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DETERIORATION PROCESSES IN TROUBLED FINANCIAL INSTITUTIONS AND THEIR IMPLICATIONS FOR PUBLIC POLICY

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DETERIORATION PROCESSES IN TROUBLED FINANCIAL INSTITUTIONS AND THEIR IMPLICATIONS FOR PUBLIC POLICY

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The path of deterioration and eventual collapse of a financial institution is of specific interest both from the standpoint of public policy and from the (sometimes differing) vantage points of the institution's own stockholders and managers.

If the path is slow and steady, this gives time for stockholders to intervene, seek management or policy changes, and perhaps arrange a capital infusion or a discreet takeover through merger with a stronger institution. A slow and steady path also gives the public authorities who must defend the deposit insurance fund an opportunity for repeated assessments before they have to build a legally airtight case for intervention.

On the other hand, a sudden change of direction from health to crisis, and a rapidly accelerating deterioration of condition, leaves little room for maneuver on anyone's part.

We discuss first a process of slow deterioration and some of its determinants, then a process of rapid deterioration and some of its causes, and, finally, some implications for public policy and for those directly interested in the institutions themselves.

Slow Deterioration and its Causes

Consider first the simplest case: that of an institution

having a stable deposit base, a stable book-valued level of earning assets, and a net worth reserve position that is initially above the required regulatory minima. Such an institution is fully in steady state if its net earnings, after debt service and taxes, are sufficient to cover any necessary appropriations to reserves and to pay dividends that will keep the stockholders at bay. For simplicity, suppose that the balance sheet at the beginning of a year is:

$$TA = C + A = L + D + N, \qquad (1)$$

and $C = L$, $A = D$, where C is current cash-equivalent assets, A is earning assets, L is current non-deposit liabilities, D is deposits, and N is net worth. TA is total assets.

Earnings arise from the following relation:

$$kC + rA - kL - pD - qD - F = E, \qquad (2)$$

where k is the interest rate applicable to both cash-equivalent assets and current non-deposit liabilities, r is the (average) earnings rate on earning assets, and p is the (average) interest rate paid on deposits. The operating cost structure includes a variable cost rate, q, which we relate to deposits, and F, fixed costs. For the enterprise to be profitable, $(r - p)$, the operating spread, must be positive by an amount large enough to cover operating and fixed costs and to provide the needed returns to net worth. E is total earnings, and return on net worth is therefore E/N.

Trouble may come from the deposit environment, as it did in the 1977-82 period for banks and savings institutions, when the rapid rise of market rates of interest, together with the invention of money-market mutual funds, caused serious losses of

deposit base. These could be countered only by raising p, the interest rate paid on deposits. The rate received on earning assets could adjust upward more easily for banks than it could for savings institutions, most of which were locked in with large portfolios of fixed-rate mortgage loans. Result: savings institutions suffered with negative spread for several years.

Interest-rate risks can be severe for holders of long-term, fixed-rate portfolios, such as the traditional savings and loan association concentrating on long-term mortgages. I have analyzed elsewhere the deterioration of position of firms in the savings and loan industry from the base year 1981 through 1985, depending upon the assumed course of interest rates during that time period. (See Balderston, 1984, Ch.4.) The "base case" in that study assumed zero savings growth and simply projected the fate of each institution according to the effect on it of each interest-rate scenario. For all but the "optimistic" scenario, which involved steadily falling interest-rates, appreciable numbers of firms reached negative net worth. The timing of this event depended on the severity of interest-rate cost pressures and on the starting size of the net worth cushion to absorb operating losses. Even apart from a general rise of interest rates, financial institutions could be adversely affected by new competition for the liquid assets of the public so that they would have to counter this by incurring large increases of advertising and other promotion costs. These, in our formulation, would be reflected by increases of q. Changes in payments technologies and in ways of gaining returns on liquid assets

could have this kind of effect upon financial intermediary institutions.

Another basic cause of slow deterioration could be the accumulation of default losses on the earnings portfolio at increasingly higher rates, where these rates were not anticipated in bad debt reserve allocations based upon historical experience. Country banks in the Midwest, currently suffering from high rates of default on farm loans, are a case in point. In many instances, their earning assets have been concentrated in loans to enterprises in the farm economy, and the continuing and worsening farm depression of 1982-85 has caused these financial institutions to share the distress of their borrowers. (Note that the occurrence of bad debts at normal, anticipated levels is not a problem, for this can be provided for in the loan rates established at the time when loans are made. It is the rise of the default rate beyond anticipated levels that causes the deterioration of the financial institution.)

If earning assets are reasonably distributed over a population of borrowers, so that the failure of any one of them is not a disaster, slow deterioration as a result of adverse developments in asset markets is also likely to proceed over a period of years rather than months. It takes the form of subnormal profits, or operating losses, after deductions for loan losses, and of direct charges against net worth when new loan loss reserves have to be established. The combination of the two forces net worth downward; continued long enough, it causes net worth to fall below the minimum required for solvency by the regulatory authorities, and they are compelled then to intervene.

