Revised Nominal Measures of the Implicit Services of Financial Intermediaries

in the National Income and Product Accounts

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Following the approach developed by Fixler and Zieschang (1999) and in the System of National Accounts of 1993 (SNA 93), which is based on theory developed by Barnett (1978; 1980), Hancock (1985), and Anderson, Jones and Nesmith (1997a; 1997b), we measure the financial services associated with banks' financial assets by the product of the value of these assets and the "user cost" of these assets. The user cost of bank assets is defined as the spread between the rate of interest they yield for the bank and the opportunity cost of the funds needed to finance these assets, which is assumed to equal a risk-free "reference rate". Similarly, financial services to depositors are valued based on the user cost of deposits, defined as the spread between the reference rate and the rate of interest that the bank pays. This spread represents the amount that the depositors implicitly pay for the services of the bank when they forego the interest income they could earn by investing their funds at the reference rate and instead accept the lower rate that the bank pays on deposits.

Implementation of this user cost approach in the NIPAs would require solutions to conceptual measurement issues such as how to measure the reference rate, how to treat bank assets other than loans, how to treat equity capital (or "own funds" in the terminology of the SNA) that is loaned to customers, and how to handle activities of Federal Reserve Banks. In addition, many practical measurement issues arise. The paper investigates these issues and discusses the

possible effects that the revised user cost approach to measuring bank output would have on the national accounts.

I. Introduction

Because banks do not charge explicitly for a significant proportion of the financial services that they provide, how to value bank output has been a topic of much discussion in the national accounts literature. In national income accounting, interest payments, which banks rely on for much of their income, are generally treated as a distribution of income by business to providers of capital, not as a payment for services. Yet since banks and similar financial intermediaries are net recipients of interest (that is, the "net interest paid" used to compute national income is negative) treating their interest flows as distributions of income has the unsatisfactory implication that these businesses are consumers of society's income rather than producers of services for customers. To avoid this result, the national income and product accounts (NIPA's) have long included an imputation for implicit financial services equal to the gap between the interest that banks receive from borrowers and the interest that they pay to depositors and other providers of funds. This imputation is allocated to depositors.[1] The view that all the implicit services are provided to depositors derives from the notion that depositors are the ultimate lenders and that the net interest belongs to them.

This view, however, does not account for banks' role as financial intermediaries. In that role banks transform deposits into earning assets via the provision of many financial services. In particular, banks provide services related to the provision of credit that overcome problems of asymmetric information and that transfer risk to the bank. Banks devote staff time and other resources to activities that serve borrowers, such as processing loan applications and loan payments, making underwriting decisions, counseling borrowers, assisting borrowers with liquidity management, risk bearing, and record keeping. Furthermore, borrowers who choose to pay interest to banks rather than reduce their holdings of financial assets paying a lower rate of interest may be assumed to receive enough value from this arrangement to make its costs worth

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[1] European countries currently treat the implicit financial services as an intermediate input to a fictitious sector, thereby keeping them out of GDP. Starting in 2005, the implicit services will be allocated to depositors and borrowers.

bearing. Historically, banks were virtually the only source of credit to many households and businesses, and burgeoning needs for credit services were a major impetus for industry growth. Accordingly, the measure of bank output should reflect these services.

In this paper we develop alternative measures of banks' implicit financial services that recognize that these services are provided both to depositors and to borrowers. Our approach to measuring banks' implicit financial services brings the NIPA's closer to conformity with the recommendations of the 1993 United Nations' System of National Accounts (SNA), which provides international guidelines for the preparation of national accounts. The SNA term for the implicit financial services that are implicitly paid for by the spread between banks' cost of funds from depositors and its return from investments in loans is "Financial Intermediation Services Indirectly Measured" (FISIM). The SNA uses the difference between a risk-free "reference rate" and the average interest rate paid to depositors to measure the value of implicit financial services to depositors, and the difference between the average interest rate paid by borrowers and the reference rate to measure implicit services to borrowers. We also use a reference rate approach, but we extend the approach to include borrowed funds other than deposits on the liability side of the balance sheet and to include non-equity securities on the asset side of the balance sheet.

II. Conceptual Framework

The theoretical justification for the reference rate approach has two components, one that considers the economic behavior of the financial firm (which, for convenience, we term "the bank"), and another that considers the economic behavior of the bank's customers. The analysis that takes the viewpoint of the bank has the advantage of fitting nicely with the literature on economic models of financial firms. In particular, the "user cost of money" framework set out in Donovan (1978), Diewert (1974) and Barnett (1978) and applied to banking by Hancock (1985), Fixler (1993) and Fixler and Zieschang (1999) shows that the reference rate plays an important role in models of economic decision making by financial firms.

The user cost of financial assets is an extension of the concept of user cost developed earlier for non-financial fixed assets. In a competitive marketplace where renting out a such an asset yields economic profits of zero, the rental payment or user cost, uc_t for any year t must equal the difference between the starting value of the asset, p_t, and the present value of the asset at reference rate of interest r_r at the end of the rental period, $p_{t+1}/(1+r_r)$. If the growth rate of the asset's value from year t to year $t+1$ reflects depreciation δ_t and an expected rate of increase in asset prices π_t, then substituting into the equation $uc_t = p_t - p_{t+1}/(1+r_r)$ yields $uc_t = p_t[1 - (1 + \pi_t - \delta_t)/(1 + r_r)] = p_t(r_r - \pi_t + \delta_t)/(1 + r_r)$. Alternatively, if uc_t is to be paid at the end of the year, $uc_t = p_t(r_r - \pi_t + \delta_t).$[2]

A parallel expression for a user cost formula for a financial asset with principal value y_{At} would equal the difference between its immediate cash value in year t, assumed to be y_{At}, and the present value of selling the asset for an expected price of $y_{At+1} = (1 + \pi_t) y_{At}$ in period $t+1$ after receiving interest income of $r_A y_{At}$. Here π_t represents both changes in asset prices (pure holding gains) and, if the asset is a debt instrument, expected changes in value due to default or creditworthiness developments. The discount rate used to calculate the present value is the reference rate r_r. On the assumption that the opportunity is available to earn this rate on an asset that requires no costly services to the borrower, including the bearing of credit risk, r_r measures banks' opportunity cost of financial capital.[3] The discounted cash flow from holding an asset that yields a rate of return of r_A is, then:

$$y_{At}\left[1 - \frac{1 + r_A + \pi_t}{1 + r_r}\right] = y_{At}\left[\frac{r_r - r_A - \pi_t}{1 + r_r}\right] \qquad (1)$$

The bracketed tem on the right-hand-side is the user cost of the financial asset.

