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Internet Banking: Developments and Prospects

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These reviewers have suggested that, given that several years have passed since the original data were taken (the database for this report closed as of September 30, 1999) and that the analysis and projections based on those data now seem out of date, the basic inquiry and data analysis might be usefully extended and revised. This will be undertaken at a later point and as a separate project, and the initial investigation is here retained as a work in itself.

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Executive Summary

This report addresses significant gaps in knowledge about the Internet banking landscape. Using information drawn from a survey of national bank examiners, the authors find that although only 20 percent of U.S. national banks offered Internet banking in the third quarter (Q3) of 1999, these transactional Internet banks accounted for almost 90 percent of national banking system assets and 84 percent of the total number of small deposit accounts. All the largest national banks offered Internet banking, but only about 7 percent of the smallest banks offered it. Among institutions offering Internet banking, large banks are more likely than small ones to offer a broad range of services on the Internet. Matching call report data to examiner survey information, the authors found that banks in all categories of size offering Internet banking tended to rely less on interest-yielding activities and deposits than non-Internet banks do, and institutions with Internet banking outperformed non-Internet banks in profitability. An exception to the superior performance of Internet banks versus non-Internet banks were *de novo* Internet banks, which were less profitable and less efficient than non-Internet *de novos*. Projections based on banks' plans as of Q3 1999 indicated that 45 percent of all national banks would offer Internet banking by the beginning of 2001. Although most of the growth in new Internet banking will be due to small banks coming on line, as of Q3 1999, almost half of all national banks had no plans to offer Internet banking. Large banks have more aggressive plans to offer business Internet banking services in the future than small institutions.

This paper addresses significant gaps in existing knowledge about the Internet banking landscape. Using information drawn from a survey of national bank examiners, the authors find that while only 20 percent of national banks offered Internet banking in Q3 1999, these transactional Internet banks accounted for almost 90 percent of national banking system assets and 84 percent of the total number of small deposit accounts. All of the largest national banks offered Internet banking, but only about 7 percent of the smallest banks offered it. Among institutions offering Internet banking, large banks are more likely than small banks to offer a broad range of services on the Internet. Matching call report data to the examiner survey information, the authors also find that banks in all size categories offering Internet banking tend to rely less on interest-yielding activities and deposits than do non-Internet banks, and institutions with Internet banking outperformed non-Internet banks in terms of profitability. Excepted from the superior performance of Internet banks versus non-Internet banks are *de novo* Internet banks, which were less profitable and less efficient than non-Internet *de novos*. Projections based on banks' plans as of Q3 1999 indicate that 45 percent of all national banks will be offering Internet banking by the beginning of 2001. While most of the growth in new Internet banking will be due to small banks coming online, almost half of all national banks had no plans to offer Internet banking. Large banks have more aggressive plans to offer business Internet banking services in the future than small institutions.

The authors develop statistical models to explain why banks choose to adopt Internet banking, and why some choose to offer a relatively wider array of Internet banking products and services. The authors also investigate whether offering Internet banking effects a bank's profitability. Among the key factors explaining which banks have chosen to offer Internet banking are membership in a bank holding company, physical location of the bank in an urban area, relatively higher premises and other fixed expenses to net operating revenue, and higher noninterest income, and efficiency than non-Internet banks. Bank profitability is strongly correlated with Internet banking, but offering Internet banking does not have a statistically significant impact on bank profitability. Rather, it is likely that the more aggressive business posture of early adopters of Internet banking explains both their relatively higher profitability and their decision to offer Internet banking. Among banks that offer Internet banking, larger banks and banks that offered the service for a longer time were significantly more likely to offer a wider range of services on the Internet.

Contents

Illustrations

Figures

Tables

Chapter One

Introduction

Banking over the Internet has attracted increasing attention since the late 1990s from banks, brokerage houses, and insurance companies, as well as the business press, regulators, and law makers, both in the United States and elsewhere. This attention has been due, in part, to the rapid and significant growth in electronic commerce (e-commerce) and to the notion that electronic banking and payments are likely to advance more or less in tandem with e-commerce. Industry analyses outlining the potential impact of Internet banking on cost savings, revenue growth, and increased customer convenience have generated considerable interest and speculation. Public policy issues emerging with the development of Internet banking are themselves generating increased attention, from banking regulators and other government officials. To date, however, because little systematic information on the nature and scope of Internet banking exists, much of the analysis of its benefits and impact has necessarily been based on anecdotal evidence and conjecture.

The purpose of this report is to help fill significant gaps in knowledge about the Internet banking landscape. The report presents data, drawn from a survey of national bank examiners, on the number of national banks that offer Internet banking and on the products and services they offer. It projects the extent of Internet banking at the beginning of 2001 implied by that survey. In addition, it investigates the profile of national banks that offer Internet banking, using univariate statistical analysis, relative to other national banks with respect to profitability, cost efficiency, and other characteristics. Separately, the report examines *de novo* national banks, to investigate the extent to which new entrants are embracing Internet banking technology.

The report develops and tests empirical models to explain which banks choose to adopt Internet banking and, among "early adopters," which choose to offer a relatively wide array of Internet banking products and services. A multivariate regression model is used to estimate and investigate whether Internet banking is affecting bank profitability.

The main findings can be summarized as follows:

- Only 20 percent of national banks offered Internet banking in the third quarter (Q3) of 1999. As a group, these "Internet banks" accounted for almost 90 percent of national banking system assets and 84 percent of small deposit accounts.[1]

[1]The term "Internet bank" is used here to mean a bank that offers customers the ability to transact business with the bank over the Internet. The term is not confined 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 may include electronic bill presentment, insurance, and brokerage. The term "non-Internet bank" is used to mean a bank that does not offer transactional Internet banking, even if it has a Web site.

- All of the largest national banks offered Internet banking, while only about 7 percent of the smallest banks offered it. Among institutions offering Internet banking, large banks are far more likely than small banks to offer a broad range of services over the Internet.

- Banks of all sizes that offer Internet banking tend to rely less on interest-yielding activities and core deposits than non-Internet banks do.

- Bank profitability is strongly correlated with Internet banking, but offering Internet banking does not have a statistically significant impact on profitability. Rather, the aggressive business posture of early adopters of Internet banking probably explains both their relatively higher profitability and their decision to offer Internet banking.

- One exception to the superior performance of Internet versus non-Internet banks is the case of *de novo* banks. *De novos* offering Internet banking were less profitable and less efficient than non-Internet *de novos*.

- Among the key characteristics of banks that explain which have chosen to offer Internet banking are the following: membership in a bank holding company, physical location of the bank in an urban area, a relatively higher ratio of premises and other fixed expenses to net operating revenue, and higher noninterest income, profitability, and efficiency than non-Internet banks.

- Among banks that offer Internet banking, larger banks and banks that have offered this service for a longer time were significantly more likely to offer a wider range of services over the Internet. Large banks have more aggressive plans to offer business Internet banking services in the future than smaller institutions.

- Projections based on banks' plans as of Q3 1999 indicate that 45 percent of all national banks will offer 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.

- Although most of the growth in Internet banking will be due to small banks coming on-line, almost half of all national banks, most of them small institutions, had no plans to offer Internet banking.

- Customer use of Internet banking is disproportionately concentrated among a few large banks. On the basis of an analysis of data from private sector studies, the five banks with the greatest number of on-line customers are estimated to account for almost 36 percent of all Internet banking users. By comparison, the same five banks account for only 20 percent of small deposit accounts.

In **Chapter Two** Internet banking is defined, providing a context for analysis. In **Chapter Three** the database is described along with a description of the number and size distribution of national banks offering Internet banking. This chapter also provides information on the nature of the Internet banking products and services offered by national banks. In **Chapter Four** the structure and performance of banks offering Internet banking are compared to those of other banks. In **Chapter Five** econometric models are developed of factors that explain which banks offer Internet banking and factors that explain which of those banks offer a wide range of Internet banking services, with an empirical test of whether offering Internet banking affects bank

profitability. In **Chapter Six** the extent of Internet banking at the beginning of 2001 is projected on the basis of bank examiners' understanding of the Internet plans of national banks. This chapter discusses the current and potential future demand for Internet banking based on bank and industry estimates of customer use. **Chapter Seven**, the final chapter, summarizes the major findings.

Chapter Two

Internet Banking: Definitions and Background

Internet banking is the use of the Internet as a remote delivery channel for banking services, including traditional services, such as opening a deposit account or transferring funds among different accounts, as well as new banking services, such as electronic bill presentment and payment, which allow customers to receive and pay bills over a bank's Web site.

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

To date, assembling comprehensive information on the Internet banking activities of commercial banks in the United States has been difficult, in part because there are no special reporting requirements for a bank that elects to reach customers through this new delivery channel, hence, no regularly compiled data about this attribute of banking.[1] Two recent studies (1998, 1999) 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 on an actual count of banks.[2] To the authors' knowledge, prior to the present study, only Egland, Furst, Nolle, and Robertson (1998) (see **References**) have provided both an actual count of banks that offer Internet banking and an analysis of their major structure and performance characteristics.[3]

With this in mind, **Figure 2-1** offers an approximation of the "supply" of Internet banking from the end of 1997 through the end of 1999. During that time, according to estimates by the

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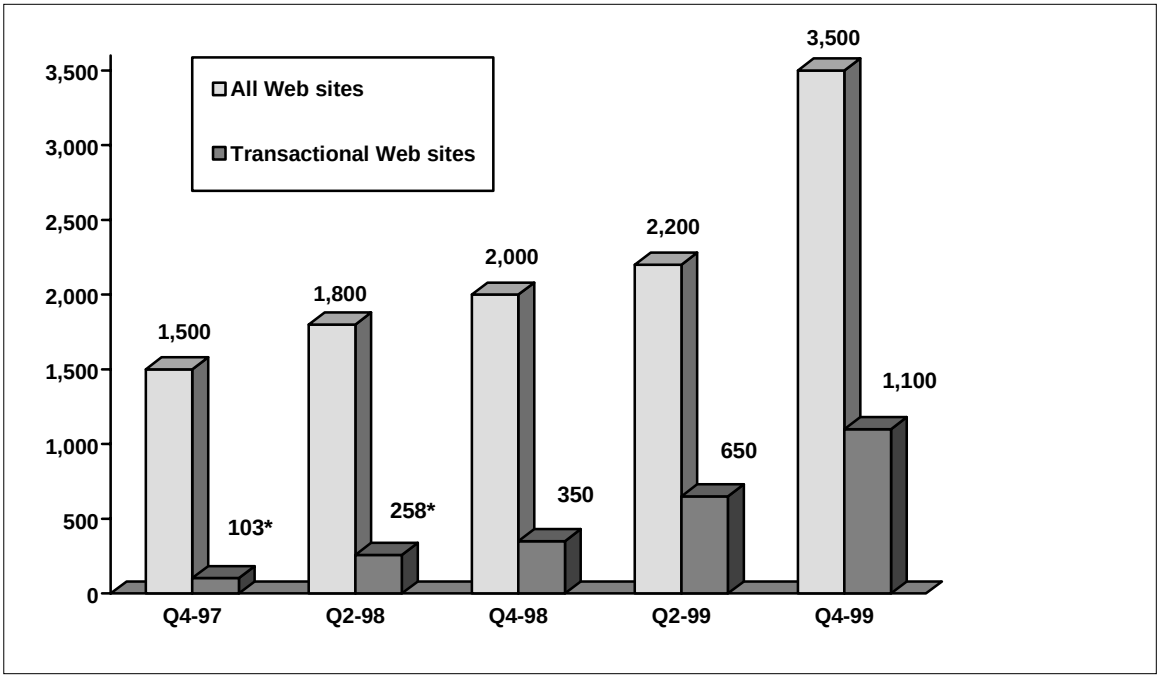
[1]Banks are also not required to report information about other delivery channels, such as ATMs and telephone banking. Beginning in 1999 the Office of Thrift Supervision (OTS) has required prior notice for federally chartered thrifts, and in the third quarter of 1999 a line was added to the call report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

[2]See United States General Accounting Office (GAO) (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").

