Working Paper Series
Congressional Budget Office
Washington, D.C.

The Fair Value of the Federal Deposit Insurance Guarantee

Judy Ruud*

November 2007
2007-13

*Formerly of CBO.

Contents

Summary and Introduction

The Federal Deposit Insurance Corporation (FDIC), an agency of the U.S. government, guarantees insured deposits in banks and savings associations in the event of the depository's insolvency. When a bank fails, the shortfall between the value of the bank's available assets and the value of its insured deposits is a cost to the deposit insurer and hence the government.[1] As of December 2006, the FDIC insured an estimated $4.1 trillion in deposits.[2]

Deposit insurance is accounted for in the federal budget on a cash basis.[3] This means that the cost of deposit insurance is recognized when cash is paid out by the government offset by collections from insurance premiums and recoveries in the same budget period. Budget projections thus require estimates of expected future claims on the FDIC from bank failures. Those estimates are prepared largely using linear extrapolations of current claims toward a long-term historical average. This paper describes a model for making those estimates in a more systematic way, taking account of banks' capital position and volatility in the value of their assets—two primary drivers of bank failure.

The model projects the year-by-year probability distribution of the number of bank failures, and the assets and insured liabilities of the failing banks. Drawing on an extensive academic literature and standard market usage, an options-pricing model is used to estimate the present-value cost to the taxpayer of those failures, assuming discount rates that reflect the correlation of defaults with market conditions that the private market would use to value similar liabilities (that is, "fair value"). The fair value of the deposit insurance guarantee for each bank is the estimated price that private insurers would charge to assume the FDIC's deposit insurance guarantee obligation.

The likelihood of failure—and the option value of the deposit insurance guarantee—is sensitive to several key variables: the initial level of bank capital, bank asset volatility, and the term of the insurance. The greater the initial level of capital, the lower the likelihood of failure. The longer the term of the insurance and the greater the volatility of bank asset values, the greater the likelihood of failure and the value of the deposit insurance guarantee.

Calculations were made using 2004 data for a set of 231 exchange-traded banks and bank holding companies, constituting about 30 percent of the deposits of FDIC-insured institutions.[4]

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[1] The term "bank" in this paper refers to financial institutions whose deposit liabilities are insured by the FDIC, including depositories formerly insured by the Bank Insurance Fund (BIF) and the Savings Association Insurance Fund (SAIF) that accept demand deposits and make loans to businesses and households. Credit unions are excluded because they have a different insurer.

[2] FDIC Quarterly Banking Profile, fourth quarter 2006, p. 17, Table I-B.

[3] Deposit insurance is not subject to "credit reform," the budgetary accounting treatment for most federal direct loans and guarantees.

[4] The data set is made up of mid-sized and large banks: stocks of the smallest banks are not exchange traded, and some of the largest banks are excluded because they are owned by financial service companies with non-bank assets greater than 5 percent of the stock-issuing entity's total assets.

The model projects FDIC cash outlays of about $875 million (undiscounted) over the next 5 years. That estimate is net of the FDIC's recoveries from the assets of failed banks but excludes collections of deposit insurance premiums.[5] Using private-sector discount rates, the fair value of the deposit insurance (again excluding premiums) over 5 years is about $1.2 billion. Extrapolating to all FDIC-insured institutions, the 5-year fair value of deposit insurance is about $4 billion.[6]

The total cost of providing deposit insurance includes, in addition to the cost of the guarantee, the administrative cost of monitoring the banks. Higher monitoring costs tend to reduce guarantee costs.[7] That is, the more closely banks are monitored for safety and soundness, the greater the monitoring cost, and the smaller the guarantee cost because the guarantee agency is better able to prevent losses from accumulating at an insured bank (for example, by closing it). If a bank's position could be monitored accurately and continuously, the guarantee cost would approach zero, because the bank could be closed when it became insolvent. In fact, however, an insurer's ability to monitor a depository is limited and periodic, so that guarantee costs are usually positive. However, in periods when few banks fail, the monitoring cost of deposit insurance can be greater than the guarantee cost.

