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Noninterest Income and Financial Performance at U.S. Commercial Banks

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Abstract: Noninterest income now accounts for over 40 percent of operating income in the U.S. commercial banking industry. This paper demonstrates a number of empirical links between bank noninterest income, business strategies, market conditions, technological change, and financial performance between 1989 and 2001. The results indicate that well-managed banks expand more slowly into noninterest activities, and that marginal increases in noninterest income are associated with poorer risk-return tradeoffs on average. These findings suggest that noninterest income is co-existing with, rather than replacing, interest income from the intermediation activities that remain banks' core financial services function.

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Introduction

A number of theories have been advanced to explain why banks, and more generally financial intermediaries, exist. In most of these theories, banks exist because they mitigate a host of problems that otherwise prevent liquidity from flowing directly from agents with excess liquidity (depositors) to agents in need of liquidity (borrowers). These problems arise because of informational asymmetries, contracting costs, and scale mismatches between liquidity suppliers and liquidity demanders. Intermediation-based theories of financial institutions see banks as the solution to these problems because: banks have a comparative advantage at gathering information on borrower creditworthiness; banks are better able than individual lenders to monitor borrowers; banks provide increased liquidity by pooling funds from many households and businesses and by issuing demandable deposits in exchange for these funds; and banks diversify away idiosyncratic credit risk by holding portfolios of multiple loans.[1]

Much of the empirical literature in commercial banking has followed these rich theoretical leads, analyzing the financial flows fundamental to the intermediation process (e.g., interest paid on deposits, interest received from loans and securities, and the resulting net interest margins) and the risks associated with those flows (e.g., liquidity risk associated with deposits, credit risk associated with loans, market risk associated with fixed income securities, and interest-rate risk associated with the relative maturities of deposits, loans, and securities). However, commercial bank business models have evolved over the past two decades, and today banks generate an increased portion of their income from nonintermediation and/or noninterest activities. For example, between 1980 and 2001 noninterest income in the U.S. commercial

[1] Seminal theoretical studies in this area include Gurley and Shaw (1960), Pyle (1971), Benston and Smith (1976), Leland and Pyle (1977), Fama (1980), Diamond and Dybvig (1983), Diamond (1984), Boyd and Prescott (1986),

banking system increased from 0.77% to 2.39% of aggregate banking industry assets, and increased from 20.31% to 42.20% of aggregate banking industry operating income.

The increasing presence of noninterest income at commercial banks has been widely documented and discussed in the industry press and regulatory publications (for example, Feldman and Schmidt 1999), but only a few academic studies have investigated the impact of increased noninterest income on the financial performance of commercial banks. While it is well known that large banks and banks with specialized strategies (e.g., credit card banks, mortgage banks) rely more heavily on noninterest income than do small banks with traditional business strategies, there is little systematic understanding of why noninterest income varies across banks and how noninterest income is associated with bank financial performance.

This paper attempts to fill in some of these gaps. In Section 1 we document the long-run trends in the amount and composition of noninterest income at U.S. commercial banks. In Section 2 we discuss the regulatory and technological determinants of noninterest income at commercial banks, and consider why noninterest income has grown more quickly at some banks than at others. In Section 3 we discuss the potential effects of increased noninterest income on the financial performance of commercial banks. We refer to the extant literature on noninterest income at commercial banks throughout each of these first three sections. In Section 4 we specify an econometric model designed to answer two broad questions: Which bank characteristics, market conditions, and technological developments are most closely associated with increased noninterest income? Is noninterest income associated with improvements or declines in bank financial performance? In Section 5 we describe the 1989-2001 panel data set on U.S. commercial banks that we use to estimate the econometric model.

James (1987), and Gorton and Pennacchi (1990). See Saunders (2000, chapter 6) and Freixas and Rochet (1999, chapter 2) for general discussions of why banks exist and overviews of the theoretical literature.

We report the results of our econometric model in Section 6. We find numerous strong statistical associations between noninterest income and bank characteristics, market conditions, technological progress, and bank performance. For example, our results suggest that well-managed banks rely relatively less on noninterest income; that banks which stress customer relationships and service quality tend to generate more noninterest income; and that the development of new financial technologies such as cashless transactions and mutual funds are associated with higher levels of noninterest income in the banking system. We also find that increases in noninterest income tend to be associated with higher profitability, higher variation in profits, and a worsened risk-return tradeoff for the average commercial bank during this time period. These results are consistent with previous research findings, extend our knowledge beyond the small extant literature on this topic, and are robust to changes in estimation technique and data subsampling. In Section 7 we briefly discuss the implications of our results for the future roles of intermediation and nonintermediation activities in bank business models.

1. The changing sources of bank income

There are a number of different ways to measure the incidence of noninterest income at commercial banks. Table 1 illustrates how two of those measures – noninterest income as a percentage of bank assets, and noninterest income as a percentage of bank operating income – have increased over time for "large" (assets greater than $1 billion) and "small" (assets less than $1 billion) U.S. commercial banks between 1984 and 2001. Using operating income as the financial benchmark suggests a relatively small increase over time: noninterest income increased by 17 percent on average at large banks (from 25.47% to 29.89% of operating income) and increased by 16 percent on average at small banks (from 14.07% to 16.38% of operating income). Using total assets as the financial benchmark indicates a substantially larger increase

over time: noninterest income increased by 79 percent on average at large banks (from 1.20% to 2.15% of assets) and increased by 26 percent on average at small banks (from 0.72% to 0.91% of assets). Finally, using industry aggregates rather than bank averages suggests still larger increases over time: industry noninterest income-to-operating income increased by 72 percent (from 24.60% to 42.20% of aggregate industry operating income) and industry noninterest income-to-assets increased by 125 percent (from 1.06% to 2.39% of aggregate industry assets).

These figures illustrate several important points. First, noninterest income comprises a larger portion of commercial bank income today than in 1984. This is not just a U.S. phenomenon: Kaufman and Mote (1994) found that noninterest income ratios increased in the banking sectors of virtually all developed countries between 1982 and 1990. Second, noninterest income ratios are larger, and have grown more quickly over time, at large banks than at small banks. Third, the large industry aggregate ratios indicate that the lion's share of total noninterest income is being generated by a small number of banks. Indeed, the 1 percent of banks with the highest ratios of noninterest income-to-assets accounted for almost 18 percent of all noninterest income in the U.S. commercial banking sector in 2001.

The across-the-board growth of noninterest income at commercial banks suggests that intermediation activities are becoming a less important part of banking business strategies. The data displayed in Figure 1 suggest otherwise. If intermediation activities have become less important for banks over time, it stands to reason that the correlation between bank profitability and bank net interest margin would grow weaker over time. Figure 1, which displays the average correlation of ROE and net interest margin each year between 1984 and 2001, shows no such weakening. Although these data are crude and exhibit substantial noise over time, they suggest an intriguing possibility: increased noninterest income is co-existing with, rather than

replacing, intermediation activities at the typical commercial bank.

Table 1 also shows how the composition of noninterest income has changed over time. At large banks, service charges on deposit accounts have comprised a relatively stable portion of total noninterest income, fluctuating between about 29% and 36% and following no trend over time. Fee income from fiduciary activities has fallen by approximately half, from about 22% to about 11%, and may reflect the gradual movement of trust and investment departments out of commercial bank affiliates and into separate securities affiliates. "Other" noninterest income has increased from about 49% to about 57%; note that most of this increase occurred in the final years of the sample after rulings by federal regulators and industry deregulation allowed banks expanded product powers. In contrast, the composition of noninterest income at small banks has remained remarkably unchanged since 1984.

2. The regulatory, technological, and strategic drivers of noninterest income

Over the past two decades, the banking industry has been transformed by sweeping deregulation and rapid technological advances in information flows, communications infrastructure, and financial markets. Deregulation fostered competition between banks, nonbanks, and financial markets where none existed before. In response to these competitive threats and opportunities, many banks embraced the new technologies that drastically altered their production and distribution strategies and resulted in large increases in noninterest income. In contrast, many other banks have continued to use traditional banking strategies for which noninterest income remains relatively less important.

