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GAO

Briefing Report to the
Honorable William Proxmire

June 1986

COMMERCIAL BANKING

The Relationship Between Profitability and Capital Ratios

GAO/GGD-86-88BR

GAO

United States
General Accounting Office
Washington, D.C. 20548

General Government Division

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June 9, 1986

The Honorable William Proxmire
Ranking Minority Member
Committee on Banking, Housing
and Urban Affairs
United States Senate

Dear Mr. Proxmire:

On November 14, 1985, your office requested information on the relationship between capital and profitability for commercial banks. Specifically, your staff requested that we replicate for the commercial banking industry a table relating rates of return on assets to capital ratios that was prepared for a GAO report on the thrift industry.[1] Subsequently, we presented to your staff our preliminary work which found a generally positive relationship in 1984, the latest year for which a full year's data are available (see table I.1 and figure I.1). At that time, your office requested a small expansion of the work to include examining whether the relationship we observed between capital and profitability continued to hold when two other factors, bank size and the stage of the business cycle, were considered.

Objectives, Scope, and Methodology

It is the purpose of this briefing report to provide information on the relationship for all U.S. commercial banks between bank capital held at the end of the year and profits earned during the year.

We first measured the relationship for all commercial banks between bank profits during 1984 and bank capital at the end of the year. However, bank profits can vary widely over time with interest rates and the business cycle, so that we might find that the observed positive relationship holds at one phase of the cycle but not at others. For

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[1]See Thrift Industry Problems: Potential Demands on the FSLIC Insurance Fund, Table 7 (GAO/GGD-86-48BR, Feb. 1986).

example, in 1982, interest rates were high by historical standards and the economy was experiencing a recession. In 1984, interest rates had fallen and the economy had recovered from the recession. We present the data for 1984 first in our discussions in appendix I and then present data for 1982 to check the relationship in differing economic environments.

Small banks operate in a very different market environment from large banks. For example, the degree of competition they face and the health of their local economies may differ from those of large banks which are more diversified in their operations. Consequently, in appendix I we check the sensitivity of the relationship between capital and profits to variations in bank size by dividing our observations into five separate groups of different-sized banks. The size categories we adopt are comparable to the various industry asset classifications used by the regulators. Then, we examine the relationship between bank capital and profits within each size category. This procedure "explores" the effects of bank size on the relationship between capital and profits. The relationship among bank capital, size, and profitability is depicted in tables I.4 and 1.5 and illustrated in figures I.7 and I.8.

Our data are drawn from the Reports of Income and Condition that each federally insured commercial bank must make at the end of each calendar quarter to the Federal Deposit Insurance Corporation (FDIC). We measure the rate of return on assets (ROA) as the ratio of net income after taxes earned during each year (1982 and 1984) to the total value of assets held at the end of each year. The capital ratio is measured as the ratio to total assets of the bank's total equity capital plus its reserve for possible loan losses and its subordinated debt. This measure is referred to as "total capital" in the industry. Where we present averages, the data have been weighted, as is common practice, by the value of bank assets measured as a proportion of total industry assets.

A word of caution needs to be given against reading more into some of the relationships discussed in appendix I than is warranted. There are over 14,000 banks in the United States. However, the numbers of firms in some of our asset size subcategories are small. Averages taken for small subsets can be misleading as they may be influenced by the behavior of one or two firms. To help the reader judge when small subset size presents a problem, the numbers of observations in each subcategory are listed in the tables.

In our analysis, small subsets present a problem at high or exceptionally low levels of capital for the largest two size categories of banks. Averages in those subcategories can be misleading because of weakness of one or two of the nation's largest banks. Moreover, the atypical problems of very large firms may carry over into industry averages because very large firms can dominate asset-weighted average industry figures. This problem is discussed further below in context.

Results

Table I.1 presents a breakdown of the return on assets (ROA) for all commercial banks by bank capital-to-asset ratios for 1984 and 1982. This information is also presented in figure I.1. As can be seen in table I.1 and figure I.1, in 1984 the average return on assets for commercial banks generally increases as the capital-to-asset ratio increases to 11 percent and declines somewhat for the remaining two highest capital ratios. In 1982, the pattern is similar except that the highest average profit ratio occurs at a higher percentage capital level (11 to 12 percent). Thus, the positive relationship between bank capital and profitability does not appear to be affected by the stage of the business cycle.

Next, we examine the relationship between bank profits and capital for different size categories of banks. The results of this analysis are presented for 1984 and 1982 in tables I.2 and I.3 respectively. Figures I.2 through I.6 show the relationship in the two years for banks of different sizes. For the first and third size categories of banks, we observe that profitability rises with bank capital, except at the very highest capital ratios. Profitability rises with each level of capital in both years in the size category $25 million to $100 million. That is, the results are very similar to those observed for the industry as a whole.

However, the results are different, and much less easy to characterize, for the two largest size categories of banks, except that the relationship is also positive for the largest banks in 1982. As tables I.2 and I.3 indicate, there are substantially fewer banks in the two largest size categories than in the other size categories. Therefore, relationships depicted in figures I.5 and I.6, for the very large banks are less reliable than those in figures I.2 through I.4 for the smaller banks. We believe, therefore, that the 1982 picture is the more valid one, because average data for the largest size category of banks are likely to have been affected by large losses incurred by one of the nation's largest banks in 1984. We consider, therefore, that the relationships shown in figures I.5 and I.6 are influenced by special factors and do not invalidate the overall impression of a positive relationship between profits and capital.

It is possible that some other factors are driving the observed relationship between capital and profits. That would imply that the observed relationship between bank capital and profitability ratios is coincidental. That is, the observed positive relationship between bank capital and profitability ratios may reflect the fact that a third factor separately explains both the bank capital and profitability ratios.

One such plausible third factor is bank size. Table I.4 and figure I.7 show the relationships in both 1984 and 1982 between return on assets (ROA) and bank size, where size is measured in terms of total assets for commercial banks. In 1984, there is an inverted U-shaped relationship between ROA and total assets. That is, ROA rises for the three smallest size categories but falls for the remaining two larger groups. For 1982, ROA decreases as size increases for institutions with total assets of at least $25 million. The general impression in figure I.7 is of an inverse relationship between bank size and return on assets.