[3]As Egland, Furst, Nolle, and Roberston (1998) explained, there is an element of estimation even in that study, because a single Web site may cover more than one bank that is a member of a multibank holding company. The authors therefore distinguished between the number of Web sites and the number of the banks covered by those Web sites. See Egland, Furst, Nolle, and Robertson (1998), note 5.



*Actual

Sources: Office of the Comptroller of the Currency, using data from the Federal Deposit Insurance Corporation (FDIC), Couch and Parker (2000), and bank and thrift Web sites.

Figure 2-1

Estimated Bank and Thrift Web Sites and Transactional Internet Banking Web Sites

Federal Deposit Insurance Corporation (FDIC), and Couch and Parker (2000), the number of banks and thrifts with Web sites more than doubled from approximately 1500 to 3500; 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., they allowed customers to conduct business on-line, while the remainder were information-only sites.[4]

Although "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 in several ways. One way 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. The second way is for an existing banking company to create a virtual bank as a separately capitalized subsidiary bank of the bank holding company. A third way

[4]In Q2 1998, Egland, Furst, Nolle and Robertson (1998) found that 223 Web sites represented 374 banks. Extrapolating from this a ratio of 1.68 banks per banking company Web site, 18 percent of banks and thrifts offered true Internet banking as the year 2000 began.

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 that charter.

As an alternative to seeking a separate charter for an Internet-only bank, "trade name" Internet banks have been established as separate divisions of an existing bank.[5] At the beginning of 2000, there were roughly twenty trade name virtual banks in the United States. A trade name virtual bank typically operates independently from the rest of the bank in terms of staffing, marketing, and integration of computer systems into the 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 from the desire to project a fresh image and thereby attract new customers. Both trade name and separately chartered virtual banks may find it difficult to attract customers without providing some form of physical contact with the bank.[6] Some virtual banks are considering establishing kiosks, limited service offices, or other forms of physical presence to retain and attract customers.[7] Such a "clicks and bricks" approach may emerge as another main way to offer Internet banking.[8]

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

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

[7]See, for example, Financial Service Online (1999), Bank Network News (2000), Day (2000), and Toonkel (2000b).

[8]The strategy of moving away from an Internet-only strategy is receiving attention in businesses other than banking; see, for example, McIntyre and Christensen (1999) and Hamilton (2000).

Chapter Three

Internet Banking in the National Banking System

3.1 The Data

The data for this study are unique in several respects. First, the data cover the Internet banking offerings of every national bank. That information was compiled from responses to a questionnaire completed by examiners from the Office of the Comptroller of the Currency (OCC) 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 site was transactional. For banks with transactional sites, examiners provided detailed information on the nature of the sites, including the range of products offered. Examiners also answered questions about the banks' plans to offer Internet banking in the future.

The examiners' responses were matched with financial data for the 2,517 national banks that filed a Q3 1999 Report of Condition and Income (the "call report"), and banking structure data contained in the OCC's Integrated Banking Information System database were added. Further, supervisory information on banks' safety and soundness examinations (CAMELS) ratings[1] were included and their information technology (IT) practices. Although confined to national banks, the data are broadly applicable to the banking system at large.[2]

3.2 Number and Size Distribution of Internet National Banks

From reading daily articles in the business press, one might easily think that most banks offer Internet banking.[3] But, as **Table 3-1** shows, even though slightly more than half of all national banks had Web sites in Q3 1999, only 464 national banks—just under 20 percent of all FDIC-insured national banks—offered their customers transactional Internet banking.

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[1]"[S]afety-and-soundness examinations focus on five key areas affecting the health of the institution: capital adequacy, asset quality, management, earnings, and liquidity (CAMEL)." Footnote: "As of January 1, 1997, the bank and thrift regulatory agencies added a sixth component to the safety-and-soundness examination, known as the 'sensitivity-to-market-risk' component. After that date, therefore, the CAMEL rating system would be referred to as 'CAMELS.'" See "An Examination of the Banking Crises of the 1980s and Early 1990s," *History of the Eighties—Lessons for the Future* [On-line]. URL: http://www.fdic.gov/bank/historical/history/421.pdf (Accessed Jan. 8, 2000.)

[2]As of Q3 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 exhibit the same performance characteristics as state banks. Egland, Furst, Nolle, and Robertson (1998) found no significant differences in the structural attributes of national and state banks that offer Internet banking.

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

Table 3-1

Internet Banking and National Banks
(Q3 1999)

	Number	Percentage of national banks
National banks with Web sites	1364	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]

Source: Office of the Comptroller of the Currency.

Memorandum: Total national banks[e]: 2,517. Total FDIC-insured national banks: 2,334[a].

[a]Excluding credit card banks.

[b]FDIC-insured commercial national banks with transactional Internet banking as a percentage 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 Q3 1999 call report was filed.

Although only a minority of institutions offer Internet banking, as **Table 3-2** shows, the banks offering these services 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; by implication, most consumers have accounts at banks that offer Internet banking. Nearly all the evidence from market surveys indicates that consumer use of the Internet for banking transactions remains quite limited, owing primarily to a lack of consumer demand for the Internet banking products now being offered, rather than to lack of availability. The infrastructure already in place will allow very rapid growth in the use of Internet banking if consumers become convinced that the services offered over the Internet are superior to those offered by more traditional delivery channels.[4]

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

[4]Recent analyses indicate that a large percentage of customers who sign up for Internet banking discontinue using it. See, for example, 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. See also Marks (1999), who compares the relative success of on-line brokerage to on-line banking.

anywhere, to date transactional Internet banks were more than 1.7 times more likely than non-Internet banks to be located in an urban area.

Table 3-2

Comparison of Key Attributes of Internet and Non-Internet Banks
(Q3 1999)

	Transactional Internet national banks as a percentage 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 $ billions)	5.88	0.18
Average number of employees	1,659	69
Average number of offices per bank[d]	61	5
Average number of employees per office	27	15
Percentage of banks in urban areas[e]	72.2	42.6

Source: Office of the Comptroller of the Currency.

[a]Dollar value of assets.

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

[c]Includes banks with nontransactional Web sites.

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

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

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

The growth in the number of banks adopting transactional Internet capabilities has been substantial in every size category. As **Table 3-4** shows, between mid-1998 and Q3 1999, the number of transactional Internet banks under $1 billion in asset size more than tripled, with the proportion of national banks offering transactional Internet banking rising from 6.3 percent to 19.9 percent over that fifteen-month period.

Table 3-3

National Banks Offering Transactional Internet Banking: Size Distribution
(Q3 1999)

	Number of Internet banks	Internet banks as a percentage 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	61.9	1.40
$10 billion and over	41	100.0	NA
Total	464	19.9	32.67

Source: Office of the Comptroller of the Currency.

[a]Non-Internet banks include those with nontransactional Web sites.

NA = not applicable

Table 3-4

Recent Growth in Internet Banking Offered by National Banks

	Percentage of banks offering transactional Internet banking		Percentage of increase in number of banks offering Internet banking
Asset size	**Q2 1998**	**Q3 1999**	**Q2 1998 to Q3 1999**
Al national banks	6.3	19.9	188.2
Less than $100 million	2.0	7.1	226.9
$100 million to less than $1 billion	7.2	7.1	258.1
$1 billion to less than $10 billion	27.2	61.9	82.5
$10 billion and over	52.5	100.0	95.2

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

3.3 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 Q3 1999, as **Table 3-5** shows, although small transactional banks

Table 3-5

Key Services Offered by Transactional Internet National Banks
(Q3 1999)

	Percentage of Transactional Internet Banks Offering Selected Services				
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
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
Brokerage	21.6	10.6	14.7	41.1	53.7
Cash management	15.7	14.1	16.2	15.1	17.1
Fiduciary	11.9	3.5	9.8	12.3	41.5
Bill presentment	10.6	7.1	7.9	16.4	24.4
Insurance	5.4	2.4	2.3	6.8	.3
BASIC[a]	77.6	56.5	77.4	90.4	100.0
PREMIUM[b]	23.9	14.1	17.0	41.1	58.5

Source: Office of the Comptroller of the Currency.

[a]BASIC includes balance inquiry, funds transfer, and bill payment.

[b]PREMIUM includes BASIC and at least three other services.

were somewhat less likely to offer these services.[5] There is a more significant divergence by size category in the proportion of banks that offer electronic bill payment.[6] All of the very largest banks, and more than 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.

A look at Internet banking services beyond balance inquiry, funds transfer, and bill payment reveals patterns of what is offered by banks of different sizes that diverge greatly. In general, larger banks are more likely to accept credit applications on-line, but, except for the smallest size

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

[6]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.

category, there is no relationship between size and the ability to set up a new account over the Internet.

Notable, as shown in Table 3-5, 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 their cash management systems. Thus, competing in this line of business may be an important determinant of how well small banks compete with larger institutions for business customers. As of Q3 1999, small banks appeared to be giving this business line as much focus as large banks. As the table makes clear, however, only about 16 percent of all transactional banks offered this service, a percentage far below that for most other on-line products for which data were collected.[7]

Table 3-5 also contains information on the extent to which particular business lines—brokerage, fiduciary, and insurance 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.[8]

To gain a clearer picture of the typical range of Internet services available at banks of different sizes, two “menus” of Internet banking services were defined. BASIC Internet banking is defined as the three core Internet banking services: balance inquiry, funds transfer, and bill payment. PREMIUM Internet banking is defined as BASIC plus at least three other services. **Figure 3-1** shows the proportion of banks categorized by size that offer only BASIC services to those that offer PREMIUM Internet banking products. Smaller Internet banks are more likely to offer only BASIC services. 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. Banks over $1 billion in assets are at least 2.5 times more likely than banks under $1 billion in size to offer customers a PREMIUM package of services. Hence, although small banks can establish an on-line presence, they remain less likely to compete with large banks on the basis of the range of offerings. To the extent that the variety of products is a key to attracting and maintaining a strong customer base, small banks may be at a disadvantage.

