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THE DISCOUNT FROM BOOK VALUE

BY
FREDERICK E. BALDERSTON

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THE DISCOUNT FROM BOOK VALUE

by
Frederick E. Balderston*

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Center for Real Estate
and Urban Economics

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S&L MORTGAGE PORTFOLIOS: ESTIMATING THE DISCOUNT FROM BOOK VALUE

by

Frederick E. Balderston*

It is generally known that, whenever long-term interest rates have risen over an extended period of time, the bond and mortgage portfolios of financial institutions can be sold only at a discount below their book value. Ever since the Great Depression, however, it has been the practice of these institutions to carry such financial assets at book value, without "marking to market," and to recognize the market discount only if the asset is sold prior to maturity. The regulatory authorities, who oversee financial and accounting practices in banking, the savings and loan industry, and the insurance industry have concurred in this treatment, and the CPA firms that are responsible for independent audit of these institutions have been guided by an accounting standard that specifically exempts these firms from recording or reporting the estimated changes in asset values that would be necessary if current market values were substituted for book values.
It was believed that, during the early 1930s, some institutions were evaluated too severely by a market yardstick and were forced into bankruptcy, whereas they could have survived with more patience. For four decades, use of book values by these financial institutions did not have unfortunate general results, either for the public interest or for private interests. Accompanying the restricted view of asset values was a series of explicit and implicit controls and ceilings on the cost of funds of banks and savings institutions, and the two types of departures from market discipline more or less cancelled out.

From the late 1970s through 1981, however, it has become more and more evident that, as the cost of deposit funds approached market rates more closely, and as these rates and long-term interest rates were in a steeply rising trend, the existence of large amounts of financial assets of low long-term yield was a major problem of both public policy and institutional management. In order to assess the seriousness of the problem, from various points of view, we report here some estimates of the amount of discount from book values of these long-term financial assets.

The main elements needed to construct the estimated amount of discount are: (1) the book value of each asset; (2) the nominal yield rate of the asset; (3) the estimated number of years to maturity of the asset; and (4) a discount rate. Insured savings and loan associations report their book values of loan portfolio both to the regulatory authorities and (in generally available statements of condition) to the public. They do not, however, provide data on the amount of loan balance at each nominal interest rate or the number of years to maturity of each asset category.
While institutions can fairly readily assemble reports on the composition of loan portfolio according to nominal yields, their own loan files are not generally organized so as to permit them to generate an age-profile and a profile to estimated maturity of their portfolios. Without this information, the institution's management cannot make clear-cut estimates of portfolio values, even for its own internal decision-making. The manager of a typical bond portfolio uses such maturity information (and the "marked to market" values) in the normal course of portfolio management.

The author was informed that the Federal Home Loan Bank Board called for this sort of age-profile/yield-profile information some years ago, but retreated when it was found that too many members of the FHLB system would be unable to comply.

This paper contains estimates of the amount of portfolio discount for the U.S. savings and loan industry. Each of the required elements for the estimation process, and the data source, is discussed in turn. The results are then reported. Finally, some comments are offered concerning the implications of these results for public policy. It should be noted, however, that other balance-sheet magnitudes could also be examined for possible adjustment (upward and downward) to market values. We have concentrated entirely on mortgage loan portfolios.

Data Concerning Loan Balances by Nominal Yield Levels

For fall, 1979 and again for fall, 1980, the U.S. League of Savings Associations asked the cooperation of its member institutions in reporting to it the number of dollars of mortgage loan balance at each of a series of interest-rate intervals. Of the 4002 insured S&L's in
existence in fall, 1980, a total of 2,183 S&L's (54.5%) responded to the survey request. Our analysis is based on the data from this survey.

The respondents reported a total of $314.3 billion in mortgage loan balances as of October, 1980. This is 66.4% of the total outstanding long-term (nonconstruction) loan balance of U.S. insured S&L's as of December 31, 1980. The responses were skewed toward the larger institutions, and it must be emphasized that, although the responses cover more than one-half of the population of S&L firms, this is not a random sample. Thus, extending the results from the sample to the industry as a whole is a hazardous business, and it is not possible to give a sure basis for interpreting what kinds of bias may be inherent in the raw data and, therefore, in the analysis that follows here.

The FHLBB docket number of each firm and the FHLB district where it is located were given for identification in the data-tape. Thus, the data were capable of grouping according to FHLB district. (See Savings and Loan News, December, 1980, for the report of these survey results.)

