Price Indices for Financial Services

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Abstract

Financial institutions explicitly and implicitly charge their customers for financial services, as recognized in the recommended methodology for compiling financial intermediation services output in the System of National Accounts 1993. The challenge for price index compliers is to account for these and other components of the price of financial services in the construction of producer and consumer price indices. This article identifies each component of a financial services price index and discusses approaches to its estimation.

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PRICE INDICES FOR FINANCIAL SERVICES

I. INTRODUCTION

Financial institutions explicitly and implicitly charge their customers for financial services, as recognized in the recommended methodology for compiling their aggregate value in the *System of National Accounts 1993* (*1993 SNA*). The challenge for price index compliers is to account for these and other components of the price of financial services in the construction of producer and consumer price indices. This article identifies each component of a financial services price index and discusses approaches to its estimation. It briefly considers valuation and price concepts, and then turns to the anatomy of a financial services price index and compilation issues.

II. CONCEPTS FROM THE NATIONAL ACCOUNTS AND THEORIES OF THE FINANCIAL FIRM AND THE CONSUMER

A. National accounts

Supply of financial intermediation services

The *1993 SNA* recommends [6.125 and Annex III] that the value of financial intermediation services output produced by an enterprise be valued as the following sum:

- For financial assets *involved in financial intermediation*, such as loans, the value of services provided by the enterprise to the borrower per monetary unit on account is the margin between the rate payable by the borrower and a *reference rate*; plus
- For financial liabilities *involved in financial intermediation*, such as deposits, the value of services provided by the enterprise to the lender or depositor per monetary unit on account is the margin between the *reference rate* and the rate payable by the enterprise to the lender; plus
- The value of actual or explicit financial intermediation service charges levied.

The *1993 SNA* excludes from rates payable in the above definition any change in the value of the underlying asset were it to be marketed. In the national accounts, these *holding gains* appear in an account separate from the system of accounts recording the transactions and other flows resulting from the production and consumption of goods and services in the current period. In the usual case, there will be no holding gains on intermediation assets (loans) and liabilities (deposits), because their nominal contract values are fixed.[2] The first

[2] We can identify an exception to this in the case where the resident of an economic territory opens with a resident financial institution an account that is denominated in the currency of another economic territory, which makes the value of the account subject to exchange rate fluctuations between the denomination currency and the home currency. There are two effects of such holding gains and losses. The first is the change in the

(continued…)

two components shown above comprise Financial Intermediation Services Implicitly Measured (FISIM), while the sum of FISIM and the last, explicit service charge item comprise the total value of financial intermediation services output.

Uses of financial intermediation services

The same principle used to value the output of financial intermediation services is used to value their intermediate and final uses. The final uses of these services comprise the FISIM plus explicit financial service charge expenditures associated with the non-production accounts held at financial corporations by general government, households, and the rest of the world. Intermediate uses of financial services are the residual of output at purchasers' prices less final uses, where output at purchasers' prices is output as defined above plus any applicable taxes less subsidies levied on financial services.

By implication, the CPI expenditure weight for financial services is the sum of the products of the amount on account and the user cost price of across the non-production loan and deposit positions of the household institutional sector with the financial corporations sector. The CPI weight thus comprises the FISIM and explicit service charges applicable to the household sector's non-production loan/deposit portfolio.

B. The financial firm and the PPI

The user cost of money

Considering the price and output concepts for the Producer Price Index (PPI), according to the financial firm model of a financial institution, the price of the services the institution provides is the negative of the *user cost of money* on account with its respective customers, whether they are borrowers from it or lenders to it. The negative of the user cost of money (or, hereafter, the user cost rate) is the equivalent for a financial asset to the user cost of capital for a nonfinancial asset and can be viewed in either case as a rental rate for the nominal asset. For financial assets such as loans, it is the margin between accrued payments to the owner of the asset, *excluding expected holding gains*, and the *opportunity cost of money*. The opportunity cost of money is synonymous with the *reference rate* of the national accounts. For a depositor or lender to a financial institution, the user cost of money is the

