advantages in operating style that many believe flow from having a virtual bank, and the desire to project a fresh image and thereby attract new customers. Both tradename and separately chartered virtual banks may find it difficult to attract customers without providing some form of physical contact with the bank.[8] Some virtual banks are considering establishing kiosks, limited-service offices, or other forms of physical presence in order to retain and attract customers.[9] Such a "clicks and bricks" approach could emerge as another main way to offer Internet banking.[10]

[7] For business press accounts of Internet-only banks, including several tradename banks, see Hallerman (1999a), Costanzo and Senior (1999), Daudelin (2000), *Financial Service Online* (2000), Giesen (2000), and O'Sullivan (2000a and b).

[8] See O'Sullivan (2000b) and Costanzo (2000) for discussions of the difficulties virtual banks face in the marketplace. O'Sullivan (2000b) reports on research evaluating the performance of virtual banks relative to traditional banks offering Internet banking. See also *Bank Technology News* (2000), which compares studies by CheckFree Corp. and GartnerGroup showing that consumers wishing to engage in electronic billing have a significantly stronger preference for dealing with a bank with a physical presence rather than an Internet-only bank.

[9] See, e.g., *Financial Service Online* (1999), *Bank Network News* (2000), Day (2000), and Toonkel (2000b).

[10] The option of moving away from an Internet-only strategy is receiving attention in businesses besides banking. See, for example, McIntyre and Christensen (1999) and Hamilton (2000).

3. Internet Banking in the National Banking System

The Data Set

The data set for the current study is unique in a number of respects. First, it covers the Internet banking offerings of every national bank. That information was compiled based on responses to a questionnaire OCC examiners completed between mid-August and mid-September 1999 for 2,535 national banks. The questionnaire covered whether a bank had a Web site, and, if so, whether the Web site was transactional. For banks with transactional sites, examiners provided a more detailed set of information on the nature of their sites, including information on the range of products offered. Examiners also answered questions about banks' plans for offering Internet banking in the future.

We matched the examiner-response data with financial data for the 2,517 national banks that filed a third quarter 1999 Report of Condition and Income (the "call report"), and we added banking structure data contained in the OCC's Integrated Banking Information System database. In addition, we included supervisory information on banks' CAMELS ratings, as well as on their information technology (IT) practices. While our data set is confined to national banks, we believe it is broadly applicable to the banking system at large.[11]

Number and Size Distribution of Internet National Banks

Based on daily articles in the business press, one might easily conclude that most banks offer Internet banking.[12] In fact, as Table 1 shows, while slightly more than half of all national banks had Web sites in the third quarter of 1999, only 464 national banks—just under 20 percent of all FDIC-insured national banks—offered transactional Internet banking to their customers.[13]

Although only a minority of institutions offer Internet banking, Table 2 shows that banks offering these services

[11] As of the third quarter of 1999, national banks accounted for 28 percent of all banks and 59 percent of all banking system assets. On average, national banks are larger than state banks but national banks are widely distributed across asset size categories, and by size category they exhibit the same performance characteristics as state banks. Egland, Furst, Nolle, and Robertson (1998) found no evidence of significant differences in the structural attributes of national and state banks offering Internet banking.

[12] For example, during the week of March 20–24, 40 percent of the articles in the *American Banker* dealt with Internet banking.

[13] As noted at the bottom of Table 1, this figure excludes credit card banks.

Table 1—Internet banking and national banks *(Q3 1999)*

	Number	Percent of national banks
National banks with Web sites	1,364	54.2
National banks with transactional Web sites	541	21.5
of which:		
FDIC-insured commercial national banks with transactional Web sites [a]	464	19.9 [b]
of which:		
Virtual banks [c]	1	[d]
Memorandum:		
Total national banks [e]: 2,517		
Total FDIC-insured national banks: 2,334 [a]		

Source: Office of the Comptroller of the Currency

[a] Excluding credit card banks.

[b] FDIC-insured commercial national banks with transactional Internet banking as a percent of all FDIC-insured national banks, excluding credit card banks.

[c] See the text for a definition of "virtual bank."

[d] Less than 1 percent.

[e] All national banks for which a third quarter 1999 call report was filed.

Table 2—Internet banks few in number, but dominant in key characteristics *(Q3 1999)*

	Transactional Internet national banks as a percent of all national banks	
Number of banks	19.9	
Assets [a]	89.2	
Small deposit accounts [b]	84.1	
	Transactional Internet national banks	Non-Internet national banks [c]
Average size (assets in $ millions)	5,880	180
Average number of employees	1,659	69
Average number of offices per bank [d]	61	5
Average number of employees per office	27	15
Percent of banks in urban areas [e]	72.2	42.6

Source: Office of the Comptroller of the Currency.

[a] Dollar value of assets.

[b] Percent of number of deposit accounts under $100,000.

[c] Includes banks with Web sites that are not transactional.

[d] Includes headquarters, branches, and non-branch offices.

[e] "Urban area" is defined as a Standard Metropolitan Statistical Area.

accounted for most of the assets in the national banking system. In addition, transactional Internet banks accounted for almost 85 percent of all deposit accounts under $100,000 in the national banking system. Such deposits are a reasonably good measure of consumer accounts at banks, and by implication, we can say that most consumers have accounts at banks that offer Internet banking. Virtually all of the evidence from market surveys indicates that consumer use of the Internet for banking transactions is currently quite limited. Those data suggest that this limited usage is primarily due to a lack of consumer demand for the current set of Internet banking products, rather than a lack of availability. The infrastructure is in place to allow for very rapid growth in the use of Internet banking if consumers become convinced that the services offered via the Internet are superior to the services offered through more traditional delivery channels.[14]

As a group transactional Internet banks had, on average, 33 times more assets, 24 times more employees, and 12 times more offices than non-Internet national banks. In addition, although Internet banking can enable a remotely located bank to reach potential customers anywhere, to date transactional Internet banks were more than one-and-a-half times more likely to be located in urban areas as were non-Internet banks.

Table 3 illustrates the size distribution of Internet and non-Internet banks. All of the largest banks (i.e., those with $10 billion or more in assets), and almost two-thirds of mid-to-large-size banks (i.e., those with between $1 billion and $10 billion in assets) offered Internet banking. By contrast, only 7 percent of small banks (i.e., those with under $100 million in assets) did. Nevertheless, it is clear that while large banks are far more likely to be transactional, small size is not a prohibitive barrier to offering Internet banking.

Key Internet Banking Services

Egland, Furst, Nolle, and Robertson (1998) showed that in mid-1998, most transactional Internet banks offered the services of balance inquiry and funds transfer between accounts. That generalization still applied in the third quarter of 1999, as Table 4 shows, although small transactional banks were somewhat less likely to offer these

[14] Recent analyses indicate that a large percentage of customers who sign up for Internet banking discontinue using it. See, e.g., Redman (1999), who summarizes the findings of a Cyber Dialogue study. Craig (1999) presents a theoretical analysis of the obstacles to changes in payment patterns. Also see Marks (1999), who compares the relative success of on-line brokerage to on-line banking.

Table 3—National banks offering transactional Internet banking: size distribution
(Q3 1999)

	Number of Internet banks	Internet banks as a percent of banks in size category	Average asset size of Internet banks relative to non-Internet banks [a]
Less than $100 million	85	7.1	0.95
$100 million to less than $1 billion	265	27.1	1.45
$1 billion to less than $10 billion	73	61.3	1.40
$10 billion and over	41	100.0	n.a.
Total	464	19.9	32.67

Source: Office of the Comptroller of the Currency.

[a] Non-Internet banks include those with a Web site that is not transactional.

n.a.: not applicable.

services.[15] There is a more significant divergence by size category in the proportion of banks offering electronic bill payment.[16] All of the very largest banks, and over 90 percent of banks in the $1 billion to $10 billion asset class, offer electronic bill payment. This drops to 77 percent for banks between $100 million and $1 billion, and to 60 percent for the smallest size category.

