# Improved measures of commercial banking output and productivity

*New comprehensive measures of commercial banking output and productivity more accurately reflect the changes that have occurred in the industry, including deregulation, advances in technology, and the development of new banking services*

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The services that commercial banks offer have changed greatly since the 1980s because of deregulation, the expansion of information technology, and innovations in the types of services offered. Traditionally, commercial banks' primary services included facilitating transactions, providing loans, and safekeeping money and other valuables. However, with the repeal of the regulatory limits of the Glass-Steagall Act, banks began performing an increasing variety of functions, including providing investment advice, underwriting securities, and writing insurance policies.[1]

Deregulation allowed commercial banks to hold riskier financial assets on their balance sheets and to merge with investment banks. As a result, banks expanded the types of services they offered and the fees from these services became a larger share of bank revenue. Commercial banks took advantage of the lower reserve requirements for investment banks, which allowed them to take on more debt and potentially earn higher profits. Deregulation also removed the prohibition on interstate banking, allowing commercial banks to operate freely across state lines. Increased competition because of deregulation caused a number of bank failures and triggered a series of mergers and acquisitions. Banks benefited from economies of scale as bank mergers resulted in larger and fewer banks. In addition, larger banks began merging with smaller local banks, thereby gaining access to their branch networks.

The recent financial crisis dramatically underscored the changes in the structure of the commercial banking industry that occurred with the proliferation of risky new investment products, the liberalization of lending practices, and the merging of commercial and investment banks. Many banks were forced to take large write-offs as the value of their assets fell sharply. The crisis led to the collapse of several major financial institutions, widespread mortgage foreclosures, and economic recession. The crisis also emphasized the changing role of banks, fostered new regulation to avoid future financial problems, and reinforced the need for improved measures of output and productivity in the commercial banking industry.

Advances in information technology over the last few decades also greatly increased productivity in commercial banking by enabling banks to offer many new services without a proportional increase in staff. Rising customer usage of online banking and automated teller machines (ATMs) has allowed banks to expand their presence into new areas while, at the same time, reducing costs and minimizing branch staff.[2] Banks now process the majority of payments electronically, including direct payroll

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deposits, funds transfers, and electronic bill payments. The increasing popularity of e-commerce has prompted banks to employ several new related products, such as identity encryption technologies, Internet portals, and electronic billing.[3] The computerization of interest rate adjustment, credit checks, and other accounting and auditing activities has sharply reduced the amount of time bank staff devotes to them. Banks have invested heavily in electronic data processing technology, and its proliferation has resulted in rising output, falling costs, and soaring productivity in the industry.

Deregulation and advances in information technology have shifted the types of services that commercial banks offer. For example, as electronic payments have replaced traditional payment methods, the number of deposit accounts at commercial banks has declined steadily.[4] At the same time, banks have developed an increasingly wide variety of savings and investment vehicles and pursued other business opportunities, such as underwriting debt or offering mutual funds, to acquire new sources of revenue and enable them to compete with other financial services companies. As a result, these new services have become an important source of income for commercial banks.

## BLS commercial banking measures

Accurate measures of output and productivity in commercial banking are key components in understanding the industry and how it has changed over time. However, deriving such measures remains challenging because bank output is not easily defined or quantified. The Bureau of Labor Statistics (BLS) began publishing labor productivity and related measures for the commercial banking industry in 1982.[5] Since then, the BLS commercial banking output series has been modified on occasion to account for changes in industry classification, the availability of source data, and the addition of new services provided by the industry.[6] However, previous revisions, while improving some aspects of the measures, were not sufficient to capture the many changes that have occurred in the industry. New sources of data have become available over time, while some series used in the original measures are no longer published. Meanwhile, changes in technology and the regulatory environment have facilitated the development of new services that commercial banks did not previously offer, and those services now account for a substantial share of banks' output. As a result of these changes, BLS has implemented substantive revisions to its commercial banking measures.

This article introduces the new commercial banking output and productivity series through 2010 and discusses the improvements to the measures. The research community has played an important role in identifying and developing methods of measuring commercial banking output, and the BLS work is built upon this previous research. For further discussion of the challenges in measuring the real output of commercial banks, see the accompanying article by Robert Inklaar and J. Christina Wang in this issue of the *Monthly Labor Review*.

## Measuring the services commercial banks provide

Banks earn revenue directly for many of the services they provide. Common examples include service charges for demand deposit transactions and safety deposit box rental costs. These explicitly priced services also include many newly developed bank services that earn direct commissions or fees, such as investment banking, loan securitization, and the writing of insurance policies. However, much of banks' earnings for services provided to borrowers or depositors are not priced explicitly. Because the specific amount of these earnings cannot be observed, attributing banks' revenues accurately to all the services they provide may be difficult.

Although the difficulty of attributing revenues accurately complicates the task of developing measures of bank output, researchers have developed several methods for estimating the nominal (current-dollar) and real (constant-dollar) output of commercial banks. Each method uses a different definition of bank output and relies on different types of data. In the *asset framework*, banks are viewed as financial intermediaries whose function is to convert deposit funds into loans. Real bank output is measured as the real dollar value of loans and other assets held by the bank. Deposit accounts are categorized as inputs in this framework because they do not directly generate revenue for the bank, yet they do incur costs.[7] The real dollar value of loans and other assets is obtained by adjusting nominal asset values to remove changes in prices over time, a process known as deflation. Accurate measures of price change for these assets are critical to this approach, yet constructing such deflators is problematic. Even with appropriate measures of price change, the deflated values of account balances may not accurately reflect the underlying amount of bank services.[8] In addition, the asset approach fails to differentiate between loans funded by deposits and those funded by the investment of banks' own funds and to acknowledge that banks produce services for both borrowers and depositors in their role as intermediaries.

The *production framework* measures real bank output as proportional to the number of accounts, the number of transactions associated with those accounts, or the real dollar value

of accounts held at commercial banks. In this approach, the numbers of loans and deposits, the numbers of transactions associated with loans and deposits, or the real dollar values of loans and deposits are aggregated using cost shares as weights.

The *user cost framework*, originally developed to measure the services of fixed capital assets, resolves the difficulty in attributing bank earnings to customer services by assuming banks charge implicitly for the services they provide to borrowers and depositors. The user cost framework has emerged as the most common method for estimating the nominal output of banks. Nominal bank output is measured as the imputed value of the services associated with banks' loans and deposit accounts.[9] The price of the bank services is measured as the difference between the interest rate paid by the bank on deposits or the interest rate received by the bank on loans and a separate reference rate, which represents the risk-free opportunity cost of funds.[10] In theory, depositors could choose to invest their money directly in securities and earn the reference rate. If they forego this opportunity in order to deposit their money and obtain the services of a bank and therefore earn less than the reference rate on their deposits, the difference between the rate they earn on their deposits and the reference rate represents the price they choose to pay for the bank's services.[11] Similarly, borrowers can forego raising capital in the securities market at the reference rate to borrow from a bank, and the difference between the interest rate on the bank loan and the reference rate is the price they choose to pay for the banks' bearing of risk and servicing of the loan.[12] In the user cost approach, the nominal value of bank output is calculated by multiplying the interest rate differential by the current-dollar account balance, summed over a variety of different types of loans and deposits.

