Banking in the United States

Robert DeYoung
University of Kansas

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Abstract: The U.S. banking industry has been transformed utterly over the past 25 years. Mergers and acquisitions have halved the population of commercial banks, the largest banks have increased in size ten-fold, and banks' exposure to market risk has increased. The regulatory framework set into place during the Great Depression has been largely dismantled, new technologies have revolutionized how banks produce and distribute financial services, and dramatic increases in competition have pressured banks to operate more efficiently. Banks of all sizes now compete head-to-head for retail customers using very different business strategies; small banks provide person-to-person retail services and often specialize in lending to local businesses, while large banks provide high-volume retail services and compete in commercial lending, investment banking, and insurance markets around the world. These changes have brought great efficiencies to the banking industry and its customers, but they have also introduced new instabilities to the system. During the past decade, U.S. banks have experienced sustained periods of historically high profits and also suffered episodes of shockingly large investment losses. Balancing market efficiencies with financial stability is the challenge facing regulatory authorities and policymakers as this dynamic industry moves into the 21st Century.

Key words: Banking strategies, Commercial banks, Deregulation, Industry consolidation, Non-interest income, United States banks.

Biographic information: Robert DeYoung is Capitol Federal Professor in Financial Institutions and Markets at the University of Kansas. He is also an editor of the Journal of Financial Services Research; a research program coordinator at the Federal Deposit Insurance Corporation; and a Visiting Scholar at the Federal Reserve Bank of Kansas City.

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1. Introduction

In the United States, the concept of "banking" has meant different things at different times. For most of the 20th century, "banking" services were produced and delivered by a potpourri of financial institutions in separate industry segments—e.g., commercial banks, investment banks, thrift institutions, insurance companies, finance companies—which, due to relatively rigid financial regulations, offered largely separate lines of business and did not compete with each other. Among these institutions, commercial banks and other depository institutions were traditionally the largest and offered the greatest number of financial services. For example, as shown in Table 1, depositories in the U.S. (commercial banks, thrift institutions, and credit unions) held over half of all U.S. financial assets in 1970, compared with just 17 percent for insurance companies, the next largest category of financial institution. Although their role in financial markets has changed somewhat over time, commercial banks and other depository institutions continue to be important if not dominant providers of financial services for many U.S. businesses and households today. This article will focus primarily on commercial banking, and will view other U.S. banking sectors and institutions through the prism of commercial banking.

Over the past quarter century, change has been the most salient characteristic of U.S. banking markets. Commercial banks, thrifts, and life insurers have lost market share, due to the combined impacts of new information technologies, new financial instruments and markets, financial deregulation, and substantial increases in competition within and across industry

segments. By 2007, the share of industry assets held by depository institutions had fallen by more than half to around 23 percent. Where are the majority of U.S. financial assets held today? Mutual funds (stock, bond, and money market funds) increased their share of U.S. financial assets from less than 4 percent in 1970 to more than 18 percent in 2007; mortgage finance companies (including off-balance sheet mortgage investment pools financed by asset-backed securities) increased their holdings from just 4 percent to 20 percent; and securities firms (brokers, dealers, and funding corporations) increased their holdings from just 1 percent to nearly 8 percent. In addition, banks' financial fortunes have become suddenly more volatile than in the recent past, with wide swings in profits and losses making the U.S. banking industry a far different place than the stable and strictly regulated industry of just a generation ago. To understand the U.S. banking industry today, one must first understand how and why this evolution occurred.

2. The Evolution of the U.S. Banking Industry

In the U.S., a commercial bank can operate under either a national bank charter or a state bank charter. Federal law gives the Office of the Comptroller of the Currency (OCC), a bureau of the U.S. Treasury Department, the authority to grant national bank charters and serve as the primary regulator and supervisor of national banks. State laws give each of the 50 state governments in the U.S. the authority to grant state banking charters, and the banking commissions in each state share supervisory and regulatory authority over these banks with the Federal Deposit Insurance Corporation (FDIC) and the Federal Reserve (the Fed). These two federal agencies have other bank regulatory duties as well; the FDIC insures the deposits of both national banks and state banks (and recently increased its coverage from $100,000 to $250,000

per deposit account) while the Fed has additional regulatory and supervisory authority for banking firms organized as bank holding companies (BHCs) or financial holding companies (FHCs).

This web of separate chartering, regulatory, supervisory, and deposit insurance institutions reflect both the federal structure of U.S. government in which power is shared by the various states and the national government, and the pragmatic introduction of banking regulations to solve macro-economic challenges as they occurred over time. The OCC was founded in 1863 to administer a new network of nationally chartered banks that issued a single, unified national currency backed by U.S. Treasury securities, thus providing the federal government with funds necessary to fight the Civil War. The Fed was founded in 1913 to stabilize the economy during economic panics by providing a source of liquidity for commercial banks. The FDIC was established in 1933 to prevent bank runs by insuring the deposits of households and small businesses. These three federal institutions still exist and they continue to play their original bank regulatory and supervisory roles today. Apart from these basic fundamentals, however, virtually all other banking laws and bank regulations in the U.S. have changed since the 1970s.

Restrictive government regulations. During the 1970s, and indeed during the entire post-war period leading up to the 1970s, U.S. commercial banking was a protected industry. Government regulations shielded banks from geographic competition, from product competition, and to a great extent from price competition. The McFadden Act of 1927 protected banks from competitors outside their home states by prohibiting interstate branch banking. Although the Act did permit banks to enter other states by organizing multi-bank holding companies, these organizational structures required state approval which the states typically did not grant. In

addition to these interstate restrictions, most states imposed partial or blanket restrictions on intrastate branching.

Product and pricing competition were also restricted by regulation. The Glass-Steagall Act of 1933 effectively isolated commercial banking as a separate and highly regulated financial sector and thus insulated commercial banks from competition with investment banks, insurance companies, and brokerage firms. Moreover, depository institutions such as savings and loans and credit unions were not permitted to compete with banks by making commercial loans. And Federal Reserve Regulation Q imposed interest rate ceilings on most deposit accounts, effectively prohibiting price competition between banks for deposit accounts.

In this highly protected environment, the number of commercial banks in the U.S. remained relatively unchanged throughout the 1960s, 1970s, and early-1980s, at about 14 thousand federally or state chartered commercial banks (see Figure 1). Over 95 percent of these commercial banks were so-called "community banks" that held less than $1 billion of assets (2006 dollars); collectively, these small banks accounted for about one-third of the industry's total assets. The regulatory limitations on interstate banking and intrastate branching insulated community banks from large bank competition, and gave them a competitive advantage in lending and deposit-taking at the local level. These advantages also extended to the payments system, which in the U.S. at that time was based largely on paper checks. A paper-based payments system requires not just that payors and payees have deposit accounts upon which to write checks and deposit checks, but also that depository institutions have safe and convenient physical locations for processing those checks. In a world before electronic payments infrastructure (e.g., automated teller machine, credit card networks, Internet banking), the

physical brick-and-mortar infrastructures of community banks was fundamental in explaining their disproportionate presence in the industry.

Because mutual funds were not yet well-established in the 1970s, banks were a leading investment vehicle for consumers, many of whom held their investments in savings accounts and time deposit accounts. Similarly, because the information technology necessary for modern mortgage banking had not yet emerged, banks combined with thrift institutions to dominate residential mortgage markets. In 1983 (the first year these data were available from the Federal Reserve's Survey of Consumer Finance), U.S. households allocated approximately 23 percent of their assets to depository institutions, and obtained approximately 60 percent of their mortgage and consumer debt from depository institutions.

As the name implies, commercial banks were also the main supplier of loans to U.S. businesses during the 1970s. Large commercial banks made loans to business firms of all sizes: they were the major source of both long-term and short-term financing to large businesses, and they made long-term loans to small businesses for purchasing fixed assets such as equipment and real estate (Carey et al. 1993). Smaller community banks were a primary source of credit for small business enterprises, allocating between 20 and 30 percent of their loan portfolios to commercial lending during the 1970s (DeYoung, Hunter, and Udell 2004).

Of the five basic financial needs of a typical household—credit, investments, transactions, safekeeping, and insurance—commercial banks were the dominant providers during the 1970s of all but insurance products (which they were prohibited from underwriting and severely limited in their abilities to market). Moreover, the prevailing technological and regulatory conditions allowed small banks to compete on equal footing with large banks in providing most of these services, especially in small and mid-sized cities and towns.

Innovation and technological change. A parade of financial and technological innovations during the 1970s and 1980s eroded the deposit-based funding advantages of U.S. commercial banks, transformed their brick-and-mortar distribution networks, and reduced their traditional reliance on interest income. The first of these innovations was the money market mutual fund (MMMF), introduced in 1971. MMMFs transform large-denomination money market instruments (i.e., commercial paper, negotiable CDs, Treasury securities) into smaller denomination investments affordable to the average household, allow investors (limited) check-writing privileges, and were not subject to Regulation Q. MMMFs grew dramatically in the late-1970s when the Federal Reserve's tight monetary policy pushed money market interest rates as much as 10 percentage points above the Regulation Q ceiling on deposit interest rates. Household funds flowed out of bank deposit accounts and into MMMFs, a process known as "disintermediation."