Looking at Internet banking services beyond balance inquiry, funds transfer, and bill payment, patterns of what is offered by banks of different sizes diverge greatly. In general, larger banks are more likely to accept credit applications on-line, but except for the smallest size category, there is no relationship between size and the ability to set up a new account via the Internet.

One notable feature of Table 4 is that banks of all sizes were roughly equally likely to offer on-line cash management services. Cash management is a key business-oriented service, and the Internet would seem to offer significant opportunities for banks to create value by improving the efficiency of cash management systems. Thus, offering this line of business may be an important determinant for how well small banks compete with larger institutions for business customers. As of the third quarter of 1999, it appeared that small banks were giving this business line as much focus as large banks. However, as Table 4 makes clear, only about 16 percent of all transactional banks offered this service, a percentage far below that for most other on-line products for which we collected data.[17]

Table 4 also contains information on the extent particular business lines—brokerage, fiduciary, and insurance

[15] Most of the banks that did not offer balance inquiry or funds transfer at a minimum offered on-line credit applications.

[16] Electronic bill payment allows a bank's customers to instruct the bank to make payments electronically. The bank then either sends an automated clearinghouse (ACH) payment or a paper check. In either case, the customer's account is debited for the amount of the payment.

[17] In the first quarter of 1999, Pizzani (1999) reported that "banks have largely ignored the online banking needs of small businesses." As we discuss in the section on banks' plans (below), it appears that bankers are planning to increase dramatically their emphasis on business Internet banking services.

Table 4—Key services offered by transactional Internet national banks
(Q3 1999)

	Percent of transactional Internet banks offering selected services (by asset size category)				
Type of service	All banks	Less than $100 million	$100 million to less than $1 billion	$1 billion to less than $10 billion	$10 billion and over
Balance inquiry and funds transfer	88.8	74.1	90.2	94.5	100.0
Bill payment	78.2	60.0	77.4	90.4	100.0
Bill presentment	10.6	7.1	7.9	16.4	24.4
Credit applications	60.0	51.8	51.7	75.3	80.5
New account set-up	36.6	29.8	43.9	45.2	43.9
Cash management	15.7	14.1	16.2	15.1	17.1
Brokerage	21.6	10.6	14.7	41.1	53.7
Fiduciary	11.9	3.5	9.8	12.3	41.5
Insurance	5.4	2.4	2.3	6.8	29.3

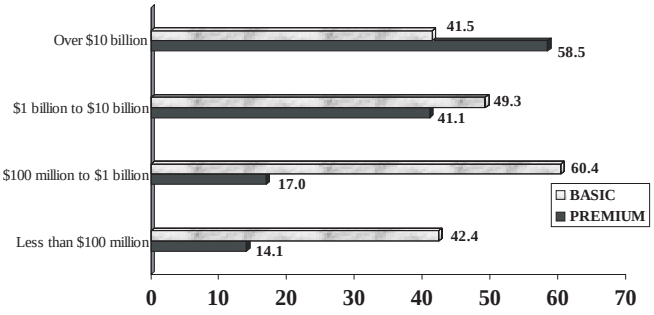
Source: Office of the Comptroller of the Currency.

services—were offered on-line. Consistent with their practices in the physical world, larger banks are much more likely to offer brokerage services than smaller banks; the on-line pattern is less clear for offerings of insurance and fiduciary services, although banks under $100 million in assets are least likely to offer any of these services.[18]

To gain a clearer picture of the typical range of Internet services available at banks in different size categories, we defined two alternative "menus" of Internet banking services. "BASIC" Internet banking is defined as the three core Internet banking services of balance inquiry, funds transfer, and bill payment. We define "PREMIUM" Internet banking as BASIC plus at least three other services. Figure 2 compares the proportion of banks by size category that offer just BASIC services to those that offer a PREMIUM set of Internet banking products. In the smaller size categories, Internet banks are more likely to offer just the BASIC range of services, compared to the larger size categories of Internet banks. But almost 60 percent of the largest banks offer PREMIUM Internet banking services, whereas only 14 percent of the smallest banks have extended product menus. More generally, banks over $1 billion in assets are at least two-and-a-half times more likely than banks under $1 billion in size to offer customers a PREMIUM package of services. Hence, the evidence indicates that, while small banks can establish an on-line presence, they are currently less likely to compete with large banks on the basis of the range of product offerings. To the extent product variety is a key factor in attracting and maintaining a strong customer base, small banks may be at a disadvantage relative to large banks.

Figure 2—Larger banks offer a greater range of Internet banking services

Percent of transactional Internet national banks offering BASIC and PREMIUM service
(Q3 1999)*



*BASIC service includes balance inquiry, funds transfer, and bill payment. PREMIUM service includes BASIC and at least three other on-line services.

Source: Office of the Comptroller of the Currency

[18] As Table 4 shows, 41.5 percent of the largest transactional banks offer fiduciary services on-line. That percent is lower than the percent of the largest banks offering 6 of the other 10 on-line services. This relatively low percentage appears to be consistent with more general findings about the somewhat lackluster competitive position of large banks in offering retirement services, both on-line and via traditional channels. See Robertson, Cambruzzi, Jacques, Nigro, Pate, Rich, and Steele (2000) for a detailed study of this issue.

Web Site Privacy Statements

Both banks and their customers stand to benefit substantially from the increased ability to collect and analyze information obtained via the Internet. In particular, both banks and customers can benefit from the collection and integration of large amounts of personal information that enhance the ability of banks to offer a wide range of products tailored to individual demands. However, these same information collection, analysis, and distribution activities raise questions related to personal privacy protection.[19] A basic step many banks are taking to address on-line privacy issues is to post a statement of their policies about the collection and use of customer information. Our database includes information on how many transactional banks had such a statement on their Web site. Table 5 summarizes that information.[20]

More than four-fifths of transactional Internet banks included a privacy policy statement on their Web site in the third quarter of 1999. That represents a large increase

Table 5—Substantial increases in number of Web site privacy policy statements

	Percent of transactional Internet national banks with a privacy policy statement on the Web site		
Asset size category	Second quarter 1998	Fourth quarter 1998	Third quarter 1999
All	40.9	54.5	83.8
Under $100 million	21.4	35.7	75.0
$100 million to less than $1 billion	32.6	41.3	79.5
$1 billion to less than $10 billion	37.5	62.5	97.7
$10 billion and over	75.0	95.0	100.0

Source: Office of the Comptroller of the Currency; Egland, Furst, Nolle, and Robertson (1998).

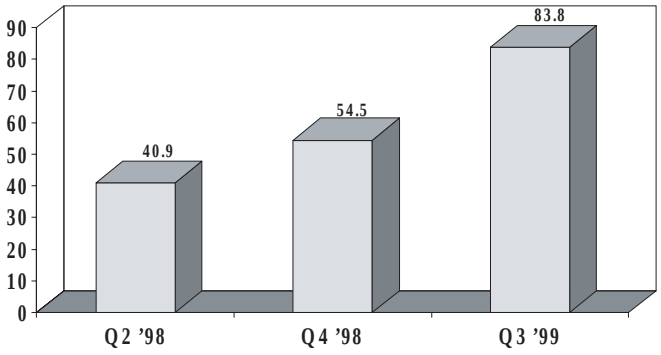
[19] See Office of the Comptroller of the Currency (1999a) for a discussion of privacy issues facing banks offering Internet banking.

[20] Note that our data is confined to whether or not transactional Internet banks posted an on-line privacy statement; it does not include an evaluation of the nature of banks' privacy statements. For an analysis of attributes of the on-line privacy statements of depository institutions, see the Interagency Web Site Privacy Report (1999).

from just over 50 percent at the end of 1998, and more than a doubling since mid-1998.[21] Large banks were more likely to post an on-line privacy policy than small banks. Indeed, 100 percent of the largest banks included on their Web sites a statement about the collection and use of customer information, and almost all banks over $1 billion in asset size did so, as compared to 75 percent of the smallest banks. However, the discrepancy between large and small bank practices in this respect narrowed considerably during 1999. Figure 3 illustrates the fact that on-line privacy statements have become more common for transactional Internet banks over time.