## Original commercial banking measures

For most service-providing industries covered by the BLS industry productivity measures, real (constant-dollar) industry output is derived by deflating nominal industry revenue. Such "deflated value" output measures are generally based on annual sales or revenue data by detailed product line or source of receipt, deflated with appropriate producer price indexes (PPIs) or consumer price indexes (CPIs) for each revenue series. Alternatively, real output may be measured by physical quantities or, in the case of commercial banking, by the volume of accounts or transactions. When BLS initially developed its commercial banking output series in the early 1980s, neither annual revenue data nor price deflators were available for the commercial banking industry. Instead, the output measure that BLS developed relied on a transactions-based approach, a variation of the production approach. Measures of output based on the number of accounts or transactions are consistent with the definition of output as a flow of services. These measures are often preferable to output measures based on account balances or assets, which are stocks.[13]

The original BLS commercial banking output index included the number of transactions occurring in three main areas of banking activity: deposits, loans, and trusts.[14] For deposits, output was based on the number of time and savings deposits, checks cleared, and electronic funds transfers. For loans, output was measured as the number of real estate loans, consumer loans, commercial and industrial loans, and credit card transactions. The output of trust accounts was measured by the number of accounts, including employee benefit funds, personal and agency trusts, and estates. Over the years, BLS has added activities such as ATM transactions, money market accounts, and home equity loans to improve the scope of the measures and keep up with developments in the industry.

Typically, BLS develops industry output measures for use in productivity analysis by combining changes in different industry outputs, using annual weights that reflect the revenue shares of those outputs.[15] When the BLS banking measures were introduced, however, the original measures used employment-based weights reflecting the amount of labor required for each activity (based on data from the Federal Reserve Board's Functional Cost Analysis Survey) to combine the indexes of loans, deposits, and trusts to form an output index. The Functional Cost Analysis Survey was discontinued in 1999. Other banking transactions data also became increasingly difficult to obtain over time.[16] At the same time, some new data sources became available to improve and expand the scope of the original measures.

As the nature of bank services has changed and some of the data that had previously been available have disappeared, shortcomings in the BLS output measure became apparent. After the Functional Cost Analysis Survey was discontinued, the weights became more outdated each year. Because new services offered by banks began to grow rapidly, the old framework became increasingly outmoded.

## New commercial banking measures

This article introduces improvements to the commercial banking output series. These improvements result in more accurate and comprehensive measures that reflect the changes that have occurred in commercial banking. The

employment-based weights used to combine the component indexes in the original BLS measures have been replaced with annual revenue-based share weights for each component. In addition, the improved output series now includes measures of several banking services—including loan securitization, investment banking, insurance provision, and other fee-based services—that have grown to constitute a large share of bank revenue in recent years. Although the core component activity measures based on the number of accounts or transactions for loans (real estate, credit card, commercial and industrial, and consumer) and for deposits (time, savings, and demand) remain the same as in the original measures, the BLS output series is now more comprehensive, covering a broader range of bank services than did the original BLS series. (Indexes for component banking services can be found in appendix A, table A-1.)

*Revenue weights for loan and deposit services.* Revenue-based share weights derived from a user cost framework are now used to aggregate the component indexes of loan and deposit activity. Separate weights were developed for real estate, commercial and industrial, credit card, and consumer loans and demand, time, and savings deposits.

For each type of loan account, the amount of interest that banks earn is divided by the account balance to determine the ex post rate of interest. Similarly, for each type of deposit account, the amount of interest that banks pay is divided by the account balance to determine the ex post rate of interest. The user cost for each type of account is computed as the difference between the reference rate and the ex post rate of interest. The reference rate used in the BLS measure is the rate of interest banks earn on U.S. Treasury and Agency securities in their portfolios.[17] The user cost for loans is calculated by subtracting the reference rate from the rate of interest banks earn; the user cost for deposits is calculated by subtracting the rate of interest the bank pays from the reference rate. The user cost for each loan or deposit category is then multiplied by the loan or deposit balance for estimating the revenue for each category. Share weights for each loan or deposit category are obtained by dividing revenue for each category by total revenue.

*New bank services.* In addition to redefining the share weights, the new banking output measure expands the scope of the original BLS output series by incorporating four additional categories of fee-based services into the banking output index: loan securitization, investment banking, insurance, and other noninterest income. Commissions and fees for these services make up a growing portion of bank revenue. Loan securitization revenue represents fees associated with loans that banks no longer hold on their balance sheets but continue to service. Investment banking revenue includes the fees and commissions banks earn from investment portfolio management, financial planning services, and the brokering and dealing of debt instruments, equities, derivatives, and other financial instruments. Insurance revenue consists of the fees and commissions banks earn from the sale of insurance and annuities. Other noninterest income is a catch-all category for other fees, such as those from ATM transactions, safety deposit box rentals, and sales of bank drafts or money orders.[18] Real output for these new bank services is obtained by deflating revenues with PPIs or CPIs. Additional details can be found in appendix B. Some sources of bank revenues, such as income from the investment of banks' own funds, are considered intermediate activities and not a service banks provide to customers. These types of activities are not included in the BLS commercial banking output measure.

Changes in the composition of commercial banking services as reflected in bank revenues in 1987, 2000, and 2010 are shown in table 1. (Revenue shares for all years are available in appendix A, table A-2.) In 1987, deposit account services made up the largest share of bank revenues by far, over two-thirds. Loans were the next largest component, accounting for about 12 percent of bank revenue. At the time, fee-based services, such as investment services and loan securitization, represented small fractions of total bank revenues. The share of commercial banking revenues attributable to loans generally rose through most of the period studied, and the share attributable to deposits generally fell. These trends reversed during 2007 and 2008, as the financial crisis began to affect the industry, but the original trends continued in 2009. By 2010, the share of deposit services had dropped sharply overall, while the share of loans had grown to constitute over one-third of bank revenues.

**Table 1. Revenue shares used to weight commercial banking services, 1987, 2000, and 2010**

[In percent]

| Service | 1987 | 2000 | 2010 |
|---|---|---|---|
| Loans | 11.9 | 24.2 | 41.2 |
| Deposits | 73.0 | 41.2 | 29.0 |
| Trusts | 3.8 | 6.5 | 5.3 |
| Investment banking | .3 | 2.3 | 2.2 |
| Insurance | .0 | .6 | .5 |
| Securitization | .6 | 9.8 | 3.0 |
| Other noninterest income | 10.5 | 15.3 | 18.7 |

Similarly, the share of bank revenues attributed to fee-based services generally increased for most of the period before dropping near the end of the period. Despite these recent declines, the share of bank revenue from fee-based services has almost doubled over the full period, from 15.2 percent in 1987 to 29.7 percent in 2010.

*Other changes.* In addition to redefining the share weights used to combine component activity indexes and the expansion of coverage to include new bank services, BLS is making three smaller changes to further improve the quality of the measures. First, the trust index was eliminated; instead, revenues from fees associated with fiduciary services are now measured explicitly.

