



Understanding the Behavior of COFI

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The Eleventh District Cost-of-Funds Index (COFI) is a proxy for the actual cost of funding for mortgage loans in the Eleventh District of the Federal Home Loan Bank System.¹ The index is used to price adjustable-rate mortgages, borrowings, and swaps. Thus, a good understanding of the behavior of the COFI is a key to sound asset/liability management of depository institutions, particularly for California institutions.

The stability of the index reflects the composition of existing liabilities of the 11th District, a significant percentage of which have fixed interest rates. There is, however, another factor at work here—the strong retail nature of the index. This adds special characteristics to the

COFI's behavior because of the sluggish way in which retail interest rates adjust to changes in market rates.

COFI and Market Interest Rates

The relation between market interest rates and COFI is complex. In general, COFI follows Treasury rates over the interest rate cycle but with a lag (*see Figure 1 on page 2*). During the December 31, 1988 to June 30, 1995 period, market rates went through an almost complete rate cycle with a peak of 9.6% (in March 1989) and a trough of 3.1% (in September 1992). Over the same period, COFI followed a narrower rate band with a peak

of 8.9% (in July 1989) and a trough of 3.6% (in April 1994).

The 1989-95 period is interesting in two respects. First, COFI peaked four months after the Treasury rates peaked but it bottomed-out 19 months after market rates did. Second, COFI volatility, measured by the peak-to-trough spread, was 530 basis points, while the market rates volatility was 650 basis points. Based on the 1989-95 cycle, it appears that COFI adjusts faster to declines than to increases in

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¹ The Eleventh District includes the states of Arizona, California, and Nevada. The index is calculated based on the monthly interest expenses, the average monthly balance of liabilities, and an adjustment factor (which annualizes the index based on a 365-day year). Interest paid on deposits, FHLB advances, and other borrowings (e.g., repos, subordinated debt, and so on), represents most of the interest expense used in the COFI calculation. Additionally, the COFI includes net cash-flows from off-balance sheet contracts that are accounted for as hedges for liabilities (e.g., net income paid and accrued, amortization of deferred losses or gains, and net origination fees). For more details see, Passmore, *The 11-th District Cost of Funds Index*, Federal Home Loan Bank of San Francisco, 1989.

market rates and the adjustment is incomplete.

The way COFI adjusts to changes in market rates does not appear to be determined by COFI's regional nature. Over the same rate cycle, COFI and the National Median Cost-of-Funds (NMCOF) exhibited similar trends (see Figure 2, on page 3). Though the levels of two indexes were different at times (especially during the 1989-91 period), they adjusted to changes in Treasury rates with a substantial lag.²

One should not read too much into the behavior of the COFI based on a single rate cycle, however. Several factors, specific to the 1989-95 cycle, may have produced the observed patterns in the rate cycles. In particular, COFI's incomplete adjustment to changes in market rates may be just the side-effect of the index's adjustment lag. That is, if retail rates indeed adjust with a lag to market rates, then it would be rational for institutions to forgo raising deposit rates to match past increases in market rates, when a new, downward, trend in rates is widely expected.

The COFI's adjustment to market rates reflects the interplay of two factors. First, COFI represents the cost of existing liabilities (and off-balance-sheet positions), some of which have long remaining maturities. For example, during a period of declining rates an institution's cost-of-funds can be expected to decline slowly as the existing fixed-rate liabilities gradually