The FDIC spends about $1 billion annually on operating expenses and about half of that amount is identified as the cost of supervision. On the grounds that all of the FDIC's expenses are related to the insurance function, in this paper all administrative costs are categorized as monitoring costs. The source of most of the financing for the FDIC's expenses is intragovernmental interest credited to the deposit insurance fund overseen by the FDIC. Three other federal regulators also monitor FDIC-insured depositories: the Office of the Comptroller of the Currency (OCC), the Office of Thrift Supervision (OTS), and the Federal Reserve. The OCC and the OTS charge banks for their examinations; the Federal Reserve does not charge for its monitoring and it is difficult to identify its FDIC-related cost.

Deposit Insurance in an Option Framework

Deposit insurance is analogous to a put option on the assets of a bank, with a strike price equal to the amount of insured deposits. In the event the bank becomes insolvent, it can "put" its assets to the Federal Deposit Insurance Corporation, which will pay off insured deposits.[8] Thinking of deposit insurance as an option has the advantage of permitting analysts to use a highly flexible and widely used set of models for valuing guarantees based on projections of payments by the government when uncertain events occur.

[5] Premiums collections have averaged about $100 million per year over the last 5 years.

[6] This extrapolation is based on the share of total bank assets held by the banks used to estimate the model.

[7] See, for example, Robert C. Merton, "On the Cost of Deposit Insurance When There Are Surveillance Costs," *Journal of Business*, 1978, vol. 51, no. 3, pp. 439-452.

[8] Technically, the decision to close an FDIC-insured depository institution is made by its chartering agency, in consultation with the FDIC (for example, nationally chartered banks are chartered by the OCC). This paper makes the abstraction that the FDIC decides when to close an FDIC-insured depository.

Although option pricing models can be complex, the basic underlying concept is highly intuitive: an option amounts to a claim to a payment, conditional on a specified future price event. In the case of deposit insurance, an FDIC payment is conditional on the value of bank assets falling below the value of liabilities (i.e., insolvency). Option valuation projects future payments by projecting the evolution of future values based on past experience. Details on the model are provided in the Appendix.

The flexibility of these models is especially useful in the case of deposit insurance because this form of guarantee is like an "exotic" option, a callable put. The holder of an ordinary (i.e., noncallable) put option chooses when to exercise it. But in the case of deposit insurance, the writer (the FDIC) can force the option to be exercised (i.e., can "call" it) by closing the bank. This reduces the value of the option relative to an ordinary put option.

The call feature of the option motivates the FDIC (or other federal bank regulator) to incur costs to monitor the financial condition of insured banks. Thus, the total cost of providing deposit insurance includes surveillance costs as well as guarantee costs. Surveillance enables the FDIC to exercise its call when it is advantageous to do so and thus can reduce guarantee costs. Surveillance, however, is also subject to diminishing returns. Accordingly, the FDIC examines banks only periodically, and asset values are subject to errors in measurement. Furthermore, if there is fraud, assets may be missing even if their values were measured accurately. In general, the sooner a bank is closed upon insolvency, the lower the cost of the deposit insurance guarantee. This study assumes that the FDIC chooses a level of monitoring expense to minimize the total cost of deposit insurance.[9]

Option values increase with the life of the option. In the case of deposit insurance, the term of the insurance is ambiguous. On the one hand, premiums are usually assessed quarterly, and banks are typically examined annually. If a bank is found to be insolvent, the option can be called and the bank closed. This suggests that the effective life of the option is one year or less.[10] On the other hand, entities that operate under a bank or thrift charter are required to have insurance for as long as they continue operations. This suggests that the put option has the life of a perpetuity, unless it is called.[11] This study takes an intermediate position and calculates the option value of deposit insurance for a 5-year term.

[9]Some reviewers have suggested that the FDIC's operating expenses appear to exceed the value that would minimize the total cost of insurance. That hypothesis is outside the scope of this paper.