Table I.5 and figure I.8 show the average-for-the-industry relationship between bank capital ratios and bank size. In general, the average size of the bank is larger in the lower capital categories. In 1982, average bank size falls without interruption as the capital ratio rises. The results are similar in 1984 except that there is a deviation from the downward trend in average bank size in the 0 to 5 percent capital category. In short, the relationship is generally negative in both years. Thus, the data indicate that as bank size increases, our measures of capital and profitability fall. In light of this, one might infer that the observed relationship between bank capital and profitability ratios is a reflection of separate casual relationships between size and the bank capital ratios and between size and profitability. In other words, if capital and profitability are both causally affected similarly (that is, negatively) by bank size, they will be positively related to each other.

Two other possibilities for the observed relationship between capital and profitability suggest themselves. First, it is logical to expect that higher profit levels would cause capital to increase simply because capital represents the accumulation of past profits. Second, higher bank capital may encourage profitability in which case the line of causation would run in the other direction. This is because capital is a factor of production that contributes to bank output and demands a payment (profits) in return. The financial resources that a bank uses in its business can be divided into debt (which includes deposits) and equity (or capital). Payments to debt-holders are covered as part of the costs of conducting bank business, while equity-holders earn profits. While profits vary over time with the business cycle, they need to be available over the long term in sufficient quantities to retain capital within the industry--otherwise capital will relocate to another industry.

The above discussion outlined three plausible explanations for the observed relationship between bank capital and profitability. However, our data and analysis do not enable us to refute or accept their validity.

Copies of the information contained in this report were provided to the Federal Reserve, the Federal Deposit Insurance Corporation (FDIC) and the Office of the Comptroller of the Currency (OCC) for their review and comments. The FDIC did not comment on our draft report as we had earlier sought the staff's advice on the study. The Federal Reserve made an informal, technical comment about our definition of capital, but acknowledged that a changed definition would not affect our results. The OCC agreed that our numbers correctly reflect the distribution of capital and ROA in the industry and it endorses our caveats about reading more than is warranted into our results. Both the Federal Reserve and OCC pointed out that ROA is but one of several possible measures of profitability and that the scope of our report is narrow. In response, we expanded our discussion to explain its acknowledged narrow scope.

As arranged with your office, copies of this report are being distributed to the various bank and thrift regulators and other parties who have expressed an interest in it.

I trust that this briefing report is responsive to your request. If you have any questions, please call me at (202) 275-8678.

Sincerely yours,

Craig A. Simmons
Senior Associate Director

APPENDIX I

Table I.1

The Relationship Between Profitability and Capital for All Commercial Banks[a]

Capital as a percent of assets[b]	1984 Total number of institutions	1984 Return on assets (%)	1982 Total number of institutions	1982 Return on assets (%)
0 to 5%	101	-1.3238	106	0.39335
5 to 6%	293	0.5151	279	0.53029
6 to 7%	1495	0.5866	1147	0.62569
7 to 8%	2942	0.5276	2745	0.75645
8 to 9%	3012	0.7166	3386	0.90360
9 to 10%	2220	1.0048	2433	1.15369
10 to 11%	1424	1.2028	1558	1.17076
11 to 12%	908	1.1118	926	1.32102
over 12%	2086	1.0671	1884	1.01542
All Banks	14481	0.626250	14464	0.676678

Notes: [a]The table is calculated using income and balance sheet figures from the Federal Deposit Insurance Corporation Reports of Income and Condition for December 1982 and 1984.

[b]Capital is defined as total equity plus the bank's reserve for possible loan losses plus subordinated debt.

Table I.2

Average Percentage Return on Assets for Commercial Banks in 1984 Stratified by Capital and Total Assets[a]

Capital as a percent of assets[b]	Total Assets ($000,000)											
	TA < 25[c]		TA ≥ 25 TA < 100		TA ≥ 100 TA < 1000		TA ≥ 1000 TA < 10000		TA > 10000		Total	
0 to 5%	-3.1849	(39)[d]	-1.9807	(46)	-1.2251	(14)	-0.8468	(2)	N/A	(0)	-1.3238	(101)
5 to 6%	-1.1808	(54)	-0.0752	(124)	0.6153	(75)	0.7168	(33)	0.4590	(7)	0.5151	(293)
6 to 7%	-0.0804	(270)	0.5016	(638)	0.7373	(462)	0.7108	(112)	0.4508	(13)	0.5866	(1495)
7 to 8%	0.3583	(727)	0.6977	(1458)	0.8390	(681)	0.7804	(73)	-1.0805	(3)	0.5276	(2942)
8 to 9%	0.4997	(987)	0.8219	(1552)	0.9095	(454)	0.2880	(19)	N/A	(0)	0.7166	(3012)
9 to 10%	0.6737	(839)	0.9779	(1126)	1.0859	(248)	1.1470	(7)	N/A	(0)	1.0048	(2220)
10 to 11%	0.7804	(662)	1.1230	(647)	1.2282	(112)	1.8523	(3)	N/A	(0)	1.2028	(1424)
11 to 12%	0.9676	(485)	1.2176	(377)	1.1511	(42)	1.1199	(3)	1.0106	(1)	1.1118	(908)
over 12%	0.6201	(1478)	1.4040	(533)	1.0254	(73)	1.1975	(2)	N/A	(0)	1.0671	(2086)
Total	0.5322	(5541)	0.8391	(6501)	0.8546	(2161)	0.7145	(254)	0.3452	(24)	0.6263	(14481)

Notes: [a]The table is calculated using income and balance sheet figures from the Federal Deposit Insurance Corporation, Report of Income and Condition for December 1984.

[b]Capital is defined as total equity capital plus the bank's reserve for possible loan losses plus subordinated debt.

[c]TA: total assets.

[d]The numbers in parentheses give the total number of banks over which the average return is computed.

