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Cost studies of the savings and loan industry

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Cost studies of the savings and loan industry

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OVERALL INTRODUCTION

This dissertation consists of two separate papers: the first deals with deposit interest rate controls on savings and loan associations (S&Ls) and the second is an economies of size study of the savings and loan industry.

Deposit rate controls on deposits have been imposed upon S&L associations since 1966 when S&Ls found it difficult to compete with both commercial banks and the open market for deposit funds. Because S&Ls hold primarily long-term, fixed-rate assets (home mortgages) it is difficult for them to quickly increase the rates they pay to depositors (in the event that this becomes necessary). The rather rapid increases in interest rates in the mid-1960s proved to be too much of a competitive disadvantage for the S&Ls; hence, deposit rate controls were placed on S&L deposits and a more stringent policy was developed toward the already existing rate controls on commercial banks. All of this activity was designed to reduce deposit competition among the various financial institutions.

Now, in 1980, legislation has been passed which will phase out these deposit rate controls over the next six years. To lend insight into the current, past, and future problems of S&L associations with respect to their ability to compete in a dynamic financial environment, this first paper provides a historical look at both the S&L industry and the deposit rate controls themselves. This part also examines the recent financial position of all federally insured S&Ls in an effort to gain knowledge of their current financial condition. Finally, Part I examines some recent developments effecting the S&L industry and suggests some changes which could be made so that S&Ls could more effectively compete in the financial environment of the 1980s.

The second part of the dissertation is an economies of size study of the S&L industry. This paper examines the relationship between average operating expenses and firm size, this relationship is important for several different reasons. First, the individual S&L associations are interested in what will, on the average, happen to their operating costs if they expand their scale of operation. Secondly, the government regulators, who have considerable control over the size of individual associations through their branching and merger decisions, are interested in the results of an economies of size study. If the results, for example, indicate that large firms are more efficient, the regulators (everything else remaining constant) may want to encourage larger size firms.

PART I. SAVINGS AND LOAN DEPOSIT RATE CONTROLS: THE PAST, PRESENT, AND FUTURE

INTRODUCTION

In 1966, deposit interest rate controls were placed on all federally regulated savings and loan associations (S&Ls) and mutual savings banks. These two financial institutions joined the plight of the commercial banks (CBs) who have had deposit rate controls since the early 1930s. Now, in 1980, steps have been taken by the federal government (the Depository Institutions Deregulation and Monetary Control Act of 1980) to phase out these interest rate controls.

The purpose of this paper is to examine these controls, particularly with respect to their implication for the savings and loan industry. In the hopes of providing the reader with a better insight into some of the problems which are facing the S&L industry today, this paper will give a brief historical overview of both the S&L industry and the rate controls themselves. This paper also examines the recent financial positions of all federally insured S&Ls in an attempt to provide some insight into the industry's ability to operate without deposit rate controls. Also discussed are some changes that could be implemented to make it easier for the S&L industry to survive without these deposit rate controls.

HISTORICAL OVERVIEW OF S&L ASSOCIATIONS[1]

The earliest predecessors of the modern savings and loan association were the British "friendly societies." These were local groups of people which banded together to form cooperatives providing protection from such calamities as fire, death, illness, unemployment, etc. In a time when these insurance duties were not adequately provided by either the government or the business sector, groups of citizens would often organize to provide services which could not be provided to an individual by him/herself.

This cooperative movement gradually moved into the home finance area; hence, the birth of the British building societies. These building societies consisted of groups of local citizens who joined together in an effort to mutually aid one another with home finance. Each member contributed a fixed amount of money (per week or month) to a central fund. When this fund grew large enough to make a home purchase, the individual members of the society would bid to see who would receive the loan, the highest bidder being the recipient. This recipient and the other members of the society would continue their contributions to the central fund until it was, once again, large enough for another home purchase. The above process would then be repeated until each member received a loan and, shortly thereafter,

[1]The first several pages of this section are a summary of the first 99 pages of History of Building and Loan in the United States [6].

the society would dissolve.

British immigrants brought the concept of the building society to the United States and in 1831 the Oxford Provident Building Association was formed in Frankford, Pennsylvania. This building association, patterned after the British building society, was quite successful and, gradually, the concept of the building association spread throughout the United States. These building associations provided a very necessary financial service during this particular time period. An increase in the manufacturing sector of the economy created a substantial class of wage earners who, in general, were not property owners. These people worked in factories and desired a stake in the community through home ownership. Even though these wage earners were not wealthy, they did earn enough to set aside a small portion of their income on a regular basis. Also contributing to the rise of these building associations was the apparent apathy of the commercial banks to the plight of the working person. At this time, banks were concerned primarily with financing business and government expenditures and not with the savings and credit problems of the average working citizen.

In this fertile environment, these building associations prospered and eventually began an evolutionary process. The first major change occurred in the early 1850s as the building associations shifted from a self-terminating organization to a ongoing business concern (serial operation). The second major revision came in the 1880s when a firm distinction was made between borrowers and savers (the permanent plan). Previously, people joined these associations with the intent of eventually getting mortgage funding and, in most cases, were expected to take out a loan. Under the permanent plan, borrowers and savers were treated separately and one was free to buy shares of an association without the concurrent obligation of becoming a borrower; likewise, the borrowers were not expected to be savers.

The permanent plan of operation yielded the type of savings and loan association that we know today: financial institutions that are primarily mutually owned (owned by their depositors), typically cater to the small saver, and invest heavily in fixed-rate home mortgages.[1]

This type of structure of the S&L industry (fixed-rate mortgages and short-term savings shares) worked relatively well (except for the panic of 1893 and the Great Depression) up until 1966. The 1950s and the early 1960s were characterized by relatively low (but steadily increasing) interest rates and a positively sloped yield curve. This environment was conducive for the S&L industry and it experienced rapid growth during the decade of the 1950s. Things changed in the mid-1960s with abrupt increases in market interest rates. This put the S&L industry at a disadvantage to both CBs and the open market for several reasons. First, given that the S&Ls hold primarily long-term, fixed-rate assets, there is a relatively long time lag between the onset of an interest rate increase and the time S&L associations are able to

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[1]Whereas the evolutionary roots of the current savings and loan associations place them in the home mortgage business, state and federal legislation has also encouraged them to remain specialists through tax incentives and various other regulations. Federal and state regulations have also, for the most part, insisted upon fixed-rate mortgages.

convert a significant portion of their assets into the higher interest earning type. Because CBs, in general, hold much shorter-term assets, this same type of conversion can occur with a much shorter time lag. If CBs can convert their assets into the higher interest earning type more quickly, this implies that they can also afford to pay their depositors a higher return for their funds than would be possible for the S&Ls. Since both CBs and S&Ls offer almost identical short-term deposits, one would expect to see a shift of deposit money from the S&Ls to the CBs. This type of shift, if it occurred to a large extent, would cause mass insolvency in the S&L industry.

The S&Ls would also face a similar problem with the open market. A quick increase in open market rates would encourage a flow of funds out of the S&Ls as depositors responded to the subsequent interest rate differentials.

A second problem created for the S&Ls is the negatively-sloped yield curve which often accompanies a quick increase in interest rates. This serves to compound the problem mentioned above. In this case, not only can CBs turn over their assets at a faster rate, these new assets earn a higher interest return than the new assets that the S&Ls are acquiring.

The immediate governmental response to this problem was (in 1966) the imposition of deposit rate ceilings on S&L associations and a more conservative approach to the already existing rate ceilings on CB deposits.[1] The stringency of the CB rate ceilings was designed to prevent the banks from competing funds away from the S&Ls and, thus, to temporarily maintain a more stable (than would otherwise be the case) flow of funds into the housing sector. The rate ceilings on the S&L deposits, it seems, were designed to protect the old S&L associations from the newer associations (ones not saddled with old, low-paying mortgages) as well as to protect the commercial banks from the S&Ls [8, page 15]. With rate controls on both institutions, a severe loss of funds from CBs to S&Ls would be prevented in times of unusually high interest rates.

It should be noted, however, that these rate ceilings do not attack the real root of the problem but only enable the S&Ls to function under their current structure. The real problem is the mismatch of the maturity of S&L assets and liabilities: relatively short-term time and savings deposits and long-term, fixed-rate mortgages.

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[1]Allowable rates on CB deposits were increased in 1957, 1962, 1963, 1964, and 1965; however, these rates ceilings were decreased on some deposits in 1966 and further increases were not allowed until 1970.

HISTORY AND DISCUSSION OF DEPOSIT RATE CEILINGS

Federal government regulation of deposit rates at financial institutions dates back to the 1930s when both the Federal Reserve System and the Federal Deposit Insurance Corporation received permission from Congress to set maximum allowable deposit rates for commercial banks which are members of the Federal Reserve System and federally insured nonmember banks, respectively. The rationale for these ceilings was twofold [9, pages 22-23]. First, a zero percent ceiling was placed on demand deposits in an effort to reduce the quantity of bankers' balances that were being held at large money center banks. It was felt that the payment of interest on demand deposits was siphoning funds from the country banks and that these funds were primarily being used for stock market speculation. The prohibition of interest on demand deposits was designed to stop this flow of funds from the country banks into the money center banks and, thus, serve the dual function of reducing speculation and keeping funds in the communities from which they originated.

The second reason was to stop destructive rate competition among individual CBs, the reasoning being that, left alone, CB competition for deposits (demand, time, and savings) would drive deposit rates to unreasonably high levels. In order to afford these expensive liabilities, the banks would be forced to purchase assets of a higher risk than would be desirable for prudent bank management. This, it was believed, would then lead to an excessive amount of bank failures.

Using data from 1923-1934, George Benston [3] did a study to test the relationship between interest payments on demand deposits and the safety of the assets in which banks invested. He concluded that

> the data examined are inconsistent with the hypothesis that supports the prohibition of interest payments on demand deposits and are consistent with the hypothesis that supports repeal of the legislation [3, page 431].

A subsequent and more in depth study by Albert Cox, Jr. [9] yielded similar results. Using data from the 1920s and early 1930s, Cox found that a

> rank correlation analysis of banks of similar size and deposit composition revealed no consistent relation between the level of interest rates that they were paying on deposits and measures of the quality of their assets [9, page 60].

Cox also found that

> a cross-section analysis of these banks, grouped within size-composition categories into those institutions which survived the years 1930-33 intact and those which did not, showed no consistently lower deposit interest rates on the part of the surviving institutions [9, page 66].

Both of the above mentioned studies find no support for the original reasons for deposit rate ceilings. However, a 1973 study by Stanley Silverberg [23], using data from 1961 through 1970, found that

> there appears to be considerable evidence that banks adjusted their loan and investment portfolios toward higher yielding assets and reduced their capital ratios to offset some of the impact of increased deposit costs. They were willing to take additional risk in order to maintain or to limit a decline in profits stemming from increased deposit costs [23, page 881].

Also, Carl Gambs [11] has used the mean-variance approach to portfolio theory to demonstrate theoretical reasons why one might expect a positive relationship between interest payment on demand deposits and the risk of bank assets.

To summarize, the empirical and theoretical results of the "correctness" in the reasoning of the original rationale for deposit rate ceilings are mixed. Intuitively, these rate ceilings do represent a drastic restriction of CB competition and the removal of these ceilings would, of course, increase bank competition. Along with this extra competition one would expect to see an increase in the number of bank failures; predicting the extent of this increase would be pure conjecture.

In 1966, the deposit rate ceilings took on a new sense of importance as their coverage was expanded to include not only the CBs, but also S&Ls. The inability of S&Ls to compete with CBs (as has been previously discussed) created a new reason for maintaining deposit rate controls. The gradually increasing interest rates of the 1950s and early 1960s produced no problens for the S&Ls; however, the high market interest rates resulting from a tight monetary policy in 1966 and subsequent periods of high inflation in the late 1960s and 1970s proved to be too much of a burden for the S&Ls.

Deposit rate ceilings on S&L associations have been in effect now for almost 15 years. This leads to the question of the current necessity and validity of this second rationale for deposit rate ceilings. A following section of this paper (A TEST OF THE S&L PROTECTION RATIONALE FOR DEPOSIT RATE CEILINGS) examines this question by looking at the recent financial positions of the federally insured S&Ls.

The results of this study indicate that the rate ceilings are necessary and that the S&Ls would have a difficult time paying a rate much higher than what they currently do.

A third rationale for deposit rate ceilings surfaced in the early 1960s. That is, these ceilings could be used "to help control credit and monetary aggregates, and therby aggregate demand for goods and services in the economy" [28, page 15]. The argument here is that lowering the ceiling rate on bank deposits would slow the rate of growth of these deposits, reduce the rate of growth of bank credit, and thus reduce inflationary pressures.

Whereas it is certainly recognized that deposit rate ceilings are capable of causing changes in monetary aggregates[1] and, to some extent, may also serve to control the quantity of credit, it is not felt that these ceilings have a significant impact on aggregate demand. An example may serve to illustrate this point. Suppose the rate ceilings on all time and savings deposits at CBs are simultaneously reduced. This move would make saving at CBs less attractive and would certainly reduce the banking systems ability to compete for funds. The result would be a decrease in the rate of growth of CB credit. But this does not mean that aggregate demand has fallen.

Making time and savings deposits less attractive will cause the time-deposit-to-demand-deposit ratio to fall and, for a given quantity

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[1]For example, low ceilings on savings deposits relative to open market rates would cause a shift out of savings deposits and a reduction in the M_2 supply of money.

of high-powered money, the quantity of M_1 will increase. Now consider what would have happened to the funds that would have gone into CB time and savings deposits but did not because of the reduced rate ceilings. These funds could (1) be spend directly on goods and services, (2) be placed in some alternative savings instrument (a money market mutual fund, for example), or (3) be held as idle demand deposit balances. If people select alternative one or two (seemingly the most likely choices), there is no reason to expect a fall in M_1 velocity. A constant velocity in conjunction with a larger M_1 would actually result in an increase in aggregate demand; the opposite of the intended effect of the rate ceilings. With option three velocity will fall, but even here it is not clear what the net effect will be as this lower velocity may be counterbalanced by the larger M_1 money supply. The net result is unclear.

However, since the early 1970s, deposit rate ceilings have not been actively used in an effort to adjust aggregate demand. The Federal Reserve has since used its general tools to accomplish this goal [28, page 16].

In summary, the main reason deposit rate ceilings are currently in effect is to offer protection to the S&L associations. However, it should be noted that even if the problem with the S&Ls is resolved, rate ceilings may still be desirable as a measure to reduce competition among financial institutions.

PROBLEMS WITH THE DEPOSIT

RATE CEILING SOLUTION

These ceilings, while protecting the S&Ls from the CBs, fail to offer protection from the open market; but, more importantly they fail to give the S&L industry the necessary tools so that they can compete with both the CBs and the open market. As open market rates become substantially higher than the binding ceiling rates that are offered at financial intermediaries, an incentive is created for depositors to shift their savings from intermediary deposits into open market instruments. This, so called disintermediation, resulted in a decrease in the rate of growth of deposits (and in some cases, a negative rate of growth) for banks and S&Ls in 1966, 1969-1970, and 1973-1974; all being times of rapidly rising open market interest rates.

In an attempt to reduce the disintermediation problem, federal authorities allowed CBs and S&Ls to introduce the Money Market Certificate (MMC) in June 1978. A MMC has a minimum $10,000 denomination and a maximum rate which is tied to the 6-month Treasury bill rate. This Treasury bill substitute has decreased the disintermediation problem but has not completely eliminated it due, in large part, to the increased development of money market mutual funds [8, page 24]. These funds typically have minimum deposit requirements of considerably less than $10,000 but pay a return which is in line with that offered on MMCs. As a result, these mutual funds have attracted the funds of some depositors who are unable to meet the minimum dollar requirements of the

MMC. It appears, however, that the overall impact of the MMCs has been a reduction in the amount of disintermediation relative to what would have otherwise occurred.

Whereas the MMCs have decreased disintermediation, the problem still remains. Rising open market rates will result in a decrease in the rate of growth of deposits at CBs and S&Ls. Hardest hit is the housing market where borrowers have few alternative sources of funds other than the financial institutions. Thus, the deposit rate ceilings serve to make the housing industry more cyclical than would be the case if S&Ls could effectively compete for funds.

The disintermediation problem may also rob the housing market of funds in a secondary manner. The prospects of current and future disintermediation places the S&Ls in a more uncertain position with respect to future deposit flows [14, page 923]. This additional uncertainty may cause, within certain limits, the S&Ls to increase their liquidity position; however, this would imply fewer funds invested in home mortgages.

Deposit rate ceilings have also resulted in inequities for the small saver [13, page 513]. The small saver being one who, for various reasons, must rely solely on financial institutions as a savings outlet and cannot meet the $10,000 minimum deposit for the MMC.[1] The large

[1]Some CBs and S&Ls have recently circumvented this minimum deposit requirement by offering what has been called the "loophole certificate" [28, page 10]. With this certificate, the institution lends the saver a portion of the necessary $10,000; however, the net yield to the saver is somewhat lower than would be the case if the full $10,000 were

investor has many investment opportunities available for their funds. Minimum deposit requirements are not a problem and these large investors are typically more familiar with different investment alternatives. Hence, it is easier for the large investor to earn a market determined rate of return on his/her money. The story is different for the small saver who is limited to financial institutions as a savings outlet. This situation tends to result in a shift in purchasing power from the small to the large saver and it also tends to discourage saving. With a relatively high rate of inflation the real return for the small saver becomes significantly negative. This realization of a deteriorating wealth position can only serve to discourage saving.

An additional cost to the small saver may be a decrease in his/her liquidity position. The current rate ceilings are designed such that, in general, the longer the maturity of the deposits, the higher is the allowable deposit rate (except for the MMC). If the small saver is limited only to financial institutions, and if the inflation rate is high, an attempt may be made to shift deposits into the longer maturity accounts in an effort to avoid a severe deterioration in the real value

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the savers own money. This certificate has allowed for a somewhat higher yield for some small savers, but still not at par with the large saver.

The small saver may also take advantage of a 2 1/2-year certificate introduced on January 1, 1980. This certificate had no minimum denomination requirements and has a ceiling rate pegged to the average yield on 2 1/2-year United States Treasury securities (however, there is a rate cap of 11 3/4 percent for CBs and 12 percent for thrift institutions). This instrument is less liquid than the MMC and, in times of rapidly increasing interest rates, it will typically pay a lower yield than will the MMC.

of the saver's funds. Thus, the small saver may end up holding longer maturity assets than would otherwise be the case.

Deposit rate ceilings serve to reduce deposit competition among all of the affected financial institutions. This reduction in competition may cause the institions to become lethargic and, hence, less efficient [16, page 328]. This inefficiency would impose costs upon society in that more resources will be used in the intermediation process than would be the case in a more competitive atmosphere. Resources may also be spent as these financial institutions attempt to circumvent the controls [10, pages 26-27]. This might involve time spent looking for loopholes in existing regulations or, as was the case in 1969, the channeling of funds through the Eurodollar market in order to pay some depositors a higher return on their funds [10, pages 24-26].

