RESEARCH PROGRAM IN FINANCE

WORKING PAPER NO. 18

THE LOSSES ON SAVINGS DEPOSITS FROM
INTEREST RATE REGULATION

by

David H. Pyle

November 1973

David H. Pyle is Associate Professor, Schools of Business Administration, University of California, Berkeley.

Funds for this research were provided by a Dean Witter Foundation Grant. Computer time was provided by the UC Computer Center. This assistance is gratefully acknowledged. This paper has been improved by comments on an earlier draft by members of the Stanford-UC Finance Colloquium and by other colleagues at Berkeley, including in particular Charles Kelso and Barr Rosenberg. Research assistance was provided by Jay Morrisson.
ABSTRACT

Ceilings on the deposit rates payable by savings institutions under the Interest Rate Adjustment Act of 1966 resulted in interest income losses for savers. A recursive, rate-adjustment model of deposit rate formation is used to predict the deposit rates which would have been paid in the absence of the Act. The resulting estimate of lost interest income during 1968-1970 is $5.18 billion.
THE LOSSES ON SAVINGS DEPOSITS FROM INTEREST RATE REGULATION

by

David H. Pyle

As a result of the regulation of maximum interest rates payable at savings institutions, savers who held interest-bearing accounts in commercial banks, mutual savings banks, and savings and loan associations received less interest income than they otherwise would have received. The objective of the research reported here was to estimate the size of the opportunity losses that resulted from this regulation.\(^1\)

In the analysis that follows, the effects of large certificates of deposit (CDs) have not been included in the loss estimates. Therefore, it seems safe to suggest that the estimated losses were incurred by savers who did not find suitable alternative ways of saving. Alternatives offering substantially higher interest rates than those available from savings institutions were available to some savers; the shift of corporate short-term investments from CDs to commercial paper is an illustration of the behavior of these savers (table 1).

In contrast, consider the effects of maximum rates on other types of savings deposits during the same period.\(^2\) The compound rate of growth of savings deposits during 1960-1965 was 11.3 percent. From table 1, we
see that 1967 was a typical year in this respect. Effective maximum rates in 1968, 1969, and 1970 resulted in a compound deposit growth rate over this three-year period of 6.6 percent. Even in 1969, however, when there was a massive outflow of CDs, the savings deposit growth rate remained positive. Why didn't savings deposits leave savings institutions at a rate similar to that experienced by commercial banks on CDs? Presumably because many savers did not know of or could not avail themselves of suitable alternatives offering higher rates. Transaction costs, minimum transaction quantities, information costs, and inconvenience prevented savers from buying short-term market securities. Most importantly in terms of the losses reported here, interest regulation under the Interest Rate Adjustment Act of 1966 precluded interest-rate competition among the savings institutions that had previously provided low transaction cost, low minimum balance, convenient alternatives for these savers.

The Losses on Savings Deposits

To estimate the size of the opportunity losses to savers as a result of the Interest Rate Adjustment Act, an estimate of the interest rates that would have been paid on savings deposits in the absence of this law is needed. Note that the emphasis here is not on the effects of maximum deposit rates per se since commercial banks were subject to ceiling rates under Regulation Q prior to the passage of the Interest
Rate Adjustment Act. Rather the emphasis is on the particular effects of the joint regulation of maximum rates at all major savings institutions.

The evidence from the growth rate of savings deposits and from simple regressions of the average interest rates paid on deposits on market interest rates suggests that the rates paid by savings institutions in 1967 were not significantly affected by the 1966 legislation. Consequently, this observation was used in obtaining the prediction equations. 5

To obtain a set of prediction equations for the annual average rates paid by the three major types of savings institutions, the following simultaneous, rate-adjustment model was estimated for the period 1952-1967 using two-stage least squares:

1) \( i_{SL}(t) = i_{SL}(t-1) + a_1 \left[ i_G(t)-i_{SL}(t-1)+k_{SL} \right] + a_2 \left[ i_{CB}(t)-i_{SL}(t-1)+k_{SL} \right] \)

2) \( i_{CB}(t) = i_{CB}(t-1) + b_1 \left[ i_G(t)-i_{CB}(t-1)+k_{CB} \right] + b_2 \left[ i_{SL}(t)-i_{CB}(t-1)+k_{CB} \right] + b_3 d(t) \)

3) \( i_{MS}(t) = i_{MS}(t-1) + c_1 \left[ i_G(t)-i_{MS}(t-1)+k_{MS} \right] + c_2 \left[ i_{CB}(t)-i_{MS}(t-1)+k_{MS} \right] \)

where \( i_{SL} \), \( i_{CB} \), and \( i_{MS} \) are annual average rates of interest paid on savings and time deposits (other than large CDs) by savings and loan associations, commercial banks, and mutual savings banks, respectively;

\( i_G \) is the annual average yield to maturity on five years U.S. government bonds;
d is a dummy variable which is 0 before 1961 and 1 thereafter; and

k and \( \ell \) are constants in the various rate adjustment functions.