[10]For studies that assume the term of deposit insurance is the time until the next audit, see Alan J. Marcus and Israel Shaked "The Valuation of FDIC Deposit Insurance Using Option-Pricing Estimates," *Journal of Money, Credit and Banking*, 1984, vol. 16, no. 4 part 1, pp. 446-460; and Ehud I. Ronn and Avinash K. Verma, "Pricing Risk-Adjusted Deposit Insurance: An Option-Based Model," *Journal of Finance*, 1986, vol. 41, no. 4, pp. 871-895.

[11]Robert Merton's path-breaking analysis assumes a perpetual term. See Robert C. Merton, "On the Cost of Deposit Insurance When There Are Surveillance Costs," *Journal of Business*, 1978, vol. 51, no. 3, pp. 439-452.

The Simulation Model

Bank insolvency or failure is defined as the condition in which the market value of a bank's assets is less than the value of its liabilities. Similarly, the FDIC's loss given default is the extent to which the value of insured liabilities exceeds the market value of available assets when the bank is closed. Thus, estimates of the probability of insolvency and the loss to the FDIC require stochastic, or random, simulations of the paths of bank asset and liability values over the assumed 5-year term of the insurance. The process that generates those evolving values is the core of the simulation model.

In addition to the underlying movements in the value of assets and of assets minus liabilities, or net worth, the behavior of regulators, banks, and markets needs to be taken into account in projecting bank insolvencies and FDIC cash flows. Accordingly, regulators are assumed to audit banks annually and close those that are insolvent. On average, a bank is closed when liabilities exceed assets by 9 percent.[12] Thus, for projections of bank failures, the value of assets less liabilities is "checked" for capital adequacy and closure only once a year. The simulations of bank assets and liabilities also reflect the assumption that banks "gamble for resurrection"—that is, they increase their asset volatility when they become undercapitalized by regulatory standards. This increase in volatility increases the FDIC's loss given default. Further, banks that become undercapitalized (from a regulatory perspective) are required to stop paying dividends. This reduces the probability of default and loss given default in the simulations.

Some studies assume that financial institutions have a target ratio of capital to liabilities and that they repurchase or issue stock when they drift too far above or below the preferred capital ratio.[13] Because the level of bank capital is a significant determinant of the option value of deposit insurance, such repurchases or issuances can have a substantial effect on the cost of insurance. A high level of capital, for example, will reduce the value of the deposit insurance guarantee.

While banks may have a preferred level of regulatory capital (measured at its book or accounting value as a percent of total assets), it is less clear that they aim to hit a target for market value capital. Levels of the market value of bank capital (i.e., market value of equity) vary widely across banks and over time, making it difficult to identify a robust target and speed with which banks would move toward the target. Furthermore, the target level of capital and speed of adjustment may vary with a bank's financial condition; for example, when a bank is undercapitalized, the cost of adding equity through stock sales may be prohibitively high. Accordingly, this analysis assumes that banks have a large tolerance for variations in the market value of capital—that is, they do not conduct transactions to increase or decrease the market value of their capital, except when they are undercapitalized and are required by law to stop

[12] The liability-to-asset ratio of 1.09 used as the default trigger is the loss as a percentage of assets for banks over $1 billion in asset size in 1992–1993. Source: FDIC *Failed Bank Cost Analysis 1986-1993*, p. 21.

[13] See, for example, George G. Pennacchi, "A Reexamination of the Over- (or Under-) Pricing of Deposit Insurance," *Journal of Money, Credit and Banking*, 1987, vol. 19, no. 3, pp. 340-360.; and Deborah Lucas and Robert McDonald, "An Options-based Approach to Evaluating the Risk of Fannie Mae and Freddie Mac," *Journal of Monetary Economics*, 2006, vol. 53, pp. 155-176.

payment of dividends.