Finally, various forms of nonprice competition have surfaced in an effort to circumvent the deposit rate ceilings. The institutions may maintain longer operating hours, offer premiums with deposits, etc. in an attempt to attract extra deposits. This is also inefficient in that customers would derive a higher degree of satisfaction if they were simply given money payments instead of the extra service and/or gifts.

A TEST OF THE S&L PROTECTION RATIONALE FOR DEPOSIT RATE CEILINGS

The validity of the hypothesis that deposit rate ceilings are necessary involves the examination of the recent financial positions of individual S&L associations. With income, expense, and balance sheet information on individual S&Ls, it is possible to (1) see how much of a rate increase the S&Ls can afford to pay out of current earnings and (2) see how long individual S&Ls can last if deposit rates rise, given they have the opportunity to draw upon their accumulated reserves.

If S&Ls can pay a significantly greater percentage on deposits than what they are currently paying, there may be no need for the deposit rate ceilings. However, ever if this is not true, it may be the case individual S&Ls are holding such a large quantity of reserves that they may be able to last through short periods of unusually high interest rates by simply drawing upon these reserves. It is recognized that this may not be a desirable alternative as this would obviously reduce the soundness of the S&L industry.

Methods and Results

The data were obtained from the Federal Home Loan Bank Board (they are only for federally insured S&Ls) and cover three separate time periods: the second half of 1978 and the first and second halves of 1979. In each case, income and expense data pertain to the entire half year; whereas, the balance sheet information shows the positions of the S&Ls

on the last day of the half year in question (December 31, 1978, June 30, 1979, and December 31, 1979, respectively). The following experiments were applied to each data tape separately; no attempt was made to combine the information on the three tapes.

In terms of definitions, an increase in deposit rates refers to an increase in the rate paid on all interest bearing accounts at the S&L with the exception of the negotiable certificates of deposits (NCDs). The NCDs are not subject to rate ceilings and it is assumed that they are already earning a market return. Using this rationale, one might argue that MMCs should also be excluded from the analysis; however, data limitations prevented this.

Capacity to Pay Higher Rates

To find the capacity of the federally insured S&Ls to pay higher rates of return to depositors out of current net before-tax income the following equation was used for each S&L.

$$R = \frac{(NI + T) \times 2}{SC} \times 100 \qquad (1)$$

where

R = percentage point increase in rate of return,

NI = net income of the association,

T = total income taxes of the association,

SC = total savings deposits (excluding NCDs).[1]

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[1]For a more detailed description on the exact nature of NI, T, and SC, please see the Appendix.

The results for December 31, 1978 are listed in table 1, those for June 30, 1979 are in table 2, and the December 31, 1979 results are in table 3. In each case, column (1) lists the number of associations falling into each of the listed rate categories, column (2) lists the percentage of the total number of associations which fall into each rate category, and column (3) lists the percentage of total assets held by the firms in each rate category. The derivations of columns (4) through (7) are self-explanatory.

The cumulative results in column (5) can be interpreted as showing the number of associations that cannot pay more than the upper limit of the listed rate category. For example, from table 1, 96 associations could not pay more than what they were paying in the second half of 1978 (due to either negative or zero net incomes), 146 could not pay more than two-tenths of one percent more, etc.

These results show several points. First, a large number of S&Ls would find it difficult to pay even a one percentage point increase in their average rate. On December 31, 1979 (table 3), 1911 associations could not afford more than a one percentage point increase on their average savings deposits from their current net before-tax income. Second, the general position of the S&L industry has deteriorated over the time periods tested. An examination of column (1) reveals an increase in the number of associations which fall into the lower rate categories as one moves from table 1 to table 2 to table 3. Whereas, a comparison of tables 1 and 2 shows a decrease in the number of associations in the higher rate categories (as one might expect) the

Table 1. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income, December 31, 1978.

Percentage Point Increase in Rate of Return (R)	(1) Number	(2) Percent of Total	(3) Percent of Assets	(4) Columns (3)/(2)	(5) Cumulative Number	(6) Cumulative Percent of Total	(7) Cumulative Percent of Assets
R ≤ 0.0	96	2.37	1.04	0.44	96	2.37	1.04
0.0 < R ≤ 0.2	50	1.24	0.64	0.52	146	3.61	1.68
0.2 < R ≤ 0.4	94	2.32	1.74	0.75	240	5.93	3.42
0.4 < R ≤ 0.6	159	3.93	2.43	0.62	399	9.86	5.85
0.6 < R ≤ 0.8	328	8.10	6.16	0.76	727	17.96	12.01
0.8 < R ≤ 1.0	434	10.72	8.72	0.81	1161	28.68	20.73
1.0 < R ≤ 1.2	609	15.04	11.86	0.79	1770	43.72	32.59
1.2 < R ≤ 1.4	666	16.45	16.76	1.02	2436	60.17	49.35
1.4 < R ≤ 1.6	560	13.83	12.52	0.91	2996	74.00	61.87
1.6 < R ≤ 1.8	382	9.44	10.08	1.07	3378	83.44	71.95
1.8 < R ≤ 2.0	259	6.40	4.56	0.71	3637	89.84	76.51
2.0 < R ≤ 2.2	155	3.83	8.87	2.32	3792	93.67	85.38
2.2 < R ≤ 2.4	91	2.25	3.38	1.50	3883	95.92	88.76
2.4 < R ≤ 2.6	55	1.36	4.52	3.32	3938	97.28	93.28
2.6 < R ≤ 2.8	32	0.79	1.90	2.41	3970	98.07	95.18
2.8 < R ≤ 3.0	21	0.52	1.56	3.00	3991	98.59	96.74
R > 3.0	57	1.41	3.26	2.31	4048	100.00	100.00

Table 2. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income, June 30, 1979.

Percentage Point Increase in Rate of Return (R)	(1) Number	(2) Percent of Total	(3) Percent of Assets	(4) Columns (3)/(2)	(5) Cumulative Number	(6) Cumulative Percent of Total	(7) Cumulative Percent of Assets
R ≤ 0.0	179	4.43	2.66	0.60	179	4.43	2.66
0.0 < R ≤ 0.2	90	2.23	2.12	0.95	269	6.66	4.78
0.2 < R ≤ 0.4	165	4.08	2.38	0.58	434	10.74	5.32
0.4 < R ≤ 0.6	283	7.00	4.11	0.59	717	17.75	11.28
0.6 < R ≤ 0.8	489	12.10	10.30	0.85	1206	29.85	21.57
0.8 < R ≤ 1.0	533	13.19	11.31	0.86	1739	43.04	32.88
1.0 < R ≤ 1.2	603	14.93	15.57	1.04	2342	57.97	48.46
1.2 < R ≤ 1.4	537	13.29	12.86	0.97	2879	71.26	61.32
1.4 < R ≤ 1.6	434	10.74	12.11	1.13	3313	82.00	73.42
1.6 < R ≤ 1.8	284	7.03	6.25	0.89	3597	89.03	79.68
1.8 < R ≤ 2.0	164	4.06	5.24	1.29	3761	93.09	84.91
2.0 < R ≤ 2.2	112	2.77	5.11	1.84	3873	95.87	90.03
2.2 < R ≤ 2.4	64	1.58	4.28	2.71	3937	97.45	94.31
2.4 < R ≤ 2.6	30	0.74	2.37	3.20	3967	98.19	96.68
2.6 < R ≤ 2.8	16	0.40	2.57	6.43	3983	98.59	99.24
2.8 < R ≤ 3.0	15	0.37	0.22	0.59	3998	98.96	99.47
R > 3.0	42	1.04	0.53	0.51	4040	100.00	100.00

Table 3. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income, December 31, 1979.

Percentage Point Increase in Rate of Return (R)	(1) Number	(2) Percent of Total	(3) Percent of Assets	(4) Columns (3)/(2)	(5) Cumulative Number	(6) Cumulative Percent of Total	(7) Cumulative Percent of Assets
$R \leq 0.0$	252	6.24	4.52	0.72	252	6.24	4.52
$0.0 < R \leq 0.2$	129	3.19	2.54	0.80	381	9.44	7.06
$0.2 < R \leq 0.4$	234	5.79	4.27	0.74	615	15.23	11.33
$0.4 < R \leq 0.6$	338	8.37	6.09	0.73	953	23.60	17.41
$0.6 < R \leq 0.8$	444	11.00	10.49	0.95	1397	34.60	27.91
$0.8 < R \leq 1.0$	514	12.73	12.21	0.96	1911	47.33	40.11
$1.0 < R \leq 1.2$	550	13.62	13.20	0.97	2461	60.95	53.32
$1.2 < R \leq 1.4$	485	12.01	10.24	0.85	2946	72.96	63.56
$1.4 < R \leq 1.6$	343	8.49	8.63	1.02	3289	81.45	72.18
$1.6 < R \leq 1.8$	259	6.41	7.32	1.14	3549	87.89	79.50
$1.8 < R \leq 2.0$	165	4.09	4.27	1.04	3713	91.95	83.78
$2.0 < R \leq 2.2$	93	2.30	3.81	1.66	3806	94.25	87.58
$2.2 < R \leq 2.4$	68	1.68	4.72	2.81	3874	95.94	92.32
$2.4 < R \leq 2.6$	44	1.09	3.45	3.17	3918	97.03	95.75
$2.6 < R \leq 2.8$	24	0.59	1.18	2.00	3942	97.62	96.93
$2.8 < R \leq 3.0$	22	0.54	1.84	3.41	3964	98.17	98.77
$R > 3.0$	74	1.83	1.23	0.67	4038	100.00	100.00

opposite is true for a comparison of tables 2 and 3. This latter comparison shows an increase in the number of associations in the higher rate categories (rates greater that 2.2 percent). This appears to be an exception to the general trend as a small number of association have experienced an increase in their income positions.

This general deterioration is probably due, in large part, to the rapid growth in MMCs at S&Ls. In December 1978 MMCs accounted for only 10.1 percent of total deposits at S&Ls. By July 1979 this percentage had increased to 20.2 and further growth caused this percentage to increase to 27.6 by December 1979 [22, page 2]. MMCs have been one of the most expensive sources of funds for the S&Ls and an increase in their volume has certainly increased the cost of doing business for the S&Ls.

Column (4) serves to indicate the relative size of the associations in each rate category. A value in column (4) greater than one would imply that the associations in that particular category are typically of above average size; likewise, a value less than one for a particular category would be indicative of smaller than average associations. An examination of tables 1 through 3 shows that it is generally the smaller associations which have the relatively weaker income positions. An exception to this appears in tables 2 and 3 in the higher rate categories. These two tables show the existence of some relatively high income earning small associations.

Also of interest is the capacity of the insured S&Ls to pay higher rates to depositors out of their current net before-tax income plus allowing them to dip into some "reserves" that they may have. The scenario goes as follows. Assume that the individual S&L maintains the same income, expense, assets, and liability position as they did in the second half of 1978. Then how long could the individual S&L last, given some deposit rate increase, provided they were allowed to dip into some "reserve" fund.

The time an individual association could last can be determined by the following equation.

$$Y = \frac{RES_i}{(SC \times \bar{R}) - [(NI + T) \times 2]} \qquad (2)$$

where

Y = the number of years the individual association can last,[1]

RES_i = the dollar volume of reserve fund i, i = 1, 2, and 3,[2]

$\bar{R}$ = increase in the average deposit rate.

RES_1 is equal to the accumulated retained earnings of the firm (undivided profits plus net undistributed income) and the results are provided in table 4. For each increase in the average deposit rate (1.0, 2.0, 3.0, and 4.0 percent), row (1) shows the number of associations which fall into each time category, row (2) lists the percent of

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[1] If Y is less than zero, reflecting the fact that $(SC \times R)$ is less than $[(NI + T) \times 2]$, it is assumed the association will be able to last indefinitely.

[2] For a more detailed description on the exact nature of RES_1, RES_2, and RES_3, please see the Appendix.

the total number of associations that fall into each time category, and row (3) lists the percent of total assets held by these associations. The derivations of rows (4) through (7) are self-explanatory.

Row (5) can be interpreted as showing the number of S&Ls unable to pay the higher rate for the upper limit of the time category. For example (from table 4), if the deposit rate increased by one percentage point, 253 S&Ls would not be able to last as long as one year, 360 would not be able to last as long as two years, etc.

This same experiment was repeated using a second measure of reserves, RES_2, where RES_2 is equal to RES_1 plus the bad-debt reserves of the S&L (Federal insurance reserves plus reserves qualifying for Federal insurance reserves plus general reserves plus other reserves). These results are given in table 5. It should be noted, however, that the bulk of RES_2 are specifically designated as bad-debt reserves and can only be used if the S&L incurs a loss on a loan. These reserves are not available to be used in the sole event that expenses exceeds income for the association. It would also be undesirable to let individual S&Ls get into a position where all or almost all of their reserves are liquidated to pay for cronic operating losses.

RES_3 is equal to RES_2 plus stock (permanent, reserve, and guaranty stock plus paid-in surplus) and the results are given in table 6. This shows the absolute maximum time period the S&Ls could last. Once RES_3 is gone, the S&L becomes insolvent. It should be noted, that there is only a difference between RES_2 and RES_3 for the stock associations as mutuals do not issue stock.

The above three experiments were repeated using RES_1, RES_2, and RES_3 for the June 30, 1979 data and the results are presented in tables 7, 8, and 9, respectively. The December 31, 1979 results are listed in tables 10, 11, and 12.

These results yield the following conclusions. First, given that the S&Ls realistically only have access to RES_1, a relatively large number of S&Ls would experience difficulty if they were forced to pay rates much higher than what they were paying during the time periods tested. For example, looking at the December 31, 1979 results, suppose deposit rates increased, on the average, two percent. If S&Ls have access only to RES_1 (table 10, row 5), 1730 S&Ls will not be able to last as long as two years. Examination of the RES_2 results leads to more optimistic results in that only 298 would not be able to last the two years; however, it is doubtful that it would be desirable (or politically acceptable) for even this number to experience insolvency.

Second, these results substantiate the previous claims that the financial position of the S&L industry has generally deteriorated over the time periods considered. Examination of the RES_1 results reveals a consistent increase in the number of associations in the lower time categories as one moves from table 4 to table 7 to table 10. The RES_2 results (tables 5, 8, and 11) show basicly the same trend as one compares tables 5 and 8; however, a comparison of tables 8 and 11 shows a decrease in the number of associations in some of the lower rate categories. This is reflective of the improved income positions of some associations as was seen in a comparison of tables 2 and 3. The

Table 4. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income plus accumulated retained earnings, December 31, 1978.

Increase in Rate of Return ($\bar{R}$)			Number of Years the Individual Associations Can Last (Y):							
			$0 \le Y \le 1$	$1 < Y \le 2$	$2 < Y \le 3$	$3 < Y \le 4$	$4 < Y \le 5$	$5 < Y \le 10$	$10 < Y \le 15$	$Y > 15$
	(1)	Number	253	107	96	71	67	202	115	3137
	(2)	% of Total	6.25	2.64	2.37	1.75	1.66	4.99	2.84	77.50
	(3)	% of Assets	3.69	1.61	1.56	1.89	1.62	3.78	1.74	84.11
$\bar{R}$ = 1.0%	(4)	Row (3)/(2)	0.59	0.61	0.66	1.08	0.98	0.75	0.61	1.09
	(5)	Cum.[a] Number	253	360	456	527	594	796	911	4048
	(6)	Cum. % of Total	6.25	8.89	11.26	13.01	14.67	19.66	22.50	100.00
	(7)	Cum. % of Assets	3.69	5.30	6.86	8.75	10.37	14.15	15.89	100.00
	(1)	Number	767	695	487	380	273	561	166	719
	(2)	% of Total	18.95	17.17	12.03	9.39	6.74	13.86	4.10	17.76
	(3)	% of Assets	12.59	16.33	10.68	9.58	6.09	12.22	3.42	29.10
$\bar{R}$ = 2.0%	(4)	Row (3)/(2)	0.66	0.95	0.89	1.02	0.90	0.88	0.83	1.64
	(5)	Cum. Number	767	1462	1949	2329	2602	3163	3329	4048
	(6)	Cum. % of Total	18.95	36.12	48.15	57.54	64.28	78.14	82.24	100.00
	(7)	Cum. % of Assets	12.59	28.92	39.60	49.18	55.27	67.49	70.91	100.00

	(1)	Number	1596	1185	576	260	145	170	26	90
	(2)	% of Total	39.43	29.27	14.23	6.42	3.58	4.20	0.64	2.22
	(3)	% of Assets	32.64	27.54	13.60	5.16	6.50	8.58	0.83	5.15
$\ddot{R}$ = 3.0%	(4)	Row (3)/(2)	0.83	0.94	0.96	0.80	1.82	2.04	1.30	2.32
	(5)	Cum. Number	1596	2781	3357	3617	3762	3932	3958	4048
	(6)	Cum. % of Total	39.43	68.70	82.93	89.35	92.92	97.13	97.70	100.00
	(7)	Cum. % of Assets	32.64	60.18	73.78	78.94	85.44	94.02	94.85	100.00
	(1)	Number	2395	1159	333	80	29	23	4	25
	(2)	% of Total	59.17	28.63	8.23	1.98	0.72	0.57	0.10	0.62
	(3)	% of Assets	52.68	29.60	12.01	1.32	1.25	2.59	0.03	0.52
$\ddot{R}$ = 4.0%	(4)	Row (3)/(2)	0.89	1.03	1.46	0.67	1.74	4.54	0.30	0.84
	(5)	Cum. Number	2395	3554	3887	3967	3996	4019	4023	4048
	(6)	Cum. % of Total	59.17	87.80	96.03	98.01	98.73	99.30	99.40	100.00
	(7)	Cum. % of Assets	52.68	82.28	94.29	95.61	96.86	99.45	99.48	100.00

[a]Cum. = Cumulative.

Table 5. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income plus accumulated retained earnings and bad-debt reserves, December 31, 1978.