Banking industry deregulation removed a whole host of restrictions that had stunted the evolution of the banking industry, constrained the efficiency of financial product markets, and extended the lives of thousands of poorly run and/or suboptimal-sized commercial banks. First,

the phase-out of Regulation Q interest rate ceilings allowed banks to pay market rates of interest to depositors. Banks gradually abandoned bundled pricing of retail deposit products – in which they compensated depositors for below-market interest rates by providing a "bundle" of products free-of-charge (e.g., check printing, safety deposit boxes, travelers checks) – in favor of explicit fees for individual retail deposit products.[2] Second, two decades of deregulation at the state level, culminating with the Riegle-Neal Act of 1994, eliminated barriers-to-expansion across state boundaries. Banking companies embraced this new freedom by acquiring banks in other states, by converting multiple bank charters into bank branches, and in rare cases by opening de novo branches in other states. The most geographically expansive banks grew large enough to profitably employ high-volume, automated lending technologies based on credit scoring and securitization – a business model that generates large amounts of noninterest income. Third, the Gramm-Leach-Bliley Act of 1999 allowed banks to expand further into financial services activities unrelated to traditional bank intermediation. Large banking companies took quick advantage of this legislation to expand into nontraditional activities that generated noninterest income (e.g., securities underwriting, insurance sales, retail brokerage).[3]

Advances in information and communications technology (e.g., the Internet, ATMs), new intermediation technologies (e.g., loan securitizations, credit scoring), and the introduction and expansion of financial instruments and markets (high-yield bonds, commercial paper, financial

[2] For evidence that fees charged on deposit accounts and other depositor services have increased over time, see Board of Governors of the Federal Reserve, "Annual Report to Congress on Retail Fees and Services of Depository Institutions," June 1997 through June 2002.

[3] Kane (1996) and Kroszner and Strahan (1997, 1999) argue that banks were routinely circumventing regulatory constraints on geographic and product market expansion years prior to deregulation, and that deregulation occurred because the relative cost of maintaining the restrictions to one interest group became less than the relative benefit to other interest groups. Indeed, Gramm-Leach-Bliley was preceded by a series of federal regulatory rulings that incrementally relaxed restrictions on banking powers. For example, during the 1990s the Office of the Comptroller of the Currency granted national banks to power to sell insurance from offices in small towns, and the Federal Reserve relaxed the limitations on the amount of revenue a bank could generate in its Section 20 securities subsidiaries.

derivatives) all would have occurred in the absence of deregulation. But deregulation allowed banks to achieve the scale to use these new technologies more efficiently, and the increased competition induced by deregulation provided banks with the incentives to adopt and adapt these new technologies. Many of these new technologies have emphasized noninterest income while de-emphasizing interest income at banks. Banks can extract fee income from customers willing to pay a "convenience premium" for doing their banking at ATMs or over the Internet. Banks can earn loan origination, loan securitization, and loan servicing fees to offset the interest income that they lost with the disintermediation of consumer lending (e.g., mortages, credit cards). Banks can earn fees from selling back-up lines of credit to firms that float commercial paper rather than borrowing from banks.

By most accounts, deregulation and technological advances have fostered increased competitive rivalry among banks and nonbanks alike. Banks have faced increased competition in retail markets due to deregulation (e.g., the Riegle-Neal Act), financial innovation (e.g., mutual funds), and advances in communications technology (e.g., on-line brokerage accounts), all of which have provided banks' retail customers with alternatives to traditional bank deposit accounts. Banks have also faced increased competition in wholesale markets, due to increasingly deeper and more efficient financial markets (e.g., high-yield commercial debt, commercial paper, equity finance) which have provided banks' business customers with alternatives to traditional bank loans. Well-managed banks responded to these competitive pressures by becoming more cost-efficient and more revenue-efficient. This included offering customers an expanded array of new and/or nontraditional fee-based products, selling increased amounts of existing fee-based products, pricing fee-based products more efficiently (e.g., by unbundling retail deposit products), and improving the quality of fee-based products and services

so that they commanded higher prices. Numerous studies have documented the response of local banks to out-of-state entry (e.g., Berger, Bonime, Goldberg, and White 2000; Berger, Goldberg, and White 2001; Berger, Saunders, Scalise, and Udell 1998; DeYoung, Hasan, and Kirchhoff 1998; Evanoff and Ors 2001; Keeton 2000; and Whalen 2001.)

There is emerging evidence that commercial banks are gravitating towards two divergent banking strategies in which noninterest income plays different roles. DeYoung and Hunter (2003) and DeYoung, Hunter, and Udell (2004) argue that two generic banking strategies are emerging from the fog of deregulation and technological change. In the first of these two strategies, large banks take advantage of economies of scale in the production, marketing, securitization, and servicing of consumer loans. Although these banks operate with very low unit costs, they tend to earn very low interest margins because the products they produce are essentially financial commodities and the markets they sell them into are extremely competitive. Large amounts of noninterest income (e.g., from origination, securitization, and servicing fees) are essential for this model to be profitable. In the second of the two strategies, small community banks operating in local markets develop relationships with their depositors and their borrowers. They add value to their depositor relationships through person-to-person contact at branch offices, and they make loans to informationally opaque, small, idiosyncratic borrowers who do not have direct access to financial markets. Although these small, locally-focused banks operate with relatively high unit costs, they can earn market returns because they earn high interest margins – they pay low interest rates to a loyal base of low-cost core depositors, and they charge high interest rates to borrowers over which they have market power (i.e., high switching costs). Noninterest income is less important for these banks, although at the margin these banks' attention to high levels of service quality will command higher fees for any given product. The

data in Table 1 are consistent with this large bank/small bank strategic dichotomy.

3. Noninterest income and financial performance

The consequences of noninterest income for the financial performance of commercial banks are not well understood. All else equal, an increase in noninterest income will improve earnings – but an increase in noninterest income seldom occurs without concomitant changes in interest income, variable inputs, fixed inputs, and/or financing structure.[4] As noninterest income trended up during the 1990s, it was generally believed that shifting banks' income away from intermediation-based activities (in which bank income was subject to credit risk and interest rate risk), and toward fee-based financial products and services, would reduce banks' income volatility. Moreover, it was conventionally believed that expansion into new fee-based products and services reduced earnings volatility via diversification effects. But recent empirical studies indicate that neither of these beliefs holds on average.

DeYoung and Roland (2001) suggest three reasons why noninterest income may increase the volatility of bank earnings. First, most bank loans are relationship based and as a result have high switching costs, while most fee-based activities are not relationship based. Thus, despite credit risk and fluctuations in interest rates, interest income from loans may be less volatile than noninterest income from fee-based activities. Second, within the context of an ongoing lending relationship, the main input needed to produce more loans is variable (interest expense); in contrast, the main input needed to produce more fee-based products is typically fixed or quasi-fixed (labor expense). Thus, fee-based activities may require greater operating leverage than lending activities, which makes bank earnings more vulnerable to declines in bank revenues.

[4] There are some narrow exceptions to this statement. For example, an exogenous increase in market power would allow a bank to increase its fees, thereby increasing its noninterest income without having to make any operational changes. Similarly, an exogenous improvement in bank management could result in more efficient pricing of existing fee-based products and services.

Third, most fee-based activities require banks to hold little or no fixed assets, so unlike interest-based activities like portfolio lending, fee-based activities like trust services, mutual fund sales, and cash management require little or no regulatory capital. Thus, fee-based activities likely employ greater financial leverage than lending activities. Using data from U.S. banks during the 1990s, the authors demonstrate that three traditional streams of income from intermediation activities – interest from loans, interest from securities, and service charges from deposits – were all less volatile than income from fee-based activities.

Stiroh (forthcoming a) finds that increased focus on noninterest activities at U.S. commercial banks is associated with declines in risk-adjusted performance. In a second study, Stiroh (forthcoming b) finds potential diversification benefits within broad lines of banking business (e.g., diversifying across different types of loans, or diversifying across different sources of fee-based income), but finds little potential for diversification benefits across broad lines of banking business. Staikouras and Wood (2003) investigate the diversification effects of noninterest income at banks in 15 different European countries. While they also conclude that noninterest income is more volatile than interest income over time, they find negative correlations between these two income streams, which leads them to conclude (in contrast to the U.S. studies) that noninterest income tends to stabilize bank earnings. Structural and regulatory differences may explain why these findings for European banks are different from the findings for U.S. banks. Fee-based services are relatively new to many U.S. banks, and thousands of small community banks lack the size and expertise to engage in many of these activities. In contrast, universal banking has been the historic norm in many European banking systems and small community banks are less prevalent. It is possible that this combination of experience, size, and expertise could allow the average European bank to better exploit the diversification

potential of fee-based activities. Additional studies are necessary before such a conclusion could be drawn with any confidence, however.