For an individual bank, the probability and timing of failure depend primarily on a few key variables: the initial capital position (the cushion between asset and liability values), asset value volatility (which drives period-to-period changes in asset value), and the extent to which banks gamble by taking on more risk (as measured by increase in asset volatility) when they become undercapitalized. The value of this last parameter is identified by calibrating the model's average probability of failure to the historical long-run default rate on debt with the same credit rating as the average credit rating of the banks in the data set.[14]

The FDIC's expected cost is the shortfall between the market values of the bank's available assets and its insured deposits. That difference depends on the liability structure of the bank, because some liabilities, such as Federal Home Loan Bank Advances, repurchase agreements, and municipal deposits that exceed the deposit insurance coverage ceiling, are secured by pledged bank assets. In the event of bank failure, secured claims have a higher priority than domestic deposits and so are not available to pay insured deposits. Further, all domestic deposits, both insured and uninsured have the same priority claim on assets. Thus, the claims of uninsured depositors reduce the value of assets available to the FDIC. All else equal, the cost to the FDIC of a bank failure increases with the share of insured deposits, secured liabilities, and domestic deposits.

Estimates

The model simulates the market value of bank assets, liabilities, and net worth for a 5-year horizon for each of the 231 institutions in the data set. The sample consists of exchange-traded institutions for which bank assets constituted at least 95 percent of the stock-issuing entity's assets as of December 2004. The stock-issuing entity in most cases is a bank holding company rather than a single bank. Thus, the 231 exchange-traded entities correspond to about 500 banks, which account for about 30 percent of the assets of all FDIC-insured institutions.[15] All banks within a single holding company are considered one entity, a definition that is consistent with the authority of the FDIC to require commonly controlled banks to cover the cost of a constituent bank's failure. Some banks that are part of large financial conglomerates, such as Citibank, are

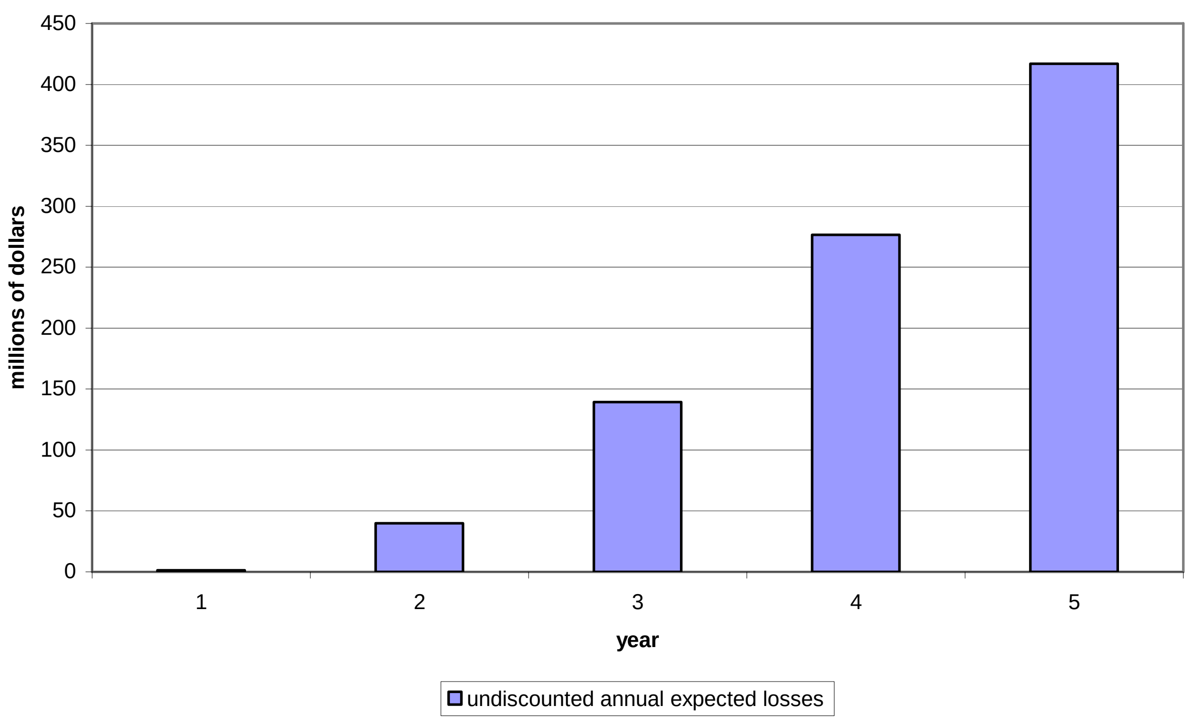
[14] Another basis for choosing a 5-year term is that given the current well-capitalized position of most banks, the average cumulative probabilities of failure resulting from the simulations approach the long-run average probabilities at a 5-year horizon. For terms of 1-4 years, the average cumulative probability of failure generated by the simulations is below the long-run average.