Increase in Rate of Return ($\bar{R}$)			Number of Years the Individual Associations Can Last (Y):							
			$0 \leq Y \leq 1$	$1 < Y \leq 2$	$2 < Y \leq 3$	$3 < Y \leq 4$	$4 < Y \leq 5$	$5 < Y \leq 10$	$10 < Y \leq 15$	$Y > 15$
	(1)	Number	63	39	26	23	30	157	143	3567
	(2)	% of Total	1.56	0.96	0.64	0.57	0.74	3.88	3.53	88.12
	(3)	% of Assets	0.20	0.31	0.09	0.27	0.50	3.21	2.79	92.63
$\ddot{R}$ = 1.0%	(4)	Row (3)/(2)	0.13	0.32	0.14	0.47	0.68	0.83	0.79	1.05
	(5)	Cum.[a] Number	63	102	128	151	181	338	481	4048
	(6)	Cum. % of Total	1.56	2.52	3.16	3.73	4.47	8.35	11.88	100.00
	(7)	Cum. % of Assets	0.20	0.51	0.60	0.87	1.37	4.58	7.37	100.00
	(1)	Number	131	103	157	250	326	1262	560	1259
	(2)	% of Total	3.24	2.54	3.88	6.18	8.05	31.18	13.83	31.10
	(3)	% of Assets	0.46	0.81	2.88	5.87	5.92	30.14	12.73	41.20
$\ddot{R}$ = 2.0%	(4)	Row (3)/(2)	0.14	0.32	0.74	0.95	0.74	0.97	0.92	1.33
	(5)	Cum. Number	131	234	391	641	967	2229	2789	4048
	(6)	Cum. % of Total	3.24	5.78	9.66	15.84	23.89	55.07	68.90	100.00
	(7)	Cum. % of Assets	0.46	1.27	4.15	10.02	15.94	46.08	58.81	100.00

	(1)	Number	212	375	843	792	606	916	150	154
	(2)	% of Total	5.24	9.26	20.83	19.57	14.97	22.63	3.71	3.80
	(3)	% of Assets	0.92	6.28	18.65	21.54	14.37	22.39	7.55	8.33
$\bar{R}$ = 3.0%	(4)	Row (3)/(2)	0.18	0.68	0.90	1.10	0.96	0.99	2.04	2.19
	(5)	Cum. Number	212	587	1430	2222	2828	3744	3894	4048
	(6)	Cum. % of Total	5.24	14.50	35.33	54.90	69.87	92.50	96.21	100.00
	(7)	Cum. % of Assets	0.92	7.20	25.85	47.39	61.76	84.15	91.70	100.00
	(1)	Number	349	1163	1308	645	312	227	11	33
	(2)	% of Total	8.62	28.73	32.31	15.93	7.71	5.61	0.27	0.82
	(3)	% of Assets	2.31	25.98	33.43	14.59	14.19	6.51	2.32	0.67
$\bar{R}$ = 4.0%	(4)	Row (3)/(2)	0.27	0.90	1.03	0.92	1.84	1.16	8.59	0.82
	(5)	Cum. Number	349	1512	2820	3465	3777	4004	4015	4048
	(6)	Cum. % of Total	8.62	37.35	69.66	85.59	93.30	98.91	99.18	100.00
	(7)	Cum. % of Assets	2.31	28.29	61.72	76.31	90.50	97.01	99.03	100.00

[a]Cum. = Cumulative.

Table 6. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income plus accumulated retained earnings, bad-debt reserves, and stock, December 31, 1978.

Increase in Rate of Return ($\bar{R}$)			Number of Years the Individual Associations Can Last (Y):							
			$0 \leq Y \leq 1$	$1 < Y \leq 2$	$2 < Y \leq 3$	$3 < Y \leq 4$	$4 < Y \leq 5$	$5 < Y \leq 10$	$10 < Y \leq 15$	$Y > 15$
	(1)	Number	30	23	21	18	27	162	153	3614
	(2)	% of Total	0.74	0.57	0.52	0.44	0.67	4.00	3.78	89.28
	(3)	% of Assets	0.09	0.25	0.07	0.21	0.52	3.20	2.86	92.80
$\ddot{R}$ = 1.0%	(4)	Row (3)/(2)	0.12	0.44	0.13	0.48	0.78	0.80	0.76	1.04
	(5)	Cum.[a] Number	30	53	74	92	119	281	434	4048
	(6)	Cum. % of Total	0.74	1.31	1.83	2.27	2.94	6.94	10.72	100.00
	(7)	Cum. % of Assets	0.09	0.34	0.41	0.62	1.14	4.34	7.20	100.00
	(1)	Number	58	61	134	255	334	1296	589	1321
	(2)	% of Total	1.43	1.51	3.31	6.30	8.25	32.02	14.55	32.63
	(3)	% of Assets	0.22	0.53	2.47	5.66	6.43	30.22	12.39	42.10
$\ddot{R}$ = 2.0%	(4)	Row (3)/(2)	0.15	0.35	0.75	0.90	0.78	0.94	0.85	1.29
	(5)	Cum. Number	58	119	253	508	842	2138	2727	4048
	(6)	Cum. % of Total	1.43	2.94	6.25	12.55	20.80	52.82	67.37	100.00
	(7)	Cum. % of Assets	0.22	0.75	3.22	8.88	15.31	45.53	57.92	100.00

	(1)	Number	91	300	872	810	626	991	154	204
	(2)	% of Total	2.25	7.41	21.54	20.01	15.46	24.48	3.80	5.04
	(3)	% of Assets	0.38	4.98	19.58	20.77	13.99	24.04	5.80	10.49
$\bar{R}$ = 3.0%	(4)	Row (3)/(2)	0.17	0.67	0.91	1.04	0.90	0.98	1.53	2.08
	(5)	Cum. Number	91	319	1263	2073	2699	3690	3844	4048
	(6)	Cum. % of Total	2.25	9.66	31.20	51.21	66.67	91.15	94.95	100.00
	(7)	Cum. % of Assets	0.38	5.36	24.94	45.71	59.70	83.74	89.54	100.00
	(1)	Number	173	1143	1357	684	342	267	29	53
	(2)	% of Total	4.27	28.24	33.52	16.90	8.45	6.60	0.72	1.31
	(3)	% of Assets	1.26	25.57	33.38	14.93	12.99	8.81	2.38	0.70
$\bar{R}$ = 4.0%	(4)	Row (3)/(2)	0.30	0.91	1.00	0.88	1.54	1.33	3.32	0.53
	(5)	Cum. Number	173	1316	2673	3357	3699	3966	3995	4048
	(6)	Cum. % of Total	4.27	32.51	66.03	82.93	91.38	97.98	98.70	100.00
	(7)	Cum. % of Assets	1.26	26.83	60.21	75.13	88.12	96.93	99.32	100.00

[a]Cum. = Cumulative.

Table 7. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income plus accumulated retained earnings, June 30, 1979.

Increase in Rate of Return ($\bar{R}$)			Number of Years the Individual Associations Can Last (Y):							
			$0 \leq Y \leq 1$	$1 < Y \leq 2$	$2 < Y \leq 3$	$3 < Y \leq 4$	$4 < Y \leq 5$	$5 < Y \leq 10$	$10 < Y \leq 15$	$Y > 15$
	(1)	Number	316	187	154	127	123	309	160	2664
	(2)	% of Total	7.82	4.63	3.81	3.14	3.04	7.65	3.96	65.94
	(3)	% of Assets	4.45	3.47	2.55	2.43	2.76	6.19	3.18	74.98
$\bar{R}$ = 1.0%	(4)	Row (3)/(2)	0.57	0.75	0.67	0.77	0.91	0.81	0.80	1.14
	(5)	Cum.[a] Number	316	503	657	784	907	1216	1376	4040
	(6)	Cum. % of Total	7.82	12.45	16.26	19.41	22.45	30.10	34.06	100.00
	(7)	Cum. % of Assets	4.45	7.92	10.45	12.88	15.64	21.82	25.00	100.00
	(1)	Number	874	782	541	369	223	556	172	523
	(2)	% of Total	21.63	19.36	13.39	9.13	5.52	13.76	4.26	12.95
	(3)	% of Assets	15.31	16.92	13.96	9.80	5.40	13.49	3.70	21.42
$\bar{R}$ = 2.0%	(4)	Row (3)/(2)	0.71	0.87	1.04	1.07	0.98	0.98	0.87	1.65
	(5)	Cum. Number	874	1656	2197	2566	2789	3345	3517	4040
	(6)	Cum. % of Total	21.63	40.99	54.38	63.51	69.03	82.79	87.05	100.00
	(7)	Cum. % of Assets	15.31	32.23	46.19	55.99	61.39	74.88	78.58	100.00

	(1)	Number	1660	1187	547	254	137	168	25	62
	(2)	% of Total	41.09	29.38	13.54	6.29	3.39	4.16	0.62	1.53
	(3)	% of Assets	33.51	30.01	13.56	7.40	4.75	6.36	1.75	2.66
$\bar{R}$ = 3.0%	(4)	Row (3)/(2)	0.82	1.02	1.00	1.18	1.40	1.53	2.82	1.74
	(5)	Cum. Number	1660	2847	3394	3648	3785	3953	3978	4040
	(6)	Cum. % of Total	41.09	70.47	84.01	90.30	93.69	97.85	98.47	100.00
	(7)	Cum. % of Assets	33.51	63.52	77.08	84.48	89.22	95.58	97.33	100.00
	(1)	Number	2437	1115	332	86	30	16	6	18
	(2)	% of Total	60.32	27.60	8.22	2.13	0.74	0.40	0.15	0.45
	(3)	% of Assets	54.16	28.38	11.73	2.58	1.02	1.78	0.12	0.24
$\bar{R}$ = 4.0%	(4)	Row (3)/(2)	0.90	1.03	1.43	1.21	1.38	4.45	0.80	0.53
	(5)	Cum. Number	2437	3552	3884	3970	4000	4016	4022	4040
	(6)	Cum. % of Total	60.32	87.92	96.14	98.27	99.01	99.41	99.55	100.00
	(7)	Cum. % of Assets	54.16	82.54	94.27	96.85	97.86	99.65	99.76	100.00

[a]Cum. = Cumulative.

Table 8. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income plus accumulated retained earnings and bad-debt reserves, June 30, 1979.

Increase in Rate of Return ($\bar{R}$)			Number of Years the Individual Associations Can Last (Y):							
			$0 \leq Y \leq 1$	$1 < Y \leq 2$	$2 < Y \leq 3$	$3 < Y \leq 4$	$4 < Y \leq 5$	$5 < Y \leq 10$	$10 < Y \leq 15$	$Y > 15$
	(1)	Number	100	42	37	45	63	293	228	3232
	(2)	% of Total	2.48	1.04	0.92	1.11	1.56	7.25	5.64	80.00
	(3)	% of Assets	0.45	0.17	0.45	0.51	1.73	5.61	3.98	87.12
$\bar{R}$ = 1.0%	(4)	Row (3)/(2)	0.18	0.16	0.49	0.46	1.11	0.77	0.71	1.09
	(5)	Cum.[a] Number	100	142	179	224	287	580	808	4040
	(6)	Cum. % of Total	2.48	3.51	4.43	5.54	7.10	14.36	20.00	100.00
	(7)	Cum. % of Assets	0.45	0.61	1.06	1.57	3.30	8.91	12.88	100.00
	(1)	Number	167	142	250	384	378	1279	478	962
	(2)	% of Total	4.13	3.51	6.19	9.50	9.36	31.66	11.83	23.81
	(3)	% of Assets	0.66	1.44	4.91	8.68	7.36	32.28	12.30	32.37
$\bar{R}$ = 2.0%	(4)	Row (3)/(2)	0.16	0.41	0.79	0.91	0.79	1.02	1.04	1.36
	(5)	Cum. Number	167	309	559	943	1321	2600	3078	4040
	(6)	Cum. % of Total	4.13	7.65	13.84	23.34	32.70	64.36	76.19	100.00
	(7)	Cum. % of Assets	0.66	2.11	7.01	15.69	23.05	55.33	67.63	100.00

	(1)	Number	258	495	943	802	507	790	120	125
	(2)	% of Total	6.39	12.25	23.34	19.85	12.55	19.55	2.97	3.09
	(3)	% of Assets	1.25	9.58	22.48	21.76	11.31	23.12	5.14	5.36
$\bar{R}$ = 3.0%	(4)	Row (3)/(2)	0.20	0.78	0.96	1.10	0.90	1.18	1.73	1.73
	(5)	Cum. Number	258	753	1696	2498	3005	3795	3915	4040
	(6)	Cum. % of Total	6.39	18.64	41.98	61.83	74.38	93.94	96.91	100.00
	(7)	Cum. % of Assets	1.25	10.83	33.32	55.07	66.38	89.50	94.64	100.00
	(1)	Number	390	1318	1241	560	280	212	13	26
	(2)	% of Total	9.65	32.62	30.72	13.86	6.93	5.25	0.32	0.64
	(3)	% of Assets	2.62	31.70	31.69	15.91	10.98	6.50	0.23	0.36
$\bar{R}$ = 4.0%	(4)	Row (3)/(2)	0.27	0.97	1.03	1.15	1.58	1.24	0.72	0.56
	(5)	Cum. Number	390	1708	2949	3509	3789	4001	4014	4040
	(6)	Cum. % of Total	9.65	42.28	73.00	86.86	93.79	99.03	99.36	100.00
	(7)	Cum. % of Assets	2.62	34.32	66.02	81.93	92.91	99.41	99.63	100.00

[a]Cum. = Cumulative.

Table 9. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income plus accumulated retained earnings, bad-debt reserves, and stock, June 30, 1979.

Increase in Rate of Return ($\bar{R}$)			Number of Years the Individual Associations Can Last (Y):							
			$0 \leq Y \leq 1$	$1 < Y \leq 2$	$2 < Y \leq 3$	$3 < Y \leq 4$	$4 < Y \leq 5$	$5 < Y \leq 10$	$10 < Y \leq 15$	$Y > 15$
	(1)	Number	49	23	28	45	52	289	253	3301
	(2)	% of Total	1.21	0.57	0.69	1.11	1.29	7.15	6.26	81.71
	(3)	% of Assets	0.25	0.14	0.37	0.52	1.65	5.49	3.96	87.63
$\bar{R}$ = 1.0%	(4)	Row (3)/(2)	0.21	0.25	0.54	0.47	1.28	0.77	0.63	1.07
	(5)	Cum.[a] Number	49	72	100	145	197	486	739	4040
	(6)	Cum. % of Total	1.21	1.78	2.48	3.59	4.88	12.03	18.29	100.00
	(7)	Cum. % of Assets	0.25	0.39	0.76	1.28	2.93	8.41	12.37	100.00
	(1)	Number	75	91	222	391	396	1338	499	1028
	(2)	% of Total	1.86	2.25	5.50	9.68	9.80	33.12	12.35	25.45
	(3)	% of Assets	0.38	1.00	4.42	8.56	7.88	32.60	11.48	33.67
$\bar{R}$ = 2.0%	(4)	Row (3)/(2)	0.20	0.44	0.80	0.88	0.80	0.98	0.93	1.32
	(5)	Cum. Number	75	166	388	779	1175	2513	3012	4040
	(6)	Cum. % of Total	1.86	4.11	9.60	19.28	29.08	62.20	74.55	100.00
	(7)	Cum. % of Assets	0.38	1.38	5.80	14.36	22.25	54.85	66.33	100.00

	(1)	Number	110	425	978	843	540	846	147	151
	(2)	% of Total	2.72	10.52	24.21	20.87	13.37	20.94	3.64	3.74
	(3)	% of Assets	0.53	8.57	22.69	21.16	12.09	23.65	5.29	6.02
$\bar{R}$ = 3.0%	(4)	Row (3)/(2)	0.19	0.81	0.94	1.01	0.90	1.13	1.45	1.61
	(5)	Cum. Number	110	535	1513	2356	2896	3742	3889	4040
	(6)	Cum. % of Total	2.72	13.24	37.45	58.32	71.68	92.62	96.26	100.00
	(7)	Cum. % of Assets	0.53	9.11	31.79	52.96	65.04	88.69	93.98	100.00
	(1)	Number	203	1297	1316	593	302	260	24	45
	(2)	% of Total	5.02	32.10	32.57	14.68	7.48	6.44	0.59	1.11
	(3)	% of Assets	1.47	30.16	33.06	15.61	11.76	7.29	0.27	0.37
$\bar{R}$ = 4.0%	(4)	Row (3)/(2)	0.29	0.94	1.02	1.06	1.57	1.13	0.46	0.33
	(5)	Cum. Number	203	1500	2816	3409	3711	3971	3995	4040
	(6)	Cum. % of Total	5.02	37.13	69.70	84.38	91.86	98.29	98.89	100.00
	(7)	Cum. % of Assets	1.47	31.68	64.69	80.29	92.06	99.36	99.63	100.00

[a]Cum. = Cumulative.

Table 10. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income plus accumulated retained earnings, December 31, 1979.

Increase in Rate of Return ($\bar{R}$)			Number of Years the Individual Associations Can Last (Y):							
			$0 \le Y \le 1$	$1 < Y \le 2$	$2 < Y \le 3$	$3 < Y \le 4$	$4 < Y \le 5$	$5 < Y \le 10$	$10 < Y \le 15$	$Y > 15$
	(1)	Number	402	220	173	166	125	333	151	2468
	(2)	% of Total	9.96	5.45	4.28	4.11	3.10	8.25	3.74	61.12
	(3)	% of Assets	5.83	5.05	3.73	3.79	2.40	7.54	3.57	68.10
$\bar{R}$ = 1.0%	(4)	Row (3)/(2)	0.59	0.93	0.87	0.92	0.77	0.91	0.95	1.11
	(5)	Cum.[a] Number	402	622	795	961	1086	1419	1570	4038
	(6)	Cum. % of Total	9.96	15.40	19.69	23.80	26.89	35.14	38.88	100.00
	(7)	Cum. % of Assets	5.83	10.89	14.61	18.40	20.80	28.34	31.91	100.00
	(1)	Number	971	759	542	356	247	460	142	561
	(2)	% of Total	24.05	18.80	13.42	8.82	6.12	11.39	3.52	13.89
	(3)	% of Assets	17.93	18.89	13.21	7.50	5.69	11.13	3.62	22.03
$\bar{R}$ = 2.0%	(4)	Row (3)/(2)	0.75	1.00	0.98	0.85	0.93	0.98	1.03	1.59
	(5)	Cum. Number	971	1730	2272	2628	2875	3335	3477	4038
	(6)	Cum. % of Total	24.05	42.84	56.27	65.08	71.20	82.59	86.11	100.00
	(7)	Cum. % of Assets	17.93	36.82	50.03	57.53	63.22	74.36	77.98	100.00

	(1)	Number	1710	1149	534	204	138	160	36	107
	(2)	% of Total	42.35	28.45	13.22	5.05	3.42	3.96	0.89	2.65
	(3)	% of Assets	36.32	27.61	13.39	4.74	5.51	6.07	0.91	5.45
$\bar{R}$ = 3.0%	(4)	Row (3)/(2)	0.86	0.97	1.01	0.94	1.61	1.53	1.02	2.06
	(5)	Cum. Number	1710	2859	3393	3595	3735	3895	3931	4038
	(6)	Cum. % of Total	42.35	70.80	84.03	89.08	92.50	96.46	97.35	100.00
	(7)	Cum. % of Assets	36.32	63.94	77.33	82.07	87.58	93.65	94.55	100.00
	(1)	Number	2477	1059	297	91	36	40	4	34
	(2)	% of Total	61.34	26.23	7.36	2.25	0.89	0.99	0.10	0.84
	(3)	% of Assets	54.71	26.41	12.22	1.06	1.61	3.62	0.04	0.33
$\bar{R}$ = 4.0%	(4)	Row (3)/(2)	0.89	1.01	1.66	0.47	1.81	3.66	0.40	0.39
	(5)	Cum. Number	2477	3536	3833	3924	3936	4000	4004	4038
	(6)	Cum. % of Total	61.34	87.57	94.92	97.18	98.07	99.06	99.16	100.00
	(7)	Cum. % of Assets	54.71	81.12	93.34	94.40	96.01	99.63	99.67	100.00

[a]Cum. = Cumulative.