All else equal, an efficient bank should generate higher amounts of noninterest income. For example, a well-managed bank will set its fees to fully exploit market demand, and will cross-sell additional fee-based products to a larger percentage of its core customer base. Thus, holding product mix and banking strategy constant, the intensity of noninterest income is likely to be a forward-looking signal of a bank's financial success. Surprisingly, little work has been done on this potential relationship between management quality, bank earnings, and noninterest income. DeYoung (1994) shows that cost-efficient commercial banks generate more noninterest income, but does not explore the causal relationship between these variables. Rogers (1998) finds similar results for profit-efficient commercial banks.

4. Empirical model

The available evidence indicates that noninterest income and financial performance are inter-related. Banks with large amounts of noninterest income have been shown to suffer declines in risk-adjusted performance, *ceteris paribus*, while banks with high-quality management (which is reflected in risk-adjusted performance) should be better at generating noninterest income, *ceteris paribus*. Our econometric model recognizes these inter-relationships. The first equation in our model attempts to identify the bank characteristics, market conditions, and technological developments most closely associated with noninterest income:

$$\begin{aligned} NIIRATIO_{t,i} = a &+ b*RELROE_{t,i} + c*CORERATIO_{t,i} + d*LOANRATIO_{t,i} \\ &+ f*RESHARE_{t,i} + g*C\&ISHARE_{t,i} \\ &+ h*FTERATIO_{t,i} + k*\ln ASSETS_{t,i} + m*MBHC_{t,i} \\ &+ n*GROWTH_{t,i} + p*CCBANK_{t,i} + q*SECTION20BANK_{t,i} \\ &+ r*MKTHERF_{t,i} + s*TECHNOLOGY_{t} \\ &+ t*JOBGROWTH_{i,t} + u*FOREIGN_{t,i} \\ &+ v*TIME + w*STATE + \varepsilon_{t,i} \end{aligned} \quad (1)$$

where the subscripts *i* and *t* index banks and years, respectively. The dependent variable in equation (1) is the ratio of noninterest income-to-assets (NIIRATIO). We construct four different versions of NIIRATIO based on different definitions of noninterest income. NIIRATIO1 = total noninterest income/assets. NIIRATIO2 = (noninterest income generated from service charges on deposit accounts)/assets. NIIRATIO3 = (total noninterest income minus service charges)/assets. NIIRATIO4 = (total noninterest income minus service charges and income from trading activities)/assets.

On the right-hand-side of equation (1) we include each bank's financial performance relative to its peers over the past three years (RELROE) as a proxy for the quality of its management.[5] We represent each bank's lending strategy with ratios of loans-to-assets (LOANRATIO), real estate loans-to-total loans (RESHARE), and commercial and industrial loans-to-total loans (C&ISHARE). Core deposits-to-assets is included as a proxy for traditional relationship banking (CORERATIO), while a dummy variable for credit card banks is included to capture the effects of this very nontraditional business strategy (CCBANK). The ratio of full-time-employees-to-deposits is a proxy for personalized service (FTERATIO), although in some regressions this variable may simply capture inefficient spending on labor. We include the natural log of bank assets to account for bank size (lnASSETS), and a dummy variable to account for large, discontinuous increases in bank size (GROWTH).[6] Organizational form is captured by three dummy variables, one for affiliation with a multibank holding company

[5] RELROE equals bank i's ROE minus the median ROE among the banks in bank i's asset class, calculated each year from t-3 through t-1 and then averaged. We used five asset classes: less than $100 million; $100 million to $500 million; $500 million to $1 billion; $1 billion to $10 billion; and more than $10 billion, all measured in 2001 dollars. We note that RELROE may reflect things other than bank management quality, such as the local competitive, economic, and regulatory conditions faced by the bank during the past three years. However, we expect that the time dummies and state dummies in our regressions should soak up much of this variation.

[6] The dummy variable Large Growth equals one if bank i's asset growth rate was in the top X% of the distribution of asset growth for all banks in year t, where the threshold parameter X% is set equal to the percentage of the bank population that was acquired in year t. Thus, Large Growth is a proxy for growth by acquisition.

(MBHC), one for affiliation with a MBHC that has a Section 20 securities subsidiary (SECTION20BANK), and one for affiliation with a foreign bank holding company (FOREIGN). We include the market-weighted Herfindahl index (MKTHERF) and the annual growth rate in state employment (JOBGROWTH) to capture these two characteristics of bank i's local environment. We include four TECHNOLOGY variables to proxy for the development and application of new technologies in the banking system: the number of automated teller machines per capita (ATMs); the number of cashless transactions per capita (CASHLESS); the dollar amount of mutual fund assets per capita (MUTUALFUNDS); and the dollar amount of mortgage-backed-securities per capita (MORTGAGEBACKED). State dummy variables (STATE) and time dummy variables (TIME) control for unspecified cross-sectional and intertemporal sources of variation in noninterest income.[7] Equation (1) is estimated as a panel using generalized least squares (GLS) estimation techniques with random bank effects.

The second, third, and fourth equations in our model attempt to determine whether and how noninterest income is related to bank financial performance, after controlling for bank characteristics, market conditions, and technological developments:

$$\begin{aligned} ROE(6)_{t,i} = a &+ b*NIIRATIO(6)_{t,i} + c*CORERATIO(6)_{t,i} + d*LOANRATIO(6)_{t,i} \\ &+ f*LOANQUALITY(6)_{t,i} + g*LOANCONC(6)_{t,i} \\ &+ h*FTERATIO(6)_{t,i} + k*\ln ASSETS(6)_{t,i} + m*MBHC(6)_{t,i} \\ &+ n*GROWTH(6)_{t,i} + p*CCBANK(6)_{t,i} + q*SECTION20BANK(6)_{t,i} \\ &+ r*MKTHERF(6)_{t,i} + s*JOBGROWTH(6)_{i,t} + u*FOREIGN(6)_{t,i} \\ &+ v*TIME_t + w*STATE_i + \varepsilon_{t,i} \end{aligned} \quad (2)$$

$$\begin{aligned} SigmaROE(6)_{t,i} = a &+ b*NIIRATIO(6)_{t,i} + c*CORERATIO(6)_{t,i} + d*LOANRATIO(6)_{t,i} \\ &+ f*LOANQUALITY(6)_{t,i} + g*LOANCONC(6)_{t,i} \\ &+ h*FTERATIO(6)_{t,i} + k*\ln ASSETS(6)_{t,i} + m*MBHC(6)_{t,i} \\ &+ n*GROWTH(6)_{t,i} + p*CCBANK(6)_{t,i} + q*SECTION20BANK(6)_{t,i} \end{aligned}$$

[7] Note that we do not directly test for the effects of deregulation on NIIRATIO, but instead we test whether and how bank size, bank growth by merger, bank product mix, local market competition, and other conditions influenced by deregulation affect NIIRATIO. To the extent that our right-hand-side specification does not include all of the important changes in bank behavior and environment due to deregulation, the residual effects of deregulation on the dependent variable will be captured in the state dummy variables and in the time dummy variables.

$$+ r*MKTHERF(6)_{t,i} + s*JOBGROWTH(6)_{i,t} + u*FOREIGN(6)_{t,i} + v*TIME_t + w*STATE_i + \varepsilon_{t,i} \quad (3)$$

$$SHARPE(6)_{t,i} = a + b*NIIRATIO(6)_{t,i} + c*CORERATIO(6)_{t,i} + d*LOANRATIO(6)_{t,i} + f*LOANQUALITY(6)_{t,i} + g*LOANCONC(6)_{t,i} + h*FTERATIO(6)_{t,i} + k*lnASSETS(6)_{t,i} + m*MBHC(6)_{t,i} + n*GROWTH(6)_{t,i} + p*CCBANK(6)_{t,i} + q*SECTION20BANK(6)_{t,i} + r*MKTHERF(6)_{t,i} + s*JOBGROWTH(6)_{i,t} + u*FOREIGN(6)_{t,i} + v*TIME_t + w*STATE_i + \varepsilon_{t,i} \quad (4)$$

where the parenthetical (6) indicates that we measure the regression variables as six-year trailing averages, from year t-5 through year t. This allows us to use multi-year measures of bank financial performance on the left-hand-side of these equations.[8] The dependent variable in equation (2) is ROE(6), the six-year average of return-on-equity. The dependent variable in equation (3) is SigmaROE(6), the standard deviation of ROE over the same six-year period. The dependent variable in equation (4) is SHARPE(6) – a standard measure of risk-adjusted return referred to as the Sharpe Ratio – calculated as the difference between ROE(6) and the six-year trailing average yield of the 1-year constant maturity Treasury Bill, divided by SigmaROE(6).[9]

The right-hand-sides of equations (2), (3), and (4) are similar to equation (1), with a few exceptions. The major difference is the addition of the NIIRATIO(6) on the right-hand-side. Because of potential simultaneity between noninterest income and bank financial performance, we construct an instrument for NIIRATIO(6) as follows: we re-estimate equation (1) using GLS panel techniques for thirteen separate, overlapping, six-year data panels (1984-1989 through 1996-2001); use the estimated parameters from these rolling regressions to calculate thirteen six-year sets of annual fitted values of $NIIRATIO_{it}$; and use the six-year averages of these fitted values as the instruments for NIIRATIO(6). The other changes include removing RESHARE,

[8] We selected a six-year average for these variables because the average post-war business cycle has been 5-and-a-half years, based on data available at the National Bureau of Economic Research website, www.nber.org.