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[2] Barnett (1978) uses a different approach to derive equation (2). He considers a consumer who maximizes life cycle utility subject to a set of budget constraints that the change in wealth in any period equals current income received minus current expenditures and who is able to invest in an instrument that earns the reference rate of return.
[3] Barnett (1978) describes the reference rate as a minimum rate of return that accounts for risk, but most applications of the reference rate approach, including the 1993 SNA, view the reference rate as a risk-free rate.

For our empirical estimates, we will use an alternative end-of-period expression for the user cost of financial assets of $r_r - r_A - \pi_t$. We use effective average interest rates calculated as ratios of interest accrued throughout the year (or quarter) to the average value of assets over the course of the year (or quarter). In contrast, the present value formula (1) assumes that all interest is paid at the end of the year and that assets are valued at the beginning of the year. Since the product of our interest rates and our asset values equals the sum of the interest accruals over the course of the year, in effect, we are adopting a mid-year perspective and using a simple sum of the interest accruals to approximate the sum of interest accruals discounted to the middle of the year.

Typically, banks' financial assets have negative user costs, making them a source of revenue, and their liabilities have positive user costs; this occurs because the rate of the return on the asset exceeds the reference rate. However occasionally an asset may have a positive user cost, indicating that it is an input into the bank's production process, or a liability may have a negative user cost, indicating that it is an output of the bank.

To make the signs more intuitive for our purposes, we define the **user cost price** of an asset as the negative of the user cost. In that way financial products having positive contributions to profits will have a positive price and those with negative contributions will have a negative price and thereby be subtracted. Letting π_{Ai} represent the expected holding gains for asset i net of expected credit losses per dollar invested in asset i, asset i has a user cost price of:

$$p_{Ai} = r_{Ai} + \pi_{Ai} - r_r \qquad (2)$$

In practice, banks carry loans and some securities at book value, and hence do not report capital gains on these debt instruments. They do make provisions for credit losses, however, and these credit losses constitute a kind of capital loss. Capital gains and losses are excluded from the concept of income measured by the national accounts, which seek to measure the income that originates from current production of goods and services. Hence, we will assume that $\pi_{Ai} = 0$

and calculate the user cost price of assets as $r_{A_i} - r_r$. The effect of this assumption is nontrivial: since 1974 the provision for credit losses tends has tended to range from around 10 percent to around 20 percent of net interest income at commercial banks, with a maximum value of 38 percent in 1987.[4]

For liability products, the user cost price is

$$p_{L_i} = r_r - r_{L_i}.$$

(3)

The user cost price formulas in (2) and (3) do not include a term for fees such as service charges. To completely express a bank's profit, fees on loans would be added to the formula for the user cost price of assets and fees charged on liabilities (deposits) would be subtracted from the formula for the user cost of liabilities. In principle, for national accounts purposes, fees should count as explicit sales of services rather than as imputed sales. In practice, the NIPA's, count service charges on deposits as explicit sales, but service charges or fees on loans are included in interest income from loans and hence in imputed sales of banks. This treatment of fees is dictated by the way that bank Call Reports (which are the primary data source on banks) collect the data.

III. User Cost Prices as Values of Implicit Services of Financial Intermediaries

The lack of a distinction between fees and interest charges on loans in the Call Reports is indicative of the substitutability of fees and interest for one another in the revenue structure of the bank. Note that adjustments to interest rates can also substitute for fees on deposits, as banks could in principle charge explicitly for services to depositors and pay them the reference rate of interest. Because banks have substituted fee income for net interest income, growth rates for

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[4] These ratios are calculated using data from the FDIC, available at http://www2.fdic.gov/hsob/. A worthwhile topic for future research would be whether expected capital gains or credit losses should be included under some circumstances; see Fixler and Moulton (2001). Realized net credit losses for surviving banks were slightly lower than provisions for credit losses, in part because of timing differences.

bank output calculated from fee income alone would be misleading. In 1980 net interest constituted 80 percent of commercial banks' pre-tax gross income (which does not reflect non-interest expenses, loan loss provisions, and gains on sales of securities), but in 1990 net interest constituted 68 percent of banks' gross income, and in 2000 it constituted 58 percent of bank's gross income.[5]

In addition to substituting between fees and interest margins as sources of revenue to cover the cost of providing a constant level of service, banks may also simply offer fewer services and charge lower net interest margins. Variation in interest rates may thus represent implicit prices for some financial services. For example, in 2002, E*Trade Bank, an inter-net bank with limited services and no physical branch available to most of its customers paid an average rate of 4 percent on deposits, compared with an average rate of 3 percent for a peer group consisting of all thrifts with assets under $100 million.[6] Consumers who could have earned E*Trade Bank's deposit rate but who instead chose to accept the average deposit rate in order to obtain more services from a conventional bank paid an implicit price of 1 percent per year for the extra services.