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values of the stocks of the asset or liability corresponding to the account to which the service charge rates are applied. These are holding gains/losses proper and appear in the *1993 SNA* Revaluation account. As such they do not appear in the Production account, and are not part of the value of output. The second effect of holding gains is the change in service charge flows occurring because of the change in the nominal value of the asset (account) to which they are applied. These latter flows are included in the value of output if the interest rates and other components of the service charge rate apply to the current price value of an account that is subject to revaluations, rather than to its original contract value, as they would in the foreign currency denomination example.

difference between the *opportunity cost or reference rate* and the rate payable by the institution to the lender.[3]

Account-based service charges adjusted by service use intensity indicators

The user cost of money, while critical to an economically-based concept of the price of financial services, is not the only aspect that must be considered. The user cost is expressed as a unitless rate per monetary unit on account, and thus its dual volume measure is in monetary units and subject to the changes over time in the purchasing power of those monetary units. We desire instead a price for financial services that is not unitless, like a rate, but rather possesses a measure in monetary units. Peering further into the problem of defining a price for financial services, it is natural to consider the implicit and explicit charges for services associated with an account as an appropriate measure of the price of those services. The explicit charges would comprise all overt service levies in monetary units against the customer's account for transaction processing and the like, and the implicit charges in monetary units would be the user cost rate times the amount held on account in monetary units.

The implication of considering the account as the primary unit of output for a financial institution is that its output is expressed in terms of, among other things, the numbers of accounts of various types that it provides to its customers. However, among the dimensions of output besides the number and type of accounts would be indicators of the average utilization of specific service dimensions on each account, such as transaction processing, statement generation, assessment of creditworthiness via loan applications and applications for letters of credit, as applicable to the type of account. Variations in these other indicators of service would indicate variations in the quality or nature of service across accounts and institutions, to the extent that these variations are correlated with the explicit and implicit service charges on accounts.

C. The household final consumer and the CPI

The user cost of money

Considering the price and output concepts for the Consumer Price Index (CPI), as with the PPI for financial services provided by a financial institution, the purchasers' price of these services to a household comprises an explicit and an implicit component. For a deposit account or other type of asset created for a household by a financial institution, the explicit service charge includes all overt levies for services on the user's account, including

[3] Interested readers can reference Diewert (1974), Donovan (1978), Barnett (1978, 1979) and Hancock (1985) for an in-depth treatment of the user cost of money concept. *[Detailed references to be provided].*

applicable taxes.[4] The implicit service charge is the user cost rate times the amount held on account.

Account-based service charges adjusted by service use intensity indicators

The user cost of money, while critical to an economically-based concept of the price of financial services, is again not the only aspect that must be considered in determining the price of consumption of financial services. We desire a price for financial services that is not unitless, like a rate, but rather possesses a measure in monetary units and it is natural to consider the implicit and explicit charges for services associated with an account as an appropriate measure of the price of those services. The explicit charges would comprise all overt service levies in monetary units against the customer's account for transaction processing and the like, and the implicit charges in monetary units would be the user cost rate times the amount held on account in monetary units.

The implication of considering the account as the primary unit of consumption for a household and for the household institutional sector of the *1993 SNA* is that its consumption is expressed in terms of, among other things, the numbers of accounts of various types that it holds with financial institutions. Among the dimensions of the household's consumption of financial services besides the number and type of accounts held would be indicators of the average utilization of specific service dimensions on each account, such as transaction processing, statement generation, assessment of creditworthiness via loan applications and applications for letters of credit, and so on, depending on the type of account held. Variations in these other indicators of service would indicate variations in the quality or nature of service across accounts, to the extent that these variations are correlated with the explicit and implicit service charges on accounts.

III. THE ANATOMY OF A FINANCIAL SERVICES PRICE INDEX

A. Index components

Prices and price relatives

The reference rate

It has been suggested that the reference rate be

- The interbank overnight borrowing rate (*1993 SNA*)
- A government bond (default risk free) rate matched to the maturity of the asset/liability with which the service flow is associated.

