

The Choice of Capital Instruments

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A NUMBER OF VERY LARGE BANKING ORGANIZATIONS HAVE RECENTLY PROPOSED OR CONSUMMATED MERGERS, INCLUDING CHEMICAL AND CHASE MANHATTAN, CITICORP AND TRAVELERS, AND NATIONS BANK AND BANK AMERICA. THESE COMBINATIONS HAVE INCREASED THE IMPORTANCE OF HAVING A SYSTEM OF BANK SUPERVISION AND REGULATION THAT PROTECTS THE TAXPAYERS AND THE FINANCIAL SYSTEM WHILE AVOIDING THE IMPOSITION OF UNNECESSARY COSTS ON BANKS. THIS ARTICLE FOCUSES ON THE COSTS IMPOSED BY ONE OF THE PRIMARY TOOLS OF CURRENT BANK SUPERVISION AND REGULATION—THE MEASUREMENT AND REGULATION OF CAPITAL ADEQUACY.

Bank capital ratios have become one of the principal measures of a bank's financial condition. Capital ratios have long been an important regulatory consideration, but their importance has recently grown partly as a consequence of international efforts to harmonize bank supervisory rules and partly because of the inclusion of prompt corrective action provisions in the Federal Deposit Insurance Corporation Improvement Act (FDICIA). One important concern is that the emphasis on capital regulation will increase banks' costs and make them relatively less competitive with other financial service providers. The capital regulations may impose costs on banks to the extent that the controls reduce the subsidy value of the federal safety net; however, this increase in costs is an intended consequence of the regulations, designed to offset Federal Deposit Insurance Corporation (FDIC) liability.¹

A more troubling question is whether the regulations impose costs that are not necessary for achieving the goals of the regulation. In particular, the current standards effectively force banks to maintain minimum levels of equity capital as measured in accounting values. Yet a variety of studies have suggested that maintaining higher equity capital levels at the cost of reduced debt levels is costly—for example, in reducing the tax shield associated with corporate interest payments. If equity is more expensive than debt, regulators should reconsider the limits they impose on substituting debt for equity.

In an earlier article in this *Economic Review*, Wall and Peterson (1996) surveyed the existing literature on banks' responses to binding capital regulations. They found that empirical evidence supports the hypothesis that capital regulations exercise a binding influence on

banks' capital positions. They then examined banks' two options for responding to binding regulations: (1) actions that increase regulatory capital ratio measures without reducing a bank's risk of failure, which Wall and Peterson call cosmetic changes, and (2) actions that increase regulatory ratios and reduce the risk of failure, which they called effective increases in capital.² The evidence they survey indicates that stock market participants see through cosmetic changes that artificially raise capital and that they reduce the stock price of banks engaging in such steps. Banks may effectively increase their capital through the issuance of new stock, but this action also reduces the price. One explanation of both findings is that the market may interpret cosmetic actions and new equity issuance as indicating that the bank expects weak future earnings and thus must take other steps to satisfy the regulatory requirements.

Wall and Peterson's review may be interpreted as suggesting that capital regulations impose unnecessary costs on the banking system, but this conclusion is not obvious. Financial market participants seem to be using a bank's decision to issue capital as a method of inferring the bank's future earning power. If market participants are rational and financial markets are competitive, these inferences should be correct on average, so it is not necessarily the case that capital regulations have been costly to the banking system as a whole.³

However, even if financial market participants make correct inferences on average, they may still be unable to fully separate banks with good prospects that have had bad luck from banks with bad prospects.⁴ If market participants cannot perfectly separate the two sets of banks, then the market price of good banks may fall more than it otherwise would and the market price of bad banks may fall less than it otherwise would. In effect, the capital regulations cause good banks to issue capital at a lower price than they should, and good banks' losses are offset by bad banks' being able to issue capital at a higher price.

The market may make inferences about a bank's condition from either debt or equity issues. However, as the residual claimant on a bank's value, the value of common equity is most sensitive to market misestimation, while claims on a fixed portion of the bank's cash flow—that is, debt—are less sensitive to misestima-

tion. Hence, capital regulations that occasionally force banks to issue new equity may impose higher costs on good banks than capital regulations that allow the bank to substitute a debt issue.

This article focuses on the question of whether existing capital regulations are imposing unnecessary costs on banks. The first section reviews the regulatory and market influences that have been hypothesized to influence banks' decisions about issuing capital. The second section describes the model used in this research. The results reported in the third section provide new evidence on the costs associated with new capital issues by banks, thereby shedding additional light on the private costs of capital regulation. The final part analyzes some reasons why regulators might choose to set minimum equity capital requirements.

