PREFACE

The greater part of mankind may be divided into two classes; that of shallow thinkers, who fail short of the truth; and that of abstract thinkers, who go beyond it. The latter class are by far the most rare: and I may add, by far the most useful and valuable. They suggest hints, at least, and start difficulties, which they want, perhaps, skill to pursue; but which may produce fine discoveries, when handled by men who have a mere past way of thinking. At worst, what they say is uncommon; and if it should cost some pains to comprehend it, one has, however, the pleasure of hearing something new. An author is little to be valued, who tells us nothing but what we can learn from every coffee-house conversation.


The men and women who have written this book are "abstract thinkers." We are honored that the authors considered Global Risk Based Capital Regulations an appropriate forum for their ideas. It is a privilege to have had this opportunity to edit and compile the work of such an outstanding group of financial economists, bankers, and lawyers.

The depth and scope of the knowledge of the authors who have written Global Risk Based Capital Regulations is an important element of the human capital which finances our public and private enterprises. This human capital protects our institutions and our freedoms from the vagaries of short-sighted reactionary forces, and this human capital allows artists, bankers, entrepreneurs, and politicians to venture beyond the trite fictions of current events and plan greater strategies. We thank each author for his or her encouragement and enthusiasm. We thank the editors of the journals and books who permitted us to reprint previously published articles. We appreciate their generosity and commitment to the dissemination of important ideas.
CHAPTER 14

RISK BASED CAPITAL: INFORMATIONAL AND POLITICAL ISSUES

James R. Barth
R. Dan Brumbaugh, Jr.

In recent years we have witnessed more turmoil among our nation's depository institutions than at any time since the Great Depression. Not only did more than 4,300 federally insured institutions fail from 1989 through 1991, but the failures imposed unprecedented losses upon the federal deposit insurance agencies. The insurance fund for savings and loans went bankrupt in 1989 and required the injection of taxpayer funds to resolve still-open but insolvent institutions. Two years later, the insurance fund for commercial and savings banks reported insolvency, and Congress lent the insurance fund up to $70 billion from the U.S. Treasury Department to resolve several hundred expected bank failures. Over this same time period, nearly 2,000 credit unions failed; but the federal insurer for these institutions resolved the failures with ample resources remaining to cover any likely future problems.

This turmoil produced justifiable nervousness and even anger among taxpayers. When first established in the 1930s, the federal deposit insurance system was intended to accomplish three goals: (1) protect small depositors; (2) prevent widespread runs on depository institutions; and (3) protect taxpayers. The first two goals have clearly been accomplished, but not the third. Therein lies the problem. To better protect taxpayers, bank regulatory agencies in the United States and 11 other countries adopted risk based capital requirements in 1989 (referred to as...
Chapter 14 Risk Based Capital Regulations

The purpose of this chapter is to assess the merits of the risk-based capital system and the adequacy of its measurement tools. The chapter examines how the risk-based capital system works, the factors that influence capital requirements, and the implications for bank regulation and supervision. The chapter concludes with a discussion of the potential benefits and drawbacks of the risk-based capital system and suggestions for improving it.

The risk-based capital system was developed in response to the failure of several large commercial banks in the late 1980s and early 1990s. The failure of these banks was attributed to inadequate capital levels and an insufficient risk management framework. The risk-based capital system was designed to address these weaknesses by requiring banks to hold capital in proportion to their risk exposure.

The risk-based capital system has been widely adopted by banks around the world. It has been effective in improving the financial soundness of banks and reducing the risk of bank failure. However, the system has also been criticized for being complex and difficult to implement. It has also been criticized for being too lenient in some cases and too stringent in others.

In conclusion, the risk-based capital system has been a significant improvement over the previous regulatory framework. It has helped banks to improve their financial stability and has contributed to the overall stability of the banking system. However, further refinements are needed to ensure that the system remains effective in the face of new challenges.

References


Appendix

- Tables and charts showing the implementation and impact of Basel II capital standards.
- A case study of a bank that has successfully implemented Basel II.
- A discussion of the challenges faced by banks in implementing Basel II.

Further Reading

back runs or, if not, could nonetheless swamp the federal insurance fund, and thus impose costs upon taxpayers. The most important factor underlying these concerns was the adequacy of the savings and loans' net worth, because that determines whether or not an institution is solvent.

Although net worth equals assets minus liabilities, there are a number of ways in which these balance sheet items can be measured. During the period in question, net worth was measured mostly by regulatory accounting practices (RAP) and generally accepted accounting principles (GAAP). Both RAP and GAAP are based on the book values of assets and liabilities, and thus may produce figures significantly different from the market values of an institution. A critical issue, therefore, concerns the accuracy of book-value measurement of net worth and, more specifically, the relationship between a market-value and a book-value measure of net worth.

A related issue is the problem of moral hazard created by the existence of deposit insurance. As Benston (1984), Flannery (1982), Karenen (1981, 1983a, 1983b), and Kane (1985) explain, in the absence of loan premiums, banks would otherwise be the case. A regulatory response to this particular problem, as already noted, has been in part to switch to variable-rate insurance premiums and variable net worth requirements, with the degree of variability reflecting the riskiness of an institution's activities. Risk-sensitive premiums or net worth requirements depend on a measure of net worth, however, which means that their development is intricately intertwined with the issue of net worth measurement.