Rapid Deterioration in the No-Growth Institution

The no-growth institution can experience rapid deterioration, defined as loss of net worth to the point of insolvency or other conditions which would make the institution unable to function. On the liability side, the classic case is a "run" on the deposit base, with the result that the institution must close its doors when it cannot produce cash quickly enough to meet cash withdrawal demands. Savings institutions that are members of the Federal Home Loan Bank System, and member banks of the Federal Reserve System, have access to liquidity from these lenders of last resort, and this liquidity source is intended to guard the financial system against runs which could spread to financial panic. Runs on state-insured S&L's in Ohio and in Maryland during 1985 remind us that runs and panics must still be kept in mind as a contingency.

Another possibility on the liability side, similar to the classic run, occurs if an institution relies upon market sources for deposits that suddenly dry up -- as for example, the over-ceiling CD's issued by Continental Illinois Bank which were not renewed as soon as rumors of trouble began to circulate. It is probable that Continental would not have been able to get these CD's renewed even by offering premia of several hundred basis points -- which it was not, in any case, able to do because the costs would have been prohibitive.

On the asset side, rapid deterioration can occur if an institution has a dense concentration in one type of asset risks -- either by direct investment (if this is permitted up to a

significant percentage of total assets) or in its lending operations -- and if these investments or loans are suddenly made worthless by the same environmental event. Asset diversification regulations and policies are supposed to operate as safeguards against this eventuality, but there are numerous instances of over-concentration of risk exposure, where the covariances of returns have been very high. Numerous U.S. money-center banks engaged in high concentrations of lending during the 1970 s to South American countries whose economies were all too similar from the standpoint of risk exposure (the so-called ABC loans, to Argentina, Brazil and Chile). The U.S. farm credit system is now in very deep trouble because of the depression in the farm economy (WSJ, September 19, 1985). This system, by design, has been required to concentrate its financial resources in a single sector of the U.S. economy, and the result is disastrous.

In the traditional savings and loan association, loans to any one borrower were usually limited by regulation to ten percent of total assets. This is hardly a sufficient diversification requirement, however, if net worth reserves are as low as three percent of assets. Numerous instances of disastrous financial performance can be traced to the evasion of limits on loans to any one borrower, via the technique of lending to different dummy corporations that actually are the same borrower in disguise.

This technique is often associated with another serious cause of deterioration risk: namely, conflict of interest in lending or investing, where a principal stockholder or executive of the financial firm forces non-arm's-length treatment of the

transaction, thus causing risk accumulation in the institution. Over-concentration of commitments joined with conflict of interest is a recipe for rapid deterioration. Here, two conceptually distinct elements of risk exposure are joined together in a potentially damaging manner. The over-concentration of commitments implies that, as of a given probability of occurrence of default, the realization of the negative event will cause a size of loss that is beyond the absorptive power of the institution. Conflict of interest in the making of a commitment, on the other hand, implies an under-estimation bias in the estimation of the probability of default and a consequent loss.

Conflict of interest is rumored in the pressure exerted by Marvin Warner to have State Savings Bank of Ohio use E.S.M. Securities of Florida as its custodian and manager during several years up through January 1985 for more than $600 million of government securities. In other instances, C. Arnholdt Smith was convicted of conflict of interest and diversion of funds from United States National Bank of San Diego in a celebrated criminal case, and Jacob Butcher of Tennessee was convicted of looting banks under his control.

Of half a dozen Federal take-overs of troubled S&L's in California during 1985, several may well have been made necessary because principal stockholders and executives engaged in a pattern of conflict of interest in lending and investment, combined with high concentration of these commitments to the same borrowers and in the same geographical area or type of transaction (e.g., raw

land). Abuses of position such as these deserve investigation and prosecution, and they also raise significant questions concerning kinds of powers that the regulatory authorities need and the information that they have to obtain in a timely manner in order to prevent injury to the public and to the deposit insurance funds.

Rapid Deterioration with Rapid Growth

The above instances of rapid deterioration could occur in the absence of growth in deposits and assets, but the flexibility to create a disaster and create it quickly is much enhanced by rapid deposit growth. Rapid growth provides a large net cash inflow whose disposition is then at the discretion of the institution's management. The greater the rate of growth as a percentage of the deposit and asset base, the greater the potential for a high concentration of bad decisions.

Rapid growth may, first of all, imply a level of risk that deviates from the historical statistically-derived probability distribution of risk for a given class of assets simply by virtue of the fact that this probability distribution is averaged over time in statistical estimation, and high growth permits the institution to concentrate to an unusual degree in a short time-slice. If the institution is "lucky", it may select a time-slice with lower than (historical) average risks; but if it is "unlucky", its large new commitments of assets are of greater than average risks in the business cycle. It would be of interest, from this standpoint, to examine the extent of intertemporal variability in the risk-distribution, as related to the business cycle or other causes.