The logic of this adjustment model is that the current average rate paid by a savings institution is its most recent average rate adjusted by the difference between the most recent rate and the current rate on a primary security and by the difference between the most recent rate and the current rate on a competitive secondary security. The constants in these adjustment functions may be interpreted as normal or steady-state spreads between the various rates. The dummy variable in the commercial bank equation is intended to capture the effect of changing competitive attitudes by commercial banks with respect to savings and time deposits. The introduction of negotiable CDs in 1961 is an objective indicator of this shift in bank behavior.

The results of the experiment with this model suggested that the average rate paid on the competitive secondary security \( (i_{CB}) \) was not a significant determinant of the average rate paid by savings and loan associations \( (\hat{\alpha}_2 = 0.034 \text{ with a } t\text{-statistic of } 0.169) \), and that the average yield on the primary security \( (i_p) \) was not a significant determinant of the average rate paid by mutual savings banks \( (\hat{\alpha}_1 = 0.0089 \text{ with a } t\text{-statistic of } 0.166) \). Elimination of these variables reduced the rate adjustment equations to a recursive system, which was then re-estimated using ordinary least squares. The resulting prediction equations fitted on the 1952-67 data are as follows (t-statistics in parenthesis below the coefficient estimates):
1') \[ i_{SL}(t) = 0.202 + 0.843 i_{SL}(t-1) + 0.134 i_G(t) \]
\[ \begin{array}{c} \text{(1.72)} \\ \text{(13.94)} \end{array} \]
\[ \begin{array}{c} \text{(3.30)} \end{array} \]

\[ R_{adj}^2 = 0.988 \quad \text{Standard Error} = 0.077 \]

2') \[ i_{CB}(t) = -1.396 + 0.348 i_{CB}(t-1) + 0.131 i_G(t) + 0.70 i_{SL}(t) \]
\[ \begin{array}{c} \text{(-3.13)} \\ \text{(2.20)} \end{array} \]
\[ \begin{array}{c} \text{(2.15)} \end{array} \]
\[ \begin{array}{c} \text{(3.14)} \end{array} \]
\[ + 0.257 d(t) \]
\[ \begin{array}{c} \text{(2.53)} \end{array} \]

\[ R_{adj}^2 = 0.994 \quad \text{Standard Error} = 0.084 \]

3') \[ i_{MS}(t) = 0.935 + 0.394 i_{MS}(t-1) + 0.466 i_{CB}(t) \]
\[ \begin{array}{c} \text{(3.79)} \\ \text{(2.22)} \end{array} \]
\[ \begin{array}{c} \text{(3.56)} \end{array} \]

\[ R_{adj}^2 = 0.992 \quad \text{Standard Error} = 0.074 \]

Before reporting the predicted interest rates for 1968, 1969, and 1970, let us examine the prediction equations. First, note that each of the constant terms has a sign that is consistent with the logic of the rate adjustment model and historical interest rate spreads. In the savings and loan equation, the implied steady-state spread between the average deposit rate and the average yield on five-year bonds is about 150 basis points. Using this result and the constant in the commercial bank equation gives an implied steady-state spread between the average rate paid by savings and loan associations and the average rate paid by commercial banks, which is 140 basis points before 1961 and 110 basis points thereafter. In the case of mutual savings banks, the implied steady-state spread between their average rate paid and the average rate paid
at commercial banks is positive as expected but the magnitude of 200 basis points is larger than expected. 7

Given the rate adjustment specification, the coefficient for the lagged dependent variable plus the coefficient for the competitive secondary security rate (if included) and the coefficient for the primary security rate (if included) should sum to one for each prediction equation. In the savings and loan equation, they sum to 0.977, in the commercial bank equation to 1.179, and in the mutual savings bank equation to 0.860.