Second, commercial and industrial loan output in the original output series was measured by the number of new commercial and industrial loans. The method was changed to also include the number of existing commercial and industrial loans, which require banks' continued maintenance.[19]

Finally, the method used to estimate the output of domestic branches of foreign banks was revised. This component of commercial bank output is included through adjustments to the weights used rather than through the development of a separate output index, as was previously the case. The revenue of each loan or deposit account type is adjusted upward based on the ratio of assets and liabilities for all commercial banks to assets and liabilities for domestic branches of foreign banks. These ratios have remained fairly constant over time.[20]

## Effect of the revisions

*Impact on output trends.* The revised BLS commercial banking output measure now captures a larger portion of the services banks provide. Many of these new services grew rapidly in recent years. As a result, commercial bank output increased more rapidly than previously measured, 233 percent between 1987 and 2010 (an average of 3.8 percent per year) compared with 174 percent (an average of 2.4 percent per year).

Following the financial crisis and resulting recession that began in 2007, the value of commercial bank assets fell sharply and bank revenues from loans and some other services declined. However, several categories of bank output have continued to grow, such as time and savings deposits, service charges on deposit accounts, and other noninterest income. This continued growth is attributable to increased customer demand for bank services during the recession and the increasing popularity of deposit accounts as customers pay off their debt and increase their savings.

The effect of the changes to the weighting scheme can be separated from those resulting from the inclusion of new bank services. Shown in chart 1 are the original output index, a partially revised output index that includes only changes to the weighting scheme, and the new output index that includes both the effects of changes to the weights and the addition of the new services.[21] The "weights-only" output index rose 193 percent from 1987 to 2010, showing that a change to revenue weights more accurately captures the quickly rising output in the banking industry.

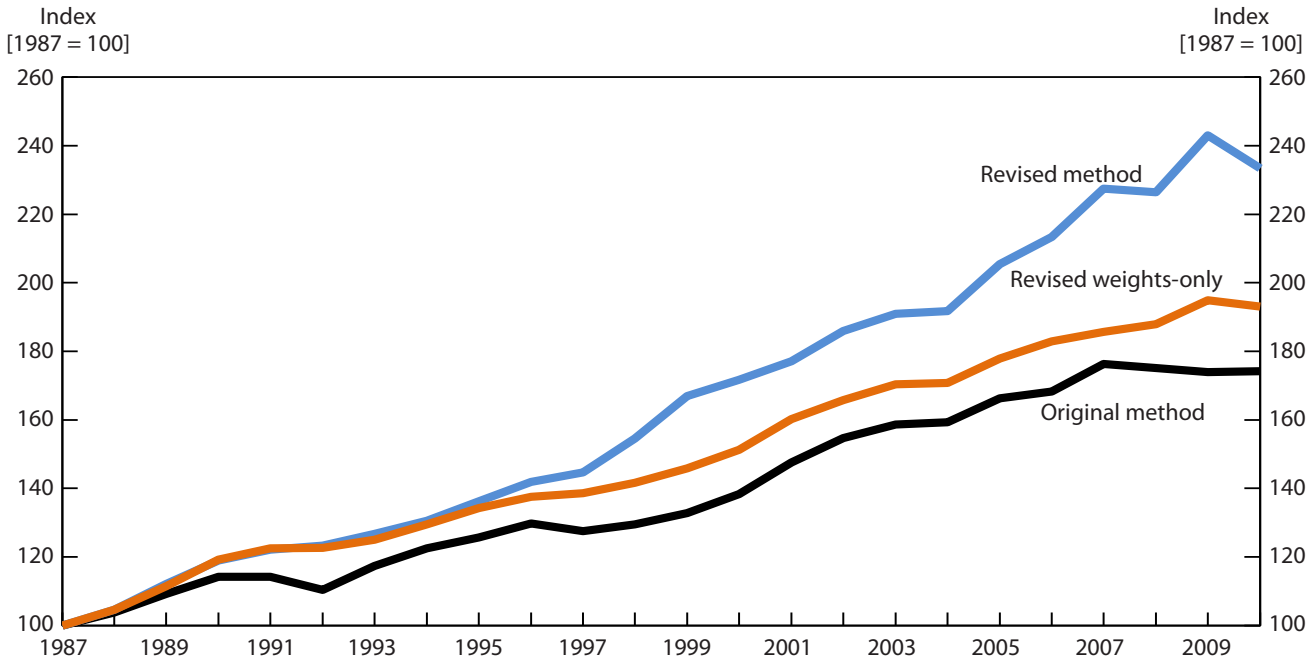
Shown in table 2 are average annual growth rates for the original commercial banking output index, the partially revised output index (incorporating only the new weighting scheme), and the new output measure. Growth rates are shown for the full 1987–2010 period and three subperiods: 1987–2000, 2000–2007, and 2007–2010. Incorporating the new weighting scheme alone caused bank output growth to increase in three of the four subperiods. The addition of the new bank services to the output measure also boosted banking output over the full period covered.

Table 3 shows the changes in the output of different categories of bank services during the full period studied and each of the subperiods. During the overall 1987–2010 period, growth in investment banking, insurance, and securitization services outpaced the growth in traditional banking services, such as demand deposits, commercial and industrial loans, and consumer loans. Investment banking grew most rapidly, 16.0 percent per year, on average, while insurance grew 13.4 percent per year and loan securitization grew 7.9 percent annually, on average. Real estate loans and credit card loans also exhibited strong growth over the full period.

During the 2007–2010 period, however, the banking crisis and economic recession resulted in a shift in the mix of banking services provided and revenues earned. Securitization services fell 23.1 percent per year, while insurance services fell 12.6 percent per year and investment banking fell 7.8 percent per year over the period. Real estate, commercial and industrial loans, and credit card loans all experienced modest declines, while consumer loans remained virtually flat. As bank lending declined, time and savings deposits and other noninterest income grew robustly, contributing to a slight increase in output from 2007 to 2010.

*Impact on labor productivity trends.* The more rapid growth in banking output resulting from the adoption of the new methodology is reflected in the growth of labor productivity. Faster productivity growth is consistent with

**Chart 1. Comparison of original, revised weights-only, and revised banking output indexes, 1987–2010**




SOURCE: U.S. Bureau of Labor Statistics.

the changes that occurred in the structure of the industry, including deregulation, increased numbers of mergers and acquisitions, and the rapid expansion of information technology, which enabled banks to sharply increase output without a concomitant increase in labor input.

Chart 2 compares the original and new BLS labor productivity indexes, illustrating the effect of the revisions that have been incorporated into the commercial banking measures. The two indexes continue to diverge, with the measures compiled using the revised methodology showing substantially more rapid growth.

Employment and average weekly hours of commercial bank employees changed little over the entire period, despite the huge increases in the quantity of services provided. This is due in part to the increased mergers of many commercial banks, which caused employment to fall, as well as to the computerization of many bank services, which reduced the time needed to perform them. As a result, productivity grew by 240 percent, or 3.9 percent per year, on average, between 1987 and 2010, as opposed to 179 percent, or 2.6 percent per year, on average, under the original method.

