

# On Indirect Measurement Methods of Deposit and Loan Service Prices

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

Toru Ohmori

([tooru.oomori@boj.or.jp](mailto:tooru.oomori@boj.or.jp))

Economic Statistics Division  
Research and Statistics Department  
Bank of Japan

# 1.Motivation

- One method of measuring deposit and loan service price is to view the differential between actual deposit and loan interest rates and appropriate “reference rates” as the “deposit and loan service prices indirectly measured”.
- In this method, the “computed interest rate data” is used as the deposit and loan interest rates (*e.g.* the FISIM-based method by the ONS, the User-Cost-Approach-based method by the BLS).
- In general, the “computed interest rate data” whereby the actual rate of interest receivable and the actual rate of interest payable are calculated as the interest receivable / loan outstanding and as the interest payable /deposit outstanding.
- It seems that the indirect measurement method of deposit and loan service prices using “computed interest rate data” has a estimation bias problem that service prices will be overestimated or underestimated in some cases (*e.g.* financial market interest rate is adopted as the “reference rate” , and suddenly “reference rate” rises (or falls) during the current period).

- In Japan, all sorts of interest rate data is published by the Bank of Japan and some organizations.
- Can we use the “published interest rate data” as the actual deposit and loan interest rates in place of the “computed interest rate data”?
- If this data is able to be used indirect measurement method of deposit and loan service prices, it will be avoided the estimation bias problem and the increase of reporting burden.

- Outline of the PIRD (Published Interest Rate Data)-based method  
See table 1, 2
- Deposit and Loan Interest Rates and Reference rates  
See table 3, 4
- Weights and Data Source for calculating the weights  
See table 5, 6
- Estimation Results of Deposit and Loan Service Price Index for the Private Corporations and Local Governments(1987/10-2002/12) by the PIRD-based method  
See Chart 1-3

Table 1

## PIRD-based method for indirectly measuring deposit and loan service prices (1)

Basic concept	<ul style="list-style-type: none"> <li>• Based on User Cost Approach.</li> </ul>
Interest rates of deposit and loan	<ul style="list-style-type: none"> <li>• Published interest rate data of representative deposit and loan. using flow-based data to measuring deposit and loan service price.</li> </ul>
Reference rate	<ul style="list-style-type: none"> <li>• Using Interbank rates in principle (see table 9 for detail).</li> </ul>
Handling of fees	<ul style="list-style-type: none"> <li>• 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).</li> </ul>
Aggregating weights	<ol style="list-style-type: none"> <li>1. Annual average outstanding basis (= turnover ratio adjusted new transaction amount basis. See Appendix 2 for detail).</li> <li>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).</li> </ol>
Handling “negative service prices”	<ul style="list-style-type: none"> <li>• 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.</li> </ul>
Qualitative differences in the services	<ul style="list-style-type: none"> <li>• Break down the deposit and loan as much as possible to distinct categories of a homogenous level.</li> <li>• The services generated by banks via deposits and loans to be qualitatively different in each category.</li> </ul>
Corresponding nominal output	<ul style="list-style-type: none"> <li>• 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.</li> </ul>