Since interest rate differentials are substitutes for explicit fees charged by the bank, a meaningful measure of banks' total output must include an imputed component that reflects the interest rates that banks offer to borrowers and to depositors. The rationale for calculating this imputed component by means of user cost prices can take either the point of view of the bank or the point of view of the bank's customers. The rationale from the point of view of the bank is more closely related to the prior literature on user costs of financial assets, which seeks to model the economic behavior of banks.

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[5] The percentages are calculated from data from the FDIC available at http://www2.fdic.gov/hsob/. The growing importance of fee income partly reflects banks' entry into new kinds of activities.
[6] These average rates are calculated from data available at http://www3.fdic.gov/idasp/main.asp. They imply user cost prices for depositor services of 1.1 percent at E*Trade Bank and 2.2 percent at peer group banks. E*Trade Bank also earned an average user cost price of 0.3 percent on its assets, compared with 1.2 percent earned by its peer group. It now has one physical branch located in Arlington, VA.

Assume that an investment that entails no default risk or provision of costly services to the borrower is available to banks. The rate of return on this investment — the reference rate — is the opportunity cost of funds that the bank uses to evaluate investment opportunities. The spread between this reference rate of return and the lending rate is the amount available to cover the costs of providing financial services to borrowers, which include the cost of bearing risk. If the bank is indifferent at the margin between investing in the reference rate asset and investing in higher-yielding loans, the spread between the loan rate and the reference rate must represent the cost of providing financial services to borrowers. In a marketplace where competition keeps loans from being priced at levels that yield economic profits (profits in excess of a normal return on capital), we can expect an equilibrium where banks are indifferent between investment opportunities at the margin. Note that if such an equilibrium were not present, so that banks were not indifferent between investments, they would be expected to gravitate towards a corner solution for the composition of their investment portfolio, with either an extreme concentration in loans or no loans at all. A corner solution does not seem to describe the patterns that are usually observed in the mix of investments held by banks.

Furthermore, if the bank's net return on investments funded by deposits equals the reference rate, then the "price" the bank receives for providing services to depositors equals the spread between the reference rate and the rate paid on deposits . If the bank is indifferent to marginal changes in amounts on deposit, the spread between the reference rate and the deposit rate equals the marginal cost of providing services to depositors. In the short run constraints on the size of a bank based on the amount of capital it has on hand may prevent it from accepting deposits until it reaches the point of indifference. However, in a long run competitive equilibrium for the industry deposit rates will permit banks just to cover their costs. In addition, large banks that are perceived as having minimal default risk are able to borrow at approximately the reference rate in the bond market, thereby avoiding the costs of providing services to depositors. If these banks are indifferent at the margin between raising funds from depositors

and raising funds in the "wholesale" market, the spread between the reference rate and the rate paid on deposits must represent the marginal cost of providing services to depositors.

An analysis from the customer's perspective is also important to make sure that user costs value intermediation services provide sensible measures of the because goods and services are valued from the purchaser's perspective in calculating GDP.

Bank loan customers are willing to pay spreads over the reference rate because they require or want lender services that issuers of credit market instruments at the reference rate of interest do not receive. For the customers who require these services, access to capital markets is very costly or impossible because of the problems of asymmetric information noted earlier, and liquidating financial assets as an alternative to borrowing is also impossible. Another group of loan customers could, if they so desired, liquidate assets or borrow at approximately the reference rate in capital markets to obtain the needed funds. At the margin, there are both household and business borrowers who choose to hold financial assets — which earn the reference rate of return — rather than liquidating the assets and carrying smaller loan balances. For the marginal users of the borrowed funds, the difference between the loan rate and the reference rate represent the net marginal cost borne by borrowers for liquidity management, inducing the bank to accept their risk and any other services provided by the lender. This difference can therefore be viewed as the imputed price paid for credit services.

For depositors who could have invested at the reference rate of interest, the spread between the reference rate and the rate that deposits earn, which equals the user cost of deposits, represents the net opportunity cost of holding deposits. Depositors who choose to forego the opportunity to earn the reference rate on a financial asset that provides no services may be presumed to receive marginal benefits from bank services equal to the net interest income foregone.

IV. Effect on the Measure of Imputed Output

A. User Cost of "Own Funds"

The current measure of the value of the implicit financial services of depository institutions in the NIPA's is their net interest income. These imputed sales of financial services constitute the imputed gross output of depository institutions. Expressing the user cost measure of their imputed output in a way that allows a comparison with the current measure shows that it is smaller.

Using the expressions for user cost prices of assets and liabilities in equations (2) and (3), the revised measure of the imputed sales, or imputed output, of depository institutions can be expressed as: :

$$V = \sum p_{Ai} y_{Ai} + \sum p_{Li} y_{Li}$$
$$= \sum (r_{Ai} + \pi_{Ai} - r_r) y_{Ai} + \sum (rr - r_{Li}) y_{Li}$$

(4)

The first term in the last line of equation (4) represents the value of implicit services that the bank provides to borrowers. In the SNA, this portion of the interest paid by borrowers is deemed to represent a fee for services received from banks. The assumption implicit in equation (4) is that the financial services are proportional to the number of dollars in the product.

The last term in equation (4) shows the value of the unpriced services provided to depositors and other providers of funds to the bank. The income-side entry that corresponds to these unpriced services consists of imputed interest that the bank pays to depositors and other similar creditors.

A rearrangement of the terms in equation (4) reveals that V equals the NIPA's current measure of imputed output combined with two additional terms:

$$V = \left[\sum r_{Ai} y_{Ai} - \sum r_{Li} y_{Li} \right] - r_r \left[\sum y_{Ai} - \sum y_{Li} \right] + \sum \pi_{Ai} y_{Ai}$$

(5)

The first term on the right-hand side of equation (5) represents net interest income, the current definition of banks' imputed output in the NIPAs. The third term can be viewed as expected asset appreciation less expected losses, which include anticipated credit losses. Holding gains or losses are excluded from measures of output both in the NIPAs and in the SNA, so we exclude this term from our revised measure of imputed output.