OVER THE LAST FEW DECADES, the structure of the commercial banking industry has changed greatly. Deregulation led to increased competition and consolidation in the industry, mergers of commercial and investment banks, and the emergence of interstate branching. In addition, new technologies have reduced costs and allowed banks to offer a variety of new services. These changes, while allowing commercial banks to improve and expand the banking services they offer, continue to make the measurement of output in the commercial banking industry challenging.

In addition, the financial crisis and the economic recession that began in December 2007 have altered the role of

**Table 2. Average annual percent change in commercial banking output, for 1987–2010 and subperiods, original, revised weights-only, and new methods**

| Method | 1987–2010 | 1987–2000 | 2000–2007 | 2007–2010 |
|---|---|---|---|---|
| Original | 2.4 | 2.5 | 3.5 | –0.4 |
| Revised weights-only | 2.9 | 3.2 | 3.0 | 1.3 |
| New | 3.8 | 4.2 | 4.1 | .9 |

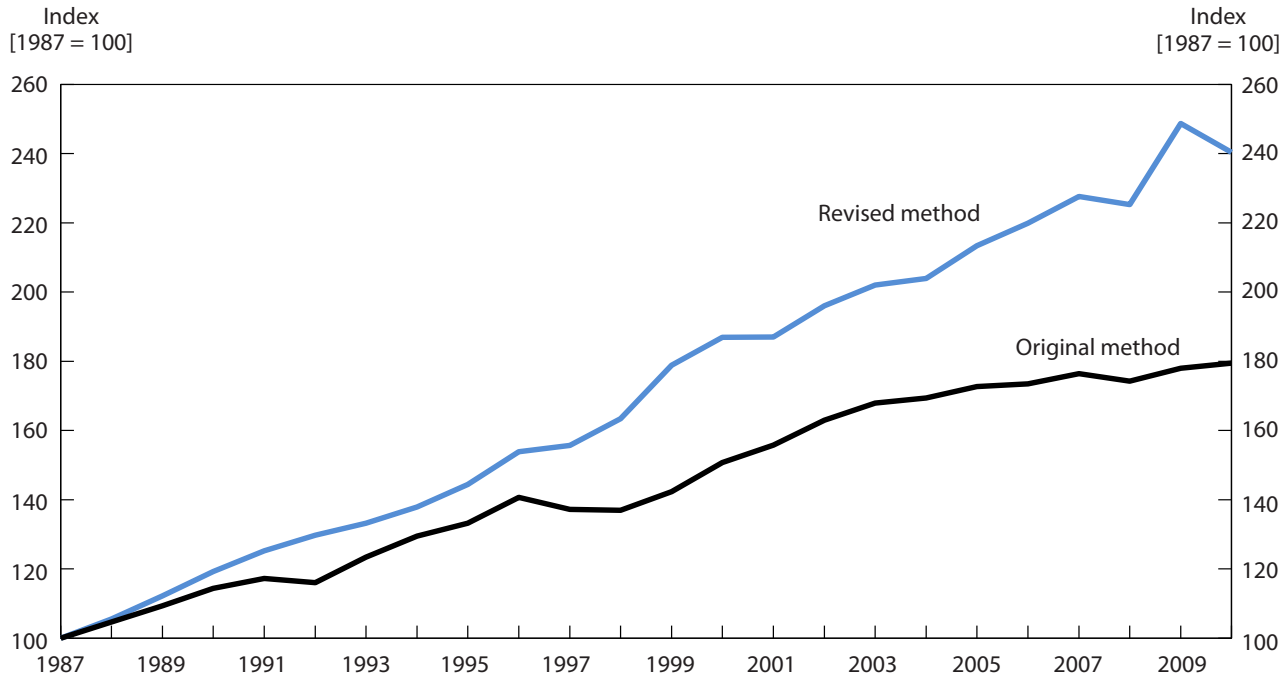
**Table 3. Average annual percent change in commercial banking services, 1987–2010**

| Service | 1987–2010 | 1987–2000 | 2000–2007 | 2007–2010 |
|---|---|---|---|---|
| Demand deposits | 2.2 | 3.1 | 2.5 | –2.6 |
| Time and savings deposits | 4.0 | 2.8 | 4.2 | 9.2 |
| Real estate loans | 5.5 | 7.0 | 5.6 | –1.1 |
| Commercial and industrial loans | 1.6 | –1.2 | 9.4 | –3.6 |
| Credit card loans | 8.4 | 11.8 | 7.2 | –2.5 |
| Consumer loans | –.2 | –4.1 | 7.2 | .2 |
| Securitization | 7.9 | 22.8 | –1.9 | –23.1 |
| Insurance | 13.4 | 23.1 | 8.7 | –12.6 |
| Investment banking | 16.0 | 26.8 | 8.6 | –7.8 |
| Trusts | 3.6 | 4.6 | 4.0 | –1.8 |
| Other noninterest income | 3.1 | 1.8 | 3.4 | 8.1 |

commercial banks in the economy. In response to the crisis, commercial banks have tightened their lending standards. Proposed regulation has sought to address some of the causes of the crisis, as well as prevent future crises, by centralizing and standardizing the buying and selling of risky investment products and limiting the amount of debt commercial banks may take on.

The improved BLS output measure better reflects the changes that have occurred in the services offered by banks, changes in the structure of the industry, and the technological advances that have taken place. At the same time, several opportunities exist to further improve the BLS commercial banking measures and to resolve remaining data inconsistencies. These include investigating alternative ways to measure the number of credit card loans rather than using the number of credit card transactions as a proxy for those loans, measure the number of consumer loans rather than estimating the number of those loans by deflating consumer loan balances, and find a more detailed breakdown of bank services data. As the industry continues to grow and change, BLS will incorporate new data and improved methods to ensure more accurate measures of commercial banking output and productivity. □

**Chart 2. Comparison of banking labor productivity indexes, 1987–2010**




SOURCE: U.S. Bureau of Labor Statistics.

## Notes

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[1] For much of the 20th century, the commercial banking industry was heavily regulated. The Glass-Steagall Act was passed in 1933 to regulate the financial industry following the collapse of the banking system at the beginning of the Great Depression. The Act created the Federal Deposit Insurance Corporation (FDIC) to guarantee the safety of most bank deposits, gave the Federal Reserve the power to regulate interest rates on deposit and savings accounts, and prohibited bank holding companies from owning other financial companies, among other things. In 1980, the Depository Institutions Deregulation and Monetary Control Act began to strip away these regulations, allowing individual banks to merge and removing the regulation of interest rates. The passage of the Riegle-Neal Act in 1994 further eased limits on banks' activities by permitting banks to operate freely across state lines. Many of the remaining restrictions instituted by Glass-Steagall were removed in 1999 with the passage of the Financial Services Modernization Act. The Act allowed commercial and investment banks to merge by permitting bank holding companies to own other types of financial services companies.

[2] Stan Sienkiewicz, "The Evolution of EFT Networks from ATMs to New On-Line Debit Payment Products," *Discussion Paper, Payment Cards Center* (Philadelphia, PA: Federal Reserve Bank of Philadelphia, April 2002).

