OUTPUT AND PRICE MEASUREMENT IN COMMERCIAL BANKS: EVIDENCE FROM FDIC DATA

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Abstract

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Price and output measurement of the financial services produced by commercial banks is complicated by provision of "free" services to depositors funded by net earnings from loans and other assets. To overcome this measurement problem, we apply a user-cost-of-money-based financial firm model to Federal Deposit Insurance Corporation (FDIC) data for the years 1984-88 and calculate price and quantity indexes for large commercial banks. We assess the sensitivity of these indexes to the assumptions about the opportunity cost or "benchmark" rate implicit in current and proposed national accounting methodologies for banking. We also assess the difference between price indexes designed to deflate sales valued in accounting and user-cost-of-money terms. We show that the reserve tax studied by Barnett, Hinich, and Weber (1986) is an important factor in explaining the difference between the two price measures.

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1. Introduction

The output and productivity performance of the service sector has received a great deal of recent attention, particularly the commercial banking industry, the principal provider of financial services. The measurement of their financial service output has proved challenging to national income accountants because many of the services are provided in bundles whose components may not be explicitly priced, such as the safekeeping and recordkeeping services provided by demand deposit products. Banks earn their revenue principally through an interest rate differential, although fees-for-services are a growing source of revenue.

The Bureau of Economic Analysis (BEA) measures bank output as Gross Output Originating (GPO) in constant dollars. Nominal GPO is defined as gross sales revenue less intermediate consumption and real GPO is calculated by extrapolating a benchmark value by factor based on "number of persons engaged in production." For the period 1982-1989 the measured real growth in commercial bank output is 5.5% and the growth in the implicit price index for the same period is 89%. The advances in information processing technology and the financial product innovation over this period, contrasted with the modest measured rate of growth, suggests a need for reevaluating the extrapolation methodolgy.

The extraoplation method is not BEA's preferred method, which is to calculate real value added via double deflation, but is used because a sales deflator for the commercial banking industry is not available. We approach this price measurement problem using the user cost of money-based financial service price measurement model presented in Fixler (1988). We evaluate the methodology by

applying it to Federal Deposit Insurance Corporation (FDIC) data and calculate price and quantity indexes for large commercial banks.

To compensate for the undervaluation of bank output arising from "free" services both the Bureau of Economic Analysis and the UN Statistical Office (UNSO) include an imputation of the uncharged-for financial services sold to business and final consumer in their measure of bank financial service output.[1] Fixler and Zieschang (1991) show that in a financial firm optimization model the difference between BEA's imputation and UNSO's imputation can be characterized as a difference in the method of calculating the opportunity cost of bank funds. Withon our price measurement model, we calculate price and quantity indexes for the different imputation methods.

The financial service production of commercial banks may be divided into two categories consistent with FDIC data: (i) intermediation and production of monetary services and (ii) all other services such as data processing, safe deposit box rental, trust management, and "corporate payments services" including specialized transaction services and payroll processing. Accordingly, our definition of output is the collection of financial services attached to 29 financial products, of which 25 are asset/liability products and 4 are fee-for-service financial products. Using the data collected quarterly in FDIC reports of condition and income (the "call" reports) for large banks in the years 1984-1988, we find that the measured output growth is insensitive to the method of imputation. Under either imputation approach, the measured output increased by about 56% and prices declined by about 7%. To discover how much of this growth was due to the intermediation/monetary services, we computed quantity indexes without the 4 fee-for-service products and obtained an output growth over the five year period of 48%. This finding suggests that a significant source of bank financial service output lies in financial products that are neither loans nor deposit products, the common bank financial products.

Using a similar monetary services price measurement framework and source of data, Barnett, Hinich, and Weber (1986), found a substantial nominal tax burden arising from the required reserves regulations of the central bank. We confirm their results for the large banks we examine, and estimate of the economic cost of the reserve requirement tax at about 4 to 5 percent of economic revenue. However, we find that the reserve tax contributes only modestly to the rate of price change in accounting terms.