The middle term on the right side of equation (5) is, then, the difference between the current measure of banks' imputed output and our revised user cost based measure. The user cost based measure is smaller by an amount proportional to the difference between total assets and total liabilities. This difference represents the value of the assets purchased with the bank's "*own funds*", i.e. funds that come from stockholder's equity rather than from deposits or other types of liabilities of the bank. When a bank lends funds obtained from depositors, the net interest it receives reflects the combined value of services to borrowers and services to depositor who furnished the funds. In contrast, when the bank lends its own funds, the amount of interest left after deducting the cost of services to borrowers does not represent an implicit payment for services provided to customers but instead represents net interest income earned by the bank. Of course, the ultimate source of the "own funds" is the banks' stockholders. Stockholders, unlike depositors, receive no financial services in connection with the value of their equity, so the portion of the interest that the bank earns by lending funds that normally would represent the value of unpriced services to the providers of the funds lacks this interpretation if the funds come from stockholders.

The reduction in the measure of imputed output by an amount equal to the user cost of own funds is broadly consistent with the SNA's (6.125) recommendation that the return to lending of own funds be excluded from FISIM because that lending of "own funds" does not constitute intermediation. However, the SNA seems to suggest use of r_{A_i} to calculate the amount excluded from FISIM to account for lending of own-funds. We use r_r instead because borrowers receive services equal to the amount borrowed times a spread of $r_{A_i} - r_r$ regardless of whether the ultimate source of their funds is a stockholder or a depositor.

B. Specifying the Definition of Assets and Liabilities in the Formula for "Own Funds"

In addition to our possible difference from the SNA in the choice of the interest rate used to adjust for lending of own funds, important differences exist between the assets and liabilities included in our calculation of imputed output and those included in European Commission's measure of FISIM. The measure of own funds, and hence the revised measure of imputed output in equation (5), is sensitive to which types of assets and liabilities are defined as in scope. To calculate FISIM the European Commission counts only loans and deposits, on the grounds that financial intermediaries have control over interest rates only of loans and deposits. (Commission of the European Communities, 2002, p.7.) However, in our calculations of imputed output assets are not limited to loans, and the liabilities are not limited to deposits. We include all assets that earn interest or that count as deposits at other banks, and we include all non-deposit liabilities that bear interest.

One reason to prefer our broader definitions of assets and liabilities is that banks can substitute between types of assets, or between types of liabilities. From 1951 to 2001 loans rose from around one-third of financial assets to around two-thirds of financial assets of banks, while deposits fell from around 99 percent of liabilities to around 70 percent of liabilities. The results are not necessarily sensitive to how assets are defined because securities, which are the main financial asset other than loans, tend to have interest rates near the reference rate. However, liabilities usually have significant user costs even if they are not deposits. (Subordinated debentures are an exception, as these liabilities tend to have interest rates near the reference rate.) Consequently, a narrow definition of assets and liabilities as loans and deposits would result in an understatement of the growth rate of banks' imputed output over the last half century.

Another reason to prefer our broader definitions of assets and liabilities is they avoid the implication that own funds are negative, which occurs under the narrow definitions because banks have more deposits than loans. Negative own funds may result in estimates of imputed output that exceed the net interest received by banks. Since the justification for imputed output

rests on net interest being a substitute for explicit fee income, imputed output that is not "paid for" by net interest would be hard to justify.

Finally, too narrow a definition of assets can lead to logical inconsistencies in the treatment of bank assets that also represent liabilities of some other bank. Even though banks with claims on one another are frequently subsidiaries of the same holding company, the aggregate data for the commercial banking industry generally does not consolidate the offsetting assets and liabilities. However, our estimates of the gross output delivered to customers outside the industry should be the same as if we had a consolidated industry balance sheet that netted out the intra-industry assets against the corresponding liabilities. This occurs if any inter-bank items that are counted in the liability component of the calculation of imputed output are also counted in the asset component.

Federal funds and repurchase agreements are combined on the Call Reports, and they are reported both as assets and as liabilities. The liability total for the industry for this item exceeds the asset total, because repurchase agreements from industry outsiders such as securities dealers are a net source of funds for the industry. The asset total primarily contains funds advanced to other banks. Because federal funds and repurchase agreements represent very short-term lending with essentially no risk, their interest rates are usually lower than the reference rate. This implies that more depositor-type services are associated with these transactions than borrower-type services. We impute depositor-type services used as intermediate inputs by businesses outside the banking industry equal to the user cost of the net liability position of the banking industry.[7] The implicit services between banks in connection with federal fund and repurchase agreement assets that are offset by similar liabilities have net value of zero.

Another type of asset that is a liability of other banks is "balances due from depository institutions". Most of these balances due are included in deposit liabilities of US banks and

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[7] We would like to have better information on who the counterparties are for the repurchase agreements that are not with other banks. For example, even though we assume that they are all with domestic business, some of them may represent funds borrowed from foreign businesses.

hence are implicitly treated as sources of imputed interest equal to their user cost. We therefore include in imputed output the user cost price of these balances due, which is negative for the balances that earn no interest or a rate of interest lower than the reference rate. The effect on the estimate of imputed output is the same as if these balances due were netted out of the liabilities on the consolidated balance sheet for the industry. The gross output associated with balances due from foreign banks cannot be estimated precisely, however, because the data do not identify the amount of monetary interest received on these balances. We estimate a lower bound for the absolute value of user cost price of these assets by making an assumption that all balances due from foreign banks are included in the overall total for interest-bearing balances due. Calculations of bounds for the error arising from this assumption showed that the error is trivially small.

