http://clevelandfed.org/research/review/
Economic Review 1999 Q3

Depositor-Preference Laws and the Cost of Debt Capital

by William P. Osterberg and James B. Thomson

William P. Osterberg is a senior economist and James B. Thomson is a vice president and economist at the Federal Reserve Bank of Cleveland.

Introduction

The subsidy inherent in the current deposit-insurance system creates perverse incentives for risk taking by insured depository institutions (Kane [1985]). The thrift debacle and its attendant financial and political costs have exposed the dangers of combining virtually unlimited federal deposit guarantees and regulatory discretion. Federal deposit guarantees, the too-big-to-let-fail doctrine, and capital forbearance programs have effectively limited markets' ability to discipline troubled institutions. On the other hand, principal-agent conflicts have often produced government regulatory policies designed to forestall disciplinary actions against troubled banks and thrifts (Kane [1989]; Thomson [1992]).

Armed with increased awareness of the role played by regulatory forbearance in the thrift debacle and in record losses from the 1980s' bank closings, Congress passed the Federal Deposit Insurance Corporation Improvement Act of 1991.[1] The FDICIA contains four important reforms: First, it requires prompt corrective action for undercapitalized banks and for those considered problem institutions by their primary federal regulator.[2] Second, the FDICIA limits Federal Reserve discount-window loans to troubled depositories.[3] Third, the FDICIA now requires the Federal Deposit Insurance Corporation to charge insured institutions a risk-related deposit-insurance premium. Finally, the FDICIA replaces the too-big-to-let-fail doctrine with the systemic-risk exception, which codifies the terms and conditions under which the FDIC can bail out uninsured claimants of failed depositories.[4]

1 DeGennaro and Thomson (1996) show that capital forbearance increased the total taxpayer bill in the thrift debacle more than 500 percent.

2 Carnell (1993) notes that the FDICIA does not remove regulatory discretion but progressively limits it as an institution slides toward insolvency.

3 Todd (1993) argues that these discount-window provisions are designed to prevent the Federal Reserve from propping up insolvent banks through improper solvency-based loans.

4 Carnell (1993) contends that abuse of the exception can be limited by FDICIA provisions requiring written authorization from the Federal Reserve Chairman and the Secretary of the Treasury for financing systemic-risk losses by a special assessment on banks' total liabilities (total deposits).

Shortly after enacting the FDICIA, Congress added another potentially important measure to limit the FDIC's (and hence taxpayers') exposure. The Omnibus Budget Reconciliation Act of 1993 created a national depositor-preference law, changing the priority of depositors' (and thus the FDIC's) claims on the assets of failed banks by making other senior claimants subordinate to depositors.[5] In other words, Congress implemented depositor preference in an effort to reduce the FDIC's losses by changing the capital structure of banks.

This paper analyzes the impact of depositor-preference laws on banks' cost of debt capital and on the value of FDIC deposit guarantees.[6] We extend the single-period-cash-flow version of the capital-asset pricing model, presented by Chen (1978) and modified by Osterberg and Thomson (1990, 1991), to include depositor preference. In this model, the value of a firm is the present value of its future cash flows. The values of a firm's debt and equity are the present values of these claims on the firm's cash flows. Riskless cash flows are discounted at the risk-free rate of interest. Risky cash flows are converted to certainty-equivalent cash flows by deducting a risk premium from the expected cash flow. In this model, the risk premium is simply the market price of risk, multiplied by the covariance of the risky cash flow with the market portfolio.

In section I of this paper, we present the results of a single-period analysis of a bank that has both uninsured and insured deposits and subordinated debt, as derived in Osterberg and Thomson (1991). Section II extends our 1991 analysis to include the intended impact of depositor-preference laws. In section III, we investigate the laws' effects on the value of debt capital and deposit guarantees when general creditors behave strategically. We present conclusions and policy implications in section IV.

I. Banks' Cost of Capital and the Value of Deposit Insurance: No Depositor Preference

The following assumptions are used throughout this paper: 1) the risk-free rate of interest is constant; 2) capital markets are perfectly competitive; 3) expectations are homogeneous respecting the probability distributions of the yields on risky assets; 4) investors are risk averse and seek to maximize the utility of terminal wealth; 5) there are no taxes or bankruptcy costs; 6) all debt instruments are discount instruments, so the total promised payment to depositors and subordinated debtholders includes both principal and interest; and 7) the deposit-insurance premium is paid at the end of the period.[7]

In this section, we present results from Osterberg and Thomson (1990) for a bank with insured deposits and uninsured deposits, extended to include general creditors. The FDIC charges a fixed premium of ρ on each dollar of insured deposits. The total liability claims against the bank, D, is the sum of the end-of-period promised payments to the uninsured depositors, B_u, insured depositors, B_i, general creditors, G, and the FDIC, $z(\rho B_i)$. We assume that the FDIC underprices its deposit guarantees on average, and that in the absence of regulatory taxes (Buser, Chen, and Kane [1981]), the FDIC provides a subsidy that reduces banks' cost of capital and increases banks' value.