The remainder of the paper is organized in the following way. Section 2 discusses the formulation and computation of the bank output price index, and a decomposition of the difference between economic and accounting revenue. Section 3 presents the empirical analysis. Section 4 concludes.

2. The Bank Output Price Index

Fixler (1988) derives a superlative Tornqvist commercial bank output price index and the corresponding implicit and explicit quantity indexes. The Tornqvist formula, as shown in Caves, Christensen, and Diewert (1982), is an exact index number for Translog flexible functional forms and when chained can accomodate changes in technology over time. The output price is defined as the price of the financial service bundle attached to each dollar in a financial product; that is, the price is a rate per dollar in a product. Thus bank financial service output is measured in monetary units.

The construction of the financial service prices relies on the user cost of money concept developed in Donovan (1978) and Barnett (1978, 1980) and applied to financial firms in Hancock (1985). One of the advantages of the user cost formulation is that it provides a method for imputing the value of the uncharged-for financial services that has a microeconomic foundation.

The user cost of a financial product measures the negative of the economic return to the bank for providing the financial service and its form depends on the product's asset/liability classification. The user cost of the *ith* asset financial product in period t is given by

(1) $$u_i^t = \rho^t - h_a^t$$

where ρ is the bank's opportunity cost of money and h_a is the holding revenue obtained from the ith asset. The user cost for the *ith* liability financial product is given by

(2) $$u_i^t = h_l^t - \rho^t$$

where h_l denotes the holding cost rate for the ith liability product.[2]

The sign of the user cost can be either positive or negative and this feature allows one to characterize products as *financial* inputs and outputs. A positive user cost denotes a financial input and a negative user cost a financial output. These characterizations only refer to the role of the product in the financial operations of the firm; that is, the characterization is distinct from our definition of output which is the collection of financial services attached to financial products. Thus a demand deposit product can be a financial input in the sense that its funds are used in loan creation while the attached financial services are included as the final output of the bank.[3]

Banks are assumed to maximize economic variable profit or revenue

$$E = p \cdot y$$

where the vector of financial service prices, measured as rates per dollar in financial products y_i, are given by $p_i = -u_i$, $i = 1, \ldots, n$. The corresponding sign convention for y_i is that its sign is the opposite of the sign of the corresponding u_i. Revenue is maximized by selecting the optimal portfolio of asset and liability financial products

$$E^* = \Pi(x,p) \equiv Max_y[p'y:(x,y) \in T]$$

where x is a fixed vector of inputs, which includes physical capital assets such as buildings and equipment, and T is the production possibility set.

If the profit function is translog with parametric prices, then a "Fisher" version of the output price index is:

$$(3) \qquad P(p^{t-1},p^t) = \left[\frac{\Pi^{t-1}(x^{t-1},p^t)}{\Pi^{t-1}(x^{t-1},p^{t-1})} \times \frac{\Pi^t(x^t,p^t)}{\Pi^t(x^t,p^{t-1})}\right]^{\frac{1}{2}}$$

which is equivalent to the following Tornqvist index

$$(4) \qquad P(p^{t-1},p^t) = \left[\prod_{i=1}^{n} \frac{p_i^t}{p_i^{t-1}}\right]^{\frac{1}{2}(s_i^{t-1}+s_i^t)}$$

where s_i is the *ith* product's share of financial revenue.[4] Nonfinancial inputs are held constant at their reference period values. When the financial input-output status of any product changes between compared periods, the price index is calculated according to the Fisher Ideal formula rather than the Tornqvist formula. Our use of the Fisher Ideal formula in such an event derives from Diewert and Morrison (1986), who consider the conceptually similar problem of a change in the sign of net exports in a terms of trade index. They point out that the Caves, Christensen and Diewert superlative index number result previously cited holds only for strictly positive prices and quantities. A change in financial input-output status violates that condition.[5]

Thus far we have considered economic prices and revenue. An examination of revenue measured in accounting prices is also of interest because financial statements are the most widely used and easily obtained source of information on

bank performance. In addition, an examination of the difference between accounting and economic revenue can shed light on, *inter alia*, the magnitude of the effective tax imposed by the central bank through reserve requirement regulations.