## PIRD-based method for indirectly measuring deposit and loan service prices (2)

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

$P_L$  :Loan service price index,

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

$P_D$  :Deposit service price index

$P$  :Deposit and Loan service price index

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

$R_{Li}$  :Published interest rate of loan category i

$RF_{Li}$  :Reference rate of loan category i

$$w_L + w_D = 1$$

$RD_j$  :Published interest rate of deposit category j

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

$RF_{Dj}$  :Reference rate of deposit category j

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

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

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

Table 3

## Deposit Interest Rates and Reference Rates

	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 basis)	<ul style="list-style-type: none"> <li>• 87/10-97/5: Call rate (uncollateralized 1 month)</li> <li>• 97/6- :TIBOR (Tokyo Interbank Offered Rate: Japanese yen 1 month)</li> </ul>
Time deposits (2 month-less than 3 month)	Average interest rates on time deposits by term (new receipt basis)	<ul style="list-style-type: none"> <li>• 87/10-97/5: Call rate (uncollateralized 2 month)</li> <li>• 97/6- :TIBOR (Tokyo Interbank Offered Rate: Japanese yen 2 month)</li> </ul>
Time deposits (3 month-less than 6 month)	Average interest rates on time deposits by term (new receipt basis)	<ul style="list-style-type: none"> <li>• 87/10-97/5: Call rate (uncollateralized 3 month)</li> <li>• 97/6- :TIBOR (Tokyo Interbank Offered Rate: Japanese yen 3 month)</li> </ul>
Time deposits (6 month-less than 1 year)	Average interest rates on time deposits by term (new receipt basis)	<ul style="list-style-type: none"> <li>• 87/10-97/5: Call rate (uncollateralized 3 month)</li> <li>• 97/6- :TIBOR (Tokyo Interbank Offered Rate: Japanese yen 3 month)</li> </ul>
Negotiable certificates of deposit (90 days -180 days)	Average interest rates on certificates of deposit (new issues basis)	<ul style="list-style-type: none"> <li>• 87/10-97/5: Call rate (uncollateralized 3 month)</li> <li>• 97/6- :TIBOR (Tokyo Interbank Offered Rate: Japanese yen 3 month)</li> </ul>

Source: Bank of Japan, Japanese Bankers Association

Table 4

## Loan Interest Rates and Reference Rates

	Interest Rates	Reference Rates
Short-term loans and discounts	Short-term prime lending rate	<ul style="list-style-type: none"> <li>• 87/10-97/5: Call rate (uncollateralized 3 month)</li> <li>• 97/6- :TIBOR (Tokyo Interbank Offered Rate: Japanese yen 3 month)</li> </ul>
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

Table 5

### The Weight Data of each Deposit and Loan

	Annual average outstanding basis	Percentage of the private corporations and local governments (annual average outstanding basis)
Current deposits	3.2% (166,074)	97.7%
Special deposits	0.5% (24,673)	96.7%
Ordinary deposits	7.9% (404,479)	36.4%
Time deposits	17.0% (874,101)	30.5%
Negotiable certificates of deposit	3.6% (183,095)	99.5%
Short-term loans and discounts	33.9% (1,740,594)	
Long-term loans and discounts	33.9% (1,740,594)	
total	100.0% (5,133,612)	

Figures in parentheses are value data , 100 million yen

## Data Source for calculating the weights

## 1. Deposit

Average amount outstanding	<i>“Yokin, Genkin, Kashidashikin”</i> (Deposit, Vault Cash, Loans and Discounts)
----------------------------	---

Source: Bank of Japan (only Japanese basis)