Table 11. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income plus accumulated retained earnings and bad-debt reserves, December 31, 1979.

Increase in Rate of Return ($\bar{R}$)			Number of Years the Individual Associations Can Last (Y):							
			$0 \leq Y \leq 1$	$1 < Y \leq 2$	$2 < Y \leq 3$	$3 < Y \leq 4$	$4 < Y \leq 5$	$5 < Y \leq 10$	$10 < Y \leq 15$	$Y > 15$
	(1)	Number	89	54	48	49	73	375	284	3066
	(2)	% of Total	2.20	1.34	1.19	1.21	1.81	9.29	7.03	75.93
	(3)	% of Assets	0.23	0.41	1.12	1.17	1.76	7.49	5.79	82.03
$\bar{R}$ = 1.0%	(4)	Row (3)/(2)	0.10	0.31	0.94	0.97	0.97	0.81	0.82	1.08
	(5)	Cum.[a] Number	89	143	191	240	313	688	972	4038
	(6)	Cum. % of Total	2.20	3.54	4.73	5.94	7.75	17.04	24.07	100.00
	(7)	Cum. % of Assets	0.23	0.64	1.76	2.93	4.69	12.18	17.97	100.00
	(1)	Number	160	138	260	421	420	1233	448	958
	(2)	% of Total	3.96	3.42	6.44	10.43	10.40	30.53	11.09	23.72
	(3)	% of Assets	0.76	2.23	5.39	8.91	10.58	30.21	9.33	32.60
$\bar{R}$ = 2.0%	(4)	Row (3)/(2)	0.19	0.65	0.84	0.85	1.02	0.99	0.84	1.37
	(5)	Cum. Number	160	298	558	979	1399	2632	3080	4038
	(6)	Cum. % of Total	3.96	7.38	13.82	24.24	34.65	65.18	76.28	100.00
	(7)	Cum. % of Assets	0.76	2.99	8.38	17.29	27.87	58.07	67.41	100.00

	(1)	Number	249	482	958	806	504	743	120	176
	(2)	% of Total	6.17	11.94	23.72	19.96	12.48	18.40	2.97	4.36
	(3)	% of Assets	1.27	10.08	24.14	19.26	11.34	20.89	4.91	8.12
$\bar{R}$ = 3.0%	(4)	Row (3)/(2)	0.21	0.84	1.02	0.96	0.91	1.14	1.65	1.86
	(5)	Cum. Number	249	730	1689	2495	2999	3742	3862	4038
	(6)	Cum. % of Total	6.17	18.10	41.83	61.79	74.27	92.67	95.64	100.00
	(7)	Cum. % of Assets	1.27	11.35	35.49	54.76	66.09	86.98	91.89	100.00
	(1)	Number	368	1284	1256	564	256	241	21	48
	(2)	% of Total	9.11	31.80	31.10	13.97	6.34	5.97	0.52	1.19
	(3)	% of Assets	3.06	30.75	30.89	14.65	8.94	10.66	0.31	0.74
$\bar{R}$ = 4.0%	(4)	Row (3)/(2)	0.34	0.97	0.99	1.05	1.41	1.79	0.60	0.62
	(5)	Cum. Number	368	1652	2908	3472	3728	3969	3990	4038
	(6)	Cum. % of Total	9.11	40.91	72.02	85.98	92.32	98.29	98.81	100.00
	(7)	Cum. % of Assets	3.06	33.81	64.70	79.35	88.29	98.95	99.26	100.00

[a]Cum. = Cumulative.

Table 12. Capacity of insured savings and loan associations to pay higher rates of return to depositors out of current net before-tax income plus accumulated retained earnings, bad-debt reserves, and stock, December 31, 1979.

Increase in Rate of Return ($\bar{R}$)		Number of Years the Individual Associations Can Last (Y): $0 \leq Y \leq 1$	$1 < Y \leq 2$	$2 < Y \leq 3$	$3 < Y \leq 4$	$4 < Y \leq 5$	$5 < Y \leq 10$	$10 < Y \leq 15$	$Y > 15$
	(1) Number	35	35	45	44	64	400	291	3124
	(2) % of Total	0.87	0.87	1.11	1.09	1.58	9.91	7.21	77.37
	(3) % of Assets	0.11	0.32	0.98	1.17	1.64	7.51	5.56	82.60
$\bar{R}$ = 1.0%	(4) Row (3)/(2)	0.13	0.37	0.88	1.07	1.04	0.76	0.79	1.07
	(5) Cum.[a] Number	35	70	115	159	223	623	914	4038
	(6) Cum. % of Total	0.87	1.73	2.85	3.94	5.52	15.43	22.63	100.00
	(7) Cum. % of Assets	0.11	0.43	1.41	2.59	4.23	11.74	17.40	100.00
	(1) Number	74	97	245	413	442	1286	477	1004
	(2) % of Total	1.83	2.40	6.07	10.23	10.95	31.85	11.81	24.86
	(3) % of Assets	0.38	1.96	4.97	8.72	10.17	30.67	9.83	33.32
$\bar{R}$ = 2.0%	(4) Row (3)/(2)	0.21	0.82	0.82	0.85	0.93	0.96	0.83	1.34
	(5) Cum. Number	74	171	416	829	1271	2557	3034	4038
	(6) Cum. % of Total	1.83	4.23	10.30	20.53	31.48	63.32	75.14	100.00
	(7) Cum. % of Assets	0.38	2.34	7.30	16.02	26.19	56.86	66.69	100.00

	(1)	Number	118	424	979	840	531	801	149	196
	(2)	% of Total	2.92	10.50	24.24	20.80	13.15	19.84	3.69	4.85
	(3)	% of Assets	0.61	8.88	23.92	19.22	12.30	21.68	5.23	8.17
$\bar{R}$ = 3.0%	(4)	Row (3)/(2)	0.21	0.85	0.99	0.92	0.94	1.09	1.42	1.68
	(5)	Cum. Number	118	542	1521	2361	2892	3693	3842	4038
	(6)	Cum. % of Total	2.92	13.42	37.67	58.47	71.62	91.46	95.15	100.00
	(7)	Cum. % of Assets	0.61	9.49	33.41	52.63	64.93	86.61	91.84	100.00
	(1)	Number	200	1253	1329	588	285	282	31	70
	(2)	% of Total	4.95	31.03	32.91	14.56	7.06	6.98	0.77	1.73
	(3)	% of Assets	1.96	29.48	31.88	15.53	8.90	10.82	0.59	0.84
$\bar{R}$ = 4.0%	(4)	Row (3)/(2)	0.40	0.95	0.97	1.07	1.26	1.55	0.77	0.49
	(5)	Cum. Number	200	1453	2782	3370	3655	3937	3968	4038
	(6)	Cum. % of Total	4.95	35.98	68.90	83.46	90.52	97.50	98.27	100.00
	(7)	Cum. % of Assets	1.96	31.44	63.32	78.85	87.75	98.57	99.16	100.00

[a]Cum. = Cumulative.

table 8 and 11 comparisons show an improvement for some associations but the overall results of these tables tend to uphold the general trend of poorer financial conditions. The comments relevent to the RES_2 results also hold true for a comparison of the RES_3 results (tables 6, 9, and 12).

The results listed in tables 4 through 12 also indicate that the weakest associations tend to be smaller than average in terms of total assets. An examination of the associations that fall into the $0 \leq Y \leq 1$ time category reveals a percent-of-assets-to-percent-of-total ratio (row 4) which, in some cases, is as small as 0.10.

Problems with Results

There are several factors which cause the results to both overstate and understate the problem being measured. First, the average return on mortgages held by S&Ls has been increasing over time as current mortgage rates continue to be higher than the average return on mortgages held by S&Ls. Since the above scenarios assume that the average rate of return of mortgages will remain constant over time, this trend would make the results listed indicate that the problem will actually be worse than would be the case under less rigid assumptions. The data in table 13 show that the average return on mortgages at S&Ls has increased an average of approximately 25 basis points per year since 1972. This table also illustrates several other problems facing the S&L industry. Whereas the average cost of funds has not, on the average, increased much more rapidly (approximately 26 basis points per year since 1972) than the average return on mortgages, it has exhibited a greater deal of volatility. An

Table 13. Average interest return on mortgages held and average interest cost of funds of insured savings and loan associations, 1972 through the first half of 1979.[a]

Half Year	(1) Average Interest Return on Mortgages (Percent)	(2) Change in Column (1) (From Previous Period)	(3) Average Interest Cost of Funds (Percent)	(4) Change in Column (3) (From Previous Period)	(5) Column (1) Minus (3)
1972 H1	6.93	-	5.39	-	1.54
H2	7.02	0.09	5.42	0.03	1.60
1973 H1	7.10	0.08	5.46	0.04	1.64
H2	7.23	0.13	5.72	0.26	1.51
1974 H1	7.35	0.12	6.00	0.28	1.35
H2	7.51	0.16	6.28	0.28	1.23
1975 H1	7.59	0.08	6.31	0.03	1.28
H2	7.74	0.15	6.34	0.03	1.40
1976 H1	7.87	0.13	6.35	0.01	1.52
H2	8.03	0.16	6.40	0.05	1.63
1977 H1	8.14	0.11	6.39	-0.01	1.75
H2	8.28	0.14	6.48	0.09	1.80
1978 H1	8.39	0.11	6.54	0.06	1.85
H2	8.54	0.15	6.79	0.25	1.66
1979 H1	8.70	0.16	7.23	0.44	1.47

[a]Source: "Nonbank Thrift Institutions in 1977 and 1978" [2, page 932] and "Statistical Series" [27, pages 35-36].

examination of columns (2) and (4) makes this point clear. Also, column (5) indicates that the interest rate spread between the cost of funds and return on assets for the S&Ls has been decreasing since the first half of 1978.

Also serving to overstate the problem is the fact that (as discussed earlier in this paper) with interest rate ceilings on deposits, the individual S&Ls may be less cost conscious than otherwise. This implies that expenses are larger and, therefore, net income is smaller for each association. It could be that, if deposit rates rose, the endangered associations would scramble to become more efficient and would be in less danger of becoming insolvent.

Also, as mentioned before, is the problem that MMCs are not exculded from total savings deposits when conducting the experiments. If one agrees that MMCs earn a market rate of return their exclusion would make SC in equation 2 smaller and, hence, Y would be larger.

On a more recent note, various events have served to make it easier for S&Ls to survive their current problems. Prepayment penalty income for the first quarter of 1980 amounted to $694 million and special Federal Home Loan Bank Board dividends for the second quarter of 1980 are expected to add an extra $200 to $250 million to the industry [25, page 14]. The Federal Home Loan Bank Board has both increased the return on its stock and has increased the frequency of these dividend payments (from yearly to quarterly). The Federal Home Loan Bank Board has also set up an emergency advance plan where certain S&Ls can receive funds at one-half a percent below the normal advance rate.

There is also some indication that S&Ls have reduced their staffs by attrition in an effort to combat the current earnings squeeze [18, page 3].

In summary, the results listed in this section tend to indicate that the S&L industry would have a difficult time if deposit rate ceilings were lifted and the rates that S&Ls would be forced to pay increased substantially. A one or two percent increase in deposit rates would quickly place a large number of S&Ls in a poor financial position. The capacity of S&Ls to pay a higher deposit rate is increased substantially if they are allowed to dip into their bad-debt reserves; however, this is not allowed under current regulations and, in itself, may not be a desirable option.

ALTERNATIVE STRUCTURES FOR S&Ls

What could be done to change the structure of the S&Ls so that they would be able to compete in an atmosphere of no rate ceilings? The problem of the S&Ls results from a mismatch of the maturities of their assets and liabilities; hence, solutions have centered on either lengthening the maturities of their liabilities or providing their assets with a more variable return.

Lengthening Liability Maturity

The former proposition listed above would involve having S&Ls hold a larger percentage of their liabilities in long-term time deposits (in conjunction with high penalties for early withdrawal). With a relatively small percentage of deposits subject to immediate withdrawal, the S&Ls would be more sheltered from the threat of competition with both CBs and the open market. When interest rates rise, the S&L could increase the rate it pays on all types of deposits but this would not mean an immediate increase in the rate paid to all depositors. The S&L would not have to pay a higher rate on its old time accounts (at least not until they reached maturity), but only on its savings deposits and the new time accounts acquired.

However, this type of plan may create several undesirable problems. First, a maturity structure consisting only of long-term time deposits (say, 6-8 years) may be undesirable in that it may discourage deposits from savers who desired more liquidity. Such a rigid structure may result in a shift of deposits from the S&Ls into other financial institutions as the savers attempted to maintain their desired liquidity position. This would obviously place the S&Ls at a competitive disadvantage relative to other financial institutions. A maturity structure which would offer the desired liquidity to the small saver may not be sufficient to offer the S&Ls adequate protection against interest rate changes.

Variable Return Assets

The alternative to lengthening the maturities of liabilities would be to provide the S&Ls with assets which offer a more flexible return. This can be done by either shifting to some type of variable rate loan or by keeping the fixed rate loan but making the assets of a more short-term nature.

Short-term assets

The latter suggestion involves making S&Ls somewhat like CBs with respect to the types of assets they hold (for example, allowing S&Ls to hold consumer loans, etc.). However, any shift of funds into alternative loans would necessarily imply a shift out of home mortgages which would cause problems for the housing industry. Surely some of the resulting slack would be taken up by CBs and other sources of mortgage credit; however, the net result would probably be a reduction in the amount of funds available to the housing market than would be the case with specialized S&Ls.

Variable-rate loans

There are basically three types of variable rate loans: a variable-rate mortgages (VRM), a variable-maturity mortgage (VMM), and a rollover mortgage (ROM).

The VRM is a fixed-maturity mortgage whose rate varies in some fixed relationship with either an open market rate (called a reference rate) or with some cost of funds index. The result is that monthly payments vary as the rate applied to the mortgage changes. As a consumer protection measure, the frequency and the allowable amount of change in the rate may be regulated by law.

Use of VRMs would certainly provide S&Ls with greater flexibility and might even allow them to operate and compete effectively with CBs in the absence of deposit rate controls. It should be noted, however, that the simple introduction of a VRM instrument is no guarantee that S&Ls will be able to operate without controls. First, one must consider the time lag between the introduction of VRMs and their general acceptance. The movement from a portfolio of 100 percent fixed-rate mortgages to that of VRMs takes some time. During this interval one can only expect a gradual improvement in the competitive position of the S&Ls.

The authorization of the use of VRMs is no guarantee that S&L portfolios would equilibrate at a point of 100 percent VRMs. It might be the case that, because of consumer resistance, only 50 percent of S&L portfolios would be VRMs. Obviously the smaller the percentage of their portfolios in VRMs, the more vulnerable the S&Ls would be toward abrupt interest rate increases.

However, even a 100 percent VRM portfolio is no guarantee that the S&Ls will be able to function without deposit rate ceilings. First, the reference rate or the index to which the VRM interest rate is tied may not be responsive enough to allow for the needed changes. For example, suppose that the reference rate is some long-term federal government bond rate. When interest rates are quickly increasing, it is the short-term rates that exhibit the most volitility. It could be that the return on banking assets would become very high while the reference rate remained relatively low. Beyond these reference rate problems are the consumer protection provisions that tend to be incorporated into VRM contracts. These are provisions with respect to the frequency and size of possible rate increases. It is easy to foresee the case where the protection provisions would be restrictive enough to negate a significant portion of the benefit of VRMs.

To summarize, the VRMs at least have the potential of allowing S&Ls to function without deposit rate controls. The important point to note here deals with who is to bear the risk of the interest rate changes. Under the current fixed-rate system these risks are shouldered entirely by the S&Ls with no interest rate risk placed upon the borrower of funds. The exclusive use of VRMs, where the reference rate is tied to the prevailing mortgage rate and the rate applied to VRMs is changed frequently, would shift almost all of the burden of rate change onto the borrower. This would most likely allow for the suspension of rate ceilings; however, this situation may not be the most desirable as the burden placed upon the borrower may be too heavy. The optimal solution may be a situation where the burden of interest rate increases is split between the borrower and the S&L. This solution may necessitate the occasional imposition of deposit rate controls, however, it may be the most desirable.

This begs the question of whether or not deposit rate controls will work in the future. In the earlier years of deposit rate controls there were few alternatives for savers who customarily used the financial institutions as a savings outlet and even some of these alternatives were eliminated by the federal authorities (such as the increase in the minimum denomination of Treasury bills from $1,000 to $10,000 in March 1970). However, as time has passed, (1) savers have become more sophisticated and more willing to enter the open market and (2) more alternatives have gradually developed for the saver (as one would expect in a market economy). These events have forced the government regulators to allow higher cost deposits at financial institutions (MMCs, etc.) which has recently put the S&Ls in a severe earnings squeeze.

As time passes, the system tends to adjust and creates institutions and structures which serve to make rate controls less and less workable. Indeed, the high interest rates of late 1979 and early 1980 created a sufficient crisis to induce federal legislation to phase out these deposit rate controls. It is at least the perception of Congress that these ceilings are no longer workable (or desirable).

If these controls are no longer workable today, will they be workable in the future? If the current institutions and structures which have been created to circumvent the deposit ceilings remain, then the answer to this question is no. However, if these institutions and structures disappear with the rate ceilings (for example, suppose without deposit rate ceilings, money market mutual funds cease to offer a relevant service to the public and they fall from existence), then the answer may be yes. Under these conditions, the brief imposition of rate ceilings may be a viable alternative. The interpretation of "brief" being a time period too short to allow the redevelopment of the above mentioned institutions.

The VMM is a mortgage instrument with fixed monthly payments, an interest rate which may vary (in the same fashion as a VRM), and a maturity which is flexible. It is the maturity which will increase or decrease in response to reference rate changes.

The use of VMMs may also allow S&Ls to earn a market rate of return on its assets but it does not have the added advantage of providing for an increased flow of funds into the S&L when rates increase. It should be pointed out, however, that a sufficiently large increase in the mortgage rate could couse the maturity to go to infinity (or to some specified maximum, say, 40 years). In this case, the monthly payments would not be sufficient to cover the interest charge and a negative amortization would result.

The third type of variable-rate loan is the ROM. The ROM is a loan such that the terms of the contract are renegotiated periodically (typically, every 3-5 years). The applicable rate may be some open market rate, some index, or the prevailing mortgage rate. Borrower and lender periodically meet to adjust the terms of the contract and, at this times, the borrower has the option of prepaying the remaining balance and the lender has the option of demanding payment in full.

Typically, it is expected that the loan will be renegotiated at the prevailing interest rate.

Both the VMM and the ROM have the potential of allowing S&Ls to operate without deposit rate controls; however, as with the VRM, their introduction is no guarantee that rate controls will not have to be periodically reimposed. As a final note, one could develop hybrid types of mortgages that, for example, included characteristics of both the VRM and the VMM.