Much less subtle than the time-concentration of risk is the enhancement of opportunities for errors and wrong-doing. It is said that Federal Reserve studies of bank failures show rapid growth to be a definite determinant. During 1983 and 1984, some savings institutions grew at annual rates of 100, 200, or even up to 1,000 percent. (See comments of Chairman Edwin E. Gray, Federal Home Loan Bank Board, in defense of the 1985 regulation restricting the rates of savings growth.)

These extraordinary growth rates in the firm's deposit base could be achieved only through recourse to the jumbo CD market, whereby accounts are solicited, often by roomsful of telephone sales representatives, on a purely rate-competitive basis, or by utilizing "brokered" savings, where an intermediary assembles available short-term funds from investors and pension funds and places them, for a brokerage fee, with the financial institution offering the most attractive rate. Acquisition costs for such deposits are not necessarily higher than the costs of promotion for locally-based savings accounts, but the funds are more volatile, and the existence of the jumbo and brokered-savings markets facilitates the pursuit of extreme high-growth strategies.

High-growth percentages at the levels that Gray complained of would compel an institution, no matter how expert its management, to reduce the average degree of "seasoning" of its portfolio of earning assets. Nearly all classes of earning assets have a profile of statistical risk that follows the pattern of undetectably low risk for the first time-period after

acquisition, then rising probability of default for a series of time periods through a second stage, then stabilization and decline of default probability for a series of time-periods in the third stage. Thus, the managers of a very rapidly growing financial firm would have to act in some positive manner to offset this lack of seasoning if they are to avoid accumulation of risk.

Again, there are less subtle hazards. Management of any firm has a finite level of executive energy and capacity in the short run. A management cadre of fixed size may have slack to increase its asset-acquisition at low rates of growth, but at some sufficiently high growth rate, it loses the ability to undertake effective underwriting and review of newly-incurred asset risks. This problem is particularly severe if the firm is operating in less-than-perfectly-efficient asset markets. In efficient markets, simple proportional increases in transaction size could conceivably be undertaken at high growth rates (as, for example, in the markets for short- and medium-term US government securities). Most business and commercial loan markets and most real estate lending markets are far from meeting "efficient-market" criteria, for they are replete with incomplete and biased information and they require judgment concerning idiosyncratic aspects of the borrower or the loan collateral.

These two problems of time-concentration and management overload are enough to increase risk exposure above that of the low-growth firm that is otherwise the same in profile. But it is sometimes the overt strategy of the high-growth financial firm to engage in a high concentration of asset commitments by type, a

high concentration to a few borrowers, and even a high incidence of commitments to principals in the firm. When all of these elements of exposure are present simultaneously, we have the recipe for disaster that has in apparent fact been played out several times in the recent California cases.

Let us suppose that a new controlling interest takes over an institution that has been stable, of moderate asset-size, and modestly profitable. The new controlling interest installs management that is given the objective of transforming the institution rapidly to one of much more substantial size and power. The deposit base and other borrowings must therefore be expanded rapidly to provide funds for the growth targets. Customer segments are finite in size, however, and each segment of the market responds slowly and incompletely to offered increments above the prevailing market rate.

To return to the earlier equations, we can say that for targeted increment in earning assets A* above the initial level A, and an equal growth of deposit base, D*, the firm will have to pay for the added deposits at a steeply increasing interest rate, the larger is D* relative to D. The firm may attempt to segment its depositor population so as to pay rate p* only to the growth component D* (though if the higher rate must be paid to all depositors, the earnings target inflates the more rapidly). Thus, we have two revised equations for the firm at the end of the first year of "go-go" operation:

$$TA + TA^* = C + A + A^* = L + D + D^* + N + N^* \quad (3) \text{ from eq. (1)},$$

$$kC + rA + r^*A^* - kL - pD - p^*D^* - qD - F = E + E^* \quad (4) \text{ from (2)}.$$

High deposit growth (a high ratio D*/D) is feasible only by paying a non-linearly higher, above-market, rate of interest, at least on the deposit increment D* and possibly on a portion or all of the deposit base D. What earnings rate must be obtained on the asset increment A* in order to meet these extra costs and also expand net worth reserves through internally-generated earnings? The answer is as follows. Assume that the firm was earlier in equilibrium, with earnings E (from equation (1)) just sufficient to satisfy the shareholder market. Set E* = N*, the latter being derived from the required ratio of net worth to total assets, TA + TA*, as set by the regulatory authorities.

Then, the required policy to sustain growth is:

$$E^* = r^*A^* - p^* D^*. \qquad (5)$$

But there is a yield-risk function for earning assets, and it provides that the firm can obtain higher yield only at higher probabilities of default and loss. (Like the function describing the deposit-inflow from alternative rates paid to depositors, this function has to be empirically determined.) The required earnings rate on incremental assets, r*, is:

$$r^* = (E^* + p^* D^*)/A^*. \qquad (6)$$

This can be restated as:

$$r^* = E^*/A^* + p^*, \qquad (6a)$$

assuming that the increment in deposits finances the increment in earning assets and that they are thus equal. The first term of (6a) applies the average regulatory standard of required net worth to the increment in earning assets, A*. If this is, for example, a standard of 5% net worth to total assets, then the target rate of return, r*, must be 500 basis points higher than

the incremental cost of funds, p*. As the asset markets are intensely competitive, it is possible to meet this target rate only by moving to a higher level of ex ante risk on the yield-risk function. For most firms having a prudent regard for their own capital, the sensible course is to restrain the target growth increment to a size compatible with limited exposure to asset risk.