The automated teller machine (ATM), which was also introduced during the 1970s, had an equally powerful impact on retail banking. The ATM (a) improved service quality by providing greater convenience for retail customers, (b) enhanced revenues by charging transactions fees to customers of other banks, and (c) increased the efficiency of bank branches by (as its name implies) serving as a substitute for more expensive human tellers. Indeed, the data suggest that the average banking office in the U.S. has become more productive—assets, operating income, and the number transactions per banking office have all increased since the 1980s (DeYoung, Hunter, and Udell 2004)—which helps explain the large increase in the number of bank branches since the 1970s (see Figure 1).

In contrast to most developed economies, approximately two-thirds of U.S. payments transactions were still conducted using checks and cash at the close of the 20th century.

However, electronic payments technologies—less expensive for banks to produce, and typically more convenient for their customers—are rapidly replacing paper-based payments in the U.S. The number of checks paid in the United States was declining by about 3% annually during the late 1990s, while payments made with credit cards and debit cards were increasing by 7.3 percent and 35.6 percent per year, respectively (Gerdes and Walton 2002, Humphrey 2002). Similarly, the volume of automated clearinghouse (ACH) transactions handled by the Federal Reserve—such as automatic payment of recurring monthly bills, and automatic deposit of wage and salary payments—increased at a 14.2 percent annual rate from 1990 to 2000 (Berger 2003). Because the dispersal and receipt dates of electronic payments are more predictable than for check-based payments, U.S. consumers now hold smaller precautionary balances: the fraction of household financial assets held in transactions accounts fell from 7.3 percent in 1983 to 4.6 percent in 2001 (Federal Reserve Survey of Consumer Finance 2004).

Internet banking has further diminished the importance of geography and reduced the cost of producing the most basic banking services. The variable cost of producing a basic Internet banking transaction is very low, and as such there appear to be economies of scale associated with delivery channel—however, there is also some evidence that offering Internet banking services can also enhance the profitability of small banks (DeYoung 2005, DeYoung, Lang, and Nolle 2007). Because U.S. banks do not report detailed data on the throughput of their various delivery channels, a complete understanding has yet to develop. The predominant Internet banking strategy is the "click-and-mortar" model that combines a transactional Internet site with networks of traditional brick-and-mortar offices and ATMs; no more than two dozen U.S. banks offer their services exclusively over the Internet.

Among all of the financial innovations that have developed since the 1970s, securitized lending has perhaps left the biggest imprint on the structure and performance of the U.S. banking industry. This lending technology—in which banks originate loans but do not finance them—has yielded large production and financing efficiencies for banks that use it, and has increased access to credit for millions of households and small businesses. But the failings of this lending technology were one of several key causal factors for the disruptions in world financial markets during 2008 and 2009.

A loan securitization is a trust that purchases existing home mortgage loans (or auto loans, or credit card receivables) from banks, using funds raised by selling "mortgage-backed securities" (MBSs) to third-party investors. The MBSs yield returns based on the performance of the mortgage loans held in the trust. This process allows banks to sell their otherwise illiquid loans to the securitization, and use the proceeds of these sales to fund additional loans or make other alternative investments. (A growing secondary market in the U.S. for syndicated loans—loans made to large firms by "syndicates" of large banks—has provided similar liquidity benefits and reduced the cost of loans to large firms. See Berlin 2007.) Community banks have been able to better diversify their locally concentrated loan portfolios by purchasing MBSs from securitizations of mortgages from other areas of the country. In contrast, many large retail banks have transformed themselves from traditional "originate-and-hold" mortgage lenders to "originate-and-securitize" mortgage bankers, relying less on traditional interest-based income and increasingly more on non-interest income from loan origination fees, loan securitization fees, and loan servicing fees. As discussed below, the scale economies associated with loan securitization have greatly influenced the industry's strategic profile.

The growth in securitized mortgage lending was facilitated in large part by two government-sponsored enterprises, or GSEs. The Federal National Mortgage Association (Fannie Mae, founded in 1938) and the Federal Home Loan Mortgage Corporation (Freddie Mac, founded in 1970) are the dominant forces in U.S. residential mortgage markets: approximately half of total existing residential mortgage debt in the U.S. has either been securitized by, or is held in the portfolios of, these two institutions. These dominant market positions were achieved in large part as a result of the GSEs lines of credit at the U.S. Department of the Treasury—these credit lines created the perception in financial markets that Fannie Mae and Freddie Mac were "too-big-to-fail," which gave them a funding advantage over private-sector mortgage securitizers. As outlined in detail by Frame and Wall (2002), the sheer size of these two companies raised fears about the systemic macroeconomic consequences should one or both ever become insolvent. Indeed, when Fannie Mae and Freddie Mac suffered losses in their huge portfolios of subprime MBSs in 2008 and were on the verge of insolvency, the Treasury Department made good on the "implicit government guarantee" by injecting equity funding and nationalizing ownership of the two GSEs.

Loan securitization rests on another financial innovation, credit scoring, which transforms quantitative information about individual borrowers (such as income, employment, or payment history) into a single numerical "credit score." Lenders use credit scores when analyzing loan applications; investment banks use credit scores to construct pools of loans into to be securitized; and bond-rating companies use credit scores to assign risk ratings to asset-backed securities. First introduced in the 1950s, credit scoring is now widely used in consumer, mortgage, and micro-small business lending (Mester 1997). Although some (mostly larger) banks have developed their own credit-scoring formulas, most lenders rely on standardized credit scores

such as the "FICO score" (developed by the Fair Isaac Corporation) acquired from third-party credit bureaus (e.g., Equifax, Experian, or TransUnion) to solicit and prescreen loan applicants. Because credit-scoring has significantly reduced the unit cost of underwriting individual loans, it has also increased the minimum efficient scale of consumer loan underwriting operations—hence, credit-scoring has expanded lenders' incentives to make additional credit available (Berger, Frame, and Miller 2005; Frame, Srinivasan, and Woosley 2001). During the mid-2000s, "subprime" mortgage loans to households with low credit scores comprised a substantial portion of this credit expansion; many of these borrowers defaulted on their loans, causing large investment losses for U.S. banks that held these mortgages as well as for other financial institutions that invested in securities backed by these mortgages.

Deregulation. By the 1980s, technological change and rapidly evolving conditions in financial markets had made the old regulatory regime untenable. Portions of the old regime were quickly dismantled. The disintermediation of household savings out of bank deposits and into higher yielding MMMFs and other non-bank investments forced the Federal Reserve to loosen and eventually remove almost entirely the interest rate restrictions imposed by Regulation Q. The Garn–St. Germain Depository Institutions Act of 1982 authorized banks and thrifts to offer money market deposit accounts (MMDAs)—transaction accounts with no interest rate ceiling—which allowed them to compete directly with MMMFs. The Act also permitted thrift institutions to make commercial loans and thus compete more directly with community banks.

Other parts of the old regime took longer to fall away. Between 1980 and 1994, thirty-two states gradually liberalized geographic restrictions on banking and branching within state borders. Various states also circumvented the federal McFadden Act by entering into bilateral and multilateral agreements that allowed cross-border bank ownership through multi-bank

holding companies; by the end of the decade, all but six states allowed some sort of interstate banking. In 1987 the Federal Reserve allowed commercial bank holding companies to operate "Section 20" subsidiaries to underwrite corporate securities in limited amounts, and in 1989 began relaxing restrictions in the Glass-Steagall Act that had banned commercial banks from themselves underwriting corporate securities.

The 1990s witnessed two crowning deregulatory acts. In 1994 the U.S. Congress passed the Riegle-Neal Interstate Banking and Branching Efficiency Act, which effectively repealed the McFadden Act at the national level and harmonized the patchwork of state-by-state banking and branching rules. This Act limits inter-state expansion of commercial banking companies only to the extent that they are prohibited from acquiring other commercial banks should their national deposit market share exceed 10%. (Bank of America is the only U.S. banking company currently constrained by this law.) And in 1999 Congress passed the Graham-Leach-Bliley Financial Services Modernization Act, which effectively repealed the Glass-Steagall Act by granting broad-based securities and insurance powers to commercial banking companies. These deregulatory acts ratified the decades-long deregulation movement that began in the 1970s, and helped accelerate the adoption of new financial processes and information technologies by U.S. banks.