While these results appear to be reasonably consistent with the model specification, the coefficients may be biased due to serial correlation of the errors in the autoregressive equations that were estimated. 8 On the basis of sample statistics, the asymptotic bias in the coefficients appears to be small, because the estimated regression errors are very small relative to the variability of the exogenous variables over the time period. 9 For example, in the savings and loan equation, the ratio of the variance of the residuals to the variance of the bond yield is approximately 0.007. Given the small sample size, this may be cold comfort with respect to the actual biases.

Any coefficient bias that may exist does not mean there will be bias in the predictions. Perhaps the best test of the reliability of the prediction equations is to examine their performance in 1971 and 1972 after market interest rates had fallen from their 1968-1970 levels. Suppose that the maximum interest rates payable in 1971 and 1972 permitted
savings institutions to pay interest rates consistent with the rate adjustment equations (1'), (2'), and (3') and that the rate adjustment was based on the actual average rate paid in 1970. The resulting predictions and the actual rates paid are given in Table 2. Given the estimated regression standard errors of 0.077 for \( \hat{\sigma}_{SL} \) and 0.074 for \( \hat{\sigma}_{MS} \), these predictions for the savings and loan rate and for the mutual savings bank rate seem reasonably precise. The estimated regression standard error for \( \hat{\sigma}_{CB} \) was 0.084.

The apparent lack of precision in the 1971 and 1972 predictions of the commercial bank rate can be explained by the fact that the rate adjustment mechanism was not feasible for commercial banks in these years. Federal administration of interest rate ceilings at savings institutions since the enactment of the Interest Rate Adjustment Act of 1966 provided for a spread between the rates payable at the two other savings institutions and the rates payable at commercial banks. During 1967-1972, this spread was either 50 basis points (on all regular or savings accounts) or 25 basis points (on all other savings and time deposits with which we are concerned). The lower ceiling rates applicable to commercial banks continued to constrain their behavior in 1971 and 1972. The result is that predicted rates are greater than actual rates in these years as well as in the 1968-1970 period. In fact, the average maximum rate payable (where the average is over deposit types) was 4.85 percent in 1971 and 4.93 percent in 1972—lower than the predicted rates. The predicted rates at commercial banks could not have been paid.
Given this evidence on the reliability of the prediction equations, let us turn to the predicted rates for 1968, 1969, and 1970. Using observed values for primary market rates and predicted values for secondary market rates, the recursive system given by equations (1'), (2'), and (3') generated the predicted rates given in table 3. Taking the predicted rates in this table as the rates that would have been paid in the years in question in the absence of interest rate regulation under the Interest Rate Adjustment Act, the losses to savers in terms of interest rates are the differences between the predicted rates and the actual rates paid.

By multiplying the average stocks of savings deposits at each savings institution (table 4) by the appropriate interest rate loss, an estimate of the interest income lost in each year by savers at the three types of savings institutions was obtained. These results are reported in table 5. The total estimated loss in interest income at all three savings institutions is $5.18 billion.

The estimate of interest income losses in excess of $5 billion during 1968 through 1970 does not include the continuing effects of interest rate regulation since 1970. There are two major effects. The first we have already noted in the discussion of commercial bank rates in 1971 and 1972, namely, that the maximum rates payable by commercial banks still hindered their ability to behave in the manner implied by the rate adjustment equation. Second, the effective interest rate ceilings in the 1968-1970 period reduced the level from which savings
and loan associations and mutual savings banks began the rate adjustment process when their ceilings were no longer effective.

**Some Final Observations on the Interest Income Losses**

The estimated income losses to savers at savings institutions due to interest rate regulation are important fractions of interest earnings during the years in question. The total interest income reported on individual income tax returns in 1968 was $16.8 billion; in 1969, $19.6 billion; and in 1970, $22 billion. The estimated losses on savings deposits are 4.2 percent of the total interest income reported in 1968; 9.6 percent in 1969; and 19 percent in 1970.

At least in the aggregate, savings institutions would have been able to sustain the added interest costs from net income over the period. For savings and loan associations, reserves and undivided profits increased by $2.82 billion over the period which was more than sufficient to cover the estimated cost of $1.59 billion. For commercial banks, net income for 1968–1970 totaled $10.2 billion as compared to the estimated added interest cost of $2.97 billion. For mutual savings banks, the change in general reserves was $0.74 billion compared to the estimated addition to interest cost of $0.62 billion.