Under these assumptions, the end-of-period cash flows to insured depositors, Y_{bi}, clearly equal the promised payments to insured depositors, B_i, in every state. Therefore, whatever a bank's capital structure may be, the value, expected return, and cost of one dollar of insured deposits are defined as $V_{bi} = R^{-1}B_i$, $E(R_{bi}) = r$, and $r+\rho$, respectively.

■ 5 Title III of the Omnibus Budget Reconciliation Act of 1993 instituted depositor preference for all insured depository institutions by amending Section 11(d)(11) of the Federal Deposit Insurance Corporation Act [12 U.S.C. 1821(d)(11)]. At the time when national depositor preference was enacted, 29 states had similar laws covering state-chartered banks, and 18 had depositor-preference statutes covering state-chartered thrift institutions.

■ 6 For empirical studies of the impact of depositor-preference laws, see Hirschhorn and Zervos (1990), Osterberg (1996), and Osterberg and Thomson (1998).

■ 7 For simplicity, we assume that the deposit-insurance premium is an end-of-period claim on the bank. This is equivalent to assuming that the premium is subordinate to B_i and that, in effect, the bank receives coverage while not necessarily paying the full premium. However, although this assumption affects how the deposit-insurance subsidy enters into the expressions in this paper and the actual size of the subsidy, it does not qualitatively affect the results.

BOX 1

Definition of Notation

B_i = Total promised payment to insured depositors.

B_u = Total promised payment to uninsured depositors.

G = Total promised payment to general creditors.

ρ = Deposit-insurance premium per dollar of insured deposits.[8]

z = Total promised payment to the FDIC (ρB_i).

B = Total promised payment to depositors and the FDIC ($B_i + B_u + z$).

S = Total promised payment to subordinated debtholders.

D = Total promised payment ($B_i + B_u + G + S + z$).

Y_{bi}, Y_{bu}, Y_G, Y_s, Y_e, and Y_{FDIC} = End-of-period cash flows to insured depositors, uninsured depositors, general creditors, subordinated debtholders, stockholders, and the FDIC.

V_{bi}, V_{bu}, V_G, V_s, V_e, and V_{FDIC} = Values of insured deposits, uninsured deposits, general-creditor claims, subordinated debt, bank equity, and the FDIC's claim.

V_f = Value of the bank.

$E(R_{bi})$, $E(R_{bu})$, $E(R_G)$, $E(R_s)$, and $E(R_e)$ = Expected rates of return on insured and uninsured deposits, general-creditor claims, subordinated debt, and equity.

r = Risk-free rate ($R = 1 + r$).

X = End-of-period gross return on bank assets.

$F(X)$ = Cumulative probability-distribution function for X.

λ = Market risk premium.

$COV(X, R_m)$ = Systematic or nondiversifiable risk.

R_m = Return on the market portfolio.

$CEQ(X)$ = Certainty equivalence of $X\,[E(X) - \lambda COV(X, R_m)]$.

Uninsured Depositors

End-of-period cash flows to uninsured depositors depend on the promised payment to the uninsured depositors and on total promised payments minus subordinated debt:

$$Y_{bu} = \begin{cases} B_u & \text{if } X > D-S = B_i+B_u+G+z, \\ B_uX/(D-S) & \text{if } D-S > X > 0, \text{ and} \\ 0 & \text{if } 0 > X. \end{cases}$$

While total promised payments to debtholders and the FDIC equal D, the effective bankruptcy threshold for uninsured depositors is D less the claims of subordinated debtholders. The value of and the required rate of return on uninsured deposits are

$$(1)\quad V_{bu} = R^{-1}\{B_u[1-F(D-S)] + [B_u/(D-S)]CEQ_0^{D-S}(X)\}$$

and

$$(2)\quad E(R_{bu}) = \frac{1-F(D-S)+[1/(D-S)]E_0^{D-S}(X)}{V_{bu}} - 1.0.$$

Equation (2) shows that the cost of debt (uninsured-deposit) capital is a function of the bank's systematic risk, as measured by $\lambda COV(X, R_m)$; total promised payments to depositors and the FDIC, $(D-S)$; the probability that losses will exceed the level of subordinated debt, $F(D-S)$; and the risk-free rate of return. Osterberg and Thomson (1990, 1991) show that when the FDIC misprices its guarantees, the cost of uninsured deposit capital also depends on the deposit mix, because underpriced (overpriced) deposit guarantees lower (raise) the effective bankruptcy threshold for senior claims, $F(D-S)$, as well as the bankruptcy threshold, $F(D)$. Furthermore, underpriced (overpriced) deposit guarantees increase (decrease) the claims of uninsured depositors relative to senior claims, $B_u/(D-S)$, and relative to total claims, B_u/D. The size of this effect is a function of the FDIC's pricing error per dollar of insured deposits and of the weight of insured deposits in the senior creditor pool.