To obtain information about these and other related issues, we will examine the determinants of the costs incurred by the FSLIC to resolve savings and loan failures. 6 Although there have been numerous studies attempting to predict commercial bank failures and a few attempting to predict savings and loan failures, only a meager amount of work has been done to evaluate the cost to the federal insurance funds when institutions fail. 7 The importance of evaluating failure costs is that, as Morton (1977) and Hovitz (1983a) have pointed out, the risk to the insurer follows both the risk of insolvency and the magnitude of losses when insolvency occurs. This chapter differs from earlier studies in a number of important ways. We develop a model that describes the relationship between market-value and book-value measures of net worth. This is important because the FSLIC's costs to resolve failures reflect the negative market-value net worth of failed institutions. The use of these cost figures is essential for designing appropriate risk-adjusted premiums or risk-adjusted net worth requirements. 8 In our empirical analysis, we specifically focus on the determinants of the costs of failure in order to assess the riskiness to the federal insurer of various activities that have recently come under increased regulatory control and to examine the importance of timelines in resolving or closing insolvent institutions. At the same time, we examine the relationship between alternative book-value measures of net worth and the costs of failure. 9

DESCRIPTION OF SAVINGS AND LOAN FAILURES AND RESOLUTION COSTS

Unlike most industries, in the banking and savings and loan industries a regulator decides when an institution has failed. As a result, insolvent institutions are not necessarily closed in a timely and cost-effective manner, before substantial negative net worth has developed. When savings and loan institutions did fail in the first half of the 1980s, however, the FSLIC resolved the failures by liquidation, by merger, or by providing financial assistance that allowed an institution to continue operating. In 1985, a new tool for dealing with troubled institutions was introduced, called the Management Consent Program (MCP). This program, evaluated by Eisenshus, Brunbaugh, and Rogers (1988), involved the hiring of outside management to manage the troubled institution in the hope that a merger—rather than a more costly liquidation—could ultimately be effected.

Exhibit 1 presents information for the 1980-90 period on the number of savings and loan failures, classified by type and by whether or not the failure resulted in costs for the FSLIC. Until recently, the number of liquidations has been relatively small. Only 27 of the 581 institutions that failed from 1980 through 1985 were liquidated. Since 1934, when the FSLIC was established, only 40 of the 578 failures requiring FSLIC assistance were resolved through liquidation. In contrast, from 1934 through 1985, there were 336 mergers, MCPs, and other actions requiring financial assistance by the FSLIC. Including the 25 MCP cases, 221 of these cases occurred during the 1980-85 period. Exhibit 1 also indicates that there were 333 supervisory mergers during this six-year period. The unique aspect of these particular failures is that they impose no costs other than administrative expenses upon the FSLIC.
It is worthwhile to take a brief look at how a savings and loan came to be resolved through a supervisory merger, rather than FSLIC assistance. A candidate for a supervisory merger was an institution that was considered by the Federal Home Loan Bank Board (FHLBB) to have less than 24 months until its RAP net worth was depleted. Although the FHLBB could not force all supervisory candidates to merge, there were a number of incentives for them to do so. First, in the case of supervisory merger, current management was allowed to remain. Second, the institution was not required to publish notice of the merger, as was required in the case of a voluntary merger. This eliminated the need for a public comment period and public hearings, avoiding delay that would otherwise occur in the merger process. Third, antitrust constraints were often waived. All these provisions were made because a supervisory merger involved an institution that was considered to be a failing firm. Of course, some troubled institutions resisted a supervisory merger. In such cases, the FHLBB removed the current management and appointed a conservator. This conservator then favored a supervisory merger, if any one or more of the following conditions existed: (1) the institution had regulatory net worth of less than zero; (2) the institution was in an unsafe and unsound condition; (3) substantial dissipation of assets was occurring; or (4) a cease and desist order had been violated.

If the FHLBB could not find a merger partner to acquire a troubled savings and loan at no cost, the institution became an FSLIC-assistance case. The FSLIC then proceeded to estimate the cost of liquidating the institution, and bids were accepted from potential acquirers to determine whether a less costly merger could be arranged. The Garn-St Germain Act required that bidders from the same state as the institution being acquired be given preference over out-of-state bidders, and that bidders that were of the same type of financial intermediary as the failed institution be given preference over different types of intermediaries. By law, the FSLIC was required to liquidate an institution if liquidation was less expensive than a merger.

Exhibit 2 presents the costs incurred by the FSLIC for failed savings and loan institutions during the 1980–90 period. This exhibit presents the costs corresponding to failures involving FSLIC assistance reported in Exhibit 1. Notice that the annual resolution cost levels jumped significantly in 1988, and then dropped just as precipitously in 1989. These abrupt changes reflect the fact that in 1988, once its funds for the year were depleted, the FSLIC continued to resolve insolvent institutions,
null
and was liquidated, thereby not paying off the promissory notes from the FSLIC, the insurance fund incurred a loss for the full value of the certificates. Goodwill is recorded when one institution acquires another. It is the difference between the liquidation value of the acquired institution if its assets and liabilities were to be sold separately on the open market and the actual higher price paid for that institution by the acquirer. Goodwill may therefore be viewed as representing the “charger value” (or the value of the institution as a going concern) of the acquired institution.

RAP net worth, in addition to allowing goodwill and income-capital certificates, allowed for appraised equity capital and net worth certificates (authorized by the Garn-St Germain Act) to count as net worth, and for losses on asset sales to be deferred. Net worth certificates were similar to income-capital certificates. Appraised equity capital represented onetime accounting adjustments that were made to the value of fixed assets to allow the books to reflect the assets’ increased appraised market value. It is a biased mark-to-market method because, while markups occur, markdowns do not. Both the appraised equity capital and loss deferral provisions were phased out beginning in 1985.13

All three of these measures of net worth are based upon the value of the assets and liabilities when these balance sheet items were first entered onto the books of an institution. As seen in Exhibit 3, these book-value measures provide different indications of the financial condition of institutions. Since all the institutions represented in the exhibit failed, it is clear that the book-value measures of net worth systematically understated the cost to the FSLIC of resolving the failures. This explains why the appropriate measure of net worth would have been a market-value measure. For, as will now be discussed more fully, only through the availability of, and reliance upon, such a measure could the FSLIC have adequately contained its risk exposure.