[4] Such as so-called 'intangibles taxes' levied annually on balances on account as of a given date.

Preference is given here to the second alternative, based on the following reasoning. A bank "backing" its deposit liabilities with government securities is effectively a narrow bank; that is, an institution not in the business of making loans, but only taking and servicing deposits. Thus, this rate has the appeal of splitting off the borrower service margin from the loan rate as the difference between the loan rate charged and the matched government bond rate. On the liability side, it has the appeal of determining the depositor service margin as the difference between the matched bond rate (or interbank rate if the deposit is immediately callable and turnover is daily) and the interest paid on the deposit. The difference between the average reference rate so calculated on assets and that calculated on liabilities provides a measure of the degree to which the institution has matched the maturity-structure of its asset and liability portfolios. This wedge would not be included in financial intermediation service output if calculated as suggested here.[5]

The "indicator" approach

The price of services attached to an account *i* is given by the following sum of implicit and explicit components, based on our previous discussion:

$$p_i^t = \left[\frac{\left(r_i^t - \rho_i^t\right)}{1+\rho_i^t} + s_i^t \right] A_i^t$$

where

p_i^t = the price of services at time *t* on account *i*

r_i^t = the average rate of return payable on account *i* during period *t*

ρ_i^t = the reference rate

s_i^t = the rate charged for explicit service charges payable on account *i* during period *t*

A_i^t = the average amount on account *i* during period *t*

[5] However, an argument could be made that this wedge represents an important dimension of intermediation, which is the extent to which a bank borrows "short" from depositors and lends "long" to borrowers. Given the usual upward sloping term structure of interest rates plotted against maturity, the wedge would assume positive values and the bank realizes an income flow from its management of borrowers' holding period requirements versus depositors' holding period requirements. In an inverted term structure, which sometimes occurs in the presence central bank operations to brake the growth of the monetary stock by forcing short-term rates upward, the bank actually pays a tax, as represented by this wedge, for adopting a "longer" position in assets than in liabilities. The flattening and even inversion of the term structure of government bond rates thus provides an incentive to "crunch" credit, particularly at long maturities.

It should be noted that the user cost price should be discounted (divided) by one plus the reference rate, 1+ρ; this may be important in countries where the risk free rate is relatively high or volatile owing to expectations of future inflation.

Using the above, the price relative for an individual financial product that is an asset *A* to the issuing or creating financial institution (such as a loan) to have the following form:

$$R_i^{t,t-1} = \frac{p_i^t}{p_i^{t-1}} = \left[\frac{\left(r_i^t - \rho_i^t\right)/\left(1+\rho_i^t\right) + s_i^t}{\left(r_i^{t-1} - \rho_i^{t-1}\right)/\left(1+\rho_i^{t-1}\right) + s_i^{t-1}} \right] \frac{A_i^t}{A_i^{t-1}}.$$

By implication, the price relative for services attaching to an asset account comprises a factor for the relative change in the total service charge rate multiplied by a factor representing the relative change in the amount on account.

For liability products, the price of financial services again comprises an implicit and explicit component, as

$$p_i^t = \left[\frac{\left(\rho_i^t - r_i^t\right)}{1+\rho_i^t} + s_i^t \right] L_i^t,$$

where *L* represents the amount on a liability account to the creating or issuing financial institution (such as a deposit), producing a relative of the form:

$$R_i^{t,t-1} = \frac{p_i^t}{p_i^{t-1}} = \left[\frac{\left(\rho_i^t - r_i^t\right)/\left(1+\rho_i^t\right) + s_i^t}{\left(\rho_i^{t-1} - r_i^{t-1}\right)/\left(1+\rho_i^{t-1}\right) + s_i^{t-1}} \right] \frac{L_i^t}{L_i^{t-1}}$$

A note on holding gains and losses

A holding gain (loss) is the increase (decrease) in the size of the account (*A* for asset or *L* for liability) through time, other than an addition to or subtraction of funds from the account by the holder, possibly because of a feature of the contract forming the liability. For example,