General Creditors

General creditors have the same priority of claim as uninsured depositors; consequently, they will have similar end-of-period cash flows.

$$Y_G = \begin{cases} G & \text{if } X > D-S = B_i+B_u+G+z, \\ GX/(D-S) & \text{if } D-S > X > 0, \text{ and} \\ 0 & \text{if } 0 > X. \end{cases}$$

As before, total promised payments equal D, and the effective bankruptcy threshold is $D-S$. The value of and the required rate of return on senior nondeposit debt are

$$(3)\quad V_G = R^{-1}\{G[1-F(D-S)] + [G/(D-S)]CEQ_0^{D-S}(X)\}$$

and

$$(4)\quad E(R_G) = \frac{1-F(D-S)+[1/(D-S)]E_0^{D-S}(X)}{V_G} - 1.0.$$

■ 8 For simplicity, we express the premium as a function of insured deposits. The results of interest are not materially affected by adopting the more realistic assumption that premiums are levied on total domestic deposits, insured and uninsured.

Equation (4) shows that the cost of non-deposit debt (general-credit) capital is a function of the same factors as uninsured deposits, including the bank's systematic risk, $\lambda COV(X, R_m)$, total promised payments to senior creditors and the FDIC, $(D-S)$, the probability that losses will exceed the level of subordinated debt, $F(D-S)$, and the risk-free rate of return. It also depends on the size of the deposit-insurance subsidy.

Subordinated Debtholders

The end-of-period expected cash flows accruing to subordinated debtholders are

$$Y_s = \begin{cases} S & \text{if } X > D, \\ X+S-D & \text{if } D > X > D-S, \text{ and} \\ 0 & \text{if } D-S > X. \end{cases}$$

The value of the subordinated debt and the required rate of return on subordinated debt capital are

$$(5) \quad V_S = R^{-1}\{S[1-F(D-S)]-D[F(D)-F(D-S)] + CEQ_{D-S}^{D}(X)\}$$

and

$$(6) \quad E(R_s) = \frac{S[1-F(D-S)]-D[F(D)-F(D-S)]}{V_S} + \frac{E_{D-S}^{D}(X)}{V_S} - 1.0.$$

Equations (5) and (6) show that the cost and value of subordinated debt capital depend on the probability of bankruptcy, $F(D)$, the face value of the subordinated debt, S, total promised payments, D, and the probability that senior claimants will not be repaid in full, $F(D-S)$. Note that the last two terms in equation (6) represent the claims of subordinated debtholders in states where they are the residual claimants.

Equityholders

The end-of-period cash flows accruing to stockholders are

$$Y_e = \begin{cases} X-D & \text{if } X > D, \text{ and} \\ 0 & \text{if } D > X. \end{cases}$$

The value of equity and the expected return to stockholders are

$$(7) \quad V_e = R^{-1}\{CEQ_D(X) - D[1-F(D)]\}$$

and

$$(8) \quad E(R_e) = \frac{E_D(X) - D[1-F(D)]}{V_e} - 1.0.$$

The FDIC's Claim

The net value of deposit insurance is the value of the FDIC's claim on the bank, that is, the value of the FDIC's premium less the value of its deposit guarantee. In the absence of depositor-preference laws, the end-of-period cash flows to the FDIC and the value of its position are

$$Y_{FDIC} = \begin{cases} z & \text{if } X > D, -S, \\ (B_i+z)X/(D-S)-B_i & \text{if } D-S > X > 0, \text{ and} \\ -B_i & \text{if } 0 > X, \text{ so that} \end{cases}$$

$$(9) \quad V_{FDIC} = R^{-1}\{z[1-F(D-S)] + \frac{B_i+z}{D-S} CEQ_0^{D-S}(X) - B_i F(D-S)\}.$$

Equation (9) shows that the net value of deposit insurance is a function of the composition of the senior claims, the bank's systematic risk, the presence of junior debt claims in the bank's capital structure, the risk-free rate of return, the effective probability of bankruptcy, $F(D-S)$, the level of promised payments to insured depositors, and the deposit-insurance premium. In fact, equation (9) can be interpreted as showing that the equity-like buffer provided by subordinated debt affects the value of the FDIC's position by changing the probability that put options corresponding to the FDIC guarantee will be "in the money" at the end of the period. Equation (9) also demonstrates that if deposit insurance is to be priced fairly, $V_{FDIC} = 0$, the premium will be influenced by the degree to which the bank funds itself with claims junior to insured deposits.