The market-value measure of net worth equals the present value of the expected future net cash flows.15 More formally,

$$MVNW_t = \sum_{n=t}^{\infty} B^n E[P_n]$$

(14-1)

where $MVNW_t$ is market-value net worth at time $t$, $B$ is a discount factor, $E$ is the mathematical expectations operator, and $P$ is the cash flow. Letting $MVNW_t^*$ be the perfect forecast present value, we can write,

$$MVNW_t^* = MVNW_t + U_t$$

(14-2)

where $U_t = MVNW_t^* - E[MVNW_t]$ is the forecast error. This means that only without forecast errors will the observed measure of market-value net worth be exactly equal to true market value. Otherwise, these two values will differ. Assuming rational expectations, however, this difference will be “white noise,” and the observed measure of market value will be an unbiased measure of true market value.16

The relationship between a book-value measure of net worth and a market-value measure can be obtained as follows. Based on Equations 14–1 and 14–2, we can write,

$$MVNW_t = (1/B) MVNW_{t-1} - (1/B) P_{t-1} - U_t + (1/B) U_{t-1}$$

(14-3)

Book-value net worth, on the other hand, is given by

$$BVNW_t = (1/B) BVNW_{t-1} - (1/B) P_{t-1}$$

(14-4)

so long as the assets and liabilities remain on the books. Assuming that these two measures are equal at the time the assets and liabilities are
Chapter 14 Risk-Based Capital: Informational and Political Issues 379

MNVN = BVNW - U

(14-5)

where the term 1/B^2\times U is omitted because it approaches zero as one goes further back in time. This equation states that book-value and market-value measures of net worth differ only by a white noise error term—reflecting unanticipated and unrealized capital gains and losses—so long as the two measures were equal when the assets and liabilities were entered onto the books, and expectations were formed rationally and remained unchanged through time. But it is known that the two measures of net worth may not even have been equal when the assets and liabilities were entered onto the books. The reason is that, as Maisel (1979) explains, the value of such intangibles as information, customer relations, and goodwill may be considerable but not included in book-value net worth. In other words, Equation 14-5 captures, at best, the liquidation value of an institution, but not its value as a going concern. Even as a measure of liquidation value, it is still deficient, for reserves for loan losses may inaccurately reflect actual expected losses, and other reserves (such as those for contingencies and deferred taxes) may actually increase market-value net worth.

To account for these and other factors that cause market and book values to differ, Equation 14-5 may be modified as follows:

MNVW = a + b BVNW - U

(14-6)

where nonzero values of a and b indicate that book-value net worth is not an unbiased measure of true market-value net worth. This further means that actual cash flows will not simply reflect expected cash flows, due to unanticipated and unrealized capital gains and losses or forecast errors, but will also differ ex ante because accounting cash flows will not be the best linear predictor—in terms of mean square error—of future expected cash flows. Depending upon the specific accounting provisions made, clearly there may be more than one accounting-value or book-value measure of net worth. Only one can be unbiased, however, in the sense that it produces values of zero for a and unity for b. Due to charter value, one would expect a to be positive. In general, the value of b could be greater than or less than unity. For troubled institutions, however, the value of b is likely to be less than unity. The reason is that if an institution is approaching insolvency, it is subject to close regulatory scrutiny; therefore, it has an incentive to sell any assets still "above water" in order to book the gain, increase income and net worth, and reduce its exposure to supervisory pressures. On the other hand, the institution has an incentive to retain those assets that are "under water" to avoid booking losses. Thus, all institutions failing their regulatory net worth requirements are likely to have values of 5 less than unity. When expectations change, there can be an abrupt and systematic divergence between market-value and book-value measures of net worth. In regard to this type of change, it is crucial to rely on market-value rather than book-value measures of net worth. In late 1979, many argue that expectations regarding future short-term interest rates shifted upward, thereby causing future expected profits of savings and loans to decrease, since their liabilities were paying flexible short-term rates and their assets were earning fixed long-term rates. This caused market-value net worth of institutions to decline abruptly and systematically as opposed to book-value net worth. This was considered to be a permanent decline and not just a temporary decline due to an error in forecasting profits. In 1982, some believe the reverse occurred, with ex, and other reserves (such as those for contingencies and deferred taxes) may actually increase market-value net worth.

There are a number of summary comments to be made about Equations 14-1 and 14-2. First, it is clear that future expected cash flows, and not past actual cash flows, determine the current market-value net worth. This means that past cash flows may be a misleading indicator of current market-value net worth. It also means that an institution that is insolvent in market-value terms can earn accounting cash flows for a time and, thus, pay dividends, if it is a stock-type institution. Second, if there is no information about MVN\nu, then MVNW will be a constant and MVNW will vary. Information is generally available about MVNW, however, so that MVNW will, in fact, vary. This means that book-value net worth will generally be a biased measure of market-value net worth. Third, whatever affects expected future cash flows, affects current market-value net worth. For an insured depository institution, this means expectations about those factors that determine its cash flows, such
as interest rates on assets and liabilities. These, in turn, are affected by the provision of federal deposit insurance and the premium structure, asset and liability powers, net worth requirements, tax factors, and competition from within and without the Industry.\textsuperscript{18}

Finally, although market-value net worth is extremely important, a measure is seldom readily available. For stock institutions, one can argue that the price of the stock multiplied by the number of shares outstanding is such a measure. This would be the case, however, only for widely and actively traded stocks, for which one could be reasonably sure that the current price reflects expectations conditional upon all currently available information. Among commercial banks and savings and loans, this condition is not satisfied for the overwhelming majority of institutions. Furthermore, such a measure incorporates the put option value of deposit insurance. As an alternative, one could attempt to adjust book-value measures of assets and liabilities to reflect current values, but this is quite difficult since many of these balance sheet items are not actively traded in secondary markets.\textsuperscript{19}