- A household resident in one country may take out a loan with a resident financial institution that is denominated in the currency of another country. The household bound by repayment of such a contract would be exposed to holding gains and losses on the value of the loan liability depending on fluctuations in the exchange rate. The financial institution issuing the loan would have the same holding gain or loss on its

loan asset, because the loan would be denominated in its home currency on its accounts.[6]

It should be pointed out that a price index constructed with the above price concept yields a volume measure for an individual account that is identically one, and for the banking institution as a whole it implies that output be measured as the numbers of accounts for the specific classes of assets/liabilities being considered. As noted above, this is not meant to suggest that the number of accounts for specific types of assets and liabilities is the sole dimension of financial services output, as service intensity adjustments would also need to be made as appropriate.

The "real balances" approach

Under certain conditions, constructing financial services deflators employing a general price index are effectively approximating a decomposition of relative change in output that produces a volume measure indexing the number of accounts.[7] Under "real balances" approach, the price relative for intermediation assets is

$$R_i^{t,t-1} = \frac{p_i^t}{p_i^{t-1}} = \left[\frac{\left(r_i^t - \rho_i^t\right) / \left(1 + \rho_i^t\right) + s_i^t}{\left(r_i^{t-1} - \rho_i^{t-1}\right) / \left(1 + \rho_i^{t-1}\right) + s_i^{t-1}} \right] \frac{P_i^t}{P_i^{t-1}}$$

and for intermediation liabilities is

$$R_i^{t,t-1} = \frac{p_i^t}{p_i^{t-1}} = \left[\frac{\left(\rho_i^t - r_i^t\right) / \left(1 + \rho_i^t\right) + s_i^t}{\left(\rho_i^{t-1} - r_i^{t-1}\right) / \left(1 + \rho_i^{t-1}\right) + s_i^{t-1}} \right] \frac{P_i^t}{P_i^{t-1}},$$

where P is a general price index (such as the GDP price index or the CPI excluding financial services) of the goods and services intended to be purchased with the funds in the account.

If the relative change in the size of the account is proportional to the relative change in the general price index, the real balances approach is the same as the indicator approach. This

[6] A financial institution may "write down" the value of a non-performing loan to an amount less than its contract value because it has determined the borrower will be unable to repay and it will be unable to collect the full amount. Unlike a holding gain or loss generated as a result of exposure to exchange risk, accumulated "write downs" appear on the institution's balance sheet as a liability counter-entry to the contract value of the loan asset, rather than a direct "mark (down) to market" of the value of the compromised asset. The write down is interpreted as a reduction in the contract size of the asset, and shows up in the other changes in the volume of assets account rather than in the asset revaluation account of the national accounts system, which tracks holding gains and losses.

[7] Such a correspondence was found in the US in a comparison between measures of bank productivity that relied on physical measures and a user cost-based measure that was further deflated by the GDP deflator.

condition might be predicated a transactions motive for determining the size of the account held. For a given account, the actual volume measure for this approach would be the "real" value of the account in terms of the general price index, whose relative change would be equal to one for an individual account if its size moves proportionately with the general price index. The output for the entire class of accounts would again be measured as the number of accounts under this "transaction motive" model. Otherwise, we still could expect the real balances approach to be roughly similar to the indicator approach to the extent that movements in account balances are proportional to general inflationary trends. In fact, most of the credit and monetary aggregation literature as well as the financial firm literature takes this deflation approach to the output of financial institutions.

Quality adjustment

Of course, these price relatives are correct only if there have been no changes in the intensities as shown by the evolution of specific service indicators, such as transactions processed, on the relevant accounts. Such explicit breakdowns may be available for the explicit service charge component *s* of the price of services on account *i*, but would not be available for the implicit service charge given by the user cost rate term in parenthesis. To determine the marginal effect of intensity of use measures on the implicit component, model based, hedonic methods would be the most common approach. Even at the individual account level, any such use-intensity-aware financial service price measures would become index numbers themselves, rather than the simple price relatives shown above.