Regulatory authorities and public accountants sometimes make it easier for the "go-go" firm to employ a high-growth, high-risk policy. We have been supposing, for example, that a dollar of earning assets earned the same expected return throughout the life of that asset (in other words, until it matured, or until the borrower paid off the principal due). However, intermediaries are often able to justify the collection of front-end fees when they originate loans or make financial commitments to borrowers. If the regulatory authorities and the accountants permit it, the firm may take into currently reported earnings the maximum amount of origination fees instead of amortizing these fees over the life of the financial assets in question. The result is a larger level of reported earnings (on paper, since the fees may not actually be paid in cash by the borrower, but instead may be received by a downward adjustment of the cash transfer to the borrower relative to the size of the loan obligation). The accounting reports do not adequately reflect the strain on the net worth accounts. The high-growth policy appears to be sustainable -- until the more-than-proportional addition to risk associated with the incremental assets comes

home to roost.

Thus, any accounting devices that enable the financial firm to report higher current profits than would be justified by a longer-term view are dangerous from the standpoint of constraining growth by invoking the net worth reserve standard. During the period of severe losses from 1980-82, the Federal Home Loan Bank Board enacted regulations that permitted insured S&L's to restate the asset value of the office premises they owned from historical, book value to current market value. This had the effect of enabling these firms to report considerably higher net worth.

The regulatory authorities may incite growth in another way, by reducing the net worth reserve standard. By doing this, they enable the firm's management to reduce the size of the required earnings target, E*, for a given growth rate, and thus, the firm may expand its targeted growth without increasing its risk exposure any further.

Perhaps the most spectacular case of utilizing rapid deposit growth to "bet the company" was the rise and fall of Financial Corporation of America during the 1981-84 period. After Charles Knapp assumed control of American Savings and Loan Association, FCA acquired deposits at a high incremental cost of funds and went through a period of extraordinary asset growth and growth in total reported earnings and earnings per share. FCA originated huge volumes of fixed-rate loans in the California residential markets at a time when few other lending institutions were active. High origination fees fed these reported earnings

and enabled the firm to meet net worth reserve requirements. The stated intention of FCA was to warehouse new loans for a brief period, package them, and resell them to long-term holders in the secondary markets -- thus enabling the firm to recyle the released funds into the lending markets again. FCA was caught, initially, when interest rates moved upward against it and compelled it to recognize a large downward adjustment of reported earnings and net worth. Only later did it become evident, as reported by successor management under the leadership of President William Popejoy, that significant loan losses were developing in the earnings portfolio because underwriting standards had been lax during the interval of rapid growth. The reserve allocations for loan losses announced during 1984 exceeded $600 million and had a severe impact on book net worth.

A Model of the Fast Deterioration Process in the Financial Firm

To illustrate how the several elements of managerial policy and market response are connected together in a time-path that leads to deterioration of the firm, we have constructed a simplified model of the financial firm. (See Appendix A for a description of the characteristics of this model, which is realized in Lotus 1-2-3 on a personal computer for ease of manipulation.)

The model starts with a base year (for illustration, 1983), at the beginning of which it has a prototypical balance sheet. Assumptions are made concerning the earnings rate on loan portfolio (here, 12%), the interest rate paid to depositors (here, 10%), and other operating parameters. Each year's operations result in a net profit (or loss) after taxes, which is

then added to (or subtracted from) net worth. At the end of the second year, loan losses are deducted from net worth, based on the portfolio's size at the beginning of the first year. This lag in realization of loan losses occurs because borrower default, foreclosure, and attempts to salvage the value of collateral occur only with substantial delay.

Table 1 shows some results from this model. The first panel shows how net profit after taxes varies over a five-year horizon beyond the base year when the loan loss parameter is varied between 0 and 9% per year. The second panel shows the effects of these variations on the firm's net worth. The third panel shows how the ratio of net worth to total assets, changes over time at each level of the loan loss parameter.

This model, then, is a convenient way to demonstrate how particular changes in any quantitative aspect of the market environment or of the firm's operating characteristics can translate into a path ending in collapse. It is very similar in spirit to the more complicated models used at the Federal Home Loan Bank Board and that used in my earlier study, but its compactness facilitates easier manipulation and interpretation.