For the purposes of this chapter, a measure of market-value net worth is available. It is the cost that was incurred by the FSLIC when a savings and loan failed and was resolved. As discussed earlier, when an institution failed, it was either liquidated or merged. Whether or not an institution was liquidated depended on the bids the FSLIC received from financially healthy institutions. If a bid for an institution resulted in costs to the FSLIC lower than the costs of liquidating that institution, the bid was accepted and a merger occurred. Otherwise, a liquidation occurred. In either case, however, the FSLIC incurred costs to bring the market value of assets up to the market value of liabilities.\textsuperscript{20} In the case of a liquidation, the market value was based upon the goodwill of the institution and the assets and liabilities, whereas in the case of a merger, the market value was based upon the assets and liabilities remaining intact. The market value for a failed institution if liquidated therefore served as an upper-limit cost to the FSLIC. To the extent that a failed institution generated additional value by remaining intact (for example, due to entry and to geographical restrictions), a merger was the likely resolution to dealing with a troubled savings and loan, and the costs to the FSLIC were accordingly lower.\textsuperscript{21} Since in the case of savings and loan failures, one is talking about zero or negative values for net worth, the failure costs reflect negative market-value net worth. Exhibit 3 shows that this measure differs systematically from accounting-value or book-value measures of net worth.

We are now in a position to examine the determinants of failure costs or negative market values. We pay special attention to the relationship between alternative book-value measures of net worth and these costs. We also pay attention to the relationship between variables that have come under greater regulatory scrutiny—due to the belief that they contribute to failures—and failure costs. Since the HLBB and the FSLIC were interested in the likelihood that an institution's market-value net worth would become negative and, if so, what resulting costs would be incurred, our empirical results provide information about these costs, as well as which book-value measure of net worth is most closely related to these costs. The next section examines these issues.

AN EMPIRICAL ANALYSIS OF FAILURE COSTS ACCORDING TO THE FEDERAL INSURER

To understand the exposure risk to the FSLIC, we examined empirically 324 savings and loans that failed during the period from December 1981 through October 1985; summary statistics are presented in Exhibit 4.\textsuperscript{22} In addition to the general data covering all failures, the data are broken down according to method used to resolve the troubled institutions. As may be seen, the average size of the failed institutions in our sample was $199.2 million and the average cost per failure to the FSLIC was $38.9 million.\textsuperscript{23} Although the average size of FSLIC-assisted liquidations was only about 69 percent of the average size of FSLIC-assisted mergers, the cost was 300 percent greater for the FSLIC. Finally, the vast majority of failures in our sample, and in general, were supervisory mergers that imposed no costs on the FSLIC. In the two earliest and most widely cited studies of savings and loan failure costs, the samples were smaller, and all supervisory mergers were excluded, thereby resulting in a biased sample of failures.\textsuperscript{24}

To explain the cost of failure for institution \textit{i}, we posit the model

\[
\text{Cost} = \alpha_0 + \alpha_1 \text{Net worth} + \alpha_2 \text{Cost of funds} + \alpha_3 \text{Credit risk} + \alpha_4 \text{Liquidity} + \alpha_5 \text{Regulatory variables} + \alpha_6 \text{Other}, + \epsilon_i
\]

(74–7)

where the right-hand-side variables reflect categories of variables that are more fully defined in Exhibit 5. Equation 14–7 is related to Equation 14–6 in that all the variables included as regressors collectively capture...
book-value net worth and change in expectations regarding the value of the assets and liabilities since they were entered onto the institution's books. The intercept term is related to the intercept term in Equation 14–6 that represents chargeable value. The disturbance term is included to capture the forecast errors.\textsuperscript{22} Of course, Equation 14–7 also reflects, as Kaufman (1985, 10) explains, the fact that the FSLIC did not necessarily engage in sufficiently "appropriate monitoring to obtain timely and current observations" on market-value net worth. In a world of complete and perfect information as well, as the technical and legal ability to take actions to deal with troubled institutions in a timely fashion. The FSLIC could have eliminated its failure costs entirely.

Short of this, there were undoubtedly actions the FSLIC could have taken to reduce these costs. This means that the parameters in Equation 14–7 are subject to variation in the monitoring rules of the insurer change—or as any regulation or policy rule changes, as Robert Lucas (1976) has forcefully pointed out. Based upon Kaufman's observation, therefore, one has to view Equation 14–7 as being true only so long as the particular monitoring regime in place during the estimation period

**EXHIBIT 4**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>All failures (N = 324)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>8.9</td>
<td>41.0</td>
<td>559.7</td>
<td>0</td>
</tr>
<tr>
<td>Total assets</td>
<td>169.2</td>
<td>360.0</td>
<td>3,997.0</td>
<td>2.3</td>
</tr>
<tr>
<td>FSLIC-assisted liquidations (N = 17)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>59.9</td>
<td>92.2</td>
<td>330.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Total assets</td>
<td>177.1</td>
<td>252.6</td>
<td>647.5</td>
<td>4.9</td>
</tr>
<tr>
<td>FSLIC-assisted mergers (N = 80)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>31.1</td>
<td>61.5</td>
<td>559.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Total assets</td>
<td>305.4</td>
<td>572.1</td>
<td>3,997.0</td>
<td>2.3</td>
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<tr>
<td>Supervisory mergers (N = 2:3)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>110.0</td>
<td>212.2</td>
<td>1,979.6</td>
<td>5.2</td>
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</table>

Source: Federal Home Loan Bank Board.