Dollars of outstanding loan balance were reported for a series of interest-rate intervals; less than 5.50%; a category for each 0.5% change, up to 12.5%; and above 12.5%. For purposes of discount calculation, we used 5.25% as a point estimate for "less than 5.50%," and for the last interval, "more than 12.5%," we chose 12.75%. The intervening categories were represented by their midpoints. Loan balances were assumed to consist entirely of fixed-rate mortgages; to the extent that small amounts of variable-rate loans existed as of October, 1980, the estimation procedure overstates the amount of portfolio discount.

A comparison of the U.S. League survey respondents to the population of insured S&L's in the U.S. is made in Table 1. Part A shows that,
Table 1  
Comparison of the U.S. League Survey Respondents, Fall, 1980 with the Population of Insured S&L's

Part A: Firms by Asset Size

<table>
<thead>
<tr>
<th></th>
<th>small (&lt; $100 mn.)</th>
<th>medium (100-300 mn.)</th>
<th>large (&gt; $300 mn.)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>% not in survey</td>
<td>54.38%</td>
<td>36.28%</td>
<td>45.51%</td>
<td>47.62</td>
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<td>% in survey</td>
<td>45.62%</td>
<td>63.72%</td>
<td>54.49%</td>
<td>50.38</td>
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Part B: Firms by Type of Organization

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<th>Mutual</th>
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<th>Total</th>
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<td>% in survey</td>
<td>54.40</td>
<td>33.74</td>
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Part C: Firms by FHLB District

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<th>7</th>
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<tr>
<td>% not in survey</td>
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<td>56.97</td>
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<td>60.91</td>
<td>49.51</td>
<td>60.63</td>
<td>55.56</td>
<td>49.62</td>
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<tr>
<td>% in survey</td>
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<td>49.81</td>
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<td>55.74</td>
<td>61.88</td>
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<td>50.49</td>
<td>39.32</td>
<td>44.44</td>
<td>50.38</td>
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</tbody>
</table>

SOURCE: U.S. League of Savings Associations survey, October, 1980, and FHLBB tape, 12/31/80. After screening both tapes for accuracy and matching, there were 1,919 usable firms on the U.S. League tape and 3809 usable firms on the FHLBB tape.
by asset-size, firms of $100-300 million in assets are overrepresented in the sample and those of less than $100 million, present in less than their population proportion. By type of organization, mutuals are more heavily represented in the sample than their fraction of the population. By FHLB district, a smaller than average percentage of firms was included from Districts 2, 9, and 11, and a larger percentage from Districts 5, 6 and 8.

Data Concerning the Estimated Maturity of Loans

As was pointed out earlier, mortgage loan portfolio data are not typically organized and reported according to both nominal yield and number of years to maturity. The U.S. League survey did not request maturity information. Therefore, it was necessary to use an indirect method of approximation.

Back issues of the FHLB News, a regularly issued bulletin of the Federal Home Loan Bank system, are available from 1962 to 1980. For varying numbers of previous years, the News has data on prevailing contract interest rates and years to maturity of new loans made, for a number of important SMSA's throughout the United States. We attempted to choose one key SMSA to represent each FHLB district. In each instance, we examined the prevailing rate data to find in what year there was a contract rate to match, or nearly match, the mid-point of each interest rate range in the U.S. League survey. Then we found the associated average number of years to stated maturity as reported in the News, and we subtracted from this the number of years from the year in question to 1980. This gave an estimate of the remaining number of years to stated maturity of the loans in that interest rate category for that Federal
Home Loan Bank district. If the same prevailing rate was reported for
two different years, we calculated the number of years to maturity in
each case and then took the midpoint.

Table 2 shows the resulting estimated number of years to stated
maturity of loans at each nominal interest rate in each FHLB district.
The SMSA used to represent each district is shown at the bottom of each
district's column. The data series was incomplete for Indianapolis and
for Des Moines, and the same maturity data were therefore used for
Districts 5 and 6 (Cleveland) and for Districts 7 and 8 (Chicago).

The discounting calculations, it is evident, are based on a double
approximation: there is actually a wide spectrum of nominal interest
rates, but only "prevailing rates" were available and only the midpoints
of the intervals are used; and there were quite widely varying maturities
of loans when made, but these are reduced to "prevailing" numbers of
years to stated maturity.