Osterberg and Thomson (1990) show that the value of the uninsured bank is $R^{-1}CEQ_0(X)$. The value of the insured bank, V_f, equals the uninsured bank's value minus equation (9), which is the value of the FDIC's claim.

$$(10)\quad V_f = R^{-1}\{CEQ_0(X) + B_i F(D-S) - [(B_i + z) /(D-S)]CEQ_0^{D-S}(X) - z[1-F(D-S)]\}.$$

Equation (10) shows that the structure of a bank's debt (in terms of payment priority) affects the value of the bank only through the net value of deposit insurance to the bank. To see this, note that $B_i F(D-S) - [(B_i+z)/(D-S)]CEQ_0^{D-S}(X)$ is the value of FDIC guarantees, and $z[1-F(D-S)]$ is the value of the FDIC premium. If deposit insurance is correctly priced (that is, the value of its guarantee equals the value of its premium), then the structure of a bank's liability claims does not affect the bank's value.

II. Banks' Cost of Capital and the Value of the Insurance Fund: Depositor Preference

In this section, we rederive the results to incorporate depositor preference, which subordinates the claims of general creditors to those of uninsured depositors and of the FDIC. As in section I, we assume that the FDIC charges a flat-rate insurance premium of ρ on each dollar of insured deposits, and that on average the FDIC underprices its deposit guarantees.[9] To simplify the analysis, we assume that depositor preference does not change total liability claims against the bank, D.[10] Under this assumption, depositor-preference laws have no impact on claims that are junior to deposits and general-creditor claims.

■ **9** The results are qualitatively the same if the FDIC charges a variable-rate premium, so long as the deposit guarantees are mispriced.

■ **10** The results for uninsured depositors, FDIC, and general-creditor claims are qualitatively the same if we assume that depositor-preference laws change the level of total promised payments (see Osterberg and Thomson [1991, 1994]).

Uninsured Depositors

The end-of-period cash flows to uninsured depositors depend on the promised payment to uninsured depositors and on the total level of promised payments minus subordinated debt and the now-subordinated claims of general creditors:

$$Y_{bu} = \begin{cases} B_u & \text{if } X > B = B_i + B_u + z, \\ B_u X/B & \text{if } B > X > 0, \text{ and} \\ 0 & \text{if } 0 > X. \end{cases}$$

While total promised payments to debtholders and the FDIC equal K, the effective bankruptcy threshold for uninsured depositors is $B(=D-G-S)$. The value of—and the required rate of return on—uninsured deposits are

$$(11)\quad V_{bu} = R^{-1}\{B_u[1-F(B)] + (B_u/B)CEQ_0^B(X)\},$$

and

$$(12)\quad E(R_{bu}) = \frac{1-F(B)+(1/B)E_0^B(X)}{V_{bu}} - 1.0.$$

From the standpoint of uninsured deposit capital, depositor-preference laws have the same impact as a requirement that banks issue subordinated debt. That is, when uninsured depositors and the FDIC have claims in bankruptcy that are senior to those of general creditors, the effective bankruptcy threshold for uninsured depositors is lowered from $D-S$ to $D-G-S$. For uninsured depositors (and, as we shall see, for the FDIC), the pecking order of more junior claims is irrelevant to the value of their own.

To assess depositor preference's impact on the value of uninsured deposits, we control for possible changes in total promised payments by normalizing their expected cash flows by the level of uninsured deposits, and compare uninsured deposits in banks with and without depositor-preference laws. We then separate the expected cash flow to an uninsured deposit (with a par value of one dollar) in the presence of depositor-preference debt into two instruments. One is identical to the uninsured deposit in section I; the other has the following end-of-period payoffs and value:

$$\Delta Y_{bu} = \begin{cases} 0 & \text{if } X > D-S, \\ 1-X/(D-S) & \text{if } D-S > X > B, \\ X/B - X/(D-S) & \text{if } B > X > 0, \text{ and} \\ 0 & \text{if } 0 > X, \text{ so that} \end{cases}$$

$$(13) \quad \Delta Y_{bu} = R^{-1}[F(D-S)-F(B) + \frac{(D-S-B)}{B(D-S)} CEQ_0^B(x) - \frac{1}{D-S} CEQ_B^{D-S}(x)] > 0.$$

Equation (13) is positive; note that the first term in the brackets is strictly greater than the third term. Moreover, since by definition $D-S>B$, the middle term is also positive. Therefore, depositor preference must increase the value of a dollar of uninsured deposits.