The new evidence is obtained by analyzing the determinants of which new security, if any, a banking organization issues to meet capital regulations. Issuance of capital instruments may impose a variety of costs on banks, depending on the instrument chosen. Capital regulations have always counted common equity and at least some types of preferred stock in calculating the ratios. However, including some types of debt securities as well may enhance the ability to distinguish among the different theories of capital structure. Under the existing tier 1 risk-based and leverage capital regulations, no type of debt security is a substitute for equity; however, the capital regulations first adopted in December 1981 allowed a special type of debt called mandatory convertible debt to substitute for equity in primary capital (the equivalent of the current tier 1 capital measure). Thus, to include debt securities, the discussion looks back at the issuance decisions made under the primary capital regulations of the 1980s.

Most of the private costs and benefits associated with different capital structures arise because of the differences between debt and equity.

1. Both the calculation of the capital adequacy measure and the required level have been the subject of ongoing debate. For a critical analysis of the existing rules see the Shadow Financial Regulatory Committee (1996, Statements 84, 96, 110, 112, 124, and 126), Peek and Rosengren (1997), and Jones and Mingo (1998).

2. An example of a cosmetic change would be selling assets that have appreciated in value but not those that have decreased in value to increase capital as measured by regulatory accounting even if the sale reduced the bank's economic capital. An example of an effective action is the issuance of new capital by a bank.

3. Admittedly, the conclusion that capital regulations may have not been costly might be weakened by the inclusion of risk aversion on the part of investors.

4. In this case the term bad luck is used as a way of referring to banks that happened to obtain an earnings draw from the lower tail of the distribution.

The results of the empirical analysis support Wall and Peterson's conclusion that asymmetric information costs are an important part of the issuance of additional common equity. The results also suggest, though, that the option to issue debt securities as a substitute for equity may be more valuable to large banks than to smaller banks, the latter being significantly less likely to issue mandatory convertible debt.⁵

The analysis of the regulatory implications of allowing banks to substitute debt for equity in the capital structure suggests

If equity is more expensive than debt, regulators should reconsider the limits they impose on substituting debt for equity.

that properly structured debt is as good, or better than, equity in addressing most regulatory concerns. The area of primary regulatory concern in which equity is likely to be superior is that of minimizing the risk of failure after a bank has already incurred a loss. However, subordinated debt may be more effective in discouraging banks from taking

excessive risk and therefore may reduce the probability that a bank becomes financially distressed. Moreover, even if a failure should occur the regulators retain other tools for reducing the costs to society. Thus, the one advantage of equity over debt from a regulatory perspective may not be that important.

Theoretical Determinants of the Capital Issuance

Banks are private corporations that operate in a special regulatory environment. As private corporations, their capital structure decisions are subject to the same influences as other corporations. These influences include factors that would lead to an optimal equity-to-debt ratio in a static setting as well as dynamic adjustment costs such as the costs of issuing new equity. The regulatory environment modifies the private costs and benefits of different capital structures in two important ways. First, deposit insurance reduces the sensitivity of insured-deposit interest rates to an organization's riskiness by guaranteeing repayment even if the bank should fail. The FDIC's historical practice of extending these guarantees to other liabilities that lack de jure insurance coverage may also reduce the sensitivity of these claims to the bank's riskiness.⁶ The lower sensitivity of liability rates to a bank's riskiness reduces the amount of capital shareholders would want the bank to hold for any given level of portfolio risk. The second regulatory influence

is that of capital regulations. These regulations are one-sided: regulators require banks to maintain minimum levels of capital, but they virtually never object to a bank maintaining capital ratios in excess of its needs.

Regulatory Influences. The theory of security issuance for U.S. banks incorporates both the theory of capital structure for nonfinancial corporations and the unique features of banks. One of the most important features of banks is that their deposits are insured by the federal government.⁷ A consequence of deposit insurance is that the cost of a large portion of a bank's funds is relatively insensitive to changes in the bank's risk, creating an incentive for banks to take greater risks. The federal government attempts to limit the exposure of its deposit insurance agency by imposing a variety of regulations on banks and by requiring banks to undergo periodic examinations.

Capital regulation is an important type of regulation. U.S. bank regulators have long been concerned with bank capital adequacy. The capital regulations during the 1970s were enforced on a case-by-case basis, successfully preventing most banks from lowering their capital ratios to a level significantly below their peers' during this period. But regulators did not prevent the industry as a whole from reducing its capital (Marcus 1983). The 1981 capital guidelines were developed to stop the reduction in capital ratios and to increase the ratios at the largest U.S. banking organizations.

The capital guidelines announced in 1981 by the Federal Reserve System for bank holding companies define two types of capital: primary capital and total capital. Primary capital includes common stock, perpetual preferred stock, retained earnings, loan-loss allowance, and mandatory convertible securities. Total capital includes primary capital plus limited-life preferred stock and subordinated debt. The standards also define three categories of bank organizations: multinational organizations (the seventeen largest bank holding companies), regional organizations (all other banks with assets in excess of \$1 billion), and community organizations (those with assets of less than \$1 billion).