The effective maturity of a flat-payment, self-amortizing
mortgage loan, as distinct from its stated maturity, may be considerably
less than its stated maturity. When the underlying property that is
security for the loan is sold to a new owner, either a provision for
making the loan "due on sale" or a decision by seller or buyer to extin-
guish the loan may result in its being paid off. Also, S&L's frequently
originate loans and then sell them into the secondary markets, so that
their effective maturity from the standpoint of the originating institu-
tion is simply the interval of holding prior to such a sale. Finally,
default and foreclosure by the lender extinguishes the old loan on a
property.
**Table 2**

Estimated Years to Maturity from 1980, Mortgage Loans by FHLB District

<table>
<thead>
<tr>
<th>Interest Rate Interval, Midpoint %</th>
<th>District 1</th>
<th>District 2</th>
<th>District 3</th>
<th>District 4</th>
<th>Districts 5 &amp; 6 Cincinnati &amp; Indianapolis</th>
<th>Districts 7 &amp; 8 Chicago &amp; Des Moines</th>
<th>District 9 Little Rock</th>
<th>District 10 Topeka</th>
<th>District 11 San Francisco</th>
<th>District 12 Seattle</th>
</tr>
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<tr>
<td>9.75</td>
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<td>27</td>
<td>29</td>
<td>30</td>
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</table>

**Note:**
SMSA utilized: Boston New York Philadelphia Atlanta Cleveland Chicago Houston Denver San Francisco Seattle

During the era of more stable interest rates, effective maturities of from 7 to 11 or 12 years for 30-year loans were not at all unusual. In a period of rising interest rates, effective maturity tends to lengthen, as borrowers become more reluctant to give up the advantageous terms of their old loans. In California, the Wellenkamp decision of the California Supreme Court, voiding the enforcement of "due on sale," contributed to the lengthening of effective maturity.

We did not have a good source of empirical data on effective maturity from which to forecast future effective maturity, from 1980 onwards, for loans of different interest rates in each FHILB district. As a rough approximation, therefore, we used, as an estimate of effective maturity, one-half of the estimated number of years to stated maturity.

It is of interest that, in Table 2, all districts showed maturities of 22 years or more for the nominal interest rate of 9.75% and all rates above that. Only for nominal rates of 6.25% and below were there fewer than ten years remaining on loans in some districts. We were surprised to find so little evidence of a steady progression of years to maturity with higher nominal interest rates.

In the discounting process, discount calculations are made both to stated maturity and to one-half of stated maturity.

**Selection of Discount Rates**

For different interpretive purposes, it may be plausible to use any of several discount rates in calculating the present value of loan portfolios.

If a loan were to be sold in the open mortgage market, it would bring a price adjusted to the currently prevailing mortgage rate. Perhaps
some further corrections would be made for the "seasoning effect," whereby a loan is less likely to cause delinquency or collection problems if it has survived a number of years of servicing by the borrower. Also, the effective rate could differ according to the number of years to stated or estimated maturity. Finally, different rates may prevail geographically at a given time.

These complications are ignored here in an analysis that must already involve some crude approximations. We have therefore chosen as representative of the current mortgage rate and a market discount rate, for all FHLB districts, the rate of 17%. One set of computations uses this discount rate.

Obviously, however, the higher the discount rate selected, the more alarming the bad news of marking to market when interest rates have generally risen substantially. As of the third quarter of 1981, the market rate of interest on U.S. Treasury obligations was approximately 14% over a wide range of maturities, from 5 years out to 40 years. This rate of interest, 14%, can be taken as the default-free interest rate, and it is the lowest market-related discount rate that could be defended in public policy terms. It may be used if it is regarded as appropriate to ignore the marketability and default problems of residential mortgages. This would also be the federal government's borrowing rate for bailouts. A second set of calculations, therefore, measures the discount from book value of loan balances by employing the discount rate of 14%.

Finally, one may ask how great is the gap between the loan yields of the mortgage portfolio and the average cost of savings, in order to
obtain some gauge of the size of the gap to be overcome in order to achieve "break-even." An approximate cost of savings at the present time is 11%, and use of this as the discount rate will give us the capitalized value of the weighted portfolio yield in comparison to the cost of funds. A third set of computations is based upon the 11% rate.