**EXHIBIT 5**
Cost-of-Failure Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Mean$^a$</th>
<th>Standard Deviation$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Cost to the FSLIC to receive or to close a troubled institution</td>
<td>8.94</td>
<td>41.03</td>
</tr>
<tr>
<td>RW</td>
<td>RW</td>
<td>-0.06</td>
<td>11.17</td>
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<tr>
<td>GVW</td>
<td>GVW</td>
<td>-5.37</td>
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<tr>
<td>TNN</td>
<td>Tangible net worth</td>
<td>-7.00</td>
<td>1.30</td>
</tr>
<tr>
<td>Cost of fees—CA</td>
<td>Cost of fees—CA</td>
<td>12.98</td>
<td>3.29</td>
</tr>
<tr>
<td>Credit risk</td>
<td>Credit risk</td>
<td>6.50</td>
<td>7.85</td>
</tr>
<tr>
<td>D</td>
<td>D</td>
<td>4.55</td>
<td>15.17</td>
</tr>
<tr>
<td>Liquidity—LA</td>
<td>Liquidity—LA</td>
<td>11.30</td>
<td>23.32</td>
</tr>
<tr>
<td>Regulatory incentives</td>
<td>Regulatory incentives</td>
<td>2.01</td>
<td>11.68</td>
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<tr>
<td>AOD</td>
<td>AOD</td>
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</tr>
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<td>BD</td>
<td>BD</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td>DI</td>
<td>DI</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td>Other</td>
<td>Other</td>
<td>0.00</td>
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<tr>
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<td>0.04</td>
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<td>LOMR</td>
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<td>0.04</td>
</tr>
<tr>
<td>TA</td>
<td>TA</td>
<td>0.00</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*Through December 1985, all FSLIC-insured institutions reported over financial condition to the FSLIC in the semiannual financial report. Beginning in March 1986, the quarterly financial report was added.

$^a$Units are in millions of dollars for all lending related variables.

**Chapter 14 Risk Based Capital: Informational and Political Issues**
remains in effect. The main qualification to this interpretation is that it assumes that the federal insurer can indeed take appropriate action, based upon improved monitoring, if an institution is market-value insolvent even though its book-value net worth is not very low. In this regard, Horvitz and Pottt (1981, 48) have stated that "in fact, the current situation in which liquidation values are well below book values has put the insurance agency in the position of being concerned with a firm's solvency when, according to FDIC-FSLIC book-value rules, insolvency cannot be declared." They add that "this may prevent the insurance agency from taking early corrective action to protect its claim even when it is in the best interests of the agency to do so."

Finally, before discussing the variables further, it is important to indicate, unlike the two previous studies of savings and loan failures, costs mentioned earlier. Equation 14-7 was estimated using a Tobit model and correcting for heteroskedasticity. The reason for using a Tobit model is that for a large percentage of our sample, the failure costs are all zero, even though in principle, these costs can be negative. Since these costs are missing due to censoring, a censored normal regression model is appropriate.26 Regarding heteroskedasticity, when Equation 14-7 was estimated using ordinary least squares, the residuals indicated the presence of heteroskedasticity. We therefore weighted all variables by the square root of total assets, which was the indicated weight based upon regressions of the residuals squared from the unweighted regressions on different transformations of total assets (Maddala, 1986, 6).

The empirical results from estimating Equation 14-7 are reported in Exhibit 6, where there are three alternative specifications corresponding to the three alternative book-value measures of net worth.27 If all three accounting measures were unbiased measures of market value, their coefficients would be identical and equal to -1, and the other coefficients would equal zero. This is not the case, however. Instead, for example, the RAP net worth has no significant effect on cost, while both GAAP and tangible net worth significantly reduce failure costs. The coefficients of GNW and TNW indicate that each additional dollar of GNW reduces cost by 32 cents, while an additional dollar of TNW reduces cost by 47 cents. Since KNW bears no relationship to failure costs, regulators can obtain more information about the insurance fund's exposure to risk by paying attention to GNW and TNW.

Beginning in April of 1986, the FHLBB and subsequently the Congress moved to eliminate the differences that had developed in the early

### Exhibit 6

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Alternative Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Net worth</td>
<td></td>
</tr>
<tr>
<td>RWN (RAI not worth)</td>
<td>-0.12</td>
</tr>
<tr>
<td>GNW (GAAP net worth)</td>
<td>-0.32</td>
</tr>
<tr>
<td>TNW (tangible net worth)</td>
<td>-0.47</td>
</tr>
</tbody>
</table>

#### Cost of Funds—CA (Cost of FHLBB Bank Advances)

|                        | (3.51)**                    | (2.06)**                    | (3.33)**                    |
| f (discounts)          | 1.06                        | 1.13                        | 0.92                        |
| D (deposits)           | 0.86                        | 0.91                        | 0.72                        |
| Liquidty—LA (liquid assets) | 0.35                        | 0.34                        | 0.29                        |
| Regulatory variables   | 0.05                        | 0.01                        | 0.08                        |
| ADI (administration and development (2.51)** | (2.58)** | (3.32)** |
| BD (brokered deposits) | 0.27                        | 0.26                        | 0.25                        |
| DI (direct investments) | 0.80                        | 0.72                        | 0.69                        |
| JCD (jumbo CDs)       | 0.09                        | 0.08                        | 0.12                        |
| Other                  | (0.02)                      | (0.04)                      | (1.40)                      |

#### Notes

- The dependent variable is cost to the FHLBB for savings and loan failures. Units are in thousands of dollars. T-statistics are in parentheses. A double asterisk indicates statistical significance at a 5 percent level. For a description of p-value, see Maddala (1983, 40).
In 1980, both RAP and GNP growth and to require that all financial state-

The institution's capital ratio (equal to a measure) equal to 3.0%, or in years.

A particular interesting variable includes the term in our model. In this model, we set a higher value for the growth rate of the RAP ratio. This finding is also consistent with the view that once an institution is in the higher risk category, it is more likely to suffer losses. The estimated coefficients are divided into

The model estimates the costs of the RAP ratio. This finding is also consistent with the view that once an institution is in the higher risk category, it is more likely to suffer losses. The estimated coefficients are divided into

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variables for type of failure resolution, type of organizational form, and type of charter under which the institution operates are not significantly related to failure costs. The other explanatory variables, in other words, have sufficient explanatory power that these specific variables add nothing.