The 1981 guidelines do not specify numerical standards for the multinational organizations, but 1981 statements expressed the regulators' expectation that these firms would increase their capital ratios. Regional organizations were expected to maintain a minimum primary capital-to-total-assets ratio of 5 percent, whereas community organizations were required to maintain a 6 percent ratio. The regulators also stated that banking organizations were generally expected to operate at capital levels above these minimal standards. The regional bank standard was extended to cover the multinational organizations in June of 1983.⁸ The primary capital standard for all banking organizations was set at 5.5 percent in March 1985.

The effect of the 1981 primary capital guidelines has been to place a lower bound on the primary capital level of banking organizations. Further, the limits on the amount of mandatory convertible debt included in primary capital set a limit on the maximum total-debt-to-total-assets ratio.

Although the 1981 standards appear to have been effective in raising capital levels, the regulations also seemed to be distorting banks' portfolio decisions. In particular, the standards did not distinguish among the riskiness of different assets and also failed to explicitly incorporate off-balance-sheet exposures into the capital requirements. Subsequent to the imposition of the 1981 standards, banks were observed responding to the apparent incentives created by the capital regulations—not only were they increasing capital but they were also reducing their holdings of highly liquid, low-risk assets and increasing their exposure to off-balance-sheet contracts. In July 1988 the central banks and bank regulators of the major industrial nations reached an international agreement to implement capital guidelines that took more accurate account of the credit risks associated with banks' on- and off-balance-sheet portfolios. Interim risk-based capital standards took effect in 1990, with the full standards taking effect at the end of 1992. As a part of the risk-based capital guidelines, the narrower definition of capital excluded mandatory convertible debt, reducing its value as a substitute for equity in complying with the capital guidelines.⁹ Thus, even though the primary capital standards are no longer effective, more can be learned about the relative costs of debt and equity arising from market forces by analyzing bank capital decisions under the primary capital regulations of the 1980s.

Market Influences. Market forces could potentially impose varying costs based on both the level of a bank's

capital and changes in the bank's capital structure. The theoretical starting point for analyzing market forces is Modigliani and Miller's (1958) demonstration that a firm's capital structure—that is, its mix of debt and equity—does not affect its value in perfect markets. An implication of this model is that securities prices are an unbiased estimate of their intrinsic value, so the timing and type of security sold by the firm do not affect the value of the firm. Modigliani and Miller's work not only established the conditions under which capital structure is irrelevant but also told financial economists under what conditions capital structure may be relevant.¹⁰

Building on a variety of studies analyzing nonfinancial corporations' optimal capital, Orgler and Taggart (1983) develop a market model of optimal capital structure for banks.¹¹ In their model, the benefits to banks of lower capital ratios are more favorable tax treatment and an increase in the value of deposit insurance. The offsetting costs of lower capital ratios are the (eventual) diseconomies of scale in producing deposit services and the deadweight costs of bankruptcy that are partially borne by the bank's owners.¹² Flannery (1994) argues that agency costs also may be an important determinant of bank capital structures.¹³ Lower capital ratios impose desirable

Allowing banks to issue debt rather than equity may reduce their costs of complying with the capital standards.

5. One limitation of the empirical analysis is that the model has problems identifying why banks would issue preferred stock rather than mandatory convertible debt.
6. Although *de jure* deposit insurance coverage was limited to \$100,000 per depositor in a domestic branch, the FDIC generally provided 100 percent coverage of all deposits and sometimes guaranteed nondeposit liabilities during the time period of this article's sample. However, the 1991 passage of FDICIA initiated a variety of steps to reduce the government subsidy to failed banks. Bank regulators appear to be generally following through on FDICIA, and deposit insurance coverage has been limited for most of the bank failures since the act's passage. However, the effectiveness of these steps in practice has not yet been fully resolved because none of the very large banks that were eligible for inclusion in this study's sample have failed since the adoption of FDICIA. See Wall (1993) for a discussion of FDICIA and its application to large banks.
7. Deposit insurance originates with the Federal Deposit Insurance Act, Banking Act of 1933 (48 Stat. 162 [1933]). The FDIC provides insurance for deposits, accompanied by regulatory and examining functions to monitor this insurance function.
8. Prior to 1983 bank holding company capital regulations were based on the Federal Reserve's general supervisory authority. In 1983 the Federal Reserve was given a specific statutory mandate by the International Lending Supervision Act of 1983 (Public Law 98-181) to require banking organizations to maintain adequate capital levels.
9. See Wall (1989) for a discussion of the 1981 guidelines and their replacement by the risk-based capital guidelines.
10. See Miller (1995) for a discussion of the relevance of the "M & M" propositions to banking.
11. For example, see Modigliani and Miller (1963), DeAngelo and Masulis (1980), and Masulis and Trueman (1988) on income taxes and Baxter (1967) and Kraus and Litzenberger (1973) on bankruptcy costs.
12. Diseconomies of scale exist if an increase in volume results in an increase in average unit costs. Deadweight losses of bankruptcy refer to costs that arise solely because of the bankruptcy and provide no social value—legal costs, for example.
13. See Jensen and Meckling (1976), Barnea, Haugen, and Senbet (1981), and Jensen (1986) for a discussion of agency costs in more general settings.