Accounting revenue is given by the sum of interest revenue, service fee revenue on deposit products and capital gain income less interest expense as

$$A^t = \sum_{i=1}^{n_a} h_{ai}^t a_i^t - \sum_{j=n_a+1}^{n} h_{lj}^t l_j^t$$

where without loss of generality, we arrange the product vector y so that the first n_a elements are assets, the remaining n_l elements are liabilities, and $a_i = |y_i|$ if $i \leq n_a$ and $l_j = |y_j|$ if $j > n_a$. We define the accounting-price-adjusted output price index as

$$AP(h^{t-1}, h^t, u^{t-1}, u^t, p^{t-1}, p^t) = \Delta(h^{t-1}, h^t, u^{t-1}, u^t) P(p^{t-1}, p^t) \tag{5}$$

where Δ is the accounting price adjustment factor for the difference between the accounting holding revenue vector h and the user cost price vector p. Following Reece and Zieschang (1987), Fixler (1988), and Fixler and Zieschang (1991), the form of the economic price to accounting price conversion factor Δ is

$$\begin{aligned}\Delta(h^{t-1}, h^t, u^{t-1}, u^t) &= \frac{-\sum_{i=1}^{n_a}\left[h_i^t/u_i^t\right]\left|s_i^t\right| + \sum_{j=n_a+1}^{n}\left[h_j^t/u_j^t\right]\left|s_j^t\right|}{-\sum_{i=1}^{n_a}\left[h_i^{t-1}/u_i^{t-1}\right]\left|s_i^{t-1}\right| + \sum_{j=n_a+1}^{n}\left[h_j^{t-1}/u_j^{t-1}\right]\left|s_j^{t-1}\right|} \\ &= \frac{1+(A^t - E^t)/E^t}{1+(A^{t-1} - E^{t-1})/E^{t-1}}\end{aligned} \tag{6}$$

The implicit quantity index that results from the use of the accounting price index AP as a deflator of accounting revenue A is the same as the one obtained with deflating economic revenue E with the price index P. The reason is that both the numerator and denominator of the implicit quantity index obtained by deflating accounting revenue include the factor Δ, and are otherwise identical to the numerator and denominator of the implicit quantity index obtained by deflating economic revenue.

The difference between the levels of accounting revenue A and economic revenue E appearing in equation (6) can be written as:

$$(7) \qquad A - E = \rho\left[\sum_i a_i - \sum_j l_j\right] + \rho\sum_j k_j l_j \ .$$

recalling that a_i represents the dollar volume of the ith asset product, and l_j the dollar volume in the jth liability product. k is the total reserve ratio for the jth liability product.[6] The first summand in this expression is the opportunity cost of net assets, the opportunity cost in income foregone of funds invested for owners of and lenders to the banking enterprise. (Lenders to the enterprise would include, for example, holders of subordinated debt and mortgages on the bank's building(s).) The second summand is the reserve tax discussed by Barnett, Hinich, and Weber (1986).[7]

3. Empirical Analysis

After describing some salient features of the FDIC data employed, we turn to the construction of the user costs and the indexes.

Data. The data set is the same as that used in Fixler and Zieschang (1990). Our analysis uses a "large bank" subset of the approximately 13,000 commercial banks that are covered by deposit insurance and therefore in the FDIC "call report" file. We consider only the banks that have international operations or assets over 300 million dollars (FDIC classes FFIEC031 and FFIEC032). This gives us a sample of about 450 banks for each of the years 1984 through 1988, representing about 3.2% of the commercial banks insured by FDIC in each year. Although the percentage of the number of banks included is small, our bank sample represents a large fraction of total deposits for all FDIC reporting institutions. For example, in 1988 our sample covered about 54% of all FDIC insured deposits.