General Creditors

Under depositor preference, general-creditor claims are junior to those of depositors and the FDIC but senior to those of subordinated creditors; hence, end-of-period cash flows to general creditors are

$$Y_G = \begin{cases} G & \text{if } X > D-S = B_i + B_u + G + z, \\ X-B & \text{if } D-S > X > B, \text{ and} \\ 0 & \text{if } B > X. \end{cases}$$

The total promised payments to debtholders and to the FDIC equal D, and the effective bankruptcy threshold is $D-S$. The value of and the required rate of return on general-creditor claims are

$$(14) \quad V_G = R^{-1}\{G[1-F(D-S)] - B[F(D-S)-F(B)] + CEQ_B^{D-S}(X)\},$$

and

$$(15) \quad E(R_G) = \frac{G[1-F(D-S) - B[F(D-S)-F(B)]}{V_G} + \frac{E_B^{D-S}(X)}{V_G} - 1.0.$$

Equations (14) and (15) show that non-deposit debt (general credit) behaves like subordinated debt (equations [5] and [6]), except that subordinated debt protects general creditors from loss. The value of general-creditor claims depends on the effective bankruptcy threshold, $F(D-S)$, the face value of their claims, G, total promised payments to senior claimants, B, and the probability that senior claimants will not be repaid in full, $F(B)$. Note that when earnings fall between B and $D-S$, general creditors are the residual claimants, and theirs will behave like an equity claim.

Following the procedure used in the previous section, we construct the replicating portfolio for a general-creditor claim (with a par value of one dollar) under depositor preference. With depositor preference, the expected cash flow to such a claim is divided into one part that is identical to the general-creditor claim in section I, and a second that has the following end-of-period payoffs and value:

$$\Delta Y_G = \begin{cases} 0 & \text{if } X > D-S, \\ (X-B)/G - X/(D-S) & \text{if } D-S > X > B, \\ -X/(D-S) & \text{if } B > X > 0, \text{ and} \\ 0 & \text{if } 0 > X, \text{ so that} \end{cases}$$

$$(16) \quad \Delta V_G = R^{-1}[\frac{CEQ_B^{D-S}(X) - B[F(D-S)-F(B)]}{G} - \frac{CEQ_0^{D-S}(X)}{D-S}] < 0.$$

Equation (16) is unambiguously negative. That is, depositor preference decreases the value of a general-creditor claim.

The FDIC's Claim

As before, the net value of deposit insurance is simply the value of the FDIC's claim on the bank. Under depositor preference, the end-of-period cash flows to the FDIC and the value of its position are

$$Y_{FDIC} = \begin{cases} z & \text{if } X > B, \\ (B_i + z)X/B - B_i & \text{if } B > X > 0, \text{ and} \\ -B_i & \text{if } 0 > X, \text{ so that} \end{cases}$$

$$(17)\quad V_{FDIC} = R^{-1}\{z[1-F(B)] + \frac{B_i+z}{B} CEQ^B_0(X) - B_i F(B)\}.$$

As with uninsured deposits, the impact of a depositor-preference law is indistinguishable from a subordinated-debt requirement. Depositor preference affects the net value of the FDIC's claim by changing the senior claimants' probability of loss and by altering the weight of the FDIC in the pool of senior claims.

The change in the value of the FDIC guarantee on a one-dollar-par-value deposit is the value of a security with the following cash flows (where $\rho = z/B_i$):

$$\Delta Y_{FDIC} = \begin{cases} 0 & \text{if } X > D-S, \\ \rho-(1+\rho)X/(D-S)+1 & \text{if } D-S>X>B, \\ (1+\rho)X/B-(1+\rho)X/(D-S) & \text{if } B>X>0, \text{ and} \\ 0 & \text{if } 0>X, \text{ so that} \end{cases}$$

$$(18)\quad V_{FDIC} = \frac{1+\rho}{R}[F(D-S)-F(B)-\frac{1}{D-S}CEQ^{D-S}_B(X) + \frac{D-S-B}{B(D-S)}CEQ^B_0(X)] > 0.$$

Equation (18) is positive; to see this, note that the first term in the brackets is strictly greater than the second term. Since we assume that on average the FDIC underprices its guarantees, its claim on the bank is negative; hence, the size of the FDIC subsidy is smaller under depositor preference.

Finally, depositor preference affects the value of the bank entirely through its effect on the net value of deposit insurance.

$$(19)\quad V_f = R^{-1}\{CEQ_0(X) - z[1-F(B)] + \frac{B_i+z}{B} CEQ^B_0(X) - B_i F(B)\}.$$

Thus, if deposit insurance is always correctly priced (that is, if its net value to the bank is zero), depositor preference has no impact on bank value. But it does change the fair value of deposit insurance and so must be accounted for when setting the premium.