limits on management and reduce the need for shareholder monitoring.¹⁴ Conversely, lower capital increases the incentives for bank shareholders to have managers undertake riskier projects and to reject some low-risk investments. These costs of reduced capital may be mitigated, Flannery argues, by having the bank issue deposits with very short maturities so that debtholders may take effective action if the bank adopts a high-risk investment strategy. Thus, Flannery's analysis argues that banks should issue very short-term debt and maintain low capital ratios (although they would not necessarily be undercapitalized by regulatory standards).

Shrieves and Dahl (1992) and Hughes and Mester (1994) point to another agency problem that may influence banks' capital structure—managerial risk aversion. Most individuals are thought to be risk averse, and there is no good reason for thinking that bank managers are inherently more risk averse than the average shareholder. However, bank managers have proportionately far more of their total wealth (including human capital) invested in their bank than most shareholders and, as a consequence, have more to lose from the bank's failure. Thus, bank managers may choose higher capital levels than would be optimal from the shareholder's perspective. Hughes and Mester estimate bank cost functions that allow for managerial risk aversion and find support for such risk aversion.

An implicit assumption of the static trade-off models of capital structure is that the cost of adjusting a bank's capital structure is zero. Recent work that focuses on information asymmetries between managers and investors suggests, however, that the process of adjusting the capital ratio may convey important information to shareholders. An important part of the analyses of information asymmetries has focused on the issuance of new securities by corporations. Myers and Majluf (1984) examine a firm's decision to issue debt or equity and conclude that the announcement to issue equity conveys negative information to the market about the firm's value. The market may overvalue both the debt and equity of a firm. However, if the market overestimates the value of a firm, that overestimation will have a proportionately larger impact on equity because equity has the residual claim on firm's value. Thus, if management believes the intrinsic value of a firm is less than its market value, existing shareholders benefit if the firm issues equity. Otherwise, existing shareholders are best served either by the firm issuing debt or forgoing any new security issue. Prospective new shareholders realize the incentive of existing shareholders to have the firm issue new equity only if it is overvalued and, hence, interpret a new equity issue as an adverse signal about firm value. This model suggests that firms generally prefer to issue debt rather than equity. One version of this analysis holds that firms follow a pecking order in determining which securities to issue. A firm will

issue debt until further debt issuance would become "excessively" costly, and then it will issue equity.

Thus, a variety of hypotheses have been offered relating to the cost and benefits of different levels of equity and changes in the equity level. Most of these costs and benefits arise from important differences between debt and equity. First, interest payments on debt receive more favorable tax treatment than dividends on equity. Second, equity may absorb losses without causing the firm to enter financial distress and bankruptcy whereas bankruptcy is often required before debtholders will accept reduced payments. This second difference has four implications: (a) higher levels of debt financing, holding other factors constant, increase the expected costs of financial distress, (b) higher levels of debt financing increase the risk to managers' human capital, (c) higher levels of debt may encourage more efficient management, and (d) higher levels of debt give equityholders an incentive to prefer a riskier investment strategy. A third difference between debt and equity is that the market is less likely to view debt issuance as an adverse signal.

One further issue is that of a possible scale effect in the cost associated with security issuance. Smaller firms (nonbanking as well as banking) are less likely to have publicly issued securities, and those having publicly issued securities are likely to have a less diverse set of types of securities. A possible explanation is that smaller security issues tend to be less liquid, in part because the costs of analyzing a security often increase at a rate that is less proportionate to the size of the issue and in part because the issue may be held by a smaller set of investors. Whatever the explanation, the implication is that the smaller banking organizations in the sample studied may be less likely to issue preferred stock or mandatory convertible debt than to expand the size of their outstanding common stock issue.

The Empirical Model

Specification. The model of security choice presented here uses multinomial logit. Roughly, the model may be thought of as simultaneously estimating linear regression models to estimate the probability that a particular type of security will be issued (see the box for specifications). In this case the concern is to explain the decision to issue one of three securities: common stock, preferred stock, or mandatory convertible debt. Because in a multinomial logit model one of the outcomes is determined by the decision made for all the other outcomes, the model requires specifying one of the possible choices as the base case and considering the probability of the other cases relative to the base case. For example, if a bank decides not to issue common or preferred stock then it must issue mandatory convertible debt. Mandatory convertible debt, the focus of this article, is the base case in the model developed below.