C&ISHARE, and TECHNOLOGY from the right-hand-sides of these equations, and adding LOANQUALITY (loan loss allowance-to-assets) and LOANCONC (a Herfindahl-like measure of the concentration of the loan portfolio). We estimate equations (2), (3), and (4) as separate panels using GLS estimation techniques with random bank effects. Note that equations (1) through (4) constitute a "system" of equations only to the extent that the equation (1) specification is used to estimate instruments for NIIRATIO(6) in equations (2), (3), and (4).[10]

5. Data set

Our data set contains 37,175 year-end observations of 4,712 U.S. commercial banks from 1989 through 2001. To be included in the sample at year *t*, bank *i* had to be located in a Metropolitan Statistical Area (MSA); had to be at least six years old; had to have positive amounts of loans and positive amounts of transactions deposits; and could not have exited the market via failure, liquidation, or regulatory insolvency before the end of year *t+2*. The data panel is unbalanced due to de novo bank entry and bank exit by acquisition or failure over time.

Summary statistics and definitions for the variables used in the regression equations (1) through (4) are displayed in Table 2. These data were drawn primarily from the Reports of Condition and Income (call reports), and were augmented with data from a number of other sources including the Federal Reserve Board FR Y-9C reports, the Federal Reserve Board National Information Center (NIC) structure database, the Federal Deposit Insurance Corporation's Summary of Deposits database, and the Bank for International Settlements Statistics on Payment and Settlement Systems in Selected Countries. All data are expressed in year 2001 dollars. The regression variables have been truncated, or "Windsorized," at the 1st and

[9] We acknowledge that ROE, SigmaROE, and SHARPE are accounting performance measures – not cash flow performance measures, and not market performance measures – and as such they are imperfect proxies for the theoretical objective of bank managers, which is to maximize the value of the bank to the stockholders.

99th percentiles of their sample distributions in order to reduce the influence of outlying observations on the estimated regression parameters.

6. Regression Results

Table 3 displays the regression results for equations (1) through (4) using the primary definition on noninterest income NIIRATIO1. Tables 4, 5, and 6, respectively, display the regression results using the alternative definitions of noninterest income NIIRATIO2, NIIRATIO3, and NIIRATIO4. We discuss the results of the equation (1) regressions first.

6.1. Noninterest income regression

In Table 3, nearly all of the estimated coefficients in equation (1) are statistically different from zero and have economically reasonable signs. Well-managed banks, as measured by RELROE, tend to generate lower amounts of noninterest income per dollar of assets. This negative association contrasts with the results of the bank efficiency studies cited above. This result, however, is consistent with findings in more recent studies that find that the increase in earnings from increases in noninterest income is not large enough to justify its added riskiness. In other words, our result suggests that well-managed banks tend not to expand into activities that have poor risk-return tradeoffs. (This result foreshadows our findings from the bank performance regressions, discussed below.)

Noninterest income is associated with a number of bank characteristics. The positive coefficient on CORERATIO suggests that depositor relationships (a) provide ready customers for selling fee-based services and/or (b) allow banks to exploit inelastic depositor demand by selling these services at higher prices.[11] The positive coefficient on FTERATIO may indicate that customers are willing to pay higher fees for personal service; alternatively, it may simply

[10] We also estimated equations (2), (3), and (4) as separate regressions – i.e., using raw data to calculate NIIRATIO(6) instead of estimating an instrument for it – and the results were little changed.

indicate that the production of most fee-based services requires high levels of labor inputs. The negative coefficient on LOANRATIO indicates that banks with intermediation-based, portfolio lending strategies rely on interest income rather than noninterest income. The negative coefficient on RESHARE is consistent with the automated processes increasingly used to underwrite mortgage loans; this suggests that borrowers shop for mortgages beyond their primary bank, and furthermore do not develop relationships with their mortgage lenders.

The results show a strong, positive link between large banks (lnASSETS, GROWTH) and noninterest income. Moreover, CCBANK, SECTION20BANK, and MBHC – all of which are characteristics of large banking strategies – each carry a positive coefficient as well. These results are consistent with the DeYoung, Hunter, and Udell (2004) framework in which large banks pursue non-traditional, transactions-based strategies that generate large amounts of noninterest income. Affiliates of foreign bank holding companies (FOREIGN) also tend to generate higher levels of noninterest income.

The external environment also affects the amount of noninterest income banks generate. The positive coefficient on JOBGROWTH indicates that banks located in states with strong economies generated higher amounts of noninterest income per dollar of assets. The positive coefficient on MKTHERF suggests that banks with market power may be able to charge higher fees. Technological change embodied in the growth in cashless payments, loan securitization, and mutual funds and are all significantly related to the level of noninterest income at banks. The positive sign on CASHLESS suggests that banks have been able to use (and price) new payments technologies such as credit cards, debit cards, electronic checks, etc., to generate increased fee income. The positive sign on MUTUALFUNDS suggests that sales of these products comprise a nontrivial and nontraditional source of fee income for the average bank.

[11] DeYoung and Hunter (2003) discuss how banks benefit by imposing switching costs on core depositors.

The negative sign on MORTGAGEBACKED suggests that the growth in automated lending processes has reduced the opportunities for the average bank to generate fee income from portfolio lending relationships.

In Table 4, where the alternative definition of the dependent variable NIIRATIO2 includes only service charges on deposit accounts, a large number of the equation (1) coefficients change signs and/or statistical significance. The coefficients on CCBANK and C&ISHARE are both significantly negative (rather than zero and positive, respectively, as in Table 3). These are reasonable results. Credit card banks get substantial funding from the capital markets, and hence hold little if any core deposits. Commercial lending relationships generate relatively low amounts of deposit service charges (captured here in NIIRATIO2), but relatively large amounts of fee income from cash management and other business services (captured in NIIRATIO4, as shown below). The coefficient on JOBGROWTH is not statistically different from zero (rather than positive), indicating that income from service charges is less sensitive to macroeconomic fluctuations than other forms of noninterest income. The coefficients on lnASSETS and GROWTH are no longer positive and significant, which is consistent with the declining importance of core depositor relationships as banks get larger and gain access to other sources of funding. The coefficient on MKTHERF is negative (rather than positive); perhaps banks earning market power rents in other lines of business (e.g., lending, cash management, mutual fund sales, trust services) feel less competitive pressure to aggressively market fee-based services to their depositors. The coefficient on ATMS is negative (rather than zero); perhaps banks willingly accept reduced service charge income from their own depositors to persuade them to use the less costly (relative to human tellers) ATM distribution channel. The coefficient on the MBHC dummy is not statistically different from zero (rather than positive), which indicates that the

above-average levels of noninterest income at MBHC-affiliates tend to come from lending activities and off-balance sheet activities, not from depositors. Finally, the coefficient on FOREIGN is not significant (rather than positive), which is consistent with the mission of these banks, most of which enter the U.S. to service home country clients rather than U.S. households.

In contrast, the equation (1) coefficients in Table 5 (NIIRATIO3) and Table 6 (NIIRATIO4) are relatively robust to the Table 3 results. The most notable exception is in Table 6, where the coefficient on RELROE is positive (rather than negative). Although well-managed banks tend to eschew expansion into noninterest activities in general, this suggests that well-managed banks tend to focus on the narrow set of activities in NIIRATIO4, most of which are unrelated to either traditional core deposit business or trading activities. This includes (among other items) fees from the sale of mutual funds and insurance policies, fees from securitization activities, income from loan servicing, fees from providing trust services, and income from providing cash management services.