CURRENT DEVELOPMENTS IN THE SAVINGS AND LOAN INDUSTRY

The recent rapid increase in market interest rates has created a severe earnings squeeze for the S&L industry. The popular acceptance of the MMC (34.7 percent of total S&L savings deposits in March 1980) has proven to be very costly to S&Ls both in terms of dollar expense and in the reduction of the average maturity of S&L liabilities. This rocky period has encouraged much legislation and many regulatory changes, some of which will be discussed below.

The Depository Institutions Deregulation and Monetary Control Act of 1980 was a step in the direction of making S&Ls and mutual savings banks more like CBs. This act authorizes NOW accounts (third-party transfers) for thrifts and also expands their loan and investment powers (thrifts may now grant consumer loans). But more importantly, this act provides for an orderly six year phase out of deposit rate ceilings at financial institutions. Recent federal legislation has suspended state usury laws[1] and regulatory changes by the Federal Home Loan Bank Board have allowed federally chartered S&Ls to offer both VRMs and ROMs.

These changes provide for the removal of rate ceilings and they also give the thrifts the opportunity to move away from the exclusive

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[1]The suspension of state usury laws is an important prerequisite to the introduction of VRMs and ROMs. S&Ls would be reluctant to introduce these instruments if their interest rate flexibility would be negated by usury ceilings.

use of fixed-rate mortgages. Whether or not S&Ls will be in a position 6 years from now to operate without rate ceilings is certainly a question to be considered. The VRM approved by the Federal Home Loan Bank Board limits rate adjustments to one-half of a percentage point per year and also provides the additional consumer protection of a 2 1/2 percentage point ceiling on the cumulative increase in the VRM interest rate. The ROM approved by the Federal Home Loan Bank Board (called a renegotiable rate mortgage or RRM) provides for rate adjustments every 3 to 5 years, a maximum rate increase of one-half of a percent per year, and a ceiling of a 5 percentage point rate increase over the life of the contract. These limitations serve to spread the interest rate risk between the borrower and the lender but they also serve to make it less likely that S&Ls will be able to function without rate ceilings.

The rate at which these alternative mortgages instruments will be accepted is not exactly known; however, from examination of the California S&L industry, Joseph McKenzie concluded that

> although aggressive California VRM marketeers have achieved half VRM portfolios in about three years, the evidence suggests that the nationwide equilibrium proportion of VRMs will be well below 50 percent. It also will take about 10 years to reach this level [20, page XV-15].

Another study by Smith, Wiest, and Field "estimated that 52.8 percent of all current [home] owners are potential users of VRMs" [26, page IV-32]. This expected slow rate of acceptance in conjunction with the predicted low equilibriun proportion of VRMs makes one skeptical about the proposed six year phase out of deposit rate controls. These problems are compounded by the consumer protection provisions that must be built into the ROM and VRM contracts. A prolonged period of low interest rates followed by an extended period of high rates may make the cumulative rate increase ceilings binding and place the S&L industry in the same position that it is today.

This, however, may not be a totally undesirable situation. As mentioned previously, a spread of the interest rate risk among both the S&Ls and the borrower may necessitate the occasional imposition of deposit rate controls.

A recent development in the mortgage market which may serve to stabilize the flow of funds into the housing sector is the more extensive use of mortgage-backed securities [24]. In 1978, $40 billion of mortgage-backed securities were issued; this represented almost 25 percent of all home loan originations. These securities tap open market funds which tend to be a more stable source than has been the case of deposits at S&Ls. It appears that, in the future, this development may serve to add stability to the mortgage credit market.

CONCLUSIONS

Interest rate ceilings on deposits at financial intermediaries create problems for some sectors of the economy. The housing market tends to become more volatile, the small saver is denied a market determined return on his/her savings, and inefficiencies develop.

Recently these problems have become severe enough to prompt legislation which calls for the gradual removal of these interest rate ceilings. However, as this study suggests, the current position of the S&L industry cannot safely allow for the removal of these ceilings without some change in the structure of the industry which would allow either for longer term liabilities or for assets with a more variable return.

Recent regulatory changes now permit the use of mortgages which have a variable return; however, it is not clear that these new mortgage instruments will allow S&L associations to operate in the total absence of rate controls. The consumer protection provisions of these instruments as well as problems with consumer acceptance may prevent the S&Ls from ever holding an asset portfolio which is flexable (with respect to interest rates) enough to allow them to safely compete with both CBs and the open market; thus, even if rate controls are phased out over the next six years, the reimposition of these controls may be an occasional necessity.

APPENDIX: VARIABLE DEFINITIONS

Listed below are (1) the various variables used in Part I, (2) their location on the Federal Home Loan Bank Board semiannual report data tapes, and (3) their brief definitions.

NI DATA BASE FIELD NAME: (D120)

Total income minus total expenses of the association.

T DATA BASE FIELD NAME: (ETIT)

All Federal, State, or local income taxes or any other taxes based on income.

SC DATA BASE FIELD NAMES: (BBRR + B103)

Interest earning NOW accounts plus passbook and other accounts that earn at or below the regular rate plus accounts earning in excess of the regular rate with initial minimum deposit requirements of less than $100,000.

RES_1 DATA BASE FIELD NAMES: (C106 + C107)

Undivided profits plus net undistributed income.

RES_2 DATA BASE FIELD NAMES: (C106 + C107 + C102 + C103 + C104 + C105)

RES_1 plus Federal insurance reserves plus reserves qualifying for Federal insurance reserves plus other general reserves plus other reserves.

RES_3 DATA BASE FIELD NAMES: (C106 + C107 + C102 + C103 + C104 + C105 + C100 + C101)

RES_2 plus the par value of permanent, reserve, and guaranty stock plus any paid-in or capital surplus.

PART II. ECONOMIES OF SIZE IN THE SAVINGS AND LOAN INDUSTRY

INTRODUCTION

The purpose of an economies of size[1] study is to measure the long-run relationship between the size of the firm and its average operating costs. Declining long-run average costs indicate economies of size and rising long-run average costs imply diseconomies of size.

Economies of size are usually attributed to increased specialization of labor and to technological factors. As a firm increases in size it is better able to take advantage of specialization of labor. The small firm may have each worker performing several different tasks, whereas the large firm may have each employee performing only one task, thereby enabling the worker to become more efficient at that one task. Technological factors may also result in falling long-run average costs. For example, a computer that will handle 100,000 different accounts at a savings and loan association (S&L) may not be ten times as expensive as a computer that will handle 10,000 accounts; thus, the larger firm may be able to obtain a cost advantage.

Diseconomies of size tend to be attributed to managerial problems. As the firm size increases, it may become more difficult to manage, lower level employees become increasingly separated from top management, communication may become a problem and the result can be an

[1]Strictly speaking, the phrase "economies of scale" may be legitimately used only when a cost study assumes a homogeneous production function. Since this study does not confine itself to the measurement of cost curves which are associated with homogeneous production functions, the more general phrase "economies of size" will be used instead.

increase in average operating costs.

Reasons for this Study

An economies of size study can be justified for three reasons. First, it can provide valuable information to S&L managers who should be interested in what would, on the average, happen to their operating costs if they did expand the size of their operations. From the standpoint of the individual S&L, it may not be very apparent what the results of expanding their size of operation may be. What is needed is a study which takes a macro view. Second, government regulators are also interested in firm operating cost. Policy decisions, such as branching and merger restrictions, effect the size of the existing firms. Operating costs may not be of primary concern to the regulators; however, if costs are significantly related to size of operation, they should be taken into consideration along with other factors such as competition, allocational efficiency, etc.

Finally, an economies of size study provides a test of an economic hypothesis. Textbooks have traditionally assumed the presence of both economies and diseconomies of size; these notions based more on intuition than on actual empirical data. Empirical studies of this type can serve to either substantiate or refute these textbook claims.

Theory

Economic theory suggests that the short-run average cost (SRAC) curve for the firm will be "U" shaped. Different sized firms will have different "U" shaped SRAC curves and the envelope of these short-run curves is defined as the long-run average cost (LRAC) curve (see figure 1).

Unlike the short-run curves, economic theory itself has little to say about the shape of the LRAC curve. It has been suggested that it could be a straight horizontal line, a downward sloping curve, an upward sloping curve, or some combination of the three. The actual shape of a LRAC curve for any particular industry is something that must be determined by empirical results rather than something which is suggested by economic theory.

Cross-sectional data on individual firms are really short-run data as all firms are always operating in a short-run time horizon. For this reason, the data collected are points which are scattered around the various SRAC curves and are not randomly scattered around the LRAC curve. Thus, using ordinary least squares, it is not empirically possible to measure a LRAC curve. What is actually measured is a curve such as the dashed line in figure 1 [7, page 1010-1011] which might be called a "LRAC relationship" to distinguish it from the textbook definition of a LRAC curve. This LRAC relationship is somewhat of a hybrid, containing both short-run and long-run elements.

Firm Heterogeneity

If all of the firms in the sample were homogeneous except for size, it would be possible to fit a cost relationship directly to the data. However, firms are not homogeneous and some adjustments are necessary to avoid possible biases. For example, suppose a single sample of S&Ls in a study includes firms from two different market

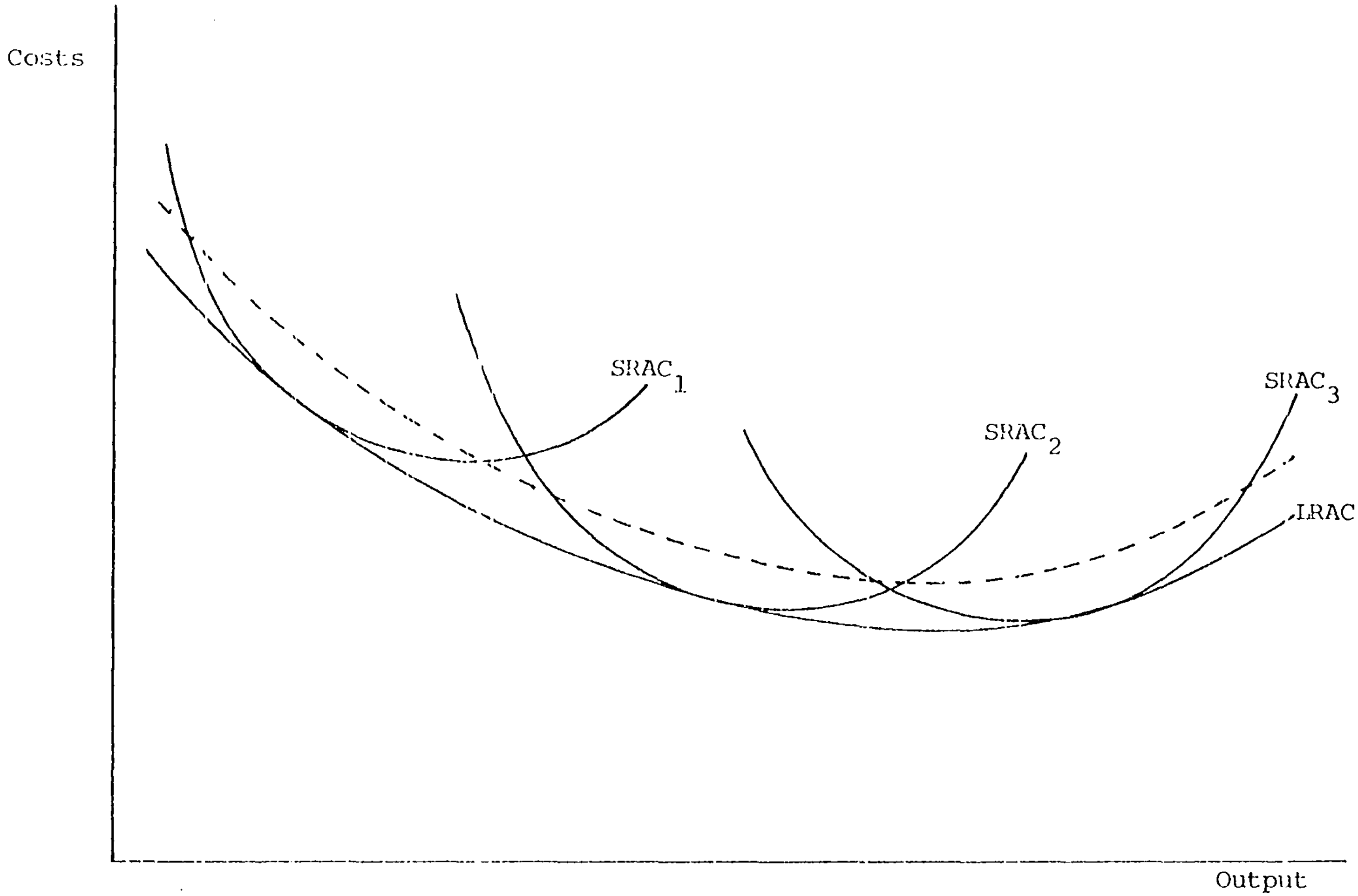

Figure 1. The long-run average cost curve (LRAC) and the measured long-run average cost relationship (dotted line).

areas. One area is characterized by high labor costs, the other low labor costs. Furthermore, suppose the high-labor-cost market generally contains the larger S&Ls (as may be the case in larger urban centers). Under these circumstances the unadjusted data will tend to show higher costs for the larger associations, not because of reasons associated with size, but because of locational factors. In this case, simply regressing costs on output would result in a bias which would favor diseconomies of size.

Thus, the test procedure needs to involve adjustments in the data to account for labor cost differences and any other differentials which are independent of the cost-output relationship itself. These adjustments can be done by using one or both of the following techniques.

First, cost adjustment variables may be included directly in the regression equation [12, page 31]. This would imply the following:

$$Y = f(X_1, X_2, \ldots, X_n, Z_1, Z_2, \ldots, Z_n, u) \qquad (3)$$

where Y is the cost variable, X is the output variable (typically X_2 through X_n are zero, but they may be used to represent output squared, cubed, etc.), the Zs are the cost adjustment variables, and u is the disturbance term.

The inclusion of the Zs in the regression equation serves to account for the cost differentials which are independent of the cost-output relationship itself. By doing this, the true cost-output relationship can be measured with the Xs. This technique has the advantage of measuring the cost-output relationship and simultaneously adjusting for extraneous cost differentials. The coefficients of the Zs (provided they are significantly different from zero) may also provide useful information with respect to the cost structure of the S&L industry. For example, one cost adjustment variable may be a stock-mutual dummy intended to account for possible cost differences between stock and mutual associations. The coefficient of the variable may provide information as to which type association is, on the average, more expensive to operate.

A second way to adjust the data is to construct subsamples, each of which contains as homogeneous a group of firms (except for size) as possible. This technique is not meant to be used in the absence of the method discussed above, but it can be used to greatly reduce the number of adjustment variables needed in the regression equation (but to the detriment of the number of usable observations). For example, some heterogeneity is due to the fact that firms operate in different market areas. A firm in New York City cannot be expected to face the same labor costs, building costs, property taxes, etc. as a firm of comparable size in Los Angeles. A sample which includes only New York City firms would not have to be adjusted for different market conditions.

Major Questions

It appears that, as with any economies of size study, there are four major questions that must be answered. These are:

1) What cost variable should be used?

2) What output variable should be used?

3) What cost adjustments are necessary?

4) What is the proper functional form?

The format of the remainder of this paper will center around these four questions.

LITERATURE REVIEW

Three studies will be examined here. The first two, one by George J. Benston [4] and the other by Eugene F. Brigham and R. Richardson Pettit [7], appeared in the Study of the Savings and Loan Industry which was directed by Irwin Friend. The third article was written by Jay Atkinson [1] as an invited research paper for the Federal Home Loan Bank Board (FHLBB).

The Benston Study

Benston did cross-sectional studies of 3,159 federally insured S&Ls for each of the years 1963 through 1966. The data were obtained from balance sheet and cost information provided to the FHLBB by its members and by those associations insured by the Federal Savings and Loan Insurance Corporation (FSLIC). The size of the associations (in terms of total assets) ranged from $300,000 to $500 million.

The cost variable

Benston used total costs minus income received from renting office space to others, fees for services, state income taxes, advertising costs, and interest expenses [4, pages 681-85]. The latter two costs were excluded because

> they are costs of acquiring customers or factors of production rather than costs of using factors of production. Also, these costs are determined primarily by market conditions (in both the markets for savings and loans) and, as such, are readily determinable from market data. Since differences in advertising and dividends do not reflect differences in the operating efficiency among associations directly, including them with operating costs would serve only to obscure the

> relationship between operating costs and output and the other explanatory variables [4, page 689].

The output variable

Benston used three different output variables in separate regressions. These were number of loans made per year, average number of loans serviced per month, and average number of savings accounts serviced per month. Total assets was rejected as a measure of output because it was thought that "mortgage lending costs are related to the number of loans made rather than to the dollar amount of loans" [4, page 687].

Cost adjustments

Cost adjustments were made by including in the regression equation a federal-state charter dummy, a stock-mutual dummy, dummies to account for the age of the association, and dummies to adjust for managerial differences. Also included were the number of offices, six output homogeneity variables, a wage adjustment variable, variables to measure the rate of change and the variability of output, and four variables that adjusted for risk differentials.

Functional form

The final cost equation was in the following doublelogarithmic form [4, page 698].

$$\ln C = \ln a + b \ln QP + \Sigma\, c_i \ln QD_i + \ln U \qquad (4)$$

where

C = operating costs

QP = the output variable

QD_i = cost adjustment variables

U = the error term.

This functional form was used because it is a cost function which is "based on a Cobb-Douglas production function" [4., page 680].

Results

In the functional form used above, a value of b equal to one would imply no economies of scale, b significantly less than one would imply economies of scale, and b significantly greater then one would imply diseconomies of scale. The value of b was found to be in the range of 0.90 to 0.92, values which were significantly different from one (at the 1% level).

The Brigham-Pettit Study

Brigham and Pettit (B-P) used data (from the FHLBB) from 1962 through 1966 to do cross-sectional studies of three different market areas: Los Angeles-Long Beach, Chicago, and the Detroit-Cleveland area.

The cost variable

The total-cost-to-assets ratio was used to measure costs. Included in total costs were both advertising and interest expenses. It should be noted that, whereas, Benston fitted a total cost curve, B-P fitted an average cost curve.

The output variable

The dollar volume of assets was used to measure the size of the institution because

> the level of assets appears to be the definition of output that most closely measures the relevant social product. It seems to us that a larger mortgage is more valuable to society than a smaller mortgage, and making $100,000 of savings available to borrowers would seem to be approximately 10 times as valuable to society as transmitting $10,000 of savings to the mortgage market [7, page 1002].

Cost adjustments

Also included in the regression equation were variables which measured the number of branches, average deposit size, the fixed-asset-to-total-asset ratio (to adjust for S&Ls that own substantial office buildings), the growth rate of the loan portfolio, the fee-income-to-gross-income ratio (to adjust for interfirm differences in construction lending, sale of participations, and risk), the scheduled-items-to-specified-assets ratio (designed to measure the risk of the loan portfolio), and a stock-mutual dummy.