III. Banks' Cost of Debt Capital and the Value of Deposit Guarantees: Depositor Preference when General Creditors Behave Strategically

The results in section II assume that general creditors do not respond to the subordination of their claims under depositor preference. However, in practice, general creditors of insured depositories will respond to changes in the priority of their claims and the higher risk that results. At the very least, general creditors will charge the depository institution a higher rate of interest to compensate for the increased risk of loss. As nondeposit funds become more expensive relative to deposits, institutions will lessen their funding in nondeposit markets, thus reducing the loss buffer afforded to uninsured depositors and the FDIC by nondeposit creditors.

Senior nondeposit creditors might also respond to depositor preference by reducing the average maturity of their claims. This response increases creditors' ability to "run" on the depository institution if its condition deteriorates. In fact, financially distressed institutions may find it difficult or impossible to issue unsecured nondeposit claims. This response by nondeposit creditors to depositor preference has two implications. First, if nondeposit creditors can effectively exit a troubled institution before it is closed, little or no loss cushion will be afforded to uninsured depositors and the FDIC. Second, the failure of nondeposit creditors to renew their claims could trigger a liquidity crisis that causes the institution to be closed.[11]

The third option for unsecured general creditors is to take collateral against their claim. By becoming secured creditors, they will have transformed their claim into one that is senior (to the extent of the collateral) to deposit claims. This, in turn, will have two effects on the claims of uninsured depositors and the FDIC. First, the loss buffer afforded by general-creditor claims is reduced. Second (and more importantly), the general asset pool available to pay unsecured claims is also reduced. If enough general-creditor claims take collateral, the total loss exposure of the FDIC and uninsured depositors could increase.

11 The decision to close a bank is based on one of two measures of solvency: the incapacity to pay obligations as they mature or book-value, balance-sheet insolvency. Inability to renew nondeposit credits could trigger insolvency under the maturing-obligations test (see Thomson [1992]).

Structural Arbitrage

The static nature of our model does not allow us to study the dynamic reaction of general creditors to depositor-preference laws directly. However, we can examine the implications of structural arbitrage by general creditors through its impact on the cash flows accruing to each class of claimant. Under the assumption that general creditors effectively collateralize their claims on the bank, we can show the unintended effect of depositor-preference laws on the cost of capital for banks and on the FDIC's claim.

As in section I, we assume that the FDIC charges a flat-rate insurance premium of ρ on each dollar of insured deposits and that, on average, the FDIC underprices its deposit guarantees. The total liability claims against the bank, D, are the sum of the end-of-period promised payments to uninsured depositors, B_u, insured depositors, B_i, general creditors, G, subordinated debtholders, S, and the FDIC, $z (= \rho B_i)$. As in the previous section, we assume that total claims, D, are not affected by depositor preference and general creditors' responses to it.

Uninsured Depositors

The end-of-period cash flows to uninsured depositors depend on the promised payment to uninsured depositors, the total level of promised payments minus subordinated debt and claims, and the claims of general creditors:

$$
Y_{bu} = \begin{cases} B_u & \text{if } X > D-S, \\ B_u(X-G)/(D-S) & \text{if } D-S > X > G, \text{ and} \\ 0 & \text{if } 0 > X. \end{cases}
$$

While the total promised payments to debtholders and the FDIC equal D, the effective bankruptcy threshold for uninsured depositors is $(D-S)$. The value of and the required rate of return on uninsured deposits are

$$
(20) \quad V_{bu} = R^{-1}\Big(B_u[1-F(D-S)+\frac{B_u}{D-S}\{CEQ_G^{D-S}(X)-G[F(D-S)-F(G)]\}\Big),
$$

and

$$
(21) \quad E_{bu} = \frac{1-F(D-S)}{V_{bu}} + \frac{\frac{1}{D-S}\{E_G^{D-S}(X)-G[F(D-S)-F(G)]\}}{V_{bu}} - 1.0.
$$

From the standpoint of uninsured deposit capital, general creditors' strategic behavior has rendered depositor claims junior to their own.