[15] All institutions were Bank Insurance Fund members. Prior to 2006, the FDIC administered two deposit insurance funds, the Bank Insurance Fund (BIF) and the Savings Association Insurance Fund (SAIF). BIF member institutions were primarily commercial and savings banks supervised by the FDIC, the Office of the Comptroller of the Currency (OCC), or the Federal Reserve Board (FRB). SAIF members were predominantly savings associations supervised by the Office of Thrift Supervision (OTS). The Federal Deposit Insurance Reform Act of 2005 provided for the merger of the two funds into a single fund, the Deposit Insurance Fund (DIF), which occurred March 31, 2006.

not included because they do not meet the criterion that at least 95 percent of their assets be bank related.

Chart 1 shows the FDIC's annual undiscounted expected losses (and cash flows) for the sample of banks. The banks' strong capital position in 2004 is reflected in low expected losses the first year, under $2 million (which is barely perceptible in the chart). Expected losses increase each year because of the volatility and random evolution of asset values, and by the fifth year the FDIC's expected cash payments exceed $400 million. The cumulative total of those losses over 5 years is $875 million.

Chart 1. Undiscounted annual expected losses, for set of 231 entities, base case



Under the model's base case assumptions (Table 1), the 5-year fair value of the deposit insurance guarantee for the sample of 231 banks is about $1.2 billion. Chart 2 compares cumulative undiscounted expected losses and the option value for 1 to 5 years.

If the fair value of deposit insurance bears the same relation to assets among banks outside the sample as it does to those in the sample, the fair value of the deposit insurance guarantee for all FDIC- insured institutions for a 5-year term is about $4 billion. Including the cost of monitoring,

Chart 2. Cumulative undiscounted expected losses and N-year option value, for set of 231 entities, base case