Figure 1. COFI Lags Changes in Market Rates

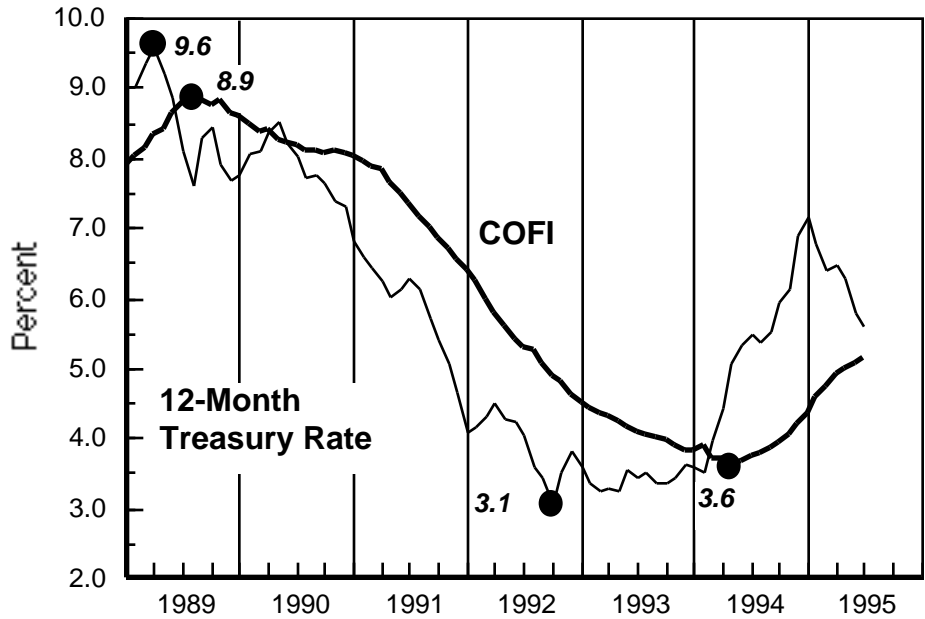
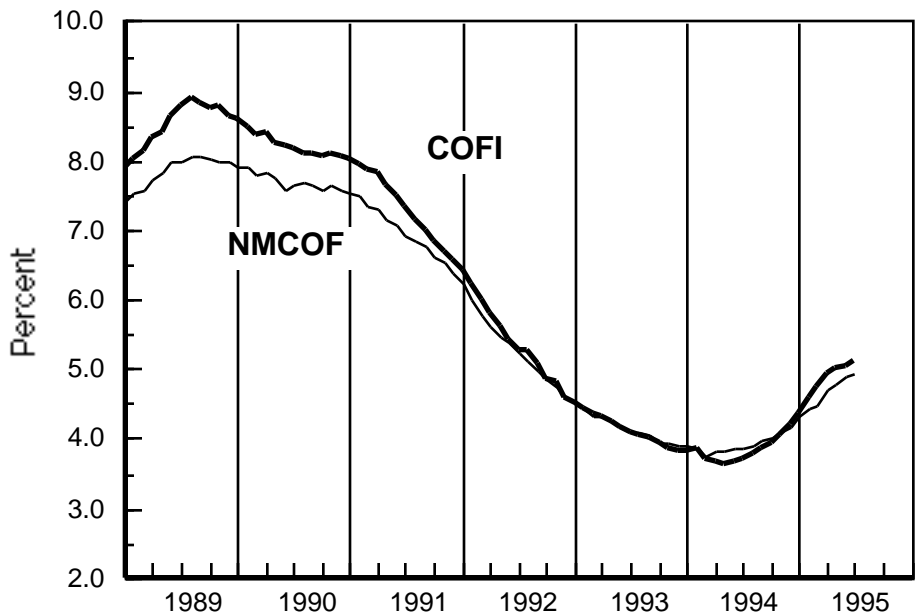


Figure 2. COFI and the National COF Display Similar Trends



² The NMCOF represents the cost-of-funds for all OTS-regulated, SAIF-insured thrift institutions; it is calculated following the same methodology as that used to calculate the COFI.

mature and are replaced with new lower-rate funds.

Second, a large proportion of the COFI liabilities are retail funds which, even if they have stated maturities that are short term (e.g., demand deposits and short-term (CDs), have offered rates that adjust incompletely and with a lag to changes in market rates³. This stickiness of retail rates acts to lengthen COFI's adjustment lag beyond the length implied by their remaining maturities. Since retail funds reprice to current market rates with a lag, it might take a prolonged period of rate stability before retail rates catch up with past changes in market rates.⁴

the period, from 53% of total liabilities in 1989 to 59% in 1995. Over the same period, liabilities maturing in more than 36 months declined from 7% to 3% of total liabilities.

Based on the data in Table 1, the weighted-average remaining maturity of COFI liabilities (excluding non-maturity and variable-rate liabilities), appears to be about 12 months. This suggests that it would take about 12 months for COFI to fully adjust to a one-time change in market rates. This estimate, however,

ignores the effect of put and call options that are embedded in these liabilities. In general, a liability's remaining maturity is shortened by the options. For example, CDs may be withdrawn early when interest rates rise and callable debt may be retired when rates decline. This effect, however, is moderated by the fact that options on retail funds are not usually exercised rationally. That is, a high percentage of CDs and demand deposits are rolled over when it would make sense to withdraw the funds and invest them elsewhere at higher rates.