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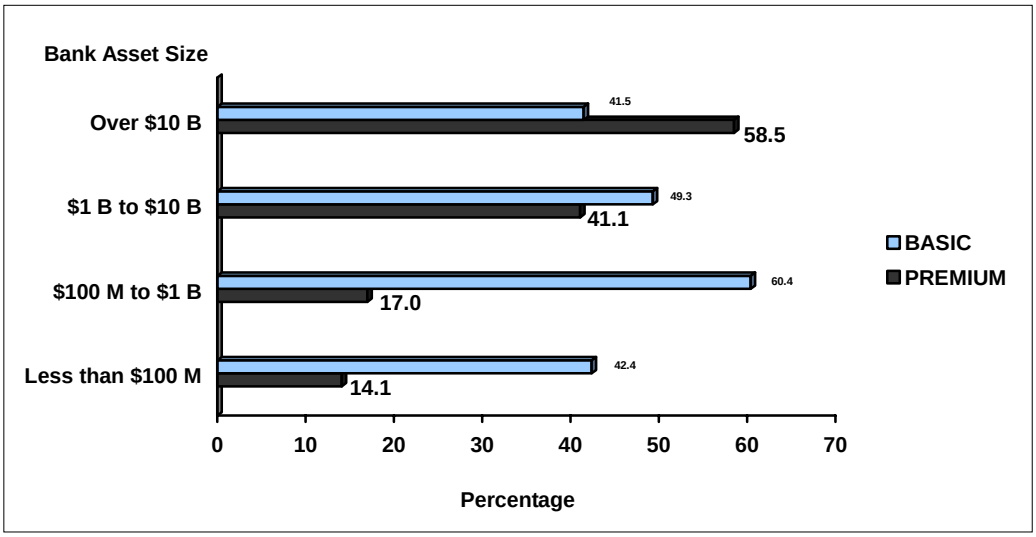
[7]In Q1 1999, Pizzani (1999) reported that “banks have largely ignored the on-line banking needs of small businesses.” As discussed in section 6.1, on banks’ plans, bankers appear to be planning a dramatic increase in emphasis on business Internet banking services.

[8]As shown in Table 3-4, 41.5 percent of the largest transactional banks offer fiduciary services on-line. This percentage is lower than the percentage of the largest banks offering six of the other ten on-line services. The 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 through traditional channels. For a detailed study of this issue, see Robertson, Cambruzzi, Jacques, Nigro, Pate, Rich, and Steele (2000).



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

M = million B = billion

Figure 3-1

Large Banks Offer a Greater Range of Internet Banking Services

3.4 Web Site Privacy Statements

Both banks and their customers stand to benefit substantially from the increased ability to collect and analyze information obtained over the Internet. In particular, both 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. But the collection, analysis, and distribution of information raise questions related to protecting personal privacy.[9] A fundamental step many banks are taking to address on-line privacy is to post a statement of their policies about the collection and use of customer information. The database includes information on the number of transactional banks that had such a statement on their Web sites (see **Table 3-6**).[10]

More than four-fifths of transactional Internet banks included a privacy policy statement on their Web sites in Q3 1999. That proportion represents a large increase from just over 50 percent at the end of 1998 and more than a doubling since mid-1998.[11] Large banks were more likely to

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

[10]The data here are confined to whether or not transactional Internet banks posted a privacy statement on line; the data do 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).

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

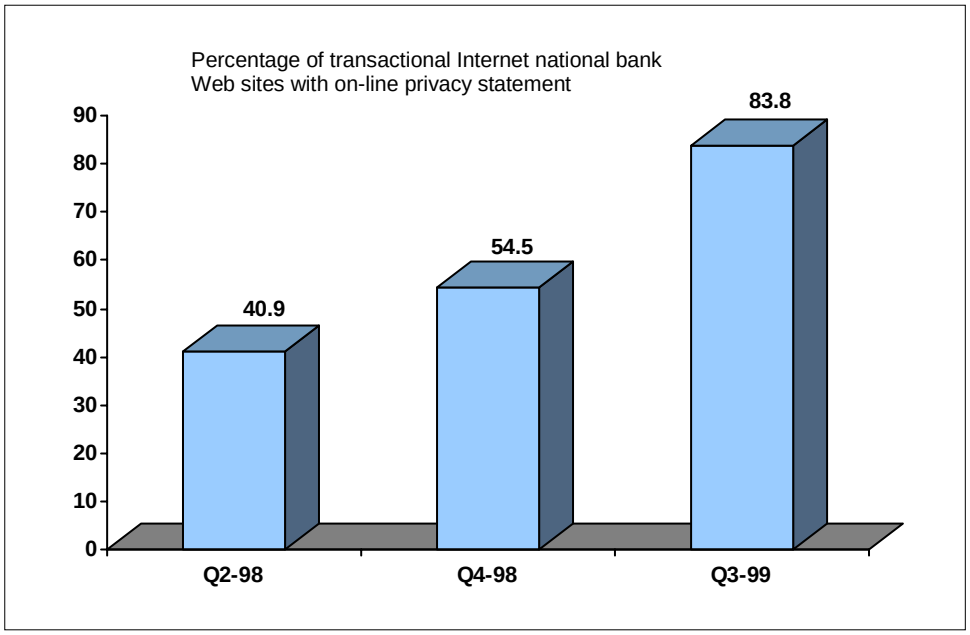
Table 3-6

Increases in Privacy Policy Statements on Web Sites

	Percentage of transactional Internet national banks with a privacy policy statement on the Web site		
Asset size category	**Q2 1998**	**Q4 1998**	**Q3 1999**
All national banks	40.9	54.5	83.8
Less than $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

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

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 with 75 percent of the smallest banks. The discrepancy between the practices of large and small banks in this respect narrowed considerably during 1999. As **Figure 3-2** shows, over time on-line privacy statements have become more common for transactional Internet banks.



Source: Office of the Comptroller of the Currency.

Figure 3-2

Most Transactional Internet National Banks Have an On-Line Privacy Statement

Chapter Four

Internet and Non-Internet Banks: Comparison of Performance

In comparing transactional Internet banks in mid-1998 to non-Internet banks, Egland, Furst, Nolle, and Robertson (1998) found little other than size to distinguish the two groups. As **Tables 4-1**, **4-2**, and **4-3** illustrate, by Q3 1999 differences between Internet and non-Internet banks had begun to emerge in portfolio composition and funding, in sources of income and expenditures, and in measures of performance.[1]

4.1 Portfolio Composition, Income, and Expenses

Table 4-1 shows major lending and funding characteristics of Internet and non-Internet banks.[2] Overall, on the asset side, Internet banks have a relatively greater focus on business lending (Commercial & Industrial [C&I] 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 have begun to view the addition of Internet banking as a way to offer products that will reduce their dependence on core deposits.[3]

Differences in the business strategies of Internet and non-Internet banks also are evident in the table. The first column shows the ratio of non-interest income to net operating revenue, which is a rough proxy for the amount of revenue generated by "nontraditional" activities. Internet banks generated a substantially higher proportion of their income—roughly speaking, about 50

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[1]This report makes extensive use of univariate comparisons between Internet and non-Internet bank characteristics. Because the importance of bank size has already been established, the report "controls" 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.

[2]The tables throughout the remainder of the paper that compare structure and performance characteristics of Internet and non-Internet banks contain a calculation of a difference of means as a test of 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, a probability (p) value is provided 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 compared represent real differences between categories of banks (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 those with small samples) use a cutoff point of 0.10 to assert statistical significance.

[3]See, e.g., Winig (2000), who reports that 85 percent of community bank chief executive officers (CEOs) who participated in a Grant Thornton survey at the beginning of 2000 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. The same survey reveals a surge in the interest of community bankers in offering Internet banking.

Table 4-1

Selected Balance Sheet Ratios for Internet and Non-Internet National Banks[a]
(Q3 1999)

	Loan composition (ratios in percent)		Funding (ratios in percent)	
Asset size category	**C&I loans and other loans**	**Credit card loans and other 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
	(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
	(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
	(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.

C&I = Commercial and Industrial

[a]Numbers in parentheses are p-values for the difference of means test for Internet and non-Internet bank values in each cell. *** = Significant at the 1 percent or better level; ** = significant at the 5 percent level; and * = significant at the 10 percent level.

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

percent more—from non-traditional activities compared to non-Internet banks. This 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 also in other services that yield fee income.[4]

In addition to revenue enhancement, Internet banking may enable banks to reduce costs of operation, in particular, by allowing them to reduce expenditures on "brick and mortar." To the extent this may be so, Internet banking could be considered a *causal* factor in generating lower expenses related to maintaining physical branches. On the other hand, banks with relatively high expenses in maintaining their branch networks may be expected to have the greatest incentive to adopt Internet banking. The adoption of Internet banking would thus be the *effect* of existing characteristics of banks. The data in Table **4-2** show that, consistent with the first hypothesis, Internet banks over $100 million in asset size had lower expenses for building and equipment

[4]See Gold (2000), for example. *Bank Technology News* (1999d) cites a Forrester Research, Inc., study that showed that individuals with higher income are more likely to be active users of Internet banking.

Table 4-2

Income and Expenses: Internet and Non-Internet National Banks[a,b]
(Q3 1999)

Asset size category	"Non-traditional" income: Noninterest income/ net operating revenue[b] (%)	Expenses: Premises and fixed assets/ net operating revenue[b] (%)
Less than $100 million:		
Internet banks	22.0	11.7
Non-Internet banks	14.6	9.3
	(0.000)***	(0.000)***
$100 million to $1 billion:		
Internet banks	23.1	8.2
Non-Internet banks	16.8	9.1
	(0.000)***	(0.000)***
$1 billion to $10 billion:		
Internet banks	36.8	7.2
Non-Internet banks	23.0	8.0
	(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 p-values for the difference of means test for Internet and non-Internet bank values in each cell. *** = Significant at the 1 percent or better level; **=significant at the 5 percent level; *=significant at the 10 percent level.

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

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

relative to net operating revenue. Among the smallest size Internet banks, however—the majority of which adopted Internet banking after Q2 1998—building and equipment expenditures were higher than for non-Internet banks. This difference may indicate that smaller banks with high costs of maintaining a branch network are motivated to adopt Internet banking by the prospect of future cost savings. Because the call report data aggregate expenditures for buildings and equipment, this result may be due to high initial costs of equipment for small banks seeking to establish an on-line presence. Further research can establish whether Internet banking is likely to reduce costs associated with physical branch networks, and whether relatively high branch-related expenses are a causal factor in the adoption of Internet banking.

4.2 Performance Measures

Even the banks most successful at offering Internet banking at the end of 2000 serve a relatively small share of their customer base with this delivery channel.[5] As a result, banks and industry analysts have found it difficult to determine whether Internet banking has so far had a

[5]For a discussion of the "demand" for Internet banking, see section 6.2.

significant impact on bank performance.[6] For example, in their comparison of Internet and non-Internet banks in mid-1998, Egland, Furst, Nolle, and Robertson (1998) did not find significant differences in profitability, efficiency, or credit quality. But, as new information has shown, by Q3 1999, differences between Internet and non-Internet banks in performance had emerged.