Estimation Technique

The choice of issuing one of the three forms of primary capital is a polychotomous, discrete decision. The decision is modeled such that the probabilities that bank i chooses to issue mandatory convertible debt (m), preferred stock (p), or common stock (c) are represented by P_{mi} , P_{pi} , and P_{ci} , respectively, such that $P_{mi} + P_{pi} + P_{ci} = 1$.

The probability of issuer i choosing one form of capital—for example, preferred stock—can be characterized as $P_{mi} = Pr [\text{Choose preferred stock} | \text{Factors affecting choice}]$, (1)

or, alternatively,

$$P_{mi} = F(X_i' \beta_j), \quad (2)$$

where X is the vector of factors that influence the choice for bank i ; β_j is the coefficient matrix for factors for each j alternative form of capital; Pr is the probability operator; and F is the cumulative density function.

Each equation is estimated cross-sectionally using the multinomial logit package of LIMDEP.

No generally accepted formal model incorporates all the factors discussed in the theory section to explain corporate security issuance decisions. The research reported here follows prior studies of nonbanking corporations' security issues, most notably Marsh (1982) and Jung, Kim, and Stulz (1996), in developing empirical proxies for the theoretical concepts. The discussion decomposes the security issuance decision into four parts: taxes, financial distress, security timing and pecking order, and costs related to issue size. Table 1 provides a summary of the variables and predicted signs discussed in this section.

Proxy for Taxes. Taxes may affect the capital structure decision since the issuance of a debt security, vis-à-vis an equity security, has different tax implications for the issuer. Because interest is deductible for tax purposes, the use of debt financing generally increases the value of the firm. The greater the effective tax rate (ETR), the more valuable the tax deduction and, hence, the less likely the firm is to issue either type of equity. Thus, the expected sign on the coefficients on ETR is negative in the equations for both the probability of issuing preferred stock and the probability of issuing common stock relative to mandatory convertible debt.

Proxies for Financial Distress. The relevant measure of financial distress costs for the purposes of deter-

mining optimal security issuance is the expected costs borne ex ante by the firm's existing shareholders. These costs include those borne by the firm's private creditors, given that these creditors demand a higher interest rate to compensate for higher risk levels.

The probability of distress is affected by the firm's business risk, which is in turn affected by revenue risk and operating risk. Ideally, the business risk is measured by some variable that is independent of capital structure; for example, good proxies for industrial firms would be the historical variability of sales and operating earnings. However, for banking firms whose "production" is related to the management of interest rate risk, the risk associated with operations is more complex. Since there is no comprehensive measure of the business risk of a bank that is independent of capital structure, the variability in pretax operating income (VOI) over the prior four years is used as a risk measure. The problem of variability in profitability affecting capital structure is somewhat mitigated by the fact that bank capital structures vary within narrow bounds relative to industrial corporations. The expected sign of the coefficient on VOI is positive in both the preferred and common stock equations.

Another aspect of a bank's risk is that induced by the capital structure. One proxy for a bank's financial

14. Jung, Kim, and Stulz (1996) suggest that owner/manager agency conflicts result in some nonbank firms issuing equity. Their reasoning is that some managers may want to undertake certain projects even though the projects have a negative net present value (NPV) to shareholders. Assuming these managers have effective control of the firm, their primary concern is how best to fund the negative NPV projects. If the project is funded with debt, then the expected value of the payment of interest and principal on the debt may exceed the expected returns on the negative NPV projects, eventually resulting in a shrinkage of the resources under the manager's control. However, if the projects are funded by equity, then the combination of the new equity and negative NPV projects need not reduce these resources.

The implications of this hypothesis, assuming it is true, for regulating banks' equity capital are unclear. On the one hand, capital regulation may reduce the cost to managers of issuing new equity by allowing them to claim to skeptical shareholders that a new issue is required to meet regulatory requirements. However, regulatory equity capital minimums may also increase the costs to managers if their firm should incur a substantial loss and fall into violation of the capital requirements.