Average Maturity of COFI Liabilities

The weighted-average remaining maturity of COFI liabilities is rather short. In June 1995, about 59% of COFI liabilities consisted of demand deposits, variable-rate liabilities, and liabilities with remaining maturity of three months or less (see Table 1, below). Only about 3% of the COFI liabilities had remaining maturities of 36 months or longer.

The remaining maturity of COFI liabilities shortened over the 1989 to 1995 period. Short-maturity liabilities (i.e., the non-maturity, the variable-rate, and the short remaining maturity liabilities) increased somewhat over

Table 1. Remaining Maturity Structure of 11th District Liabilities*

(Balances as a percentage of total liabilities)

	1989	1990	1991	1992	1993	1994	1995
Non-Maturity Liabilities							
Demand Deposits & Escrows	13.44	16.21	21.15	25.90	27.21	28.20	21.70
Other Liabilities	2.10	1.81	1.50	1.38	1.69	1.60	1.62
Total	15.53	18.03	22.65	27.28	28.90	29.80	23.33
Variable Rate Liabilities							
	NA	NA	NA	NA	7.73	8.52	10.50
Liabilities Maturing in 3 Months or Less							
Certificates of Deposits	18.26	22.64	25.78	21.94	16.22	14.87	14.61
Borrowings	19.33	14.62	10.35	9.64	7.25	6.08	10.62
Total	37.59	37.26	36.13	31.59	23.47	20.96	25.23
Liabilities Maturing in 4 to 36 Months							
Certificates of Deposits	32.29	31.74	30.28	30.77	28.70	31.33	34.19
Borrowings	7.41	6.86	6.09	4.36	3.79	4.08	3.70
Total	39.70	38.61	36.37	35.12	32.48	35.42	37.88
Liabilities Maturing in 36 Months or More							
Certificates of Deposits	2.58	2.22	1.86	3.45	5.00	3.54	2.01
Borrowings	4.59	3.88	2.99	2.56	2.42	1.72	1.04
Total	7.17	6.11	4.85	6.01	7.42	5.26	3.06

* Data as of the end of June quarter.

³ The reasons for the stickiness exhibited by retail rates are unclear. See, O'Brien, Orphanides, and Small, Estimating the Interest Rate Sensitivity of Liquid Retail Deposit Values, Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, May 1994.

⁴ An econometric analysis of the relation between COFI and market rates confirms these conclusions. For details, see Filimon, Proposed COFI Equation, OTS internal memorandum, 1995.

Most of the COFI Liabilities are Retail Funds

Retail funds have a different repricing behavior than market funds. First, depositors often fail to exercise their option to withdraw their deposits when market rates are more attractive. Second, institutions seem able to attract new retail funds at rates that are lower than market rates. The combination of these factors, which applies to both demand deposits and CDs, makes the remaining maturity calculation above rather imprecise.

The retail component of 11th District liabilities is large. In 1995, almost all the deposits, consisted of non-brokered deposits (see Table 2). And more than half the liabilities are deposits with balances of less than \$80,000.

Over the 1989 to 1995 period, retail deposits in the 11th District increased. First, the size of the deposit base increased from 67% of liabilities in 1989, to over 73% in 1995. Second, brokered funds declined from 8.9% of liabilities in 1989, to 1.1% in 1995. Third, deposits with balances of less than \$80,000 increased from 43% to 52% of liabilities, over the same period.

The Behavior of Demand Deposit Rates and Balances

Demand deposit rates are less volatile than Treasury rates (see

Table 2. Structure of 11th District Deposits*
(Balances as a percentage of total liabilities)

	1989	1990	1991	1992	1993	1994	1995
Source of Funds							
Retail Funds	57.67	65.69	74.89	79.02	74.34	76.95	72.35
Brokered Funds	8.90	6.87	3.79	2.61	2.65	1.17	1.09
Balance Size							
Less than \$80,000	42.76	48.48	54.65	59.50	55.80	56.64	51.77
Between \$80,000 and \$100,000	9.45	10.77	11.45	11.22	11.26	11.15	10.47
Greater than \$100,000	14.36	13.32	12.57	10.91	9.92	10.34	11.20
Total Deposits	66.57	72.57	78.68	81.63	76.99	78.12	73.43