Table 4-3 compares the profitability, efficiency, and credit quality of Internet banks compared to non-Internet banks, by asset size category in Q3 1999. What distinctly stands out in the table are the differences in performance of Internet and non-Internet banks in the smallest size category compared with larger banks. For example, although 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.[7] The smallest size banks also were 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.[8] 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 the pattern is less distinct. As discussed in section **4.3**, the differences for small banks were probably due to the relative performance of *de novo* banks that offered Internet banking.

Interestingly, nonperforming loans were significantly higher for Internet banks in the $1 billion to $10 billion assets size category. This is consistent with the results shown in **Table 4-1**, that is, that these banks were more heavily concentrated in credit card and business lending than non-Internet bank of a similar size. Internet banks in the smallest size category have relatively fewer nonperforming 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.

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[6]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 that argues that "a mature Internet bank could operate at a 15%–20% expense-to-revenue ratio" compared with 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" (132), a result echoed in Hitt and Frei (1999).

[7]The authors also used return on assets as a measure of profitability and found very similar results.

[8]Following DeYoung (1999), the term "accounting efficiency" is used here for this measure of cost efficiency.

Table 4-3

Comparison of Performance of Internet Banks and Non-Internet National Banks[a,b]
(Q3 1999)

Asset size category	Profitability: Return on equity (%)	Accounting efficiency: Noninterest expense to net operating revenue[c] (%)	Credit quality: Noncurrent loans to total loans[d] (%)
Less than $100 million:			
Internet banks	6.34	77.90	0.52
Non-Internet banks.	10.13	65.52	0.87
	(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
	(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
	(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 p-values for the difference of means test for Internet and non-Internet bank values in each cell. *** = Significant at the 1 percent or better level; * *=significant at the 5 percent level; and * =significant at the 10 percent level.

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

[c]A higher ratio indicates lower efficiency.

[d]A higher ratio indicates lower credit quality.

4.3 *De Novo* Banks

To investigate further the differences in the performance of small banks, two different groups of Internet banks were examined: *de novo* Internet banks, i.e., those banks that offered Internet banking and had been in operation a year or less as of Q3 1999; and "mature" Internet banks, i.e., those banks that Egland, Furst, Nolle, and Robertson (1998) had determined offered Internet banking at least as far back as Q2 1998. Segmenting the data this way allowed an exploration into two possible reasons for the poor performance of small Internet banks relative to small non-Internet banks: the "newness" of the banks and the "newness" of Internet banking.

De novo banks as a rule perform worse than established banks, a pattern that generally holds for at least the first three years.[9] Because most *de novo* banks are small (with less than $100 million in assets), their performance might have affected the measures of performance for the entire group of small banks.[10] This suspicion was heightened by the discovery that, among small

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

[10]Fifty-six of the fifty-nine *de novo* (one year or younger) national banks in Q3 1999 were in the under $100 million asset size category.

banks, *de novo* banks were 3 times more likely to offer Internet banking than mature small banks.[11] 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 setup expenses as well as ongoing expenses for advertising and operating this delivery channel.[12] On the revenue side, *de novo* banks that offer Internet banking may rely heavily on their ability to attract customers through the Internet, and this strategy may not produce strong revenues, given the relatively slow pace of customer adoption of Internet banking. In light of this, *de novo* national banks were separated from all other small national banks.

As **Table 4-4** shows, in a comparison of the nine *de novo* Internet national banks and forty-seven *de novo* non-Internet national banks in Q3 1999 across key performance characteristics, *de novo* Internet banks were less profitable and more inefficient than *de novo* non-Internet banks. One key factor contributing to these results was that *de novo* Internet banks exhibited a much higher expense ratio than the non-Internet *de novo* banks. As discussed in section **4.1**, although the data do not indicate the composition of the expenditures for premises and fixed assets, expense ratios for *de novo* Internet banks might have been higher, in part owing to costs incurred in setting up Internet banking.[13]

4.4 Internet Experience and Bank Performance

Clearly, the combination of being a new bank and of offering Internet banking has resulted in relatively poor performance, but the poor performance of small Internet banks compared to non-Internet banks may be the result of short-run costs incurred in making an investment in Internet banking. This investment can be expected to yield substantial gains in the longer run. Few banks have had Internet banking for more than several years, so ascertaining what the "long run" is is difficult. The data, however, allow an exploration of whether, among *mature* small banks offering Internet banking (i.e., in operation for more than three years as of Q3 1999), those that have offered it for a relatively long time (i.e., at least since Q2 1998) outperformed those that

[11]See notes to Table 4-4: 19.2 percent of small *de novo* banks offered Internet banking, while only 6.1 percent of "mature" small banks offered it.

[12]This may be true, even if much of the setup and operation of the bank's Internet banking are outsourced to third-party vendors.

[13]Table 4-4 also shows that *de novo* Internet banks received a higher proportion of revenue from traditional interest income than non-Internet *de novos* did. Although 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. This outcome may reflect difficulties for *de novo* Internet banks in successfully developing customer and business relationships over the Internet.

Table 4-4

***De Novo* National Banks (Less Than $100 M in Asset Size): Internet Banks and Non-Internet Banks**
(Q3 1999)

	Internet banks	Non-Internet banks[c]
Number of banks	9	47
Profitability[d]	14.70	8.64
	(0.082)*	
Accounting efficiency[e]	238.09	133.14
	(0.024)**	
Premises and fixed assets-to-net operating revenue (%)	33.36	9.60
	(0.002)***	
"**Traditional" income**[f]	87.86	75.99
	(0.253)	

Source: Office of the Comptroller of the Currency.

Memorandum: Among small banks, *de novo* banks are more than 3 times as likely to offer Internet banking as banks in existence three years or more: percentage of *de novo* banks offering Internet banking: 19.2; percentage of mature small offering Internet banking: 6.1.

[a]*De novo* banks are those in the $100 million or less asset size category operating for one year or less as of Q3 1999.

[b]Numbers in parentheses are p-values for the difference of means test for Internet and non-Internet values in each cell. *** = significant at the 1 percent or better level; ** =significant at the 5 percent level; and * =significant at the 10 percent level.

[c]Non-Internet banks include those with nontransactional Web sites.

[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.

have offered it for a relatively long time (i.e., at least since Q2 1998) outperformed those that have only recently begun to offer it.[14] Such a comparison may separate the "newness" of a bank from the "newness" of Internet banking.

Tables 4-5 and **4-6** present the results of subtracting *de novos* and then segmenting mature small Internet banks by "Internet experience." Table 4-5 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 of non-Internet banks compared to small Internet banks, as displayed in Table 4-3, completely disappears if *de novo* banks are excluded. Even so, all small Internet banks still exhibit greater inefficiency than small

[14]The performance of "Internet-experienced" banks was compared to that of banks that began to offer Internet banking after Q2 1998, for all size categories. No statistically significant difference in performance was found between these two "vintages" of Internet banks in the banks over $100 million in assets. Hence, the discussion here is confined to the smallest size banks.

Table 4-5

Mature Small National Banks:
Internet Banks Are Less Efficient But Not Less Profitable[a]
(Q3 1999)

	Internet banks	Non-Internet banks[c]
Number of banks	61	1,009
Profitability[d]	10.36	8.64
	(0.232)	
Accounting efficiency[e]	70.50	133.14
	(0.000)***	
Premises and fixed assets-to-net operating revenue (%)	10.41	19.60
	(0.000)***	
"Traditional" income[f]	78.24	85.51
	(0.000)***	

Source: Office of the Comptroller of the Currency.

Memorandum: Among small banks, *de novo* banks are more than 3 times as likely to offer Internet banking as banks in existence three years or more: percentage of *de novo* banks offering Internet banking: 19.2; percentage of mature small banks offering Internet banking: 6.1

[a]*De novo* banks are those in the $100 million or less asset size category operating for one year or less as of Q3 1999.

[b]Numbers in parentheses are p-values for the difference of means test for Internet and non-Internet values in each cell. *** = Significant at the 1 percent or better level; **=significant at the 5 percent level; *=significant at the 10 percent level.

[c]Non-Internet banks include those with nontransactional Web sites.

[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.

non-Internet banks. Hence, the newness of small Internet banks does not explain this aspect of worse performance.

To investigate whether the newness of offering Internet banking may explain the greater inefficiency of small Internet banks, the 61 small Internet banks were divided into two groups: "Internet-experienced" banks, which offered Internet banking no later than Q2 1998, and "Internet-inexperienced" banks, which began to offer Internet banking some time between the beginning of Q3 1998 and the end of Q3 1999.[15] Both groups were compared to small non-Internet banks.

Table 4-6, which summarizes the results of the comparisons, indicates no statistical difference between the accounting efficiency of Internet-experienced banks and non-Internet banks. Small banks that only began to offer Internet banking after Q2 1998, however, exhibited statistically significant poorer accounting efficiency than non-Internet banks. Hence, the lower

[15]As indicated at the beginning of Chapter Two, there is no record of the exact date when banks began to offer their customers Internet banking.

efficiency of small Internet banks as a group may be attributed to those banks that only recently began to offer Internet banking; thus, Internet experience appears to matter for small banks.

Table 4-6

Mature Small National Banks: Does Internet Experience Matter?[a]

	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 Q3 1999. Non-Internet banks include those with nontransactional Web sites. "Internet-experienced" banks are those that have offered Internet banking since at least Q2 1998. "Internet-inexperienced" banks are those that began to offer Internet banking after Q2 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 percent level; ** = significant at the 5 percent level; and * = significant at the 10 percent 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.

Table 4-6 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 result helps to explain the greater inefficiency of small banks for which the Internet is relatively new. It suggests, too, the possibility that the disadvantages of expense and efficiency may be a temporary consequence of investing in Internet banking.[16] Neither Internet-experienced nor 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 than non-Internet banks. These results suggest that although small banks that have only recently begun to offer Internet banking have relatively high expenses, growth in revenues is sufficient to maintain overall profitability.

[16]The statistical results do not allow any certainty that for small banks newness of Internet *causes* poorer efficiency. Other factors may explain both why some small banks chose not to be in the vanguard of offering Internet banking and why they had poorer accounting efficiency ratios than did the eleven early adopter Internet-experienced banks.