INTERACTION OF INFORMATION WITH POLITICAL DECISION MAKING

The findings just covered indicate that information embedded in book-value measures of capital can be useful in designing a risk based capital requirement for federally insured depositories. It may be possible, for example, for federal regulators to establish a risk based capital requirement that would increase as a book-value measure of net worth decreased, thereby providing appropriate incentives for risk taking by the depositories and also providing protection against losses by the insurer. These findings also suggest that objective criteria about the riskiness of a depository’s portfolio could be included in the risk based capital requirement.

The design and implementation of a risk based capital requirement are, in part, political decisions. The level of capital required, the weighting for risk in a portfolio, and the remedial steps that would be required if book value of capital were to fall or risk to increase, for example, the president, and Congress. Therefore, it is instructive to examine recent experience with the interaction between information and political decision making.

As discussed in Barth (1991) and Barth and Regalia (1988), many of the savings and loans that were resolved through the 1980s had reported their book-value insolvency for years before finally being resolved. The 205 institutions resolved in 1988, for example, had reported being insolvent, on average, for 40 months, or 3.5 years. This implies that rules based on objective criteria like book-value net worth can be ignored, and that objective criteria may be a necessary but not a sufficient condition to guarantee appropriate implementation of rules.

The fact that the FHLBB did not close book-value-insolvent institutions also suggests that changing the rules to include better information may not be very useful. This is a direct challenge to those who argue that market-value accounting is crucial to regulatory reform. White (1991).

for example, suggests that “the most important reform” is changing the accounting system to include market values. Yet, if the FHLBB did not resolve a smaller number of institutions reporting book-value insolvency, there is no reason to assume that it would have resolved more institutions if market-value accounting had been required.

Another instructive example of the interaction of information with political decision making is provided by Barth, Brumbaugh, and Litan (1992, 54–56) in the context of more recent commercial banking difficulties and the risk based capital requirements established by the Basle agreement. In July 1991, the chairman of the House committee on energy and commerce referred to Citicorp as “technically insolvent.” At the time, Citicorp reported equity capital under GAAP of 3.7 percent of total assets and tangible capital of 3.1 percent. At the same time the bank equity analyst for Shearson Lehman Brothers reported that Citicorp’s tangible capital, adjusted for this estimate of the deterioration in its assets, was 1.8 percent. In response, Citicorp cited its risk based capital, which is calculated to be 8 percent. Thus, a risk based capital requirement designed by regulators provided more than twice the amount of GAAP and tangible capital, which the analysis here has found to convey valuable but upwardly biased net worth data.

One way to respond when regulatory discretion appears to weaken apparently sensible rules, is to eliminate the discretion. See, for example, Benston et al. (1969) in the context of early closure. In the case of designing a risk based capital requirement, this may prove especially difficult. As described earlier, the parameters in the failure-cost equation can change if the monitoring rules change, or another regulation or policy changes. This suggests that by its very nature the risk based capital requirement may require continuous changes and refinements that will make the elimination of discretion seemingly impossible.

SUMMARY AND CONCLUSIONS

The first half of the 1980s witnessed a historic number of business and financial firm failures. These failures were associated with the collapse of private deposit insurance systems in Ohio and Maryland and a weakening of public confidence in the safety of their deposits at federally insured depository institutions, especially as the insurance funds were being drawn down significantly for the first time since their establishment in the
1930s. Savings and loan institutions were particularly hard hit in 1932 and 1933. For example, FSLIC losses during these two years exceeded 50% of deposits.

The purpose of this chapter is to evaluate the costs of these capital requirements for savings and loan institutions and to identify the reasons why they are too high or too low. The results of the analysis can provide guidance for modifications to the current capital requirements.

The analysis was conducted under the assumption that savings and loan institutions are high-risk enterprises and that the traditional equity capital requirements are appropriate for this purpose. The analysis was based on a sample of 34 savings and loan institutions in the United States. The sample included all savings and loan institutions that were examined by the FSLIC during the period 1983-84.

The analysis showed that the current capital requirements are too high. The average capital requirement for the sample institutions was 20% of total assets, compared to a capital requirement of 10% for commercial banks. However, the analysis also showed that the capital requirements are not fully capitalized. The average capital requirement for the sample institutions was 15% of total assets, compared to a capital requirement of 10% for commercial banks.

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Chapter 14 Risk Based Capital: Informational and Political Issues

The finding that delay in resolving or closing failed savings and loans did raise costs is important in the context of a risk based capital requirement, because it reinforces the conclusions based on the biased nature of book-value net worth measures. It suggests that failure to take into account the upward bias in book-value net worth measures when designing risk based capital requirements can result in costly mistakes.

Besides net worth and delay, other important variables found to be significantly related to failure costs were acquisition and development loans (ADL) and direct investments (DI). In January of 1985, the FSLIC adopted a controversial regulation aimed at curtailing these types of assets on the grounds that they increased the risk exposure of the FSLIC, as well as moving savings and loans away from their more traditional role as providers of residential mortgage funds. Subsequently, the boards required that additional net worth be held by institutions engaging in direct investments and acquisition and development loans. Our results indicate that both types of assets did indeed significantly increase the costs to the FSLIC of resolving failures.38

These results suggest that a risk based capital requirement can be weighted to take into consideration aspects of risk in the portfolios of depositories, as well as book-value measures of net worth.34 These results need to be interpreted cautiously, however. Our findings are based on institutions that became insolvent and were left open for a period of time before closure. The institutions therefore had an incentive to take greater risk, and by being left open while insolvent, had an opportunity to take greater risk. Thus, our findings concerning the ADL and DI variables may not apply to savings and loans that are solvent and did not have an incentive to take greater risks. As a result, weighting a risk based capital requirement for specific risk assets may be sensitive when capital has fallen substantially or is near to the point of insolvency, but may not be sensitive when capital is at levels deemed adequate.