APPENDIX I

Table I.3

Average Percentage Return on Assets for Commercial Banks in 1982 Stratified by Capital and Total Assets[a]

Capital as a percent of assets[b]	Total Assets ($000,000)											
	TA < 25[c]		TA ≥ 25 TA < 100		TA ≥ 100 TA < 1000		TA ≥ 1000 TA < 10000		TA ≥ 10000		Total	
0 to 5%	-3.8210	(34)[d]	-1.5564	(38)	-0.7173	(20)	0.5683	(5)	0.4220	(9)	0.39335	(106)
5 to 6%	-0.9973	(44)	0.0628	(99)	0.2740	(84)	0.5813	(42)	0.5339	(10)	0.53029	(279)
6 to 7%	0.1322	(275)	0.5679	(475)	0.6198	(311)	0.6215	(83)	0.7726	(3)	0.62569	(1147)
7 to 8%	0.6719	(805)	0.8290	(1331)	0.7710	(562)	0.6913	(47)	N/A	(0)	0.75645	(2745)
8 to 9%	0.9387	(1266)	1.0236	(1659)	0.9224	(441)	0.6104	(20)	N/A	(0)	0.90360	(3386)
9 to 10%	1.0641	(1113)	1.2037	(1100)	1.1238	(215)	1.1572	(5)	N/A	(0)	1.15369	(2433)
10 to 11%	1.1654	(783)	1.2766	(677)	1.0761	(96)	0.9833	(2)	N/A	(0)	1.17076	(1558)
11 to 12%	1.2544	(542)	1.3292	(335)	1.2151	(46)	1.6163	(3)	N/A	(0)	1.32102	(926)
over 12%	1.0398	(1400)	1.5924	(427)	1.1073	(54)	-0.2539	(3)	N/A	(0)	1.01542	(1884)
Total	0.9157	(6262)	1.0186	(6141)	0.7951	(1829)	0.6266	(210)	0.4981	(22)	0.67668	(14464)

Notes: [a]The table is calculated using income and balance sheet figures from the Federal Deposit Insurance Corporation, Report of Income and Condition for December 1982.

[b]Capital is defined as total equity capital plus the bank's reserve for possible loan losses plus subordinated debt.

[c]TA: total assets.

[d]The numbers in parentheses give the total number of banks over which the average return is computed.

APPENDIX I

Table I.4

The Relationship Between Profitability and Total Assets for Commercial Banks of Different Sizes[a]

Total assets ($000,000)	1984 Total number of institutions	1984 Return on assets percent	1982 Total Number of institutions	1982 Return on assets percent
TA < 25[b]	5541	0.5322	6262	0.9157
25 ≤ TA < 100	6501	0.8391	6141	1.0186
100 ≤ TA < 1000	2161	0.8546	1829	0.7951
1000 ≤ TA < 10000	254	0.7145	210	0.6266
10000 ≤ TA	24	0.3452	22	0.4981
Total	14481	0.6263	14464	0.6767

Notes: [a]The table is generated using income and balance sheet figures from the Federal Deposit Insurance Corporation Reports of Income and Condition for December 1982 and 1984.

[b]TA: Total Assets.

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Table I.5

The Relationship Between the Capital-to-Assets Ratio and the Average Value of Total Assets for Commercial Banks

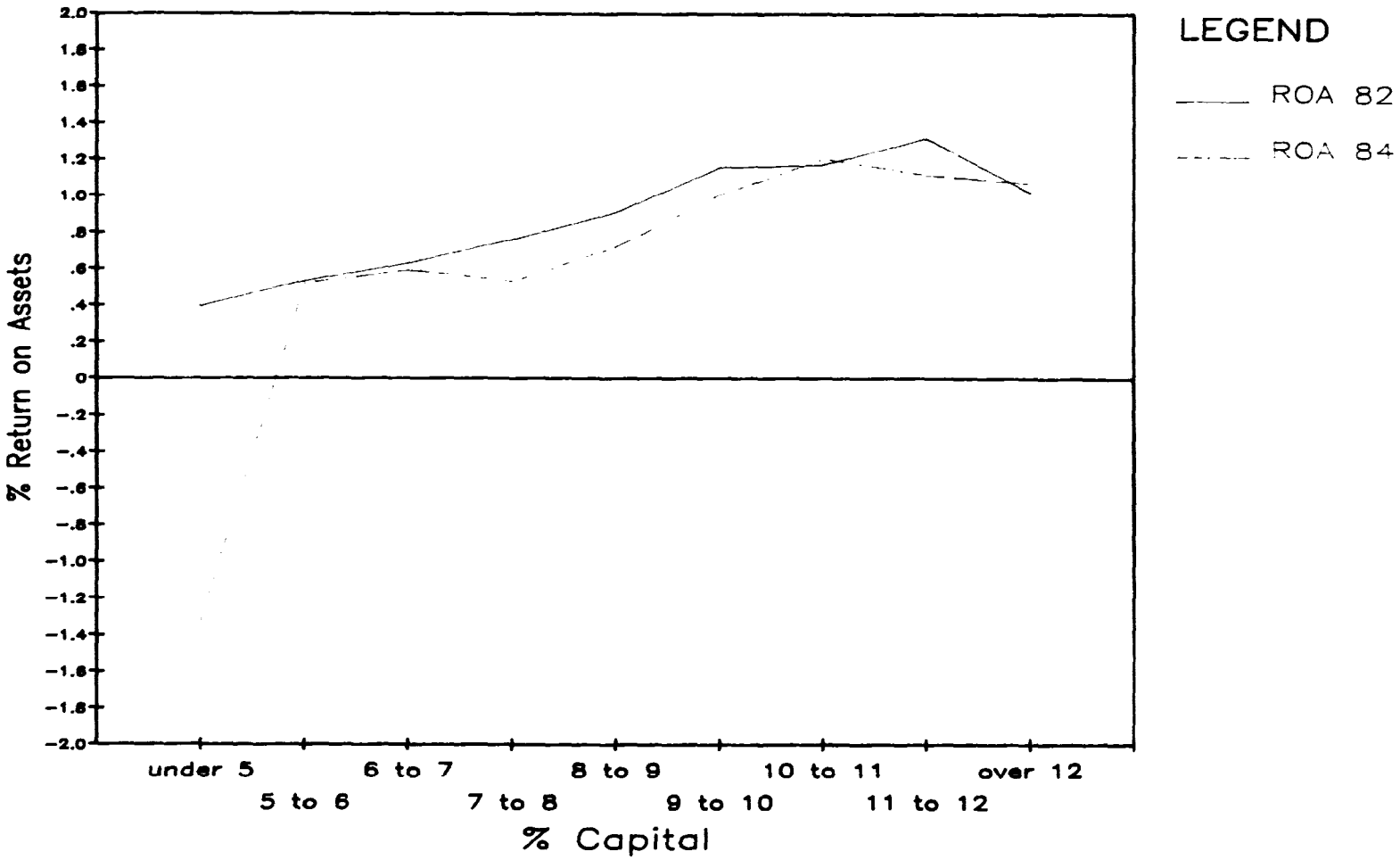
Capital as a percent of Assets	1984		1982	
	Total number of institutions	Average total assets per institutions ($000,000)	Total number of institutions	Average total assets per institution ($000,000)
0 to 5%	101	106.5	106	3,335.0
5 to 6%	293	1,782.1	279	2,268.4
6 to 7%	1495	618.6	1147	328.0
7 to 8%	2942	167.2	2745	115.2
8 to 9%	3012	81.8	3386	69.7
9 to 10%	2220	57.9	2433	48.3
10 to 11%	1424	51.0	1558	44.6
11 to 12%	908	56.5	926	40.2
over 12%	2086	28.8	1884	29.5