4.5 Safety, Soundness, and Information Technology (IT)

Federal bank regulators regularly examine banks for safety and soundness and issue CAMELS ratings, which range from "1" (best) to "5" (worst) and cover six aspects of bank safety and soundness: capital adequacy (C), asset quality (A), management (M), earnings (E), liquidity (L), and sensitivity to market risk (S). Similarly, separate bank examinations evaluate key aspects of the banks' IT risk management practices using the Uniform Rating System for Information Technology (URSIT). Like CAMELS ratings, IT exam scores range from a 1 to 5.[17]

Table 4-7 compares the composite and management components of the CAMELS and IT ratings for Internet and non-Internet banks by size. Because relatively few banks offered Internet banking, the "early adopters" might be expected to be more forward-looking and astute with respect to technology than non-Internet banks, and this astuteness might be expected to be reflected in examiner ratings. The numbers in Table 4-7 provide weak support for that conjecture, inasmuch as Internet banks generally had lower IT and CAMELS ratings, although their p-values generally are above 10 percent.[18] One exception to the general rule that Internet banks receive better supervisory ratings is that Internet banks in the $1 billion to $10 billion size category on average received worse IT ratings, although on average they received better CAMELS ratings.

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[17]See the *Federal Register* (**64**, 12 [Jan. 20, 1999], 3109-3116) for a detailed description of the URSIT, "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." URSIT exams are therefore given to service providers over which regulators have supervisory authority, as well as to banks.

[18]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 Q3 1999.

Evidence suggests 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, 1992–98. See also O'Sullivan (1998), who summarizes research suggesting that IT spending on staff boosts profitability.

Table 4-7

Safety and Soundness and IT 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	1.53	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 percent level; ** = significant at the 5 percent level; and * = significant at the 10 percent 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).

Chapter Five

Internet Banking: Determinants and Impact on Bank Profitability

Drawing on the analysis in **Chapter Four**, this chapter estimates a multivariate logistic model to determine the factors that explain which banks are most likely to choose to offer Internet banking. A multivariate framework will show whether the univariate relationships described in Chapter Four hold after controlling for relevant factors. In addition to estimating the factors that determine adoption, a model is estimated to determine the factors that explain which banks choose to offer a wide range of Internet banking services. Finally, whether Internet banking has an impact on bank profitability also is investigated.

5.1 The Decision to Offer Internet Banking: A Multivariate Analysis

To test for the factors that explain which banks choose to offer Internet banking, the sample was limited to national banks that did not offer transactional Internet banking at the end of Q2 1998. Limiting the sample in this way ensured that the independent variables used in the regressions measure bank characteristics *prior to* the adoption of Internet banking. A logistic regression can then be estimated with the dependent variable INTNEW, which takes on a value of 1 if a bank adopted Internet banking by the end of the third quarter but zero otherwise. The explanatory variables in the model are characteristics of the bank as of Q2 1998, before any banks in the sample adopted Internet banking. Because all banks in the sample had to exist as of Q2 1998, *de novo* banks less than five quarters old as of Q3 1999 were excluded.

Explanatory variables include the following:

- ASSETS is the size of a bank, measured by assets in Q3 1999. The analysis in **Chapter Three** leads to the expectation that, controlling for other factors, the larger the bank the more likely it will be to choose to offer Internet banking; i.e., the coefficient on this variable was expected to be positive.
- YOUNG takes on a value of 1 if the bank is less than three years old as of Q3 1999. Because the model uses Q2 1998 data as the regressors, banks a year or less old as of Q3 1999 are not included. This variable controls for the “newness” of a bank. The coefficient is expected to be positive, because some new banks probably were formed on the belief that new technology creates new business opportunities.
- BHC takes on a value of 1 if a bank is a member of a bank holding company, but zero otherwise. The expectation is that, other things being equal, a bank that is a member of a bank holding company is more likely to offer Internet banking, because a bank holding company can use a single Web site to provide Internet banking access to customers of the many banks in the holding company.
- URBAN takes on a value of 1 if a bank is located in an urban area (Standard Metropolitan Statistical Area), but zero if it is not. The univariate analysis indicates that

banks in urban areas are more likely to offer their customers Internet banking than banks in nonurban areas (see **Table 3-2**). Banks in more densely populated areas may respond to greater customer demand for Internet banking and to more intense competitive pressure from rival banks in the same market. Hence, a positive coefficient is expected for this variable.

- DEPOSITS is the ratio of deposits to assets on a bank's balance sheet in Q2 1998. Banks that are less reliant on traditional sources of funding may pursue a more aggressive overall business strategy, including the adoption of Internet banking. The sign expectation for this variable is negative.

- EXPENSES is the ratio of expenses for premises and fixed assets to net operating revenue in Q2 1998. The direction of this effect is ambiguous. On the one hand, banks with relatively high expenses for premises and fixed assets may view adoption of Internet banking as a way to reduce expenditures devoted to maintaining a branch network.[1] On the other hand, some analysts have argued that banks without a large branch network will seize on Internet banking as an inexpensive means to expand their customer base.

- NIINCOME is the ratio of noninterest income to net operating revenue in Q2 1998. One measure of the "aggressiveness" of a bank's business strategy is the degree to which the bank generates income from fee-generating activities. Here it was hypothesized that banks with a greater reliance on nontraditional revenue are both more likely to view Internet banking as a way to market fee-generating services and more likely to adopt innovative services as part of an overall aggressive business strategy.

- ROE is return on equity in Q2 1998. This measure of bank profitability is included in the empirical model to test whether it has an independent effect on the decision to offer Internet banking.[2] The direction of its effect is ambiguous. It is possible that more profitable banks will choose to incur the costs of offering Internet banking, both because they are financially more able to do so and because they believe doing so will help them maintain their competitive position. It is also possible, however, that less profitable banks may be more willing to invest in Internet banking to improve their performance.

- INEFFICIENCY is the ratio of noninterest expense to net operating revenue (i.e., the "accounting efficiency" measure) in Q2 1998. The higher the value of this variable, the more inefficient the bank. As was the case with ROE, the sign expectation for this variable is ambiguous. Inefficient banks may view offering Internet banking as a means to become more efficient; in this case, the estimated coefficient for the variable would be positive. But the coefficient may be negative if relatively efficient banks are more innovative and better able to incorporate new technology and new services.

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[1]This variable should be interpreted with caution, because such expenditures cannot be decomposed into those associated solely with physical offices.

[2]The discussion in section 4.2 speculated that profitability is positively *correlated* with Internet banking. In the second half of the 1990s, banks that gave greater emphasis to fee-generating activities tended to be more profitable than other banks; thus, such banks are here seen as also more likely than other banks to choose to offer Internet banking. The multivariate model was used to test whether, taking account of the degree to which a bank relies on noninterest income earning activities, differences in profitability are part of the explanation of which banks choose to offer Internet banking.

- The CAMELS rating is included in the model to test whether there is an independent influence for the overall safety and soundness character of a bank on its decision to offer Internet banking. The sign for this variable is ambiguous for the same reasons as ROE and INEFFICIENCY.

To summarize, the model is:

$$\begin{array}{c} \overset{(+)}{} \quad \overset{(+)}{} \quad \overset{(+)}{} \quad \overset{(+)}{} \quad \overset{(-)}{} \quad \overset{(?)}{} \\ \text{INTNEW} = f\,(\text{ASSETS, YOUNG, BHC, URBAN, DEPOSITS, EXPENSES,} \\ \overset{(+)}{} \quad \overset{(?)}{} \quad \overset{(?)}{} \quad \overset{(?)}{} \\ \text{NIINCOME, ROE, INEFFICIENCY, CAMELS),} \end{array}$$

where the sign in parentheses above the name of the variable indicates the expected sign of the regression coefficient (and a question mark indicates that there is no *a priori* sign expectation for the variable).

Table 5-1 presents the results of the logit estimation of the model, both for national banks regardless of size and for national banks under $100 million in assets ("small" banks). Looking first at results for "all national banks," all the coefficients have the expected sign and all but one of the variables (DEPOSITS) are statistically significant at the 10 percent level or greater. As hypothesized, *ceteris paribus*,[3] the larger the bank, the more likely it is to offer Internet banking; a bank that is a member of a bank holding company is more likely than an independent bank to offer Internet banking; and banks located in urban areas are more likely to offer Internet banking. In addition, the coefficient on YOUNG is significantly positive, indicating that newer banks are more likely to offer Internet banking.

NIINCOME has a positive coefficient, indicating that banks that emphasize nontraditional activities are more likely to offer Internet banking. The coefficient on DEPOSITS is negative, as expected, but not significant. The positive coefficient on EXPENSES is consistent with the hypothesis that banks with relatively high fixed expenses may see Internet banking as a way to reduce expenses for premises and fixed assets.

Coefficients on the various performance variables all appear to indicate that banks that perform better are more likely to adopt Internet banking. Thus, the signs on ROE are positive, and the coefficients on accounting INEFFICIENCY and CAMELS are negative. These results are generally consistent with the view that, on average, early adopters of Internet banking are relatively profitable and relatively safe institutions.

Overall, the results of the logit estimation are similar for the small banks sample to those for the all-bank sample, which indicates that for both small and large banks many of the same factors are involved in the decision to offer Internet banking. Among the differences for the small banks

[3] "All other things being equal."

Table 5-1

Characteristics That Explain the Decision to Offer Internet Banking

Variable	All national banks	Small national banks[b]
	Estimate	Estimate
Constant **p-value**	2.7940*** (0.000)	-3.5852*** (0.000)
ASSETS **p-value**	8.3300 E-7*** (0.000)	0.0016 E-2*** (0.009)
YOUNG **p-value**	0.7051** (0.047)	1.2828*** (0.007)
BHC **p-value**	0.6506*** (0.002)	0.3641 (0.290)
URBAN **p-value**	0.7363*** (0.000)	0.7901*** (0.009)
DEPOSITS **p-value**	-0.7041 (0.294)	-2.5317*** (0.010)
EXPENSES **p-value**	7.5198*** (0.000)	5.7962* (0.091)
NIINCOME **p-value**	2.6809*** (0.000)	3.4385** (0.016)
ROE **p-value**	2.3636*** (0.009)	2.8679** (0.044)
INEFFICIENCY **p-value**	-0.9682* (0.092)	0.0865 (0.937)
CAMELS **p-value**	-0.2692** (0.026)	-0.1518 (0.527)
Number of observations	2089	1169

Source: Office of the Comptroller of the Currency.

Memorandum: Dependent variable: INTNEW = 1 if the bank adopted Internet banking between Q3 1998 and Q3 1999.

*** Significant at the 1 percent level.; ** significant at the 5 percent level.; and * significant at the 10 percent level.

[a]Banks offering Internet banking prior to Q3 1998 were excluded.

[b]Small banks are those with less than $100 million in assets.

sample (see the column to the right in Table 5-1), a notable one is that the deposits-to-assets variable (DEPOSITS) is statistically significant, indicating that small banks that emphasize traditional funding are less likely to choose to offer Internet banking. Perhaps surprisingly, affiliation with a multibank holding company is not significant in the sample of small banks. Although the relationship between ROE and the adoption of Internet banking is significantly positive in that sample, the coefficients on INEFFICIENCY and CAMELS variables are not statistically significant. This might indicate that at smaller institutions the relationship between performance and Internet adoption is somewhat weaker.

