Ⅲ On Indirect Measurement Methods of Deposit and Loan Service Prices*

- Using Published Interest Rate Data to Measure Deposit and Loan Services Prices, and Problems with this Method -

Toru Ohmori

Economic Statistics Division

Research and Statistics Department

Bank of Japan

JAPAN

Abstract

One method of measuring the prices of deposit and loan services is to view the differentials between actual loan and deposit interest rates and appropriate "reference rates" as the "indirectly measured prices of deposit and loan services." In fact, the ONS in the UK and the BLS in the US are considering the adoption of this type of estimation method for their measurements of deposit and loan services prices.

This paper reviews the prior research at the ONS and BLS, identifies the problem points, and examines the feasibility of using published interest rate data "of a constant quality" to indirectly measure deposit and loan services prices in Japan. The conclusions show: (1) published interest rate data that is indicative and "of a constant quality" is not available for certain lending rates; and (2) there are logical inconsistencies between the published-interest-rate-data-based method for measuring deposit and loan service prices which is examined in this paper and the input-output tables, which are presently utilized to determine the weights of individual service prices in the Corporate Service Price Index (CSPI). Consequently, the paper concludes that it would be difficult to incorporate indirectly measured deposit and loan service prices in the CSPI.

* The author would like to thank Professor Takanobu Nakajima of Keio University for his useful comments during the preparation of this paper. The views expressed herein are those of the author, and do not necessarily reflect those of the Bank of Japan or of the Research and Statistics Department.

1. Introduction

One method of measuring the prices of the services that the banking industry creates via deposits and loans (hereafter referred to as "deposit and loan services") is to view the differentials between actual loan and deposit interest rates and some sort of appropriate "reference rates" as the "indirectly measured prices of deposit and loan services." In contrast with the conventional price index compilation method of directly surveying and aggregating the prices of goods and services, this approach may be referred to as an "indirect" deposit and loan services prices measurement method.

Bodies that compile statistics overseas have been considering the adoption of "indirectly measured deposit and loan services prices" in price indices as the prices of the services created by the banking industry. For example, at the 16th meeting of the Voorburg Group on Services Statistics held in September 2001, the UK Office for National Statistics (ONS) and the US Bureau of Labor Statistics (BLS) presented reports including the basic principle of "indirectly measured deposit and loan services prices," and it seems that the measurement of deposit and loan service prices based on this approach is likely to spread.

The Bank of Japan prepares and releases a Corporate Service Price Index (CSPI) which tracks the prices of services traded among corporations. At present, the CSPI only covers the prices of those banking industry services – such as various transaction fees – that are explicitly collected. In other words, the CSPI only tracks the prices of those banking industry services that can be directly measured. Because of this, the conceptual approach and means of measuring the prices of those deposit and loan services that banking industry apparently charge for indirectly is presently an outstanding issue for the CSPI compilation, and the idea of taking the differentials between actual loan and deposit interest rates and some sort of appropriate "reference rates" as "indirectly measured deposit and loan services prices" may present the direction for one possible solution. If the prices of those deposit and loan services that banking industry apparently charge for indirectly can be grasped and measured in this manner, and then combined with the fees for banking services that are explicitly collected, the overall prices of banking industry services could then be measured in a broader manner.

Accordingly, this paper provides an overview of the prior research conducted at the ONS and BLS, identifies the differences between these two bodies of research and the problem points, and then examines if this approach could be used, at the practical level, to actually measure deposit

and loan services prices in Japan, as well as the potential implications from this for the compilation of the CSPI. To clarify the key issues, this paper focuses solely on the prices of the "indirectly measured" deposit and loan services, and does not give any consideration to transaction fees and other banking services whose prices can be directly measured.

The remainder of this paper is structured as follows. Chapter 2 presents the background to the approach of measuring banking services prices as the differential between actual deposit and loan interest rates and some sort of appropriate "reference rates." Chapter 3 reviews the prior research by the ONS in the UK and the BLS in the US on indirect deposit and loan services prices measurement methods, and examines their merits and demerits. Based on this, Chapter 4 examines the specific means whereby an indirect method of measuring the prices of deposit and loan services would be applied in Japan, as well as the availability of the basic data required under this approach. Chapter 5 considers the implications of adopting this method for the compilation of the CSPI, and estimates the prices of deposit and loan services to private-sector corporations and to the public sector in Japan using the basic data that is actually available. Based on the results of this trial estimation, Chapter 6 presents the problems with using this indirect method to measure the prices of deposit and loan services in Japan. Chapter 7 then considers the feasibility of incorporating the indirectly measured prices into the CSPI, and Chapter 8 reviews the findings and presents the conclusions.

2. Relationship between Services Production Prices and the Indirectly Measured Prices of Deposit and Loan Services

As a start, this chapter reviews the background to the approach whereby the differential between actual loan and deposit interest rates and some sort of appropriate "reference rates" may be viewed as the "indirectly measured prices of deposit and loan services."

We begin with deposits. Let us assume that a given economic entity can manage its funds on the financial market and receive the "reference rate," but chooses to deposit these funds in a bank instead, even though the bank pays a deposit interest rate that is less than the "reference rate." Here, one may assume that while the economic entity chooses to sacrifice the differential between the two rates, it does receive some other kind of economic benefit equivalent to this by maintaining the bank deposit. In such cases, the economic benefit that the entity receives from holding the bank deposit may be viewed as a service that is consumed by the entity and produced

by the bank. Under these circumstances, the differential between the deposit interest rate and the "reference rate" may be considered as the price of this service that is produced by the bank.

The logic for the pricing of loan services is essentially the same. A given economic entity can procure funds from the fiancial market at a "reference rate," but chooses instead to borrow from a bank at a higher rate. Presumably, the entity chooses to borrow from the bank at a higher cost because it receives some sort of economic benefit from bank borrowing that is equivalent to the differential between the two rates. Here again, this economic benefit may be viewed as a service that is consumed by the entity and produced by the bank, and the differential between the two rates may viewed as the price of this service that is produced by the bank.

This summarizes the background behind the concept of viewing the differential between actual loan and deposit interest rates and some sort of "reference rates" as the indirectly measured prices of deposit and loan services."

Because the interest rates that depositors receive from banks are equal to those that the banks pay, and because the interest rates paid by bank borrowers are the same as those received by the banks, the differential between the "reference rate" and the interest rate paid by the banks is the same as the differential between the "reference rate" and the interest rate received by depositors. Similarly, the differential between the "reference rate" and the interest rate the banks receive from borrowers is the same as the differential between the "reference rate" and the interest rate paid by the borrowers. These are all assumptions for measuring the prices of deposit and loan services from the side of the banks, which are the service providers.

3. Methods for Measuring the Prices of Deposit and Loan Services Considered by the ONS and the BLS

At the 16th meeting of the Voorburg Group on Services Statistics held in September 2001, the UK Office for National Statistics (ONS) and the US Bureau of Labor Statistics (BLS) presented reports concerning methods of measuring the prices of deposit and loan services. Based on those reports, this chapter reviews the proposed measurement methods and considers the problems with them.

3.1 Regarding the ONS Method for Measuring the Prices of Deposit and Loan Services

While the ONS examinations of means of measuring the prices of deposit and loan services are

still in their initial stages, they are based on the "Financial Intermediation Services Indirectly Measured (FISIM)" concept put forth in the System of National Accounts 1993 (93SNA) and are being considered as a measurement and allocation method by Eurostat and other organizations. FISIM aims at measuring the value of services produced by financial intermediaries based on the differentials between the total interest receivable and the total interest payable, and then posting these as the consumption expenditures of each institutional sector.[1]

Tables 1 and 2 present an outline of the ONS method for measuring deposit and loan service prices, using the Eurostat FISIM measurement and allocation approaches as a reference. The essence of the ONS method, which is based on the Eurostat FISIM measurement method[2], is as follows: (1) given the actual rate of interest receivable that is used for the calculation of the FISIM deflator, the actual rate of interest payable and the reference rate, the differential between the actual rate of interest receivable and the reference rate is viewed as the price of the loan services provided, while the differential between the reference rate and the actual rate of interest payable paid is viewed the price of the deposit services provided; and (2) the actual rate of interest receivable and the actual rate of interest payable are calculated as the total amount of interest receivable / loans outstanding and as the total amount of interest payable / deposits outstanding, respectively (hereafter, these are referred to as "computed interest rates").

For convenience, the ONS measurement method as summarized above is hereafter referred to as the "FISIM-based method" to measuring deposit and loan service prices. Let us now review the problems with this FISIM-based method.

First, let us consider item (1), above, whereby the differential between the the actual rate of interest receivable used for the calculation of the FISIM deflator and the "reference rate" is viewed as price of the loan services provided, and the differential between the reference rate and the actual rate of interest payable is viewed the price of the deposit services provided.

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[1] The nominal value of services produced under the Eurostat FISIM method is not necessarily equal to that under the 93SNA FISIM. This is because of the differences between the Eurostat and 93SNA equations defining FISIM nominal production value, and in the ranges of financial assets and liabilities measured.(See Ohmori[2003] for details).

[2] The Eurostat FISIM calculation equation is "total amount of interest receivable – total amount of interest payable – {(loans outstanding – deposits outstanding) × reference rate}." This can be rewritten as "{loans outstanding × (the actual rate of interest receivable – reference rate)} + {deposits outstanding × (reference rate – the actual rate of interest payable)." In this case, the actual rate of interest receivable is the total amount of interest receivable / loans outstanding, and the total amount of interest payable / deposits outstanding (Nakayama [2001]).

The concept of measuring the prices of loan and deposit services based on the differentials between “reference rates” and “computed interest rates” used for the calculation of the FISIM deflator is itself theoretically consistent with the SNA.

However, for the “loan services prices” and “deposit services prices” (as measured based on the differentials between the “computed interest rates” and the “reference rates”) to be consistent with the “price measures” concept of the SNA, these loan and deposit services must be homogenous at the aggregated level. In this regard, Ohmori[2003] criticizes the ONS measurement method because (1) it does not reflect the differences in the distinct categories of deposit and loan functions provided as part of financial intermediaries’ actual economic activities, or the qualitative differences in the services that they provide; and (2) it does not adequately reflect the compound settlement and financial intermediary functions provided by financial intermediaries. For these reasons, when the differential between the the actual rate of interest receivable used for the calculation of the FISIM deflator and the “reference rate” is viewed as the price of loan services, and the differential between the “reference rate” and the actual rate of interest payable is viewed as the price of the deposit services, doubts must remain as to whether or not these prices accurately measure the value of the distinct categories of deposit and loan functions provided in the context of the financial intermediaries’ actual economic activities.