6.2. Financial performance regressions

In equations (2), (3), and (4) the primary test is the coefficient on the NIIRATIO variable, which measures the relationship between noninterest income and various measures of bank financial performance. We will not discuss the coefficients on the remaining right-hand-side variables; while these coefficients may be interesting in their own right, they are included here merely as control variables.

The results are reasonably robust across the four alternative definitions of NIIRATIO. A marginal increase in noninterest income is associated with significantly higher ROE in Tables 3, 5, and 6, while in Table 4 (where NIIRATIO includes only services charges on deposit accounts) a marginal increase noninterest income is associated with significantly lower ROE. A marginal

increase in noninterest income is associated with significantly higher variability of ROE (SigmaROE) in all four tables. Finally, a marginal increase in noninterest income is associated with significantly lower risk-adjusted ROE (SHARPE) in all four tables. Hence, noninterest income increases returns to shareholders, but not by enough to offset the additional risk to which this exposes shareholders. These findings are consistent with the recent literature which finds that noninterest income is more volatile than generally thought, and the equation (1) results which suggest that well-managed banks use less noninterest income than poorly-managed banks in their business strategies.[12]

Table 7 illustrates the impact of a one standard deviation increase in NIIRATIO on bank financial performance. For example, a one-standard deviation increase in NIIRATIO1(6) (from 1.07 percent of assets to 2.00 percent of assets) is associated with about an 11% increase in ROE(6) (from .1124 to .1251). But in equation (3), the same one-standard deviation increase in NIIRATIO1(6) is associated with about a 55% increase in SigmaROE(6) (from .0562 to .0872). These results suggest that expanding noninterest income led to a poor risk-return tradeoff; and indeed, the same one-standard deviation increase in NIIRATIO1(6) is associated with a very large percentage reduction in the Sharpe Ratio. We can also make some useful comparisons across the rows of Table 7. As expected, increased income from service charges on deposit accounts (NIIRATIO2) is associated with the smallest (just 12%) increase in earnings variability (SigmaROE). However, this relative stability in earnings comes at a price: increased service charge income is associated with a 2% decline in the level of earnings (ROE).

[12] We considered the possibility that the impact of higher noninterest income on bank earnings (i.e., the coefficients on NIIRATIO in equations (2) and (4)) may be masked or otherwise affected by the variation in interest income over time or across banks. It may be the case that banks migrate to noninterest income sources only because traditional margin income sources are drying up. To test this possibility, we added the six-year trailing average of the net interest margin (interest income minus interest expense, divided by assets) to the right-hand-side of equations (2) and (4). The coefficients on the net interest margin variables were positive and highly significant, but the coefficients on NIIRATIO retained their signs and remained statistically significant.

6.3. Robustness tests

The results of some robustness tests are summarized in Tables 8 and 9. The broadest definition of noninterest income, NIIRATIO1, was used in each of these tests. In Test 1 we re-estimated equations (1) through (4) using fixed effect estimation techniques rather than random effects. Because large and small banks tend to have different business strategies, we re-estimated the equations for a subsample of mostly small banks that were not affiliated with MBHCs (Test 2) and also for a subsample of large banks with assets above $1 billion (Test 3). Because well-run banks may engage in different noninterest activities than poorly-managed banks, we re-estimated the equations for a subsample of banks with RELROE above (Test 4) and below (Test 5) the annual sample medians. To explore whether our results have changed as banks gained experience with fee-based activities and production processes, we re-estimated the equations for a 1989-1994 subsample (Test 6) and for a 1995-2001 subsample (Test 7).

The results were quite robust to these tests, with only a few coefficients with signs and significance different from Table 3. In the fixed effects regression (Test 1) the coefficient on CCBANK changed from positive to negative; we have no economic interpretation for this change, which resulted merely because we changed our assumptions about the structure of the regression error. In the large bank regression (Test 3) the coefficient on FOREIGN changed from positive to negative; these banks no longer appear to be especially fee-intensive when compared to large U.S. banks. In the 1995-2001 regressions (Test 7) the coefficients on CASHLESS and MORTGAGEBACKED flipped signs with each other; this is not especially surprising, given the likelihood of colinearity between two variables that both chart the increasing application of banking technologies over time. For non-MBHC banks (Test 2) noninterest income was associated with reductions in ROE; this is consistent with the argument

made by Stiroh (forthcoming b) that small banks often engage in noninterest lines of business for which they have little experience or no expertise. In the 1989-1994 regressions (Test 6) noninterest income was associated with an improved risk-return tradeoff; this implies that moderate expansion into noninterest income at first improved bank performance, but as time passed the typical bank may have moved too far in this direction. This interpretation is consistent with the 1989-1994 regressions (Test 7) where noninterest income is associated with reductions in both ROE and the Sharpe Ratio.

7. Conclusions

Most banking theories characterize banks as intermediaries between small, information-poor agents with excess liquidity and larger, informationally opaque agents with liquidity needs. According to these theories, banks earn profits by purchasing transactions deposits from the former set of agents at a low interest rate, then reselling those funds to the latter set of agents at a higher interest rate that the bank sets based on its comparative advantage at gathering information and underwriting risk. Until recently, the typical commercial bank closely resembled the banks in these theoretical models. But over the past two decades U.S. commercial banks have come to rely to an increasing extent on noninterest income, much of which is unrelated to either deposit-taking or loan-making.

It is tempting to conclude that interest-based, intermediation activities have become less central to the financial health and business strategy of the typical commercial bank, and that fee-based, non-intermediation financial services have become more important. This article explores the possibility. We estimate an econometric model for urban U.S. commercial banks between 1989 and 2001. The model analyzes (a) which bank characteristics, market conditions, and technological developments have been most closely associated with the increases in various

types of noninterest income at U.S. commercial banks over the past two decades, and (b) whether increases in various types of noninterest income have been associated with improved or worsened bank financial performance. With regard to the former, our results suggest that large banks generate relatively more noninterest income; that well-managed banks rely less heavily on noninterest income; that relationship banking tends to generate noninterest income; and that some technological advances (e.g., cashless transactions, mutual funds) are associated with increased noninterest income while other technological advances (e.g., loan securitization) are associated with reduced noninterest income at banks. With regard to the latter, our results suggest that marginal increases in noninterest income have been associated with higher profits, more variable profits, and on net, a worsening of the risk-return tradeoff for the average commercial bank during our sample period. Our results are consistent with the small extant literature on noninterest income at commercial banks, and are quite robust to changes in estimation technique and for most subsamples of the data.

We also find a number of interesting results that extend the extant literature. For instance, our results suggest that the expansion into noninterest income improved the risk-return tradeoff at the average bank during the first part of our sample period, but worsened the risk-return tradeoff during more recent years. These findings speak to the main question of our investigation: they suggest that the long-run secular expansion into noninterest activities may have peaked, and that intermediation-based products and services are likely to remain the central business activities at the average U.S. commercial bank.

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Figure 1

Average annual cross-sectional correlations between commercial bank return-on-equity and commercial bank net interest margin. OLS trend lines are superimposed over each series of correlations.

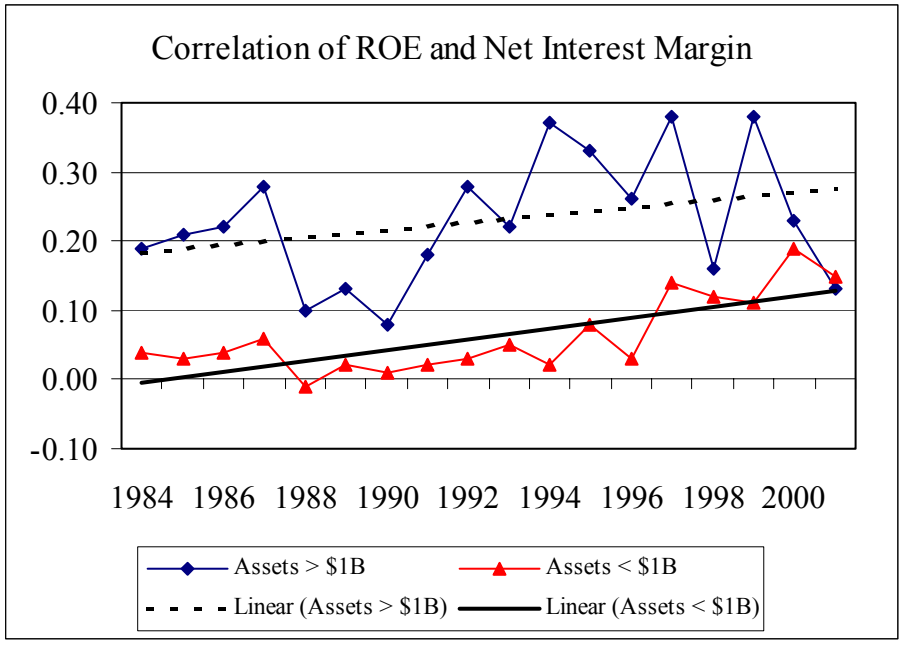

Table 1

Average incidence and composition of noninterest income at U.S. commercial banks, 1984-2001.