5.2 Factors That Explain Which Banks Offer a Wide Range of Internet Banking Services

The next step was to investigate factors that explain which banks choose to offer a relatively wide range of Internet banking services, given that they offer transactional Internet banking. To do so, the regression sample included all national banks that offered transactional Internet banking as of Q3 1999. Hence, the "old Internet banks" (banks that offered Internet banking as of Q2 1998) were added back into the sample, and banks that had not adopted Internet banking were dropped. The dependent variable in the regression analysis is PREMIUM, which takes on a value of 1 if an Internet bank offered balance inquiry, funds transfer, electronic bill payment (i.e., BASIC Internet banking), plus at least three other Internet banking services. This approach was used to ascertain whether the variables that explain which banks choose to offer Internet banking also distinguish Internet-intensive banks from other transactional Internet banks. In addition, because it is plausible that banks will expand their services as they gain experience in Internet banking, a dummy variable, OLDINTERNET, was included, which takes on a value of 1 if the institution offered Internet banking as of Q2 1998.

Table 5-2 presents the results of the logit estimation for both the entire, or all-banks, sample and for the sample of Internet banks with assets less than $100 million. The all-banks results show that, consistent with the univariate analysis, larger banks are more likely to offer a wider range of Internet banking services. Size, however, is not a factor when only banks with assets less than $100 million are considered. In addition, the coefficient on BHC indicates that banks that are members of a holding company are more likely than independent banks to offer a wide range of Internet banking services. Perhaps surprisingly, this relationship cannot be found for small banks. As expected, the coefficient on OLDINTERNET is positive in both regressions, indicating that banks with greater experience in Internet banking are more likely to offer an expansive range of services.

The statistically significant negative coefficient on DEPOSITS in both regressions indicates that, among Internet banks, those that place less emphasis on traditional funding tend to offer a wider range of Internet banking services, which is consistent with a more innovative business approach overall. The coefficients on NIINCOME, although in the expected direction, are not statistically significant.

Internet banks with a higher ratio of premises and fixed assets to net operating revenue (EXPENSES) also tend to offer a wide range of Internet banking services. One possible interpretation of this result is that banks with relatively high fixed expenses may have an incentive to encourage customers to use the Internet, in order to reduce such expenses in the future. This relationship, however, does not hold for small banks.

There is no clear relationship between "better performance" and offering expanded Internet services. In the all-bank sample, the coefficient on ROE is insignificant. The coefficients on INEFFICIENCY and CAMELS are significant but point in opposite directions. That is, the

Table 5-2

What Explains the Decision to Offer a Wide Range of Internet Banking Services?

Variable	All Internet national banks	Small Internet national banks[a]
	Estimate	**Estimate**
Constant	-1.0880	1.9895
p-value	(0.527)	(0.483)
ASSETS	3.6250 E-8***	0.0002 E-1
p-value	(0.003)	(0.329)
YOUNG	-0.9199	1.4535
p-value	(0.459)	(0.467)
BHC	2.5340**	-0.2816
p-value	(0.019)	(0.849)
URBAN	0.2480	0.0636
p-value	(0.462)	(0.951)
DEPOSITS	-4.2718***	-5.3779*
p-value	(0.001)	(0.079)
EXPENSES	6.6602**	-4.0052
p-value	(0.046)	(0.745)
NIINCOME	1.0916	2.8678
p-value	(0.392)	(0.563)
ROE	-2.2965	-2.0170
p-value	(0.184)	(0.746)
INEFFICIENCY	-2.5747***	-0.7805
p-value	(0.010)	(0.835)
CAMELS	0.7081***	-0.6685
p-value	(0.006)	(0.496)
OLDINTERNET	1.4779***	1.6485*
p-value	(0.000)	(0.089)
Number of observations	431	79

Source: Office of the Comptroller of the Currency.

Memorandum: Dependent variable: PREMIUM = 1 if a transactional Internet bank offered balance inquiry, funds transfer, electronic bill payment and at least three other on-line services.

*** Significant at the 1 percent level; ** significant at the 5 percent level; * significant at the 10 percent level.

[a]Small banks are those with less than $100 million in assets.

negative coefficient on INEFFICIENCY would indicate that inefficient banks are less likely to offer expanded services, while the positive coefficient on CAMELS would indicate that banks with poorer examination ratings are more likely to offer PREMIUM Internet banking services. None of the performance ratios are significant for small banks. Thus, although the results clearly

indicate that banks with better performance ratios and exam ratings are more likely to offer Internet banking, no clear relationship was found between performance characteristics and extent of service offerings among banks that have adopted Internet banking.

5.3 Does Internet Banking Affect Bank Profitability?

As speculated in **Chapter Four**, it is probably too soon to see a systematic impact of Internet banking on banks' profitability. Here a multivariate regression model is estimated to investigate whether there is a link between offering Internet banking and a bank's profitability. A bank's ROE in Q3 1999 is regressed against control variables and an explanatory variable denoting whether or not a bank offers Internet banking. The model also tests for any differences in this relationship for more experienced Internet banks and new Internet banks.

The focus of the investigation is to see if Internet banking has an independent effect on bank profitability. A dummy variable (INTERNET) was created that equals 1 if the bank offered Internet banking in Q3 1999, and it is included as a regressor in explaining ROE. If Internet banking remains too small a factor to affect bank profitability, then the coefficient on this variable will not be statistically significant.

Table 5-3 presents the results of ordinary least-squares regressions using various regressors to explain ROE, both for all national banks (specifications 1 through 3) and for small national banks (specifications 4 through 7). Specification 1 enters only the INTERNET variable in the regression. This specification reports only the simple correlation between Internet banking and profitability without controlling for other relevant factors. The results from this simple specification indicate no simple correlation between Internet banking and profitability. Specifications 2 and 3 check whether the finding of no relationship between Internet banking and profitability is robust when controlling for factors commonly used in models estimating profitability.[4] The control variables in specification 2 include total assets (ASSETS), a dummy variable indicating that a bank is less than three years old (YOUNG), the lagged equity capital-to-assets ratio (CAPASSETS),[5] and the loan-to-assets ratio (LOANASSETS). Specification 3 expands the control variables to include the ratio of noninterest income to net operating revenue (NIINCOME), the ratio of expenditures on premises and fixed assets to net operating revenue (EXPENSES), the measure of accounting inefficiency (INEFFICIENCY), and the ratio of noncurrent loans to total loans (CREDQUAL). Unlike the previous regressions to explain adoption of Internet banking services, all the explanatory variables are measured as of Q3 1999 (with the exception of the lagged capital-to-assets ratio). Both specifications indicate no relationship between the existence of Internet banking and profitability.

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[4]See, for example, Berger (1995) and Samolyk (1994) and the studies cited therein.

[5]The capital-to-assets ratio is lagged because of the simultaneity between current earnings and current capital.

Table 5-3

Does Internet Banking Affect Bank Profitability?

Variable	All national banks			Small national banks[a]			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant **p-value**	0.1177*** (0.000)	0.1334*** (0.000)	0.3232*** (0.000)	0.1043*** (0.000)	0.1043*** (0.000)	0.0784*** (0.001)	0.3994*** (0.000)
INTERNET **p-value**	-0.0007 (0.917)	-0.0020 (0.745)	0.0012 (0.834)	-0.0294 (0.112)			
OLD INTERNET **p-value**					-0.0124 (0.769)	-0.109 (0.795)	-0.0124 (0.728)
NEW INTERNET **p-value**					-0.0332* (0.102)	-0.0249 (0.217)	-0.0047 (0.784)
ASSETS **p-value**		-2.6953E-11 (0.867)	2.0947E-10 (0.132)			7.81 E-7*** (0.000)	-7.52 E-8 (0.643)
YOUNG **p-value**		-0.0652*** (0.000)	-0.0169 (0.180)			-0.0626*** (0.003)	-0.0066 (0.7140)
CAPASSETS **p-value**		-0.1967*** (0.000)	-0.1403*** (0.001)			-0.1404** (0.048)	-0.1501** (0.016)
LOANASSETS **p-value**		0.0133 (0.450)	0.0220 (0.147)			0.0075 (0.8038)	0.0097 (0.707)
NIINCOME **p-value**			0.1229*** (0.000)				0.1180** (0.046)
EXPENSES **p-value**			-0.1678*** (0.006)				-0.0797 (0.460)
INEFFICIENCY **p-value**			-0.2880*** (0.0y0)				-0.4127*** (0.000)
CREDQUAL **p-value**			-2.1353*** (0.000)				-2.6252*** (0.000)
Number of observations	2222	2222	2222	1109	1109	1109	1109
Adjusted R^2	0.000	0.024	0.282	0.001	0.001	0.039	0.325
F	0.011	12.016***	97.721***	2.532	1.365	8.443***	54.379***

Source: Office of the Comptroller of the Currency.

Memorandum: Dependent variable: Return on equity (ROE).

*** significant at the 1 percent level; ** significant at the 5 percent level; * significant at the 10 percent level.

[a]Small banks are those with less than $100 million in assets.

The univariate analysis in Chapter Four indicated that the relationship between Internet banking and profitability might be different for banks with assets less than $100 million. Thus, regressions were separately analyzed for this set of banks. Specification 4 is again the simple correlation between Internet banking and ROE at small banks. The estimated correlation is negative and, unlike the model for all banks, has a low p-value. In light of the discussion in section **4.4**, that small banks may face more of a challenge than larger banks when they first offer Internet banking, specification 4 was adjusted by entering separate dummy variables for banks that adopted Internet banking as of Q2 1998 (OLD INTERNET) and those that adopted it after Q2 1998 (NEW INTERNET) (see Table 5-3, column 5). Interestingly, while there is clearly no statistical relationship between profitability at smaller banks and OLD INTERNET, the relationship between NEW INTERNET and profitability at small banks is negative with a p-value of 10 percent.

As reported in specifications 6 and 7, however, the significance of NEW INTERNET completely disappears when the other control variables are added in. This suggests that the difference in profitability of OLD INTERNET and NEW INTERNET small banks is not due to the existence of Internet banking, but, rather, to the different conditions at banks offering Internet banking before and after Q2 1998. This is consistent with the authors' earlier conjecture that more profitable institutions are quicker to adopt Internet banking.

Another earlier conjecture, that Internet banking may not yet have had a big impact on the bottom line of most banks, receives strong support from the regression analysis, with, however, two caveats: First, there may be small subsets of banks for which this result may not hold. As discussed in section **4.3**, Internet banking may have a significant impact on the profitability of very young (a year or less old) Internet banks. In addition, at the end of 1999 a very small number of large institutions dominated the market for customer usage of Internet banking. Internet banking may have had an impact on this handful of institutions. Second, the results are not necessarily "timeless." Internet banking may eventually become a very important factor affecting bank performance for many banks. The degree and speed at which this may happen will depend, in part, on the emphasis banks place in the future on Internet banking, as well as on the growth in the use of Internet banking. The issue of the plans of national banks is the subject of the next chapter.