The Policy of "Growing Out of Trouble"

By 1981, many financial institutions faced a future of grave impairment in earnings prospects because their portfolios of fixed-rate, long-term paper (bonds or mortgages) had been accumulated at much lower interest rates than those prevailing in 1981. These firms were not required to mark these financial assets down to market values which were far below book values,

Table 1: Illustrative Results of the Deterioration Model

66	table,varying c8,effect on net profit after tax						
67	0	17	19	22	26	30	34
68	0	17	19	22	26	30	34
69	1	17	19	22	24	27	30
70	2	17	19	21	22	24	25
71	3	17	19	20	20	21	21
72	4	17	19	19	19	18	17
73	5	17	19	18	17	15	13
74	6	17	19	17	15	12	9
75	7	17	19	17	13	9	5
76	8	17	19	16	11	6	1
77	9	17	19	15	9	3	-3
78							
79							
80	table,varying c8,effects on net worth						
81	0	84	103	126	152	181	216
82	0	84	103	126	152	181	216
83	1	84	83	93	104	116	130
84	2	84	63	60	56	51	46
85	3	84	43	27	9	-12	-36
86	4	84	23	-6	-38	-74	-116
87	5	84	3	-39	-85	-136	-193
88	6	84	-17	-72	-131	-196	-269
89	7	84	-37	-105	-176	-255	-342
90	8	84	-57	-138	-222	-313	-413
91	9	84	-77	-171	-266	-370	-482

92	Table,NW/TA,varying C8						
93	+C8	100*C	100*D	100*E	100*F	100*G	1
94	0	7	8	9	10	11	12
	1	7	7	7	7	7	7
	2	7	5	5	4	3	3
	3	7	4	2	1	-1	-2
	4	7	2	0	-3	-5	-8
	5	7	0	-3	-7	-10	-13
	6	7	-1	-6	-11	-15	-20
	7	7	-3	-9	-15	-21	-26
	8	7	-5	-12	-19	-26	-34
	9	7	-7	-16	-24	-33	-42

but the expected revenue streams from these portfolios were nevertheless inadequate.

Some firms adopted a policy of seeking to dilute the effects of this low-rate portfolio by adding, at the most rapid pace they could, a large volume of new and higher-rate loan paper. This is the policy of "growing out of trouble."

To be successful in pursuing this policy, an individual firm would have to control the extra lending risks associated with rapid asset-growth, as discussed above. The firm would also have to pay some market premium (and incur exceptional promotional costs) to stimulate a greater-than-average deposit inflow with which to finance its rapidly growing portfolio.

One firm, acting in a manner different from all others, might succeed in obtaining high deposit growth at a small premium over market rates; but many, or the majority, of firms could clearly not do so and would simply defeat each other's strategies.

Similarly, one firm alone might succeed in acquiring very large volumes of loans at the (now-higher) market rates without incurring exceptional risk. But if many or most financial firms in the same market sought to do this, they would either drive the lender's terms downward significantly, or they would find themselves incurring exceptional risks in making a large volume of lending transactions.

Seen in this light, "growing out of trouble" cannot be an <u>industry-wide</u> prescription for overcoming the losses incident to the previous accumulation of low-yield assets. It is, rather, analogous to a policy of "Sauve qui peut!" among the sailors when

their ship hits an iceberg. In their scramble for the life-boats, the sailors may trample each other and prevent any boats from launching.

Implications of Slow Deterioration and Rapid Deterioration for Financial Regulation

Slow deterioration gives everyone -- the regulators, and the firm's managers and stockholders -- time with which to confront the problem. If the main cause is a run-up of interest rates, time may provide a remedy in falling rates and the recovery of market value of the discounted portfolio. Even if this does not happen, the firm may be able to survive for a long period if its current operating losses are relatively modest and its net worth reserve cushion in the base year is large. The crucial issue in the firm confronted with losses arising from such interest-rate risks is whether its low-yield portfolio will run off quickly enough to permit it to obtain higher-yielding replacement assets before its net worth is exhausted.

The regulatory authorities can also act in a reasonably deliberate manner. If subsidy must be contemplated, they can enter into a contract for (relatively small) annual subsidies over a multi-year contract period, and the calculation of the needed subsidy amount is not difficult if the problem is simply that of portfolio discount arising from interest-rate fluctuations.

Another form of slow deterioration arises when the firm has incurred exceptional default losses and is thereafter faced with a long period of workout costs to recover value from bad

assets. Such a work-out process requires high business expertise and usually involves high operating costs for the workout process. In such a case, the regulatory authorities have somewhat more difficulty in evaluating precisely the size of the losses and the subsidy problem. They may also face uncertainties in determining whether the incumbent management has sufficient skill to perform the work-out task. In such cases, the regulatory authorities may seek a robust merger partner for the troubled firm in order to assure the presence of management capability for the workout.

Growing regulatory interest in risk-adjusted premiums for deposit insurance is quite natural, given the recent growing incidence of failures and near-failures among financial firms. This kind of policy approach would, however, imply the necessity of a good analytical method of setting the insurance premiums for the different levels of risk. Financial analysts and finance theorists have proposed a number of ingenious approaches (e.g., Federal Home Loan Bank Board. 1983. Agenda for Reform, and Ronn and Verma, 1985), but it would also be necessary to win the confidence of the U.S. Congress and of the regulated financial firms in the industry in such a system.