The most noticeable industry response to deregulation was an historic wave of commercial bank mergers and acquisitions. Not including acquisitions arranged by the FDIC to resolve failing institutions, there were approximately 3500 bank mergers during the 1980s, nearly more 5000 during the 1990s, and over 2000 more between 2000 and 2006. These combinations increased the size and geographic footprints of U.S. commercial banks of all sizes, but were especially important for creating large, multi-state banking companies for the first time

in the history of the United States. While enormous in scope by any measure, this consolidation was slow to produce truly nation-wide retail banking franchises. Predicting the speed and extent of this industry consolidation has been difficult: Berger, Kashyap, and Scalise (1995) made a comprehensive study of industry consolidation during the middle of the merger wave, and estimated a future path for consolidation that overshot the mark *ex post*; armed with the advantage of a decade of additional information, Jones (2006) suggested that consolidation was still in process but may finally be showing some signs of slowing down.

Large multi-state banks have been quicker than smaller community banks to adopt new financial and information technologies, including various forms of electronic payments, credit scoring and loan securitization, financial derivatives and other off-balance-sheet activities. The more scalable of these technologies have also disseminated rapidly at smaller banks, albeit with a few years lag, due to the declining costs of delivering these technologies and a highly competitive sector of third-party technology vendors (Frame and White 2004). For example, imaging technology allows banks of all sizes to transmit checks as electronic images, saving the substantial transportation and handling expenses associated with paper checks; the Check Clearing for the 21st Century Act of 2003 (Check 21) facilitated these efficiencies by recognizing an electronic image as a legal substitute for a paper check.

3. A Stylized View of Banking Strategies

Technological change and industry deregulation left U.S. commercial banks at a strategic crossroads. DeYoung, Hunter, and Udell (2004) provide a simple but powerful model of the new strategic landscape, how banks responded, and the new industry equilibrium that resulted. Bank size, and the scale economies that can result from increased bank size, are key to the analysis.

Research suggests that banks practicing traditional "originate-and-hold" banking can operate without substantial unit cost disadvantages once they have about $500 million in assets, which is still very small by today's standards (DeYoung and Rice 2004a). However, small banks attempting to practice "originate-and-securitize" banking will face enormous cost disadvantages (Hughes, Lang, Mester, and Moon 1996, Rossi 1998), chiefly because of scale economies associated with the collection and analysis of the "hard," quantifiable borrower information essential to the asset securitization process (Stein 2002). There is evidence that large banks and small banks have comparative advantages in lending to large firms and small firms, respectively (Berger, Miller, Petersen, Rajan, and Stein 2005). The large scale, impersonal retail delivery channels favored by large banks (e.g., ATM networks, electronic payments) also thrive on hard information. Because their rival banks usually have access to the same information, large banks face intense price competition for the non-differentiated financial products they sell (e.g., credit cards, mortgage loans, transactions services).

In contrast, small banks augment their stores of hard information with "soft," non-quantifiable information collected over time via personal interaction with their borrowers, depositors, and the local community (Scott 2004). This "relationship-based" approach to banking allows small banks to serve local businesses that are unable to access public capital markets and households who require in-person financial services. Because these small banks differentiate themselves from their larger rivals by offering personalized products and services (e.g., small business loans, financial planning), and because they have a store of customer information to which their small local competitors do not have access, they can charge higher prices.

The key implication of the model is that the banking industry will naturally settle into a dichotomous structural equilibrium in which both large banks and small banks are profitable. Large bank size is a prerequisite for attaining the operating scale necessary to profitably exploit the technological and financial advantages of the transactions banking business model, just as relatively small size is a prerequisite for maintaining the local focus necessary for profitable community banking and relationship lending. The "financial commodity" strategy practiced by large banks sacrifices personalized service and high prices in exchange for high sales volume, standardized products, and low unit costs. The "relationship banking" strategy practiced by small banks sacrifices sales volume and lower unit costs in exchange for local economic focus, differentiated products, and high prices. Banks of middling size will be unable to take profitable advantage of either strategy and will exit the industry, likely via merger and acquisition.

There is considerable empirical evidence consistent with this strategic framework. Table 2 compares various financial ratio averages for two groups of U.S. commercial banks in 2006. The "small bank" group in the first column is comprised of 434 banks each having between $500 million and $2 billion in assets. These banks are arguably large enough to capture enough scale economies to operate at a reasonable level of efficiency, but still small enough to practice traditional relationship-based community banking. The "large bank" group in the second column is comprised of 56 banks each having at least $10 billion in assets. These banks far exceed the upper size limit attributed to community banks, and are large enough to pursue a "financial commodity" production process and business strategy.

These data suggest a fundamentally different approach to lending for the two groups of banks. The large banks are more likely to practice large-scale "originate-and-securitize" approaches to consumer lending and less likely to engage in relationship-based small business

lending, while the small banks are more likely to "originate-and-hold" consumer loans and to engage in relationship-based small business lending. For example, the average large bank sold-off and securitized roughly a dollar of consumer (automobile, home mortgage, home equity, or credit card) loans for every eight dollars of consumer loans on its balance sheet (15.61%), while the average small bank held nearly all of its consumer loans as portfolio investments (0.14%). These "consumer loan turnover" ratios are averages, and they belie an even starker comparison not included in the table: This ratio ranged as high as 200% for the large banks, but no higher than 33% for the smaller banks. In contrast, the average large bank invested only half as many of its assets (4.46%) in small business loans compared to the average small bank (8.55%). Moreover, this comparison likely understates the relationship-lending gap between large and small banks, because a substantial portion of the small business loans made by large banks are underwritten based on the personal credit score of the proprietor and hence are more like hard information-based credit card loans than soft information-based relationship loans.

The difference in the funding sources used by these banks provides further evidence of two different strategic approaches to banking. The typical large bank funded nearly one dollar of every twelve dollars of assets with funds that it purchased overnight from other banks (7.85%), while the typical small bank relied less than half as much (3.01%) on purchased short-run financing. In contrast, the average small bank funded over 60 percent of its deposits using "core deposits"—that is, stable deposit balances with long durations, including transactions deposits, small savings deposits, and certificates of deposit less than $100,000—compared to only about 50 percent for the average large bank. For the small banks, these data are more consistent with a traditional banking approach in which stable deposits fund loan portfolios, with profitable bank-customer relationships being forged on both sides of the balance sheet. For the large banks,

these data are more consistent with a transactional approach to banking in which standardized loans are originated and sold, thus requiring a more flexible and shorter duration mix of funding.

These differences in lending and funding strategies are reflected in the interest margins earned by the two sets of banks. The net interest margin averaged only 2.82% for the large banks, substantially less than the 3.63% average for the smaller banks—and note that this 81 basis point difference is driven completely by higher interest income for the smaller banks, not by any small bank advantage in interest expense. This remarkable finding is consistent with the differences in returns to hard information lending and soft information lending, as suggested above. The retail consumer and mortgage loans in which many large banks specialize are high-volume, financial commodities sold in highly competitive markets, resulting in downward pressure on loan interest rates. In contrast, the relationship-based small business loans in which many small banks specialize are low-volume, idiosyncratic credits made to informationally opaque borrowers in less competitive markets, which allows for higher lending margins.

While interest margins tend to be lower for the large banks, non-interest income tends to be higher. On average, non-interest income accounts for nearly 40 percent of operating income (net interest income plus non-interest income) at the large banks, or roughly twice the amount generated by the small banks. The large banks earn greater amounts of fee income both from traditional banking services—such as deposit account fees, fees for providing fiduciary services (e.g., managing trusts and investment accounts), and gains from trading bank-eligible investment securities—as well as from non-traditional banking services such as investment banking and insurance activities. And the large banks nearly double the earnings of small banks in the catch-all "other non-interest income" category, which includes fees earned from providing loan commitments and letters of credit.

In terms of overall profitability, large banks' deficiencies in net interest income are more than offset by their ability to generate large amounts of non-interest income. On average, compared to the small banks the large banks earn both higher returns of assets (1.23% versus 1.12%) and higher returns on equity (13.70% versus 12.81%). These returns are not adjusted for risk, however, and it may be that the large banks need to generate higher equity returns to reward their owners for higher risk. As discussed in detail below, there is growing evidence that fee-based banking activities generate riskier earnings than do margin-based banking activities.

To be sure, this highly stylized analysis oversimplifies the array of strategic choices available to commercial banks. Many large banks offer customized, relationship-based services to clients with idiosyncratic financial needs, such as corporate investment banking clients and high net worth "private banking" customers. Similarly, most small banks have relied to some extent on hard information, such as pledged collateral and audited financial statements, to underwrite business loans. Thus, there is ground between the two polar strategies proposed here, and some (though clearly not all) of that strategic landscape is profitable. Large retail banks attempt to access that ground via marketing: While these banks encourage their retail customers to purchase standardized deposit and loan products (e.g., automated credit-scored loans) through impersonal banking channels (e.g., on-line banking), they also attempt to differentiate these products and services from those of their competitors with image-based advertising campaigns. As shown in Figure 2, the largest U.S. banking companies spend proportionately more on television and commercials—media well-suited for delivering qualitative, image-based messages—and proportionately less on print advertising, which is better suited for delivering quantitative information about actual product characteristics.