The next item (2), which is a more practical issue, concerns the use of “computed interest rates” whereby the actual rate of interest receivable and the actual rate of interest payable calculated as the total amount of interest receivable / loans outstanding and as the total amount of interest payable / deposits outstanding, respectively.

When these equations are adopted, the service prices can be calculated fairly easily whenever data are available for both end-of-the-period deposits and loans outstanding and for the total amounts of interest receivable and payable over the course of the current period . Regardless, there are still certain problems with the use of “computed interest rates.”

In general, the interest receivable and payable during any given period includes interest generated from deposits and loans that were accumulated prior to that period. This is also true for the deposits and loans outstanding. In other words, the “computed interest rates” are calculated using the stock-based data of deposits and loans outstanding (which incorporate deposits and loans accumulated prior to the period in question), as well as interest receivable and interest payable that is generated, in part, from deposits and loans that were accumulated prior to the

current period.[3] Because of this, the selection of the "reference rates" presents various problems.

For example, let us consider the case where the interest rate on the financial market suddenly rises (or falls) during the current period. In such cases, there is a high probability that the "computed interest rates" will significantly lag behind the financial market changes. Considering this, if interbank and other financial market interest rates[4] are adopted as the "reference rates," and if the prices of deposit and loan services are calculated as the differentials between these rates and the "computed interest rates," there is a high likelihood that a bias will emerge whereby during periods of rising financial market interest rates, the prices of loan services will be underestimated (and the prices of deposit services will be overestimated), and conversely, during periods of falling financial market interest rates, the prices of loan services will be overestimated (and the prices of deposit services will be underestimated).[5]

To summarize, the issues with the ONS "FISIM-based method" to measuring deposit and loan service prices are: (1) when the differential between the actual rate of interest receivable used for the calculation of the FISIM deflator and the "reference rate" is viewed as the price of loan services, and the differential between the "reference rate" and the actual rate of interest payable is viewed as the price of the deposit services, doubts must remain as to whether or not these prices accurately measure the value of the distinct categories of deposit and loan functions provided in the context of the financial intermediaries' actual economic activities; and (2) since "computed interest rates" derived from stock-based data are used to measure the prices of deposit and loan services, when financial market interest rates are used as the "reference rates," there is a high likelihood that a bias will emerge whereby during periods of rising financial market interest rates, the prices of loan services will be underestimated (and the prices of deposit services will be overestimated), and conversely, during periods of falling financial market interest rates, the prices of loan services will be overestimated (and the prices of deposit services will be underestimated).

3.2 Regarding the BLS Method for Measuring the Prices of Deposit and Loan Services

[3] In cases like this, some sort of deflator would normally be required to calculate the loans and deposits outstanding in real terms, and determining the correct type of deflator is problematic.
[4] The use of such rates as "reference rates" has been proposed by Eurostat (see Table 1).
[5] This problem could be mitigated by using the mid-rate between the interest rate payable (= average deposit interest rate) and the interest rate receivable (= average lending rate) as the "reference rate" since the computations would then no longer utilize financial market interest rate data.

The BLS examinations of means of measuring the prices of deposit and loan services are far more detailed than those conducted to date by the ONS, and the BLS report includes explanations using specific calculation examples. The BLS method is outlined in Tables 3-4, and may be summarized as follows: (1) a user cost approach[6] is introduced for measuring the prices of deposit and loan services: (2) the deposits and loans are broken down by type and term of service to levels where they are "homogenous"; (3) within each of these homogenous categories, the measurement is made on deposit and loan rates that are deemed to be indicative; (4) the prices of the deposit and loan services are calculated as the differential between these measured rates and a "reference rate": (5) a single interest rate is used as the "reference rate" for all categories of deposits and loans (the BLS proposes the use of the official discount rate, the federal funds rate, or a weighted average of the interest rates on all banks' securities holdings as this "reference rate"); and (6) "computed interest rates" are used for the measured indicative deposit and loan rates, with the computed rates calculated based on their average balances, total interest payable, and total interest receivable.

Unlike the ONS FISIM-based method, the BLS method of measuring the prices of deposit and loan services is based on the theoretical framework presented in Fixler and Zieschang[1992,1998] of applying a user cost approach to the measurement of deposit and loan services prices. Under the user cost approach, the deposit and financial services produced are viewed as the financial output[7] -- that is, as the amounts by which the actual rate of interest receivable is greater than the "reference rate" and by which the "reference rate" is greater than the actual rate of interest payable – and therefore these are the differentials that are measured. For convenience, the BLS measurement method is hereafter referred to as the "User-Cost-Approach-based method(UCA-based method)" to measuring deposit and loan service prices.

Let us begin our examinations of this UCA-based method by reviewing items (1) to (4), above. The BLS method measures the price of services as the differential between "computed interest rates" and some sort of "reference rate," and is similar to the ONS FISIM-based method in this respect. However, different deposit and loan services are presumed under the BLS and ONS methods.[8]

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[6] See Hancock[1985] for the theoretical framework of the user cost approach.
[7] In this paper, the terms "financial output" and "financial input" follow Ohmori and Nakajima[2000].
[8] See Ohmori[2003] for further details regarding this point.

The BLS method breaks down the deposit and loan rates to distinct categories of a homogenous level,[9] and then measures representative deposit and loan rates within each homogenous category. In other words, the BLS method considers the contents of the services generated by the banking industry via deposits and loans to be qualitatively different in each category. In contrast, as noted above, the ONS FISIM-based method views all loans and all deposits as homogenous services at the aggregated level.

So the BLS and ONS approaches take different viewpoints toward the contents of the services generated by financial intermediaries via deposits and loans. On the whole, the BLS method may be considered as more desirable considering the compound settlement and financial intermediary functions provided by financial intermediaries.

The next issue is item (5), whereby a single "reference rate" is used for each category of deposits and loans.

The use of a single rate may be an effort to eliminate an arbitrary selection of the "reference rate," which is often a problem with the user cost approach,[10] and this may also be based on the concept that lending and borrowing rates are theoretically identical when there are no financial intermediaries.

In practical terms, there is no great necessity for adopting the same "reference rate" for all deposits and loans. For example, when a distinction is made between short-term and long-term loans, it may be inappropriate to use the official discount rate or the federal funds rate as the "reference rate" for long-term corporate loans.

One of the merits of adopting a user cost approach for the indirect measurement of the prices of deposit and loan services is that the most appropriate "reference rates" can be used based on the qualitative differences among individual financial assets and liabilities. Of course, it is important to avoid arbitrariness in the selection of the "reference rates," but some doubts must also remain concerning the BLS "reference rate," which has such a great effect on the service price results.

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[9] Regardless, for loans some doubt remains as to whether the classification reaches a level that satisfies the "constant quality" condition, given the categorization into mortgage loans, agricultural loans, commercial loans and consumer loans. In particular, the BLS report does not explain how the principle of "constant quality" can be maintained for commercial loans. Given the differences in financial systems and financial markets, this issue is not examined in any great detail here.

[10] See Appendix 1 for the problems with applying the user cost approach to measuring deposit

Turning to item (6), like the ONS method, the BLS method uses "computed interest rates" for the interest rates payable and the interest rates receivable. The user cost approach assumes that in the process of funds management and procurement, banks, depositors and lenders conclude contracts at the beginning of each period stipulating the amounts of financial assets and liabilities and the interest rates. So, the theoretical basis is that the banks, depositors and lenders make decisions at the beginning of each period on whether or not to maintain the balances of their financial assets and liabilities (that were accumulated in the past) or to rearrange these portfolios, and these decisions are what determines payment and receipt of user costs on each financial asset and liability. However, as pointed out in Chapter 3.1 above, when prices are measured on a stock-based data, there is a high likelihood that a bias will emerge as a result of the time lag between the changes in the financial market interest rates, which are used to calculate the "reference rate", and the "computed interest rates."

To review, the BLS "UCA-based method" to measuring the prices of deposit and loan services provides many highly instructive points, considering the compound settlement and financial intermediary functions provided by financial intermediaries, and how they produce distinct categories of deposit and loan services. Regardless, two problems with the BLS method must be noted: (1) only one interest rate is used as the "reference rate," and this rate is used for both deposits and loans; and (2) while the services prices are measured on a stock- based data, the "reference rate" is based on financial market interest rates at the current period.

4. Using Published Interest Rate Data to indirectry measure Deposit and Loan Services

As noted in Chapter 3, the ONS and BLS methods for measuring the prices of deposit and loan services measure different contents. So we need to clarify the position on exactly which service contents should be measured for deposit and loan services prices.

This paper takes the position that our understanding and measurement of financial intermediaries' economic activities should be in accordance with "the actual conditions," that the banking industry has a compound nature in providing both settlement and financial intermediation functions, and that there are qualitative differences among the distinct deposit and lending services that the banking industry provides. Accordingly, the BLS method can be used as

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and loan services prices.

a reference basis for arranging an indirect means of measuring the prices of deposit and loan services. Yet, as noted above, the BLS has the bias problem created by measuring the deposit and loan service prices on a stock-based data while using financial market interest rates at a current period as the "reference rate."

It should be possible to improve the BLS method to more accurately determine deposit and loan service prices by adopting some sort of flow-based interest rate data (or some "reference rate" equivalent to this) in place of the "computed interest rates," which are derived from deposits outstanding, loans outstanding, and the total amounts of interest payable and interest receivable.[11] This chapter examines this idea in greater detail.

4.1 The Interest Rate Data User Cost Approach Concept

In Japan, data is published on all sorts of financial market interest rates, and on deposit and lending rates. If this type of data can be used at the sub-categorized level for deposit and lending rates in place of "computed interest rates," it should then be possible to combine published deposit and lending rate data with appropriate "reference rates" to measure the prices of deposit and loan services. For convenience and comparison with the BLS method, hereafter this is called the "published-interest-rate-data-based method(PIRD-besed method)" to measuring the prices of deposit and loan services.

In general, published interest rate data of deposits and loans are figures that are applied to transactions for a given period, and thus the time lag before they reflect fiancial market interest rate movements is relatively brief compared with "computed interest rates." This means that the time lag bias, which is one of the problems with the BLS method, can be resolved relatively easily.

Tables 5-6 present a simple summary of this PIRD-based method to measuring the prices of deposit and loan services.

Like the BLS method, the basic concept is (1) to introduce the user cost approach to the measurement of deposit and loan services prices, (2) to break down the deposit and loan rates as much as possible by type and term of service into distinct categories of a homogenous level, (3) to then measure representative deposit and lending rates within each homogenous category, and

[11] The BLS method also has the practical clerical problem of requiring interest payable and interest receivable data corresponding to each financial asset and liability.