Functional form

The regression equations were of the following semilogarithmic form [7, page 1015].

$$Y = a + b \ln \text{assets} + \Sigma\, c_i X_i + u \qquad (5)$$

where

Y = cost-to-average-asset ratio

X_i = the cost adjustment variables

u = the error term.

Results

With the above functional form, a negative value of b (significantly different from zero) would imply economies of scale and a positive value would indicate diseconomies. For all three of the market areas tested, b was significantly less than zero (at the 1% level).

The Atkinson Study

Atkinson used cross-sectional data which included 1,878 S&L associations; the size of which ranged from $1 million to about $1.2 billion. Output and cost data on the S&Ls are from the December 1975 FHLBB Semi-Annual Report. Data on bank deposits came from the Federal Deposit Insurance Corporation Call Reports on commercial banks and wage rate data came from the Bureau of Labor Statistics Area Wage Surveys.

The cost variables

Two total cost variables were tried: one which included both deposit interest expenses and total operating expenses, and another which included only operating expenses. The first cost variable was later rejected due to "severe dominant variable problems" [1, page 13]. As a result, the second cost variable was used throughout the study.

The output variable

The output variable was the sum of the firm's earning assets. No discussion was given as to the merits of this variable.

Cost adjustments

The loans-serviced-by-others-to-total-assets ratio and the loans-serviced-for-others-to-total-assets ratio were included in the regression equations to adjust for secondary market activity. Also included was the "bad"-loans-to-total-assets ratio to adjust for risk, the "other"-loans-to-total-assets ratio to adjust for asset heterogeneity, the borrowed-funds-to-total-funds ratio to adjust for higher costs that may accrue to firms which borrow, the interest-paid-on-accounts-earning-at-or-below-the-passbook-rate-to-total-interest-payments ratio to adjust for liability heterogeneity, a Herfindahl index which measured Standard Metropolitan Statistical Area (SMSA) savings deposit concentration (included were comparable deposits at commercial banks) to adjust for differing market conditions, a service-corporation-investment-to-total-assets ratio to adjust for the extra costs of a service corporation, a Herfindahl index of the firms dispersion of deposits among its offices to adjust for the number of offices a firm has, a stock-mutual dummy, and a state-federal charter dummy.

Functional form

Atkinson fitted several different equations; they were all in a logarithmic form. The most general form fitted was [1, page 10]:

$$\ln c = \beta_0 + \beta_1 \ln Q + \beta_2 (\ln Q)^2 + \beta_3 \ln r +$$

$$\beta_4 \ln w + \beta_5 (\ln r)^2 - 2\beta_6 (\ln r \ln w) +$$

$$\beta_7 (\ln w)^2 + \beta_8 (\ln Q \ln r) + \beta_9 (\ln Q \ln w) +$$

$$\sum_{i=1}^{11} \beta_{i+9} AV_i + \mu \qquad (6)$$

where

c = total operating costs (not including interest payments)

Q = total assets

r = average interest rate paid by the firm for deposits (to represent the price of capital)

w = an index of wage costs for the SMSA in which the S&L is located (to represent the price of labor)

AV_i = the ith adjustment variable

μ = the error term.

This form is more flexible than the simple doublelogarithmic form used by Benston as it allows more flexibility with respect to the assumptions made about the underlying production function. Also, the inclusion of the $(\ln Q)^2$ term allows the function to measure both economies and diseconomies and not just one or the other. The above cost function was fitted using a variety of differint constraints on the various coefficients. The first form fitted was a homogeneous cost function assuming unitary elasticities of substitution ($\beta_2 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = 0$), implying a basic Cobb-Douglas production function. The second form was a homothetic cost function with unitary elasticities of substitution ($\beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = 0$), the third was an unconstrained (Translog) cost function where all coefficients may take on any values, the fourth was a more general homothetic function ($\beta_8 = \beta_9 = 0$), the fifth was a general homogeneous function ($\beta_2 = \beta_8 = \beta_9 = 0$), and the final form was an unconstrained (Translog) cost function with the assumption of unit elasticities of substitution between inputs ($\beta_5 = \beta_6 = \beta_7 = 0$).

In an effort to add more flexibility to the basic Cobb-Douglas cost function, Atkinson also fitted the following equation [1, page 30]:

$$\ln c = \beta_0 + \beta_1 \ln Q + \beta_2 \ln w + \beta_3 \ln r + \sum_{i=1}^{11} \beta_{i+3} AV_i + \sum_{i=1}^{3} \beta_{i+14} D_i + \sum_{i=1}^{3} \beta_{i+17} (D_i \ln Q) + \mu \quad (7)$$

where

D_1 = 1 if assets fall between \$50 and \$100 million
= 0 otherwise

D_2 = 1 if assets fall between \$100 and \$200 million
= 0 otherwise

D_3 = 1 if assets are greater than \$200 million
= 0 otherwise.

This intercept-slope dummy scheme enables the measurement of both economies and diseconomies of scale; however, it has the disadvantages of (1) being somewhat arbitrary with respect to its cutoff points and (2) producing a discontinuous average cost function.

Results

With the basic Cobb-Douglas form, the cost elasticity of size (β_1) ranged from 0.84 for a sample which included only unit associations to 0.91 for a sample which included only branch associations. The coefficient of the $(\ln Q)^2$ term was significantly greater than zero (at the 1% level) in all of the equations where it was included. This would indicate that the assumption of a constant cost elasticity of size may not be appropriate and the diseconomies of scale may be present. The intercept-slope scheme also supported these results.

METHODS

This is a cross-sectional study using data provided by the FHLBB. These data include all federally insured S&Ls. Balance sheet data are from June 30, 1979; income and expense data are from the first half of 1979.

The Cost Variable

The cost variable used in this study was total operating expenses (TOE). This variable does not include either interest payments on deposits or state and federal income tax payments. Interest payments were excluded because they are not directly related to the operating efficiency of the firm. What is of interest is how efficiently an institution can transfer funds from savers to borrowers and not the cost of funds themselves. Income tax payments were also excluded because they are not related to operating efficiency and their inclusion would result in a bias if tax rates are either progressive or regressive.

The Output Variable

Since the function of a S&L is as a financial intermediary, the proper measure of output would be the quantity of intermediation it does per period of time. However, this information is not available so total assets were used as a proxy. This is actually a measure of both current and past intermediation but it was felt that this was the best substitute variable available.

The Cost Adjustments

Differing market conditions were adjusted for by dividing the data into samples of homogeneous market areas. The areas selected were Philadelphia, Chicago, New York City, and the Los Angeles-Long Beach area.[1] The data were further adjusted by excluding from these samples associations which had obtained their insurance after 1970. New associations will (1) be saddled with "start up" costs in addition to their usual operating costs and (2) will typically be small associations. Their inclusion would tend to result in a bias toward economies of size.

Table 14 lists the adjustment variables included in the individual regression equations. When a loan becomes delinquent the S&L must take some action above and beyond the normal servicing costs of a loan. Ultimately this may necessitate the foreclosure of the property which would create extra costs for the association. The real-estate-acquired-to-total-assets ratio (RISK) is designed to measure the extra costs the association may incur due to bad debts. Real estate acquired consists of property which has been acquired by foreclosure, real estate in judgement, and repossessed mobile homes and chattels. The greater the

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[1]This assumption of homogeneous market areas does not strictly hold. Included in each subsample were S&Ls whose head office is located in the various cities. However, branches may be located in other geographical regions. This may introduce a bias in the results. For example, suppose the larger associations have branches in primarily rural areas, locations which may be associated with lower labor costs, building costs, etc. This would result in a bias toward economies of scale. This homogeneity assumption seems to be the most heavily violated in the Los Angeles sample, as California has traditionally had more liberal branching laws.

Table 14. Adjustment variables in the regression equation.

Variable	Description	Adjusts for:
RISK	$\frac{\text{Real estate acquired}}{\text{Total assets}}$	Risk.
DC	= 1 for federal charter = 0 for state charter	Charter differences.
DT	= 1 for mutual association = 0 for stock association	Organizational differences.
AH	$\frac{\text{Other loans}}{\text{Total loans}}$	Asset heterogeneity.
LH	$\frac{\text{Savings and NOW accounts}}{\text{Total savings}}$	Liability heterogeneity.
BORR	$\frac{\text{Borrowed money}}{\text{Total assets}}$	Borrowing.
LSFOR	$\frac{\text{Loan servicing fees}}{\text{Total loans}} \times 10{,}000$	Mortgages sold.
LSBY	$\frac{\text{Service fees on loans purchased}}{\text{Total loans}} \times 10{,}000$	Mortgages purchased.

quantity of bad debts the greater will be real estate acquired; hence, one would expect the sign of the RISK variable to be positive.

DC and DT are both dummy variables which attempt to account for charter differences and organizational (stock-mutual) differences, respectively. Much has been written with respect to the different motivations of managers of both stock and mutual associations. It has traditionally been assumed that stock associations are more motivated by profit considerations due to their particular type of ownership. The managers of the stock associations must consider the needs of the stockholders whose interests rest, in part, with the size of future dividend payments. In contrast, the managers of mutual associations have been thought to be more responsive to the needs of the community and less interested in the pure goal of profit maximation. With these considerations, one could argue that stock associations should be more efficient than the mutuals and, thus, the expected sign of DT would be positive. Benston [4, page 693], however, disputes these claims and argues that there is more similarity between the motivations of the managers of the two types of institutions. Based of interviews with S&L managers, Benston concluded that the salaries of the managers of mutual associations tended to be tied to the performance of the individual associations. If this is the case, there may be no difference in the performance of stock or mutual managers. Under these assumptions, the expected value of the variable DT would be zero.

Different charters imply a different set of operating rules for the state and federal associations which may imply a difference in operating costs. A priori, it is not possible to tell which type of charter may result in lower operating costs and it may even be the case that these factors will vary from state to state. Different charters also imply a different number of government regulators. The state chartered associations in this sample are subjected to regulation from both state and federal authorities (federal regulation because of federal deposit insurance) and this might imply extra costs for the state associations. In conclusion, the expected value of DC is unknown and it may even vary from state to state.

AH accounts for asset heterogeneity as other loans measures the nonmortgage loans of the association which may be more or less expensive to make relative to mortgage loans; thus, the expected sign of AH is unknown. LH adjusts for liability heterogeneity and is used because savings and NOW accounts are more expensive to handle than are time accounts. Savings and NOW accounts, given that these funds are (for practical purposes) subject to immediate withdrawal, experience more activity (deposit and withdrawal) than is the case for time accounts. With time deposits, funds are usually kept on deposit for an extended period of time and these accounts do not experience as much deposit and withdrawal activity as is the case with savings and NOW accounts. Thus, one would expect lower servicing costs for the time accounts and, therefore, a positive value for LH.

BORR adjusts for extra costs which may be incurred by borrowing. Atkinson used a compatible variable because he felt that the presence of borrowing may indicate a firm which is out of equilibrium and, thus, is experiencing higher costs [1, page 39]. Presumably, the greater the borrowing the more the firm is out of equilibrium and the higher will be operating costs (positive expected value of BORR). LSFOR and LSBY adjust for secondary market activity. A firm which sells a mortgage has the costs of originating and marketing the mortgage but the purchasing firm will not experience these costs [1, page 6]. Thus, a firm which is a net buyer of mortgages would be expected to have lower operating costs (LSBY negative) and a firm which is a net seller of mortgages would be expected to show higher operating costs (LSFOR positive).

Previous studies have included some variable to adjust for the number of branches of the association, the rationale being that branching is expensive to the firm. It is certainly recognized that branching is expensive; however, a branching variable is not included in this study because branching is an important ingredient for a firm to expand its output. This is particularly true with the presence of deposit rate ceilings as, under these circumstances, it is very difficult for the individual S&L association to compete for funds located in other geographical regions (accounts opened and maintained by mail) via higher deposit interest rates. Since, in all cases, it is important for a firm to have branches in order to maintain its size, it would be inappropriate to adjust for the number of branches. It is felt that including the number of branches as an adjustment variable in the regression equation would filter out costs which are necessary for the association to maintain its size, and would thus distort the actual cost-output relationship that is being measured.

Functional Form

A cubic equation was fitted to measure the total cost function. This form exhibits more flexibility than the various logarithmic forms used in previous studies as it is capable of measuring both economies and diseconomies of size and of producing an average cost curve with a finite intercept.

The exact equation measured is:[1]

$$TOE = \beta_0 \text{ ASSETS} + \beta_1 (\text{ASSETS})^2 + \beta_2 (\text{ASSETS})^3 + \sum_{i=1}^{8} \beta_{i+2} AV_i + \mu \qquad (8)$$

where

TOE = total operating expenses,

$ASSETS$ = total assets/1,000,000,

AV_i = the ith adjustment variable,

μ = the disturbance term.

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[1] A total cost curve of this form will result in an average cost curve of the form $TOE/ASSETS = \beta_0 + \beta_1 \text{ ASSETS} + \beta_2 (\text{ASSETS})^2$. This average cost function has a finite y-intercept (β_0). Also, if this function has a positive value of $\hat{\beta}_0$, a negative value of $\hat{\beta}_1$, and a positive value of $\hat{\beta}_2$, it will result in a "U" shaped average cost relationship. Including an intercept in the measured total cost function would result in an average cost function of the form $TOE/ASSETS = \beta_0/\text{ASSETS} + \beta_1 + \beta_2 \text{ ASSETS} + \beta_3 (\text{ASSETS})^2$, a function which is asymptotic to the y-axis.

The doublelogarithmic form was rejected because of its rigidities. It can measure either economies or diseconomies of size, but not both simultaneously. This form also places undesirable prior constraints on the shape of the resulting average cost curve. If a doublelog total cost function measures economies of size this will imply that the average cost function will be asymptotic to both axes.[1] This may be the reason why previous studies have shown rather dramatic economies of size available for the relatively small firms and scarcely any available to the larger firms (for a comparison of results with a doublelog form, see the Appendix to this part).

The translog functional form exhibits more flexability than the doublelog form in that the translog function is not constrained to be asymptotic to the x-axis and it is capable of producing somewhat of a "U"-shaped function. The translog function will, however, produce an average cost relationship which is asymptotic to the y-axis. For this reason, the translog form was also rejected.

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[1]A doublelog function of the form $\ln TC = \ln \beta_0 + \beta_1 \ln ASSETS$ is the same equation as $TC = \beta_0 (ASSETS)^{\beta_1}$. This translates into an average cost function of $TC/ASSETS = \beta_0 (ASSETS)^{(\beta_1 - 1)}$. If economies of size are measured, β_1 will be less than one and greater than zero, hence, $-1 \leq (\beta_1 - 1) \leq 0$. Letting $(\beta_1 - 1) = -c$, where $0 \leq c \leq 1$, then $TC/ASSETS = \beta_0/(ASSETS)^c$. As ASSETS approaches zero, $\beta_0/(ASSETS)^c$ will approach positive infinity and as ASSETS gets very large, $\beta_0/(ASSETS)^c$ will approach zero.

It is strongly felt that the functional form of the measured total cost function should not be influenced by the nature of some assumed production function. Previous studies have based the functional form of the total cost function on the specific nature of some production function (a Cobb-Douglas form, for example). There is no reason to expect the production function applicable to an individual industry to be of a specific form; this is a testable hypothesis and not something that can be based on a priori information. Basing the form of the cost function on an arbitrary production function may place undesirable constraints upon its shape and, hence, may produce misleading results.

In selecting a cubic total cost function, no consideration was given to the possible underlying production function. The important consideration here is the ultimate flexibility of the form of the total cost function used.

RESULTS

The results of fitting equation (8) to the data of the metropolitan areas mentioned above, using ordinary least squares, are given in Table 15. The $(ASSETS)^3$ coefficient in the Philadelphia sample did not prove to be significantly different from zero (even at the 10% level); hence, this variable was excluded and a new regression was run. Also, the dummy variable DT was excluded from both the Philadelphia and New York samples as there are no stock associations permitted in these areas.

The adjustment variables were only rarely significantly different from zero which may either indicate that the firms are more homogeneous than was expected and that the bulk of the variation in costs can be explained by the output variables, or it may point to some statistical problems. The adjustment variables may not have shown enough variation or they may not be measuring the intended interfirm differences.

Figures 2 through 5 show the corresponding LRAC relationships and Figure 6 shows a comparison of the different markets.[1] In all cases, the vertical axis measures average cost as a percent of total assets. For example, from Figure 2 (the Chicago area), average operating costs for the smallest associations amounted to, on the average, 0.983 percent of their total assets.

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[1]These relationships are drawn under the assumption that all of the adjustment variables equal zero.

Table 15. Regression results of equation 8 using ordinary least squares.[a]

Variable	Philadelphia	Chicago	Los Angeles	New York	Expected Sign
ASSETS[b]	6744 (27.42)***	9833 (23.36)***	7817 (8.06)***	8202 (9.32)***	+
$(ASSETS)^2$	-3.195 (-9.32)**	-5.392 (-10.96)***	-0.7999 (-3.31)***	-4.824 (-3.84)***	-
$(ASSETS)^3$	-	$1.520\text{x}10^{-3}$ (11.19)***	$3.791\text{x}10^{-5}$ (2.51)**	$1.418\text{x}10^{-3}$ (3.12)***	+
RISK	27494 (1.35)	-29403 (-0.37)	88497 (0.13)	-20843 (-0.12)	+
DC	667.5 (0.03)	-74675 (-1.15)	1003660 (0.45)	-25553 (-0.21)	?
DT	-	-175476 (-2.12)**	-259029 (-0.12)	-	?
AH	5012 (0.74)	-2443 (-0.18)	4382 (0.04)	36336 (0.65)	?
LH	138.8 (0.29)	1548 (0.97)	-21816 (-1.09)	-2083 (-0.92)	+
BORR	-285.9 (-0.10)	707.6 (0.13)	56906 (0.65)	6032 (0.67)	+
LSFOR	12374 (0.72)	19751 (4.03)***	74827 (0.50)	-62598 (-0.67)	+
LSBY	11895 (1.74)*	79096 (1.62)	-214453 (-0.20)	677.5 (0.03)	-

R^2	0.9873	0.9798	0.9715	0.9808
F-statistic	664	715	146	215
SEE	$1.00x10^5$	$3.49x10^5$	$2.02x10^6$	$3.34x10^5$
Sample Size	78	163	48	43
ASSET Range	3.3-815	1.0-2814	14-11432	19-1976
ASSET Mean	96.6	167.5	1283	290.9

[a] The t-statistic is in parentheses.

[b] ASSETS = Total assets/1,000,000.

*** Coefficient significant at the 1% level.

** Coefficient significant at the 5% level.

* Coefficient significant at the 10% level.