Commercial banks also have assets consisting of balances due from Federal Reserve Banks, which include some required reserves. In exchange for the user cost of these balances due (which equals the amount they could have earned had they been invested at the reference rate of interest) we let banks receive implicit services from the Federal Reserve Banks of equivalent value. To be consistent, we also impute services from the Federal Reserve Banks to the Federal government equal to the user cost of their Treasury deposits, to the rest of the world in connection with international deposits, and to business in connection with other deposits. The total output of the Federal Reserve Banks therefore equals the user cost of their deposit liabilities; no output is imputed in connection with assets of Federal Reserve Banks because they consist primarily of Treasury securities, which yield the reference rate of interest. The output consumed by banks will be treated as an intermediate input consumed within the banking industry. At present in the NIPA's the output of the Federal Reserve Banks is estimated by their expenses, just as is done for nonprofit institutions, and a portion of this output is included in imputed services to customers of the banking industry.

Finally, checks in process of collection are an asset that represents a claim on deposits at the bank of the drawer. We deduct items in process of collection from deposits before

calculating the imputation for services to depositors. Using accrual accounting, the funds no longer belong to the drawer of the check once the check has been transferred to the payee.

C. Foreign Output of US Banks and Domestic Output of Foreign Banks

The primary data for our estimates, the Call Reports, cover domestic and foreign offices of banks headquartered in the US. Output of banks headquartered in the US includes output produced in their foreign offices and excludes output produced in US offices of banks headquartered in other countries. Two adjustments to the basic estimates from the Call Report are therefore necessary to estimate domestic banking output, which is the appropriate measure for calculation of GDP. First, an estimate of the output produced in foreign offices of US banks must be deducted from total US bank output to estimate gross domestic output of US banks. Second, output of US offices of foreign banks must be added to the domestic output of US banks.

Output of foreign offices of US banks is presently measured as the excess of their interest receipts from borrowers over their interest payments to depositors. Roughly speaking, in recent years the interest rate on loans in foreign offices has been about twice the rate on deposits and the amount of deposits has been about twice the amount of loans. Consequently, interest received has approximately equaled interest paid in the foreign offices, resulting in virtually no output being attributed to them.

When imputed output is measured by user costs rather than by net interest, a significant amount of output will be attributed to foreign offices of US banks. An increase in the portion of the output of US banks attributed to their foreign offices implies a decrease in their domestic output. The revised measure of foreign office output equals the user cost of foreign office loans plus the user cost of foreign office deposits. The increase in foreign office output therefore equals the reference rate times the excess of foreign office deposits over foreign office loans. These excess deposits represent a source of funds for domestic lending that, like "own funds",

involve no domestically produced unpriced services to depositors. Therefore, the implicit services to providers of these deposits do not belong in domestic output.

Estimates of the output of *US offices of foreign banks* are also affected by the revision in the definition of imputed output. Domestic output of foreign banks is currently measured in the published estimates by scaling up the estimates of the output of US banks using ratios of balance sheet items for all banking offices located in the US to corresponding items for offices of US banks alone. The implicit assumption of this procedure is that the branches of foreign banks pay and receive the same interest rates that other banks in the US do. Rather than scaling up gross interest flows, the revised measures scale up user costs of assets and liabilities. Although this changes the estimate of the domestic output of the foreign banks because the assets that are attributed to foreign banks do not exactly equal the liabilities, the most important sources of change in this estimate are revisions in the estimates of the balance sheet ratios and the use of these ratios at more detailed categories of assets and liabilities than is presently done.

VI. Measurement of Interest Rates

Estimation of user cost measures of imputed output requires a number of decisions about the specification of key concepts. One such decision is how to specify the definition of interest rates. From a theoretical standpoint, either current market interest rates or "book value" interest rates can be defended. The book value rates are computed by dividing the interest receipt or payment for a financial product by the stock of that financial product on the balance sheet.

Market interest rates should be used in conjunction with market values for assets, (whose use is sometimes called the "creditor approach"), and book interest rates should be used in conjunction with asset book values (the "debtor approach"). In our data book values rather than market values are reported for most interest-bearing assets. Perhaps for this reason, tests of market rates resulted in excessively volatile estimates of imputed services to depositors and borrowers, including some negative values. On the other hand, with book value rates, the user

cost prices of both loans and deposits are consistently positive and behave plausibly. The variation over time in relative positions of the book value reference rate, loan rate and deposit rate is depicted in figure 1.

To compute the book value reference rate r_r we divide the interest received from Treasury and Federal agency securities by the average book value of these securities over the time period during which the interest was received. This method of calculating the reference rate results in estimates of zero for imputed borrower services consumed by the Federal government. Although imputing no borrower services to Federal government debt may seem inconsistent with imputing services to other types of bond issuers, Federal debt is risk free and it can be converted into cash so quickly and inexpensively that it imposes virtually no liquidity costs on the bank. Letting imputed services for Federal debt equal zero makes GDP invariant to the proportion of Federal debt held by the banking sector.

Book value interest rates for other assets and liabilities are calculated similarly to the reference rate. However interest income from securities issued by state and local governments must be adjusted to reflect its tax-exempt status. The interest expense on liabilities used to fund purchases of these securities may be completely deductible, 80 percent deductible, or non-deductible depending on the nature of the issuer and the data of purchase of the security.[8] If the interest expense is completely deductible, then

$$\text{taxable-equivalent rate} = \frac{\text{book rate}}{1 - \text{bank's marginal income tax rate}}$$

where the book rate is calculated in the normal way as interest receipts divided by book value of holdings of tax-exempt securities. For the period starting in 1985, we use adjustments for taxable equivalency provided to us by the Federal Reserve Board (FRB). For early years we calculate adjustments using the above formula with banks' average tax rate serving as a proxy

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[8] FRB memo from Bill English to Tom Brady on "Taxable-Equivalent Interest Income", Feb. 26 1996.

for their marginal rate, subject to the restriction that the user cost price of state and local securities must be at least zero.