(4) to calculate the prices of the deposit and loan services as the differentials between these measured rates and "reference rates." (5) Unlike the BLS method (which uses a single "reference rate"), different interest rates would be adopted as the most appropriate "reference rate" for each of the distinct homogenous categories, and finally (6) published interest rate data of deposits and loans would be used as the deposit and lendig rate being measured. In other words, rather than calculating the prices of deposit and loan services using "computed interest rates" derived from stock-based data, the prices of deposit and loan services would be calculated using flow interest rate data that is applied to actual market transactions over a certain period of time. The following section now examines the availability of such interest rate data at the distinct homogenous categories level that would satisfy the "constant quality" condition.

4.1.1 Regarding Deposit Interest Rates

In general, deposits are categorized by the type, amount, and term. If interest rate data were available at this subcategorized level, it could be viewed as meeting the "constant quality" condition. Here, in keeping with the definitions under the Flow of Funds Statistics, deposits are broadly divided into transferable deposits and time and saving deposits.

Starting with transferable posits, under the Flow of Funds Statistics definitions, transferable deposits are deposits with indefinite deposit term and which are used primarily for settlements. They include current deposits, ordinary deposits, savings deposits, deposits at notice, special deposits, and deposits for tax payments (Research and Statistics Department The Bank of Japan [2002]).

Current deposits bear no interest, and special deposits may also be viewed as non-interest bearing. The Bank of Japan releases weekly interest rate data for ordinary deposits and savings deposits, and monthly rates could be computed as the monthly means. However, there is no data available showing the interest rates on deposits at notice and deposits for tax payments .

Turning to time and saving deposits, these are deposits from which withdrawals can be made with certain restrictions, and which are primarily used for savings. They include time deposits, installment savings, and resident' yen deposits with overseas financial institutions (Research and Statistics Department The Bank of Japan [2002]).[12]

[12] Under the Flow of Funds definitions, these also include all postal savings that include ordinary savings.

Among these, the resident' yen deposits with overseas financial institutions can be excluded since the purpose here is to measure the prices of domestic banking industry services. The Bank of Japan releases weekly interest rate data on installment savings by deposit term. The Bank of Japan also releases monthly time deposits rate data by amount and deposit term. These figures could all be used to compile monthly data.

To summarize, for deposits, in many cases interest rate data is available at a level that essentially meets the "constant quality" condition, so basic data for measuring the prices of deposit services can be obtained relatively easily.

4.2.2 Regarding Lendig Rates

The Bank of Japan releases the following lending rate data: the short-term prime lending rate (city bank basis) and the long-term prime lending rate (fixed interest basis), which are primarily applied for corporate loans; housing loan rates (city bank basis, variable rate), which is for loans to individuals; and the average contracted interest rates on loans and discounts (new loans, stock basis), which is for loans to both corporations and individuals. Compared with deposits, there are few "typical" loan transactions, and lending rates appear to be set in accordance with individual transaction conditions (repayment period, collateral, credit rating, etc.), funds procurement costs, the prime lending rate and other interest rate level indicators. Thus, the loan rates vary by individual contract, and there is no uniform "lending rate" (Bank of Japan[1994]). Because of this, the average contracted interest rates on loans and discounts (new loans, stock basis), which is weighted based on the balance of loans outstanding at each lending rate, cannot be said to meet the "constant quality" condition.

Then, is there any indicative lending rate that would meet the "constant quality" condition? Let us shift our attention to the short-term and long-term prime lending rates, which seem likely candidates as rates of "constant quality."

The short-term prime lending rate is the rate given on short-term loans to borrowers with the highest credit ratings. Similarly, the long-term prime lending rate is the rate given on long-term loans by financial institutions that specialize in long-term financing to borrowers with the highest credit ratings. Both the short and long-term prime lending rates may be considered as meeting the "constant quality" condition, at least in terms of the borrower risk, in that they are only applied on loans to borrowers with the highest credit ratings.

The next issue is the extent to which the short and long-term prime lending rates are indicative lending rates. The very meaning of the "prime" rate is that it is the most preferential rate, only offered to borrowers with the highest credit ratings. In usual practice, the prime is the lowest loan rate offered and spreads are then added on top of it, and thus the average contracted interest rates on new loans and discounts should always hold above the prime rate. Let us then confirm this by comparing the short and long-term prime lending rates with the average contracted interest rates on loans and discounts (new loans, stock basis).[13]

Chart 1 presents the short-term prime lending rate, the average contracted interest rates on new loans and discounts (short-term), the long-term prime lending rate, and the average contracted interest rates on new loans and discounts (long-term). The figure shows how the average contracted interest rates on new loans and discounts (short-term) remains somewhat above the short-term prime lending rate. The short-term average contracted interest rates on new loans and discounts is said to be a type of "spread lending" and to include a spread over the market interest rate in accordance with the level of borrower risk (Bank of Japan[1994]), and as far as Figure 1 indicates we may interpret the overall movements of the short-term average contracted interest rates on new loans and discounts as having the short-term prime lending rate as its lowest limit.

In contrast, Chart 1 also shows that the average contracted interest rate on new loans and discounts (long-term) generally holds below the long-term prime rate. Moreover, the figure shows that during periods when the prime rate rises this is not always necessarily accompanied by a following rise in the long-term average contracted interest rate. This implies that in comparison with the short-term prime lending rate (which is generally indicative of short-term lending rates) the long-term prime lending rate may not be strongly indicative of long-term lending rates. One reason for this is that the long-term prime lending rate is fixed at 0.9% above the coupon rate on five-year interest-bearing bank debentures (public offerings). Consequently at financial institutions that do not issue five-year interest-bearing bank debentures, the incentive for using the long-term prime lending rate as a standard for setting long-term lending rates is weak, and when such financial institutions provide long-term loans and discounts, they frequently set their rates considering their own funds procurement structures and lending terms, with variable

[13] The average contracted interest rates on new loans and discounts was compiled on a All Banks basis from April 1990 through December 1993, and has been compiled on a domestically licensed banks basis since January 1994.

rates set as a spread above the short-term prime lending rate and fixed rates set based on (yen-yen) interest rate swap. Additionally the average term of these financial institutions' long-term loans and discounts is frequently shorter than that at the financial institutions that do provide long-term loans and discounts at the long-term prime lending rate (Bank of Japan[1994]). And this is why, as shown in Chart 2, the average contracted interest rate on new loans and discounts (long-term) generally holds below the long-term prime lending rate.

Despite all this, as explained above, the short and long-term prime lending rate are the only available interest rate data that fulfill the "constant quality" condition. So, even though the long-term prime lending rate is less than ideal as an indicative long-term lending rates, we must now adopt both prime lending rates for calculating the prices of loan services.

Next we need to examine the lending services to individuals. For housing loans, the Bank of Japan releases interest rate data on city bank variable rate housing loans, and the individual banks also announce their housing loan rates, so the interest rate data can be calculated from these public materials. While the Bank of Japan does not release interest rate data on non-housing personal loans, the individual banks do publicize their rates for all types of personal loans, and this information can be compiled for the interest rate data.

The next question is whether the personal loan rate data meet the "constant quality" condition. While a definitive answer to this will require further research, the housing and other personal loan rates presented by each bank are believed to be the most preferential rates offered to their best customers, and in this sense there is a high probability that they do meet the "constant quality" condition. We then need to consider what types of rates can be deemed "indicative" for housing loans and other personal loans based on such data as the relative weights of loans with various balances outstanding. This is an important issue together with the "constant quality" requirement.

5. Estimating Deposit and Loan Services Price Indices for Private Corporations and the Local Governments

Chapter 4 presented the interest rate data user cost concept for calculating the prices of deposit and loan services, and reviewed the various interest rate data that would be available for use. In this chapter, the statistical data that is presently publicly released is used for actual calculations of deposit and loan services price indices. Considering the implications, mostly for the CSPI, the

range of this trial calculation is limited to private corporations[14] and to the local governments.

5.1 Outline of the Estimation

5.1.1 Range of Prices Measured, Estimation Period, Base Year, and Handling of Negative Service Prices

For deposits, considering the availability of interest rate data, the amounts of new transactions, the outstanding balances and other factors, the prices are measured on current deposits, special deposits, ordinary deposits, time deposits, and Certificates of Deposit (CDs). For loans, since the data required to separate short-term and long-term loans is not available, the measurement is on the total of all loans.

The estimation period is set from October 1987 through December 2002 considering the period for which the data are available. The base year is set as the year 2000, and indices are prepared on both fixed weight and weighted arithmetic mean bases.

In cases where the differentials between the "reference rates" and the deposit or lending rates are negative, that is, in cases with "negative service prices," the price of the concerned deposit or loan service is taken as zero.

5.1.2. Weights

As for the weights used for aggregating the individual deposit and loan services prices, two patterns are adopted: (1) the annual average outstanding basis (for deposits this is the annual average of the monthly average outstanding for each type of deposit, and for loans this is the annual average of the outstanding balances as of the end of each month [hereafter referred to as the "annual average loan outstanding"])[15], and (2) a mixed weight basis (for current deposits and special deposits only, the daily receipt amount is calculated as the total amount of new receipts per year divided by 365; for all other deposits and loans the amounts are on an annual average outstanding basis [Table 7 presents the data used for calculating the weights and Table 8 presents

[14] Here, "private corporations" is calculated by "Loans and Discounts(Amounts Outstanding) - ("outstanding for Overseas Yen loans" + "outstanding for financial institutions" + "outstanding for owner-occupied dwellings").

[15] The annual average outstanding weighting may also be viewed as a turnover ratio adjusted new transaction amount basis weighting, which has adjusted the total of all new transactions during the course of the year using a turnover ratio calculated from data on the total of all new transactions during the course of the year and on the annual average balances. See Appendix 2 for

the weights]).

The mixed weight basis is also adopted because with weighting under the annual average outstanding alone the total of new transactions over the course of the year, which is a flow basis figure, would be a large amount, but the figures would be small for current deposits and special deposits, which are used mostly for settlement purposes, and thus these amounts might then be underestimated.

The basic concept behind the mixed-basis weighting is as follows; (1) annual average outstanding basis data is used for interest-bearing deposits, and (2) the total amount of new deposits over the course of the year is used as the data basis for non-interest-bearing current deposits and special deposits. Here, the user cost approach – which specifies that decisions are made at the beginning of each period on whether or not to maintain the existing balances of financial assets and liabilities or to rearrange them – is modified to the same decision-making on a daily basis, and thus the daily deposit receipt amounts are used.