Figure 3—Most transactional Internet national banks have an on-line privacy statement

Percent of transactional Internet national banks with an on-line privacy statement



Source: Office of the Comptroller of the Currency

4. Internet and Non-Internet Banks: Performance Comparisons

In comparing transactional Internet banks in mid-1998 to non-Internet banks, Egland, Furst, Nolle, and Robertson (1998) found little besides relative size to distinguish the two groups. As Tables 6, 7, and 8 illustrate, by the third quarter of 1999, differences between Internet and non-Internet banks had begun to emerge in balance sheet composition and funding, in sources of income and expenditures, and in measures of performance.[22]

[21] See Egland, Furst, Nolle, and Robertson (1998) for further information on the 1998 figures.

[22] We make extensive use of univariate comparisons between Internet and non-Internet bank characteristics. Because the importance of bank size has already been established, we ''control'' for differences in bank size, roughly speaking, by stratifying the data by asset size categories. This ''first-step'' approach is useful for an initial investigation to establish a foundation of stylized facts. Furst, Lang, and Nolle (2000) include multivariate statistical methods.

Portfolio Composition, Income, and Expenses

Table 6 shows major lending and funding characteristics for Internet and non-Internet banks.[23] Overall, on the asset side, Internet banks have a relatively greater focus on business lending (commercial and industrial loans) and credit card lending. On the liability side, Internet banks generally are less reliant on core deposits for funding and make greater use of purchased funds relative to deposits. For small banks, this result is consistent with recent business press reports that they are concerned about traditional sources of funding, and that small banks have begun to view the addition of Internet banking as a way to offer products that reduce their dependence on core deposits.[24]

Differences in business strategies between Internet and non-Internet banks are also evident in Table 7. The first column in Table 7 shows the ratio of noninterest income to net operating revenue. This ratio is a rough proxy for the amount of revenue being generated by ''non-traditional'' activities. Internet banks generated a substantially higher proportion of their income from non-traditional activities compared to non-Internet banks. Roughly speaking, Internet banks received about 50 percent more of their revenue from noninterest income when compared to non-Internet banks. That pattern is consistent with a business strategy of using the Internet to target businesses and more affluent consumers, in the belief that these customers will be interested not only in loans but in other services that yield fee income.[25]

[23] In the tables throughout the remainder of the paper comparing structure and performance characteristics of Internet to non-Internet banks, we calculated a difference of means test to ascertain the likelihood that Internet banks and non-Internet banks were different with respect to a given characteristic. For each pair of observations in a table, we provide a probability value (p-value) for the hypothesis that the means in the Internet and non-Internet samples are the same. A lower p-value indicates a greater likelihood that the two figures being compared represent real differences between categories of banks (i.e., Internet vs. non-Internet, etc.). A common practice in empirical economics is to consider p-values at or below 0.05 as indicating a statistically significant difference, while some studies (particularly ones with small samples) use a cut-off point of 0.10 for asserting statistical significance.

[24] See, e.g., Winig (2000), who reports that 85 percent of community bank CEOs who participated in a recent Grant Thornton survey agreed with the statement that ''Funding with core deposits will be more difficult in three years,'' because consumers continue to look for higher-yielding alternatives to bank accounts. Correspondingly, the same survey reveals a surge in community banker interest in offering Internet banking.

[25] See Gold (2000) for example. *Bank Technology News* (1999d) sites a Forrester Research Inc. study showing that higher income individuals are more likely to be active Internet banking users.

Table 6—Internet and non-Internet national banks: selected balance sheet ratios [a, b]
(Q3 1999)

	Loan composition ratios (in percent)		Funding ratios (in percent)	
Asset size category	C&I loans/loans	Credit card loans/loans	Deposits/assets	Fed funds purchased/deposits
Less than $100 million:				
Internet banks	20.4	0.5	82.1	2.1
Non-Internet banks	16.9	0.4	85.1	1.5
(p-value)	(0.001)***	(0.691)	(0.000)***	(0.276)
$100 million to $1 billion:				
Internet banks	17.9	1.7	78.9	7.4
Non-Internet banks	18.1	0.9	82.3	3.9
(p-value)	(0.209)	(0.000)***	(0.000)***	(0.000)***
$1 billion to $10 billion:				
Internet banks	24.5	4.2	68.6	20.4
Non-Internet banks	17.8	0.9	71.8	12.1
(p-value)	(0.003)***	(0.011)**	(0.299)	(0.023)**
$10 billion and over:				
Internet banks	34.1	2.8	66.1	11.7

Source: Office of the Comptroller of the Currency

[a] Numbers in parentheses are probability values (p-values) for a statistical test of the hypothesis that the mean values in each cell are equal. Thus, a smaller p-value indicates a greater likelihood that the true mean value of the Internet sample differs from the non-Internet sample. Asterisks indicate the statistical significance of the difference of means test with:

*** = significant at the 1% level

** = significant at the 5% level

* = significant at the 10% level

[b] Non-Internet banks include banks with non-transactional Web sites.

C&I = commercial and industrial

In addition to revenue enhancement, Internet banking could enable banks to reduce costs of operation. In particular, greater reliance on Internet banking might allow banks to reduce expenditures on "bricks and mortar." To the extent this is so, Internet banking would be considered a *causal* factor in generating lower expenses related to maintaining physical branches. On the other hand, one might expect that banks with relatively high expenses in maintaining their branch networks might have the greatest incentive to adopt Internet banking. From this perspective, the adoption of Internet banking would be the *effect* of existing characteristics of banks. The data in Table 7 shows that, consistent with the first hypothesis, Internet banks over $100 million in asset size had lower expenses on building and equipment relative to net operating revenue. However, among the smallest size Internet banks—the majority of which adopted Internet banking after the second quarter of 1998—building and equipment expenditures were higher than for non-Internet banks. This might indicate that smaller banks with high costs of maintaining a branch are motivated to adopt Internet banking by the prospect of future cost savings. However, because the call report data aggregates expenditures on buildings and equipment, this result might be due to high initial costs of equipment for small banks seeking to establish an on-line presence. Further research is necessary to establish whether Internet banking will likely reduce costs associated with physical branch networks, and whether relatively high branch-related expenses is a causal factor in the adoption of Internet banking.

Performance Measures

Even the banks most successful at offering Internet banking currently serve a relatively small share of their customer base with this delivery channel.[26] As a result, it has been difficult for banks and industry analysts to determine yet if Internet banking has had a significant impact on

[26] The penultimate section of this article discusses "demand" for Internet banking in more detail.

Table 7—Income and expenses: Internet and non-Internet national banks [a, b] *(Q3 1999)*

Asset size category	"Non-traditional" income: Noninterest income/net operating revenue [c] (percent)	Expenses: Premises and fixed assets/net operating revenue [c] (percent)
Less than $100 million:		
Internet banks	22.0	11.7
Non-Internet banks	14.6	9.3
(p-value)	(0.000)***	(0.000)***
$100 million to $1 billion:		
Internet banks	23.1	8.2
Non-Internet banks	16.8	9.1
(p-value)	(0.000)***	(0.000)***
$1 billion to $10 billion:		
Internet banks	36.8	7.2
Non-Internet banks	23.0	8.0
(p-value)	(0.000)***	(0.111)
$10 billion and over:		
Internet banks	40.1	8.1

Source: Office of the Comptroller of the Currency

[a] Numbers in parentheses are probability values (p-values) for a statistical test of the hypothesis that the mean values in each cell are equal. Thus, a smaller p-value indicates a greater likelihood that the true mean value of the Internet sample differs from the non-Internet sample. Asterisks indicate the statistical significance of the difference of means test with:

*** = significant at the 1% level

** = significant at the 5% level

* = significant at the 10% level

[b] Non-Internet banks include banks with non-transactional Web sites.