Notes: [a]The table is generated using income and balance sheet figures from the Federal Deposit Insurance Corporation Reports of Income and Condition for December 1982 and 1984.

[b]Capital is defined as total equity capital plus the bank's reserve for possible loan losses plus subordinated debt.

APPENDIX I

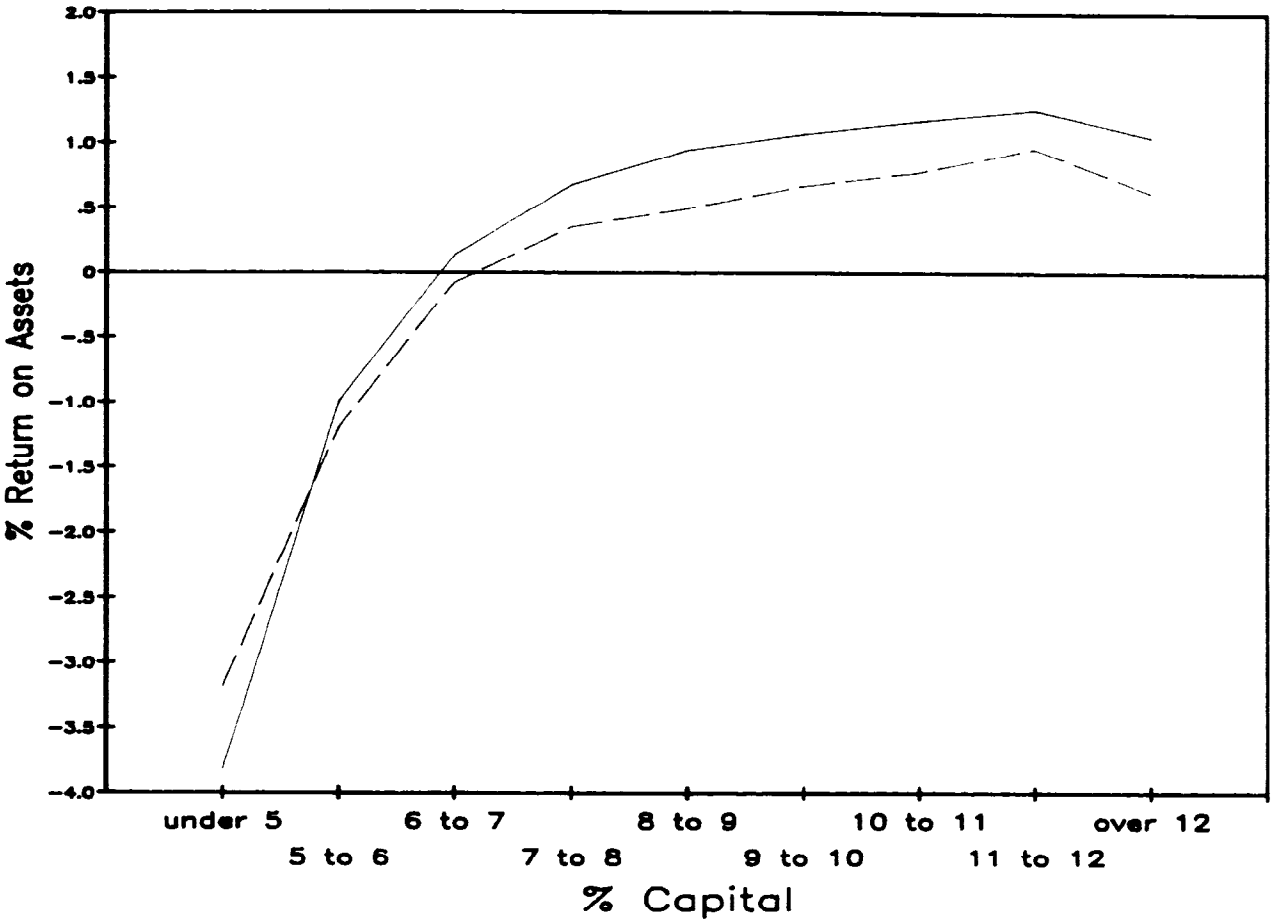
Figure I.1
The Relationship Between Return on Assets and the Capital—to—Assets Ratio for all Commercial Banks