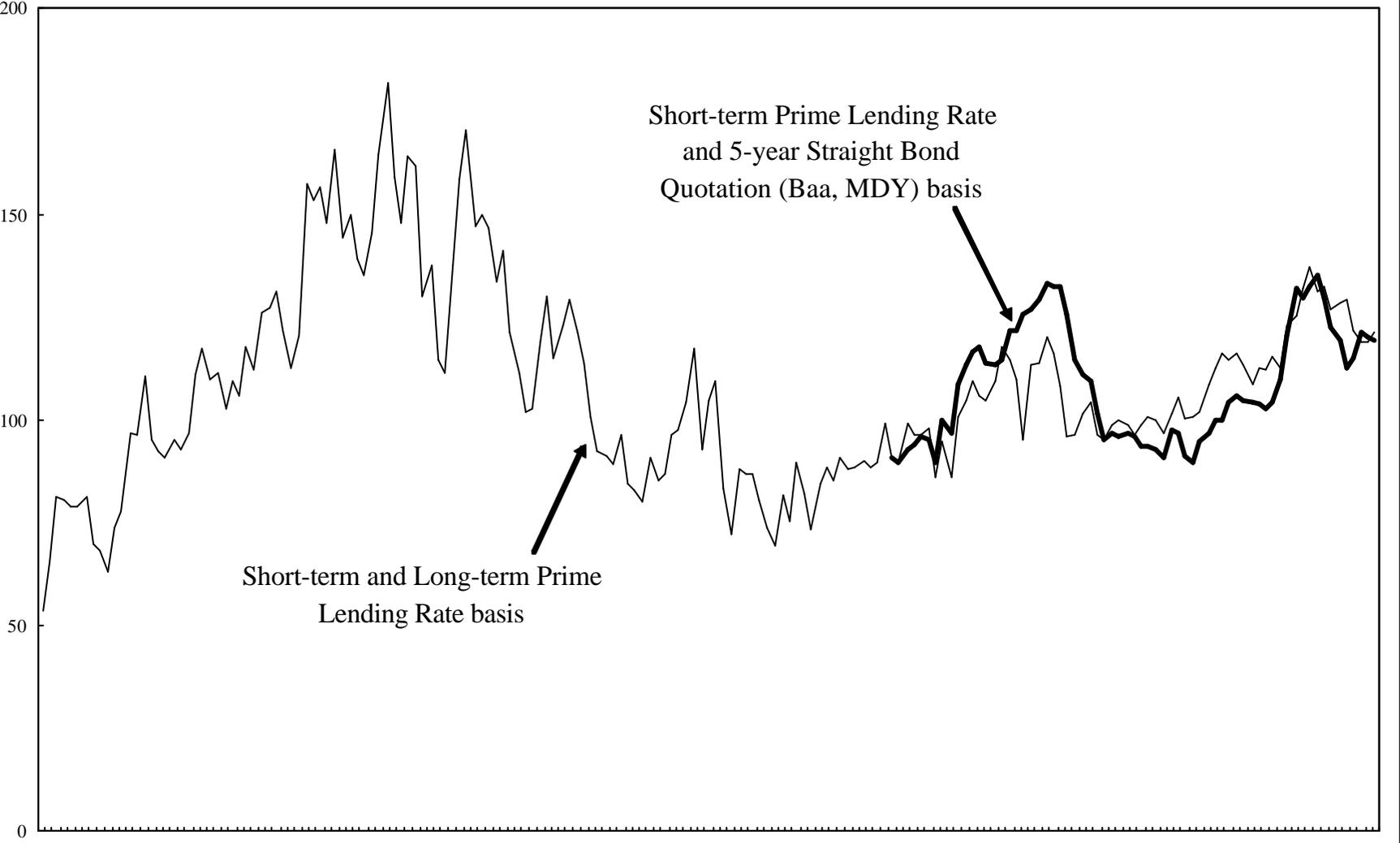
## 2. Loan

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

Chart 1. Loan and Deposit Service Price Index  
(annual average outstanding basis)

(2000CY=100)



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 2. Deposit Service Price Index  
(annual average outstanding basis)

(2000CY=100)