[c] Net operating revenue = net interest income plus noninterest income.

bank performance.[27] For example, in their comparison of Internet and non-Internet banks in mid-1998, Egland, Furst, Nolle, and Robertson (1998) observed that they did not find significant differences in profitability, efficiency, or credit quality. But, as our new information shows, by the third quarter of 1999, differences between Internet and non-Internet banks in performance had emerged.

Table 8 compares the performance of Internet banks with non-Internet banks in the third quarter of 1999. What stands out most distinctly in this table are the performance differences between the Internet banks and non-Internet banks in the smallest size category compared to larger banks. For example, while Internet banks over $100 million in assets were more profitable than non-Internet banks, Internet banks in the smallest size category were significantly less profitable than non-Internet banks.[28] The smallest size banks were also less efficient than non-Internet banks, as measured by the ratio of noninterest expense to net operating revenue ("accounting efficiency"), a commonly used measure of cost efficiency.[29] There was no statistically significant difference between the accounting efficiency of Internet and non-Internet banks in the larger size categories. The smallest size Internet banks had better credit quality than non-Internet banks; for the larger size banks there is a less distinct pattern. As we will discuss further, the differences for small banks were likely due to the relative performance of *de novo* banks that offered Internet banking.

Interestingly, noncurrent loans were significantly higher for Internet banks in the $1 billion to $10 billion assets size category. This is consistent with our previous results in Table 6 that showed that these banks were more heavily concentrated in credit card and business lending than similarly sized non-Internet bank. Internet banks in the smallest size category have relatively fewer noncurrent loans as compared to their non-Internet peers. This suggests that the relatively poor profitability and accounting efficiency ratios at these banks are due to factors not associated with credit losses.

De Novo Banks

To investigate further the performance differences of small banks, we focused on two different groups of Internet banks: *de novo* Internet banks, i.e., those banks that offered Internet banking and had been in operation a year or less as of the third quarter of 1999; and "mature" Internet banks, i.e., those banks which Egland, Furst, Nolle, and Robertson (1998) had determined offered Internet banking at least as far back as the second quarter of 1998. Segmenting our data this way allowed us to investigate two possible reasons small Internet banks per-

[27] See, for example, Azarchs (2000) and Jordan and Katz (1999). In a recent study, Moody's Investors Service (2000a) says that "Moody's does not foresee much impact from the Internet on large U.S. banks' core profitability or competitive position—at least in the intermediate term." Somewhat in contrast, Azarchs (2000) cites a Booz Allen & Hamilton Inc. study arguing that "a mature Internet bank could operate at a 15%–20% expense-to-revenue ratio" compared to a ratio of about 60 percent for most banks. Hitt, Frei, and Harker (1999) found that banks' investment in Internet banking had not resulted in "new, profitable customers to the firm, as many banks had hoped. Rather, it seems to be to retain high-value customers" (p. 132), a result echoed in Hitt and Frei (1999).

[28] We also used return on assets as a measure of profitability and found very similar results.

[29] Following DeYoung (1999), we use the term "accounting efficiency" for this measure of cost efficiency.

Table 8—Internet banks and non-Internet national banks: performance comparisons [a, b]
(Q3 1999)

Asset size category	Profitability: Return on equity (percent)	Accounting efficiency: Noninterest expense to net operating revenue [c] (percent)	Credit quality: Noncurrent loans to total loans [d] (percent)
Less than $100 million:			
Internet banks	6.34	77.90	0.52
Non-Internet banks	10.13	65.52	0.87
(p-value)	(0.000)***	(0.000)***	(0.002)***
$100 million to $1 billion:			
Internet banks	14.15	59.59	0.68
Non-Internet banks	13.03	60.57	0.73
(p-value)	(0.000)***	(0.282)	(0.249)
$1 billion to $10 billion:			
Internet banks	18.26	56.26	0.81
Non-Internet banks	15.68	54.74	0.56
(p-value)	(0.003)***	(0.256)	(0.003)***
$10 billion and over:			
Internet banks	15.35	57.84	0.82

Source: Office of the Comptroller of the Currency

[a] Numbers in parentheses are probability values (p-values) for a statistical test of the hypothesis that the mean values in each cell are equal. Thus, a smaller p-value indicates a greater likelihood that the true mean value of the Internet sample differs from the non-Internet sample. Asterisks indicate the statistical significance of the difference of means test with:

*** = significant at the 1% level

** = significant at the 5% level

* = significant at the 10% level

[b] Non-Internet banks include those with non-transactional Web sites.

[c] A higher ratio indicates lower efficiency.

[d] A higher ratio indicates lower credit quality.

formed more poorly than small non-Internet banks: ''newness'' of banks, and ''newness'' of Internet banking.

De novo banks as a rule perform more poorly than established banks, a pattern that generally holds for at least their first three years.[30] Because most *de novo* banks fall into the small size category (i.e., banks with less than $100 million in assets), we reasoned that their performance could have affected the measures of performance for the entire group of small banks.[31] That suspicion was heightened by our discovery that, among small banks, *de novo* banks as a group were three times more likely to offer Internet banking than mature small banks.[32] In addition, it is reasonable to conjecture that the performance of a *de novo* bank might be significantly affected by its choice to offer Internet banking. On the cost side, there may be one-time set-up expenses as well as ongoing expenses for advertising and operating this delivery channel.[33] On the revenue side, *de novo* banks offering Internet banking may have difficulty in attracting customers via the Internet. In light of this, we separated *de novo* national banks from the rest of the small national banks.

Table 9 compares the nine *de novo* Internet national banks and 47 *de novo* non-Internet national banks in the third quarter of 1999 across key performance characteristics. The *de novo* Internet banks had much lower profitability, and greater inefficiency, than did *de novo* non-Internet banks. In a proximate sense, one key contributing factor to these results was that *de novo* Internet banks exhibited a much higher expense ratio than did non-Internet *de novo* banks. As discussed previously, the data

[30] See DeYoung (1999) for a recent analysis of the performance of *de novo* banks.

[31] Fifty-six of the 59 (one year or younger) *de novo* national banks in the third quarter of 1999 were in the under $100 million asset size category.

[32] As the memorandum item in Table 9 shows, 19.2 percent of small *de novo* banks offered Internet banking, while only 6.1 percent of ''mature'' small banks offered Internet banking.

[33] This may be true even if much of the set-up and operation of the bank's Internet banking is outsourced to third-party vendors.

Table 9—Performance comparisons of *de novo* national banks: Internet banks performed worse than non-Internet banks [a, b] *(Q3 1999)*

	Internet *de novo* banks		Non-Internet *de novo* banks [c]
Number of banks	9		47
Profitability [d]	−14.70		−8.64
(p-value)		(0.082)*	
Accounting efficiency [e]	238.09		133.14
(p-value)		(0.024)**	
Premises and fixed assets-to-net operating revenue (percent)	33.36		19.60
(p-value)		(0.002)***	
"Traditional" income [f]	87.86		75.99
(p-value)	(0.253)		

Memorandum: Among small banks, *de novo* banks are more than three times as likely to offer Internet banking as banks in existence three years or more:

Percent of de novo banks that offered Internet banking: 19.2

Percent of mature small banks that offered Internet banking: 6.1

Source: Office of the Comptroller of the Currency.

[a] *De novo* banks are those in the $100 million or less asset size category operating for one year or less as of the third quarter of 1999.

[b] Numbers in parentheses are probability values (p-values) for a statistical test of the hypothesis that the mean values in each cell are equal. Thus, a smaller p-value indicates a greater likelihood that the true mean value of the Internet sample differs from the non-Internet sample. Asterisks indicate the statistical significance of the difference of means test with:

*** = significant at the 1% level

** = significant at the 5% level

* = significant at the 10% level

[c] Non-Internet banks include those with Web sites that are not transactional.