V. Effect on GDP and Gross Domestic Income

As is discussed above, the revised measure of imputed output of financial intermediaries will be lower than the current measure, which simply equals the banks' net interest income. The amount of the reduction caused by the change in definition of the imputed output equals sum of: (1) the user cost of own funds; (b) the user cost of foreign office deposits available for domestic lending; and (c) a portion of the change in the estimate of imputed output of domestic offices of foreign banks.

GDP will fall by more than these reductions in imputed output, because output formerly allocated to depositors will be instead allocated to borrowers. As a result of the allocation of some imputed services to borrowers, increased intermediate consumption will absorb some of the output currently counted in final demand. Households are the primary source of deposits and businesses (which include owner-occupied housing and nonprofit institutions serving households) are the primary borrowers from banks. In addition, the government sector is primarily a consumer of depositor services, because its main source of borrowed funds is securities that have user cost prices near zero. Consequently, allocating a portion of banks' imputed services to borrowers will result in some of banks' output shifting from final demand to intermediate inputs. This will make the imputed component of GDP smaller.

While the inclusion of borrowers' imputed services reduces the importance of the imputed output of financial intermediaries in the level of GDP, it also opens up a new channel of influence on the rate of change of GDP. In figure 1, the reference rate is always in between the average rate earned on bank assets and the average rate paid on liabilities, but in some periods it is closer to the asset rate, implying that borrowers received a smaller share of imputed financial services, and in other periods it is closer to the liability rate. Although trends in the split of imputed services between borrowers and depositors are meaningful, short run fluctuations of this

split that do not reflect equilibrium behavior may not be. Because the reference rate demonstrates more inertia than the other rates, abrupt declines in interest rates tend to result in a temporary reclassification of imputed output from intermediate consumption (by borrowers) to final demand (by depositors), first raising and then lowering the rate of change of GDP. Abrupt increases in rates have the opposite effect. The reason is that the Treasury and federal agency securities used to set the reference rate tend to have rates that are fixed for longer periods of time than the rates paid on liabilities and the rates earned on loans. Nevertheless, this effect is expected to be small in magnitude.

The effect on gross domestic income (GDI) of the revision in the measurement of imputed output will be the same as the effect on GDP. Consequently, the statistical discrepancy will be unaffected. Imputed expenditures on financial services by households, government or the rest of the world, which raise GDP, are matched by imputed interest flows, which raise GDI. Imputed expenditures by business have no effect on GDP because they count as intermediate inputs, and imputed interest flows between banks and other businesses do not affect GDI because they are payments of interest by a business to another business. The interest component of GDI includes only the interest paid by the business sector to other sectors net of the interest that the business sector receives from other sectors.

Even though the balance between GDI and GDP will be unchanged by the revision, some elements of the calculation of the interest component of GDI will change. To be consistent with the guidelines of the SNA (Annex III, paragraphs 5-7), we will show the value of the implicit services provided by banks to borrowers as an imputed expenditure on services by the borrower and as a negative amount of imputed interest paid by borrowers. The sum of monetary interest and imputed interest, which is counted as the total amount of interest paid by the borrower, will therefore decline. As a result, a portion of the interest paid by the borrower will effectively be reclassified as a payment for implicit services.

Note that negative imputed interest paid by non-business borrowers to banks increases GDI just as does positive imputed interest paid by banks to non-business customers. Since the

net interest component of GDI equals interest paid by business to other sectors less interest received by business from other sectors, deductions from interest received by banks have the same effect on GDI as additions to interest paid by banks.

VII. Results for 2001

To illustrate how imputed output is estimated from user costs, table 1 shows the components of the calculation of imputed output based on user costs. In column (1) of the table are average values for the year of major balance sheet items, including those that have no role in the calculations of domestic imputed output. One asset, "cash items in process of collection" is displayed as a negative liability below deposits in order to show that it is netted out from deposits for purposes of determining the consumption by sector of implicit financial services. Column (2) displays either the interest income or the interest expense for the year, depending on whether the item is an asset or a liability. Column (3) shows the book value interest rate implied by the dividing the interest income or expense by the average balance sheet value. The reference rate is the interest rate for the US Treasury and agency securities, shown on line 8. Column (4) shows the user cost prices, calculated as an interest rate spread relative to the reference rate. Column (5) shows expansion factors needed to account for domestic output of foreign banks, which are calculated using ratios of balance sheet items for the total domestic banking industry to corresponding items for domestic offices of banks headquartered in the US. Column (6) shows the contribution to imputed output of each item, calculated as the product of the average balance sheet value, the user cost price, and the expansion factor for foreign-owned offices. It is blank if the line contains an asset or a liability that is not part of the user cost calculation.

Comparing the imputed output from loans to the total imputed output shows that they account for about 41 percent of imputed output, and a similar comparison for deposits show that they account for 58 percent of imputed output. Although five asset types associated with inter-bank transactions seem to generate negative imputed output, these negative entries can be viewed as adjustments to measured output from liabilities or from implicit services from Federal Reserve

Banks. For example, the net output associated with Federal funds/repurchase agreements is the difference between the positive entry in the liability section of the table and the smaller negative entry for the asset.

The addendum section of table 1 shows totals for the assets and liabilities and for the interest income and expense used to calculate imputed output, both for domestic offices of US banks and for domestic offices of all banks. The difference between the assets and the liabilities represents own funds or foreign office deposits used for domestic lending. The user cost of these funds is $56 billion. Using detailed data not shown in table 1, this $56 billion can be decomposed into $19.9 billion from the user cost of own funds of US banks, $23.7 for the user cost of foreign office deposits used for domestic lending, and $12.3 billion for the user cost of funds from foreign sources that foreign banks lend domestically. As is evident from table 1, the user cost of own funds and foreign source funds equals the difference between the revised measure of imputed output and net interest income, which is the current measure of imputed output. A comparison of estimates of imputed output with and without the adjustment for domestic offices of foreign banks also shows that imputed output of $13.2 billion out of a total of $186.6 billion originates in the foreign-owned banking offices.