Finally, some evidence is available on the importance of benefits resulting from nonprice competition by savings institutions during the period. In the case of savings and loan associations, premiums and gifts given to savers are reported as advertising expenses. The ratio of
advertising expenses to gross income at FSLIC-insured savings and loan associations trended downward from 1955 through 1967. Advertising expenses in 1968, 1969, and 1970 were in excess of those implied by an extrapolation of the trend. Even if the entire excess over the trend is taken as an added benefit to savers, the effect is to offset only $0.04 billion of the estimated losses at savings and loan associations.

In summary, the interest income in excess of $5 billion lost as a result of ceilings on interest payable under the Interest Rate Adjustment Act of 1966 is an important fraction of total interest income for 1968-1970. The arguments brought to the defense of savings deposit rate regulation need to take these losses into account.
TABLE 1
ANNUAL RATE OF GROWTH (IN PERCENT) IN THE STOCK OF CDs, COMMERCIAL PAPER, AND SAVINGS DEPOSITS, 1967-1970

<table>
<thead>
<tr>
<th></th>
<th>CDs</th>
<th>Comm. paper</th>
<th>Savings deposits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>32.1</td>
<td>24.3</td>
<td>11.6</td>
</tr>
<tr>
<td>1968</td>
<td>14.5</td>
<td>23.9</td>
<td>8.6</td>
</tr>
<tr>
<td>1969</td>
<td>-53.0</td>
<td>54.6</td>
<td>2.5</td>
</tr>
<tr>
<td>1970</td>
<td>132.4</td>
<td>0</td>
<td>8.9</td>
</tr>
</tbody>
</table>

TABLE 2
PREDICTED (\(\hat{i}\)) AND ACTUAL AVERAGE INTEREST RATES (IN PERCENT) AT SAVINGS INSTITUTIONS WITH PREDICTION BASED ON ACTUAL VALUES OF INDEPENDENT VARIABLES

<table>
<thead>
<tr>
<th></th>
<th>(\hat{i}_{SL})</th>
<th>(i_{SL})</th>
<th>(\hat{i}_{CB})</th>
<th>(i_{CB})</th>
<th>(\hat{i}_{MS})</th>
<th>(i_{MS})</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>5.27</td>
<td>5.33</td>
<td>5.02</td>
<td>4.74</td>
<td>5.12</td>
<td>5.13</td>
</tr>
<tr>
<td>1972</td>
<td>5.48</td>
<td>5.40</td>
<td>5.06</td>
<td>4.74</td>
<td>5.17</td>
<td>5.22</td>
</tr>
</tbody>
</table>

TABLE 3
PREDICTED (\(\hat{i}\)) AND ACTUAL AVERAGE INTEREST RATES (IN PERCENT) PAID AT SAVINGS INSTITUTIONS

<table>
<thead>
<tr>
<th></th>
<th>(\hat{i}_{SL})</th>
<th>(i_{SL})</th>
<th>(\hat{i}_{CB})</th>
<th>(i_{CB})</th>
<th>(\hat{i}_{MS})</th>
<th>(i_{MS})</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>4.88</td>
<td>4.68</td>
<td>4.46</td>
<td>4.25</td>
<td>4.88</td>
<td>4.76</td>
</tr>
<tr>
<td>1969</td>
<td>5.22</td>
<td>4.80</td>
<td>4.96</td>
<td>4.34</td>
<td>5.17</td>
<td>4.89</td>
</tr>
<tr>
<td>1970</td>
<td>5.61</td>
<td>5.06</td>
<td>5.49</td>
<td>4.72</td>
<td>5.53</td>
<td>5.01</td>
</tr>
</tbody>
</table>
### TABLE 4

**ANNUAL AVERAGE STOCK OF TIME AND SAVINGS DEPOSITS (IN $ BILLIONS) AT SAVINGS INSTITUTIONS**

<table>
<thead>
<tr>
<th>Time &amp; savings deposits other than large CDs at commercial banks</th>
<th>Savings deposits at mutual savings banks</th>
<th>Savings capital at savings and loan associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>171.2</td>
<td>62.5</td>
</tr>
<tr>
<td>1969</td>
<td>183.4</td>
<td>66.0</td>
</tr>
<tr>
<td>1970</td>
<td>191.3</td>
<td>68.9</td>
</tr>
</tbody>
</table>

### TABLE 5

**ESTIMATED INTEREST INCOME (IN $ BILLIONS) LOST BY SAVERS DUE TO INTEREST RATE REGULATION UNDER THE INTEREST RATE ADJUSTMENT ACT OF 1966**