[d] Return on equity, in percent.

[e] Noninterest expense to net operating revenue, in percent. A higher ratio indicates lower efficiency.

[f] Net interest income to net operating revenue, in percent.

do not allow us to ascertain the composition of the expenditures for premises and fixed assets. Nevertheless, it is possible that expense ratios were higher for *de novo* Internet banks in part because of costs incurred to set up Internet banking.[34]

[34] Table 9 also shows that *de novo* Internet banks received a higher proportion of their revenue from traditional interest income than did non-Internet *de novos*. While the statistical significance of this result is weak, it stands in marked contrast to the significantly lower reliance on traditional income by Internet banks in other size categories. That outcome could reflect difficulties for *de novo* Internet banks in successfully attracting customers who generate fee income.

Internet Experience and Bank Performance

Clearly, the combination of being a new bank and of offering Internet banking results in relatively poor performance. But it is also possible that the poor performance of small Internet banks versus non-Internet banks is the result of short-run costs of making an investment in Internet banking, one that could be expected to yield substantial gains in the longer run. Few banks have had Internet banking for more than several years, so it is difficult to ascertain what the "long run" is with respect to Internet banking. Nevertheless, our data allow us to explore whether, among *mature* small banks offering Internet banking, those that have offered it for a relatively long time outperformed those that only recently began to offer it.[35] Making such a comparison separates "newness of bank" from "newness of Internet banking."

The results of subtracting *de novos* and then segmenting mature small Internet banks by "Internet experience" are presented in Tables 10 and 11. Table 10 shows that there is no statistically significant difference between the profitability of the 1,009 non-Internet small national banks and the 61 Internet small national banks. That is, the lower profitability for non-Internet banks compared to small Internet banks, displayed in Table 8, completely disappears as a result of excluding *de novo* banks. However, small Internet banks still exhibit greater inefficiency than small non-Internet banks, despite the exclusion of *de novo* banks. Hence, it is not the newness of the bank that explains this aspect of worse performance for small Internet banks.

In order to investigate whether "newness of offering Internet banking" might explain the poorer efficiency results for small Internet banks, we divided the 61 small Internet banks into two groups. "Internet-experienced" banks are those that offered Internet banking no later than the second quarter of 1998, and "Internet-inexperienced" banks are those that began to offer Internet banking sometime between the beginning of the third quarter of 1998 and the end of the third quarter of 1999.[36] We then

[35] We define "mature" banks as those in operation for more than three years as of the third quarter of 1999. We compared the performance of "Internet-experienced" banks (i.e., those offering Internet banking since at least the second quarter of 1998) to that of banks that began offering Internet banking after the second quarter of 1998, for all size categories. We found no statistically significant difference in performance between those two "vintages" of Internet banks in the banks over $100 million in assets. Hence, our discussion in the text is confined to the smallest size banks.

[36] As indicated previously, we have no record of the exact date banks began offering Internet banking to their customers.

Table 10—Mature small national banks: Internet banks are less efficient, but not less profitable [a,b] *(Q3 1999)*

	Non-Internet banks		Internet banks
Number of banks	1,009		61
Profitability [c]	11.13		10.36
(p-value)		(0.232)	
Accounting efficiency [d]	64.50		70.50
(p-value)		(0.000)***	
Premises and fixed assets-to-net operating revenue	9.02		10.41
(p-value)		(0.000)***	
"Traditional" income [e]	85.51		78.24
(p-value)		(0.000)***	

Source: Office of the Comptroller of the Currency.

[a] "Mature" small banks are those in the $100 million or less asset size category in operation for more than three years as of the third quarter of 1999. Non-Internet banks include those with Web sites that are not transactional.

[b] Numbers in parentheses are probability values (p-values) for a statistical test of the hypothesis that the mean values in each cell are equal. Thus, a smaller p-value indicates a greater likelihood that the true mean value of the Internet sample differs from the non-Internet sample. Asterisks indicate the statistical significance of the difference of means test with:

*** = significant at the 1% level

** = significant at the 5% level

* = significant at the 10% level

[c] Return on equity, in percent.

[d] Noninterest expense to net operating revenue, in percent. A higher ratio indicates lower efficiency.

[e] Net interest income to net operating revenue, in percent.

compared both the small Internet-experienced and the Internet-inexperienced banks to small non-Internet banks.

The results of those comparisons are summarized in Table 11. That table shows that there is no statistical difference between the accounting efficiency of Internet-experienced banks compared to non-Internet banks. However, those small banks only recently offering Internet banking exhibited statistically significant poorer accounting efficiency than non-Internet banks. Hence, the lower efficiency of small Internet banks as a group is attributable to those small Internet banks just recently beginning to offer Internet banking; i.e., it appears that Internet experience does matter for small banks.

Table 11 also shows that, for a key measure of "input" costs—the ratio of premises and fixed assets to net operating revenue—Internet-inexperienced banks were significantly worse than non-Internet banks. This fact helps explain the greater inefficiency of small banks for which Internet is relatively new. However, the results in Table 11 also suggest that higher expense ratios and lower efficiency may disappear as small banks gain experience in offering Internet banking, inasmuch as Internet-experienced banks showed no statistical differences in those two performance measures compared to non-Internet banks. It is possible that the expense and efficiency disadvantages may be a temporary consequence of investing in Internet banking.[37] It is interesting to note that neither the Internet-experienced nor the Internet-inexperienced banks exhibited statistically different profitability compared to non-Internet banks, but both groups of Internet banks were less reliant on traditional interest-yielding activities compared to non-Internet banks. Those results suggests that small banks that have only recently begun to offer Internet banking are not performing poorly on the "output" side of operations.

Safety, Soundness, and Information Technology

Federal bank regulators regularly examine for safety and soundness and issue composite CAMELS ratings for each bank. The rating is based on capital, asset quality, management, earnings, liquidity, and sensitivity to market risk (CAMELS). The CAMELS ratings can range from 1 (best rating) to 5 (worst rating). Similarly, there are separate bank examinations that evaluate key aspects of the information technology (IT) risk management practices of banks, using the Uniform Rating System for Information Technology (URSIT).[38] As with the CAMELS ratings, IT exam scores can range from 1 to 5.

Table 12 compares the composite and management components of the CAMELS and IT ratings for Internet and non-Internet banks by size category. The table shows that, overall, Internet banks have similar ratings to non-Internet banks. Because relatively few banks offered Internet banking, one might expect that the "early adopters" would be more forward-looking and astute with

[37] The statistical results do not allow us to say for certain that "newness of Internet" for small banks causes poorer efficiency. It is possible that another set of factors explains both why some small banks chose not to be in the vanguard of banks offering Internet banking, and why they had poorer accounting efficiency ratios than did the 11 Internet-experienced banks that were among the "early adopters" of Internet banking.

[38] See the *Federal Register*: January 20, 1999 (volume 64, number 12, pp. 3109–3116) for a detailed description of the URSIT, which is "an internal supervisory examination rating system used by federal and state regulators to assess uniformly financial institution and service provider risks introduced by information technology and for identifying those institutions and service providers requiring special supervisory attention." Note, therefore, that URSIT exams are given to service providers over which regulators have supervisory authority, as well as to banks.

Table 11—Mature small national banks: Does Internet experience matter? [a, b]
(Q3 1999)

	Non-Internet banks	Internet-experienced banks	Internet-inexperienced banks
Number of banks	1,009	11	50
Profitability [c]	11.13	9.95	10.58
(p-values)		(0.400)	(0.434)
Accounting efficiency [d]	64.50	63.10	71.61
(p-values)		(0.641)	(0.000)***
Premises and fixed assets-to-net operating revenue	9.02	7.99	10.85
(p-values)		(0.233)	(0.000)***
"Traditional"income [e]	85.51	75.94	75.25
(p-values)		(0.000)***	(0.000)***

Source: Office of the Comptroller of the Currency.