Table 2 shows the breakdown by sector and legal form of organization of the consumption of commercial banks' imputed output. The imputed output of commercial banks included in GDP will fall by $92.5 billion. Over $23 billion of this decline is attributable to a reclassification of some imputed output as intermediate consumption; intermediate consumption will rise from about a quarter to about half of the total consumption of implicit services. Borrower services to household owner-occupants and nonprofit institutions cause much of this change, but borrower services to corporations and to sole proprietorships and partnerships also contribute to it.

The remaining $69.1 billion of the reduction in imputed GDP reflects a reduction in imputed domestic output. The main reason why this reduction in imputed output exceeds the $56 billion user cost of own funds and foreign source funds shown in table 1 is the reduction in imputed domestic output of foreign banks due to the revised estimates of their domestic office

assets and liabilities. The total downward revision to the imputed domestic output of foreign banks, including the effect of the adoption of the user cost framework, is $26.5 billion.[9] The downward revision to the imputed output of US banks is $18.9 billion, and the downward revision to the portion of their output that counts as domestic output is $42.6 billion because of $23.7 more of their imputed output is reclassified as foreign.

Finally, table 3 shows how the downward revision to GDP and GDI of $92.5 billion will affect the five-account summary of the NIPA's. Because imputed interest payments to the rest of the world absorb $8.9 billion of the reduction in GDI due to the revised estimates of foreign office output — see account 4 — the effect on gross national income is $83.6 billion. Account 2 shows that persons will be shown as consuming $12 billion in implicit borrower services and as consuming $78.1 billion less in implicit depositor services, reducing personal outlays and personal income by $90.1 billion. Account 3 shows that state and local governments will receive $0.2 billion in implicit borrowers services, and $5.7 billion less in depositor services. Account 5 shows that measures of saving and of the statistical discrepancy are unaffected.

VIII. Future Research

Measures of financial intermediaries' implicit services to borrowers that perform well in practice and that have an appealing theoretical basis are an important advance for the NIPA's. Nevertheless, many question remain for future research. One such question is how to treat off-balance sheet commitments, including derivatives. Another concerns the treatment of credit losses. An allowance for credit losses is deducted from the value of loans and leases in calculating imputed output to place the timing of the recognition of these losses on an accrual basis. However, credit losses are not directly reflected in the measures of interest income used to calculate imputed output. If banks expect to use a portion of interest income to offset credit

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[9] The downward revision in imputed output attributable to improvements in source data and the method of estimating foreign bank output in the US account for $24.5 billion. These changes would have occurred without the adoption of the user cost framework.

losses, that portion of interest income is not available to pay for financial services. Furthermore,

estimates of expected losses will be excluded from the measure of imputed output elsewhere in

the revised NIPA's: see the discussion of insurance in Moulton and Seskin, 2003, pp. 19-21.

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Table 1. - Revised Computation of Imputed Output, Commercial Banks in U.S., 2001

(Billions of dollars)

Balance sheet item	(1) Average balance 2001	(2) Interest Income or expense 2001	(3) Average rate of interest (2) / (1)	(4) Average user cost price (3) - 6.24%	(5) Ratio of All Banks in US to U.S.-chartered banks in U.S.[a]	(6) Imputed gross output (1 x 4) x (5)
1 Total assets	6034.5					
2 Loans & leases, net of allow. for losses and unearned income	3757.8	312.5				
3 Domestic offices	3487.6	288.1				
4 Loans	3341.0	278.3	8.33	2.09	1.107	77.3
5 Leases	146.6	9.8	6.72	0.48	1.107	0.8
6 Foreign offices	270.2	24.4				
7 Investment securities, book value	1042.5	63.1				
8 Treasury sec. & U.S. Gov't agency oblig. (in MBS's)	736.8	46.0	6.24	0		
9 Other securities, book value (interest includes adjustment of 2.1 for taxable-equivalence)	305.7	19.2	6.28	0.04	1.325	0.2
10 Cash & all balances due from depository institutions	251.2					
11 Currency and coin, domestic offices	38.1					
12 Balances due from the Federal Reserve, dom. offices	24.8	0	0	-6.24	1.000	-1.5
13 Other balances due from depository institutions	54.8	0	0	-6.24	1.154	-3.9
14 Interest-bearing balances due from depository inst.	133.5	5.4	4.01	-2.23	1.154	-3.4
15 Federal funds sold and sec.purch. under agree.to resell	327.3	12.7	3.87	-2.37	1.097	-8.5
16 Trading account assets	150.4	9.5	6.34	0.10	1.080	0.2
17 Other real estate	3.5					
18 Bank premises and equipment	76.3					
19 Intangible assets	113.1					
20 All other assets	312.4					
21 Total liabilities	5703.8					
22 Total deposits	4169.2	132.5				
23 In domestic offices	3519.5	106.9				
26 Demand deposits	506.6	0.0	0.00	6.24	1.017	32.1

27	Interest-bearing deposits	3012.9	106.9			
28	Other checkable deposits	155.9	3.1	1.96	4.28	1.001	6.7
29	Savings (including MMDA's)	1522.0	33.3	2.19	4.05	1.001	61.7
30	Large time deposits	549.6	27.7	5.05	1.19	1.690	11.1
31	Other time deposits	785.3	42.7	5.44	0.80	1.001	6.3
32	LESS: Cash items in process of collection	-129.2	0	0	6.24	1.154	-9.3
33	In foreign offices	649.7	25.6			
34	Borrowed funds	1131.7	56.4			
35	Federal funds purch. & sec.sold under agree.to repur.	510.7	19.6	3.84	2.40	1.064	13.0
36	Other interest-bearing liabilities	621.1	36.8	5.93	0.31	1.296	2.5
37	Other liabilities	402.8				
38	Total equity capital	330.7				
39	PLUS: Imputed services from Federal Reserve Banks		1.5				1.5
40	**EQUALS: Total Imputed Output**						**186.6**