Strong evidence exists to support the hypothesis that moral hazard becomes an increasingly important problem in depositories when capital falls to levels that threaten solvency. Until the Basle agreement in 1969, minimum required capital levels were fixed for periods of time and did not vary from depository to depository based on the risk of insolvency or risk of loss to the deposit insurer. In principle, moral hazard could be combated with a risk based capital requirement based on risk of insolvency or risk of loss to the deposit insurer. In this chapter, we have provided evidence that potentially valuable information about true market-value solvency and risk of loss to the insurer is available in book-value net worth measures. This information could be used in a risk based capital requirement. We have pointed out, however, that possession of information is a necessary, but not sufficient, condition for appropriate regulatory response.

NOTES


2. For recent publications indicating that the turmoil appears likely to continue, see Barth, Brumbaugh, and Litan (1992), Barth and Brumbaugh (1992), Brumbaugh (1992), Gorton and Pennacchi (1992), Gorton and Rosen (1991), and Litan (1991).

3. For comparison, 309 banks insured by the Federal Deposit Insurance Corporation (FDIC) with assets of $35.6 billion failed during the 1980–85 period, representing 2 percent of all banks existing in 1980. The cost was $6.6 billion to resolve the 1980–85 bank failures.

4. For formal models in which this is demonstrated, see Kaezen and Wallace (1978) and Ruser, Chen, and Kane (1961); Horwitz (1980), Boerweg and Kaufman (1983), and Kaufman (1985), on the other hand, point out that fixed-rate deposit insurance premiums induce insured institutions to undertake more risk only to the extent that the increased risk cannot be monitored by the regulator.

5. Cassidy (1980) provided an early and interesting discussion of the appropriate level of FSLIC reserves, and also suggested the type of study conducted here.


7. The design of a risk-sensitive deposit insurance premium or capital requirement may be based on both failure studies and failure cost studies. As suggested by Barth et al. (1990a) and Brumbaugh (1992) for savings and
loan institutions and Avery, Hanrow, and Kwast (1985) for commercial banks, the premium or capital requirement would be based on the probability of failure and the expected cost to the insurer given failure. The probability of failure can be estimated (at least) by Barth et al. (1985a) and Avery, Hanrow, and Kwast (1985*), using a multinomial logit model, and the failure cost can be estimated in the way described in this chapter. The products of the probability of failure and the estimated cost in the event of failure forms the risk-sensitivity premium on capital requirements. An option-pricing approach can also be used to determine the appropriate risk-adjusted insurance premiums and capital requirements (see, for example, Marcus and Stakes (1984) and McCalloch (1985)). Avery, Hanrow, and Kwast (1985, 222), who calculated insurance premiums affecting risk, rejected this approach because "it requires stock price data which are available for only a small number of banks." In the case of savings and loans, 67 percent of the 3,245 in existence in December 1985 were mutual rather than stock associations. Furthermore, only 250 of the 1,071 stock savings and loans were actively traded. Since then, however, many more thrifts have become stock institutions. In any event, Barth, Brumbaugh, and Fosu (1993) recently used an options approach based on stock prices to estimate the value of deposit insurance for commercial banks relative to the deposit insurance premium charged, in order to assess whether credit subsidy existed. They also calculated an option-adjusted value of capital for selected banks or their holding companies. Barth, Brumbaugh, and Brumbaugh (1992), moreover, evaluated temporal and cross-sectional variations in the value of the put option for selected savings and loans, and examined the relationship between market-value capitalization, with and without the embedded put option values, and alternative book-value measures of capital. These kinds of approaches may be helpful in designing risk-based capital and insurance premiums.

8. The FSIC could increase the regulatory net worth of failing institutions by issuing promissory notes in return for income-capital or tax worth certificates. These promissory notes could be counted as net worth by the ailing institutions.

9. The FSIC could provide assistance guarantees to a merger partner in case of unforeseen events. Data regarding such arrangements were unavailable.

10. For an extremely insightful and informative analysis of failure costs covered by the FDIC and the FSIC from 1934 through 1969, see Scott and Mayes (1971).

11. Savings and loan institutions were required to file semianual financial reports to the FHLLB through 1983, and quarterly reports thereafter.

12. No new appraised equity capital could be booked after December 31, 1985. Losses on the sale of assets could be deferred only on assets awarded prior to October 28, 1984.

13. The remainder of this section and the following section drew heavily from Barth, Brumbaugh, and Saurerhaff (1986).

14. Actually, the market value of net worth is the present value of expected future cash flows adjusted for a risk factor, reflecting the fact that a savings and loan portfolio is necessarily less diversified than the market portfolio consisting of all securities.

15. For an analysis of the way in which the term rational expectations may be interpreted, as well as ex ante measures pertaining to its implementation, see Swamy, Barhi, and Tinley (1982).

16. Equation 14-5 may alternatively be written as

\[ M_{N,W,R} = BV_{N,W} + \sum_{j=1}^{\infty} B^{j-1} U_{t-j} \]  

where \( U_{t-j} \) is the white noise forecast error for \( P_t \). This expression may be derived as follows:

\[ M_{N,W} = \sum_{j=1}^{\infty} B^{j} E(P_{t+j}) \]  

where expected cash flows are related to actual cash flows by

\[ P_t = E(P_{t+j}) + U_{t-j} \]  

Solving for \( E(P_{t}) \) in Equation 14-23, substituting it into Equation 14-22, and taking first differences, one obtains

\[ M_{N,W} = \frac{1}{B} M_{N,W,R-1} - \frac{1}{B} P_{t-1} + \frac{1}{B} U_{t-j-1} \]  

It is also known that

\[ BV_{N,W} = \frac{1}{B} BV_{N,W,R-1} - \frac{1}{B} P_{t-1} \]  

so that Equations 14-N4 and 14-N5 can then be combined and generalized to the case where assets and liabilities were entered onto the books at time \( T \), yielding Equation 14-N1 specified above.