[a] "Mature" small banks are those in the $100 million or less asset size category in operation for more than three years as of the third quarter of 1999. Non-Internet banks include those with Web sites that are not transactional. "Internet-experienced" banks are those that have offered Internet banking since at least the second quarter of 1998. "Internet-inexperienced" banks are those that began to offer Internet banking after the second quarter of 1998.

[b] Numbers in parentheses are p-values for the difference of means tests for Internet-experienced banks compared to non-Internet banks, and for Internet-inexperienced banks compared to non-Internet banks, respectively. The p-values are probability values for a statistical test of the hypothesis that the mean values in each cell are equal. Thus, a smaller p-value indicates a greater likelihood that the true mean value of the Internet sample differs from the non-Internet sample. Asterisks indicate the statistical significance of the difference of means test with:

*** = significant at the 1% level

** = significant at the 5% level

* = significant at the 10% level

[c] Return on equity, in percent.

[d] Noninterest expense to net operating revenue, in percent. A higher ratio indicates lower efficiency.

[e] Net interest income to net operating revenue, in percent.

respect to technology than non-Internet banks, and that this astuteness would be reflected in examiner ratings. The figures displayed in Table 12 provide weak support for this conjecture, inasmuch as Internet banks generally had lower (better) IT and CAMELS ratings than non-Internet banks. But, because the p-values generally are above 0.10, there is little statistical significance to the difference in the ratings.[39]

5. Internet Banking: Plans and Prospects

The allure of Internet banking is a strong one, to which many banks are responding.[40] In this section we present information on banks' plans for offering Internet banking. Our data set includes OCC examiners' responses to questions about the Internet banking plans of national banks through the end of 2000. Combining information about banks' future plans with the information on third quarter 1999 Internet banking activities allows us to project the "supply" of Internet banking in the United States as 2001 begins.[41] We then contrast this projected

[39] The relative weakness of these results might be due to the overall strength of national banks during this period, and the resultant relatively strong supervisory ratings. See Office of the Comptroller of the Currency (1999b) for an analysis of national banking industry performance during the third quarter of 1999.

There is evidence showing that banks that effectively manage IT realize greater stock prices. See *Bank Technology News* (1999a), which cites a Barents study comparing stock prices of "well-run IT banks" to the banking industry average, 1992–1998. See also O'Sullivan (1998), who summarizes research suggesting that IT spending on technology staff boosts profitability.

[40] See, for example, *Retail Delivery News* (2000). A recent Ernst & Young study estimated that for the first time, bankers rated investment in Internet technology as their top technology spending priority. For a summary of the results of that study see *Bank Technology News* (1999e). In addition, Rhoads and Portanger (2000) report that pursuing an Internet-based strategy was a principal motivation behind the recent announcement of the merger of Deutsche Bank and Dresdner Bank, a combination that could create the largest bank in the world.

[41] Of course, our projections are accurate only to the extent that banks carry through with their plans.

Table 12—Safety and soundness, and information technology examination ratings: Internet banks similar to non-Internet banks [a]
(Q3 1999)

	CAMELS ratings [b]		IT ratings [c]	
Asset size category	Composite	Management	Composite	Management
Less than $100 million:				
Internet banks	1.72	1.73	1.66	1.81
Non-Internet banks	1.75	1.84	1.81	1.84
(p-value)	(0.676)	(0.135)	(0.155)	(0.803)
$100 million to less than $1 billion				
Internet banks	1.52	1.58	1.64	1.66
Non-Internet banks	1.63	1.68	1.74	1.77
(p-value)	(0.009)***	(0.023)***	(0.059)**	(0.055)**
$1 billion to less than $10 billion				
Internet banks	1.50	1.63	1.70	1.80
Non-Internet banks	1.64	1.70	1.61	1.68
(p-value)	(0.182)	(0.132)	(0.539)	(0.510)
$10 billion and over				
Internet banks	1.63	1.56	1.81	1.89

Source: Office of the Comptroller of the Currency

[a] Numbers in parentheses are probability values (p-values) for a statistical test of the hypothesis that the mean values in each cell are equal. Thus, a smaller p-value indicates a greater likelihood that the true mean value of the Internet sample differs from the non-Internet sample. Asterisks indicate the statistical significance of the difference of means test with:

*** = significant at the 1% level

** = significant at the 5% level

* = significant at the 10% level

[b] CAMELS ratings range from 1 (highest) to 5 (lowest).

[c] IT ratings (Uniform Rating System for Information Technology) range from 1 (highest) to 5 (lowest).

"supply" of Internet banking with information about possible future use of, or "demand" for, Internet banking.

Internet Banking Plans of National Banks

Table 13 summarizes key aspects of these projections. Based on responses to the examiner questionnaire, the number of national banks offering Internet banking would more than double from third quarter 1999 levels, so that by the beginning of 2001, 45 percent of national banks will be offering Internet banking. Banks offering transactional Internet banking would then account for more than 95 percent of national banking system assets. Because the largest banks already had Internet banking in the third quarter of 1999, most of the growth in the number of banks offering Internet banking will be from the smallest size banks. In the third quarter of 1999, only 7 percent of small banks (i.e., those with less than $100 million in assets) offered Internet banking, but our projections indicate that by year-end 2000 more than one-quarter of small banks will offer Internet banking. In addition, by the beginning of 2001, almost all national banks over $1 billion will offer Internet banking. Together, national banks offering Internet banking could account for almost 93 percent of consumer-type deposits in national banks. To the extent the national banking industry is representative of the entire banking industry, that suggests that more than 9 out of 10 banking industry customers will have access to Internet banking by the beginning of 2001.

In addition to an increase in the number of banks offering Internet banking, many banks plan to increase their range of on-line services. Banks' plans indicate a 125 percent increase in the number of banks offering Internet banking by year-end 2000, and a 150 percent increase in the number of transactional Internet banks offering a PREMIUM set of multiple on-line services.[42] Three planned product increases in particular stand out. As illustrated in Figure 5, the number of banks offering cash management services could increase by over 500 percent, on-line insurance offerings by banks may increase 280 percent, and there may be more than a 200 percent increase in the number

[42] See Furst, Lang, and Nolle (2000) for details on planned increases in Internet banking offerings by national banks.

Table 13—Internet banking in 2001?

	Third quarter 1999	Fourth quarter 2000 [a]
Number of national banks offering Internet banking [b]	464	1046
Percent of national banking system assets	89.2	95.2
Percent of small deposit accounts in the national banking system [c]	84.1	92.8
Percent of national banks in asset size category:		
All	19.9	44.9
Less than $100 million	7.2	25.3
$100 million to less than $1 billion	27.4	61.1
$1 billion to less than $10 billion	64.1	89.9
$10 billion and over	100.0	100.0

Memorandum:
46.2 percent of national banks had no plans as of the third quarter of 1999 to offer Internet banking in 2001 or beyond.

Source: Office of the Comptroller of the Currency

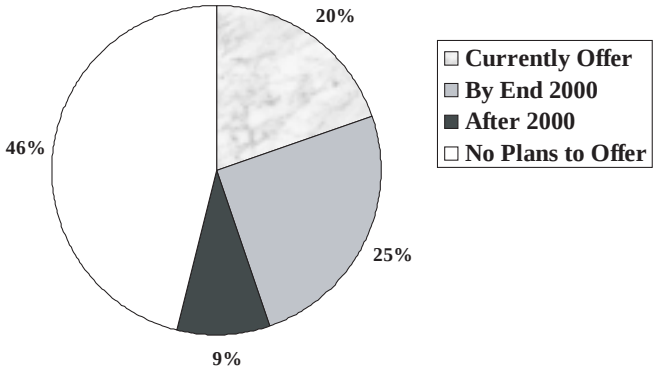
[a] Based on OCC examiners' knowledge of the Internet banking plans of national banks, as of the third quarter 1999. Percentage figures for assets, small deposit accounts, and banks per size category for fourth quarter 2000 were calculated by taking banks offering Internet banking as of the third quarter 1999, plus banks with plans to offer Internet banking by the end of 2000, relative to third quarter 1999 assets, small deposits, and numbers of national banks, respectively.