5.1.3 Categorization of Private Corporations, the Local Governments, and Individuals

For deposits, on the annual average outstanding, the *"Yokin, Genkin, Kashidashikin"* (Deposit, Vault Cash, Loans and discounts statistics) by type of depositor are used for the annual average outstanding data of private corporations and the local governments. For the mixed-basis current and special deposit figures, the amounts of new deposits by private corporations and the local governments are unclear, so the monthly basis figures for new reciepts from the same statistics are totaled, and the annual totals are proportionately divided to private corporations and the public sector based on the ratio of the private to public deposits on the annual average outstanding basis. These annual total figures for private corporations and the local governments are then divided by 365 to generate the daily figures.

For loans, the outstanding, as calculated under the following two-step procedure, is viewed as the total balance of the private corporations and the local governments. Because of the data limitations, the loan outstanding cannot be split into short-term and long-term loans. Here, the ratio of short-term to long-term loans is assumed to be 1 : 1.

(1) Overseas Yen loans and loans to financial institutions and insurance companies are subtracted

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the details.

from the total loans figure in the Loans and Discounts Outstanding by Sector statistics; loans to nondeposit money corporations engaged in the provision of finance, credit and investment and securities companies are added, and this eliminates the overseas yen loans and loans to financial institutions and insurance companies.

(2) The loans to individuals (also from the Loans and Discounts Outstanding by Sector statistics) are then subtracted from the figure calculated in (1).

5.1.4 Deposit and Lending Rates and "Reference rates"

(See Table 6 for Details)

Considering that the "constant quality" condition has been met to some extent, for deposits the published interest rate data for each type of deposit are used throughout the entire estimation period. For term deposits, the measurement is limited to deposits with a duration of one year or less, assuming that private corporations and the local governments seldom hold deposits with terms of more than one year.

For loans, two data series are prepared, as follows: (1) under the first, the short and long-term prime rates are used for the short and long-term loan rates throughout the estimation period; (2) under the second, the short-term prime rate is used for the short-term loan rates throughout the estimation period, the long-term prime rate is used for the long-term loan rates from October 1987 through May 1997, and the quotation of 5-year straight bond rated Baa by Moody's(monthly average) is used as the long-term loan rate from June of 1997 forward.[16]

As for the "reference rates," for deposits, the uncollateralized overnight call rate (overnight - 3 month) is used for all deposits from October 1987 through May 1997. From June 1997, the uncollateralized overnight call rate (overnight-1 week) is used for current deposits, special deposits and ordinary deposits only, while the Japanese yen base TIBOR (1-3 months) is used for time deposits and CDs. Turning to loans, for long-term loans the yen-yen swap interest rate (5 year) is used throughout the estimation period. For short-term loans, the uncollateralized

[16] Because the interest rate on long-term bank loans competes with the bond yield incurred when firms procure funds directly from the market, these two rates generally tend to remain rather close. The data series using the distribution yield on straight corporate bonds as the long-term loan rate is prepared considering this. Moreover, the distribution yield is adopted, rather than the issuance rate, because of data limitations and because issuance rates are believed to be set based on

overnight call rate (3 months) is used from October 1987 through May 1997, and the Japanese yen base TIBOR (3 month) is used from June 1997 forward. Fundamentally, interbank market transaction rates are used as the "reference rates" for this estimation, and this is based on the following line of thought.

The differential between the actual rate of interest payable by funds procurers and the interest rates received by funds managers is believed to reflect the financial intermediation services provided by financial intermediaries. So, when these two rates are identical, this may be interpreted as an indication that no financial intermediation services have been generated. The two rates may be considered as essentially identical for interbank market trading, and since no deposit or loan services are generated the interbank rates may be adopted as "reference rates" that do not include the costs of any financial intermediation services.[17]

5.2 Estimation Results

The annual average outstanding basis estimation results are presented in Chart 4-6, and the mixed basis estimation results in Chart 7-9.

First, both total deposit and loan service price indices (annual average outstanding basis and mixed weight basis) peak in 1991-1992, decline from that time through 1997, and then rise once again from 1998 (see Chart 4 and 7). Next, looking at the separate deposit service price and loan service price indices, both deposit service price indices (annual average outstanding basis and mixed weight basis) peak around 1991, and then consistently decline. Meanwhile, the loan service price indices have both been rising from the latter 1990s (see Chart 5-6 for the annual average outstanding basis and chart 8-9 for the mixed weight basis).

On the whole, these charts indicate that during the early 1990s the deposit service price indices were dominant in dictating the movements of the total deposit and loan service price indices, and that from the latter 1990s the loan service price indices have been the dominant factor.

Next, a comparison of the series using the long-term prime lending rate for the long-term interest rate with the series using the quotation of 5-year straight bond rated Baa by

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distribution yields (Ueki[1999]).

[17] Because of this, we must note that this "reference rate" does not represent the interest rate on financial assets as an alternative to deposits from the depositors' perspective, nor the interest rate on funds procurement as an alternative to loans from the borrowers' perspective.

Moody's(monthly average) indicates that the two sets of data do not necessarily show the same movements, and actually move in opposite directions during certain time periods.

Also, looking at the influence from different weightings, the mixed-weight basis gives a relatively higher weight to special deposits compared with the annual average outstanding basis, and this apparently pushes up the deposit services price indices. As a result, during the early 1990s, the mixed-weight basis total deposit and loan service price index is also higher than the total deposit and loan service price index calculated on the annual average outstanding basis index. During the latter 1990s, however, the influence of the deposit service price index on the total deposit and loan service price index declines, and thus the mixed-weight basis index and the annual average outstanding balance basis index come to show basically the same movements.

6. Problems with the PIRD-based method on the Trial Calculation Results

6.1 Selecting the Weights for Aggregation

Beginning with the weighting issue, the calculation results indicate that the annual average outstanding basis is preferable to the mixed-weight basis. This is because the annual average outstanding basis weights can be viewed as flow-based weighting (as they measure the total of new transactions adjusted using turnover ratios for the individual deposit and loan), and because the basic published interest rate data for the deposit and loan can be obtained relatively easily, which makes this approach very practical. In contrast, the theoretical underpinning behind the mixed-weight basis used for the trial calculation is somewhat weak compared with that for the annual average outstanding basis because the mixed-weight basis uses the annual total deposits divided by 365 as the daily deposit amounts for the current deposits and special deposits, while the day to day transaction flows through these types of accounts are actually substantial.

However, the real problem with both the annual average outstanding and the mixed-weight basis figures is the lack of data that breaks down the amounts of new loans and the outstanding of loans by term. For convenience, the above trial calculations simply posit all loans with terms of more than one year as long-term loans and all loans with terms of one year or less as short-term loans, and assumes a ratio of short-term to long-term loans of 1 : 1. These may rightfully be criticized as very rough assumptions

6.2 Concerning the Deposit and Loan Interest Rates

The PIRD-based method presented here utilizes observed financial market interest rates for the deposit and loan interest rate data. These may be considered as surveyed "model fees according to fee tables" prices. So, at least as far as the deposits interest rates are concerned, it is possible to survey "model fees according to fee tables" that meet the "constant quality" condition to some extent. Additionally, the short-term loan rates use the short-term prime lending rate, which may be considered somewhat appropriate as "model fees according to fee tables."

Unfortunately, it is difficult to select long-term loan rates that are both indicative and satisfy the "constant quality" condition. There are certain problems with the use of the long-term prime lending rate and of the quotation of 5-year straight bond rated Baa by Moody's (monthly average) as the long-term loan rates in the above estimation, as follows.

First, let us consider the use of the long-term prime lending rate. While the long-term prime lending rate data constitute "model fees according to fee tables" and thus meet the "constant quality" condition to some extent, as noted above, there are problems with the extent to which the long-term prime lending rate is "indicative.".

There are also various issues with the use of the distribution yield (monthly average) on straight five-year corporate bonds. Strictly speaking, this does not satisfy the "constant quality" condition. Also, in addition to the question of the appropriateness of using the distribution yield rather than the issuance yield, there are also problems with the extent to which this yield is indicative as a long-term loan rate when firms' long-term interest rates for direct funds procurement are used as an alternative to the long-term loan rate offered by banks (under indirect financing).[18]

Furthermore, another problem with the loan data in general is that adjustments cannot be made to account for changes in overall private corporation and the local governments credit risk. For example, in cases where a fixed "reference rate" is assumed and the prices of lending services change as loan interest rates change due to changes in the overall credit risk of private corporations and the public sector, these may provide misleading information as they would

[18] For loans, see References 1 and 2 for comparisons of the total deposit and loan service price index on the average contracted interest rates on new bank loans and discounts basis, the total loans outstanding basis, and the estimation results herein. It should also be noted that the average contracted interest rates on new bank loans and discounts basis corresponds to the "unit value" concept which does not consider the "constant quality" condition, and that these data include

appear as increases (or decreases) in the prices of loan services, or as changes in service prices due to qualitative changes and not as changes in the prices of loan services. It is doubtful that this problem could be resolved solely by adjusting the "reference rates."

As noted above, in recent years the movements of the loan service price index have dominated the total deposit and loan service price index. Therefore, in calculating the total deposit and loan service price index it is extremely important to utilize short-term and long-term loan interest rate data that is "indicative" and also satisfies the "constant quality" condition.

7. Regarding the Feasibility of Incorporation into the CSPI

This chapter considers the feasibility of incorporating the deposit and loan service prices as measured using the PIRD-based method into the CSPI.

7.1 The "Constant Quality" Condition

The CSPI compiles service price data that meets the "constant quality" condition into an index. As noted in Chapter 6, for deposits the PIRD-based method does meet the "constant quality" condition to some extent, and for each distinct category of deposits interest rate data that is believed to be "indicative" is available. For loans, however, data meeting these conditions is not available. There would thus be accuracy problems at the practical level with using these data for a service price index.

7.2 Weights for Introduction to the CSPI

Hypothetically, even if loan data that came much closer to being "indicative" and of a "constant quality" were to become available, weighting the prices of deposit and loan services as measured under the PIRD-based mehtod would still be inconsistent with the basic logic of the CSPI, which uses the value of the imputed service chages under the input-output tables to determine the service price weightings.