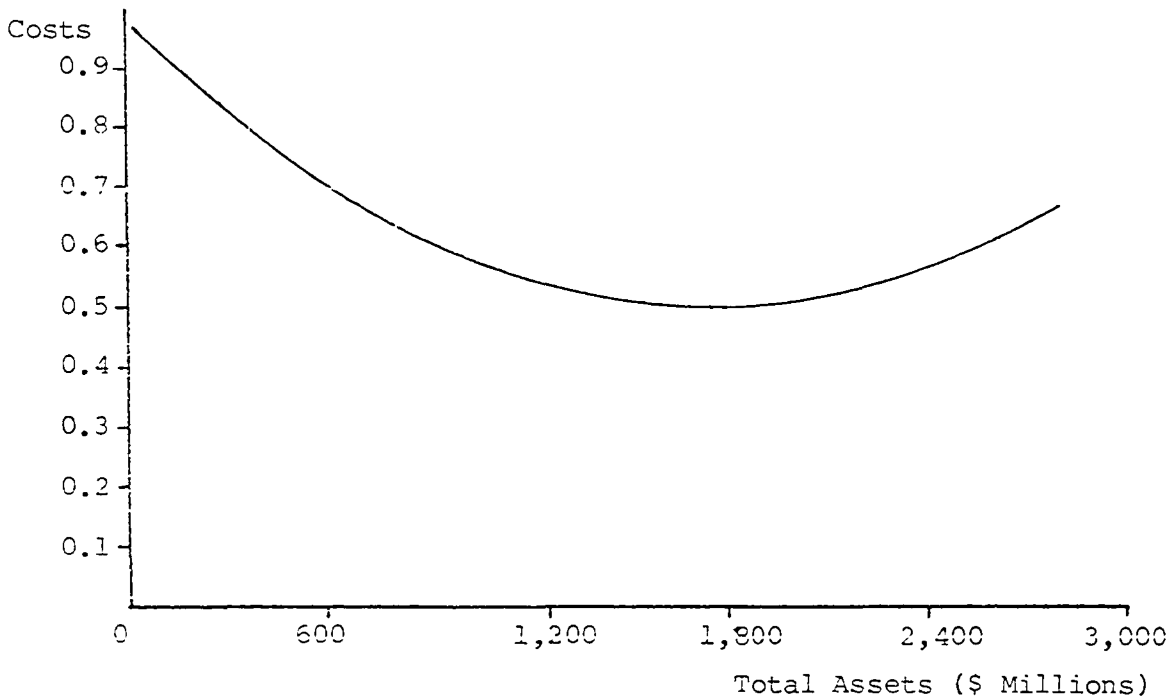

Figure 2. The Chicago area long-run average cost relationship.

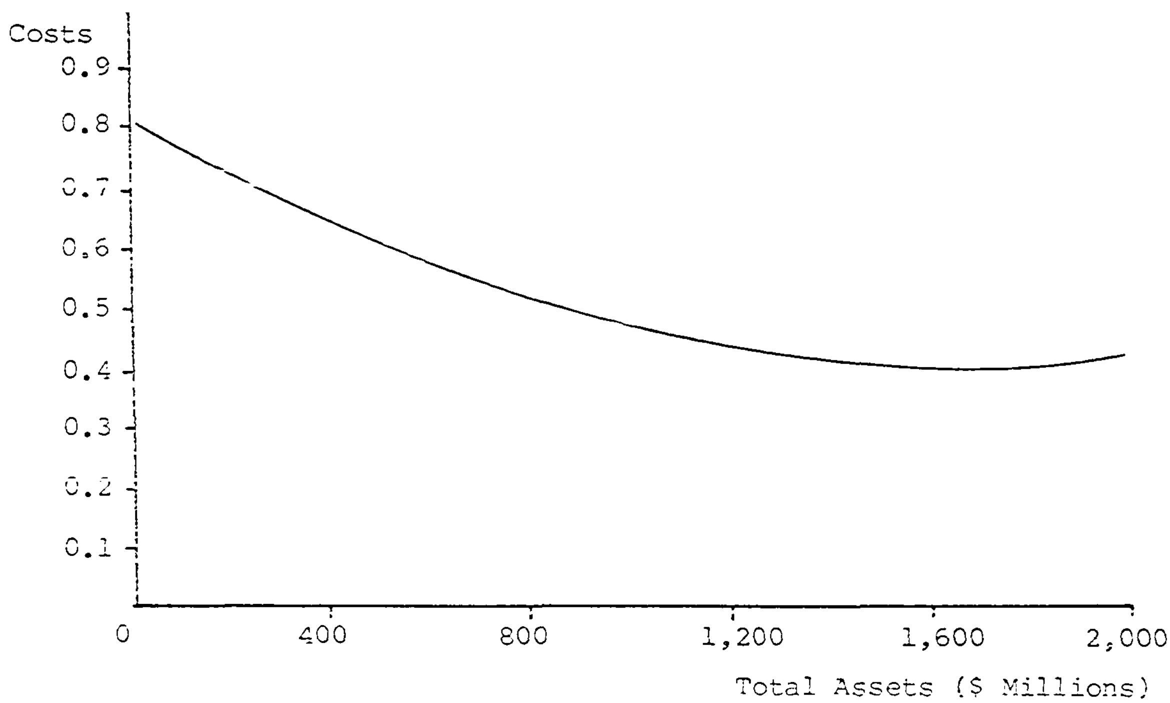

Figure 3. The New York City area long-run average cost relationship.

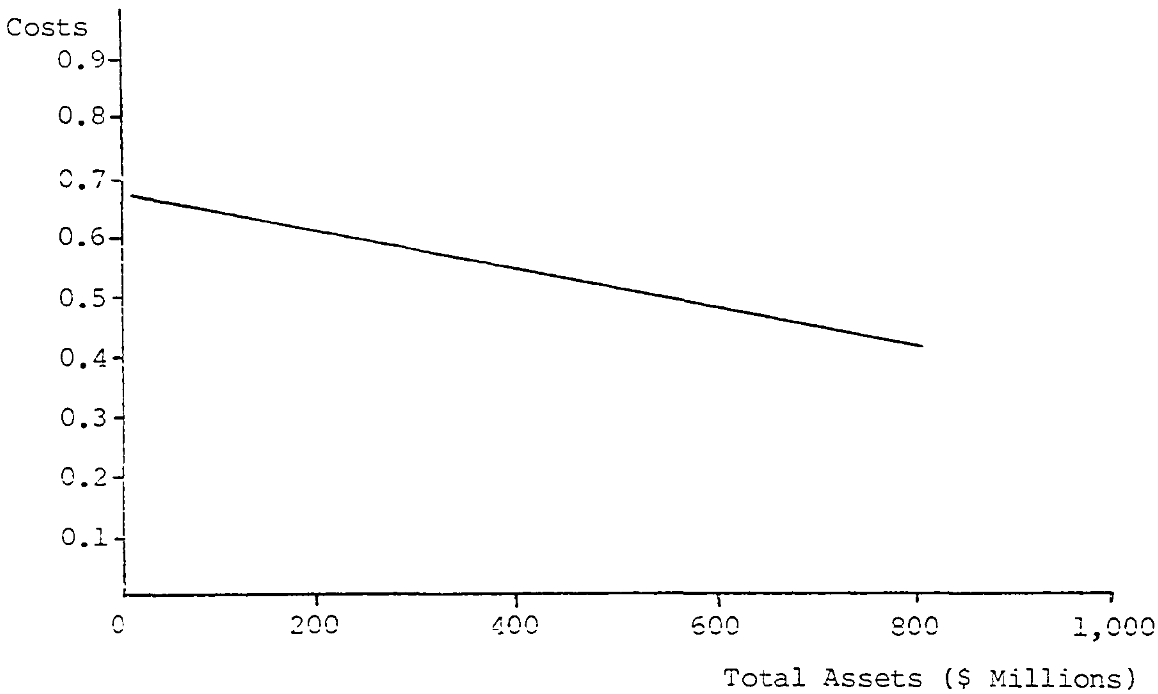

Figure 4. The Philadelphia area long-run average cost relationship.

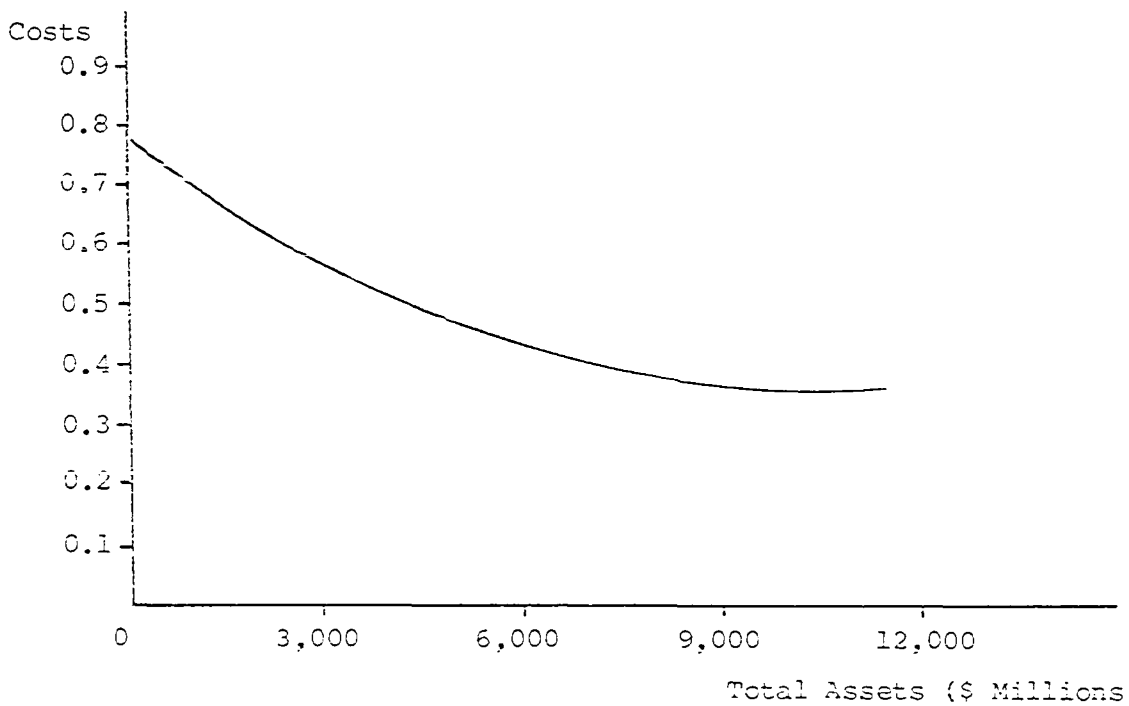

Figure 5. The Los Angeles-Long Beach area long-run average cost relationship.

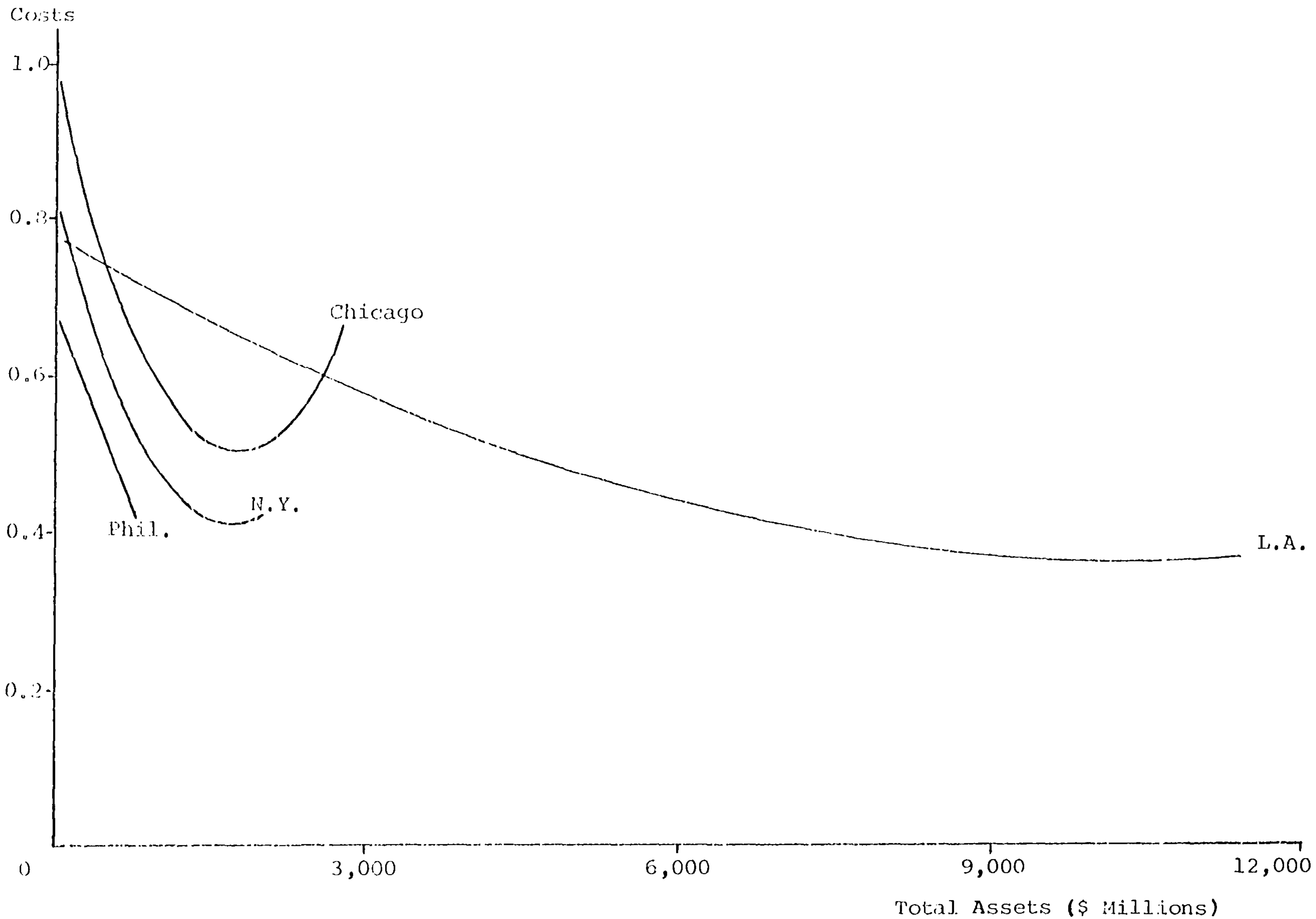

Figure 6. Area comparisons of LRAC relationships (cubic total cost functions).

By labeling the y-axis in this way, it is easy to compare the extent of the economies of size available to the different size firms. The difference between the minimum and the maximum points on the average cost relationships listed are 0.477, 0.401, 0.259, and 0.421 for the Chicago, New York, Philadelphia, and the Los Angeles areas, respectively. This would imply that, on the average, due to size efficiency the "optimal" size association in the Chicago area could, for example, pay 0.477 percent more toward their liabilities and net worth than would be the case with the smaller associations.

The Chicago, New York, and Los Angeles areas all show an upturn in their LRAC relationships which, at first glance, would seem to indicate diseconomies of size. However, as can be seen in the section on DATA LIMITATIONS AND STATISTICAL PROBLEMS, this may not be the case. Data limitations prevent the measurement of the true LRAC curve and these upturns could be due to the influence of short-run elements in the measured average cost relationship.

Even if one assumes that these measured LRAC relationships do indeed reflect the true LRAC curves, this in no way suggests that regulatory authorities should completely abandon all efforts to encourage firm growth. From the practical standpoint, the overwhelming majority of firms are nowhere near the point where diseconomies of size are measured. In the Chicago area, for example, the average size firm would have to grow over tenfold in order to encounter the measured diseconomies of size (assuming these diseconomies do exist).

What is important here is the nature of the economies of size that are measured. The downward sloping portion of the average cost relationships show a more uniform availability of economies of size than has been the case with previous studies.

The actual shape of the true LRAC curve is important from the standpoint of actual policy decision making. If studies suggest a LRAC curve which measures economies of size only for the small associations, then there is no point, on the basis of operation efficiency, in encouraging larger sized firms. This study tends to counter previous studies and suggest the presence of a more uniform type of economies of size. Certainly, more work is needed in this area to further test these claims.

DATA LIMITATIONS AND STATISTICAL PROBLEMS

As mentioned previously, a long-run average cost curve cannot be measured directly because of the short-run nature of the data. Thus, one would expect the measured LRAC relationship to lie above the true LRAC curve. However, the short-run nature of the data may produce another problem. The Chicago, New York, and Los Angeles areas all show an upturn in their LRAC relationships. This may be due to the presence of diseconomies of size or it may be due to the fact that the measured average cost relationship contains elements of both long-run and short-run cost curves. As Figure 7 illustrates, suppose there are only three different sized firms in the market, then the measured LRAC relationship (dotted line) may get its upturn because it is being influenced by the upward sloping portion of $SRAC_3$. However, the true LRAC curve may not exhibit any diseconomies of size over the range of outputs considered. It is strongly felt that the upturns in the measured average cost relationships are due to this data problem and not due to the actual presence of diseconomies of size.

A second data problem comes from the fact that there are few large associations in each sample. An examination of the data reveals that for the Chicago area there are seven associations with assets of greater than \$500 million (two associations with assets greater than \$1.76 billion, the minimum point on the LRAC relationship), the New York City area has six data points beyond the \$500 million mark (one association with assets greater than \$1.70 billion), the Philadelphia area has eleven observations beyond the \$200 million mark, and the Los

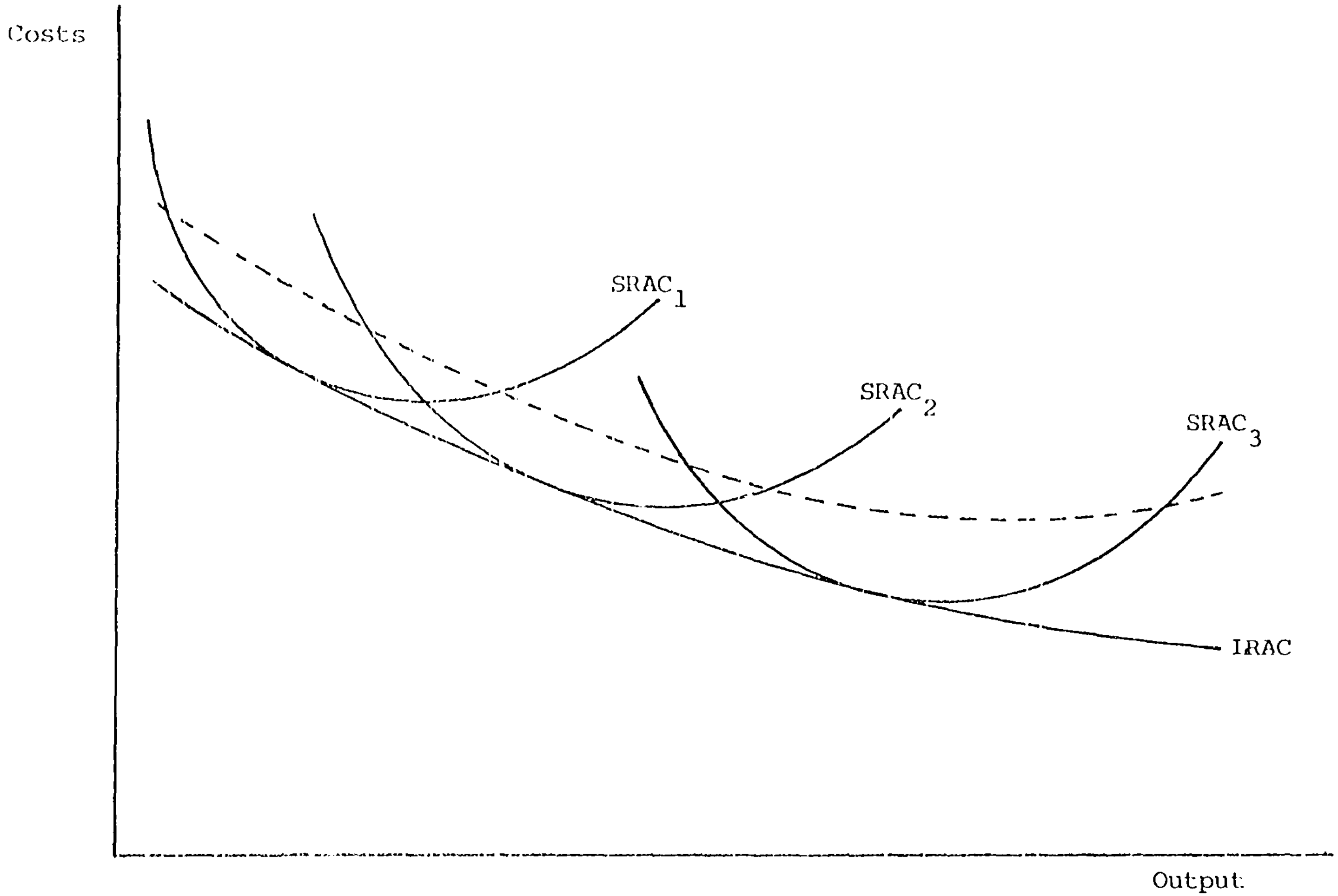

Figure 7. An example of a possible divergence, due to data limitations, between the long-run average cost curve (LRAC) and the measured long-run average cost relationship (dotted line).