[3] John Wenninger, "The Emerging Role of Banks in E-Commerce," *Current Issues in Economics and Finance* (New York: Federal Reserve Bank of New York, March 2000).

[4] Declining check usage is reflected in the rising number of credit and debit card transactions. From 2000 to 2003, for example, although the number of electronic payments increased by 13.8 billion, the number of checks cleared through commercial banks fell from 32.9 billion to 29.1 billion. See the 2004 Federal Reserve Payments Study for further information.

[5] Labor productivity describes the relationship between real industry output and the labor time involved in its production. The BLS commercial banking measures were introduced in the article: Horst Brand and John Duke, "Productivity in Commercial Banking: Computers Spur the Advance," *Monthly Labor Review*, December 1982, pp. 19–27.

[6] Since their introduction, the BLS series have been adjusted to account for a number of industry classification changes that occurred over time, the most significant being the conversion of the measures to the North American Industry Classification System (NAICS). The measures originally were based on the Standard Industrial Classification system. The measures also have been altered to incorporate new component data series to account for new products and services not available when the measures were introduced as well as to replace discontinued data series.

[7] C. W. Sealy, Jr., and James T. Lindley, "Inputs, Outputs, and a Theory of Production Cost at Depository Financial Institutions," *The Journal of Finance*, September 1977, pp. 1,251–1,266.

[8] Critics question whether appropriate price indexes with which to deflate bank assets and liabilities can be created. Susanto Basu and J. Christina Wang, "Technological Progress, 'Money' in the Utility Function, and the 'User Cost of Money'" (paper presented at the National Bureau of Economic Research/Conference on Research in Income and Wealth Summer Institute, 2006), suggest that constant-dollar balances "are proportional to services only under implausible conditions." These conditions include the economy remaining in a steady state and all technologies remaining stable, requirements that are unlikely to hold during a period of rapid technological change as has occurred in the banking industry. For more information, see Robert C. Feenstra, "Functional Equivalence between Liquidity Costs and the Utility of Money," *Journal of Monetary Economics*, 1986, pp. 271–291, and Susanto Basu, Robert Inklaar, and J. Christina Wang, "The Value of Risk: Measuring the Services of U.S. Commercial Banks" *Economic Inquiry,* December 2008, pp. 226–245.

[9] Diana Hancock, "The Financial Firm: Production with Monetary and Nonmonetary Goods," *Journal of Political Economy*, October 1985, pp. 859–880; Dennis J. Fixler, "Measuring Financial Service Output of Commercial Banks," *Applied Economics*, 1993, pp. 983–999; and Dennis J. Fixler and Kimberly D. Zieschang, "The Productivity of the Banking Sector: Integrating Financial and Production Approaches to Measuring Financial Service Output," *Canadian Journal of Economics*, April 1999, pp. 547–569.

[10] Dennis J. Fixler and Kimberly D. Zieschang, "User Costs, Shadow Prices, and the Real Output of Banks," in Z. Griliches, ed., *Output Measurement in the Service Sectors* (Cambridge, MA: National Bureau of Economic Research, 1992).

[11] Note that the price of bank services as implied by the user cost framework approach is not consistent with the price of bank services associated with a transactions-based output measure. This inconsistency reflects the fact that the number of transactions is not in a fixed proportion to the deflated dollar balances of deposits or loans.

[12] Some researchers argue that the interest rates must be adjusted to eliminate differences in risk, liquidity, and maturity. The risk portion of the interest rate differential represents the rate at which banks are compensated for bearing the borrower's risk. According to this viewpoint, the risk spread should be excluded when calculating the lending bank's output, because borrowers will pay the risk premium regardless of whether they finance through the bank or through capital markets. However, the elimination of the risk premium continues to be a contentious issue in the banking literature. For a discussion, see J. Christina Wang, Susanto Basu, and John G. Fernald, "A General-Equilibrium Asset-Pricing Approach to the Measurement of Nominal and Real Bank Output," in W. Erwin Diewert, John S. Greenlees, and Charles R. Hulten, eds., *Price Index Concepts and Measurement* (Cambridge, MA: National Bureau of Economic Research, December 2009), pp. 273–328.

[13] David B. Humphrey, "Productivity in Banking and Effects from Deregulation," *Economic Review*, March/April 1991, pp. 16–28.

[14] Banks' investments of their own funds are considered intermediate activities by BLS and are not included in the output measure.

[15] A Törnqvist formula is used wherever possible to aggregate real output by detailed product class, product line, or source of receipt. Consistent with production theory, the formula aggregates the growth rates of the various industry outputs between two periods, using their relative shares in industry value of production, averaged over the two periods, as weights.

[16] In recent years, a number of industry trade association surveys were discontinued or conducted less frequently, reducing the usefulness of the results. Other source data used in developing the original BLS commercial banking measures have become less relevant because of the significant changes that have occurred in the banking industry.

[17] To calculate the reference rate, divide the total interest earned on all U.S. Treasury and Agency securities by the balance of those securities held on the balance sheets of commercial banks. The data are obtained from the FDIC Call Reports.

[18] These fees may be charged for each of the individual services desired or for a "bundled" set of services. For example, the full set of services provided with the opening of a deposit account, such as unlimited ATM usage or overdraft protection, may be offered to customers as a bundle for a single fee.

[19] Changes to the method used for measuring commercial and industrial loan services led to overall growth in loan output of 12.6 percent (an average annual rate of about 0.5 percent per year) between 1987 and 2009. Before this change, commercial and industrial loan output declined 4.3 percent (an average annual rate of about –0.2 percent per year) between 1987 and 2008. The new measures now reflect the upward trend in commercial and industrial loan output over this period that also can be seen in other financial statistics.

[20] Adjusting real output using ratios of domestic banks' account balances to foreign bank branches' account balances amounts to assuming that the output of foreign bank branches is proportional to account balances in domestically owned banks. However, available data indicate that average transaction sizes at foreign bank branches can differ substantially from those for corresponding transactions at domestic banks. In particular, foreign bank branches tend to make much larger loans than domestically owned commercial banks. Therefore, a relationship between the account balances of foreign bank branches and those of domestic banks may not produce a reliable estimate of output in foreign bank branches as measured by transaction counts, partly due to the difference in average transaction sizes. Unfortunately, more reliable data are not available for estimating output for this component of the industry as it is defined under NAICS.

[21] The weights-only index is derived with the use of the deposit, loan, and trust indexes from the original BLS commercial banking measure, combined with their new revenue weights based on the data from the FDIC Call Reports. In the full revised measure, the original trust activity index, based on a physical count of the number of managed fiduciary accounts at commercial banks, is replaced by a deflated value trust index, based on FDIC revenue data.