The CSPI calculates weights for aggregating the prices of individual services with reference to the framework of the input-output tables. Under Japan's input-output tables, the financial industry's service output has only two components: "imputed service charges" and "fees." At present, the CSPI only measures "fees" in determining the services prices, and their weight is

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interest rates charged on loans to individuals.

calculated from the “fees” output under the input-output tables. Thus, it should be possible to use the weight calculated from the “imputed service charges” output, for example, by integrating the deposit and loan services price index as measured by the PIRD-based method with the “fees” price index under the CSPI, and to then integrate this into the CSPI overall average

However, when deposit and loan services prices are measured via the user cost approach, the contents of the assumed deposit and loans services are different from those under the “imputed service charges” of the input-output tables. Specifically, under the input-output tables, the “imputed service charges” nominal output is defined as the differential between the financial industry’s “property income receipt ” and its “interest disbursements” When the “imputed service charges” is defined in this manner, (1) no room is left for making qualitative distinctions among various services and all services must be treated as homogenous; and (2) it is not possible to separate the “imputed service charges” generated by deposits from that generated by loans. Thus the user cost approach, which recognizes the products generated by various distinct deposit and loan services is incompatible with the basic logic of the price indices that make up the CSPI.

Then what about the idea of defining the nominal output of the deposit and loan services based on the prices of deposit and loan services as measured under the user cost approach, calculating some sort of weights, and then incorporating them into the CSPI?

Hypothetically, there would be two possible approaches if the nominal output of the deposit and loan services were defined based on deposit and loan services price concept under the user cost approach: (1) the differentials between the “reference rates” and the deposit and loan interest rates divided out from the “financial output” multiplied by the deposits outstanding and loans outstanding, respectively, and then totaled; and (2) multiplying the differential between the “reference rates” and the deposit and loan interest rates divided out from the “financial input” by the deposits outstanding and loans outstanding respectively, totaling these two figures, and then subtracting this the total form the sum reached under (1),

However, the “financial output” and “financial input” concept under the user cost approach simply does not exist in the input-output tables or the SNA. So even if the nominal products of the deposit and loan services were defined based on the price concept of the user cost approach, using these for deposit and loan service price weightings, integrating them with the “fees” price index of the CSPI, whose weights are calculated based on the input-output tables, and then incorporating them into the overall CSPI average would just be theoretically inconsistent.

To summarize, we must take a negative stance toward introducing the deposit and loan service prices measured by the PIRD-based method into the present CSPI because this would likely distort the accuracy of the service price index, and because it would be inconsistent with the fundamental logic of the CSPI.

8. Conclusions

This paper has reviewed the prior research at the ONS in the UK and the BLS in the US regarding indirect methods of measuring the prices of deposit and loan services, and noted the problem points. The paper has applied the PIRD-based method, developed in an effort to overcome the problems under the ONS and BLS methods, to measure the prices of deposit and loan services in Japan and, based on the measurement results, summarized the problems with using this indirect method to measure the prices of Japanese deposit and loan services. Finally, the paper has examined the feasibility of incorporating deposit and loan service price data measured by the interest rate data user cost approach into the CSPI.

The conclusions are (1) among the various interest rate data required for measuring the loan services prices, there is no available long-term loan interest rate data that is both "indicative" and of a "constant quality"; and (2) there are inconsistencies between the basic logic of the user cost approach and that of the present CSPI, which calculates weights by aggregating the prices of distinctive services under the industry input-output tables, and therefore it would be difficult to incorporate deposit and loan services prices as measured by the interest rate data user cost approach into the present CSPI.

Nevertheless, the PIRD-based method for measuring deposit and loan services prices presented in this paper does present one realm for future examinations, including further discussions on the appropriateness of indirectly measuring the prices of deposit and loan services using the differentials between deposit and loan interest rates and some sort of "reference rates."

The points of debate regarding the definitions of deposit and loan service prices and their measurement methods are closely liked with the conceptual approaches to the service contents that the financial intermediaries generates via deposits and loans, and these discussions must be further advanced from a wide-ranging perspective, including the appropriate service price concepts corresponding to the assumed service contents.

Appendix 1

Problems with Applying the User Cost Approach to Measure Deposit and Loan Services Prices

The main body of this paper examines the PIRD-based method to measuring the prices of deposit and loan services. In general, the user cost approach entails the following problems.

1. Problems with Selecting "Reference rates"

When the user cost approach is adopted for measuring the prices of deposit and loan services, the services prices are recognized as the differentials between the interest rates on distinctive categories of deposits and loans and some sort of "reference rates." So, in addition to the selection of deposit and loan interest rates, the selection of the "reference rates" also becomes important. Yet, there are no practically appropriate selection criteria for determining the optimal "reference rates" for each distinct category of deposits and loans. In other words, the selection of the "reference rates" is always somewhat arbitrary, and different selections may well result in different deposit and loan services prices.

In response to this problem, the BLS "UCA-based method selects a single interest rate as the "reference rate." In theory, this rate is close to the interest rate at which final lenders would provide funds directly to borrowers if no financial intermediaries existed. Moreover, the BLS method applies this same "reference rate" to all types of deposits and loans. However, it is difficult to argue that the use of a single rate for all deposits and loans is necessary. Thus, appropriate "reference rates" must be selected recursively.

2. The Handling of "Negative Service Prices"

The user cost approach, which is used in the productivity analyses of banks, compares the user costs of financial assets and liabilities with "reference rates." Financial assets are viewed as output when the financial asset user cost is greater than the opportunity cost, and as input when the opposite holds true. Financial liabilities are considered output when the financial liability user cost is less than the opportunity cost, and input when the opposite holds true (see Ohmori and Nakajima[2000] and Ohmori[2003]).

Looking at this in relation with deposit and loan services prices, when the deposit or loan is a financial input, a "negative service price" is generated, and decisions must be reached on how this is to be handled.

There are two approaches to handling this issue when measuring the prices of deposit and loan services. The first is to disregard all negative deposit and loan services costs and the second is to include them in the measurement. This is also closely related to the issue of whether or not to recognize negative service products when measuring deposit and loan services output.

Considering the clarity of the relationship between the price concept and the total output of deposit and loan services, as well as the practical issues in compiling price indices, it may be deemed appropriate to eliminate any "negative service output" from the total deposit and loan services output, and also to leave out any "negative deposit and loan services prices" in the price measurements.[19]

From the standpoint of maintaining consistency with the logic of the user cost approach, however, it could just as well be argued that any "negative service output" should be included in the total deposit and loan services output calculations and similarly that any "negative deposit and loan services prices" should be included in the price measurements. There are really no clear criteria for determining which stance is more appropriate.

What is comparatively clear is that under the definition of total deposit and loan services output, because of the differences in the corresponding pricing concepts, when the "negative service output" are excluded from the total deposit and loan services output any "negative deposit and loan services prices" should also be excluded. Similarly, when the "negative service output" are included in the total deposit and loan services output, any "negative deposit and loan services prices" should also be included.

This issue of how to handle "negative deposit and loan service prices" is extremely important for the discussion of indirectly measuring the prices of deposit and loan service prices, and it demands detailed further examinations, including discussions on the definition of the total deposit and loans services output concept.

[19] The BLS method of measuring banking services prices adopts a similar stance by eliminating measured financial asset and liabilities that show "negative service prices" from the aggregations until positive values are realized.

Appendix 2

On Selecting the Weights for Aggregating Distinct Deposit and Loan Services Prices

When the PIRD-based method presented in the main body of this paper is adopted for measuring the prices of deposit and lending services, observed published interest rate data are adopted as the distinct deposit and loan measured interest rates, and this means that the service prices are being calculated from flow-basis data.

Various approaches may be used for the weighting when aggregating the distinct deposit and loan services prices, such as the average outstanding basis and the new transactions amount basis. So, which approach is most appropriate for aggregating the prices of the distinct deposit and loan services measured under the PIRD-based method?

Considering that the services prices are calculated from flow-basis data, using the new transaction amount data, which is on a flow basis, might seem most appropriate. This approach, however, might overestimate the weight of deposits and loans with short transaction periods and high transaction frequencies.

One possibility would be to use a turnover ratio for each of the distinct deposit and loan services, which would be calculated from both the total amount of new transactions and the average outstanding, to adjust the total amount of new transactions (the total amount of new transactions divided by the average outstanding could be adopted as the turnover ratio, and the total amount of new transactions could then be divided by this turnover ratio). However, the flow-based weights when the total amount of new transactions is adjusted by this turnover ratio would become the same as the weights based on the average outstanding. That is, the turnover ratio for the individual deposit and loan services being measured would be defined by the following equation.

Turnover ratio = Total amount of new transactions / Average outstanding [Equation 1]

Next, the total amount of new transactions after adjustment by the turnover ratio would be defined as follows.

Total amount of new transactions after adjustment by the turnover ratio = Total amount of new transactions / Turnover ratio [Equation 2]

Substituting Equation 2 into Equation 1, we find

Equation 2 = Total amount of new transactions / (Total amount of new transactions / Average outstanding)

= Average outstanding

Thus, even when the deposit and loan services prices are calculated using flow-basis interest rate data, there is apparently no problem with using the average outstanding weighting for aggregating the measured deposit and loan services prices.

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Table 1

FISIM-based method considered by the ONS

for indirectly measuring deposit and loan service prices

Basic concept	・FISIM measurement and allocation method considered by the Eurostat.
Interest rates of deposit and loan	・Interest rate of deposit = the actual rate of interest payable =(total amount of interest payable –deposit-related fee)／deposit outstanding ・Interest rate of loan = the actual rate of interest receivable = (total amount of interest receivable–loan-related fee)／loan outstanding — using the stock-based data to measuring deposit and loan service price
Reference rate	・reference rate of FISIM measurement and allocation method is used. — the Eurostat has proposed three type of interest rate as “reference rate” 1. “interbank rate” 2. mid-rate between the actual rate of interest payable and the actual rate of interest receivable 3. mid-rate between the “interbank rate” and the yield on bonds
Handling of fees	・Deposit-related fees are deducted from total amount of interest payable, loan-related fees are added to total amount of interest receivable.
Aggregating weight	・based on volumes of transactions(flow basis)
Handling “negative service prices”	・unclear
Qualitative differences in the services	・Deposit and loan services are homogenous at the aggregated level such as total outstanding of deposits ,or total outstanding of loans.
Corresponding nominal output	・Nominal output of FISIM as Eurostat definition.