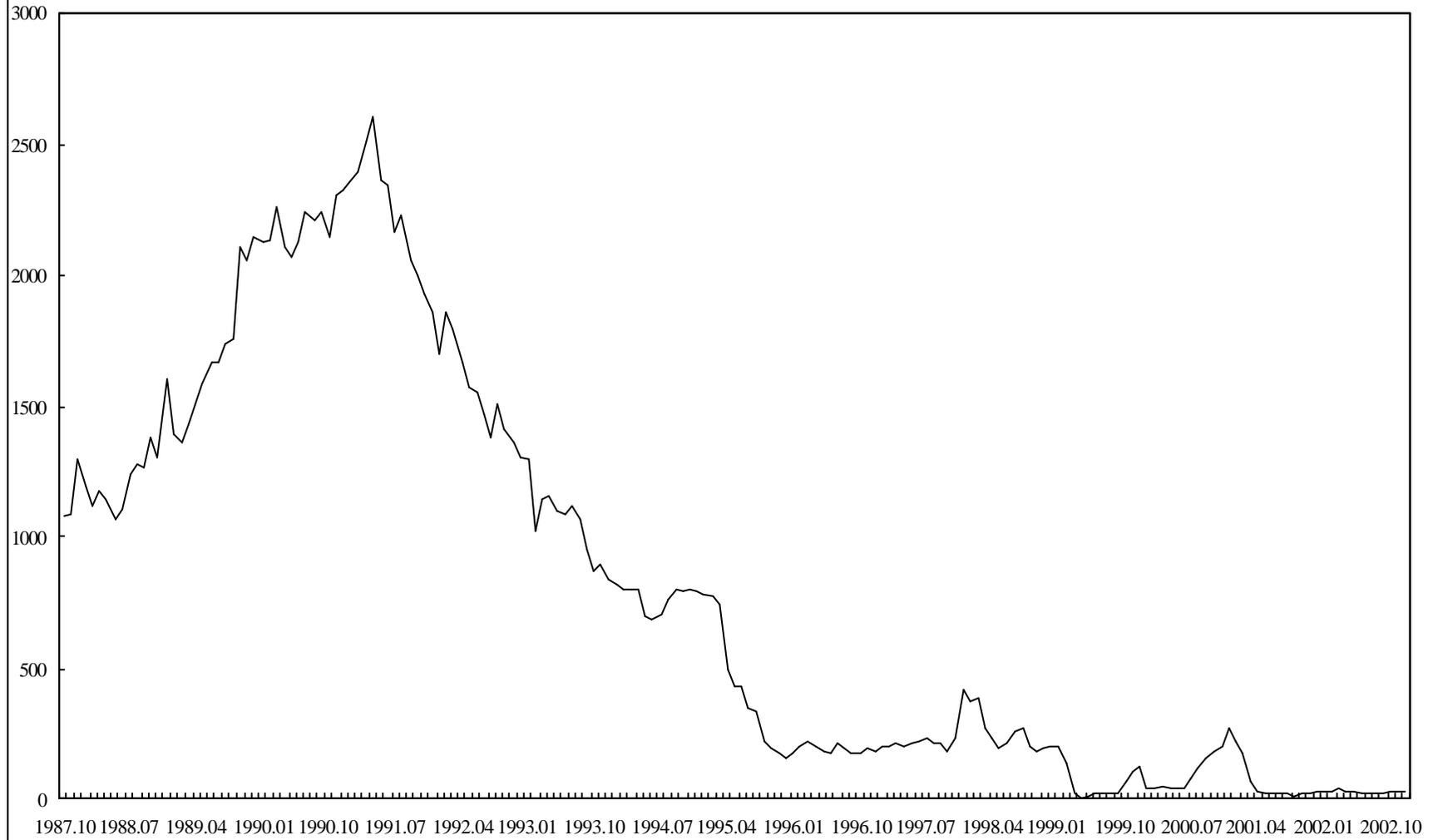
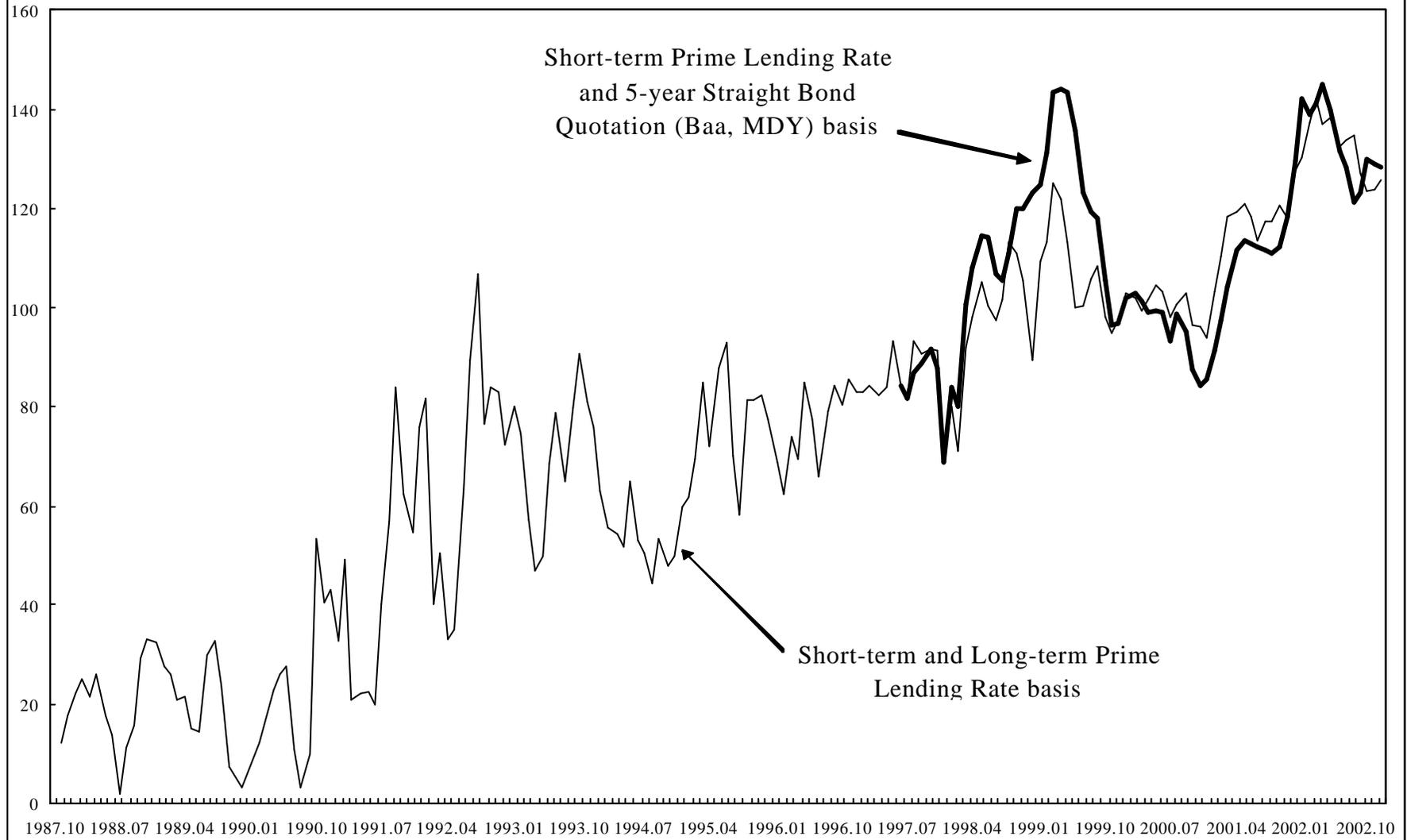


Chart 3. Loan Service Price Index  
(annual average outstanding basis)

(2000CY=100)



## 2. Problems with the PIRD-based method

- Availability of the Interest Rate Data

In the Deposit service prices, Deposit interest rates that is “indicative” and “of a constant quality” are available.

In the Loan service prices, the interest rate data of long term loans and discounts that is “indicative” and “of a constant quality” is **not available**.

- Difference between PIRD-based method and FISIM (or imputed service charge) in the contents of deposit and loan services.

FISIM (or imputed service charges in the I-O table) considers all loan services and all deposit services as **homogeneous** at the aggregated level (such as the loan total or the deposit total).

PIRD-based method considers the contents of the services generated via deposits and loans are **qualitatively different** in each type of loan and deposit.

### 3. Conclusion

- It is difficult to incorporate deposit and loan service prices as measured by the PIRD-based method into the Corporate Service Price Index (CSPI).
- Because the interest rate data of long term loans and discounts that is “indicative” and “of a constant quality” is not available, deposit and loan service prices as measured by the PIRD-based method would likely distort the accuracy of the CSPI.
- Deposit and loan service prices as measured by the PIRD-based method would be inconsistent with the fundamental logic of the CSPI which calculates weights by aggregating the prices of distinctive services under the I-O table.