## APPENDIX A: Commercial banking indexes and aggregation weights, 1987–2010

**Table A-1. Real output indexes for commercial banking services, 1987–2010**

[1987 = 100]

| Year | Demand deposits | Time and savings deposits | Real estate loans | Commercial and industrial loans | Credit card loans | Consumer loans | Securitization | Insurance | Investment banking | Trusts | Other non-interest income | Total output |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1987 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1988 | 103.5 | 104.6 | 103.4 | 106.0 | 109.2 | 99.4 | 113.7 | 124.1 | 146.1 | 113.5 | 101.9 | 104.6 |
| 1989 | 110.1 | 112.0 | 115.0 | 116.6 | 119.7 | 97.6 | 102.4 | 149.6 | 187.0 | 115.0 | 112.9 | 112.2 |
| 1990 | 117.1 | 120.5 | 146.7 | 113.9 | 133.5 | 90.1 | 164.4 | 184.0 | 228.3 | 121.0 | 106.6 | 119.0 |
| 1991 | 122.4 | 125.1 | 170.2 | 86.3 | 142.2 | 79.1 | 197.5 | 231.3 | 268.6 | 137.0 | 102.0 | 122.1 |
| 1992 | 127.0 | 126.0 | 147.4 | 57.0 | 155.3 | 69.9 | 190.7 | 286.6 | 292.6 | 148.4 | 107.7 | 123.3 |
| 1993 | 133.5 | 124.3 | 151.0 | 87.3 | 181.8 | 62.9 | 184.5 | 356.4 | 373.9 | 142.7 | 113.9 | 126.7 |
| 1994 | 136.6 | 124.8 | 177.8 | 87.3 | 223.3 | 61.7 | 275.2 | 421.7 | 484.8 | 148.1 | 106.2 | 130.6 |
| 1995 | 140.7 | 132.1 | 164.9 | 85.1 | 274.0 | 60.5 | 353.4 | 473.5 | 567.0 | 151.1 | 109.2 | 136.3 |
| 1996 | 145.0 | 133.2 | 180.3 | 89.6 | 306.9 | 57.3 | 498.6 | 519.7 | 654.3 | 151.5 | 114.8 | 141.9 |
| 1997 | 151.3 | 136.5 | 193.0 | 64.0 | 324.4 | 52.5 | 643.7 | 561.5 | 764.3 | 160.6 | 113.4 | 144.7 |
| 1998 | 149.1 | 139.2 | 201.6 | 67.5 | 350.1 | 54.8 | 800.0 | 888.0 | 1,156.2 | 167.4 | 134.1 | 154.5 |
| 1999 | 148.7 | 139.5 | 205.0 | 81.2 | 388.4 | 56.2 | 1,513.2 | 1,205.6 | 1,636.4 | 180.2 | 128.6 | 167.0 |
| 2000 | 148.9 | 142.6 | 241.4 | 85.9 | 426.7 | 58.3 | 1,448.4 | 1,497.5 | 2,181.2 | 180.4 | 126.8 | 171.7 |
| 2001 | 155.2 | 147.2 | 267.6 | 101.3 | 464.9 | 59.6 | 1,210.3 | 1,783.1 | 2,816.1 | 184.3 | 123.7 | 177.1 |
| 2002 | 160.1 | 143.4 | 295.3 | 118.5 | 493.9 | 65.7 | 1,288.2 | 2,026.5 | 2,792.4 | 189.6 | 137.0 | 186.0 |
| 2003 | 163.0 | 143.9 | 309.5 | 134.6 | 502.6 | 72.6 | 1,453.7 | 2,226.8 | 3,089.0 | 171.2 | 133.4 | 191.0 |
| 2004 | 161.0 | 148.0 | 301.3 | 133.5 | 549.8 | 76.3 | 1,444.4 | 2,633.0 | 2,858.3 | 179.8 | 129.6 | 191.8 |
| 2005 | 166.1 | 157.7 | 319.3 | 165.4 | 604.5 | 78.3 | 1,414.4 | 2,763.5 | 2,648.8 | 187.5 | 148.4 | 205.4 |
| 2006 | 170.6 | 170.0 | 323.9 | 149.7 | 645.8 | 83.8 | 1,330.2 | 2,675.5 | 3,317.7 | 221.6 | 157.2 | 213.4 |
| 2007 | 177.5 | 190.4 | 353.4 | 161.4 | 692.9 | 94.6 | 1,265.8 | 2,684.2 | 3,891.6 | 237.8 | 160.2 | 227.5 |
| 2008 | 176.1 | 206.1 | 363.2 | 134.1 | 697.6 | 98.2 | 1,036.7 | 2,367.6 | 3,602.6 | 230.0 | 162.0 | 226.4 |
| 2009 | 186.4 | 232.9 | 371.8 | 112.5 | 670.2 | 99.2 | 1,243.1 | 2,298.5 | 3,746.7 | 205.8 | 198.2 | 243.0 |
| 2010 | 163.8 | 248.1 | 342.2 | 144.4 | 642.5 | 95.1 | 574.7 | 1,791.3 | 3,052.8 | 225.0 | 202.2 | 233.4 |
| **Average annual percent change** | | | | | | | | | | | | |
| 1987–2010 | 2.2 | 4.0 | 5.5 | 1.6 | 8.4 | –.2 | 7.9 | 13.4 | 16.0 | 3.6 | 3.1 | 3.8 |
| 1987–2000 | 3.1 | 2.8 | 7.0 | –1.2 | 11.8 | –4.1 | 22.8 | 23.1 | 26.8 | 4.6 | 1.8 | 4.2 |
| 2000–2007 | 2.5 | 4.2 | 5.6 | 9.4 | 7.2 | 7.2 | –1.9 | 8.7 | 8.6 | 4.0 | 3.4 | 4.1 |
| 2007–2010 | –2.6 | 9.2 | –1.1 | –3.6 | –2.5 | .2 | –23.1 | –12.6 | –7.8 | –1.8 | 8.1 | .9 |

**Table A-2. Revenue weights for aggregating real output indexes for commercial banking services, 1987–2010**

[In percent]