Our discussion of rapid deterioration has shown that the managers and controlling interests of financial institutions have the capacity to do great damage quickly, either because they are in love with (or insufficiently knowledgeable about) risk or because they are willing to abuse the fiduciary position conferred upon them by their control. The public authorities need to be alert to such abuses and should employ professional

manpower in sufficient numbers to permit intensive investigations and frequent surprise audits.

If those in control of a financial institution are excessively prone to risk, however, public policy standards should be designed to promote greater prudence and to install in the financial firm itself some additional safeguards against the assumption of excessive risk. In this respect, proposals for risk-adjusted deposit insurance premiums are defective unless they can be set so as to guard against management strategies that may result in fast deterioration. The typical insurance premium system entails adjustment of the premium according to statistics of loss experience or according to other reliable signals of the extent of the risk exposure. If historical statistics must be accumulated in order to re-set the premium for an institution, the rapid deterioration process may well damage the firm fatally before the insurer is awakened to the problem. Stockholders and managers who decide to pursue a rapid growth, high risk policy are unlikely to be deterred by the future threat of higher insurance premiums. Thus, a risk-related premium system would need to set high ex ante premiums, to cover the possibility of high-risk behavior, and then provide ex post rebates to the firms that successfully controlled their risks. (See Maisel, 1981.)

What is needed is a public policy that will motivate stockholders and managers toward greater prudence in the operation of the financial enterprise. Requiring higher net worth reserves, and adjusting the level required in accordance with the current asset composition, properly marked to market,

and the current composition of new activity, should provide a spur toward greater care in the assumption of risks. (I have argued for this approach elsewhere; see Balderston (1984), pages 160-168.)

The public authorities should also require that these net worth reserves be maintained continuously at the required levels or should be replenished at quarterly or monthly intervals instead of with annual or longer periods of forgiveness and delay. The motivating force of a net worth reserve policy is greatly reduced if the additions to reserves under rapid growth are permitted to come after a delay and entirely from reported (accounting) profits. (By insisting that the financial institution maintain continuous net worth reserves at a reasonable minimum standard and by requiring additions to the net worth percentage if the institution engages in rapid growth by attracting volatile deposits, the public authorities can also place a sensible check against excessive use of brokered funds.)

Rates of growth in assets of S&L firms that are sustainable by additions of profits to net worth are shown in Table 2.

TABLE 2: PERCENTAGE RATES OF ASSET-GROWTH OF S&L FIRMS SUPPORTED BY INTERNALLY-GENERATED EARNINGS, AT DIFFERENT NET WORTH RESERVE STANDARDS

Average Profit Rate (% of Total Assets)	Net Worth Reserve Standard (% of Total Assets)			
	1%	3%	5%	7%
0%	0	0	0	0
0.2%	20.0	6.7	4.0	2.9
0.4%	40.0	13.3	8.0	5.7

0.6%	60.0	20.0	12.0	8.6
0.8%	80.0	26.7	16.0	11.4
1.0%	100.0	33.3	20.0	14.3
1.2%	120.0	40.0	24.0	17.1

Note: Each cell-entry is the percentage rate of growth of total assets that is compatible with the associated profit rate on total assets and net worth reserve standard, both expressed as percentages of total assets.

In the above Table, setting and enforcing continuously a high reserve standard has the immediate effect of constraining the rate of asset growth that can be financed internally from current profits. Also implied is a sharp constraint on growth if a new loss reserve allocation has to be set up when the institution is at the minimum net worth reserve standard.

Capital Infusions to Improve Net Worth

There are two likely sources for capital infusions: the equity market, and the market for subordinated debt. Horvitz (1984) advocates the latter source as a viable and appropriate one. He states that sophisticated investors in subordinated debt could be induced to hold the securities issued by financial institutions and that they would be alert to any undue buildup of risk that would threaten the safety of the debt instruments that they hold. Thus, they would serve as a pressure point against excessive risk-taking by management.

If the firm resorts to an increase of equity instead of using subordinated debt, the managers will face insistent demands from equity-holders for accountability, and this too will act as a check against the assumption of undue risk. Adding equity rather than subordinated debt does have the basic advantage of

providing the financial firm with an earnings cushion, since subordinated debt would require debt-service that would absorb cash in each time-period and common stock would not. The reduction of leverage through augmentation of the number of common shares would not be attractive to some stockholders, but the whole purpose of higher net worth reserve standards is to reduce the leverage against the deposit insurance fund. Well-capitalized financial firms may in fact be more attractive to some categories of stockholders under conditions of volatility in the financial and lending markets.

For both sources of additional net worth, the prospects of raising the funds and the terms that would have to be offered would depend strongly on the condition of the firm, its future earnings prospects, and the credibility and good reputation of the professional managers. These elements of assessment would all help to reinforce policies within the firm and managerial attitudes that would, in their turn, be in positive agreement with the thrust of public policy. The management responses to these policies would include the choice of more moderate rates of growth of assets and deposits and greater efforts to control both interest-rate risks and default risks.