Addenda:

41	Assets used to calculate imputed output, US banks	5221.0	380.2[b]	7.28	1.04		54.5
42	Liabilities used to calculate imputed output, US banks	4522.0	163.3	3.61	2.63		118.9
43	Net interest income / Total imputed output, US banks		217.0				173.4
44	PLUS: User cost of own funds and foreign office funds used for domestic lending, US chartered banks	699.0			6.24		43.6
45	EQUALS: Net interest income US chartered banks						215.5
46	Assets used to calculate imputed output, inc. foreign banks	6005.2	437.1[b]	7.28	1.04		62.4
47	Liabilities used to calculate imputed output, inc. foreign banks	5108.4	194.6	3.81	2.43		124.1
48	Net interest income / Total imputed Output, inc. foreign banks		242.5				186.6
49	PLUS: User cost of own funds and foreign office funds used for domestic lending, inc. foreign banks	896.8					56.0
50	EQUALS: Net interest income, inc. foreign banks						242.6

a. Ratios are for (by line): Loans and leases (4 & 5); Securities other than U.S. gov't securities in bank credit (10);
   Cash assets (13, 14, 15, 33); Interbank loans (16); Other assets (17); Transaction deposits (27);
   Nontransaction deposits other than large time deposits (29, 30, 32); Large time deposits (31);
   Borrowings from banks in the U.S. (36); Borrowings other than from banks in the U.S. (37).
b. Interest income includes imputed interest of $1.5 on deposits at Federal Reserve Banks.

Table 2

Consumption of Imputed Output of Commercial Banks by Sector and Legal Form of

Organization, 2001

(Billions of dollars)

	Based on User Costs	Currently Published	Revision in Level
Total	**186.6**	**255.7**	**-69.1**
Final demand	**93.6**	**186.1**	**-92.5**
Persons	78.8	156.9	-78.1
Federal government	0.3	1.4	-1.1
State & local governments	5.1	9.6	-4.4
Rest of the world	9.4	18.3	-8.9
Intermediate demand	**93.0**	**69.6**	**23.4**
Corporate	52.5	50.8	1.7
Financial	7.3	9.9	-2.5
Nonfinancial	45.2	41.0	4.2
Sole Prop. and Partnerships	20.3	18.7	1.6
Farm	1.6	1.0	0.6
Nonfarm	18.6	17.6	1.0
Other Private Business	2.5	0.1	2.4
Households and Nonprofit Institutions	17.7	0.0	17.7

Table 3

Summary National Income and Product Accounts, 2001

(Billions of dollars)

Account 1. National Income and Product Account, Proposed less published estimates

Net interest	-83.6	Personal consumption expenditures	-78.1
Imputed interest paid, domestic business 1/	-212.3	Svcs furnished w/o payment by fin.int	-78.1
Less: Imputed interest received, domestic business	-119.8		
Plus: Imputed interest paid, rest of world	-1.4	Gov't consumption expenditures, Federal	-1.1
Less: Imputed interest received, rest of world	-10.3	Svcs furnished w/o payment by fin.int	-1.1
Gross national income	-83.6	Gov't consumption expenditures, S&L	-4.4
		Svcs furnished w/o payment by fin.int	-4.4
Plus: Income payments to the ROW	-18.3		
Imputed interest received, rest of the world	-10.3	Net exports of goods and services	-8.9
Less: Income received from the ROW	0.0	Exports of services	-8.9
Imputed interest paid, rest of the world	-1.4	Svcs furnished w/o payment by fin.int	-8.9
Plus: Statistical discrepancy			
GDI	-92.5	GDP	-92.5

Account 2. Personal Income and Outlay Account, Proposed less published estimates

Personal tax and nontax payments	0.0		
		Personal interest income	-90.1
Disposable personal income	-90.1	Imputed interest received, persons	-90.1
Personal outlays	-90.1		
Personal consumption expenditures	-78.1		
Svcs furnished w/o payment by fin.int	-78.1		
Interest paid by persons	-12.0		
Personal saving	0.0		
Personal taxes, outlays, & saving	-90.1	Personal income	-90.1

Account 3. Government Receipts and Expenditures Account, Proposed less published estimates

Consumption expenditures	-5.5		
Svcs furnished w/o payment by fin.int, Federal	-1.1		
Svcs furnished w/o payment by fin.int, State and local	-4.4		
Net interest paid	5.5		
Imputed interest paid, State & local	-0.2		
Less: Imputed interest received, Federal	-1.1		
Less: Imputed interest received, State and local	-4.6		
Government current expenditures and surplus	0.0	Government current receipts	0.0

Account 4. Foreign Transactions Account, Proposed less published estimates

Exports of services	-8.9	Income payments to the ROW	-10.3
Svcs furnished w/o payment	-8.9	Imputed interest received, ROW	-10.3
Income receipts	-1.4		
Imputed interest paid, ROW	-1.4		
Receipts from the rest of the world	-10.3	Payments to the rest of the world	-10.3

Account 5. Gross Saving and Investment Account, Proposed less published estimates

		Personal saving	0.0
		Government current surplus or deficit	0.0
		Statistical discrepancy	0.0
Gross investment	0.0	Gross saving and statistical discrepancy	0.0

1/ Includes owner-occupied housing, and nonprofit institutions serving households.

**Figure 1: Relative Positions of the
Reference Rate, the Loan Rate, and the Deposit Rate**