To isolate the de facto impact of depositor preference on the value of uninsured deposits in this case, we control for possible changes in total promised payments by normalizing expected cash flows at the level of uninsured deposits, and compare uninsured deposits in banks in the presence and absence of depositor-preference laws. We then separate the expected cash flow to an uninsured deposit (with a par value of one dollar) in the presence of depositor-preference debt into two instruments: one that is identical to the uninsured deposit in section I, and a second that has the following end-of-period payoffs and value:

$$
\Delta Y_{bu} = \begin{cases} 0 & \text{if } X > D-S, \\ -G/(D-S) & \text{if } D-S > X > G, \text{ and} \\ -X/(D-S) & \text{if } G > X > 0, \text{ so that} \end{cases}
$$

$$
(22) \quad \Delta V_{bu} = [R(D-S)]^{-1}\{-G[F(D-S)-CEQ_0^G(X)]\} < 0.
$$

Equation (22) is unambiguously negative. Hence, a potential unintended effect of depositor-preference laws is to reduce the value of uninsured depositor claims on the bank.

General Creditors

The intended effect of depositor preference is to make general-creditor claims junior to those of depositors and the FDIC, but senior to those of subordinated creditors. However, the de facto effect of depositor preference may be to make general-creditor claims senior to all others. Under this scenario, the end-of-period cash flows to general creditors are

$$\Delta Y_G = \begin{cases} G & \text{if } X > G, \\ X & \text{if } G > X > 0, \text{ and} \\ 0 & \text{if } 0 > X. \end{cases}$$

The total promised payments to debtholders and to the FDIC equal K, and the effective bankruptcy threshold for general creditors is $D-B-S=G$. The value of and the required rate of return on general creditor claims are

$$(23) \quad V_G = R^{-1}\{G[1-F(G)] + CEQ_0^G(X)\},$$

and

$$(24) \quad E(R_G) = \frac{G[1-F(G)] + E_0^G(X)}{V_G} - 1.0.$$

Equations (23) and (24) show that the value and return on general-creditor claims depend only on the level and variability of cash flows and the size of G. The presence and structure of other claims on the bank do not affect the valuation of such claims because we have assumed that general creditors have de facto secured the most senior claim on the bank. Following the procedure used in the previous sections, we construct the replicating portfolio for a general-creditor claim (with a par value of one dollar) under depositor preference. The expected cash flow to a such a claim is divided into one part that is identical to the general-creditors claim in section I, and another that has the following end-of-period payoffs and value:

$$\Delta Y_G = \begin{cases} 0 & \text{if } X > D-S, \\ 1-X/(D-S) & \text{if } D-S > X > G, \text{ and} \\ X/G - X/(D-S) & \text{if } G > X > 0, \text{ so that} \end{cases}$$

$$(25) \quad \Delta V_G = R^{-1}\{[F(D-S) - F(G)] - [\frac{CEQ_0^{D-S}(X)}{D-S} - \frac{CEQ_0^G(X)}{G}]\} > 0.$$

Whether the value of general-creditor claims increases or decreases depends, in this case, on whether the difference between the first two bracketed terms in (25) is larger than the difference between the second two bracketed terms.

The FDIC's Claim

As before, the net value of deposit insurance is the value of the FDIC's claim on the bank. Under depositor preference, end-of-period cash flows to the FDIC and the value of its position are

$$Y_{FDIC} = \begin{cases} z & \text{if } X > D-S, \\ (B_i + z - G) X/(D-S) - B_i & \text{if } D-S > X > G, \text{ and} \\ -Bi & \text{if } G > X, \text{ so that} \end{cases}$$

$$(26) \quad V_{FDIC} = R^{-1}\{z[1-F(D-S)] + \frac{B_i + z - G}{D-S} CEQ_G^{D-S}(X) - B_i F(D-S)\}.$$

As with uninsured deposits, depositor-preference law's impact on the FDIC's claim on the bank depends on the degree to which general creditors engage in structural arbitrage. The change in the value of the FDIC's guarantee on a one-dollar-par-value deposit is the value of a security that has the following cash flows (where $\rho = z/B_i$):

$$\Delta Y_{FDIC} = \begin{cases} 0 & \text{if } X > D-S, \\ GX/(B_i(D-S) & \text{if } D-S > X > G, \\ -(1+\rho)X/(D-S) & \text{if } G > X > 0, \text{ and} \\ 0 & \text{if } 0 > X, \text{ so that} \end{cases}$$

$$(27) \quad V_{FDIC} = [R(D-S)]^{-1}[-\frac{G}{B_i} CEQ_G^{D-S}(X) - (1+\rho) CEQ_0^G(X)] < 0.$$

Equation (27) is clearly negative. Hence, a possible unintended outcome of the national depositor-preference law is to reduce the value of the FDIC's claim on the bank—that is, to increase the value of the FDIC's guarantees.

Finally, depositor preference influences the value of the bank entirely through its effect on the net value of deposit insurance:

$$(28) \quad V_f = R^{-1}[CEQ_0(X) - z[1 - F(D-S)] - \frac{B_i + z - G}{D-S} CEQ_G^{D-S}(X) + B_i F(D-S)].$$

As in the previous case, if deposit insurance is always priced correctly (that is, if its net value to the bank is zero), it has no impact on bank value. However, depositor preference does change the fair value of deposit insurance and so must be accounted for when setting the premium.