There is very little research on the use and effects of advertising in U.S. banking markets—largely because U.S. regulators only recently required commercial banks to report even crude data on marketing expenditures. Berger and Dick (2007) have shown that banks with strong "brand images" (defined as multi-market presence, presumably bolstered by large marketing expenditures) are able to more quickly expand the banks that they acquire. Some researchers have used marketing data from U.S. thrift institutions: Hasan, Hunter, and Mathis (2000) found that thrifts facing more intense competition spend more on advertising, while the empirical tests performed by DeYoung and Ors (2004) suggest that thrifts use advertising both to communicate high interest rates offered on certificates of deposit as well as create brand images that allow them to pay lower interest rates on checking accounts.

4. Industry structure

As discussed above, geographic and product market regulations constrained the growth of U.S. banking companies for many decades—historically, the top U.S. banking companies have been small relative to the largest Japanese and European banks. When deregulation released these constraints, U.S. commercial banks grew rapidly, chiefly by acquiring other U.S. banks. On average, about 350 commercial banks were acquired each year during the 1980s, about 500 each year during the 1990s, and about 300 each year during the first half of the 2000s—in all, over 10,000 bank charters were merged out of existence since 1980 (see Figure 3). These acquisitions have substantially altered the structure of the U.S. banking industry. The number of commercial banking charters in the U.S. has dropped by almost half, from a plateau of approximately 14,000 banks that had remained remarkably stable since the 1950s, to a low of about 7,500 banks by 2005 (and still falling).

A wave of bank failures contributed further to the decline in the number of U.S. commercial banks. Regulators shut down over 1,500 insolvent banks during the late-1980s and early 1990s, the largest number of bank failures in the U.S. since the Great Depression. There were two primary causes of these insolvencies: an unexpected increase in interest rates that destroyed the profitability of banks that had financed long-term fixed rate loans with short-term deposits, and sustained regional declines in real estate values, largely in the Southwest oil producing states and in the New England states, that destroyed the loan quality of local banks with non-diversified portfolios of real estate loans. (These same phenomena resulted in even more dramatic failures of U.S. thrift institutions; for example, the overall population of federally chartered savings institutions declined by one-third, from about 3,600 to 2,400 institutions, between 1986 and 1992.)

As will be discussed below, changes in government supervision and industry risk mitigation practices were made during the 1990s and 2000s in hopes of reducing the chance of future bank failure waves. These improvements notwithstanding, there were 25 commercial bank failures in the U.S. in 2008—the most in over a decade—and at year-end an additional 76 banks were on the FDIC's list of financially troubled banks. While the 1980s-1990s bank failure wave was caused by unwise exposures to interest rate risk and geographic loan concentrations, these more recent bank failures reflect substantial investments in (geographically diversified) mortgage-backed securities coupled with a nationwide downturn in housing markets. Policy actions taken by the U.S. Treasury (temporary capital injections) and the Federal Reserve (making short-term liquidity available) likely reduced the number of banks that would have otherwise failed during 2008 and going forward.

While bank mergers and bank failures were reducing the number of U.S. commercial banks, over 7,000 new banking charters were granted by state and federal banking authorities between 1970 and 2005. New bank start-ups are rare outside of the U.S., and this large volume of "de novo" banks in the U.S. is made possible by the competition between the federal banking authority (the OCC) and the 50 separate state banking authorities, all of which can grant banking charters. The surge in new bank charters simultaneous with the merger-driven industry consolidation was no coincidence: When large, out-of-state banking companies acquire small, locally focused banks, some portion of the acquired bank depositors, borrowers, and employees will inevitably be unhappy with changes in post-acquisition policies and will want to change banks. Combining these three essential banking inputs—deposits, loans, and skilled banking employees—with a relatively small amount of investment capital (in most cases, U.S. banking authorities require less than $20 million in start-up capital) is a simple recipe for a new bank. Indeed, studies have shown that new banks are more likely to start up in local markets immediately after established banks are acquired in mergers (Keeton 2000; Berger, Bonime, Goldberg, and White 2004). Many of these new banks have grown rapidly and have become very profitable, demonstrating that strong customer demand exists for small, locally focused banks.

As the number of U.S. commercial banks declined, the size distribution of banks also changed. As shown in Figure 4, the net reduction in the number of banks occurred wholly among banks with less than $500 million of assets (2006 dollars), from nearly 14,000 banks in 1980 to a little over 6,000 banks today. The majority of banks that failed and banks that were acquired since 1980 were in this size group, while other small banks grew up and out of this group by acquiring other small banks. In sharp contrast, the number of banks with more than $1

billion in assets has remained relatively stable between 300 and 500 since 1980, as has the number of banks with between $500 million and $1 billion in assets. An implication of these data is that banks can capture meaningful scale economies by growing up to $500 million in assets, but that growing beyond $500 million yields less substantial gains. Consistent with this implication, DeYoung and Rice (2004a) found that increases in the size of U.S. commercial banks up to about $500 million unambiguously improved the risk-return tradeoff—that is, expected returns increased while the variability of these returns declined—while increases in bank size beyond $500 million are associated with the choice of a less traditional business strategy that yielded increased returns but also increased risk.

These findings fit well with the large literature on scale economies at U.S. commercial banks (for example, Mester 1987, Clark 1988, Evanoff and Israilevich 1991, Berger and Mester 1997). Studies that used banking data from the 1970s and 1980s, when banks of all sizes were using traditional banking models, typically found that scale economies were either fully or substantially exhausted by relatively small banks, with minimum efficient scale estimated to be substantially less than $1 billion of assets. But studies that used data from the 1990s and early 2000s yielded different insights, and often concluded that additional scale economies exist for large regional banks and perhaps even for nationwide banks. While changes in estimation methodologies may be responsible for some of the differences in these two sets of studies, the change in banking production technologies and the proliferation of different banking strategies over time are arguably the more important developments. Rossi (1998) showed that economies of scale exist for even the largest mortgage banking companies, which employ a very basic transactions approach to banking. Hughes et al. (1996) concluded that even the largest commercial bank holding companies—where sales volume is often dominated by transactions

banking activities—also exhibit increasing returns to scale. And DeYoung (2005) argues that Internet-only banks—again, a pure transactions banking strategy—exhibit larger scale economies than do similar-sized banks that use a branch delivery system.

As shown in Table 3, the speed with which the scale of large U.S. banks has increased has been staggering. During the mid-1980s only the largest U.S. commercial banking company (Citibank) had more than $100 billion in assets, but by the mid-2000s nearly 20 U.S. banking companies had more than $100 billion, and three exceeded $1 trillion. Numerous storied U.S. banking franchises (e.g., Chemical Bank, Manufacturers Hanover, Bankers Trust) disappeared over the past two decades as part of so-called "mega-mergers" that fueled this rapid expansion. But most of the merger-related growth has been geographic expansion, as banks in one city, state, or region took advantage of deregulation by acquiring banks in other cities, states, or regions. This has had very little effect on the structure of local banking markets—the ownership of a local bank changes when it is acquired by a bank from outside its local market, but its local market share is left unaffected—however, the nature of competitive rivalry in local markets has been affected. The cost efficiency of local banks tends to improve after one of their local peers is acquired by a large out-of-market bank, presumably because of increased competitive pressure (DeYoung, Hasan, and Kirchhoff 1998; Evanoff and Ors, forthcoming). Part of this pressure comes from large multi-market banks' more intensive use of ATMs, on-line banking, credit scoring, and other information technologies to provide more convenience for retail customers (Berger, Dick, Goldberg, and White 2007). And as mentioned above, banks with strong "brand images" are better able to expand the local market shares of the banks they acquire (Berger and Dick 2007), suggesting that perceived (as opposed to actual) differentiation can be an effective tool for large banks selling financial commodity products.

By definition, geographic expansion increases the distances within banking organizations, and this can create challenges for bank management. Berger and DeYoung (2001, 2006) found that the operational efficiency of bank holding company affiliates declined as they were located further away from their headquarters banks. While advances in communications and information technologies have helped mitigate these long-distance management problems, the very existence of these inefficiencies points to a competitive advantage for small, locally focused banks. Distances between banks and their loan clientele have also increased over time. This phenomenon is mainly technology-driven: automated, credit-scored lending models allow banks to make consumer, mortgage, credit card, and even some small business loans to borrowers they have never met in person, and asset securitization and credit derivatives allow banks to manage the risk associated with this type of lending (Petersen and Rajan 2002; DeYoung, Glennon, and Nigro 2008).

The geographic expansion of U.S. banking companies has not been limited to domestic markets. As shown in Table 3, six of the largest 50 banking companies in the world in 2006 were U.S. banking companies: Citigroup (ranked 4th in terms of assets), Bank of America (10th), JP Morgan Chase (11th), Wachovia (27th), Wells Fargo (40th), and Washington Mutual (50th). This marks an important change from the past, when despite operating in the world's largest economy, U.S. banking companies were constrained from expanding outside their home states and were largely limited to providing commercial banking services, and as a result were smaller than the top universal banking companies from Japan, Germany, Switzerland, the Netherlands, and the United Kingdom. Through rapid geographic growth and expansion into investment banking services, U.S. commercial banking companies now rank among the world's largest in

terms of syndicated lending, debt underwriting, and equities underwriting, as displayed in Table 5.