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APPENDIX A:DESCRIPTION OF COLLAPSE MODEL 1.0,SLOW AND FAST DETERIORATION OF THE FINANCIAL FIRM.

NOTE: Collapse Model 1.0 is realized in Lotus 1-2-3 and is located in my 1-2-3 data file as file Collaps2, for text, and Collap2A for a numerical illustration. (FEB,MIT,11.15.85)

This is a simple, base-case model of the financial firm. With its help, we can illustrate an initial version of the deterioration process. The conceptual background and general motivation of this model is described above in the body of this paper.

This is an accounting model of the financial firm. The assumptions are listed first in a single block: their names are in (B5..B13), and assumed illustrative values are in (C5..C13). amd . Each of these is a rate, stated in percentage points.The model is then primed with a set of assumed magnitudes as of January 1 of the initial year. These magnitudes also serve as parameter values for the multi-year simulation; their names are located at (B14..B28) and their values are in (C14..C28).

The income statement for the base year (here, 1983 for illustration) is generated by the algebraic relationships of (C14..C28). Interest income on short-term investments is computed by multiplying short-term assets (C15) by the applicable interest rate from the parameter set (C5), which is anchored as to its absolute location as c5 and is divided by 100 because it was defined to begin with in percentage points. The base-year income statement proceeds in this way, with simple algebraic derivations for each of the income and expense items.

The end-of-year balance sheet for the base year is labelled in (B51..B65), and its elements are calculated according to the formulas of (C51..C65). The 12/31 loan portfolio is larger than the 1/1 loan portfolio in two respects. First, beginning-of-year deposits are augmented by the deposit growth rate, (c13), and it is assumed that this cash inflow is wholly invested in additions to the loan portfolio just before 12/31. Second, the year's net income after tax is incorporated into the 12/31 balance sheet by adding it (C49) to the loan portfolio. Thus the formula for year-end loan portfolio at C53 has these extra components. On the liability side, the total deposit grows by (1+c13)/100. Net worth is augmented too, because net income after tax has been added to loan portfolio, and 12/31 net worth (the formula at C64) is just total assets minus total liabilities.

Each of the base-year's balance sheet magnitudes is then transferred to the 1/1/1984 block, D14..D28. Then, the second year's income statement is generated in the same way as before. At 12/31, however, we have the first adjustment for loan losses against the amount of portfolio that the firm had on 1/1 of the base year. Thus, in the latter part of the second year, we recognize portfolio losses lagged from the beginning of the first

year. This may be seen by comparing the loan portfolio formula of the base year, C53, with that for the second year, D53. The same lagged process is repeated then for each year after the second year. The loan loss parameter is c8 and is stated as a percentage of the appropriate total loan portfolio. Thus, we have not incorporated an ageing and seasoning process into the portfolio at this point.

These relationships are then extended from the second year (here, 1984) through 1988, and we generate a path of the firm. The deterioration of the firm is here caused entirely by the lagged loan losses that are incurred. Later, we will incorporate an expense component, in that an attempt to grow beyond a "normal market rate" will require paying above-market interest, and a recognition of low Net Worth will worry the savings market and make it more expensive per dollar of savings attracted and retained.

1	Financial Institution: Deterioration and Collapse		
2			Model 1.0
3	- - - - - - - - - - - - - - -	- - - - - - - - - - - - - - -	
4	Assumptions		
5	Interest rate,ST inv.		10
6	Interest rate,Portfolio		12
7	Fee income,rate. %		2
8	loan loss, % on (t-1)		0
9			
10	Interest rate pd.,deposits		10
11	Income tax rate		30
12			
13	Deposit growth rate		10
14	Balance sheet,asof 1/1/(t)		
15	Cash,ST Investments		10
16	Loan Portfolio		1000
17	Other Assets		0
18	Fixed Assets		2
19			
20	Total Assets		1012
21			
22	Liabilities & NW		
23	Borrowings,Debt		20
24	Deposits		900
25	Other Liabilities		25
26	Total Liabilities		945
27	Net Worth		67
28	Total Liabs,NW		1012

1	Financial Institution: Deterioration and Collapse		
2			Model 1.0
3	- - - - - - - - - - - - - - -	- - - - - - - - - - - - - - -	
4	Assumptions		
5	Interest rate,ST inv.		10
6	Interest rate,Portfolio		12
7	Fee income,rate. %		2
8	loan loss, % on (t-1)		0
9			
10	Interest rate pd.,deposits		10
11	Income tax rate		30
12			
13	Deposit growth rate		10
14	Balance sheet,asof 1/1/(t)		
15	Cash,ST Investments		10
16	Loan Portfolio		1000
17	Other Assets		0
18	Fixed Assets		2
19			
20	Total Assets	@SUM(C15..C19)	
21			
22	Liabilities & NW		
23	Borrowings,Debt		20
24	Deposits		900
25	Other Liabilities		25
26	Total Liabilities	@SUM(C23..C25)	