TABLE 1 Explanatory Variables

Variables	Definitions	Expected Sign	
		P_p/P_m	P_c/P_m
ETR	Effective tax rate for the most recent year	-	-
VOI	Standard deviation of the ratio of pretax operating income (total assets) over the prior four years	+	+
FCR	Fixed charge coverage ratio, evaluated at the most recent fiscal year-end	-	-
BEA	Book value of common equity divided by book value of total assets	-	-
UNL	Ratio of uninsured liabilities to total assets for the most recent fiscal year-end	+	+
TBF	Binary variable that has a value of 1 if the issuer is one of the ten largest banks, 0 if otherwise	-	-
B1DUM	Binary variable that equals 1 if the ratio of the market value of equity to the book value of equity at the end of the most recent fiscal year-end is less than 1 and 0 if otherwise	-	-
B1MBK	Ratio of the market value of equity to the book value of equity at the end of the most recent fiscal year-end if the market-to-book ratio is less than 1 and 0 if otherwise	+	+
A1MBK	Ratio of the market value of equity to the book value of equity at the end of the most recent fiscal year-end if the market-to-book ratio is greater than or equal to 1 and 0 if otherwise	+	+
PCH	Price change of the common stock over the most recent fiscal year preceding the issuance announcement	+	+
CSI	Binary variable that has a value of 1 if the issuer issued common stock within the past twelve months and 0 if otherwise	-	-
PSI	Binary variable that has a value of 1 if the issuer issued preferred stock within the past twelve months and 0 if otherwise	-	+
MCI	Binary variable that has a value of 1 if the issuer issued mandatory convertible debt within the past twelve months and 0 if otherwise	+	+
LGMKT	Log of the market value of the issuer's common equity	?	-

risk based on a flow measure of its capital position is its ability to meet recurring, fixed charges for which the fixed coverage ratio (FCR) is the proxy. The greater the ability of the firm to satisfy its fixed financial obligations (that is, the greater the financial risk), the lower the probability of financial distress and the less likely the bank is to issue common or preferred stock.¹⁵

An alternative way to measure the risk induced by a bank's capital structure is based on its stock of capital. A measure of the capital structure is the ratio of the book value of the firm's common equity to the book value of its total assets, BEA. The expected sign on the coefficients for both types of equity issuance relative to mandatory convertible debt issuance is negative; that is,

a higher existing equity ratio implies lower probability levels of issuing common or preferred stock.

Bank shareholders are concerned about that portion of bankruptcy costs that is borne by the firm's private creditors since higher bankruptcy costs imply greater risk premiums on the bank's outstanding debt. The share of the costs borne by private creditors depends in large part on the extent to which a bank's liabilities are covered by de jure or de facto deposit insurance. Thus, banks with high levels of explicit and implicit insurance are likely to face significantly lower private costs of financial distress than banks with lower levels of coverage. This study used two proxies for the level of coverage. The proxy for explicit coverage is the ratio of uninsured lia-

bilities to total assets (UNL). This ratio is expected to have a positive effect on the probability that a bank will issue either type of equity relative to the probability it will issue mandatory convertible debt. The proxy for the implicit coverage granted large banks, TBF, is a binary variable equal to one if the bank is one of the ten largest and zero otherwise. This variable is a proxy for the fact that the largest banks are considered “too big to fail” and hence are likely to have 100 percent de facto deposit insurance. The coefficients on TBF in the common and preferred equity equations are expected to have negative signs.¹⁶

Proxies for Security Issuance Timing and Pecking Order: One proxy for timing considerations is the ratio of the bank’s market value to its book value. Bank managers claim to be reluctant to issue common equity when this ratio is less than one (Wall and Peterson 1991), saying that it results in dilution.¹⁷ This objection is not supported by finance theory, however. The book value of a firm’s stock is irrelevant to its financial decisions, and stock should be issued if the net present value of additional investments resulting from the issue exceeds the value of the stock issued. Market-to-book ratios may have greater relevance for banking because most bank assets are short-term financial assets whose market value should be close to their book value. A bank’s having a market-to-book value below one suggests ex post that its management has made bad decisions, and the market may be reluctant to give these managers additional capital. Thus, banks with low market-to-book ratios may be less likely to issue new equity, especially new common stock.

Two variables are used as proxies for the effect of market-to-book ratios of less than one: a binary variable to capture any level effects of a ratio less than one and a slope term for banks with a ratio of less than one. Specifically, the binary variable B1DUM takes a value of one if the market-to-book ratio is less than one and zero otherwise, and the slope variable B1MBK takes a value of the bank’s market-to-book value if the ratio is less than one. Both B1DUM and B1MBK have a value of zero for banks above the standards. Banks with ratios that are below one are less likely to issue equity, so the expected sign on B1DUM is negative in both equations. However, as B1MBK increases toward a value of one, the probability of

issuing equity may increase, suggesting that the coefficients on B1MBK in both equations may be expected to have a positive sign. Banks may also take account of their market-to-book ratio in making security issuance decisions if this ratio is greater than one. Thus, the variable A1MBK is also included in the model, where A1MBK takes a value of the bank’s market-to-book ratio if the ratio is greater than or equal to one and zero otherwise. The sign of the coefficients on A1MBK, like that on B1MBK, is expected to be positive.

Another measure of whether a bank’s stock may be perceived by a bank’s managers to be over- or undervalued is the recent movement in its stock price. If management’s perception of a bank’s value changes more slowly than the market’s, then greater levels of stock price appreciation may

be associated with a higher probability that management perceives the bank’s stock to be overvalued. A proxy for the recent price change in the stock is PCH, which is the price change of the common stock over the most recent fiscal year preceding the issuance announcement. The expected sign of the coefficient on PCH is positive for both types of equity.