Construction of the User Costs. Our construction of the user costs, holding costs and holding revenues follows the procedure in Fixler and Zieschang (1990). The complete expression for holding revenue of the *ith* asset is given by

(8) h_i = interest rate received + capital gain rate – provision for loan losses.

and the expression for the holding cost of the *jth* liability is given by

(9) h_j = interest rate paid – service charge rate + $\rho \times$ reserve requirements.

To calculate the interest rates used in the analysis, we sum annual income for a particular asset or liability product for all banks in the sample and divide it by the annual average of the corresponding aggregate balance sheet item. The "call report" income statements are annually cumulative so fourth quarter reports include activity over the entire year. We include 18 asset products: 10 loan products, 6 security products, Lease Financing and Balances Due From Depository Institutions. There are 7 liability products (excluding equity) including 3 domestic branch deposit

products, 2 foreign branch deposit products, Federal Funds, and Demand Notes issued to the U.S. Treasury. The 4 fee-for-service products are Fiduciary Activities, Trading Gains and Fees from Foreign Exchange Transactions, Other Foreign Transactions Gains, and Other Noninterest Income. Other Noninterest Income is a catchall category that includes corporate payments services. Details on the covered asset and liability products are provided in the Appendix. Service charges per dollar are estimated by the ratio of total service charge income to the annual average of interest and non-interest bearing deposits in domestic branches. This amount is then subtracted from the interest rates for these deposit products.

The most difficult step in constructing the user costs is the specification of a bank's opportunity cost of money. We calculate the opportunity cost as a weighted average of the return on variable assets (including capital gains) and the interest rate paid on liabilities. Specifically,

$$\rho = (1-\lambda)[\bar{r}_a - \bar{g}] + \lambda \bar{r}_l \;\; ; \;\; \lambda \in [0,1]$$

where the overbar denotes the average value and r_a is the bank's interest rate on assets, g is the capital gain rate and r_l is the bank's interest rate on liabilities. The interest rate on liabilities represents the minimum return that the bank would need to cover the costs of liabilities, considering both service fees and reserve requirements. The rate of return on variable assets (assets other than buildings, equipment, etc.) is the rate of return that the bank earns on its financial assets and therefore qualifies as an upper bound to the opportunity cost of money.

As mentioned earlier, our specification of the opportunity cost of money allows the financial firm model to subsume the standard national accounting techniques for measurement of bank output. The Bureau of Economic Analysis' method for imputing sales of financial services to business, households, government and foreigners is based on the assumption that the services provided each sector are proportional to its deposits. Fixler and Zieschang (1991) show that this equivalent

to setting $\lambda = 0$. The proposed sectoral imputation method of the United Nations Statistical Office (1990) allocates gross sales proportionate to the sum of sectoral deposits and loans, and thereby effectively assumes that the opportunity cost is an average of the interest rate on loans and the interest rate on deposits, that is $\lambda = 0.5$.

We set the capital gain term equal to zero in all user cost expressions that correspond to nonmarketable assets. This leaves the following security products for which a capital gain term is relevant: Assets held in Trading Accounts, US Treasury Securities, US Government Agency and Corporate Obligations, State and Local securities, Other Domestic Securities (mainly mortgage-related securities and Federal Reserve stock) and Foreign securities. Although an informal market has formed for commercial and industrial loans, it had little impact over the 1984-88 sample period. We assume these and other loans were not marketable and thus had zero capital gain rates. We also assume a zero capital gain rate for foreign securities because of a lack of data. Because they are held for a short-time, capital gains on assets held in trading accounts are likely to be realized, and we use realized gains on trading accounts reported to the FDIC to compute the capital gain rate for the category.

We approximate the capital gains for Treasury securities and US Government agency and corporate obligations by using the average total return data from the Merrill-Lynch Government Master Bond Index. This index includes various maturities of Treasury securities and US Agency securities. The total returns include both the market interest rate and the rate of capital appreciation, and therefore are substituted for the sum of r_a and g in the holding cost expression.