Source: Table I.1

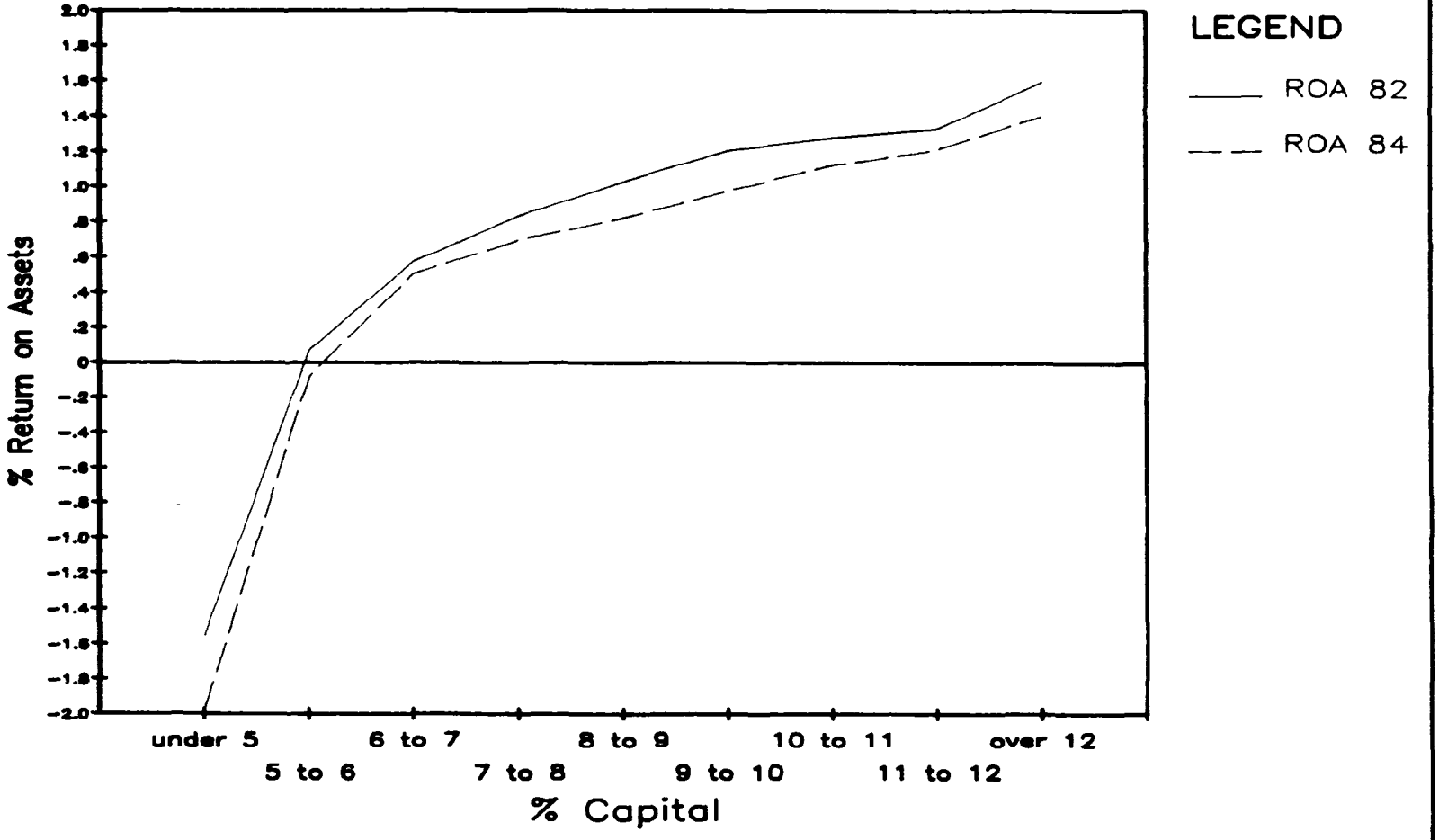
APPENDIX I

Figure I.2
The Relationship Between Return on Assets and the Capital—to—Assets Ratio for Commercial Banks with Less Than $25 Million in Total Assets



Source: Table I.2 and Table I.3

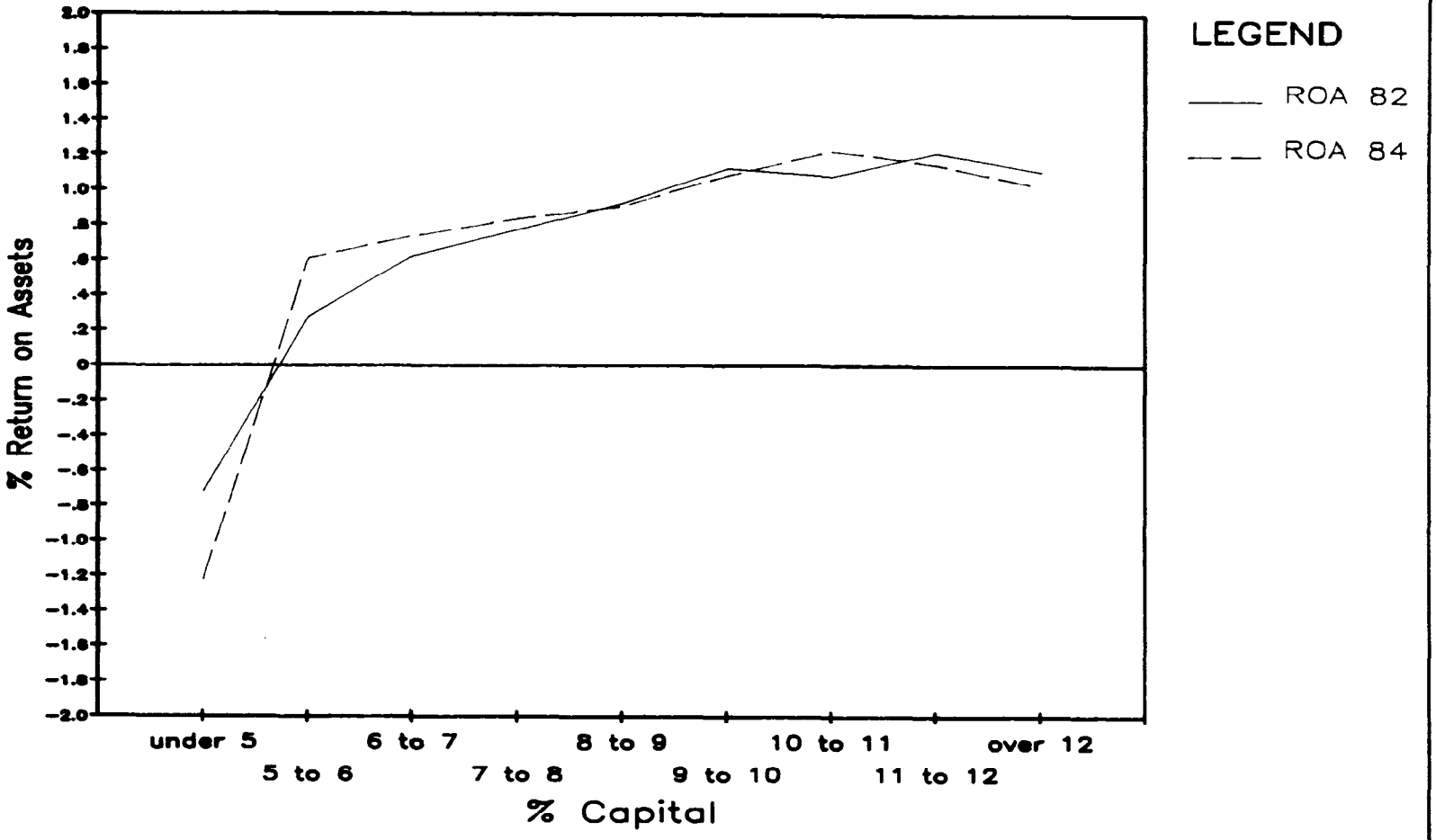
Figure I.3
The Relationship Between Return on Assets and the Capital–to–Assets Ratio for Commercial Banks with $25 Million ≤ Total Assets < $100 Million