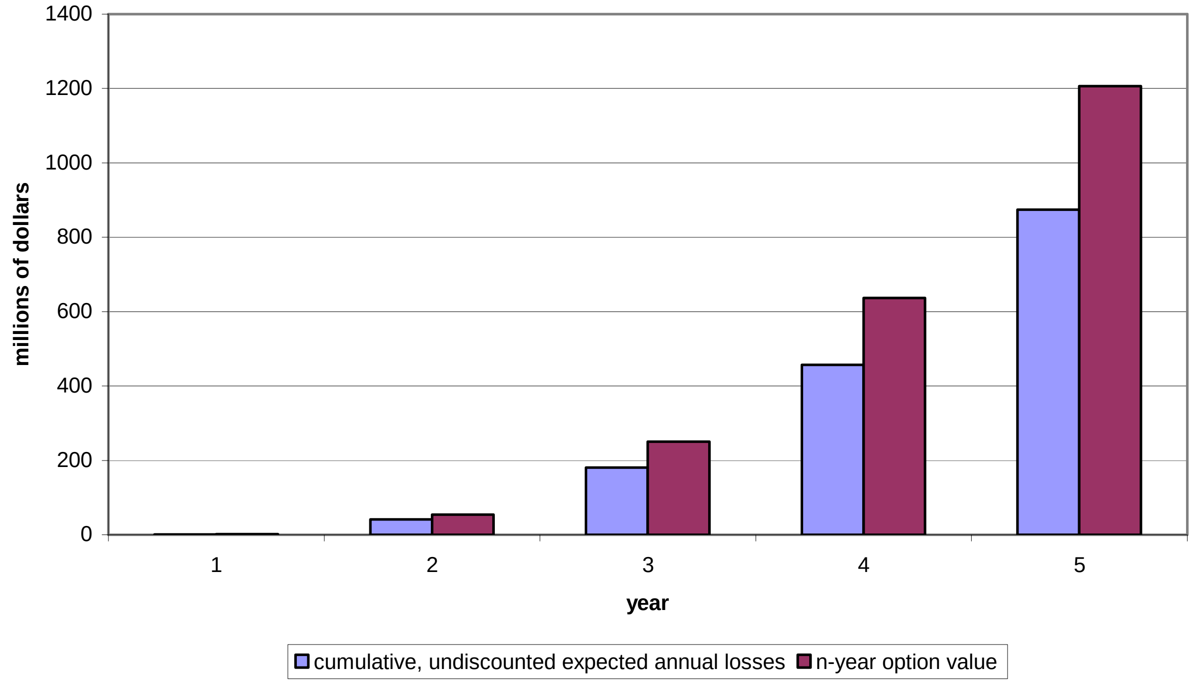


Table 1. Base case assumptions for option valuation model	
Parameter	Value
Annual risk-free interest rate	5%
Annual expected return on a market portfolio of assets	8.5%
Annual market volatility	11%
Annual trend growth in deposits and assets from inflows to the banking system	6%
Threshold undercapitalized, liability-to-asset ratio	≥0.96
Bank closure liability-to-asset ratio	≥1.09
Increase in bank asset volatility when undercapitalized	60%

if a private institution were to take on the task of providing the guarantee for 5 years it might charge about $8.5 billion.[16]

Evaluation of the Model Results

The parameter values for most of the key drivers of cost in the option valuation model (market volatility, market expected return, bank asset betas, bank asset volatilities) are empirical estimates. The parameter for which estimates would be problematic, the increase in bank asset volatility when a bank is undercapitalized, is specified by calibrating the model to observed long-run average cumulative default rates for firms with similar credit ratings.

Comparison with Credit-Rating Default Rates

Cumulative 5-year default probabilities reported by Standard & Poor's (S&P) and Moody's for comparably rated bonds range between 1.86 and 2.3 percent. The 44 banks in the data set with credit ratings had a median (and average) S&P rating of BBB+, with a range of AA- to B+. The corresponding 5-year cumulative default probability reported by S&P for BBB+ firms was 2.3 percent[17]; the cumulative 5-year default rates on bonds issued by financial institutions rated Baa by Moody's was 1.86 percent,[18] and the 5-year cumulative default rate for all corporate issuers with a Baa rating was 2.27 percent. The lower probability of default for financial institutions than for all corporations with the same credit rating over 1983-2004 may be due to forbearance by bank and thrift regulators prior to the prompt corrective action measures adopted in the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA). Thus, expected 5-year cumulative probabilities of failure in the range of 1.86 and 2.3 percent, with a post-FDICIA value perhaps closer to 2.3 percent than 1.86 percent, would be consistent with experience and current law.

Asset Volatility When Undercapitalized

Banks may increase their asset volatility as they approach insolvency (i.e., "gamble for resurrection"). But the parameter value for the possible increase in asset volatility when undercapitalized cannot be estimated with much confidence. In their analysis of Fannie Mae and Freddie Mac, Lucas and MacDonald assume a fourfold increase in asset volatility in periods of distress.[19] In the case of banks, the calibration of the probability of failure to default rates of similarly rated firms suggests that an increase of 50 percent to 75 percent in asset volatility when

[16]The present value of the FDIC's operating costs over 5 years is about $4.5 billion. Added to the $4 billion fair value of the guarantee over the same period, the total fair value cost is about $8.5 billion.

[17]Table 13, Standard & Poor's Global Fixed Income Research, "Annual Global Corporate Default Study," January 26, 2005 (based on experience for 1981-2004).