The market interest rate and capital gain terms for the Other Domestic Securities category are approximated by the total return data from the Merrill-Lynch Mortgage Master Index. All securities in this category were imputed with

the Mortgage Master total return rate, though this category is not solely composed of mortgaged-backed securities.

To measure changes in the total return to holding State and Municipal securities we examined the Lipper index for the performance of a collection of tax-exempt mutual funds. We impute the tax-equivalent return for State and Municipal securities by setting the Federal tax rate at 46% for the years 1984 through 1986, 40% in 1987 and 34% in 1988. These are the maximum statutory rates and are appropriate for the large banks in our sample. In calculating this imputation we did not consider the changes in the allowable interest deduction for purchases of tax-exempt securities because there was insufficient information in the data set to apply the revised tax rules precisely.

Results. Price indexes were computed using aggregate data for the banks selected. The price index is a chain of successive indexes; each component of the chain was calculated using equations (3)-(5) with the price and accounting data for years t and t-1. The index level is normalized to 1984 equals 100.

Because there was at least one product whose user cost changed sign in four of the five years, the output price and quantity indexes are calculated with a Fisher Ideal index formula (instead of the Tornqvist index formula). Since Fisher Ideal indexes are self-dual, there is no difference between the implicit and explicit quantity indexes. Recall that in any period there is no difference between the economic real output and the accounting real output.

Table 1 contains the calculations. In addition to the values of the opportunity cost rate implied by the BEA and UNSO imputation methods, we calculated the indexes using the 90-day Treasury Bill rate as the opportunity cost of money. There are two reasons for considering this rate. First, it represents a riskless opportunity cost of money available to all banks. Second, it is exogenous to the FDIC data. Regardless of the opportunity cost rate used, we find that the price and output

trends are similar. Prices decline by about 8% over the five year period while output grows by about 56%. Table 1B shows the price and quantity indexes when the 4 fee-for-service products are excluded. Prices decline by about 9% and output grows by about 48%. Clearly, most of the growth in the financial service output can be attributed to the 25 intermediary/monetary service goods. A number of factors underlie the movement of the quantity indexes during the 1984-88 period. Prominent are: the deregulation of interest payments on deposits, the relaxation of merger laws, the increase in the number of bank failures, the increase in loan loss reserve funds, which affect our computed rate of return on assets, and the interest rate volatility arising from general economic conditions. Although not displayed in Table 1, the difference between the price index with and without the accounting price adjustment factor is modest. Depending on the opportunity cost rate used, application of the accounting price adjustment Δ would have resulted in an accounting price index of 3.8 to 5.4 percent below the economic price index in 1988, an average annual difference in index change of about 1 per cent over the sample period.

Our finding that measured output growth is insensitive to the imputation method implies that one can obtain an accurate picture of output movements in the banking industry without undue concern over the particular measure of the opportunity cost rate. However, the insensitivity of price change to the imputation method does not imply that nominal financial service levels would be allocated by the BEA and proposed UNSO accounting regimes in the same way across the intermediate and final sectors in the national income and product accounts. If the pattern of loan and deposit activity differs markedly between the intermediate and final consumption sectors, the method for determining the opportunity cost of money, sometimes referred to as the "reference rate" in recent national income accounting discussions, can affect the measured level of final sales of financial

services.[8] Imputation methodology can therefore still effect the measured importance of financial services in Gross Domestic Product.