Weights

For a given institutional unit, the weight of the i^{th} asset product in a financial services price index is

$$w_i^t = \frac{p_i^t A_i^t}{\sum_i p_i^t A_i^t + \sum_j p_j^t L_j^t}$$

and that of the i^{th} liability product in a financial services price index is

$$w_i^t = \frac{p_i^t L_i^t}{\sum_i p_i^t A_i^t + \sum_j p_j^t L_j^t}$$

where *t* would be set to the reference base or bases of the index formula used for aggregation.

Because the financial service industry is generally one that is regulated, data needed to construct service output weights in a Producer Price Index should be available. Published research has employed bank data collected by bank regulators to construct the user cost based producer price index described in general terms above. Other financial intermediaries such as insurance firms also must complete regulation forms. Since most countries monitor their financial institutions, and there are international agreements regarding reporting requirements and accounting methods, it is likely that such indexes can be constructed for a range of countries.

The availability of the necessary data is not as clear for Consumer Price Indices. The regulatory data generally do not clearly or accurately distinguish between intermediation liabilities and assets (loans and deposits) held by the household institutional sector from the asset and liability positions of other sectors, and, in particular, do not distinguish household positions taken for the purpose of operating an enterprise, as opposed to financing present and future consumption. Hence the uses of such services by households for final consumption is not well-identified in the regulatory data. Household expenditure surveys may contain questions that relate to deposit and loan volumes as well as interest and service fees. However, many of the categories are combined so that the product detail is not as great as the regulatory data. Furthermore, there is some question about the quality of the data because individuals do not readily have the answers available to them. In principle, however, a survey should be able to capture the necessary information. (In some countries such as the US, the central bank maintains its own survey of consumer finances and collects many of the necessary pieces of data.)

IV. Compiling a Financial Services Price Index

A. Sources and methods for index weights

PPI

As mentioned above, in the case of the PPI it should be possible to obtain the weight information from the data collected as part of the regulatory review of banks. If the "real balances" approach is adopted, a general price index will be needed to calculate the price relatives for the various financial services.

There is a lack of distinction between investment banks and commercial banks in much of the available regulatory data. Financial services PPIs should distinguish between these types of services and the establishments relatively specialized in delivering them.

Over time the importance of the difference between the reference rate and the interest rate may decline as banks move toward explicit pricing of services. For example, during 1995-2000 US fees for some deposit services such as stop payment and insufficient funds charges have increased significantly, as have fees for the use of Automatic Teller Machines.

CPI

In the case of the CPI, there may be more difficulty in getting weights because it is generally more difficult to obtain financial information in surveys of consumers. In the case of the US Consumer Expenditure Survey, for example, some of the relevant questions are asked but not in sufficient detail to be useful to the construction of index weights. In addition to the absence of specificity for financial products, there is some concern about the reliability of the data.

An important issue here is the treatment of credit services provided by consumers. In particular, can households be considered as providers of credit services in the role of the 'money lenders', household enterprises making loans from so-called 'own funds' without taking deposits, that are significant providers of borrower services in some parts of the world. Another issue is the relevant reference rate for a household. One could argue that the consumers and producers should both use the rate on government securities because they have no default risk. On the other hand, many households may be unable to trade in such securities because they are dominated in large amounts and have significant transaction costs.

B. Sources and methods for price relatives

PPI

In the case of the PPI, the information needed for the construction of the user cost based prices should also be obtainable from the data collected by regulatory agencies—as has been the experience in the US. In addition, as mentioned some decisions have to be made about how to construct the user cost prices. First, if the nominal balances are to be used in the weights then the user cost based prices must be deflated. This approach is the one employed by both Barnett and Hancock.