Table 2

Outline of the “FISIM-based method” by the ONS

$$P_L = \frac{(I_L + F_L)}{L} \times 100 - RF$$

$$P_D = RF - \frac{(I_D - F_D)}{D} \times 100$$

$$P = w_L \times P_L + w_D \times P_D$$

$$w_L + w_D = 1$$

P_L：Loan service price index,　P_D：Deposit service price index

P：Deposit and Loan service price index,　RF：Reference rate

I_L：Interest receivable, F_L：Loan-related fees

L：Loans and discounts outstanding

I_D：Interest payable, F_D：Deposit-related fees

D：Amount outstanding of deposits

w_L：Weight for loan service price

w_D：Weight for deposit service price

Table 3

UCA-based method considered by the BLS

for indirectly measuring deposit and loan service prices

Basic concept	・Based on User Cost Approach.
Interest rates of deposit and loan	・Interest rate of pre-selected representative deposit = the actual rate of interest payable for each representative deposit = (interest payable for a deposit – deposit-related fees)/ Average outstanding of that deposit ・Interest rate of pre-selected representative loan = the actual rate of interest receivable for each representative loan = (interest receivable for a loan – loan-related fees)/ Average outstanding of that loan — using the stock-based data to measuring deposit and loan service price
Reference rate	1. Official discount rate (Central bank lending rate) 2. Federal fund rate (interbank lending rate) 3. weighted average of the interest rates on all banks' securities holdings where the weights are shares of the different securities in a banks' securities portfolio. — the same reference rate should be used for both loans and deposits.
Handling of fees	・ Deposit-related fees are deducted from interest payable of each deposit, loan-related fees are added to interest receivable of each loan.
Aggregating weight	・Net interest revenue will be allocated between loan and deposit products by using the reference rate.
Handling "negative service prices"	・Negative service price is excluded from index calculation until it becomes positive
Qualitative differences in the services	・Break down the deposit and loan to distinct categories of a homogenous level. ・The services generated by banks via deposits and loans to be qualitatively different in each category.
Corresponding nominal output	・Total Financial output that is defined by user cost approach.

Table 4

Outline of the UCA-based method by the BLS

$$P_L = \sum_{i=1}^{m} w_{Li} \left\{ \frac{(I_{Li} + F_{Li})}{L_i} \times 100 - RF \right\}$$

$$P_D = \sum_{j=1}^{n} w_{Dj} \left\{ RF - \frac{(I_{Dj} - F_{Dj})}{D_j} \times 100 \right\}$$

$$P = w_L \times P_L + w_D \times P_D$$

$$w_L + w_D = 1$$

$$w_L = \sum_{i=1}^{m} w_{Li}$$

$$w_D = \sum_{j=1}^{n} w_{Dj}$$

P_L：Loan service price index, P_D：Deposit service price index

P：Deposit and Loan service price index,　RF：Reference rate

I_{Li}：Interest receivable of loan category i

F_{Li}：Loan-related fees of loan category i

I_{Dj}：Interest payable of deposit category j

F_{Dj}：Deposit-related fees of deposit category j

Li：Average outstanding of loan category i

Dj：Average outstanding of deposit category j

$w_{L(i)}$：weight of loan category i

$w_{D(j)}$：weight of deposit category j

Table 5

PIRD-based method for indirectly measuring

deposit and loan service prices

Basic concept	・Based on User Cost Approach.
Interest rates of deposit and loan	・Published interest rate data of representative deposit and loan. — using flow-based data to measuring deposit and loan service price.
Reference rate	・Using Interbank rates in principle(see table 9 for detail)。
Handling of fees	・Unclear(There are inconsistencies between the basic logic of the user cost approach and that of the present CSPI, which calculates weights by aggregating the price of distinctive services under the input-output table).
Aggregating weight	1. Annual average outstanding basis (= turnover ratio adjusted new transaction amount basis. See Appendix 2 for detail). 2. Mixed weight basis (current deposits and special deposits: the daily receipt amount that is calculated as the total amount of new receipt per year divided by 365. for all other deposits and loans: annual average outstanding basis).
Handling “negative service prices”	・In cases where the differential between the “reference rates” and the deposits or lending rates are negative, the price of the concerned deposit or loan service is taken as zero.
Qualitative differences in the services	・Break down the deposit and loan as much as possible to distinct categories of a homogenous level. ・The services generated by banks via deposits and loans to be qualitatively different in each category.
Corresponding nominal output	・the differentials between the “reference rates” and the deposit and loan interest rates divided out from the “financial output” multiplied by the deposits outstanding and loans outstanding, respectively, and then totaled.

Table 6

Outline of the PIRD-based method

$$P_L = \sum_{i=1}^{m} w_{Li} \left\{ RL_i - RF_{Li} \right\}$$

$$P_D = \sum_{j=1}^{n} w_{Dj} \left\{ RF_{Dj} - RD_j \right\}$$

$$P = w_L \times P_L + w_D \times P_D$$

$$w_L + w_D = 1$$

$$w_L = \sum_{i=1}^{m} w_{Li}$$

$$w_D = \sum_{j=1}^{n} w_{Dj}$$

P_L：Loan service price index, P_D：Deposit service price index

P：Deposit and Loan service price index

RL_i：Published interest rate of loan category i

RF_{Li}：Reference rate of loan category i

RD_j：Published interest rate of deposit category j

RF_{Dj}：Reference rate of deposit category j

$w_{L(i)}$: weight of loan category i

$w_{D(j)}$：weight of deposit category j

Table 7

Data used for calculating the weights

1. Deposits

Average amount outstanidng	*"Yokin, Genkin, Kashidashikin"* (Deposit, Vault Cash, loans and discounts)

Source: Bank of Japan (only Japanese basis)

2. Loans and Discounts

Loans and Discounts outstanding (amount outstanding at end of month)	"Loans and Discounts Outstanding by Sector"
Individuals	"Loans and Discounts Outstanding by Sector"
Finance and Insurance	"Loans and Discounts Outstanding by Sector"
Nondeposit money corporations engaged in the provision of finance, credit and investment	"Loans and Discounts Outstanding by Sector"
Securities companies	"Loans and Discounts Outstanding by Sector"
Overseas Yen Loans	"Loans and Discounts Outstanding by Sector"

Source: Bank of Japan

Table 8

The weight data of deposits and loans

	Annual average outstanding basis	Mixed weight basis	Percentage of the private corporations and the local governments (annual average outstanding basis)
Current deposits	3.2% (166,074)	2.6% (135,589)	97.7%
Special deposits	0.5% (24,673)	3.9% (207,388)	96.7%
Ordinary deposits	7.9% (404,479)	7.7% (404,479)	36.4%
Time deposits	17.0% (874,101)	16.5% (874,101)	30.5%
Negotiable certificates of deposit	3.6% (183,095)	3.5% (183,095)	99.5%
Short-term loans and discounts	33.9% (1,740,594)	32.9% (1,740,594)	———
Long-term loans and discounts	33.9% (1,740,594)	32.9% (1,740,594)	———
total	5,133,612	5,285,841	———

Figures in parentheses are value data , 100 million yen

Table 9

Deposit and Lending rates, Reference rates

1. Deposit

	Interest rates	Reference rates
Current deposits	——	Call rate(uncollateralized overnight)
Special deposits	——	Call rate(uncollateralized overnight)
Ordinary deposits	Monthly average of Ordinary deposit rate	Call rate(uncollateralized 1 week)
Time deposits (1 month-less than 2 month)	Average interest rates on time deposits by term(new receipt)	・87/10-97/5: Call rate(uncollateralized 1 month) ・97/6- :TIBOR(Tokyo Interbank Offered Rate: Japanese yen 1 month)
Time deposits (2 month-less than 3 month)	Average interest rates on time deposits by term(new receipt)	・87/10-97/5: Call rate(uncollateralized 2 month) ・97/6- :TIBOR(Tokyo Interbank Offered Rate: Japanese yen 2 month)
Time deposits (3 month-less than 6 month)	Average interest rates on time deposits by term(new receipt)	・87/10-97/5: Call rate(uncollateralized 3 month) ・97/6- :TIBOR(Tokyo Interbank Offered Rate: Japanese yen 3 month)
Time deposits (6 month-less than 1 year)	Average interest rates on time deposits by term(new receipt)	・87/10-97/5: Call rate(uncollateralized 3 month) ・97/6- :TIBOR(Tokyo Interbank Offered Rate: Japanese yen 3 month)
Negotiable certificates of deposit (90 days -180 days)	Average interest rates on certificates of deposit(new issues)	・87/10-97/5: Call rate(uncollateralized 3 month) ・97/6- :TIBOR(Tokyo Interbank Offered Rate: Japanese yen 3 month)

Source: Bank of Japan, Japanese Bankers Association

2. Loans and Discounts

	Interest rates	Reference rates
Short-term loans and discounts	Short-term prime lending rate	・87/10-97/5: Call rate(uncollateralized 3 month) ・97/6- :TIBOR(Tokyo Interbank Offered Rate: Japanese yen 3 month)
Long-term loans and discounts	Long-term prime lending rate (From Jun. 97, the quotation of 5-year straight bond rated Baa by Moody's is also used	5-years yen interest rate swap

Source: Bank of Japan, Japanese Bankers Association, Japan Securities Dealers Association, Totan Derivatives Co, Ltd

Chart 1

Chart 1. Short-term and Long-term Prime Lending Rate, Average Contracted Interest Rates
on New Loans and Discounts (Short-term and Long-term)