To provide a clearer picture of the user-cost-based financial service price, we provide in Table 2 the deposit user cost prices in every year for the different opportunity cost rates. The user cost price can be viewed as the sum of the imputed value of the uncharged-for financial services and the explicit service charges. As stated earlier, the sign of the user cost denotes a product's financial input-output designation. A positive sign denotes a financial input and a negative sign denotes a financial output. Observe that for three of the five deposit products the sign of the user cost is unaffected by the opportunity cost rate and that for a given opportunity cost rate the sign does not change. However, for two products, Domestic CDs and All Other Foreign Deposits, the opportunity cost rate affects the sign of the user cost. In the case of Domestic CDs we see that for the BEA opportunity cost rate, the user cost is relatively large and always positive, while under the other two opportunity cost rates the user costs are numerically small and there is no pattern to the sign. Given the size of the BEA based opportunity cost rate, it is not surprising that we find large positive user cost prices; the higher value of the opportunity cost rate means that the imputed value of the uncharged-for financial services is higher. For the other two opportunity cost rates, Domestic CD's appear to be neither financial inputs nor outputs because their interest expense nearly offsets the return. Similar reasoning applies to the case of All Other Foreign Deposits.

Tables 1 and 2 reveal three interesting empirical findings. First, as already shown above, there has been a substantial growth in fee-for-service products. However, our estimated growth in these products is probably biased because we had to impose a price relative of 1, there being no data on either the prices or quantities of these services in the FDIC "call" reports.[9] Banks are interested in this fee-for-service business because it helps to insulate them from volatility in the financial

markets. Moreover, as stiffer capital requirements are imposed and insurance premiums increase, the fee-for-service business becomes increasingly attractive.[10]

Second, the difference between economic and accounting revenue highlights the importance of the reserve requirement tax. Earlier, we showed in equation (7) that a source of the difference between economic revenue and accounting revenue, A-E, is the reserve requirement tax imbedded in the user cost of liability financial products, given by

$$p\sum_j k_j l_j \ .$$

Not surprisingly, we find that the magnitude of the reserve tax depends on the opportunity cost rate used. As can be seen below the tax amounts to about 4-5% of economic revenue:

Opportunity. Cost Rate	Average Effective *Ad Valorem* Reserve Tax Rate on Economic Revenue (E)
BEA	5.340%
UNSO	4.408%
T-Bill	3.896%.

In addition, over the period examined an average of 19.4% of the difference between economic and accounting revenue is explained by the opportunity cost on reserves. This percentage is invariant to the opportunity cost rate because both components of A-E, the opportunity cost of net assets and the opportunity cost of required reserves, are proportional to the opportunity cost rate. The contribution of this regulatory effect to the accounting price adjustment is therefore quite small, and hence the impact of the reserve tax on the rate of change in the price of banking services output is less important than its effect on the output price level.

Third, there is a difference between our growth rates of output and those reported by BEA. BEA measures industry GNP as Value Added or Gross Product Originating, where Value Added = Industry Gross Output (Sales) - Industry

Consumption of Purchased Goods and Services. Our focus here is on gross output only. Real GNP for banking is calculated by extrapolating the base year value by an indicator series, such as number of employees and hours worked or quantity of goods and services sold, whereas we calculate output quantity indexes. Furthermore, there is a difference in the number and types of banks considered. The Banking category in the SIC code, SIC 60, which is the basis for the BEA calculations, contains Federal Reserve Banks, Commercial Banks, Savings Institutions, Credit Unions, Foreign Banking and Branches and Agencies of Foreign Banks, and Establishments Performing Functions Related to Depository Banking. We only consider institutions insured by the FDIC, mostly commercial and savings banks.

The published BEA figures for Real Gross Product Originating in 1982 dollars for years 1984 to 1987 yields the following output indexes:[11]

Year	Index, Real GPO
1984	100.0
1985	101.4
1986	103.1
1987	103.6

Observe that these quantity indexes are substantially less than the quantity indexes that we compute under either the BEA or UNSO imputation of the opportunity cost rate.