<table>
<thead>
<tr>
<th>On savings capital at savings and loan associations</th>
<th>On time and savings deposits other than large CDs at commercial banks</th>
<th>On savings deposits at mutual savings banks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>0.26</td>
<td>0.36</td>
</tr>
<tr>
<td>1969</td>
<td>0.56</td>
<td>1.14</td>
</tr>
<tr>
<td>1970</td>
<td>0.77</td>
<td>1.47</td>
</tr>
<tr>
<td>Total</td>
<td>1.59</td>
<td>2.97</td>
</tr>
</tbody>
</table>
FOOTNOTES

1. See G. Pye and I. Young, "The Effect of Deposit Rate Ceilings on Aggregate Income," *Journal of Finance* 27, no. 5 (1972), pp. 1023-34, for a discussion of the macroeconomic effects of ceilings. The authors conclude that ceilings are not neutral, including their effect on interest rates. I have not attempted to include this effect in the calculation of losses to savers. For a discussion of the policy implications of deposit rate ceilings, see E. Kane, "Short-changing the Small Saver: Federal Government Discrimination Against the Small Saver During the Vietnam War," *Journal of Money, Credit and Banking* 2, no. 4 (1970), pp. 513-22. The research reported here could be thought of as a quantification of the discrimination discussed by Kane.

2. The data on average savings deposit rates are from the 1973 *Savings and Loan Fact Book* (Chicago, Ill.: United States Savings and Loan League), p. 17, except for the commercial bank rates after 1964. Due to significant interest payments on negotiable CDs after 1964, the data in the *Fact Book* are unsatisfactory for the purpose of this research. In 1965 and 1966, the rate on savings deposits at commercial banks was calculated by deducting interest payments on business deposits from total interest and dividing by non-CD average deposits. From 1967 on a weighted average of the most common interest rates paid on savings deposits and time deposits of less than $100,000 taken for Federal Reserve surveys was used. As implied by these rate definitions, savings deposits in
this paper are taken to be savings capital at savings and loan associations, time and savings deposits other than large CDs at commercial banks, and deposits at mutual savings banks.

3. On February 25, 1970, the minimum noncompetitive bid for Treasury bills was increased from a bid for $1,000 in bills to a bid for $10,000 in bills. See D. J. Mullineaux, "Deposit Rate Ceilings and Non-competitive Bidding for U.S. Treasury Bills," *Journal of Money, Credit, and Banking* 5, no. 1, part 1 (1973), pp. 201-212, for evidence regarding the resulting reduction in disintermediation.

4. The interest rate ceilings under the Act became effective on September 26, 1966.

5. The predictions are not significantly altered if this observation is dropped.

6. Complete results of the two-stage regressions are available if anyone is interested in them.

7. By dropping the lagged dependent variable, one obtains the following prediction equation for the interest rate paid by mutual savings banks:

\[ i_{MS}(t) = 1.47 + 0.755 i_{CB}(t) \]

\[ (25.43) (35.24) \]

\[ R^2_{adj.} = 0.989 \quad \text{Standard Error} = 0.084 \]
The predictions for 1968, 1969, and 1970 using this equation are on average somewhat larger than those reported later for the rate adjustment equation.

8. The Durbin-Watson statistics (which are biased toward 2) were 2.67 for the savings and loan equation, 1.69 for the commercial bank equation, and 1.97 for the mutual savings bank equation.


10. For example, the prediction for the savings and loan rate in 1971 given these assumptions is given by

\[
\hat{r}_{SL}(1971) = 0.202 + 0.843 \, i_{SL}(1970) + 0.134 \, i_G(1971)
\]

where \( \hat{r} \) is a predicted rate, and \( i \) is an observed rate.

11. The average maximum rates reported above are weighted averages of the maximum rates payable on the different classes of deposits with the weights being the fraction of total time and savings deposits (net of CDs) at commercial banks which were held as the given deposit class. The short-fall of the actual average rates in 1971 and 1972 from the average maximum rates payable in those years is consistent with the outcomes in 1968, 1969, and 1970 when the actual average rates paid were from 6 to 10 basis points less than the average maximum rates payable in those years.
12. For example, the prediction for the savings and loan rate in 1970 is given by

\[ \hat{i}_{SL}(1970) = 0.202 + 0.843 \hat{i}_{SL}(1969) + 0.134 \hat{i}_G(1970) \]

13. This effect alone resulted in additional opportunity losses on the order of $1.4 billion.