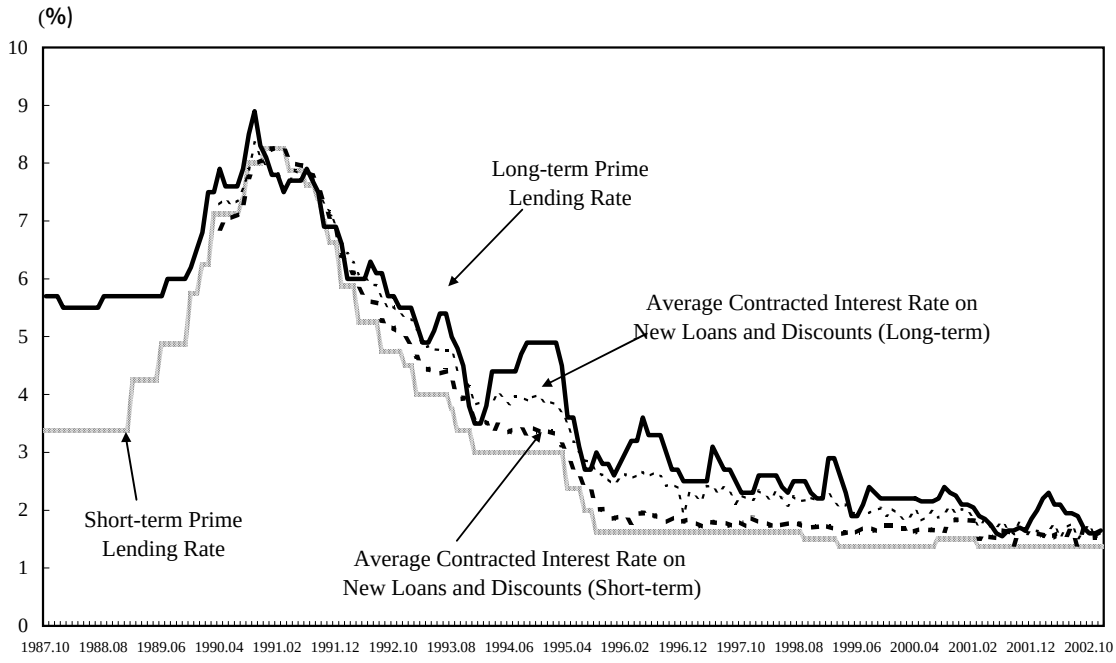

Chart 2,3

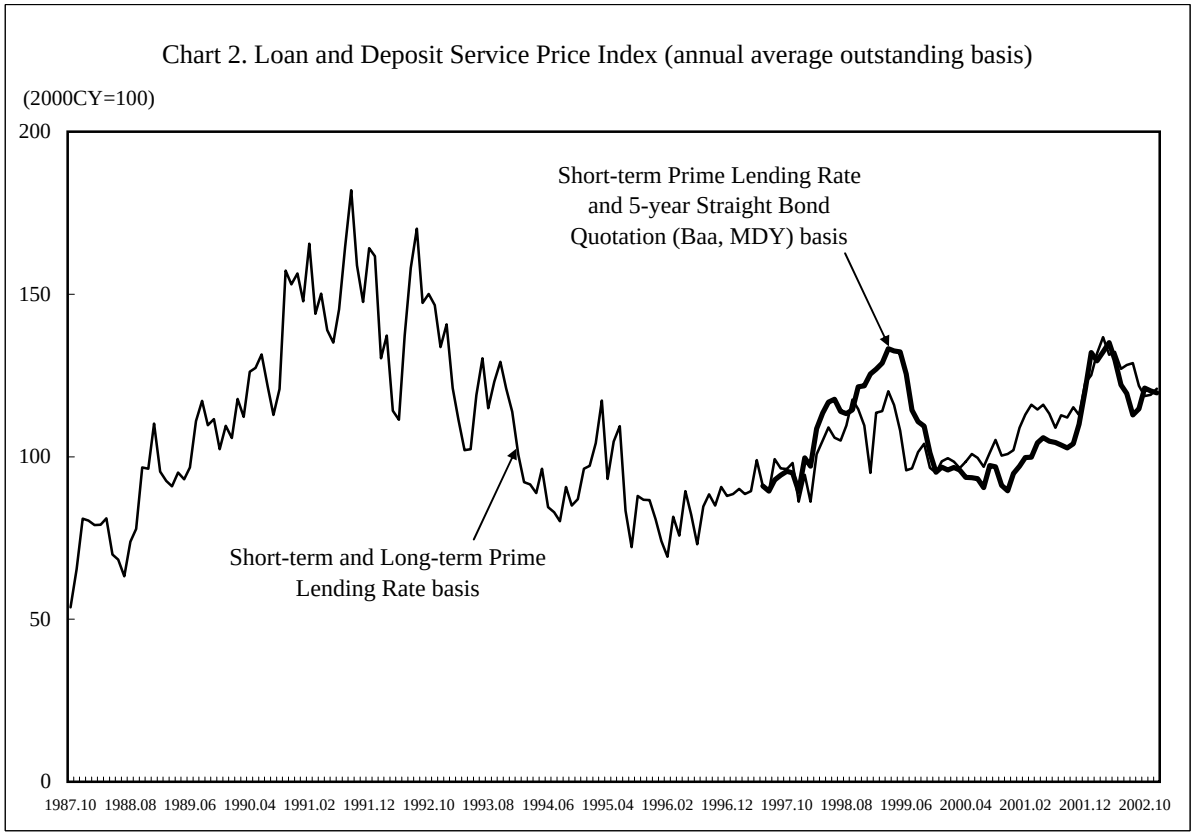
Chart 2. Loan and Deposit Service Price Index (annual average outstanding basis)
(2000CY=100)
200
150
100
50
0
Short-term Prime Lending Rate
and 5-year Straight Bond
Quotation (Baa, MDY) basis
Short-term and Long-term Prime
Lending Rate basis
1987.10 1988.08 1989.06 1990.04 1991.02 1991.12 1992.10 1993.08 1994.06 1995.04 1996.02 1996.12 1997.10 1998.08 1999.06 2000.04 2001.02 2001.12 2002.10

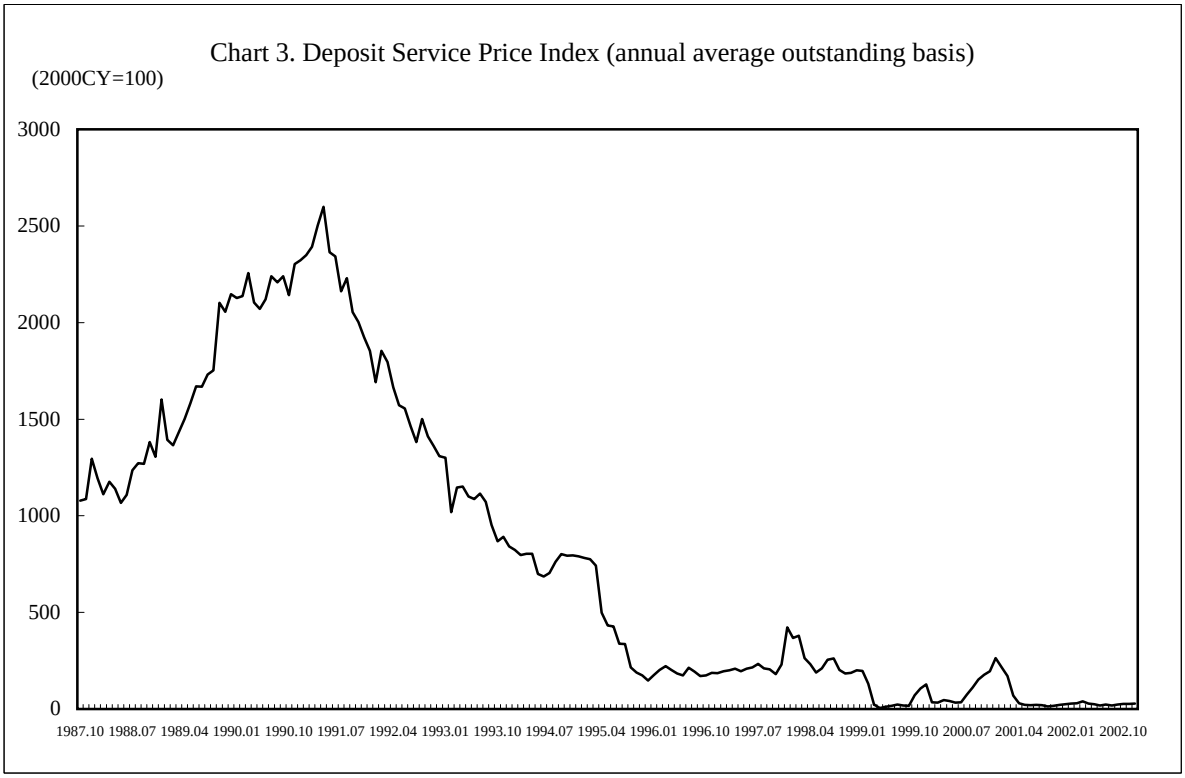
Chart 3. Deposit Service Price Index (annual average outstanding basis)
(2000CY=100)
3000
2500
2000
1500
1000
500
0
1987.10 1988.07 1989.04 1990.01 1990.10 1991.07 1992.04 1993.01 1993.10 1994.07 1995.04 1996.01 1996.10 1997.07 1998.04 1999.01 1999.10 2000.07 2001.04 2002.01 2002.10

Chart 4

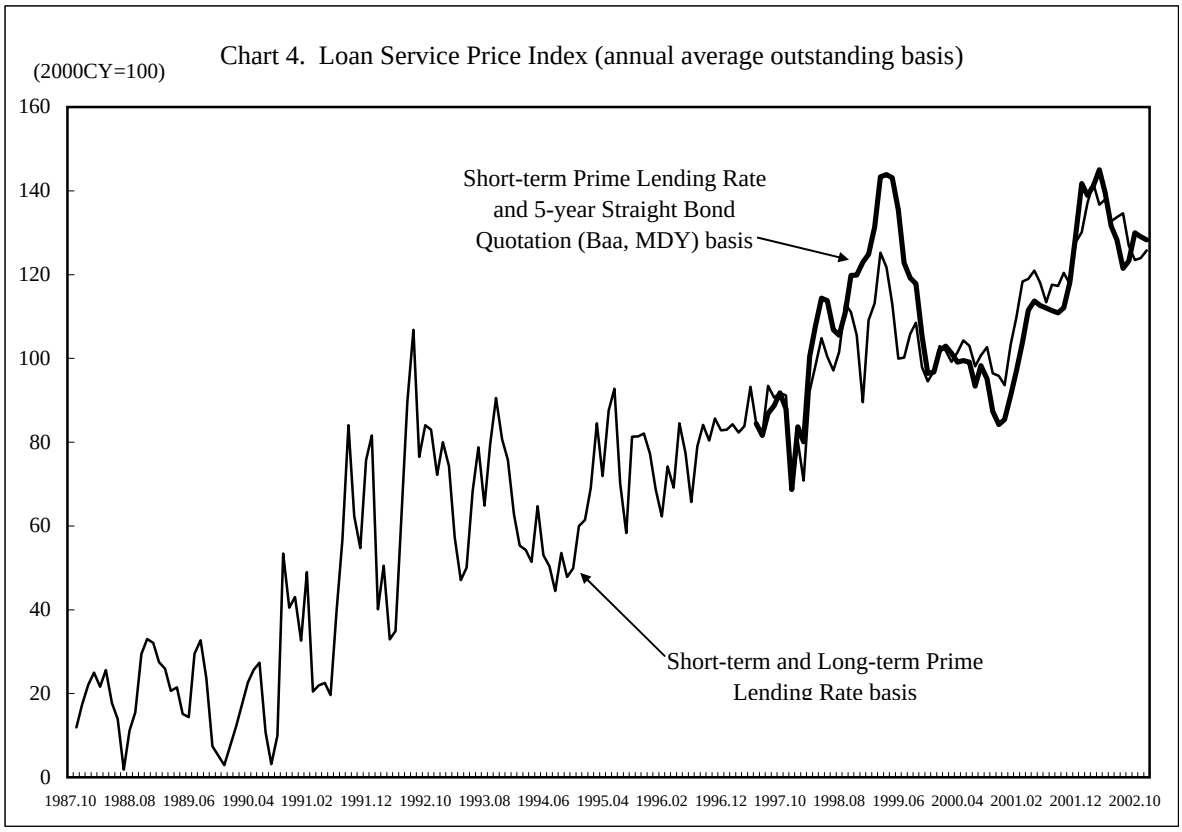
Chart 4. Loan Service Price Index (annual average outstanding basis)
(2000CY=100)
160
140
120
100
80
60
40
20
0
Short-term Prime Lending Rate and 5-year Straight Bond Quotation (Baa, MDY) basis
Short-term and Long-term Prime Lending Rate basis
1987.10 1988.08 1989.06 1990.04 1991.02 1991.12 1992.10 1993.08 1994.06 1995.04 1996.02 1996.12 1997.10 1998.08 1999.06 2000.04 2001.02 2001.12 2002.10