Source: Table I.2 and Table I.3

APPENDIX I

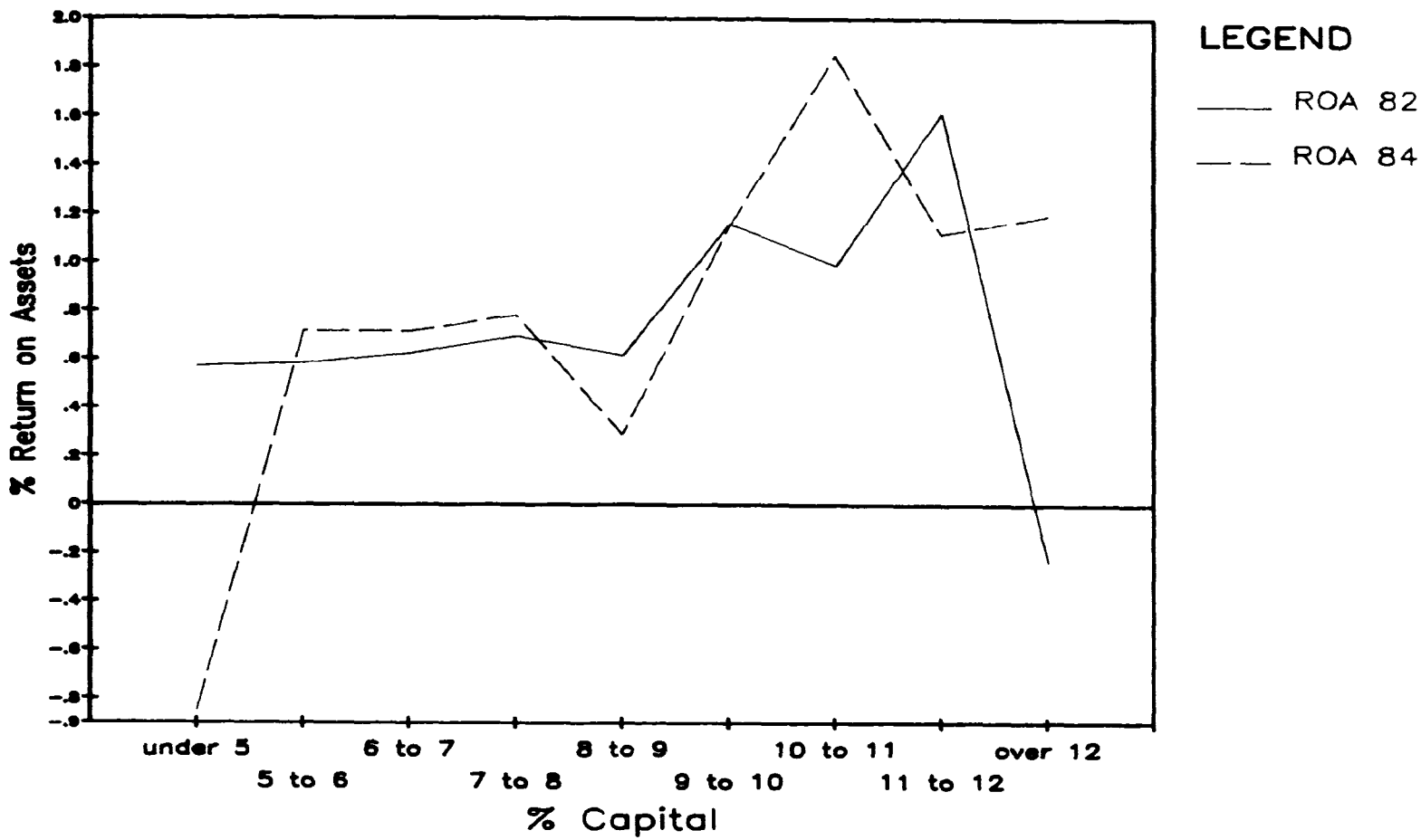
Figure 1.4
The Relationship Between Return on Assets and the Capital—to—Assets Ratio for Commercial Banks with $100 Million ≤ Total Assets < $1 Billion