4. Conclusions

In this paper we have constructed price and quantity indexes for large banks that are based on Fixler's (1988) synthesis of the Donovan-Barnett-Hancock financial firm model and the exact index number theory of Diewert (1976) and Caves, Christensen, and Diewert (1982). We have used results from Fixler and Zieschang (1991) to construct price and output measures consistent with the sectoral imputation methods for uncharged-for financial services under current and proposed

national income accounting practice for the banking sector. We found that in contrast to published figures output growth has been considerable over the years 1984-1988, and that the finding is not sensitive to the method of imputation. We have also shown that the reserve requirement tax explains a substantial fraction of the gap between economic and accounting revenue. However, despite the impact of this regulatory effect on the value of banking services at accounting prices, we find only a modest direct impact on the rate of price change.

ENDNOTES

[1]The UNSO imputation discussed here is a proposed revision to the current UN System of National Accounts. The current SNA (1968 Revision) treatment is widely recognized as deficient in its treatment of financial services.

[2]Barnett (1980) and Hancock (1985) derive these equations. To simplify the analysis we ignore the ramifications of discounting and taxes.

[3]For a detailed discussion of this point see Fixler (1988).

[4]The Caves, Christensen, and Diewert (1982) Translog Identity underlying this result requires that the coefficients on the squares and interactions of the logarithms of the arguments be the same in the translog revenue functions from the two periods compared. The coefficients on the terms of order one can be completely arbitrary, however. By implication, technology is permitted to change as indexes are constructed for different pairs of time periods.

[5]Adding to the appeal of the Fisher Index are the recent results in Diewert (1989) which indicate that, in a manner analogous to the Tornqvist results of Caves, Christensen and Diewert, the Fisher formula is exact for a generalized quadratic aggregator function that may differ between the periods compared. A precident for using the Fisher index for monetary aggregates under related circumstances to ours is Fayyad (1985), who uses the Ideal formula to replace the Tornqvist for chain links involving new monetary goods.

[6]The total reserve ratio is greater than the average required reserve ratio because excess reserves are included in the former. We use the term "average required reserve ratio" because the required reserve rate varies by type of account and total deposits. Our interest income and expense data was not sufficiently detailed to compute exact reserve requirements by type of deposit represented on the Report of Income, so we applied the average reserve rate in computing the user cost price for deposits.

[7]Our estimate of the reserve tax is an upper bound, which would be exact only if banks would never hold currency and coin and deposits with Federal Reserve Banks in the absence of regulations requiring them to do so.

[8]For example, this terminology appears in United Nations Statisical Office (1990, p. 13).

[9]Although the direction of bias is unknown, the largest component of fee-for-service income, Other Noninterest Income, contains computer intensive services that may actually be falling in price. Output growth for this category may therefore be understated by assuming no price change over the period.

[10]Congress has recently given the FDIC the authority to substantially increase the premiums paid for deposit insurance.

[11]Figures from the *Statistical Abstract of the United States, 1989*, page 484. Data renormalized to 1984=100. 1988 data unavailable.

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Table 1A
All Financial Products
18 Asset, 7 Liability, and 4 Fee-for-Service Products

	Fisher Ideal Economic Price Indexes			Fisher Ideal Quantity Indexes		
Year	$\rho = r_{T90}$	$\rho = r_{TA}$	$\rho = r_{UNSO}$	$\rho = r_{T90}$	$\rho = r_{TA}$	$\rho = r_{UNSO}$
1984	100.00	100.00	100.00	100.00	100.00	100.00
1985	113.02	109.95	110.38	115.03	114.59	114.91
1986	102.26	99.51	99.44	135.01	134.78	134.98
1987	67.17	67.35	66.19	147.57	148.04	147.84
1988	94.02	92.39	92.03	155.89	156.63	156.27

Table 1B
All Financial Products Except Fee Services
18 Asset and 7 Liability Products

	Fisher Ideal Economic Price Indexes			Fisher Ideal Quantity Indexes		
Year	$\rho = r_{T90}$	$\rho = r_{TA}$	$\rho = r_{UNSO}$	$\rho = r_{T90}$	$\rho = r_{TA}$	$\rho = r_{UNSO}$
1984	100.00	100.00	100.00	100.00	100.00	100.00
1985	118.43	114.36	114.72	114.59	113.93	114.41
1986	103.24	98.57	99.24	135.34	135.09	135.34
1987	52.95	51.85	51.50	140.15	140.27	140.30
1988	93.05	89.81	90.19	147.05	147.48	148.33