Industry consolidation and geographic expansion have also altered the nature of bank delivery systems. For example, while the number of commercial banks has declined by half since 1980, the number of commercial bank branches has nearly doubled from about 38,000 to more than 75,000 today (see Figure 1). Although some of this reflects bank purchases of thrift institutions with branching networks, the explosion in bank branches has been largely strategic in nature. By "packing the map" with branches, a bank positions itself closer to its current customers, closer to its potential (i.e., its rivals') customers, establishes a market presence at relatively low cost, and if it does so successfully may be able to limit entry by its rivals. This strategy can be especially important for large, transactions-based banks; while it is difficult for these banks to offer personalized banking services, they can offer higher levels of customer convenience by deploying a combination of local branches, automated teller machines (ATMs), and Internet banking. A series of Federal Reserve surveys in the late-1990s and early-2000s documented that retail customers pay higher deposit-related fees at large banks, a likely indication that consumers are willing to pay for this higher level of convenience (Hannan 2002). Physical branches located in prominent places can also serve as important advertising vehicles, especially in markets into which banks have recently expanded.

5. The implications of increased non-interest income

As documented in Table 2, large commercial banks generate a greater portion of their incomes from non-interest activities than to small banks. Thus, as the U.S. banking industry consolidated into fewer and larger banks during the 1980s and 1990s, one would expect a greater

portion of industry income to have flowed from fees rather than interest. Indeed, as shown in Figure 5, non-interest income roughly doubled as a percentage of total commercial bank income between 1980 and 2000, when bank merger activity was peaking in the U.S.

But the increasing size of U.S. banks, and with it the movement of the largest banks toward fee-based, transactions-based banking strategies, is not the only reason for the burgeoning importance of non-interest income. First, deregulation allowed commercial banking companies to expand into nontraditional lines of businesses—such as securities underwriting, securities brokerage, and insurance sales—that generate non-interest income. This came in stages, with the Federal Reserve's gradual relaxation of income limits at Section 20 securities subsidiaries during the 1990s, expanded insurance powers granted to national banks by the OCC during the late 1990s, and the passage of the Gramm-Leach-Bliley Act in 1999. Second, while in the past banks would earn interest income by providing credit to their business clientele, today banks increasingly earn fee income by selling backup lines of credit that enable their business clients to issue their own debt securities. Similarly, the massive shift from portfolio lending to securitized lending has transformed consumer lending from an interest-generating to a fee-generating line of business for many banks. Third, in the past banks were constrained by Regulation Q from paying market interest rates on transactions deposits, and banks made up for this by providing depositor services (e.g., certified checks, safe deposit boxes, overdraft protection) either for free or at prices that were well below costs. The relaxation of Regulation Q has resulted in market pricing for both deposit interest rates and depositor services, and thus increased fee income for banks.

DeYoung and Roland (2001) have argued that the increase in non-interest income at U.S. banks has altered fundamentally their risk-return profiles. For example, compare (a) the fee

income that a bank receives by originating and then securitizing a mortgage loan to (b) the interest income that a bank receives by making a small business loan and holding it in its loan portfolio. The former is a non-repeat transaction with the borrower, and the fees generated by this line of business are sensitive to the volatility of both the housing market and mortgage interest rates; the latter is a long-term relationship that both sides have an interest in preserving, which will continue to generate interest income (and perhaps fee income as well) into the future. Similarly, the fees associated with securities brokerage are typically based on the value of assets sold or assets under management, so that the stream of fee income generated by these activities contains systematic (undiversifiable) risk from market fluctuations. Moreover, the production functions for fee-based activities are typically dominated by fixed costs (e.g., personnel expenses), while lending activities are based primarily on variable costs (e.g., interest expenses); thus, non-interest income requires high operating leverage (i.e., a high fixed-to-variable cost ratio) which amplifies any revenue volatility into even greater earnings volatility. The authors go on to show that (non-deposit-related) fee income is associated with higher revenue volatility, higher operating leverage, and higher earnings volatility at U.S. commercial banks.

Several other empirical studies have investigated the riskiness of non-interest income. DeYoung and Rice (2004b) found that marginal increases in non-interest income are associated with a worsening of banks' risk-return trade-off. Stiroh (2004a, 2004b) found no evidence of diversification gains at banks that combine interest and non-interest income. Clark, Dick, Hirtle, Stiroh, and Williams (2007) emphasize how the increasingly retail-focused strategies of large U.S. banking companies expose these banks to economic and business cycle volatility.

The sub-prime mortgage crisis—which started in 2007 and lasted for several years afterwards—provides an illustration of the income volatility associated with fee-driven

transactions banking. While the headlines in the financial press dwelled almost exclusively on the large capital losses suffered by banks and other investors in sub-prime mortgage-backed securities, banks that originated, serviced, and/or securitized mortgages experienced material, and in some cases crippling, reductions in fee income as investor demand for new MBS dried up and household demand for both new and existing houses declined. Total industry noninterest income fell from 43% of operating income in 2006 to just 38% during the first three quarters of 2008 (not shown in Figure 5), the largest two-year decline since the mid-1970s. Many of the largest financial institutions with non-diversified, "mono-line" mortgage banking strategies failed (e.g., American Home Mortgage, New Century Financial, Countrywide Financial, Washington Mutual) due to the combined impact of plummeting fee income and large losses in their portfolios of subprime mortgages and mortgage-backed securities.

6. Risk and Return

Despite the fact that growing reliance on non-interest income was increasing the volatility of income and earnings at U.S. commercial banks, by the mid-2000s the industry appeared to be very well positioned to handle this risk. Figure 6 shows the annual aggregate (book value) equity-to-assets and return-on-assets ratios for U.S. commercial banks going back seven decades. Capitalization in the banking industry has been steadily increasing since the early 1990s; by 2004, commercial banks were holding a dollar of equity capital against every ten dollars of assets, nearly double the capital levels of the early to mid-1980s. This large reservoir of capital provided an increased margin of safety and soundness against the increased opportunities for risk-taking in today's deregulated and intensely competitive commercial banking industry.

This large capital cushion was the result of several independent developments. First and foremost was the stricter supervisory and regulatory framework mandated by the Federal Deposit Insurance Corporation Improvement Act (FDICIA) of 1991, the centerpiece of which is the practice of "prompt corrective action" by bank supervisors that imposes costly restrictions on banks with low and diminishing levels of capital (Eisenbeis and Wall 2002). Equally important were the historically high levels of bank earnings during the late-1990s and early 2000s (see ROE trend in Figure 6), which were caused by a combination of phenomena: two decades of strong macroeconomic growth, the elimination of costly regulatory constraints on banks, and increasing competitive pressures for banks to operate more efficiently. Berger, DeYoung, Flannery, Lee and Öztekin (2008) show that banks retained a large percentage of these record earnings rather than distributing them to shareholders, a financial strategy that helps account for the simultaneous increase in bank capital levels.

The Berger, DeYoung, Flannery, Lee and Öztekin (2008) study also estimates the desired or "target" capital ratios of large U.S. banking companies, and finds that during the 1990s and 2000s banks desired to hold equity capital well in excess of minimum capital levels set by their regulators. These regulatory capital requirements continue to evolve. The international Basel Capital Accord (Basel II), initially published in 2004 but not yet fully implemented in the U.S., allows the largest banking companies to determine how much capital they need to hold, based on their own internal credit risk estimates and value-at-risk modeling techniques (Gordy and Heitfield 2008). It remains to be seen how Basel II will affect total capital levels in the U.S. and the allocation of capital to risk-taking at U.S. banks. Because of these uncertainties, U.S. bank regulators will include a simple equity-to-assets (or "leverage") ratio as a backstop against modeling outcomes that recommend only low levels of capital. Consistent with the spirit of

Basel II, the Federal Deposit Insurance Reform Act of 2006 allowed the FDIC much greater latitude to charge risk-based deposit insurance premiums that better reflected banks' estimated insolvency risk.

While holding a larger cushion of equity capital is the most fundamental hedge against risk for banking companies, U.S. commercial banks are increasingly using other risk-mitigation techniques as well. Banks of all sizes employ on-balance sheet techniques to mitigate interest rate risk, writing adjustable-rate rather than fixed-rate loans, and using increasingly sophisticated duration-based asset-liability management programs. The advent of credit scores to analyze consumer and small businesses loan applications has reduced credit risk by improving lenders' estimates of loan default probabilities. For example, DeYoung, Glennon, and Nigro (2008) find that scoring small business loans reduces the probability of loan default. Larger and more sophisticated banks take off-balance sheet positions in interest rate swaps, credit default swaps, foreign exchange options, and other derivatives contracts to offset their exposures to movements in interest rates, foreign currencies, and loan defaults. The increased geographic dispersion of banks—either by operating banking offices in multiple economic regions, or by purchasing asset-backed securities backed by loans from other economic regions—has diversified banks' investment portfolios.