Chapter Six

Internet Banking: Plans and Prospects

The allure of Internet banking is strong, and many banks are responding to it.[1] This chapter presents information on banks' plans for offering Internet banking. The data include the responses of OCC examiners to an OCC questionnaire about their knowledge of the Internet banking plans of national banks through the end of 2000. The combination of information about banks' plans and information on Q3 1999 Internet banking activities provides a basis for projection of the "supply" of Internet banking in the United States at the beginning of 2001.[2] This projected "supply" of Internet banking is then contrasted with information about possible future use of, or "demand" for, Internet banking.

6.1 Internet Banking Plans of National Banks

Table 6-1 summarizes key aspects of these projections. On the basis of examiners' responses to the questionnaire, the number of national banks that offer Internet banking would more than double from Q3 1999 levels, so that, by the beginning of 2001, 45 percent of national banks will offer Internet banking (see **Figure 6-1**). Banks offering transactional Internet banking would account for more than 95 percent of national banking system assets. Because as of Q3 1999 the largest banks already had Internet banking, most of the growth in the number of banks that offer it will be among the smallest size banks. In Q3 1999, only 7 percent of small banks (those with less than $100 million in assets) offered Internet banking, but the projections indicate that by year-end 2000 more than one-quarter of small banks will offer it. In addition, by the beginning of 2001, almost all national banks over $1 billion in assets will offer it. 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, this suggests that more than nine out of ten banking industry customers will have access to Internet banking by the beginning of 2001.

In addition to an increase in the number of banks that offer Internet banking, many banks plan to increase their range of on-line services. **Table 6-2** provides detailed information about planned changes in product offerings and shows that banks' plans indicate a 125 percent increase in the number that will offer Internet banking by year-end 2000 and a 150 percent increase in the number of transactional Internet banks that will offer a PREMIUM set of many on-line services.

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[1]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 priority for technology spending. For a summary of the results of this 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 March 2000 announcement of the merger of Deutsche Bank and Dresdner Bank, a combination that would have created the largest bank in the world.

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

Table 6-1

Internet Banking in 2001?

	Q3 1999	Q4 2000[a]
Number of national banks offering Internet banking[b]	464	1046
Percentage of national banking system assets	89.2	95.2
Percentage of small deposit accounts in the national banking system[c]	84.1	92.8
Percentage of national banks in asset size category:		
All	19.9	44.9
Less than $100 million	7.1	25.3
$100 million to less than $1 billion	27.1	61.1
$1 billion to less than $10 billion	61.9	89.9
$10 billion and over	100.0	100.0

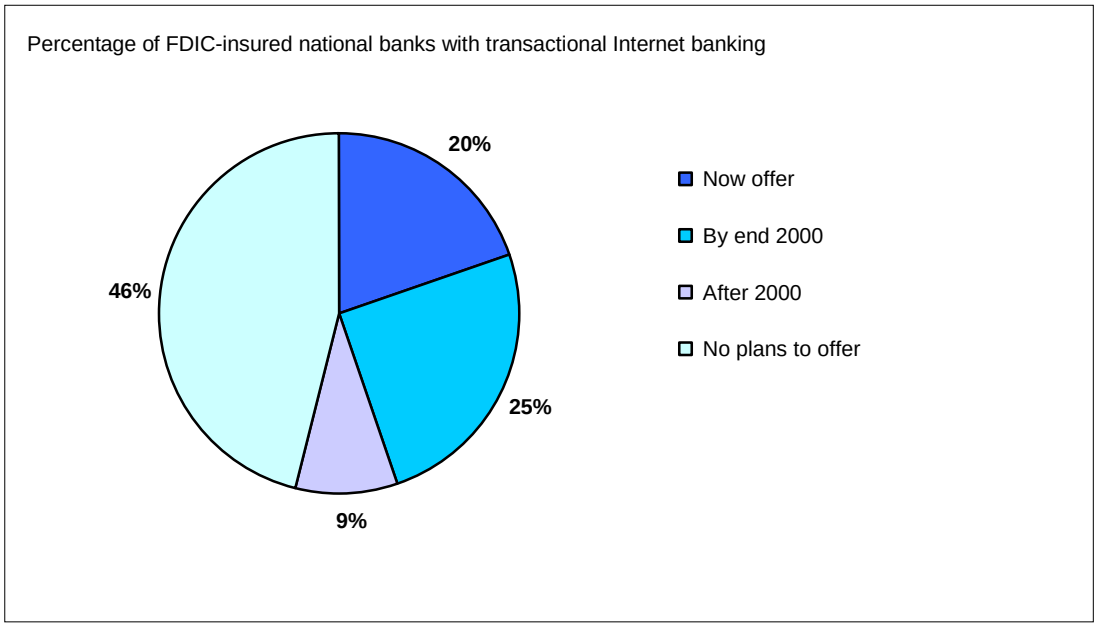
Source: Office of the Comptroller of the Currency.

Memorandum: 46.2 percent of national banks had no plans as of Q3 1999 to offer Internet banking in 2001 or beyond.

[a]Based on OCC examiners' knowledge of the Internet banking plans of national banks, as of Q3 1999. Percentage figures for assets, small deposit accounts, and banks per size category for Q4 2000 were calculated by taking banks offering Internet banking as of Q3 1999, plus banks with plans to offer Internet banking by the end of 2000, relative to Q3 1999 assets, small deposits, and numbers of national banks, respectively.

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

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



Source: Office of the Comptroller of the Currency.

Figure 6-1

Internet Banking and National Banks: Potential Growth

Table 6-2

Planned Increases in Key Services to Be Offered by Transactional Internet National Banks by Year-End 2000[a]

	Internet banks offering selected services: Actual and planned		
Type of service	**Actual Q3 1999**	**Planned Q4 2000**	**Percentage of Increase**
Number of transactional banks	464	1047	125.6
Balance inquiry and funds transfer	412	969	135.2
Bill payment	363	853	135.0
Credit applications	269	646	140.1
New account set-up	170	487	186.5
Brokerage	100	230	130.0
Cash management	73	445	509.6
Fiduciary	55	150	172.7
Bill presentment	49	258	426.5
Insurance	25	95	280.0
BASIC[b]	360	836	132.2
PREMIUM[c]	111	471	324.3

Source: Office of the Comptroller of the Currency.

[a]Based on OCC examiners' knowledge of the Internet banking plans of national banks, as of Q3 1999.

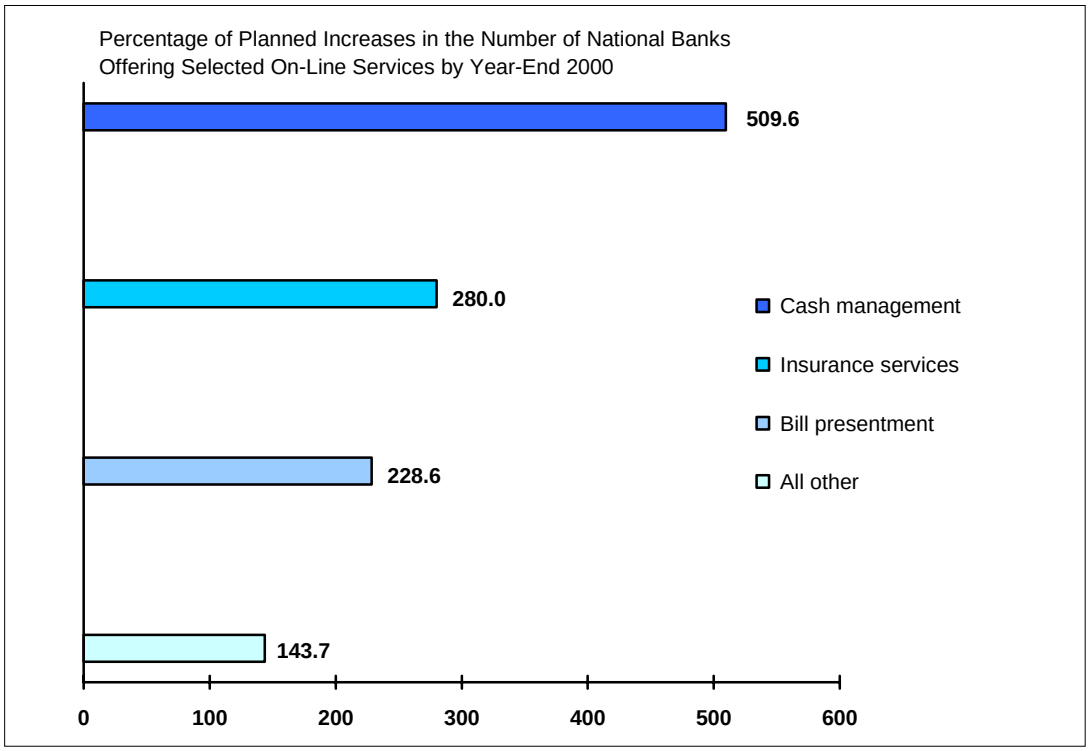
[b]BASIC includes balance inquiry, funds transfer, and bill payment.

[c]PREMIUM includes BASIC and at least three other services.

Three planned product increases in particular stand out. As illustrated in **Figure 6-2**, 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 the number of banks offering electronic bill presentment may increase more than 200 percent. Significantly, large banks' plans to offer on-line business services (cash management) are more aggressive than those of smallest banks.[3] Such developments might represent increased competition by large banks for

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

Some industry observers have begun to speculate that serving the needs of business customers, rather than consumer customers, may 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 (also called B2B) commerce, see Wenninger (2000).



Source: Office of the Comptroller of the Currency.

Figure 6-2

Biggest Percentage Increases Planned for On-Line Cash Management, Insurance Services, and Bill Presentment

community banks' business customers, who, some analysts believe, are enthusiastic about using Internet-based banking services.[4]

6.2 Current and Future Demand for Internet Banking

The level of "demand" for Internet banking in the future remains an open question. One interesting aspect of banks' perceptions of future demand is that as of Q3 1999 just under half of all national banks (46.2 percent) had no plans to offer Internet banking. Almost all the banks without plans to offer it were in the smallest size category.[5] 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.[6]

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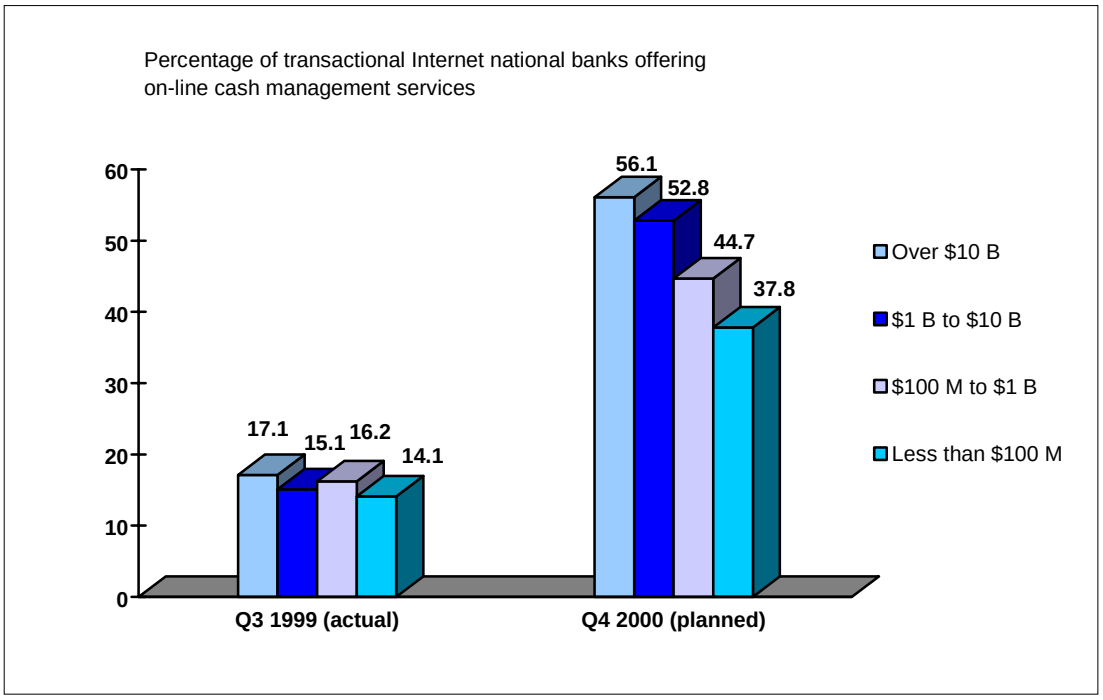
[4]For example, see *Bank Technology News* (1999c). See Wenninger (1999) for the growing importance of B2B e-commerce.