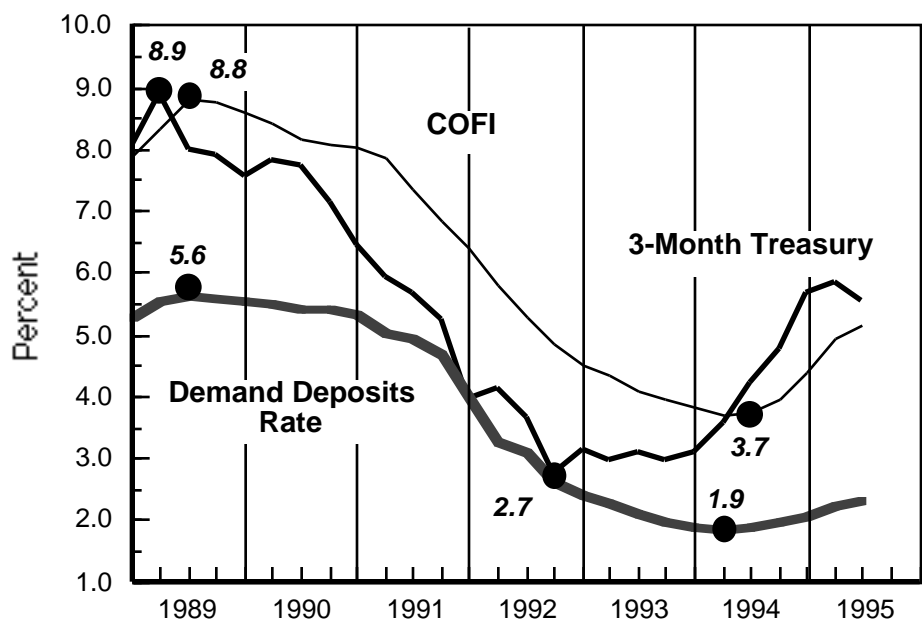
* Data as of the end of June quarter.

Figure 3).⁵ Over the period March 1989 to June 1995, the amplitude of the market rate cycle was more than 600 basis points (equal to the difference between the highest and the lowest rates, over the period). Over the same period, the corresponding

volatility measure for the demand deposit rate was only 370 basis points (this is also lower than COFI's volatility of 510 basis points).

The lagged adjustment to changes in market rates is evi-

Figure 3. Demand Deposit Rates Are Less Volatile Than Market Rates



⁵ The demand deposit rate is calculated as the weighted-average rate of all the demand deposit and escrow account rates.

dent in the trough dates of the rate cycles. The 3-month Treasury rate reached its trough in September 1992, but demand deposit rates did not stop declining until 18 months later. As Figure 3 indicates, the most recent peak in demand deposit rates (July 1989) was much closer to the peak in market rates (March 1989). Comparing the peaks of the various rate cycles, however, does not yield as clear cut conclusions as the comparison of their troughs. This suggests that deposit rates may adjust faster to declines than to increases in market rates.

Demand deposit balances do not appear to be very sensitive to the absolute level of interest rates (see Figure 4). Deposit balances increased from about \$26 billion in 1989 to almost \$48 billion in March 1994, while deposit rates declined slightly, reaching their minimum level of 1.9% in March 1994.

Demand deposit balances, however, seem to be sensitive to the spread between deposit and market rates. Over the sample period, deposit balances first increased while the spread between market and deposit rates narrowed (during the 1989 to 1991 period), then increased slightly over the next two years (during 1992 and 1993). Finally, during 1994 and 1995, balances declined rather dramatically as the spread between market and deposit rates increased.

The decline in nominal deposit balances over the last 18 months of the sample period is a fairly strong sign of the correlation between balances and deposit rate spreads. Typically, aggregate

deposit balances increase over time as a result of inflation, population growth, and GDP growth.

CD Rates are more reliable but they still lag and have incomplete adjustments.

The Behavior of CD Rates and Balances

CDs' balances and rates also exhibit low sensitivity to changes in market rates, though their sluggish adjustment to market rates is less pronounced than that of demand deposits'. Because CDs represent more than one-fifth of total COFI liabilities, the behavior of CD rates

and balances is an important determinant of COFI's behavior.

Three-month CD rates track fairly closely Treasury rates of similar maturity (see Figure 5 on page 6). There is a slight lag during the downward trend in rates over the period 1989 to 1992. The lag during the upward trend in market rates, however, seems to be substantial.

The volatility of CD rates, as measured by the difference between the maximum and minimum levels over the sample period, is slightly lower than that of market rates. This would imply that CD rates adjust almost completely to changes in market rates.