Results: Insured Savings Institutions' Mortgage Portfolios, Discount from Book Value to Full Maturity, U.S. Total

An overview of our results from a discount analysis of the U.S. League tape may be given quickly:

Discount rate: 11% 14% 17%
% discount from book value, to full maturity, U.S. total 8.3% 24.1 35.6%
% discount from book value, to 1/2 of full maturity, U.S. total 6.9% 21.1% 32.1%
Range, FHLB districts, % discount to full maturity 5.7%-14.8% 23.0%-29.2% 34.2%-39.3%
Range, FHLB districts, % discount to 1/2 maturity 4.9%-12.8% 19.7%-25.0% 29.6%-35.1%

As would be expected, the total percentage discount from book value of the mortgage portfolio for all insured S&L's increases very sharply at the higher discount rates. At the 17% discount rate, approximating the recent mortgage rate for new loans, the discount is approximately one-third of book values. When we consider an effective maturity shorter than the estimated full maturity, the percentage discount for each possible discount rate is reduced, but at an assumed effective maturity of one-half the full maturity, the reduction is quite small.
It is important to determine what portions of the total mortgage portfolio are the large contributors to the total discount. For each discount rate, we show in Table 3 the composition of percentage discounts from book value of the various nominal interest rates and their contribution to the total discount from book value. At the 11% rate, the highest nominal yields provide a negative discount percentage—in other words, they provide a premium over book value, as is shown in the first of the two columns at this discount rate.

At a discount rate of 14%, the profile changes somewhat. The amount of discount per dollar of book value of the loans is from 25% to 32% for all except the five highest interest rate ranges. Whereas these showed negligible or negative discounts at 11% discount rate, they are quite definitely discounted below book value at a 14% discount rate.

When the discount rate is set at the current mortgage loan rate of 17%, the total discount is about 1/3 of the total amount of loan balance outstanding. The amount of discount per dollar of book value of loan is over 40% in a few cases, and not less than 22% even for the highest part of the contract interest rate range. Low-rate loans are reduced still further in their relative contribution to the total amount of discount, loans at the intermediate contract rates are the heaviest contributors, and the loans in the five highest rate ranges are somewhat larger contributors to the total amount of discount.

Total book net worth of U.S. insured S&L's was 5.9% of total assets as of December 31, 1980. At the 11% discount rate, the write-down is 8.3% of the portfolio—82% of total assets—and this would amount to 6.8% of total assets, or a little more than book net worth.
Table 3
Discounts from Book Value to Full Maturity, U.S. Total, Insured S&L's, October 1980

<table>
<thead>
<tr>
<th>Interest Rate Nominal %</th>
<th>11% Discount</th>
<th>14% Discount</th>
<th>17% Discount</th>
</tr>
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<tbody>
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<td></td>
<td>$ Discount as % of Book</td>
<td>% of Total Discount</td>
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</tbody>
</table>

Overall discount, U.S. Total 8.3% 100% 24.1% 100% 35.6% 100%

Note: Negative discounts are premiums over book value.

SOURCE: Data from U.S. League Survey, October, 1980.
Also worth noting is the concentration of the total discount in the intermediate interest-rate intervals, from 7.75% to 10.25%. At all three discount rates, these intermediate nominal-yield categories account for more than 2/3 of the total amount of write-down. From Table 2, we see that the number of years to maturity for the nominal interest-rate interval of 7.75% is from 13 to 20 years, for the various FHLB districts. The rest of the maturities in this intermediate group of categories vary upward to the middle and high twenties. This is significant, in that the problem of portfolio discount cannot be expected to go away soon. It is not concentrated, as one might have expected, in the very old, very low-rate loans that have only a few more years to run. The drag on earnings from mortgage yields in the intermediate range of interest rates can be expected to persist for quite a few years into the future.

Results: Discounts from book value, by FHLB District

For each of the three discount rates, we have calculated the discount from book value of portfolio for the U.S. total and for each FHLB district. The calculation is performed both for full estimated maturity and for one-half of full maturity. Table 4 contains the results. At the 11% discount rate, there are impressive differences between FHLB districts. To full maturity, for example, District 2 (New York) has 14.8% discount from book value, and District 11 (San Francisco) has only 5.7%.

At the higher discount rates, however, this extreme difference in the experience of FHLB districts is reduced. What does happen is that changing the maturity assumption from full to one-half of the
Table 4
Discounts from Book Value of Mortgage Portfolios, by FHLBB District