[5]An additional 9 percent of national banks planned to add Internet banking after 2000.

[6]For summaries of a recent survey by Grant Thornton LLP on the Internet banking plans of community banks, see Winig (2000) and Agosta (2000). The survey revealed that 64 percent of the 638 community bank CEOs questioned



Source: Office of the Comptroller of the Currency.

Figure 6-3

Small Banks May Lag Behind Larger Banks in Offering Business Internet Banking

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

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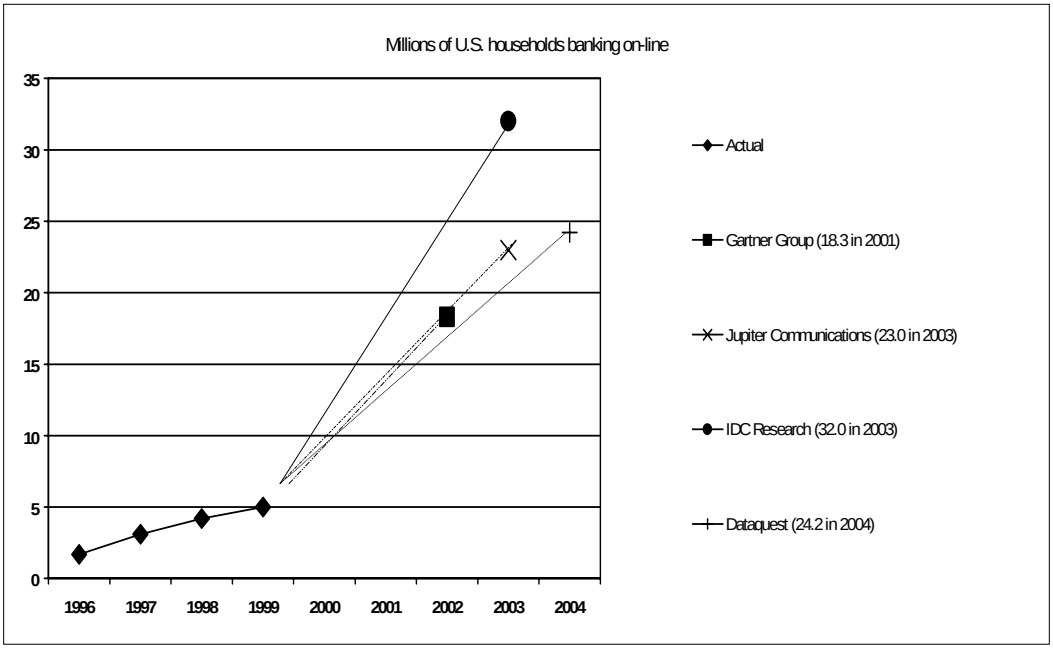
responded that they expected to offer Internet banking by year-end 2000. The discrepancy between that result and the projections here may be due to the inclusion of banks over $100 million in assets in the community banks surveyed by Grant Thornton. It is also possible that community banks are reevaluating 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 banks' attitudes toward the Internet. See Carlson (2000) for a discussion of possible reasons that some small banks are choosing not to offer Internet banking.

[7]The Federal Reserve System's 1998 Survey of Consumer Finances (SCF) 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).



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

Figure 6-4
Industry Forecasts of Internet Banking

6.3 Marketshare of Internet Banking Customers

Even though opinions on the overall growth in demand for Internet banking vary widely, questions also arise about which banks will be the winners or losers in the contest to secure on-line customers. The Internet is an extremely efficient device for banks of all sizes to use to collect and manage information to meet the various financial needs of individuals and businesses, in particular, by integrating services or "bundling" them together.[8] On the one hand, the Internet allows financial firms of various sizes, including the smallest banks, to enter markets and reach customers previously beyond 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

[8]Data management problems will probably continue to challenge banks of all sizes, in part because of the difficulties of dealing with a variety of customer databases built up over many years. See, for example, Hallenborg (1999) and *Bank Technology News* (1999b), which summarizes a study by Innovative Systems, Inc., on difficulties in data management 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 studies by Speer & Associates in November 1999 and March 2000 on the degree to which banks may lag behind nonfinancial companies in electronically collecting and using data about customers.

these economies than smaller ones. In addition, the proliferation of 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, which is likely to work to the advantage of large firms.[9]

Table 6-3 presents industry estimates of the numbers of customers on-line using Internet banking for the top five banks at the end of 1999.[10] The estimates show a disproportionate concentration of Internet banking customers among a handful of large banks. In particular, as shown in the marketshares columns, the top five Internet banks account for almost 36 percent of all U.S. customers using Internet banking; by comparison, the same five banks accounted for just over 20 percent of all small deposit accounts.[11] 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, between mid-1998 and the end of 1999 the top five Internet banks experienced more than a doubling of the number of customers using Internet banking, for an increase of more than 5 times the estimated percentage of increase in customer usage of Internet banking overall in the United States (as shown in **Figure 6-4**).

Even among the top five Internet banks, however, there is evidence of differences in success in attracting customers to use Internet banking. For example, over Q2 1998 through Q4 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 sixfold increase. In addition, the percentage of banks' "active" on-line customers—that is, customers using Internet banking at least once a month—varies. Only two of the five Internet banks have more than 50 percent of on-line customers who can be considered active users of Internet banking.

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[9]See Toonkel (2000c) for a report on Internet banking advertising strategies employed by several large banks and estimates from an Ad Relevance, Inc., study of the advertising expenditures of three large banks. Some banks are focussing on niche markets or "affinity groups" as an Internet banking strategy; see Weitzman (2000).

For a discussion of the strategic choices facing banks and the possible consequences of Internet banking choices for the structure of the banking industry and for 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 innovations to the retail payment system on the structure of the banking industry.

[10]As indicated in the source note to Table 6-3, the information on Internet banking usage there 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.

[11]Recent reports and analyses suggest that 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).

Table 6-3

Top Five Internet Banks: Estimated Growth and Market Concentration of Internet Banking Customers

	Customers using Internet banking				Marketshares	
Banking company	**Q2 1998**	**Q4 1999**	**Growth from Q2 1998 to Q4 1999** (%)	**Bank's "active" on-line customers as a percentage of its total number of on-line customers**[a]	**Bank's share of all U.S. on-line banking customers** (%)[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	9.9	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 (Q2 1998, Q2 1999).

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

[b]Q4 1999.

[c]Q2 1999.

[d]For comparability with Q4 1999 figure, includes pre-merger on-line customers at Norwest bank.

[e]For comparability with Q4 1999 figure, includes pre-merger on-line customers at NationsBank.

[f]For comparability with Q4 1999 figure, includes pre-merger on-line customers at First Chicago NBD.

Chapter Seven

Summary and Conclusions

The analysis indicates several significant differences in the profile of banks that offer Internet banking and banks that do not. Broadly speaking, Internet banks rely more heavily on noninterest income and less on core deposits for funding than non-Internet banks do. For all but the smallest size banks, Internet banks have better accounting efficiency ratios and higher returns on equity than non-Internet banks. Internet banks with assets under $100 million had significantly worse accounting efficiency and profitability ratios compared with non-Internet banks of the same size. These differences were due primarily to the influence of *de novo* small banks offering Internet banking.

At the beginning of 2000, the low level of customer use of Internet banking, as well as the relatively modest cost of setting up an Internet banking Web site, makes it unlikely that Internet banking has had a substantial direct impact on the bottom line of most institutions. The regression results on profitability are consistent with this view. An exception to this general rule, however, might be the handful of large banks with a disproportionately large share of Internet banking. It is also possible that Internet banking has had a causal impact on the bottom line of small banks, particularly *de novo* institution, some of which may be relying heavily on an Internet-based business strategy. The full costs of offering Internet banking, while not prohibitive, may be significant for these banks. Further investigation is needed to determine the cause of the relatively poor performance of *de novo* Internet banks and whether these banks' performance improves as e-banking and e-commerce expand over time.

On the demand side, although only one out of five national banks offered Internet banking as of Q3 1999, the estimates here indicate that by far most banking customers have accounts with institutions that offer it. Thus, the availability of Internet banking at the beginning of 2000 was sufficient to accommodate the 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.[1]

The revolutionary developments in information and communications technology have had and will continue to have a profound impact on the banking and the financial services industry. Internet banking will be an important part of these developments, and analyzing developments in

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[1]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 probably be, at least initially, most evident for businesses rather than for individual households.

this market will be extremely important to understanding developments in the banking industry. Yet considerable uncertainty exists as to when and how Internet banking will become a major factor. This report has offered a picture of the current market for Internet banking, the factors affecting the decision to adopt Internet banking as well as the scope of services offered, and information on banks' plans for the future. Such a picture can provide an important initial step for analysis of the likely future impact of Internet banking on the banking industry.

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Acronyms

ACH	automated clearinghouse
ATM	automated teller machine
B	billion
B2B	business to business
C&I	Commercial & Industrial
CAMELS	Federal bank regulators' ratings of safety and soundness, which range from "1" (best) to "5" (worst), cover capital adequacy (C), asset quality (A), management (M), earnings (E), liquidity (L), and sensitivity to market risk (S).
CEO	chief executive officer
FDIC	Federal Deposit Insurance Corporation
GAO	U.S. General Accounting Office
IT	information technology
M	million
OCC	Office of the Comptroller of the Currency
OTS	Office of Thrift Supervision
SCF	Survey of Consumer Finances
URL	uniform resource locator
URSIT	Uniform Rating System for Information Technology

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