Figure 4. Demand Deposit Balances Adjust to the Spread Between Demand Deposit and 3-month Treasury Rates

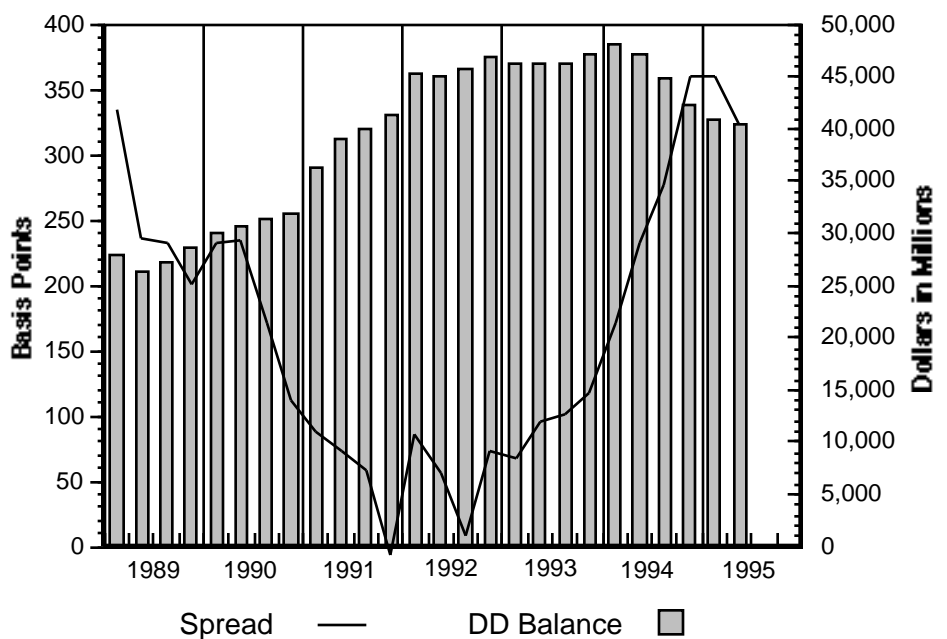
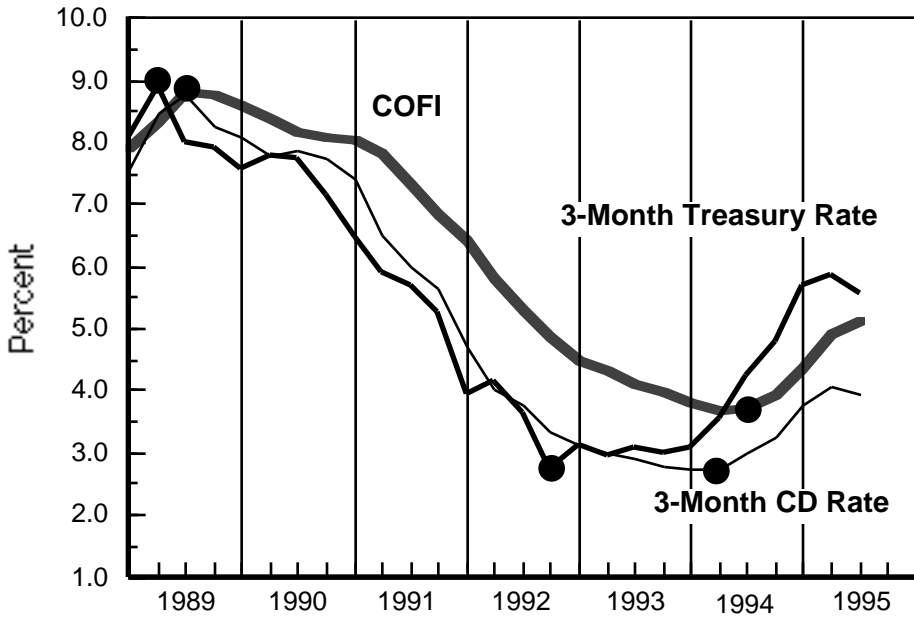


Figure 5. CD Rates Have Low Sensitivity to Changes in Market Rates



Conclusions

The COFI has a lagged and dampened response to changes in market rates. Its low volatility, however, is only partially due to the fact that some of the liabilities underlying the index have fixed rates and maturities.

Retail funds—which represent a large percentage of the COFI liabilities—contribute heavily to the COFI’s special behavior because the rates on these funds adjust only slowly and incompletely to changes in market rates. The strong retail nature of the 11th District liabilities also adds a special pattern to the COFI’s behavior: the index adjustment to increases in market rates seems to be slower than its adjustment to declines in rates