An implication of the pecking order hypothesis is that the probability that a particular type of security is issued may be related to its own past issuance. Three dummy variables designate previous issuances within the last twelve months: CSI (issuance of common stock), PSI (issuance of preferred stock), and MCI (issuance of mandatory convertible debt). If preferred stock issue is treated as something between common stock and mandatory convertible debt, the pecking order hypothesis delivers unambiguous signs for the probability of issuing common and preferred stock relative to the probability of issuing mandatory convertible debt.¹⁸ Under the pecking order hypothesis the probability of issuing common

Banks pose special problems in terms of debt maturity because a large fraction of their assets is invested in assets that either have a short maturity or are traded in liquid markets or both.

15. The coverage ratio may also be interpreted as a measure of the bank’s free cash flow. The cost of issuing new preferred stock or mandatory convertible debt may be reduced to the extent that it reduces the bank’s free cash flow. The free-cash-flow interpretation of the coverage ratios yields the same prediction as the risk interpretation of the ratios: the probability of a firm issuing debt or preferred stock is expected to be a negative function of FCR.

16. The exact size cutoff for too-big-to-fail status is unknown and may change over time. However, the ten largest banks may be regarded as a reasonable proxy for membership in this elite group.

17. Osborn and Evans give an example of the common view that banks should not issue stock at prices below book value: “Equity issues are difficult for the money center banks since most are trading below book value” (1988, 47).

18. Preferred stock may be thought of as an intermediate case because, like debt, it commits healthy banks to making a fixed annual payment and because, like common stock, it permits the firm to suspend payments in times of severe financial distress.

TABLE 2 Sample by Type of Capital and Year of Issuance

Year	Mandatory Convertible Debt Issuance	Preferred Stock Issuance	Common Stock Issuance	Total Sample
1983	1	14	13	28
1984	29	8	10	47
1985	19	8	13	40
1986	8	9	20	37
Total	57	39	56	152

stock relative to the probability of issuing mandatory convertible debt is a positive function of MCI and PSI and a negative function of CSI. Also, the probability of issuing preferred stock is a positive function of MCI and a negative function of PSI and CSI.

Proxies for Relative Costs of Issuance. The costs of issuing new security types are hypothesized to be a decreasing function of a bank's size. Given that all banks in the sample have publicly traded common stock, this hypothesis implies that the probability of issuing preferred stock and mandatory convertible debt is an increasing function of firm size. A proxy for firm size is the market value of the firm's outstanding common equity. However, the effect of bank size on issuance cost is likely to decrease with size, implying a nonlinear relationship between the size of the firm and the cost of issuance. Thus, the natural log of banks' market value (LGMKT) is used as a proxy for the relative cost of issuance. This proxy is expected to have a negative coefficient on the probability of issuing common stock, but the expected relationship with the probability of issuing preferred stock relative to issuing mandatory convertible debt is ambiguous.

Methodology and Data. The box provides the specification of the model and a discussion of the multinomial logit. The sample consists of stock issuances from 1983 through 1986. The sample of banking organizations is taken from the banks included in the expanded annual industrial data files of Standard and Poor's Compustat.¹⁹

All accounting data except for mandatory convertible debt outstanding and the primary capital ratio are obtained on an annual basis from the *Bank Holding Company Financial Supplement (FR Y-9)*, collected by the Federal Reserve System, and from Compustat. Market valuation data are obtained from the University of Chicago's Center for Research in Security Prices (CRSP) data bases.

Data on the timing and amount of securities issued are obtained from Irving Trust's *Capital Securities Issued: Commercial Banking* and Lehman Brothers' *Financings by United States Banks and Bank Holding Companies since 1976* for 1983 through 1987. When Irving Trust's publication was inadequate for determining whether a debt issued qualified as mandatory convertible, the status of

the security issue was also reviewed in *Moody's Banking and Finance Manual* and individual banking organizations' annual reports. The final sample consists of 152 observations. Table 2 provides a breakdown of the sample by security type and year.

Table 3 presents descriptive statistics for each of the continuous variables for each type of issuance: common stock, preferred stock, and mandatory convertible debt. The value of the market-to-book ratio (MBK) is presented rather than B1DUM, B1MKT, and A1MKT. These substitutions facilitate comparison of the average capital position and average market-to-book ratio of the three types of issuance. Note also that the mean values of the variables TBF, CSI, PSI, and MCI may be interpreted as the proportion of banks that are too big to fail, that have issued common stock, that have issued preferred stock, and that have issued mandatory convertible debt, respectively.