Second, a benchmark rate has to be determined. A recent paper from the Bank of Belgium examined a set of different methodologies for determining reference rates and concluded that weighting government bond rates by different maturities made the most sense. [8] Another paper from Eurostat reported on the experiences of 12 countries that used six different ways of computing the reference rate. Though the reported country experience with the FISIM/financial firm/user cost approach to financial services price and volume measurement

[8] See Sneijers, P. "Financial Intermediation Services Indirectly Measured Examination of Results of Experimental Calculations, Belgium: First Results for the Period 1995-1998," Banque Nationale de Belgique, unpublished paper presented at the Joint UNECE/Eurostat/OECD Meeting on National Accounts, April 26-28, 2000 in Geneva Switzerland.

experiences of these countries varied, there was a preference in that source for a reference rate set as the interbank rate. [9]

The quantity indexes have been shown to be robust to the selection of the discount rate and that a benchmark rate can be constructed by from weighting the interest rates on government issues of varying maturity by the proportions held in bank portfolios. However, the measure nominal level of bank output at a point in time will be affected by the reference rate and the user cost value of output and price index tend to display some volatility. The volatility in nominal values is the subject of many studied dealing with the implementation of the UN SNA suggestions regarding a benchmark rate, and has led to a further study of modes of implementing the user cost approach for bank output.

CPI

Finding the price data for the CPI may be a bit more difficult because all of the bank data collected is not easily separable into household and non-household components. For example, US banks report the total number of checkable deposits and do not distinguish between household consumption and business accounts. Indeed some of the business accounts will correspond to household enterprises. Accordingly, it would be difficult to obtain some of the components of the user cost price from bank supervision data. The fraction of the accounts that belong to households may have to be determined from direct surveys of households for use in determining the flows of interest, service fees, etc. for the household institutional sector.

C. Choice of formula

Much of the work done in constructing bank indexes has used superlative forms of output price indexes; and of those, principally the Törnqvist and Fisher Ideal indexes. Because these indices require very timely weights from two time periods they cannot readily be used for the construction of real time indices. Further, because user cost prices for financial services may change sign, the Fisher formula has an advantage over the class of geometric formulas, such as the Törnqvist and its Laspeyres perspective Cobb-Douglas special case, which are not defined when this occurs. Accordingly, for real time indices the Laspeyres or Lloyd-Moulton formulas have appeal. To account for the expected significant changes in the weights of

[9] See Ravets, C. "Results of Implement the FISIM Calculations by Member States," Eurostat unpublished paper presented the Joint UNECE/Eurostat/OECD Meeting on National Accounts, April 26-28, 2000 in Geneva Switzerland.

specific financial services, however, annual chaining of the Laspeyres or Lloyd-Moulton indices is highly desirable.

D. Other considerations

The problem of accounting for quality change is perhaps one of the more difficult to handle when it comes to financial services. The quality of the service can depend on characteristics of a bank, such as number of number of branches, tellers, and ATMs. It can also depend on a number of characteristics that depend on the individual financial product, such as number of checks allowed without charge, wire transfers, minimum balance requirements, internet banking, and so on. In principle, the service fees paid or the interest rate paid should be related to the level of service provided by the financial product.

V. CONCLUDING REMARKS

Given the importance that financial services have become in many national economies, it is important for statistical agencies to produce price indexes for these services. While the desire to produce such indexes has been around for a long time, the problem has been to identify a reliable imputation for the implicitly charged financial services provided by banks. Recent research points to the following areas where progress has been made and areas of needed data improvement:

- A reasonable reference rate for any institutional unit is an average of government bond rates weighted by the maturity structure of the unit's asset/liability portfolio.
- A fundamental, if not the sole indicator of financial services output is the vector of numbers of accounts by type of account. The effective price of financial services is accordingly a user cost rate times an amount on account.
- Second best in price and output measurement would be the so-called "real balances" approach, in which nominal account values are deflated by a general price index.
- Regulatory data provide a good foundation for the weights and even the prices needed for PPI compilation
- In order to properly measure the importance of FISIM in the CPI, household surveys are needed to identify the asset and liability positions of the household institutional sector against the financial corporations sector, exclusive of household holdings of financial assets and positions in financial liabilities to service the establishments of household enterprises.
- Better data are needed on "quality" or intensity of use indicators so that hedonic methods can be used to account for the dimensions of output besides number of accounts.