Source: Table 1.2 and Table 1.3

APPENDIX I

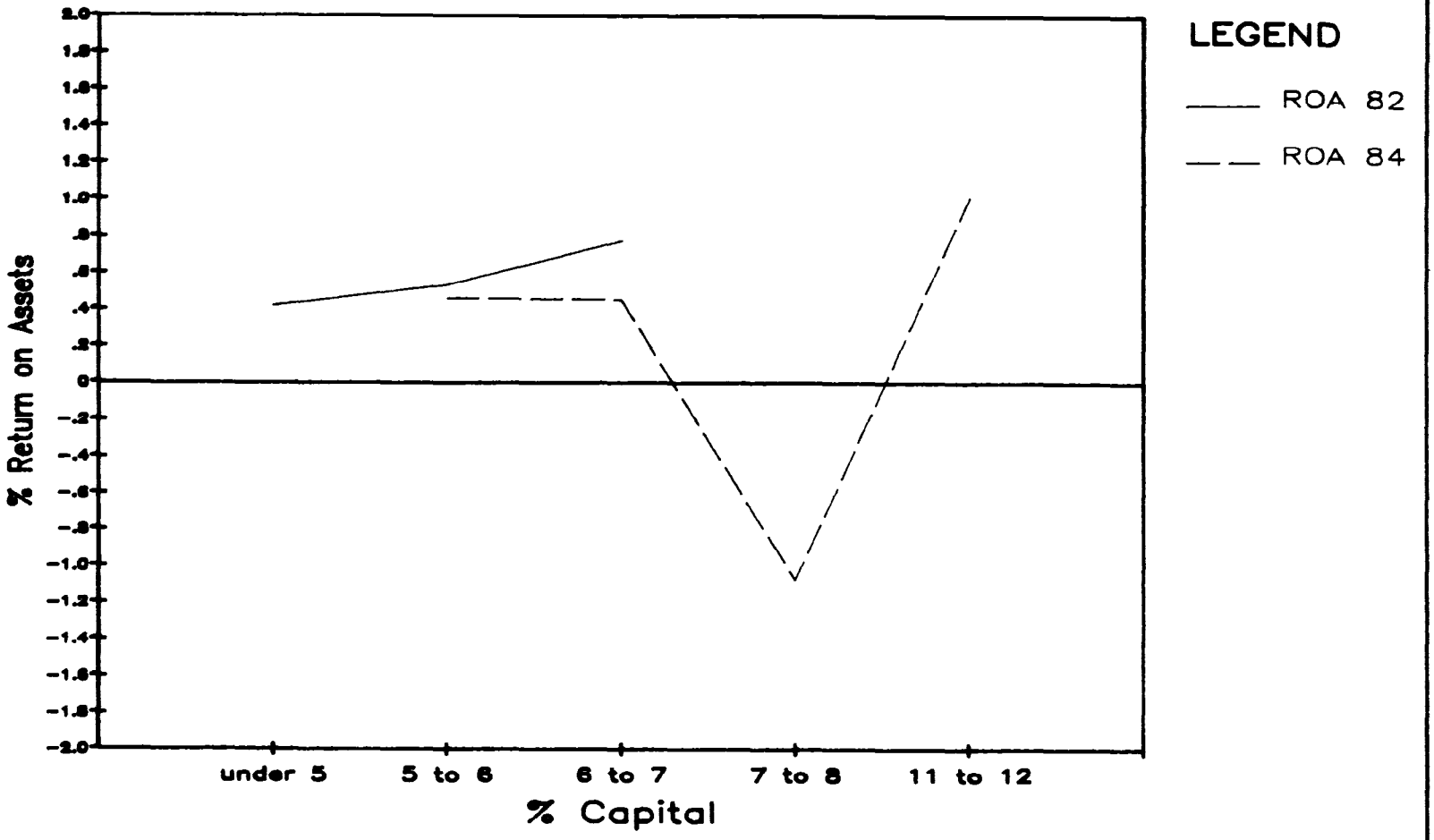
Figure I.5
The Relationship Between Return on Assets and the Capital—to—Assets Ratio for Commercial Banks with $1 Billion ≤ Total Assets < $10 Billion



Source: Table I.2 and Table I.3

APPENDIX I

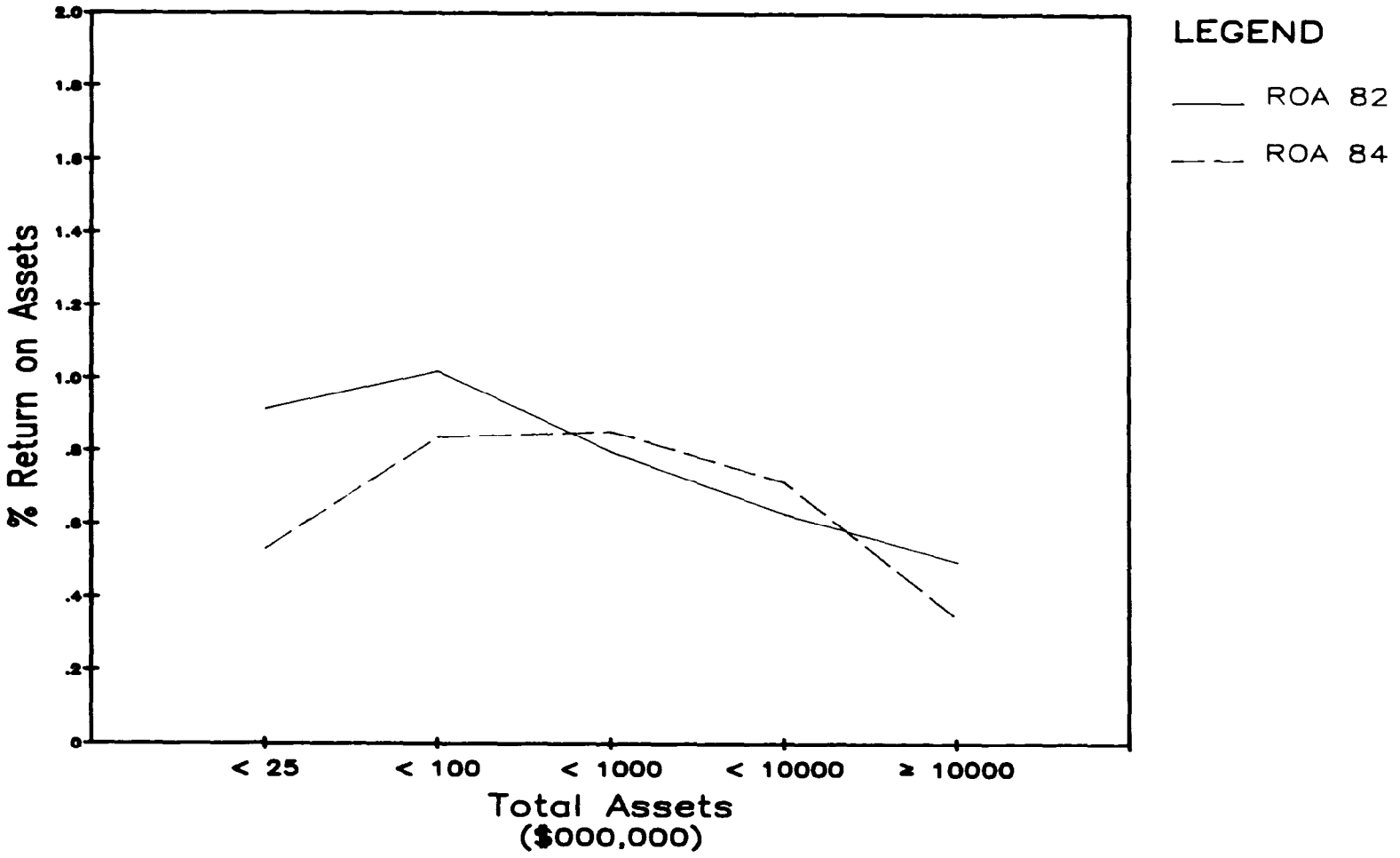
Figure I.6
The Relationship Between Return on Assets and the Capital—to—Assets Ratio for Commercial Banks with at Least $10 Billion in Total Assets