27	Net Worth	+C20-C26	
28	Total Liabs,NW	+C26+C27	
29			
30	- - - - - - - - - - - - - - - -	- - - - - - - - - - - - -	
31	Projection Model 1.0	Base yr,83	
32	Income Statement		
33	Revenues		
34	Interest,ST Investments	+C15*$C$5/100	
35	Interest,LT Portfolio	+C16*$C$6/100	
36	Fee Income		0
37	Total Revenues	@SUM(C34..C36)	
38			
39	Expenses		
40	Interest Expense,Debt	+C23*$C$5/100	
41	Interest Expense,Deposits	+C24*$C$10/100	
42	Promotion Expense		0
43	Other Operating Expense		0
44	Fixed Costs		5
45			
46	Total Expenses (cash)	@SUM(C40..C45)	
47	Net Income Before Tax	+C37-C46	
48	Income tax	+C47*$C$11/100	
49	Net Income After Tax	+C47-C48	
50			
51	Balance sheet, 12/31/(t)		
52	Cash,ST Investments	+C15	
53	Loan Portfolio	+C16+C24*$C$13/100+C49	
54	Other Assets	+C17	
55	Fixed Assets	+$C$18	
56			
57	Total Assets	@SUM(C52..C56)	
58			
59	Liabilities & NW		
60	Borrowings,Debt	+$C$23	
61	Deposits	+C24*(1+$C$13/100)	
62	Other Liabilities	+C25	
63	Total Liabilities	@SUM(C60..C62)	
64	Net Worth	+C57-C63	
65	Total Liabs,NW	+C63+C64	

+C52
+C53
+C54
+C55

@SUM(D15..D19)

+C60
+C61
+C62
@SUM(D23..D25)
+D20-D26
+D26+D27

1984

+D15*$C$5/100
+D16*$C$6/100
0
@SUM(D34..D36)

+D23*$C$5/100
+D24*$C$10/100
0
0
5

@SUM(D40..D45)
+D37-D46
+D47*$C$11/100
+D47-D48

+D15
+D16+D24*$C$13/100+D49-C16*$C
+D17
+$C$18

@SUM(D52..D56)

+$C$23
+D24*(1+$C$13/100)
+D25
@SUM(D60..D62)
+D57-D63-C16*$C$8/100
+D63+D64

Financial Institution: Deterioration and Collapse
Model 1.0

Assumptions						
Interest rate,ST inv.	10					
Interest rate,Portfolio	12					
Fee income,rate. %	2					
loan loss, % on (t-1)	0					
Interest rate pd.,deposit	10					
Income tax rate	30					
Deposit growth rate	10					
Balance sheet,asof 1/1/(t)						
Cash,ST Investments	10	10	10	10	10	10
Loan Portfolio	1000	1107	1225	1357	1502	1664
Other Assets	0	0	0	0	0	0
Fixed Assets	2	2	2	2	2	2
Total Assets	1012	1119	1237	1369	1514	1676
Liabilities & NW						
Borrowings,Debt	20	20	20	20	20	20
Deposits	900	990	1089	1198	1318	1449
Other Liabilities	25	25	25	25	25	25
Total Liabilities	945	1035	1134	1243	1363	1494
Net Worth	67	84	103	126	152	181
Total Liabs,NW	1012	1119	1237	1369	1514	1676

Projection Model 1.0	Base y	1984	1985	1986	1987	1988
Income Statement						
Revenues						
Interest,ST Investments	1	1	1	1	1	1
Interest,LT Portfolio	120	133	147	163	180	200
Fee Income	0	0	0	0	0	0
Total Revenues	121	134	148	164	181	201
Expenses						
Interest Expense,Debt	2	2	2	2	2	2
Interest Expense,Deposit	90	99	109	120	132	145
Promotion Expense	0	0	0	0	0	0
Other Operating Expense	0	0	0	0	0	0
Fixed Costs	5	5	5	5	5	5
Total Expenses (cash)	97	106	116	127	139	152
Net Income Before Tax	24	28	32	37	43	49
Income tax	7	8	10	11	13	15
Net Income After Tax	17	19	22	26	30	34
Balance sheet, 12/31/(t)						
Cash,ST Investments	10	10	10	10	10	10
Loan Portfolio	1107	1225	1357	1502	1664	1843
Other Assets	0	0	0	0	0	0

55	Fixed Assets	2	2	2	2	2	2
56							
57	Total Assets	1119	1237	1369	1514	1676	1855
58							
59	Liabilities & NW						
60	Borrowings,Debt	20	20	20	20	20	20
61	Deposits	990	1089	1198	1318	1449	1594
62	Other Liabilities	25	25	25	25	25	25
63	Total Liabilities	1035	1134	1243	1363	1494	1639
64	Net Worth	84	103	126	152	181	216
65	Total Liabs,NW	1119	1237	1369	1514	1676	1855

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