	Industry Aggregates		**Averages for Larger Banks (Assets > $1 billion in 2001 dollars)**					**Averages for Smaller Banks (Assets < $1 billion in 2001 dollars)**				
	Noninterest Income		Noninterest Income		Composition of Noninterest Income			Noninterest Income		Composition of Noninterest Income		
	as % of assets	as % of operating income	as % of assets	as % of operating income	Service charges	Fiduciary Income	Other	as % of assets	as % of operating income	Service charges	Fiduciary Income	Other
2001	2.39%	42.20%	2.15 %	29.89 %	.3189	.1146	.5666	0.91 %	16.38 %	.5921	.0297	.3782
2000	2.46%	42.93%	1.97 %	28.09 %	.3251	.1269	.5479	0.90 %	15.36 %	.5959	.0254	.3787
1999	2.52%	42.92%	2.05 %	29.86 %	.3095	.1367	.5538	0.91 %	15.47 %	.5851	.0255	.3894
1998	2.27%	40.36%	2.19 %	29.82 %	.3037	.1520	.5443	0.91 %	15.39 %	.5846	.0248	.3906
1997	2.08%	37.45%	1.83 %	27.49 %	.3207	.1577	.5216	0.96 %	15.11 %	.5995	.0250	.3755
1996	2.04%	36.50%	1.84 %	27.87 %	.3254	.1651	.5096	0.94 %	15.36 %	.5999	.0247	.3754
1995	1.91%	34.83%	1.76 %	27.95 %	.3211	.1631	.5159	0.91 %	15.10 %	.6086	.0255	.3661
1994	1.90%	34.23%	1.81 %	28.08 %	.3577	.1722	.4701	0.94 %	15.30 %	.6075	.0250	.3674
1993	2.02%	34.98%	1.87 %	28.97 %	.3246	.1681	.5073	0.96 %	15.87 %	.5999	.0248	.3754
1992	1.87%	32.98%	1.85 %	28.76 %	.3258	.1696	.5042	0.89 %	15.51 %	.6007	.0251	.3742
1991	1.74%	32.89%	1.72 %	28.85 %	.3125	.1749	.5121	0.86 %	15.89 %	.6101	.0252	.3647
1990	1.62%	32.21%	1.55 %	27.64 %	.3082	.2186	.4731	0.81 %	15.39 %	.6063	.0262	.3675
1989	1.54%	31.21%	1.41 %	26.80 %	.3093	.1932	.4975	0.81 %	15.11 %	.5918	.0261	.3821
1988	1.44%	29.54%	1.37 %	25.86 %	.3080	.1914	.5006	0.77 %	14.85 %	.5900	.0256	.3844
1987	1.38%	29.34%	1.31 %	25.71 %	.2992	.2041	.4967	0.75 %	14.72 %	.5601	.0242	.4157
1986	1.22%	27.43%	1.24 %	26.21 %	.2925	.2093	.4982	0.72 %	14.56 %	.5803	.0228	.3970
1985	1.14%	25.46%	1.21 %	25.36 %	.3003	.2134	.4863	0.73 %	13.94 %	.5830	.0219	.3951
1984	1.06%	24.60%	1.20 %	25.47 %	.2866	.2211	.4922	0.72 %	14.07 %	.5765	.0203	.4031

Note: Operating Income = Interest Income + Noninterest Income – Interest Expense.

Table 2

Summary Statistics and Definitions of Variables. All dollar-value variables are expressed in 2001 dollars.

	Definition	Mean	Standard Deviation
ATMS	Number of automated teller machines per capita in the U.S. in year *t*.	2.0309	0.9100
C&ISHARE	Commercial and industrial loans divided by total loans.	0.0976	0.1329
CASHLESS	Number of cashless transactions (debit and credit cards, electronic debits and credits) per capita in the U.S. in year *t*.	303.4877	30.1909
CCBANK	Dummy = 1 if more than 25% of bank assets are held in the form of credit card loans.	0.0092	0.0956
CORERATIO	Core deposits (transactions deposits plus time deposits less than $100,000) divided by assets.	0.5339	0.1214
CORERATIO(6)	Mean of CORERATIO, *t-5* through *t.*	0.5426	0.1054
FOREIGN	Dummy = 1 if bank is an affiliate of a bank holding company headquartered in a foreign country.	0.0239	0.1529
FTERATIO	Number of full-time bank employees divided by transactions deposits.	0.0010	0.0005
FTERATIO(6)	Mean of FTERATIO, *t*-5 through *t*.	0.0009	0.0004
GROWTH	Dummy = 1 if bank experienced "excessive" asset growth in year *t.* (Proxy for growth by large acquisition.)	0.0555	0.2289
JOBGROWTH	State job growth in nonfarm employment.	0.0165	0.0169
JOBGROWTH(6)	Mean of JOBGROWTH, *t-5* through *t.*	0.0196	0.0096
lnASSETS	Natural log of bank assets.	11.9330	1.4509
lnASSETS(6)	Mean of lnASSETS, *t-5* through *t.*	11.7859	1.4061
LOANCONC	A Herfindahl index based on loan portfolio shares of real estate, C&I, consumer, agricultural, and "other" loans.	0.5716	0.1652
LOANCONC(6)	Mean of LOANCONC, *t-5* through *t.*	0.5529	0.1489
LOANRATIO	Loans divided by assets.	0.5763	0.1429
LOANRATIO(6)	Mean of LOANRATIO, *t-5* through *t*.	0.5636	0.1291
LOANQUALITY	Allowance for loan and lease losses divided by total assets.	0.0091	0.0049
LOANQUALITY(6)	Mean LOANQUALITY, *t-5* through *t.*	0.0087	0.0042
MBHC	Dummy = 1 if bank is an affiliate in a multibank holding company.	0.4122	0.4922
MKTHERF	Market-share weighted average of the deposit-based Herfindahl indices faced by bank *i* in each of its MSAs.	0.1548	0.0844
MKTHERF(6)	Mean of MKTHERF, *t-5* through *t.*	0.1611	0.0839
MORTGAGEBACKED	Aggregate value of mortgage-backed securities per capita in the U.S. in year *t*.	2.1884	1.1087
MUTUALFUNDS	Aggregate value of mutual funds per capita in the U.S. in year *t*.	11.6518	7.6791

Table 2 – continued

	Definition	Mean	Standard Deviation
NIIRATIO1	Total noninterest income divided by average assets.	0.0112	0.0114
NIIRATIO1(6)	Mean of NIIRATIO1, *t-5* through *t*.	0.0108	0.0052
NIIRATIO2	Service charges on deposit accounts divided by average assets.	0.0060	0.0104
NIIRATIO2(6)	Mean of NIIRATIO2, *t-5* through *t*.	0.0550	0.0206
NIIRATIO3	(Noninterest income - Service charges on deposit accounts) divided by average assets.	0.0561	0.0352
NIIRATIO3(6)	Mean of NIIRATIO3, *t-5* through *t*.	0.0056	0.0046
NIIRATIO4	(Noninterest income - Service charges on deposit accounts - Trading Revenue) divided by average assets.	0.0039	0.0085
NIIRATIO4(6)	Mean of NIIRATIO4, *t-5* through *t*.	0.0032	0.0046
RELROE	ROE of bank *i* minus the ROE of the median bank in bank *i*'s asset class, averaged across year *t-3* through year *t-1*.	-0.0100	0.0887
RESHARE	Real estate loans divided by total loans.	0.5786	0.1875
ROE(6)	Mean of annual return-on-equity, *t-5* through *t.*	0.1124	0.0794
SECTION20BANK	Dummy = 1 for banks in MBHCs with Section 20 securities affiliates.	0.0149	0.1215
SHARPE(6)	Mean of (ROE(6) – 6-year average yield on 1-year constant maturity T-Bills) divided by SigmaROE(6), *t-5* through *t*.	3.6688	13.9868
SigmaROE(6)	Standard deviation of ROE, *t-5* through *t.*	0.0562	0.0746