Source: Table I.2 and Table I.3

APPENDIX I

Figure 1.7
The Relationship Between Return on Assets and Total Assets for Commercial Banks



Source: Table 1.4

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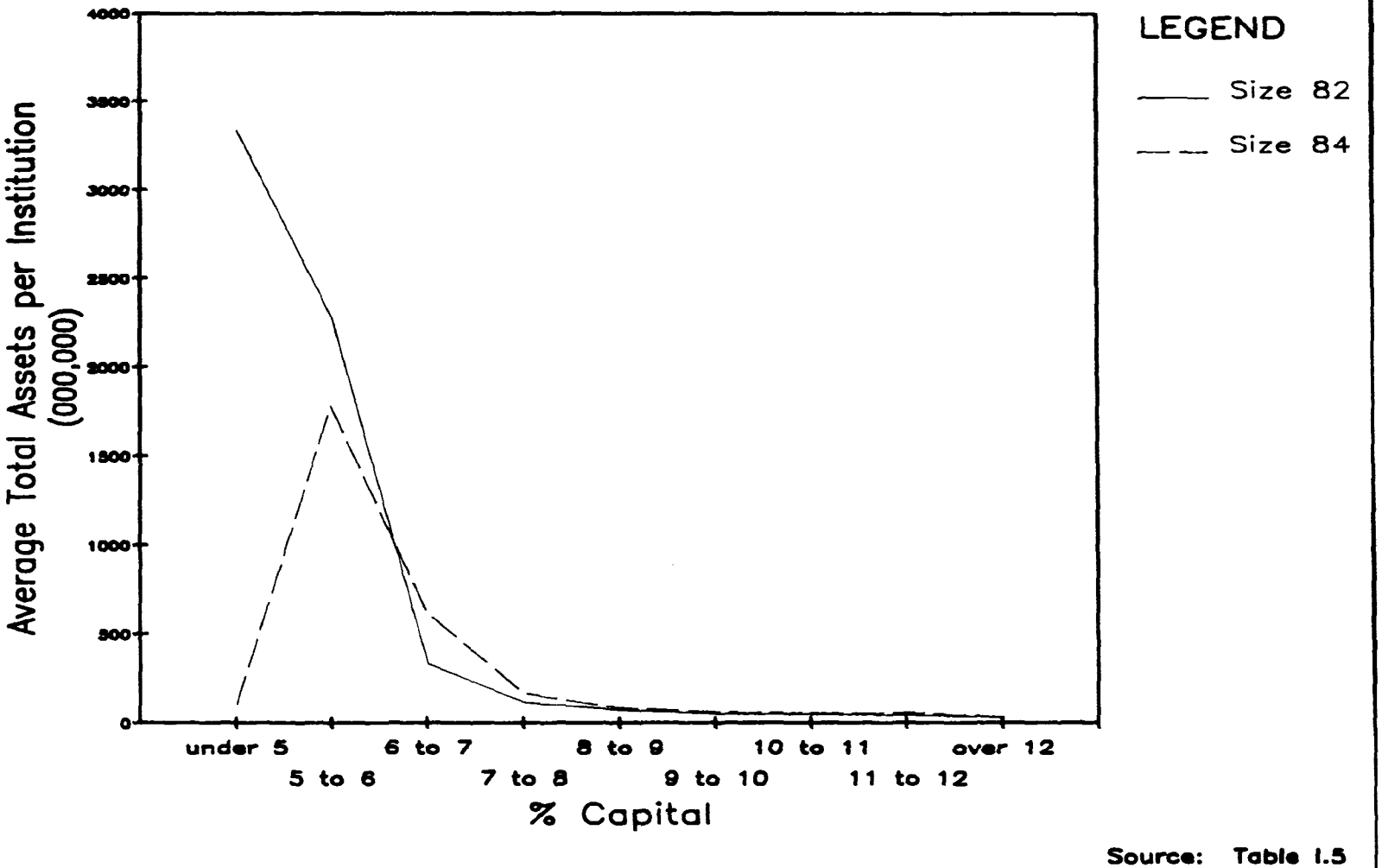
Figure 1.8
The Relationship Between the Capital—to—Assets Ratio and Total Assets for all Commercial Banks



Source: Table 1.5

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