These improvements in risk-mitigation at U.S. commercial banks occurred at the same time that industry earnings had ascended to record levels; without the benefit of hindsight, these data suggested that the risk-adjusted returns of U.S. banks had improved substantially, and that the likelihood of severe downturns in earnings and large capital losses were greatly reduced. However, one would have been wrong to conclude from this handsome financial performance

that the U.S. banking industry had become invulnerable to a banking crisis—unfortunately, history likes to repeat itself.

In mid-2007, U.S. home prices began a steep decline and unusually large numbers of home owners began defaulting on their mortgage loans. Most of these bad mortgages were subprime loans—i.e., loans to households with poor credit histories, little collateral, and questionable long-run abilities to service the loans—and were underwritten using the automated lending and asset securitization processes central to the growth of large U.S. retail and investment banking franchises during the 1990s and 2000s. Trillions of dollars of securities backed by these subprime loans declined in value, imposing large losses on the portfolios of commercial banks, investment banks, and other institutional investors in MBSs. These losses, combined with the complex nature of many of these subprime MBS contracts, resulted in a "credit crunch" as uncertain investors pulled their money out of mortgage investments.

As these funding markets seized up and a systemic collapse of the financial sector became a distinct possibility, U.S. financial regulators took a series of unprecedented policy actions. The Federal Reserve (among other actions too numerous to detail here) opened wide its discount window in order to make liquidity freely available to all types of financial institutions; temporarily guaranteed all investments in money market mutual funds against losses; pledged to purchase up to $600 billion in agency (GSE) MBSs from financial institutions; and for the first time since the Great Depression began lending directly to nonfinancial firms by purchasing their newly issued commercial paper. The Fed also set into motion a chain of events that marked the end of the large independent investment banking model in the U.S. The Fed subsidized JPMorgan Chase's acquisition of the insolvent Bear Stearns; a few weeks later denied assistance to Lehman Brothers, which required the firm to file for bankruptcy; and a week after that

converted Goldman Sachs and Morgan Stanley to bank holding company charters—in essence, these two firms accepted stricter regulations and supervisory scrutiny in exchange for access to the Federal Reserve's discount window and the ability to issue inexpensive insured deposits. The U.S. Treasury nationalized Fannie Mae and Freddie Mac (as discussed above); provided $150 billion in loans and other support to prop up and eventually nationalize American International Group, the largest insurance company in the U.S.; and gained authority under the Troubled Assets Relief Program (TARP) to inject up to $700 billion into commercial banks via equity injections and purchases of mortgage-backed securities, which it began doing in October 2008. The FDIC increased deposit insurance coverage from $100,000 to $250,000 per account; provided billions of dollars of open bank assistance to prevent the insolvency of Citigroup, at the time the largest banking company in the world; and used a variety of innovative structures and techniques to resolve insolvent banks and thrifts, including the largest depository failure in U.S. history (to date) in Washington Mutual.

As of the publication of this volume, the long-run ramifications of the breakdown in the transactions banking business model are unknown. Moving forward, we are likely to witness some retrenchment toward more traditional banking models: a larger percentage of retail loans will be funded by bank deposits rather than asset-backed securities, and there will be less credit made available for subprime borrowers. But technology does not disappear, and the second application of a new technology learns from the mistakes of the first application. Although subprime mortgage securitization had essentially stopped by year-end 2008, the loan-to-securitize credit channel generates far too much financial and informational efficiency to be abandoned; it will continue to be employed in the future, albeit with more prudence by lenders, more diligence by investors, and greater regulatory oversight. Similarly, it is far too early to

gauge the efficacy of the unprecedented policy actions taken by U.S. financial regulators in 2008 and 2009 to stabilize the financial sector. Having approved over $1 trillion of taxpayer funds to "bail out" financial institutions in the short run, the U.S. Congress faces a climate in which stricter regulation of financial institutions in the long run is a political necessity. If the new regulations stabilize financial markets and eliminate the poor incentives facing financial institution managers—and at the same time manage to avoid disrupting or destroying the true underlying efficiencies generated by technological and financial innovation—then the U.S. banking industry should weather this storm and emerge more safe, productive, and profitable than would have been possible twenty-five years ago.

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Table 1: Distribution of Assets at U.S. Financial Intermediaries in 1970 and 2007.

	1970	**2007**
Depository institutions (banks, thrifts, credit unions)	54.4	22.8
Insurance companies	17.4	10.5
Pension funds (public and private)	14.6	16.9
Finance companies	4.9	3.2
Mortgage finance companies and funds *	3.9	20.2
Mutual funds (stock, bond, money market)	3.7	18.5
Securities firms (brokers, dealers, funding corporations)	1.1	7.9
Total	100.0%	100.0%

Source: Federal Reserve System Flow of Funds Accounts.

* Includes government-sponsored enterprises (GSEs) and pools they sponsor, private mortgage securitizers and pools they sponsor, mortgage banks, and real estate investment trusts (REITs).

Table 2: Selected financial ratios (mean values) for 490 U.S. commercial banks in 2006.*

	"small" banks	**"large" banks**
Number of banks	434	56
Asset range	$500 million to $2 billion	over $10 billion
Small business loans (% of loans)	8.55%	4.46%
Securitized loans (% of consumer loans)	0.14%	15.59%
Core deposits (% of assets)	63.07%	50.70%
Purchased federal funds (% of assets)	3.01%	7.85%
Net interest income (% of assets)	3.63%	2.82%
Interest income (% of assets)	6.18%	5.33%
Interest expense (% of assets)	2.54%	2.51%
Standby financial letters of credit (% of assets)	0.59%	3.98%
Non-interest income (% of operating income)	20.28%	38.66%
Deposit service charges (% of operating income)	7.94%	8.39%
Fiduciary income (% of operating income)	1.71%	8.58%
Trading income (% of operating income)	0.02%	2.03%
Investment banking income (% of operating income)	0.60%	2.02%
Insurance income (% of operating income)	0.73%	1.29%
Loan servicing income (% of operating income)	0.01%	0.88%
Fees from mutual fund sales (% of operating income)	0.54%	1.16%
Other non-interest income (% of operating income)	8.19%	13.15%
Return on assets	1.12%	1.23%
Return on equity	12.81%	13.70%

Source: Federal Deposit Insurance Corporation.

* Each of the banks in this analysis operated with either a state or a federal commercial banking charter. If a bank was affiliated with bank holding company, it was included only if it was the largest bank (i.e., the "lead bank") in their organization. Banks less than ten years old were excluded to insure that all banks in the analysis were financially mature (DeYoung and Hasan 1998). Banks investing more than ten percent of their assets in either agricultural loans or credit card loans were also excluded, as these banks tend to face idiosyncratic market conditions and/or use more specialized production functions.

Table 3: Ten largest U.S. commercial banks in 1988, 1997, and 2007.

	June 1988		December 1997		June 2007	
1	Citicorp	$194,600	Chase Manhattan Corp.	$365,531	Citigroup Inc.	$2,220,866
2	Chase Manhattan Corp.	$98,860	Citicorp	$262,159	Bank of America Corp.	$1,535,684
3	BankAmerica	$96,923	NationsBank Corp.	$260,159	JPMorgan Chase & Co.	$1,458,042
4	Chemical Banking Company	$78,410	J.P. Morgan & Co.	$157,274	Wachovia Corp.	$719,922
5	J.P. Morgan & Co.	$74,681	Bankamerica Corp.	$140,102	Deutsche Bank	$579,062
6	Maunfacturers Hanover Corp	$73,826	First Union Corp.	$116,182	Wells Fargo & Co.	$539,865
7	Security Pacific Corp.	$64,714	Bankers Trust New York Corp.	$140,102	Washington Mutual Inc.	$349,140
8	Bankers Trust New York Corp.	$54,700	Banc One Corp.	$116,182	U.S. Bancorp	$222,530
9	First Interstate Bancorp	$51,790	First Chicago NBD Corp.	$114,096	SunTrust Banks Inc.	$180,314
10	Wells Fargo & Co.	$44,721	Wells Fargo & Co.	$97,456	National City Corp. Cleveland	$140,648

Source: American Banker.

Table 4: Largest banking companies in the world in December 2006, dollars of assets.