<table>
<thead>
<tr>
<th>District</th>
<th>Total U.S.</th>
<th>District 1</th>
<th>District 2</th>
<th>District 3</th>
<th>District 4</th>
<th>District 5</th>
<th>District 6</th>
<th>District 7</th>
<th>District 8</th>
<th>District 9</th>
<th>District 10</th>
<th>District 11</th>
<th>District 12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>11X Discount Rate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Full maturity, %</td>
<td>8.3</td>
<td>12.3</td>
<td>14.8</td>
<td>9.6</td>
<td>7.2</td>
<td>9.8</td>
<td>8.3</td>
<td>7.5</td>
<td>10.0</td>
<td>9.2</td>
<td>6.8</td>
<td>5.7</td>
<td>7.2</td>
</tr>
<tr>
<td>1/2 maturity, %</td>
<td>6.9</td>
<td>9.9</td>
<td>12.8</td>
<td>7.9</td>
<td>6.1</td>
<td>8.3</td>
<td>6.7</td>
<td>6.3</td>
<td>8.2</td>
<td>7.9</td>
<td>6.1</td>
<td>4.9</td>
<td>5.9</td>
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<tr>
<td><strong>14X Discount Rate</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Full maturity, %</td>
<td>24.1</td>
<td>24.6</td>
<td>29.2</td>
<td>24.5</td>
<td>23.5</td>
<td>24.5</td>
<td>24.0</td>
<td>23.4</td>
<td>24.6</td>
<td>25.0</td>
<td>23.4</td>
<td>23.4</td>
<td>23.0</td>
</tr>
<tr>
<td>1/2 maturity, %</td>
<td>21.1</td>
<td>21.0</td>
<td>25.0</td>
<td>21.0</td>
<td>20.7</td>
<td>20.9</td>
<td>20.7</td>
<td>20.0</td>
<td>23.5</td>
<td>22.2</td>
<td>20.0</td>
<td>20.5</td>
<td>19.7</td>
</tr>
<tr>
<td><strong>17X Discount Rate</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Full maturity, %</td>
<td>35.6</td>
<td>34.5</td>
<td>39.3</td>
<td>35.0</td>
<td>35.4</td>
<td>35.5</td>
<td>35.1</td>
<td>35.1</td>
<td>36.0</td>
<td>36.0</td>
<td>35.6</td>
<td>35.4</td>
<td>34.2</td>
</tr>
<tr>
<td>1/2 maturity, %</td>
<td>32.1</td>
<td>29.6</td>
<td>35.1</td>
<td>31.6</td>
<td>32.0</td>
<td>31.6</td>
<td>31.8</td>
<td>31.3</td>
<td>32.0</td>
<td>33.3</td>
<td>31.8</td>
<td>32.4</td>
<td>30.9</td>
</tr>
</tbody>
</table>

All insured S&L's, total nonconstruction loan balances, 12/31/80 ($bns)²
473.3 | 8.3 | 35.3 | 20.6 | 86.5 | 40.4 | 23.5 | 46.2 | 29.3 | 39.8 | 22.6 | 99.7 | 21.0 |

Discount from book value, $billions:
at 11X rate, 1/2 maturity | 32.7 | 0.8 | 4.5 | 1.6 | 5.3 | 3.4 | 1.6 | 2.9 | 2.4 | 3.1 | 1.4 | 4.9 | 1.2 |
at 14X rate, 1/2 maturity | 99.9 | 1.7 | 8.8 | 4.3 | 17.9 | 8.4 | 4.9 | 9.2 | 6.9 | 8.8 | 4.5 | 20.4 | 4.1 |
at 17X rate, 1/2 maturity | 168.5 | 2.9 | 13.9 | 7.2 | 30.6 | 14.3 | 8.2 | 16.2 | 10.5 | 14.5 | 8.0 | 35.3 | 7.2 |

2. FHLBB reports.
estimated maturity reduced the discount considerably at the 17% discount rate. At this rate, as the table shows, the discount is approximately one-third of book value in all districts.

The lower portion of Table 4 first reports the total outstanding nonconstruction loan balances of all insured U.S. S&L's, for the total U.S. and for each FHLB district. Then, using the one-half maturity assumption, the total number of dollars of discount from the book value of portfolio for the entire U.S. S&L industry is computed. Even at the 11% rate, the amount of discount is $32.7 billion; it is an estimated $168.5 billion at the 17% rate. The amount by FHLB district, in billions of dollars, is then shown for each discount rate. Districts 4 and 11, the two largest, account for 39.3% of the U.S. total loan balance. At the 11% discount rate, they are responsible for only $10.2 billion of discount, or 31.2% of the industry's total. At the 17% discount rate, however, these two districts are responsible for 39.1% of the total industry discount.

While the amount of write-down can only be described as serious at all three levels of the discount rate, it is clearly much more alarming if one adopts the procedure of "marking to market" at the recent long-term lending rate, 17%. The size of the write-down indicates the capitalized value of the drag on this industry and its loan paper under various assumptions. By the same token, the calculations reported in Table 4 show the extent to which the national problem would be reduced by a general decline in the mortgage lending rate from 17% to, say, 14%. Total discount would fall from $168.5 billion to $99.9 billion, a difference of $68.6 billion.

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