Angeles area has ten observations beyond the $1,000 million mark (one point beyond its minimum point of $10.5 billion). Whereas the large associations tended to be few, they also tended to be scattered rather uniformly over their output range. Within the Chicago area, for example, the seven associations with assets greater than $500 million tended to be distributed rather evenly throughout the $500 to $2,814 million range.

This scarcity of large associations also casts doubt on the validity of the upturn in the measured LRAC relationships. With these upturns due to only one or two data points, one should be more skeptical than would otherwise be the case.

To expand the number of observations in the $500 million plus range, the individual samples were pooled and a separate regression run (which included dummy variables to account for area differences). The result was an average cost relationship which was almost identical to that of the Los Angeles area.

Plots of the regression residuals resulted in a cone-shaped pattern which indicates that the variance of the residuals is not constant over all ranges of output; as the size of the association increases, so does the variance of the residuals, whereas this heteroskedasticity does not result in biased estimators (with the use of ordinary least squares), these estimators are not efficient. This type of heteroskedasticity will result in an underestimation of the true variance of the estimators and, consequently, the type I error will be greater than the value assumed [17, page 260].

CONCLUSIONS

This study is similar to previous studies in that it does indicate the presence of economies of scale. The primary difference with this study is in the shape of the LRAC function. Previous studies have produced LRAC curves which show the presence of rather dramatic economies of scale available for the relatively small firms while almost no economies of scale for the larger firms. This, however, may be a result of the functional forms used to estimate the cost functions (see the Appendix).

The cubic total cost function used in this study has produced an average cost relationship which suggests that the LRAC curve decreases at a much more uniform rate and that there are economies of scale available even to the larger firms. The cost savings available to the larger firms varies from 0.259 to 0.477 percent of total assets.

As with any empirical study, data and statistical problems arise which tend to cast a shadow on the results. Of importance here is the problem with heteroskedasticity, the scarcity of large associations, and the short-run nature of the data.

APPENDIX:

A COMPARISON OF RESULTS WITH A DOUBLELOGARITHMIC FUNCTIONAL FORM

To demonstrate the different results that can be obtained by the use of a doublelogarithmic functional form, the regressions for each market areas were rerun using the same adjustment variables. The actual equation fitted was:

$$\text{LNTOE} = \beta_0 + \beta_1 \text{ LNASSETS} + \sum_{i=1}^{8} \beta_{i+1} \text{AV}_i + \mu \qquad (9)$$

where

LNTOE = ln (TOE),

LNASSETS = ln (total assets).

The regression results for each market area are listed in table 16. In all cases the estimate of β_1 was significantly less than one (at the 1% level) indicating the presence of economies of size.

A comparison of the long-run average cost relationships produced by the two different functional forms is shown in figures 8 through 11.[1] The results of the doublelog form tend to be similar to those found in previous studies; that is, rather substantial economies available for the smaller associations and very little economies available for the large firms. A comparison of the two functional forms serves to

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[1]These relationships are drawn under the assumption that all of the adjustment variables equal zero.

Table 16. Regression results of equation 9 using ordinary least squares.[a]

Variable	Philadelphia	Chicago	Los Angeles	New York	Expected Sign
Intercept	-3.149 (-7.82)***	-3.301 (-9.72)***	-2.150 (-2.49)**	-2.619 (-3.21)***	?
LNASSETS[b]	0.8723 (38.3)***	0.9040 (51.8)***	0.8266 (24.6)***	0.8532 (21.8)***	+
RISK	0.05057 (1.43)	0.07557 (1.54)	0.05546 (0.66)	0.09956 (0.99)	+
DC	0.01887 (0.39)	-0.04365 (-1.05)	0.4653 (1.80)*	0.06154 (0.89)	?
DT	--	-0.01538 (-0.28)	-0.3198 (-1.26)	--	?
AH	0.02003 (1.69)*	4.159×10^{-4} (0.047)	8.251×10^{-3} (0.57)	0.03560 (1.05)	?
LH	7.243×10^{-3} (4.01)***	3.575×10^{-3} (2.57)**	0.01042 (1.17)	4.125×10^{-3} (1.34)	+
BORR	0.01029 (1.90)*	9.643×10^{-3} (2.60)***	0.02711 (2.52)**	5.894×10^{-3} (1.09)	+
LSFOR	0.03341 (1.11)	0.01045 (3.45)***	0.02183 (1.25)	-0.04647 (-0.84)	+
LSBY	0.01839 (1.54)	0.06331 (2.12)**	-1.697×10^{-3} (-0.01)	3.429×10^{-3} (0.31)	--

R^2	0.9720	0.9656	0.9664	0.9554
F-statistic	334	506	151	116
SEE	0.175	0.213	0.235	0.192

[a]The t-statistic is in parentheses.

[b]LNASSETS = ln(total assets).

***Coefficient significant at the 1% level.

**Coefficient significant at the 5% level.

*Coefficient significant at the 10% level.

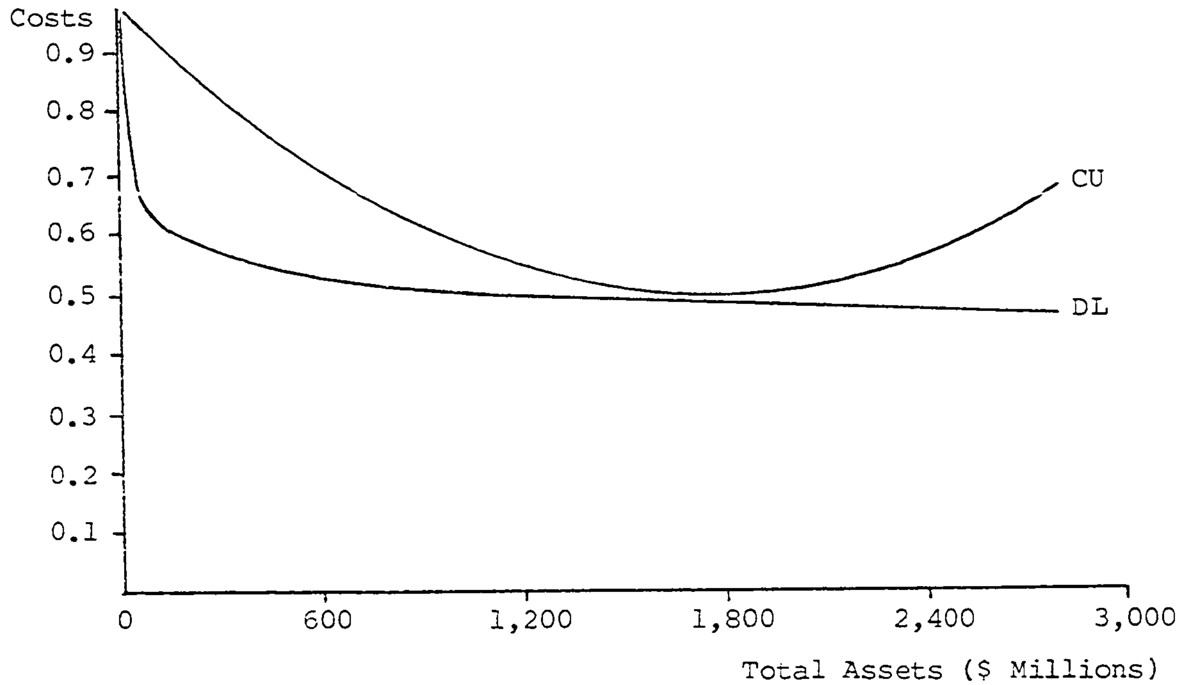

Figure 8. The Chicago area long-run average cost relationships: a comparison of the results of a cubic total cost function (CU) with a doublelog total cost function (DL).

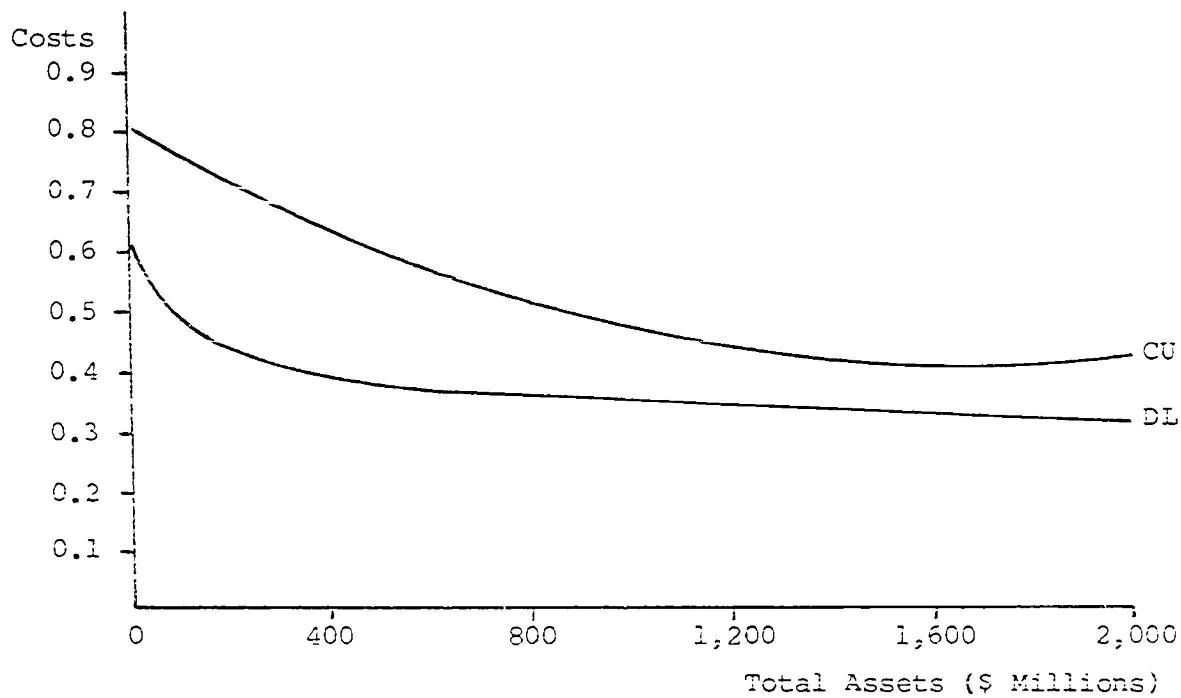

Figure 9. The New York City area long-run average cost relationships: a comparison of the results of a cubic total cost function (CU) with a doublelog total cost function (DL).

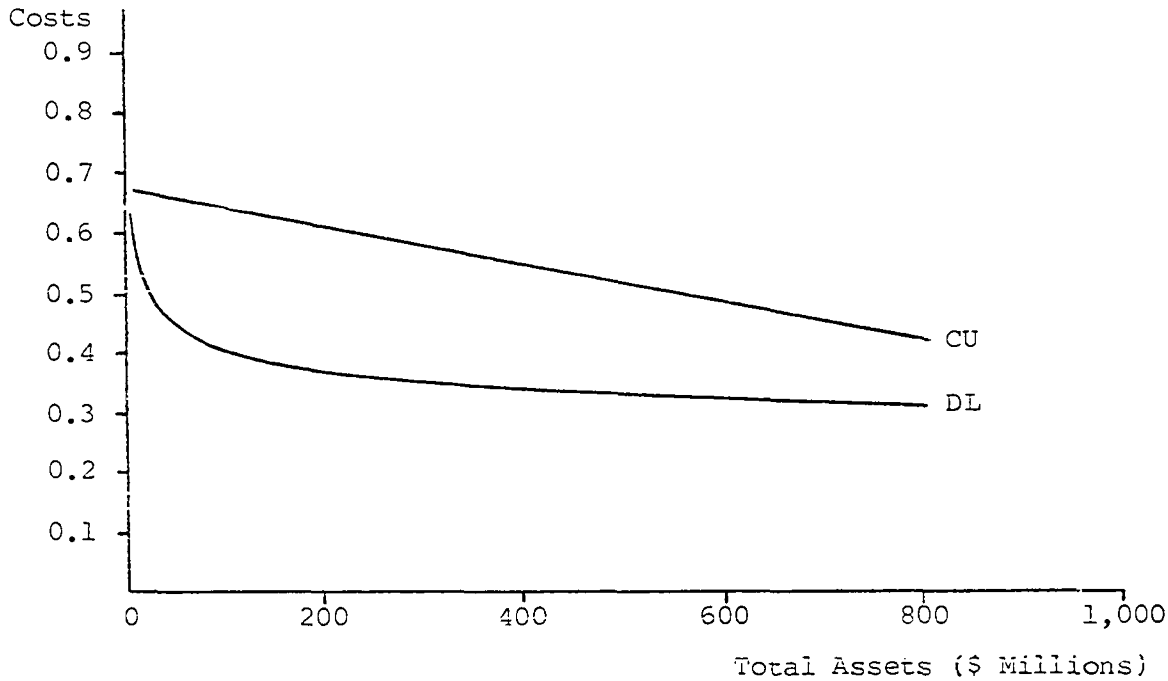

Figure 10. The Philadelphia area long-run average cost relationships: a comparison of the results of a cubic total cost function (CU) with a doublelog total cost function (DL).

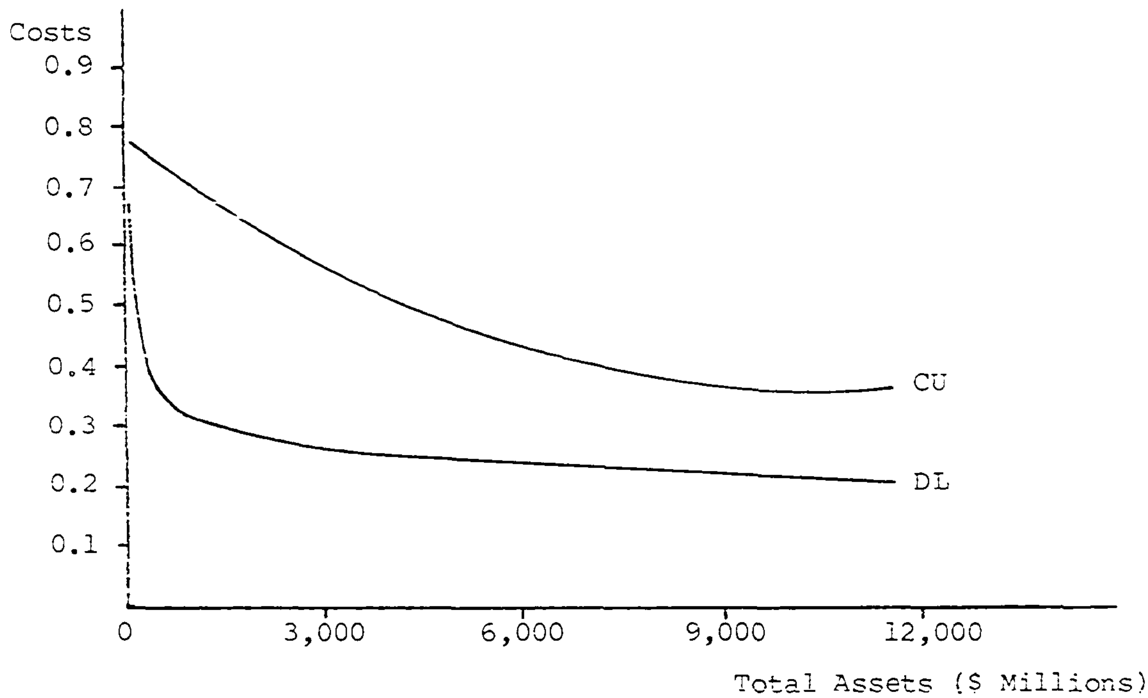

Figure 11. The Los Angeles-Long Beach area long-run average cost relationships: a comparison of the results of a cubic total cost function (CU) with a doublelog total cost function (DL).

indicate the profound effects that a change in form can have on experimental results.

In all of the comparisons the doublelog function produced an average cost relationship which fell below the corresponding average cost relationship produced by the cubic total cost function. This may be due to one or both of the following causes. First, the different functional forms used place different restrictions on the ultimate shape of the average cost relationships. These restrictions may have resulted in the above mentioned differences. Second, these average cost relationships are drawn given that all adjustment variables are equal to zero. Using different functional forms to measure the total cost functions, the various adjustment variables will take on a different degree of importance in terms of accounting for costs. That is, as the functional form is changed, so will the relative values of the adjustment variables. This fact may have caused the differences discussed above.

OVERALL SUMMARY

The first part of this dissertation demonstrates the inability of the S&L industry to operate without deposit rate controls. An examination of the recent financial position of the federally insured S&Ls reveals that a relatively small increase in their average deposit rate would place a large number of S&Ls on shaky financial grounds. If these deposit rate controls are to be successfully phased out, something must be done to substantially change their structure (that is, for example, the introduction and widespread use of variable rate mortgage instruments).

Part II shows that economies of size do exist in the savings and loan industry. Based on samples of associations in the Chicago, Philadelphia, New York City, and Los Angeles-Long Beach areas, the results indicated the presence of economies of size. Furthermore, due to the use of a cubic total cost function, these economies tend to be more uniform than what has been suggested by previous studies.

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