1	UBS AG Zurich	$1,961,327
2	Barclays PLC London	$1,949,167
3	BNP Paribas Paris	$1,898,186
4	Citigroup Inc. New York, N.Y.	$1,884,318
5	HSBC Holdings PLC London	$1,857,520
6	Royal Bank of Scotland Group PLC Edinburgh	$1,705,044
7	Credit Agricole SA Paris	$1,662,600
8	Mitsubishi UFJ Financial Group Tokyo	$1,585,767
9	Deutsche Bank AG Frankfurt	$1,480,984
10	Bank of America Corp. Charlotte	$1,459,737
11	JPMorgan Chase & Co. New York, N.Y.	$1,351,520
27	Wachovia Corp. Charlotte	$707,121
40	Wells Fargo & Co. San Francisco	$481,996
50	Washington Mutual Inc. Seattle	$346,288

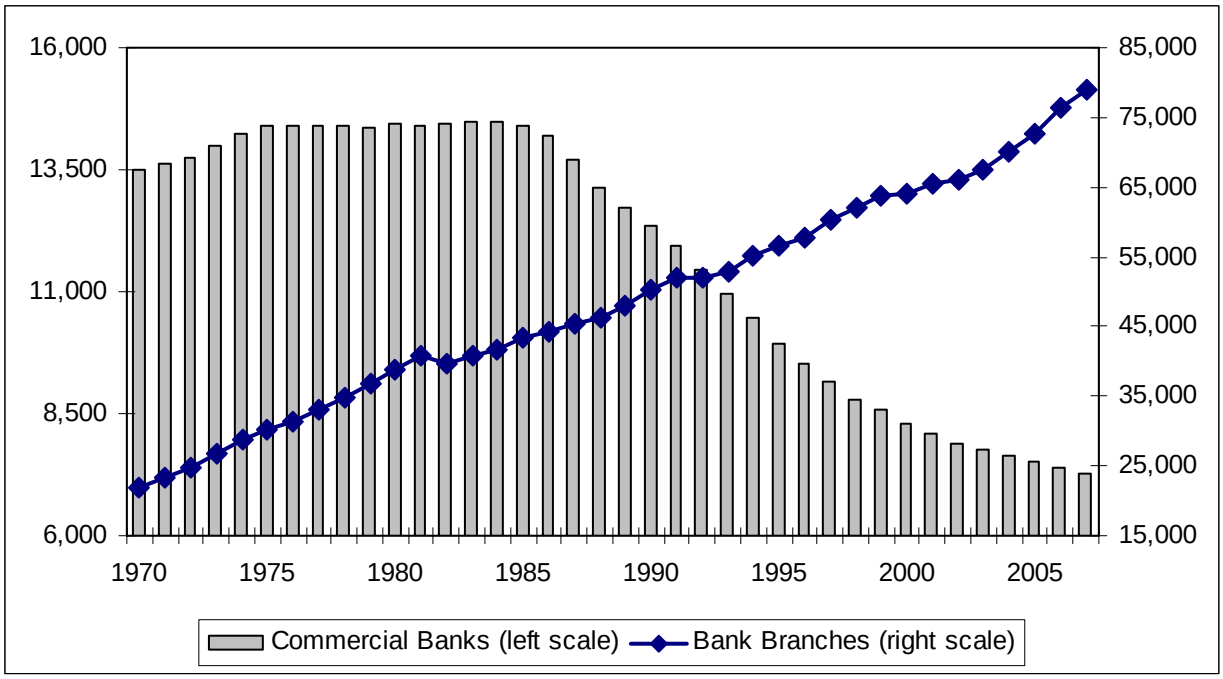
Source: American Banker

Table 5: Ten largest Debt Underwriters, Equity Underwriters, and Loan Syndicators in the world in 2007, by proceeds in billions of dollars. U.S. companies in italics.

	Global Debt Underwriting		**Global Equity Underwriting**		**Syndicated Loans**	
1	*Citi*	$546	UBS	$81	*JP Morgan*	$570
2	*JP Morgan*	$476	*JP Morgan*	$77	*Citi*	$522
3	Deutsche Bank AG	$429	*Citi*	$71	*Banc of America Securities LLC*	$337
4	Merrill Lynch	$370	Goldman Sachs & Co	$70	Royal Bank of Scotland	$210
5	Lehman Brothers	$365	Morgan Stanley	$64	Deutsche Bank AG	$180
6	Morgan Stanley	$361	Merrill Lynch	$60	Barclays Capital	$173
7	Barclays Capital	$349	Credit Suisse	$54	BNP Paribas SA	$172
8	Goldman Sachs & Co	$286	Deutsche Bank AG	$52	Goldman Sachs & Co	$134
9	Royal Bank of Scotland	$282	Lehman Brothers	$29	Calyon	$118
10	*Banc of America Securities LLC*	$276	China International Capital Co	$20	Credit Suisse	$116

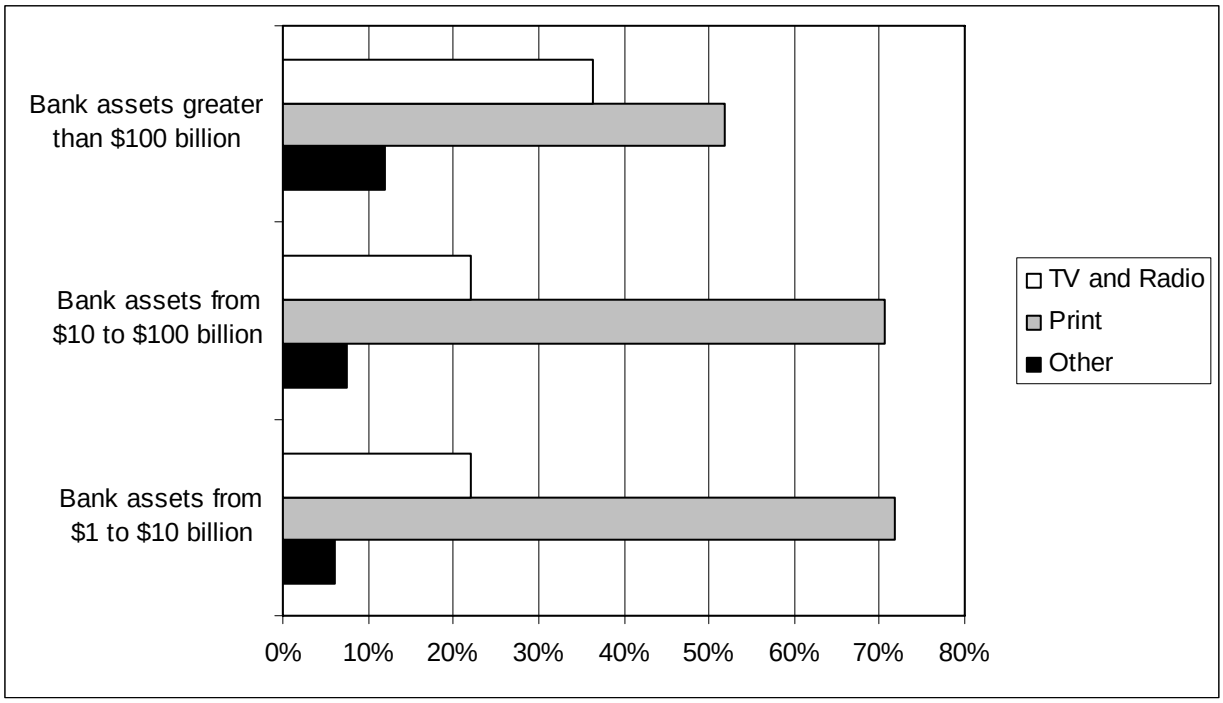
Source: American Banker.

Figure 1: Number of Commercial Banks and Commercial Bank Branch Offices* in the U.S. between 1970 and 2007.



Source: Federal Deposit Insurance Corporation.
* Excludes the main bank office.

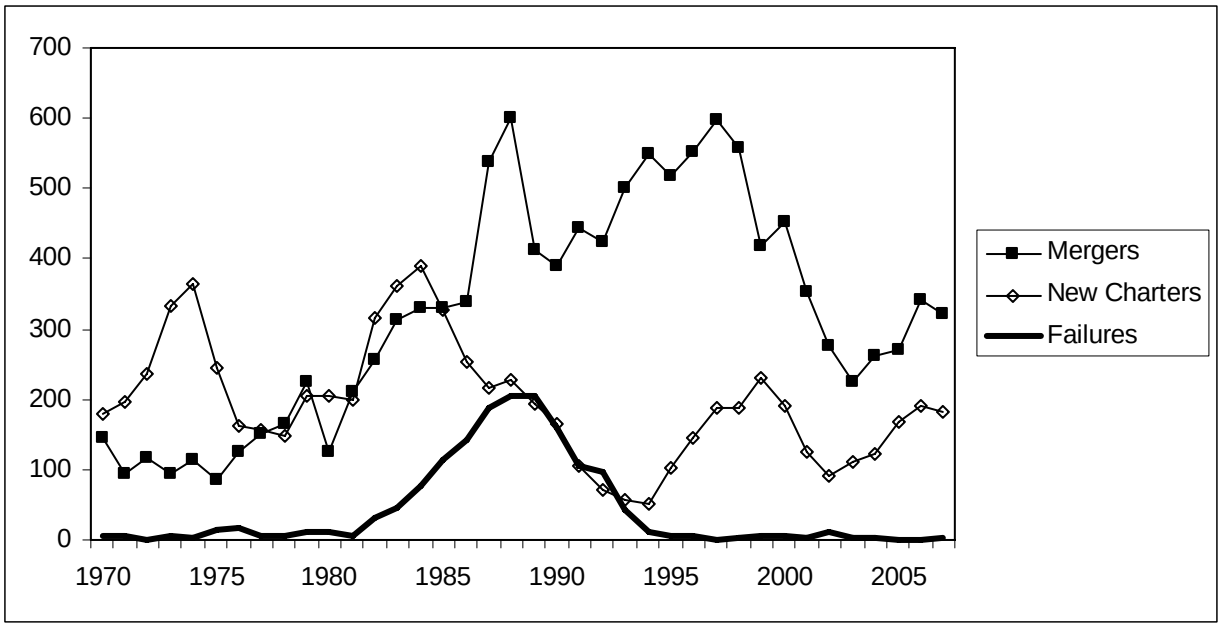
Figure 2: Average advertising expenditures for 51 commercial banking companies in the U.S. in 2006, expressed as a percent of companies' total spending on advertising.*



Source: American Banker.