Table 3

Regression results for an unbalanced panel (N=37,315) of 4,712 U.S. commercial banks in urban markets, 1989-2001. **NIIRATIO1** = noninterest income/assets. In EQ(1), all variables are based on annual observations from year t. In EQ(2), EQ(3) and EQ(4), all variables are based on 6-year averages using data from year t-5 through year t, and the right-hand-side variable NIIRATIO1 is a 6-year average of fitted values from 6-year trailing regressions (not shown) specified similar to EQ(1). All equations are estimated using generalized least squares (GLS) techniques with random bank effects, and include state dummies and time dummies (coefficients not shown). Robust standard errors appear in parentheses below the estimated coefficients. The superscripts *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent Variable:	EQ (1) NII RATIO1	EQ (2) ROE	EQ (3) SigmaROE	EQ (4) SHARPE
NII RATIO1 (instrumented)		1.3655*** (0.1607)	3.3383*** (0.1333)	-466.5617*** (45.6152)
RELROE	-0.0026*** (0.0004)			
CORERATIO	0.0173*** (0.0005)	-0.0745*** (0.0068)	0.0596*** (0.0057)	9.5873*** (1.6185)
LOANRATIO	-0.0017*** (0.0004)	0.1015*** (0.0043)	-0.0494*** (0.0036)	-0.2126 (0.9932)
RESHARE	-0.0030*** (0.0003)			
C&ISHARE	-0.0006 (0.0004)			
CCBANK	0.0015*** (0.0005)	0.0190*** (0.0044)	-0.0138*** (0.0037)	2.1295* (1.1280)
SECTION20BANK	0.0028*** (0.0003)	0.0109*** (0.0026)	0.0075*** (0.0022)	-0.9613 (0.7481)
lnASSETS	0.0011*** (<0.0001)	0.0171*** (0.0007)	-0.0013** (0.0006)	1.0270*** (0.1459)
LOANQUALITY		-10.2278*** (0.1104)	6.7029*** (0.0922)	-222.6129*** (27.6535)
FTERATIO	9.4363*** (0.1215)	-50.4329*** (1.9708)	-18.2643*** (1.6449)	4066.368*** (522.5229)
LOANCONC		0.0700*** (0.0039)	0.0082** (0.0033)	-2.1929*** (0.8853)
GROWTH	0.0001*** (0.0001)	-0.0011 (0.0011)	0.0042*** (0.0009)	-0.0318 (0.3296)
JOBGROWTH	0.0064** (0.0031)	1.5057*** (0.0413)	0.0160 (0.0341)	192.5314*** (12.1208)
MKTHERF	0.0018*** (0.0005)	0.0019 (0.0054)	-0.0276*** (0.0045)	0.8964 (1.3572)
ATMS	<-0.0001 (0.0005)			
CASHLESS	<0.0001*** (<0.0001)			
MORTGAGEBACKED	-0.0043 *** (0.0006)			
MUTUALFUNDS	0.0007 *** (0.0001)			
MBHC	0.0013 *** (0.0002)	0.0001 (0.0014)	-0.0069*** (0.0012)	1.4354*** (0.2663)
FOREIGN	0.0009** (0.0004)	-0.0266*** (0.0034)	0.0132*** (0.0028)	-2.2403*** (0.7553)
R-Squared	0.4105	0.3046	0.3135	0.0610

Table 4

Regression results for an unbalanced panel (N=37,315) of 4,712 U.S. commercial banks in urban markets, 1989-2001. **NIIRATIO2** = service charges on deposit accounts/assets. In EQ(1), all variables are based on annual observations from year t. In EQ(2), EQ(3) and EQ(4), all variables are based on 6-year averages using data from year t-5 through year t, and the right-hand-side variable NIIRATIO2 is a 6-year average of fitted values from 6-year trailing regressions (not shown) specified similar to EQ(1). All equations are estimated using generalized least squares (GLS) techniques with random bank effects, and include state dummies and time dummies (coefficients not shown). Robust standard errors appear in parentheses below the estimated coefficients. The superscripts *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent Variable:	**EQ(1)** **NII RATIO2**	**EQ(2)** **ROE**	**EQ(3)** **SigmaROE**	**EQ(4)** **SHARPE**
NII RATIO2 (instrumented)		-0.2885***	0.8241***	-235.7731***
		(0.0558)	(0.0463)	(16.2493)
RELROE	-0.0148***			
	(0.0011)			
CORERATIO	0.0264***	-0.0518***	0.0760***	10.7356***
	(0.0014)	(0.0067)	(0.0057)	(1.5854)
LOANRATIO	-0.0126***	0.0961***	-0.0524***	-0.7306
	(0.0010)	(0.0043)	(0.0036)	(0.9918)
RESHARE	-0.0048***			
	(0.0009)			
C&ISHARE	-0.0044***			
	(0.0012)			
CCBANK	-0.0051***	0.0223***	-0.0068*	-0.0495
	(0.0014)	(0.0044)	(0.0037)	(1.1104)
SECTION20BANK	0.0081***	0.0154***	0.0142***	-1.7526**
	(0.0008)	(0.0026)	(0.0022)	(0.7358)
lnASSETS	-0.0042***	0.0184***	0.0076***	-0.6493***
	(0.0002)	(0.0007)	(0.0006)	(0.1443)
LOANQUALITY		-10.0829***	6.8791***	-240.5526***
		(0.1099)	(0.0921)	(27.4586)
FTERATIO	7.7479***	-38.4169***	2.6949**	1702.075***
	(0.3273)	(1.5751)	(1.3338)	(366.9831)
LOANCONC		0.0740***	0.0103***	-2.2213**
		(0.0039)	(0.0033)	(0.8831)
GROWTH	-0.0005	-0.0007	0.0054***	-0.5554*
	(0.0003)	(0.0011)	(0.0009)	(0.3285)
JOBGROWTH	-0.0011	1.5125***	-0.1063***	220.2143***
	(0.0081)	(0.0416)	(0.0345)	(12.1128)
MKTHERF	-0.0027*	-0.0073	-0.0109**	-3.4383**
	(0.0014)	(0.0055)	(0.0046)	(1.3928)
ATMS	-0.0032**			
	(0.0013)			
CASHLESS	0.0002***			
	(<0.0001)			
MORTGAGEBACKED	-0.0263***			
	(0.0016)			
MUTUALFUNDS	0.0044***			
	(0.0004)			
MBHC	-0.0002	<0.0001	-0.0057***	1.0894***
	(0.0005)	(0.0014)	(0.0012)	(0.2654)
FOREIGN	-0.0007	-0.0263***	0.0125***	-2.0669***
	(0.0011)	(0.0034)	(0.0028)	(0.7542)
R-Squared	0.3286	0.3058	0.3103	0.0647