[b] FDIC-insured commercial banks excluding credit card banks.

[c] Percent of number of deposit accounts under $100,000.

Figure 4—Internet banking and national banks: potential growth

Percent of FDIC-insured national banks with transactional Internet banking

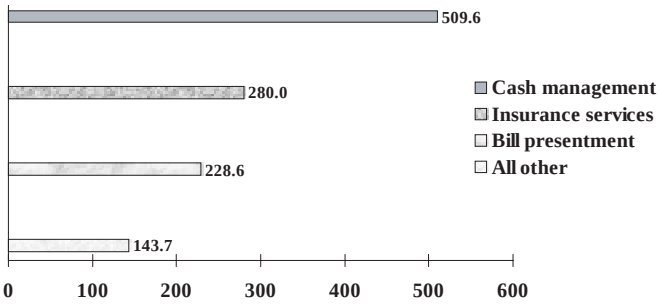


Source: Office of the Comptroller of the Currency

of banks offering electronic bill presentment. Significantly, large banks' plans to offer on-line business services (cash management) are more aggressive than those of smallest

Figure 5—Biggest percentage increase planned for on-line cash management, insurance services, and bill presentment

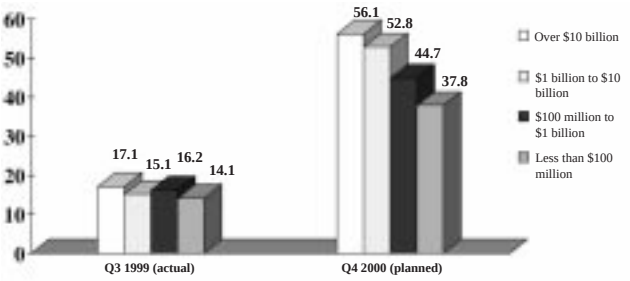
Planned percentage increases in the number of national banks offering selected on-line services by year-end 2000



Source: Office of the Comptroller of the Currency

Figure 6—Small banks may lag larger banks in offering business Internet banking

Percent of transactional Internet national banks offering on-line cash management services



Source: Office of the Comptroller of the Currency

banks.[43] Such developments might represent increased large bank competition for community banks' business customers, who some analysts believe are enthusiastic about using Internet-based banking services.[44]

[43] Indeed, several large banks have recently launched Web-based services targeting small businesses. See, for example, Hallerman (1999b), Marlin (1999), O'Brien (2000), Ptacek (2000 a and c), and Marjanovic (2000). O'Connell (2000) reports on a Meridien study which estimates costs for banks to install Internet-based cash management channels.

Some industry observers have begun to speculate that servicing the needs of business customers, rather than consumer customers, is likely to be a relatively more profitable Internet strategy for banks. See, e.g., Ptacek (2000b), O'Brien (2000), and Toonkel (2000a). For an analysis of possible roles banks could play in business-to-business commerce, see Wenninger (2000).

[44] For example, see *Bank Technology News* (1999c). See Wenninger (1999) for the growing importance of e-commerce in serving business bank customers.

Current and Future Demand for Internet Banking

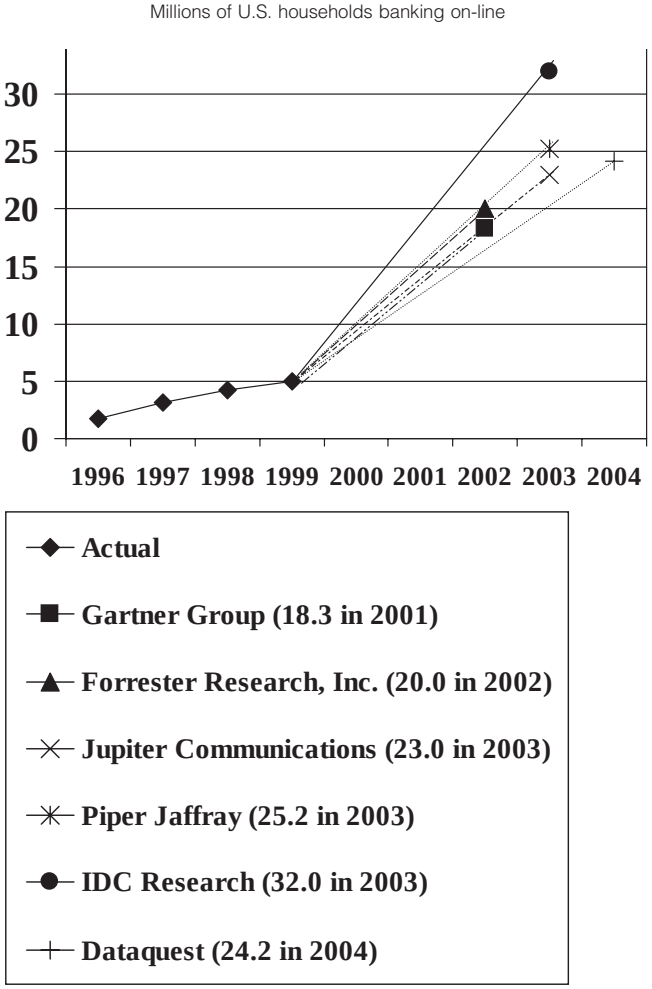
The level of "demand" for Internet banking in the future is an open question. One interesting aspect to banks' perceptions about future demand is that just under half of all national banks (46.2 percent) had no plans to offer Internet banking. Almost all of the banks without plans to offer Internet banking were in the smallest size category.[45] Clearly, some bankers have questions about how widespread and intense customer demand for Internet banking will be, and about the value of incurring the added expenses associated with offering another delivery channel.[46]

Another perspective on customer demand for Internet banking comes from considering projections about future use made by various industry analysts. Figure 7 shows that from an estimated 5.0 million U.S. households banking on-line in 1999, analysts expect growth in use of 4- to 6-fold over the next several years, i.e., perhaps to as much as 32 million households. While substantial, that level of usage would represent only about one-third of the 93 million U.S. households with a banking relationship.[47] Such growth would mean that only a minority of the household customers of banks that currently offer Internet banking, or that plan to offer it by year-end 2000, would actually choose to do their banking on-line.

Market Share of Internet Banking Customers

While opinions on the overall growth in demand for Internet banking vary widely, questions also arise about which banks will be winners and losers in the contest to secure on-line customers. The Internet is an extremely efficient device for banks of all sizes to collect and manage information in order to meet the various financial needs of individuals and businesses, in particular by integrating services or "bundling" them together.[48] On the one hand, the Internet allows financial firms of different sizes, including the smallest banks, to enter markets and

Figure 7—Industry forecasts of Internet banking



Source: Office of the Comptroller of the Currency using data from various industry sources

[45] About 9 percent of national banks planned to offer Internet banking after 2000.

[46] For summaries of a recent survey by Grant Thornton LLP on the Internet banking plans of community banks, see Winig (2000) and Agosta (2000). That survey revealed that 64 percent of the 638 community bank CEOs questioned responded that they expected to offer Internet banking by year-end 2000. The discrepancy between that result and our projections could be due to the inclusion of banks over $100 million in assets in the community banks surveyed by Grant Thornton. It is also possible that community banks are in the process of re-evaluating the relative desirability of offering Internet banking as more and more competitors go on-line. Agosta (2000) includes information from the Grant Thornton survey on small bank attitudes toward the Internet. See Carlson (2000) for a discussion of possible reasons some small banks are making the choice not to offer Internet banking.

[47] The Federal Reserve System's "1998 Survey of Consumer Finances" shows that 9.5 percent of U.S. households did not have any type of transaction account at a financial institution. See Kennickell, Starr-McClure, and Surette (2000).