IV. Conclusions

Using the cash-flow version of the capital-asset pricing model, we show how depositor-preference laws affect the value and pricing of claims on insured banks. The intended effect of depositor preference is to change the bank's capital structure in a way that increases the value of uninsured deposit claims and reduces the size of the FDIC subsidy. Under the assumptions in this paper, all general creditors would see the value of their one-dollar-par claims reduced, to the benefit of the FDIC and uninsured depositors. Under less restrictive assumptions, other claimants junior to depositors would also see the value of their claims reduced. Overall, the intended effect of a depositor-preference statute would be the same as that of a mandatory subordinated debt requirement.

Depositor-preference laws, however, have another possible effect. Unlike subordinated-debt holders, general creditors can act to offset the statutory junior status of their claims.[12] In its most extreme form, structural arbitrage by general creditors can de facto render depositor and FDIC claims junior to those of general creditors. Hence, the national depositor-preference law may actually decrease the value of depositor and FDIC claims—that is, it may increase the value of deposit guarantees. Ultimately, whether this unintended effect of depositor-preference law will dominate is an empirical issue.

References

Buser, Stephen A., Andrew H. Chen, and Edward J. Kane. "Federal Deposit Insurance, Regulatory Policy, and Optimal Bank Capital," *Journal of Finance*, vol. 36, no. 1 (March 1981), pp. 51–60.

Carnell, Richard Scott. "A Partial Antidote to Perverse Incentives: The FDIC Improvement Act of 1991," in Morin Center for Banking Studies, Boston University School of Law, *Annual Review of Banking Law*, vol. 12. Boston, Mass.: Butterworth Legal Publishers, 1993, pp. 317–71.

Chen, Andrew H. "Recent Developments in the Cost of Debt Capital," *Journal of Finance*, vol. 33, no. 3 (June 1978), pp. 863–77.

DeGennaro, Ramon P., and James B. Thomson. "Capital Forbearance and Thrifts: Examining the Costs of Regulatory Gambling," *Journal of Financial Services Research*, vol. 10, no. 3 (September 1996), pp. 199–211.

Hirschhorn, Eric, and David Zervos. "Policies to Change the Priority of Claimants: The Case of Depositor Preference Laws," *Journal of Financial Services Research*, vol. 4, no. 2 (July 1990), pp. 111–26.

Kane, Edward J. *The Gathering Crisis in Federal Deposit Insurance*. Cambridge, Mass.: MIT Press, 1985.

________. *The S&L Insurance Mess: How Did It Happen?* Lanham, Md.: The Urban Institute Press, 1989.

■ **12** For example, holders of general-creditor claims could conceivably restructure their claims by taking collateral, thereby improving their position relative to depositors and the FDIC. Hirschhorn and Zervos (1990) find that for thrifts in states with depositor-preference laws, general creditors are more likely to be collateralized; hence, in those states these laws give depositors little protection.

Osterberg, William P. "The Impact of Depositor Preference Laws," Federal Reserve Bank of Cleveland, *Economic Review*, vol. 32, no. 3 (1996 Quarter 3), pp. 2–11.

________, and James B. Thomson. "Deposit Insurance and the Cost of Capital," in Andrew H. Chen, ed., *Research in Finance*, vol. 8. Greenwich, Conn.: JAI Press, 1990, pp. 255–70.

________, and ________. "The Effect of Subordinated Debt and Surety Bonds on the Cost of Capital for Banks and the Value of Federal Deposit Insurance," *Journal of Banking and Finance*, vol. 15, nos. 4–5 (September 1991), pp. 939–53.

________, and ________. "Depositor Preference and the Cost of Capital for Insured Depository Institutions," Federal Reserve Bank of Cleveland, Working Paper no. 9404, April 1994.

________, and ________. "Depositor Preference Legislation and Failed Bank Resolution Costs," in Federal Reserve Bank of Chicago, *Payments Systems in the Global Economy: Risks and Opportunities,* proceedings of the 34th Annual Conference on Bank Structure and Competition, May 1998, pp. 226–46.

________. "A Market-Based Approach to Reforming Bank Regulation and Federal Deposit Insurance," in George G. Kaufman, ed., *Research in Financial Services: Private and Public Policy,* vol. 4. Greenwich, Conn.: JAI Press, 1992, pp. 93–110.

Todd, Walker F. "New Discount Window Policy Is Important Element of the FDICIA," *Banking Policy Report,* March 1, 1993, pp. 1 and 11–22.