| Year | Demand deposits | Time and savings deposits | Real estate loans | Commercial and industrial loans | Credit card loans | Consumer loans | Securitization | Insurance | Investment banking | Trusts | Other non-interest income |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1987 | 26.1 | 46.9 | 2.4 | 2.9 | 4.0 | 2.6 | 0.6 | 0.0 | 0.3 | 3.8 | 10.5 |
| 1988 | 24.3 | 46.5 | 3.3 | 4.3 | 4.2 | 2.4 | .6 | .0 | .3 | 3.6 | 10.4 |
| 1989 | 22.1 | 46.1 | 4.3 | 6.4 | 4.0 | 2.4 | .5 | .1 | .4 | 3.4 | 10.3 |
| 1990 | 22.0 | 48.5 | 3.6 | 4.5 | 4.2 | 2.4 | .9 | .1 | .4 | 3.5 | 10.0 |
| 1991 | 21.9 | 49.3 | 3.1 | 2.6 | 4.3 | 2.5 | 1.1 | .1 | .5 | 3.8 | 10.6 |
| 1992 | 23.4 | 44.5 | 3.8 | .8 | 5.0 | 3.0 | 1.3 | .1 | .7 | 4.6 | 12.8 |
| 1993 | 22.5 | 37.5 | 6.2 | 2.8 | 5.3 | 3.3 | 1.3 | .2 | .9 | 5.2 | 14.9 |
| 1994 | 21.6 | 34.7 | 7.5 | 4.3 | 5.7 | 3.0 | 2.1 | .2 | 1.0 | 5.4 | 14.6 |
| 1995 | 20.6 | 35.9 | 7.5 | 5.6 | 5.6 | 3.0 | 2.4 | .2 | 1.0 | 4.8 | 13.4 |
| 1996 | 19.9 | 38.0 | 6.3 | 4.7 | 5.1 | 3.0 | 3.3 | .2 | 1.1 | 4.8 | 13.6 |
| 1997 | 23.7 | 23.5 | 7.6 | 5.4 | 6.6 | 3.6 | 5.2 | .3 | 1.4 | 6.5 | 16.2 |
| 1998 | 21.6 | 24.1 | 6.8 | 5.3 | 6.0 | 3.2 | 6.0 | .4 | 1.8 | 6.8 | 18.0 |
| 1999 | 18.8 | 24.5 | 6.4 | 5.1 | 4.8 | 3.5 | 11.0 | .6 | 2.1 | 6.7 | 16.6 |
| 2000 | 18.2 | 23.0 | 7.9 | 8.6 | 4.8 | 2.8 | 9.8 | .6 | 2.3 | 6.5 | 15.3 |
| 2001 | 18.2 | 23.7 | 8.7 | 7.9 | 5.6 | 3.1 | 8.3 | .8 | 2.7 | 6.1 | 15.1 |
| 2002 | 15.6 | 25.4 | 9.4 | 6.0 | 5.4 | 3.5 | 8.8 | .8 | 2.5 | 5.8 | 16.6 |
| 2003 | 14.0 | 20.4 | 13.9 | 7.3 | 5.3 | 3.4 | 9.9 | 1.0 | 2.8 | 5.8 | 16.2 |
| 2004 | 13.5 | 22.6 | 12.7 | 6.2 | 6.7 | 2.9 | 9.8 | 1.1 | 2.6 | 6.0 | 15.8 |
| 2005 | 12.9 | 19.6 | 16.1 | 7.6 | 6.2 | 3.0 | 8.9 | 1.1 | 2.4 | 5.8 | 16.6 |
| 2006 | 12.9 | 18.4 | 17.2 | 8.5 | 5.2 | 3.1 | 7.9 | .9 | 2.8 | 6.3 | 16.6 |
| 2007 | 13.5 | 21.6 | 14.5 | 7.1 | 4.9 | 3.4 | 7.4 | .9 | 3.2 | 6.8 | 16.7 |
| 2008 | 14.2 | 27.5 | 11.2 | 4.6 | 4.9 | 3.5 | 6.2 | .8 | 2.9 | 6.8 | 17.3 |
| 2009 | 11.7 | 20.6 | 17.9 | 6.4 | 5.9 | 4.2 | 6.5 | .7 | 2.4 | 5.2 | 18.5 |
| 2010 | 9.9 | 19.1 | 18.9 | 6.7 | 11.5 | 4.1 | 3.0 | .5 | 2.2 | 5.3 | 18.7 |

NOTE: Individual weights may not sum precisely to 100 percent due to rounding.

## APPENDIX B: Technical note—methods and data used for measuring real output, labor input, and productivity for the commercial banking industry

The Bureau of Labor Statistics (BLS) labor productivity index for the commercial banking industry (North American Industry Classification System [NAICS] 522110) measures changes in the relationship between output and the employee hours expended in producing that output. The index is calculated by dividing an index of annual real industry output by an index of the total labor hours used during the year.

With this article, BLS introduces significant changes to the methodology used to compile the commercial banking output index. These changes address shortcomings in the previous methodology used to develop banking output and to expand the scope of the series to better reflect the structure of the industry as it has evolved over time. Changes to the methodology for compiling banking output include the use of annual revenue-based weights for combining individual banking services and the introduction of new types of services that banks began providing following the deregulation of the industry in the 1980s and 1990s.

Before this article, the BLS output measure for commercial banking was based on the physical volume of transactions falling into three broad categories of banking activity: deposits, loans, and trusts. Component indexes within each category were aggregated using weights based on employment, or labor requirement, shares. The aggregate indexes for deposits, loans, and trusts were then combined to form an output index for domestically owned commercial banks. A separate index measuring deposit and loan activity at U.S. branches of foreign banks also was developed. To derive the BLS commercial banking output index, the output index for domestically owned commercial banks was combined with the output index for U.S. branches of foreign banks.

The new methodology continues the use of physical volume-based activity indexes to measure bank services associated with deposits and loans. However, trust services are no longer measured using physical volume-based activity indexes. Revenues from fees associated with fiduciary services are deflated to obtain an estimate of the volume of trust activity. Similarly, deflated value measures also are developed for new, explicitly priced bank services, including loan securitization, investment banking, insurance provision, and other fee-based services.

The activity indexes for the deposit and loan components and the deflated value measures for explicitly priced services are combined with annual revenue share weights. These revenue share weights replace the weights based on employment shares that were used under the previous methodology. Revenues for implicitly priced bank services (i.e., the deposit and loan component activity indexes) are estimated using a user cost framework.

The methods and data sources for calculating output and labor input for the commercial banking industry are explained in detail in the following paragraphs. Occasionally, source data were missing in some years; estimates for those years are based on linear interpolation.

### Deposits

The deposit index includes component measures for demand deposit transactions and the number of time and savings deposit accounts.

*Demand deposits.* Demand deposit transactions are measured by the number of checks written by the public and cleared through the banks and the number of electronic funds transfers to the banks' customer accounts. Electronic funds transfers include, among other things, the direct deposit of paychecks and Social Security checks. The two components are added for each year, yielding an annual series of total demand deposit transactions. The check volume series is based on data the Federal Reserve System publishes, which reflects the total number of checks cleared by both the Federal Reserve System and other check-clearing systems. Cleared checks include drafts, travelers' checks, and money orders (other than postal), as well as negotiable orders of withdrawal drafts that thrift institutions, credit unions, and commercial banks issue. The source for the number of private and governmental electronic funds transfers is the Automated Clearing House.

*Time and savings deposits.* Time and savings deposit accounts include statement and passbook savings accounts, money market accounts, certificates of deposit, individual retirement accounts, and club accounts. The number of time and savings deposit accounts is based on data from the Federal Deposit Insurance Corporation (FDIC) Call Reports on the number of deposit accounts.[1]

## Loans

The loan index includes estimates of the number of real estate loans, consumer loans, bank credit card transactions, and commercial and industrial loans.

*Real estate loans.* Estimates of the number of residential and commercial mortgages are derived from data on the total and average values of real estate mortgages held by commercial banks from the FDIC Call Reports. These data are available for residential mortgages (one to four family units) and three types of commercial property: farmland, multifamily, and nonfarm/nonresidential. The number of real estate loans in each category is estimated by dividing the total annual mortgage value by an estimate of the average annual value of a residential or commercial mortgage, as appropriate. The estimates represent the total number of new and existing real estate loans; both providing new loans and servicing existing loans are resource-consuming activities of banks. The average value of a single-family mortgage in each year is estimated using data from the National Association of Realtors, the Census Bureau, and the Department of Housing and Urban Development. The American Council on Life Insurance provides the average value of a commercial mortgage in each year.