17. For an early, more comprehensive discussion of the long-term variability of the savings and loan industry, see Hess (1986).

18. Fraud and the quality of management are also determinants of profits, but are more difficult to predict than the factors mentioned in the text.

19. For attempts to do so, see Kane (1985) and Barth, Brumbaugh, Saurerhaff, and Wang (1985a).

20. Actually, in the case of a liquidation, the relevant liabilities are only those that are insured. Year-end 1985, 76 percent of all liabilities were insured. An additional 8 percent of liabilities were borrowed from the Federal Home Loan Banks. It should be noted, moreover, that the relatively short term to
maturity of liabilities means that, except for core deposits, their book and market values are close to one another. The major factor in explaining divergences between book- and market-value measures of net worth, in other words, is the asset side of a thrift’s balance sheet.

21. To the extent that firms other than savings and loans could only enter the industry by acquiring troubled institutions, permitting such firms to bid on troubled savings and loans should have lowered the costs to the FSIC. However, such an action also depresses the market value of net worth for existing institutions. The existence of nonbranch banks (i.e., institutions that either accept demand deposits or make business loans, but not both) in all likelihood raised costs and depressed market-value net worth for existing savings and loans. For a discussion of social versus private costs in this context, see Ginting and Hentig (1982).

22. Some additional information about our sample is as follows. (All figures are in millions of dollars.)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federally chartered institutions (N = 165)</td>
<td>8.3</td>
<td>43.4</td>
<td>559.7</td>
<td>0</td>
</tr>
<tr>
<td>Cost of failure</td>
<td>188.3</td>
<td>422.6</td>
<td>3,997.0</td>
<td>4.9</td>
</tr>
<tr>
<td>Total Assets</td>
<td>-3.8</td>
<td>16.8</td>
<td>26.2</td>
<td>-137.4</td>
</tr>
<tr>
<td>GAAP net worth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State-chartered institutions (N = 130)</td>
<td>9.6</td>
<td>37.8</td>
<td>330.5</td>
<td>0</td>
</tr>
<tr>
<td>Cost of failure</td>
<td>143.7</td>
<td>252.3</td>
<td>2,817.8</td>
<td>2.3</td>
</tr>
<tr>
<td>Total Assets</td>
<td>-2.4</td>
<td>20.0</td>
<td>32.2</td>
<td>-192.2</td>
</tr>
<tr>
<td>GAAP net worth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stock-type institutions (N = 65)</td>
<td>18.3</td>
<td>53.4</td>
<td>330.5</td>
<td>0</td>
</tr>
<tr>
<td>Cost of failure</td>
<td>163.3</td>
<td>252.9</td>
<td>1,231.3</td>
<td>9.4</td>
</tr>
<tr>
<td>Total Assets</td>
<td>-2.7</td>
<td>16.5</td>
<td>32.2</td>
<td>104.5</td>
</tr>
<tr>
<td>GAAP net worth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual-type institutions (N = 259)</td>
<td>6.6</td>
<td>37.1</td>
<td>599.7</td>
<td>0</td>
</tr>
<tr>
<td>Cost of failure</td>
<td>170.6</td>
<td>382.6</td>
<td>3,997.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Total Assets</td>
<td>-3.3</td>
<td>18.6</td>
<td>32.2</td>
<td>-192.2</td>
</tr>
<tr>
<td>GAAP net worth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

23. The cost figures used here represent the FSIC’s estimates of the resolution cost. However, to the extent that merger bids were accepted, the costs reflect an agreed-upon market transaction. In the case of liquidations, bids were either not made or, if made, were not accepted. See also the note to Exhibit 2.

24. As mentioned earlier, there were a large number of institutions that were open but insolvent. Because our estimated coefficients are based only on those insolvent institutions that were closed, the coefficients may be biased. This would be true only to the extent that operating insolvent institutions had different characteristics from the institutions in our sample. There is no prior reason to believe that this is the case.

25. The model proposed uses cross-sectional data over a four-year period, although strictly speaking, Equation 14-5 is geared to accept time-series data.

26. For a discussion of this issue, see Maddala (1986, 7–8). See also Cassidy (1980, 14).

27. Unlike Avery, Hanweck, and Kwas (1985), who found only one out of 17 explanatory variables to be significant, we find many more significant variables for savings and loan institutions.

28. In the early 1980s, due to widespread problems at agricultural banks, it was proposed that selected commercial banks be permitted to adopt accounting rules that would deviate from GAAP. See Gajewski and Meekhof (1986).

29. The rule did not apply in practice to federally chartered savings and loans since they were not permitted under federal law to undertake direct investments in excess of 3 percent of assets. For a more complete discussion of this rule and the controversy surrounding it, see Committee on Government Operations (1985).

30. Benston and Carhill (1992, 2) conclude that their findings do not support the moral hazard hypothesis that expects "insolvent and weak thrifts more than stronger thrifts to invest in nontraditional assets... that are riskier than traditional assets." Yet, Benston (1992, 24) states in apparent contradiction that "banks with FDIC-insured deposits and low levels of capital may be teased to play the by now well-known game, 'heads we win, tails the FDIC loses.'"גורון and Rosen (1991, 29) conclude that their "results show that moral hazard is not empirically important. What is important is that blockaded exit makes it hard to shrink the industry because it reduces the available exit channels and, perhaps more importantly, because it contributes to restranching management."

31. Charter value can also be estimated from Exhibit 2 as the difference between liquidation cost and actual resolution cost. In 1985, the assets of FSIC-assisted failures were $6,676,841,000. The estimated liquidation cost for the institutions was $1,508,479,000, and the actual resolution cost was $948,698,000. The difference between these is $559,781,000, implying that the charter value of these institutions was 8.4 percent of assets. (In cases where a liquidation was less expensive than a merger, the charter value was zero.)

32. For additional factors that are likely to be embodied in the intercept term x, see Loges (1983, 25).
REFERENCES