[18]Exhibit 10, Moody's Investors Service Global Credit Research, "Defaults, Losses and Rating Transitions on Bonds Issued by Financial Institutions: 1983-2004," December 2005 (based on experience from 1983-2004; Moody's Baa rating corresponds to the S&P BBB rating).

[19] Deborah Lucas and Robert McDonald, "An Options-based Approach to Evaluating the Risk of Fannie Mae and Freddie Mac," *Journal of Monetary Economics*, 2006, vol. 53, pp. 155-176.

the bank is undercapitalized is plausible. For example, a 60 percent increase in asset volatility results in an average 5-year cumulative probability of failure of 2.06 percent, which falls about halfway between the corresponding S&P rate of 2.3 percent and the Moody's rate of 1.86 percent (Table 2).

The 5-year option values corresponding to increases in asset volatility of 50 to 75 percent for an undercapitalized bank are $1 billion to $1.4 billion. Extrapolating those estimates to all FDIC-insured institutions produces 5-year option values of the deposit insurance guarantee from $3.3 to $4.6 billion.

Table 2. Option value and average cumulative probability of failure over a 5-year term for 231 bank entities, for various increases in asset volatility when undercapitalized

			Base Case			
Assumed increase in volatility when bank is undercapitalized	0%	50%	60%	70%	75%	100%
Option value (millions)	451	1,074	1,206	1,339	1,400	1,718
Average cumulative probability of failure (percent)	0.97	1.90	2.06	2.21	2.28	2.58
Moody's cumulative average 5-year default rates for financial institutions rated Baa 1983-2004 (percent)						1.86
S&P cumulative long-run (1981-2004) average 5-year default rates for BBB+-rated firms (percent)						2.3

APPENDIX

A general introduction to option pricing models may be found in most modern finance texts. This appendix gives more detail about the simulation model, including model inputs.

The simulation begins from bank conditions as of December 2004. The bank-specific variables are:

- initial market value of assets and liabilities,
- volatility of bank assets
- market risk (beta) of bank assets
- book value of
  - insured deposits
  - total domestic deposits
  - foreign deposits
  - secured liabilities
  - long-term debt
  - nondeposit liabilities

The market value, volatility, and beta of banks' assets are not directly observable. However, the market value, volatility, and beta of equity are observable for exchange-traded banks, and estimates of the market value of assets, asset volatility, and asset beta are calculated from those observed market values.

<u>Initial Market Value of Assets</u>
The initial market value of a bank's assets is estimated from the market value of equity and the accounting identity Assets = Liabilities + Equity. For a well-capitalized bank, as most were at the beginning of the simulations, the book value of liabilities was a close approximation of market value, as the bulk were deposits that may be redeemed at par. Thus, market value of assets is the sum of book value liabilities and market value of equity.

<u>Asset Volatility</u>
Asset volatility is calculated from observed equity volatility by "unlevering" the equity volatility. That is, assuming that equity volatility, sigmaE, reflects the volatility of the underlying assets (sigmaA),

$$\text{sigmaE} = \text{sigmaA} \times (\text{Assets/Equity}) \qquad (1)$$

When the firm is far from insolvency, that relationship between sigmaE and sigmaA is reasonable.[20] Because none of the banks in the sample were undercapitalized, each bank's asset volatility (sigmaA) was estimated by solving Equation 1 for sigmaA.

[20] Because of equity holders' limited liability, when a firm is close to insolvency, equity is somewhat less sensitive to changes in asset values, as gains and losses are shared partially with debt holders.

Asset Beta
A firm's market risk can be approximated by its beta, which is the covariance of the firm's equity returns with the overall market's returns, divided by the variance of the overall market's returns. A stock's equity beta can be estimated from a time series of returns on the stock and on the market portfolio.

The beta of firm assets is the weighted average of the firm's equity beta and the beta of its liabilities. If the bulk of banks' liabilities are insured deposits, those liabilities are riskless and have a beta of zero, in which case the asset beta is approximated as the "unlevered" equity beta, or:

Asset Beta = Equity Beta × (market value of equity/market value of assets).