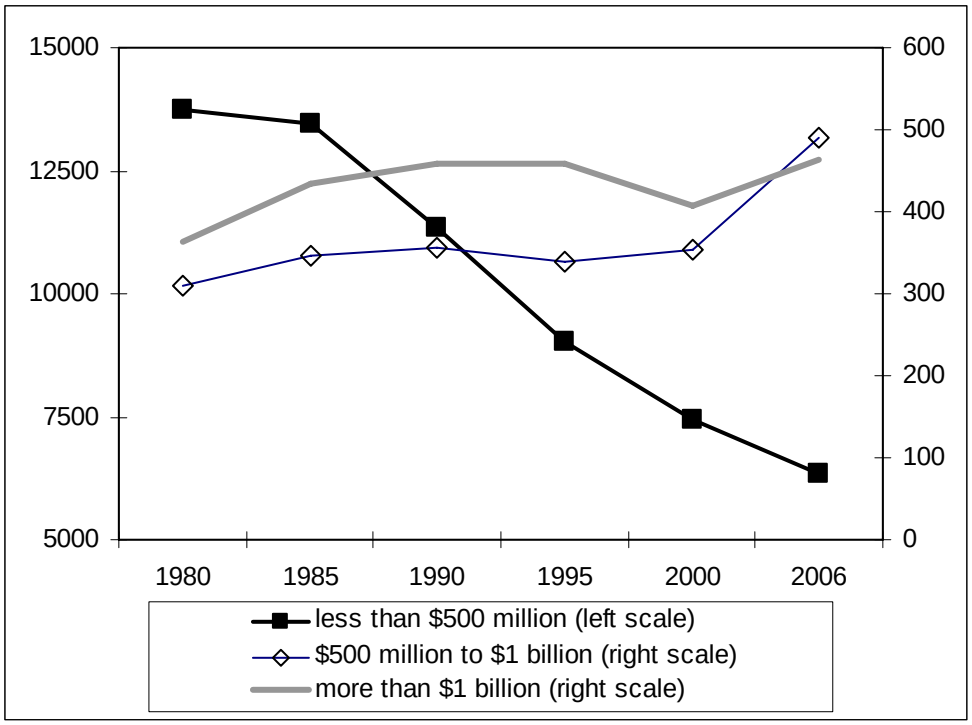
* The figure includes the largest 51 U.S. banking companies for which data was available.

Figure 3: Changes in the number of commercial bank charters in the U.S. from 1970 to 2007 due to mergers, failures, and new entry.



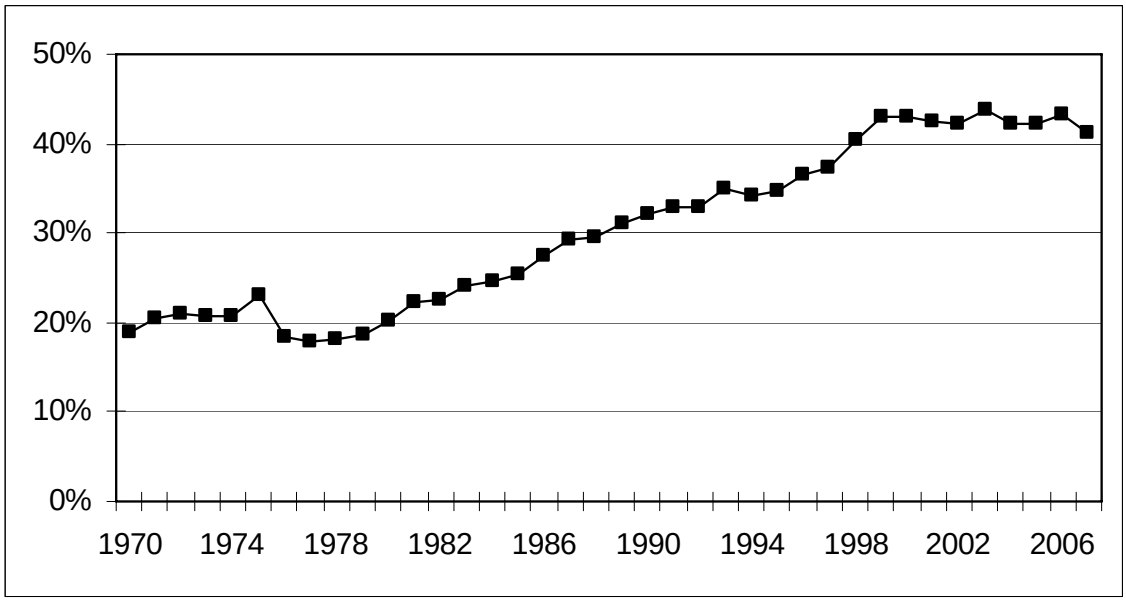
Source: Federal Deposit Insurance Corporation.

Figure 4: The changing distribution of U.S. commercial banks by size (measured in 2006 dollars) between 1980 and 2006.



Source: Federal Deposit Insurance Corportion.

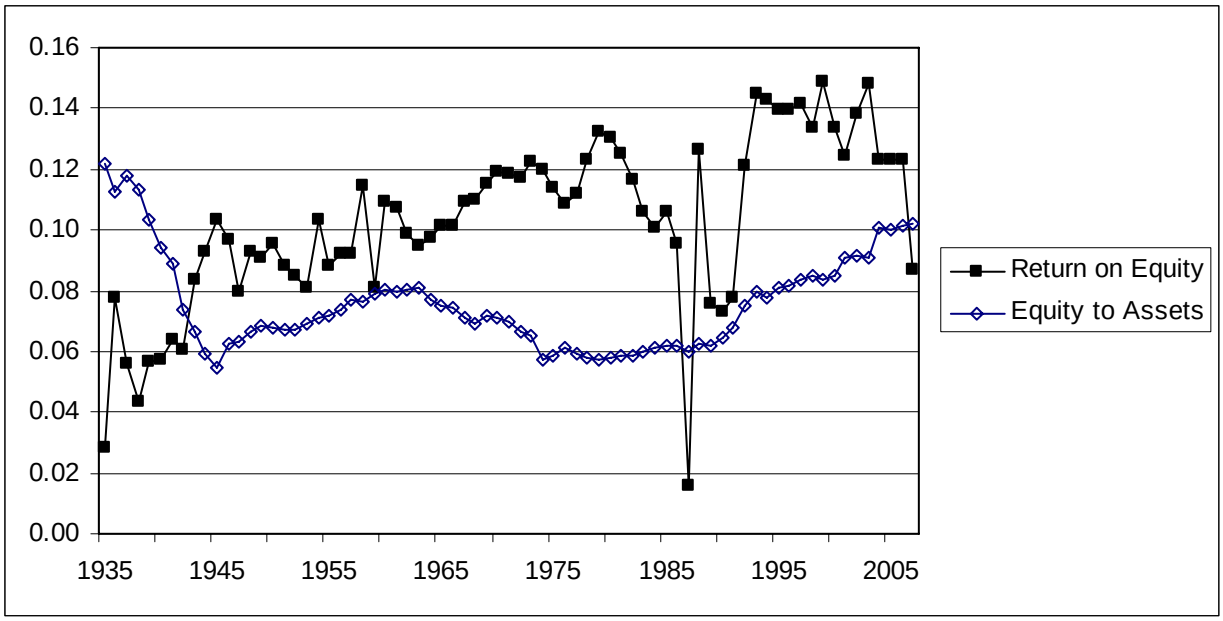
Figure 5: Aggregate non-interest income as a percent of aggregate operating income of U.S. commercial banks, 1970 to 2007.*



Source: Federal Deposit Insurance Corporation.

* Operating income is equal to net interest income plus non-interest income.

Figure 6: Aggregate Return-on-Equity and Equity-to-Assets ratios for the U.S. commercial banking industry, 1935 to 2007.



Source: Federal Deposit Insurance Corporation