Chart 5,6

Chart 5. Deposit and Loan Service Price Index (mixed weight basis)

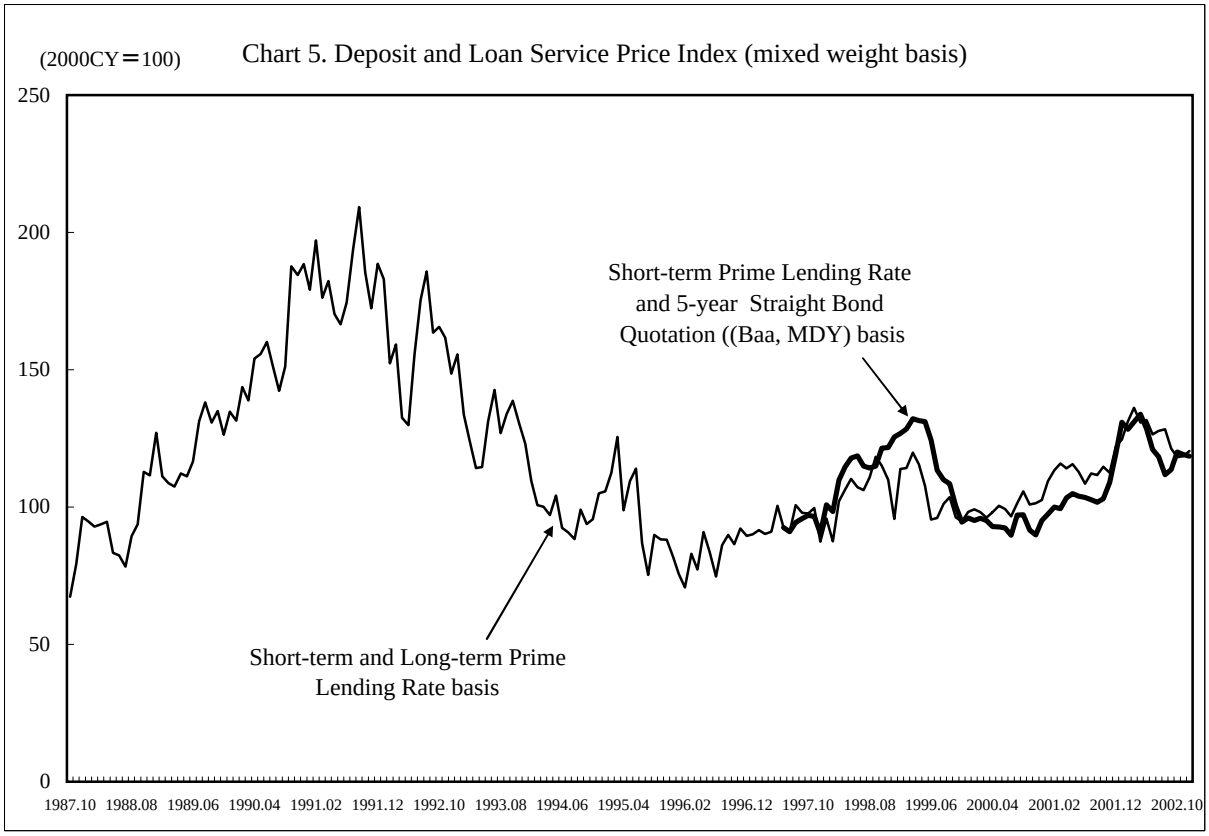

Chart 6. Deposit Service Price Index (mixed weight basis)

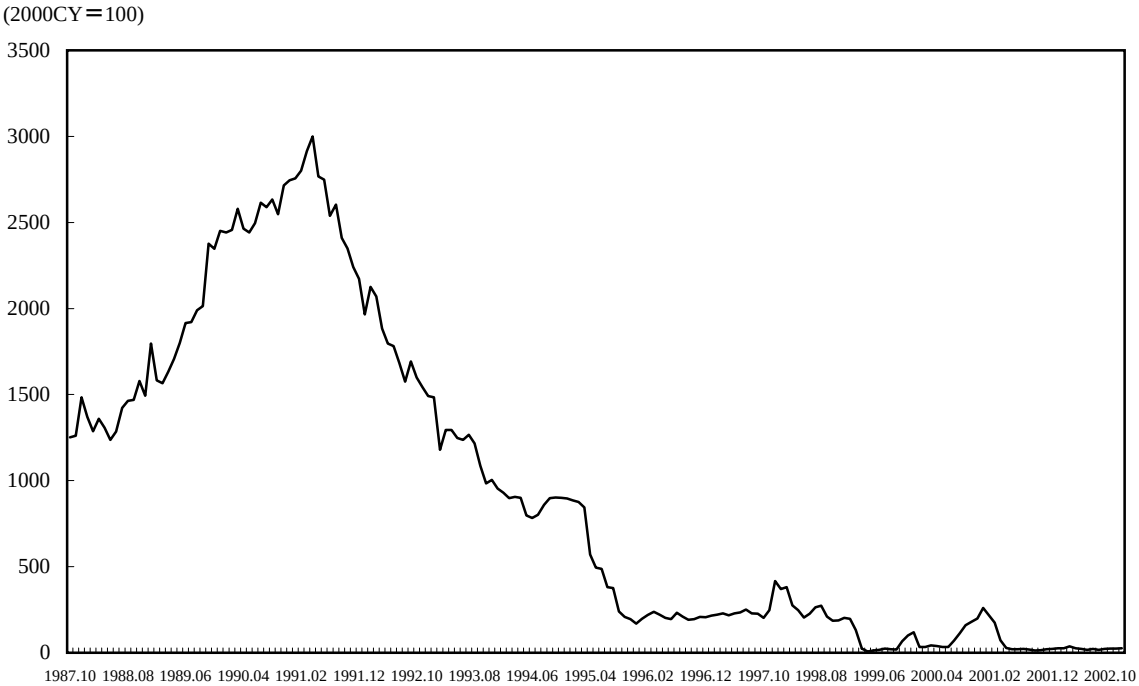

Chart 7

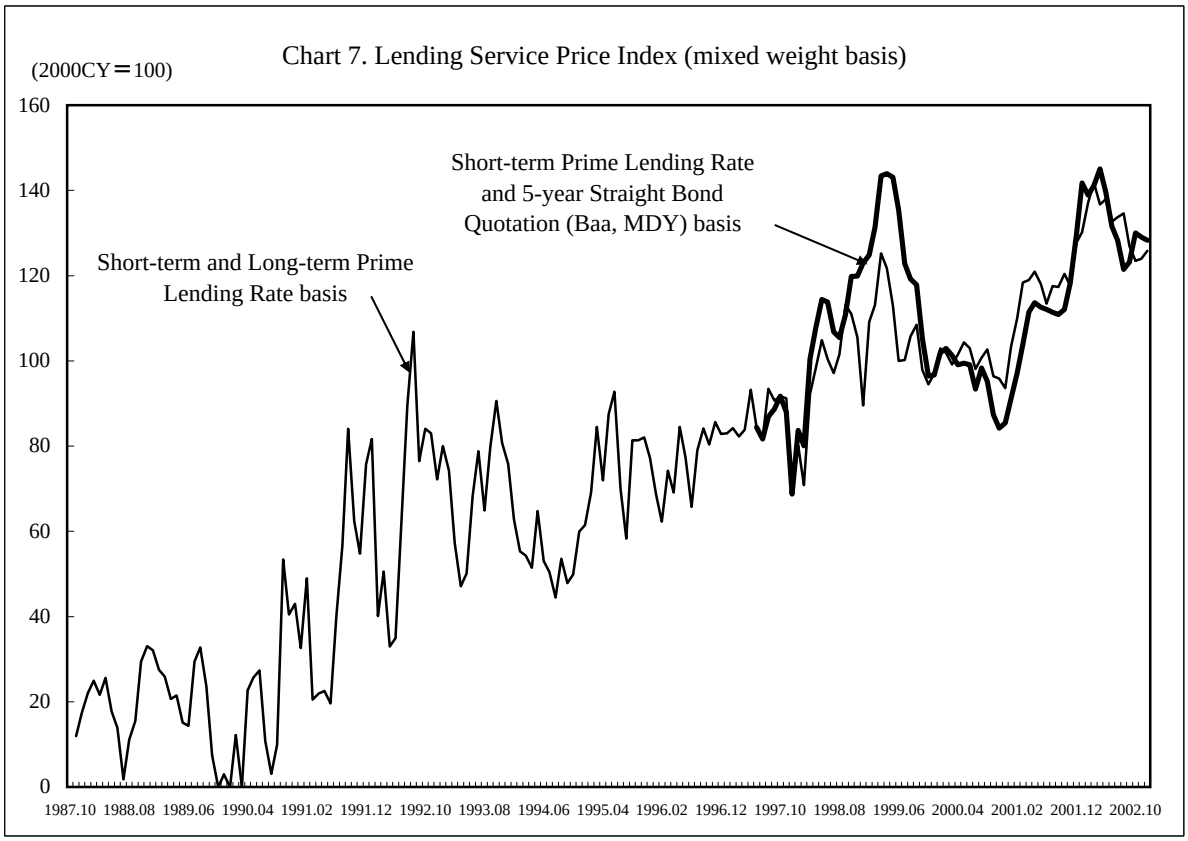
Chart 7. Lending Service Price Index (mixed weight basis)
(2000CY＝100)
160
140
120
100
80
60
40
20
0
Short-term Prime Lending Rate
and 5-year Straight Bond
Quotation (Baa, MDY) basis
Short-term and Long-term Prime
Lending Rate basis
1987.10 1988.08 1989.06 1990.04 1991.02 1991.12 1992.10 1993.08 1994.06 1995.04 1996.02 1996.12 1997.10 1998.08 1999.06 2000.04 2001.02 2001.12 2002.10

Reference 1,2