Model Parameters
The parameters required for the simulation analysis are shown in Table A1, with sources. All of the parameter values, with the exception of the increase in asset volatility when undercapitalized, have an empirical basis.

Table A1. Model parameters and sources		
Parameter	Value	Source/Basis
Risk-free rate	5%	
Market expected return	8.5%	academic research[21]
Market volatility	11%	past 1-4 year volatility of S&P 500[22]
Bank asset volatility	varies by bank	past 260 days volatility, Bloomberg
Bank asset beta	varies by bank	based on past 2-5 year weekly returns, Bloomberg
Bank expected return	varies by bank	calculated from bank asset beta, risk-free rate, and market expected return
Trend growth of assets and liabilities	6%	based on FDIC data, Quarterly Banking Profile
Default trigger	liability-to-asset ratio of 1.09	based on FDIC data, *Failed Bank Cost Analysis 1986-1993*
Volatility multiplier when bank is undercapitalized	1.6	based on calibration to expected long-term default rates for BBB+-rated companies reported by credit rating agencies

Asset Simulation

For each bank, simulated asset value is a function of initial value, expected return on assets, dividend payout, banking system growth, bank asset volatility, and bank capital. Specifically, expected asset growth is the expected rate of return less dividend payouts plus banking system trend, with growth conditional on the bank's meeting regulatory criteria for being adequately capitalized. When a bank is less than adequately capitalized, exogenous inflows of assets and outflows of dividends cease.

Simulated Asset Value. Realized changes in asset value for each period are drawn from a distribution whose mean is the expected rate of return (adjusted for dividends and trend growth) and whose variance is estimated from equity volatility. Thus, each shock to asset values may be considered to have two components, a change in the asset prices and a change in the quantity of

[21]This is a long-run expected return on equities; John Y. Campbell, "Forecasting U.S. Equity Returns in the 21st Century," presented to the Social Security Advisory Board, August 2001.

[22]Long-run market volatility is 18 percent (Ibid., p. 4).

assets. The expected return on assets is estimated with the capital asset pricing model (CAPM), which posits a relationship between the expected return on a security and its beta. The expected return for bank assets is the risk-free rate plus the product of beta and the market risk premium.

Liability Simulation

Bank liabilities are determined by initial value, interest accruals on liabilities, and banking sector trend growth (conditioned on the bank being adequately capitalized).

Market Value of Liabilities. The market value of debt issued by the bank may be more or less than the book value, depending on changes in interest rates since the debt was issued. If banks' liabilities are of relatively short duration, however, it is reasonable to assume that their value is not changed by movements in interest rates as much as the value of assets, which typically have longer duration. Further, because deposits, which typically make up the largest share of liabilities, are redeemable at par on demand, the market value of most liabilities is approximated by their face (or book) value.

Interest. Interest accrues on liabilities, thus increasing a bank's existing liabilities at the risk-free rate of interest.

Sector Trend Growth. Liabilities and assets grow at the trend rate when a bank is well capitalized (no trend growth occurs when it is not well capitalized). To be considered well capitalized, a bank's liability-to-asset ratio must not exceed .95.

Closure Rule

Insurance losses would be minimized by closure at insolvency, that is, when the value of the assets falls just below the value of the liabilities. However, assets and liabilities cannot be continuously monitored and valued precisely. In the model, the market value of the liabilities-to-assets ratio is evaluated annually. If that ratio is below the closure threshold (1.09), the simulation continues; if it exceeds the closure threshold, the simulation ends and the cost to the deposit insurer is calculated. The closure threshold is based on the actual losses of banks over $1 billion in asset size from 1991 through 1993.[23]

Data Sources

- Initial book value of a bank's liabilities: 10K filings with the Securities and Exchange Commission (SEC) as reported by Compustat.
- Book value of deposits and pledged assets: regulatory Call Reports, as reported by Financial Information Systems.
- Firm equity volatility and equity beta: Bloomberg.

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[23]This period begins with the change in laws and regulations mandating prompt corrective action for undercapitalized banks in 1991.