[48] It should be noted, however, that data management problems are likely to continue to challenge banks of all sizes. In part this is due to the difficulties of dealing with a variety of customer databases built up over many years. See, e.g., Hallenborg (1999), and *Bank Technology News* (1999b), which summarizes a study by Innovative Systems Inc. on data management difficulties for banks. See also Horsfield (2000), who reports that an Ernst & Young survey shows that "30% of financial service companies have less than 20% of their systems integrated to show and exchange related customer information across channels and . . . 41% believe that customers will not get a consistent answer across electronic delivery channels." In addition, see the American Banker (2000b) for a discussion of Speer & Associates studies in November 1999 and March 2000 on the degree to which banks may be lagging behind nonfinancial companies in electronically collecting and using data about customers.

reach customers previously out of reach to them. On the other hand, there are substantial economies of scale and scope in data storage and data processing, and larger banks are better positioned to exploit such scale and scope economies than smaller banks. In addition, the proliferation of Internet Web sites means there may be a substantial advantage for banks able to distinguish their products from those of other banks (i.e., to engage in "branding"). Doing so will require significant resources for advertising and marketing, a fact that is likely to work to the advantage of large firms.[49]

Independent industry estimates of the current usage of Internet banking among the top five banks in terms of numbers of customers on-line are displayed in Table 14.[50] These estimates show a disproportionate concentration of Internet banking customers among a handful of large banks. In particular, as shown in the "market shares" columns, the top five Internet banks account for almost 36 percent of all U.S. customers using Internet banking; by comparison, these same five banks accounted for just over 20 percent of all small deposit accounts.[51] Indeed, the top two Internet banks together account for almost one quarter of all Internet banking customers in the United States. And, as a group, the top five Internet banks experienced more than a doubling of the number of customers using Internet banking between mid-1998 and the end of 1999. That rate was more than five times the estimated percentage increase in customer usage of Internet banking overall in the United States.[52]

Even among the top five Internet banks, however, there is evidence of differences in success at attracting custom-

[49] See Toonkel (2000c) for a report on Internet banking advertising strategies being employed by several large banks, and estimates from an Ad Relevance Inc. study of the advertising expenditures of three large banks. Some banks are choosing to focus on niche markets or "affinity groups" as an Internet banking strategy. For a report on how several banks are pursuing this strategy, see Weitzman (2000).

For a discussion of the strategic choices facing banks, and the possible consequences of Internet banking choices on banking industry structure and competition, see DeYoung (2000). See also Radecki, Wenninger, and Orlow (1997), Mishkin and Strahan (1999), and Jordan and Katz (1999) for analyses of possible effects of Internet banking and other retail payment system innovations on banking industry structure.

[50] As indicated in the source note in Table 14, the information in the table on Internet banking usage is from industry analysts, not from data supplied by OCC examiners. See especially O'Sullivan (2000b), who summarizes data from a November 1999 survey by Gomez Advisors Inc. on Internet banking usage.

[51] Recent reports and analyses suggest that some banks in other countries have been at least as successful as U.S. banks in securing on-line customers. For example, see Moody's Investors Service (2000b), Rhoads and Portanger (2000), and Power (2000a and b).

[52] See Figure 7.

Table 14—Top five Internet banks: estimated growth in number of Internet banking customers, and market shares of on-line customers

	Customers using Internet banking				Market shares	
Banking company	Second quarter 1998	Fourth quarter 1999	Growth from second quarter 1998 to fourth quarter 1999 (percent)	Bank's "active" on-line customers as a percent of bank's total number of on-line customers [a]	Bank's share of all U.S. on-line banking customers (percent) [b]	Bank's share of all small deposit accounts [c]
Wells Fargo	655,000 [d]	1,454,100	122.0	55.7	13.1	5.0
Bank of America	700,000 [e]	1,176,600	68.1	46.5	10.6	8.4
Bank One Corp.	144,200 [f]	488,400	238.7	47.3	4.4	2.6
Citibank	350,000	432,900	23.7	63.1	3.9	1.4
First Union Corp.	70,000	421,800	502.6	39.9	3.8	3.8
Top five total	1,919,200	3,973,800	107.1	51.1	35.8	21.1

Source: Office of the Comptroller of the Currency using data from Faulkner & Gray (1998); O'Sullivan (2000b); and Federal Financial Institutions Examination Council, Report of Income and Condition

[a] "Active" customers are defined as those who bank on-line at least once a month.

[b] Fourth quarter 1999.

[c] Second quarter 1999.

[d] For comparability with fourth quarter 1999 figure, includes pre-merger on-line customers at Norwest bank.

[e] For comparability with fourth quarter 1999 figure, includes pre-merger on-line customers at NationsBank.

[f] For comparability with fourth quarter 1999 figure, includes pre-merger on-line customers at First Chicago NBD.

ers to use Internet banking. For example, from the second quarter of 1998 through the fourth quarter of 1999, growth in customer usage varied widely. One bank saw its Internet banking customer base increase by less than 25 percent, while another experienced a six-fold increase in customer usage of Internet banking. In addition, there is variation among the banks in the percent of their "active" on-line customers who use Internet banking at least once a month. Only two of the five Internet banks have more than a 50 percent active customer rate.

6. Summary and Conclusions

Our analysis indicates several significant differences in the profile of banks offering Internet banking relative to non-Internet banks. Broadly speaking, Internet banks rely more heavily on noninterest income and less on core deposits for funding than do non-Internet banks. For all but the smallest size banks, Internet banks have higher returns on equity than non-Internet banks. Internet banks with assets under $100 million had significantly worse accounting efficiency and profitability ratios compared to non-Internet banks in the same size category. Those differences in performance were primarily due to the influence of *de novo* small banks offering Internet banking.

The current low level of customer usage of Internet banking, as well as the relatively modest cost of setting up an Internet banking Web site, makes it unlikely that Internet banking is having a sizeable direct impact on the bottom line of most institutions. We interpret our results as explaining the characteristics of banks that decide to become early adopters of Internet banking, rather than as an indicator of the impact of Internet banking on bank performance. One exception to this general rule might be found among the handful of large banks with a disproportionately large share of Internet banking.

It is also possible that Internet banking is having a causal impact on the bottom line of small banks, particularly *de novo* institutions. Some of these institutions are relying heavily on an Internet-based business strategy, and the full costs of offering Internet banking, while not prohibitive, may be significant for these banks. In addition, while *de novo* Internet banks had poorer performance ratios than non-Internet *de novos*, further investigation will be needed to determine whether these banks' performance improves as e-banking and e-commerce expand over time. Indeed, further research is required to give a more definitive answer to the questions of whether, and how, Internet banking affects bank performance for banks of all sizes and ages.

On the demand side, while only one out of five national banks offered Internet banking as of the third quarter of 1999, our estimates indicate that a large majority of banking customers has accounts with institutions offering Internet banking. Thus, the availability of Internet banking is currently sufficient to accommodate the kind of sudden and rapid growth that has occurred in other information-intensive industries such as securities brokerage, book selling, and travel. So far, however, bank customers have not been convinced that Internet banking products and services provide sufficient value to warrant a substantial change in their banking habits.[53]

There is no doubt that the revolutionary developments in information and communications technology is having, and will continue to have, a profound impact on the banking and financial industry. Internet banking will be an important component of these developments, and as such, analyzing developments in this market will be extremely important for understanding developments in the banking industry. This article attempts to provide a useful picture of the current market for Internet banking, as well as information on the Internet banking plans of national banks. We believe this is an important initial step in analyzing the current and likely future impact of Internet banking on the banking industry.

[53] Furst, Lang, and Nolle (1998) argue that the likely method for increasing the value added from Internet banking for banking customers is to develop improved on-line methods for bundling information into a smooth end-to-end electronic process that eliminates relatively costly paper components of transactions. They also argue that the value proposition from such improvements would likely be, at least initially, most evident for businesses rather than individual households.

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