Table 2
Deposit User Costs
Cents Per Dollar[a]

Year		Non-Interest-Bearing Deposits in Domestic Offices	Domestic Certificates of Deposit at Least $100,000 Denomination	All Other Domestic Deposits	Non-Interest-Bearing Deposits in Foreign Offices	All Other Foreign Deposits
1984	$\rho = r_{T90}$	-9.91	0.30	-1.40	-9.52	1.50
	$\rho = r_{REA}$	-11.62	-1.41	-3.11	-11.23	-0.21
	$\rho = r_{UNSO}$	-10.09	0.12	-1.58	-9.70	1.32
1985	$\rho = r_{T90}$	-7.88	0.81	-0.39	-7.47	2.06
	$\rho = r_{REA}$	-10.97	-2.28	-3.48	-10.56	-1.03
	$\rho = r_{UNSO}$	-9.12	-0.43	-1.63	-8.71	0.82
1986	$\rho = r_{T90}$	-6.38	0.93	-0.07	-5.97	1.89
	$\rho = r_{REA}$	-9.36	-2.05	-3.05	-8.95	-1.09
	$\rho = r_{UNSO}$	-7.67	-0.36	-1.36	-7.26	0.60
1987	$\rho = r_{T90}$	-6.24	0.62	-0.45	-5.78	2.20
	$\rho = r_{REA}$	-7.42	-0.54	-1.63	-6.96	1.02
	$\rho = r_{UNSO}$	-6.73	0.15	-0.94	-6.27	1.71
1988	$\rho = r_{T90}$	-7.16	0.14	-1.08	-6.67	2.37
	$\rho = r_{REA}$	-9.59	-2.29	-3.51	-9.10	-0.05
	$\rho = r_{UNSO}$	-8.11	-0.81	-2.03	-7.62	1.42

[a]Positive values indicate the item is an input, negative values indicate output status.

Appendix. Financial Products

Output Class	Description
Loans and Leases	
y_1	Secured by Real Estate
y_2	Commercial and Industrial
y_3	Loans to Individuals
y_4	To Depository Institutions
y_5	To Farmers
y_6	Acceptances of Other Banks
y_7	To Foreign Governments
y_8	Non-Security Obligations of States
y_9	All Other Loans in Domestic Offices
y_{10}	Loans in Foreign Offices and Edge and Agreement Corporations
y_{11}	Balances Due from Depository Institutions[a]
y_{12}	Leases
Securities	
y_{13}	Federal Funds Sold and Repurchase Agreements
y_{14}	U.S. Treasury Securities and Agency Obligations
y_{15}	Securities Issued by States and Political Subdivisions
y_{16}	Other Domestic Securities (Debt and Equity)
y_{17}	Foreign Securities (Debt and Equity)
y_{18}	Securities in Trading Accounts
Fee Services	
y_{19}	Fiduciary Activities
y_{20}	Trading Gains and Fees from Foreign Exchange Transactions
y_{21}	Other Foreign Transactions Gains
y_{22}	Other Noninterest Income
Deposits and Other Liabilities	
y_{23}	Non-Interest-Bearing Deposits in Domestic Offices
y_{24}	Certificates of Deposit at Least $100,000 in Domestic Offices
y_{25}	All Other Deposits in Domestic Offices
y_{26}	Non-Interest-Bearing Deposits in Foreign Offices
y_{27}	All Other Deposits in Foreign Offices
y_{28}	Federal Funds Purchased and Repurchase Agreements
y_{29}	Demand Notes with the U.S. Treasury

[a]Excludes Balances Due from Federal Reserve Banks. These are reserve items, the cost of which is accounted for in the user cost of deposit liabilities.