Table 5

Regression results for an unbalanced panel (N=37,315) of 4,712 U.S. commercial banks in urban markets, 1989-2001. **NIIRATIO3** = (noninterest income minus service charges on deposit accounts)/assets. In EQ(1), all variables are based on annual observations from year t. In EQ(2), EQ(3) and EQ(4), all variables are based on 6-year averages using data from year t-5 through year t, and the right-hand-side variable NIIRATIO3 is a 6-year average of fitted values from six-year trailing regressions (not shown) specified similar to EQ(1). All equations are estimated using generalized least squares (GLS) techniques with random bank effects, and include state dummies and time dummies (coefficients not shown). Robust standard errors appear in parentheses below the estimated coefficients. The superscripts *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent Variable:	**EQ (1)** **NII RATIO3**	**EQ (2)** **ROE**	**EQ (3)** **SigmaROE**	**EQ (4)** **SHARPE**
NII RATIO3 (instrumented)		2.3441*** (0.1776)	3.4292*** (0.1477)	-397.6107*** (50.3966)
RELROE	-0.0015*** (0.0004)			
CORERATIO	0.0115*** (0.0005)	-0.0735*** (0.0067)	0.0757*** (0.0056)	6.4704*** (1.5529)
LOANRATIO	-0.0014*** (0.0003)	0.1043*** (0.0043)	-0.0490*** (0.0036)	-0.1156 (0.9961)
RESHARE	-0.0024*** (0.0003)			
C&ISHARE	<0.0001 (0.0004)			
CCBANK	0.0021*** (0.0005)	0.0168*** (0.0044)	-0.0141*** (0.0037)	1.8471 (1.1320)
SECTION20BANK	0.0020*** (0.0003)	0.0094*** (0.0026)	0.0088*** (0.0022)	-1.3472* (0.7469)
lnASSETS	0.0013*** (<0.0001)	0.0149*** (0.0008)	-0.0021*** (0.0007)	1.0117*** (0.1557)
LOANQUALITY		-10.2736*** (0.1102)	6.7383*** (0.0922)	-230.7765*** (27.6472)
FTERATIO	7.2297*** (0.1120)	-53.2993*** (1.8448)	-12.3656*** (1.5464)	2651.446*** (476.7975)
LOANCONC		0.0684*** (0.0039)	0.0086*** (0.0033)	-2.2539** (0.8858)
GROWTH	0.0007*** (0.0001)	-0.0013 (0.0011)	0.0044*** (0.0009)	-0.4441 (0.3296)
JOBGROWTH	0.0054* (0.0028)	1.5377*** (0.0413)	0.0435 (0.0343)	191.682*** (12.1714)
MKTHERF	0.0021*** (0.0005)	-0.0012 (0.0053)	-0.0341*** (0.0045)	1.5849 (1.3578)
ATMS	<-0.0001 (0.0005)			
CASHLESS	<0.0001*** (<0.0001)			
MORTGAGEBACKED	-0.0025*** (0.0005)			
MUTUALFUNDS	0.0004*** (0.0001)			
MBHC	0.0011*** (0.0002)	<0.0001 (0.0014)	-0.0069*** (0.0012)	1.3759*** (0.2661)
FOREIGN	0.0010*** (0.0004)	-0.0265*** (0.0034)	0.0135*** (0.0028)	-2.2475*** (0.7554)
R-Squared	0.3720	0.3060	0.3114	0.0597

Table 6

Regression results for an unbalanced panel (N=37,315) of 4,712 U.S. commercial banks in urban markets, 1989-2001. **NIIRATIO4** = (noninterest income minus service charges on deposit accounts and income from trading activities)/assets. In EQ(1), all variables are based on annual observations from year t. In EQ(2), EQ(3) and EQ(4), all variables are based on 6-year averages using data from year t-5 through year t, and the right-hand-side variable NIIRATIO4 is a 6-year average of fitted values from six-year trailing regressions (not shown) specified similar to EQ(1). All equations are estimated using generalized least squares (GLS) techniques with random bank effects, and include state dummies and time dummies (coefficients not shown). Robust standard errors appear in parentheses below the estimated coefficients. The superscripts *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent Variable:	**EQ (1)** **NII RATIO4**	**EQ (2)** **ROE**	**EQ (3)** **SigmaROE**	**EQ (4)** **SHARPE**
NII RATIO4 (instrumented)		3.1547*** (0.1868)	2.5041*** (0.1563)	-471.2571*** (52.4233)
RELROE	0.0008** (0.0003)			
CORERATIO	0.0097*** (0.0004)	-0.0724*** (0.0066)	0.0855*** (0.0056)	5.5706*** (1.5259)
LOANRATIO	-0.0014*** (0.0003)	0.1031*** (0.0043)	-0.0542*** (0.0036)	0.3519 (0.9890)
RESHARE	0.0001 (0.0003)			
C&ISHARE	0.0106*** (0.0004)			
CCBANK	0.0041*** (0.0004)	0.0182*** (0.0044)	-0.0100*** (0.0037)	1.5113 (1.1218)
SECTION20BANK	0.0020*** (0.0002)	0.0057** (0.0026)	0.0094*** (0.0022)	-0.9760 (0.7515)
lnASSETS	0.0018*** (<0.0001)	0.0106*** (0.0009)	-0.0024*** (0.0007)	1.5009*** (0.1840)
LOANQUALITY		-10.2579*** (0.1097)	6.8509*** (0.0924)	-236.1117*** (27.5602)
FTERATIO	5.7689*** (0.0982)	-52.2672*** (1.7086)	-2.9205** (1.4461)	2009.638*** (409.7989)
LOANCONC		0.0751*** (0.0039)	0.0169*** (0.0033)	-3.1120*** (0.8852)
GROWTH	0.0004*** (0.0001)	-0.0011 (0.0011)	0.0050*** (0.0009)	-0.5000 (0.3292)
JOBGROWTH	0.0046* (0.0026)	1.5536*** (0.0413)	0.0224 (0.0344)	191.7065*** (12.1475)
MKTHERF	0.0018*** (0.0004)	-0.0006 (0.0053)	-0.0329*** (0.0045)	1.3555 (1.3570)
ATMS	0.0020*** (0.0004)			
CASHLESS	<0.0001*** (<0.0001)			
MORTGAGEBACKED	-0.0025*** (0.0005)			
MUTUALFUNDS	0.0002** (0.0001)			
MBHC	0.0007*** (0.0001)	0.0011 (0.0014)	-0.0059*** (0.0012)	1.2418*** (0.2656)
FOREIGN	0.0008** (0.0003)	-0.0266*** (0.0033)	0.0134*** (0.0028)	-2.2929*** (0.7554)
R-Squared	0.4387	0.3082	0.3075	0.0584

Table 7

Effect of a One-Standard Deviation Increase in NIIRATIO on Bank Financial Performance. Calculations are based on the estimated coefficients from Tables 3, 4, 5, and 6 above; the standard deviations of the NIIRATIO(6) variables from Table 2 above; and the means of ROE(6), SigmaROE(6), and SHARPE(6) from Table 2.

		Equation and Dependent Variable		
Table	**Independent Variable**	**EQ (2) ROE(6)**	**EQ (3) SigmaROE(6)**	**EQ (4) SHARPE(6)**
Table 3	NIIRATIO1(6)	11.30%	55.24%	-118.27%
Table 4	NIIRATIO2(6)	-2.05%	11.88%	-52.05%
Table 5	NIIRATIO3(6)	7.12%	20.75%	-36.79%
Table 6	NIIRATIO4(6)	1.86%	29.41%	-84.73%

Table 8

Robustness tests for equation (1). Estimated coefficient signs and significance levels from alternative regressions of equation (1), all of which define the dependent variable as NIIRATIO1. A "+" indicates a statistically positive coefficient at the 10% level or better. A "-" indicates a statistically negative coefficient at the 10% level or better. An * indicates a statistically significant coefficient with a different sign than in Table 3. "NA" indicates that the variable in question did not appear in the regression.

Independent Variables	**Test 1 Fixed Effects**	**Test 2 Non-MBHC Banks**	**Test 3 Large Banks**	**Test 4 High Profit Banks**	**Test 5 Low Profit Banks**	**Test 6 1989 through 1994**	**Test 7 1995 through 2001**
RELROE	-	-		-	-	-	-
CORERATIO	+	+	+	+	+	+	+
LOANRATIO	-		-	-			-
RESHARE	-	-	-	-	-	-	-
C&ISHARE					-	-	
CCBANK	- *	+	+	+	+	+	+
SECTION20BANK	+	+	+	+			+
lnASSETS		+		+	+	+	+
FTERATIO	+	+	+	+	+	+	+
GROWTH	+	+	+	+	+	+	+
JOBGROWTH	+						
MKTHERF	+	+			+		
ATMS						NA	-
CASHLESS	+	+		+	+		- *
MORTGAGEBACKED	-	-		-	-		+ *
MUTUALFUNDS	+	+		+	+	+	+
MBHC		NA	+	+	+	+	+
FOREIGN		+	- *		+		+

Table 9

Robustness tests for equations (2), (3), and (4). Estimated signs and significance levels for the coefficient on the independent variable NIIRATIO(6) in alternative regression estimations of equations (2), (3), and (4). A "+" indicates a statistically positive coefficient at the 10% level or better. A "-" indicates a statistically negative coefficient at the 10% level or better. A "*" indicates a statistically significant coefficient with a different sign than in Table 3. "NA" indicates that the variable in question did not appear in the regression.

Dependent Variables	**Test 1 Fixed Effects**	**Test 2 Non-MBHC Banks**	**Test 3 Large Banks**	**Test 4 High Profit Banks**	**Test 5 Low Profit Banks**	**Test 6 1989 through 1994**	**Test 7 1995 through 2001**
ROE(6)	+		+	+	+	+	- *
SigmaROE(6)	+	+	+	+	+	+	+
SHARPE(6)	-	-	-	-	-	+ *	-

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