*Consumer loans.* For the years 1987 through 1997, the number of consumer loans is based on data from the Federal Reserve Board's (FRB's) Survey of Consumer Finances (SCF), the FDIC, and the BLS Consumer Price Index (CPI). An index of the number of automobile loans financed through commercial banks is calculated by dividing an index of the total value of automobile loans that commercial banks hold by an index of the average value of private automobiles that families own (based on the FRB's SCF). Similarly, an index of the number of other consumer installment loans financed through commercial banks is calculated by dividing an index of the total value of other consumer installment loans that commercial banks hold (based on data from the FDIC) by an index of the average value of consumer installment loans that families hold (based on the FRB's SCF data). The indexes are then combined using the value shares of such loans held by commercial banks as weights. For 1997 forward, the consumer loan component is based on FDIC data on the value of loans to individuals, deflated by the BLS CPI for durable goods.

*Credit card transactions.* Bank credit card transactions are measured in terms of physical volume. The trend in the number of bank credit card transactions is based on data from Visa USA and the MasterCard Association.

*Commercial and industrial loans.* The total value of commercial and industrial loans is used along with an average quarterly loan amount from the Federal Reserve Statistical Release E.2, Survey of Terms of Business Lending. This survey contains quarterly estimates of average loan size, averaged to obtain an annual average loan amount. For calculating an annual estimate of the number of loans, the total value of commercial and industrial loans is divided by the average loan amount. This annual estimate is then indexed.

Investments by the banks using their own funds are considered to be intermediate activities and are not included in output. They represent assets drawn on when demand for loans surges or added to when such demand abates.

## Explicitly priced bank services

The new BLS measures of bank output include several categories of bank services that are explicitly priced, usually as fees or commissions. These include fiduciary services, investment banking, insurance, service charges on deposit accounts, loan securitization, and a catch-all category of other noninterest income, which includes other fees for services such as ATM transactions, safety deposit box rentals, and sales of bank drafts or money orders. Revenue data for these services from 2001 to present are available from the FDIC Call Reports. For years prior to 2001, revenues were extrapolated based on related series. For investment banking, 1992 and 1997 Economic Census data are used to extrapolate the series back to 1987. Insurance revenue for 1987 to 1991 is extrapolated backward based on recent trends. Data series for fiduciary services and service charges on deposit accounts are available from the Call Reports for all years, and other noninterest income is calculated as a residual prior to 2001. The data series for securitized loan fees, which include net servicing fees and net securitization income from the Call Reports, is extrapolated before 2001, with the trend in total servicing assets.

Revenues for noninterest income are deflated with appropriate price indexes to account for changes in prices over time. Fiduciary services revenues are deflated with the BLS Producer Price Index (PPI) for trust services for 2004 to present, extrapolated back to 1987 with the personal consumption expenditure price index for trust services of commercial banks from the Bureau of Economic Analysis (BEA). Service charges on deposit accounts revenues are deflated with the CPI for checking accounts and other bank

services. Investment banking fees and commissions are deflated with an industry PPI from 2000 forward; for extrapolating the deflator back to 1987, the BEA gross output deflator for NAICS 523, securities, commodity contracts, and other financial investments, was used. Insurance fees and commissions are deflated with an industry PPI from 2002 forward; for extrapolating the deflator back to 1987, the BEA gross output deflator for NAICS 524, insurance carriers and related activities, was used. Net servicing fees and net securitization income are deflated with the CPI for financial services. The residual category of other noninterest income is deflated with the CPI for financial services, a general measure of banks' pricing practices. BLS PPIs have been used wherever possible.

For deriving the domestic banking output index, the constant-dollar indexes of explicitly priced services are combined with the BLS loan and deposit banking indexes. In the case of demand deposits, a separate index is created first to include all the services associated with these accounts. This index combines the demand deposit index and the service charges on deposit accounts index using their respective revenue weights. This composite index is then combined into the overall industry output index using an adjusted revenue weight that accounts for both interest payments and fees on deposit accounts in the calculation of its user cost price.

Ratios of the amount of assets or liabilities at all commercial banks to those at domestically owned banks, for each deposit and loan component, are derived using data from the Federal Reserve's statistical release of Assets and Liabilities of Commercial Banks. These ratios are then applied to the revenues for each loan or deposit component, incorporating an estimate of revenues for that activity at U.S. branches of foreign banks. No data are available to estimate trust activity at U.S. branches of foreign banks.

## Aggregating total output

A chained Törnqvist index is used to aggregate real output. The Törnqvist formula combines the growth rates of the various industry outputs between successive years, using their relative shares in industry revenue, averaged over the 2 years, as weights.

Revenue-based shares for most categories of bank services are based on revenue data from the FDIC Call Reports. However, revenues from loan and deposit accounts are calculated within a user cost framework. The user cost price formula can be written as

$$uc = (i/a) - r,$$

where uc is the user cost price, $i$ is the interest the bank pays or receives on the associated account, $a$ is the account balance, and $r$ is the reference rate. For calculating the estimated revenue (gross output) of each component of bank output, the user cost price for each type of account is multiplied by the balance for that type of account.

The revenues for different loan and deposit accounts are derived using data from the FDIC Call Reports on the account balances and interest paid or earned on each type of account. For calculating the ex post interest rate for each type of account, the interest paid or earned is divided by the average annual balance for each type of account. For calculating the risk-free reference rate, FDIC Call Report data on the interest earned on U.S. Treasury and Agency Securities are divided by the balances of those securities held on the balance sheets of banks.[2] For calculating the user cost of loans, the reference rate is subtracted from the ex post interest rate; for calculating the user cost of deposits, the ex post interest rate is subtracted from the reference rate.

The Törnqvist formula is used to construct the ratio of output in a given year to that in the previous year; the ratios for each year are chained together to form an index series.

## Labor input

The measure for total hours paid in commercial banking represents the sum of hours paid for supervisory workers and nonsupervisory workers. Annual hours for each category of worker are calculated by multiplying weekly hours (employment × average weekly hours) by 52 weeks. Employment data (all employees and nonsupervisory workers) and average weekly hours for nonsupervisory workers are obtained from the BLS Current Employment Statistics (CES) program. For estimating hours of supervisory workers, ratios of average weekly hours for supervisory workers relative to those of nonsupervisory workers were developed based on data from the Current Population Survey (CPS). These ratios were applied to average weekly hours for nonsupervisory workers from the CES data. NAICS industry employment and hours data are not available for NAICS 522110 from the CES program before 1990. Using methods and conversion ratios similar to those the CES program used, the Industry Productivity Program staff estimated data for 1987 through 1990. The industry is assumed to have no self-employed workers.

## Notes to APPENDIX B

[1] Reports of Condition and Income, also known as Call Reports, are submitted to the FDIC quarterly by all insured national and state commercial banks and state-chartered savings banks. These legally required reports help the FDIC monitor financial institutions' compliance with the reporting requirements of the Federal Financial Institutions Examination Council, including the observance of applicable rules, regulations, and accounting practices. The reports also provide a range of useful data on banks' operations.

[2] The Call Report category BLS uses in this calculation excludes mortgage-backed securities.