Several cross-sectional differences stand out in Table 3. First, mandatory convertible debt has the highest effective tax rate. Second, mandatory convertible debt is more like preferred stock than like common stock along many dimensions, including volatility of operating income, deviation from regulatory primary capital requirements, uninsured liabilities, too-big-to-fail status, and market-to-book and market value.

Estimation Results

Logit Regression. The logit estimation results appear in Table 4. The table provides the estimated coefficients and their *t*-statistics for each relative probability (relative to issuing mandatory convertible debt).

The explanatory power of the model is statistically significant, with the percentage of correctly predicted within-sample cases of 61.18. All coefficients are insignificant in the equation estimating the probability of issuing preferred stock relative to issuing mandatory convertible debt. Moreover, among the observations in which banks actually issued preferred stock, the model predicted that 43.59 percent would have issued mandatory convertible debt whereas it predicted that only 33.33 percent would have issued preferred stock.²⁰

TABLE 3 Descriptive Statistics by Type of Capital^a

Variable	Mandatory Convertible Debt Issuance	Preferred Stock Issuance	Common Stock Issuance
ETR	0.2542 (0.1364)	0.2156 (0.2725)	0.1656 (0.1297)
VOI	0.009882 (0.003098)	0.01049 (0.003353)	0.008266 (0.003658)
FCR	1.141 (0.0614)	1.1209 (0.04225)	1.158 (0.05962)
BEA	0.04699 (0.009169)	0.04842 (0.009867)	0.05285 (0.009454)
UNL	0.5158 (0.2134)	0.4863 (0.2307)	0.3593 (0.1902)
TBF	0.3684 (0.4867)	0.3077 (0.4676)	0.07142 (0.2599)
MBK	0.9462 (0.2005)	0.8842 (0.2400)	1.083 (0.2287)
PCH	0.2560 (0.2333)	0.2356 (0.1663)	0.3144 (0.1878)
CSI	0.1579 (0.3679)	0.2308 (0.4268)	0.1607 (0.3706)
PSI	0.1754 (0.3837)	0.1538 (0.3655)	0.1607 (0.3706)
MCI	0.2281 (0.4233)	0.1538 (0.3655)	0.1786 (0.3865)
MKT	1682. (1688.)	1588. (1915.)	550.7 (878.3)

^aMean values; standard errors are in parentheses

The sign and significance of several variables in the common stock equation are consistent with the timing of the issuance of securities. The binary variable for a bank having a market-to-book ratio of less than one (B1DUM) is marginally significantly negative (significant only at the 10 percent level), suggesting that such banks may be more likely to issue common stock. The coefficient on the market-to-book ratio of banks with a ratio of less than one (B1MBK) is significantly positive, suggesting that banks are more willing to issue common stock as their market-to-book ratio increases. Further, the coefficients on both previous preferred stock issuance (PSI) and prior mandatory convertible issuance (MCI) are positive, suggesting that banks switch to issuing com-

mon stock after exploiting opportunities to issue preferred stock and mandatory convertible debt.

The coefficient on the log of the firm's market value is significant with a negative sign, suggesting that smaller banks are more likely to issue common stock than mandatory convertible debt. This result supports the hypothesis that mandatory convertible issues are more expensive for smaller banks.

Overall, these results support prior findings in suggesting that allowing banks to issue debt rather than equity may reduce their costs of complying with the capital standards. In particular, these results support the hypothesis that allowing banks to issue debt may reduce the costs to good banks of being pooled with bad banks.

19. The data files include the primary, secondary, tertiary, full coverage, and research files. Standard & Poor's indicates that this universe contains all banks with "significant investor interest."

20. The remaining observations were predicted to have issued common stock.

TABLE 4 Multiple Logit Regression Estimation Results

Variable	Log (P_p/P_m)	Log (P_c/P_m)
ETR	1.1025 (0.5350)	0.1782 (0.9287)
VOI	85.411 (0.3856)	50.94 (0.6084)
FCR	-13.227 (0.1029)	-0.2140 (0.97691)
BEA	53.94 (0.2151)	9.949 (0.8126)
UNL	-0.6195 (0.7882)	-0.4683 (0.8315)
TBF	0.7356 (0.4735)	1.499 (0.1968)
B1DUM	2.565 (0.5207)	-7.879 (0.0548) ^c
B1MBK	0.1680 (0.9473)	10.82 (0.0019) ^a
A1MBK	2.450 (0.4047)	2.209 (0.3813)
PCH	-0.7419 (0.5538)	-0.1272 (0.9119)
CSI	0.7883 (0.2056)	0.2213 (0.7362)
PSI	0.1540 (0.83012)	2.020 (0.0120) ^b
MCI	0.06339 (0.9309)	1.5462 (0.0400) ^b
LGMKT	-0.3990 (0.3511)	-1.914 (0.00003) ^a
Constant	10.88 (0.2283)	8.700 (0.2599)
Log L		-128.6018
X^2 (28)		72.55099
Percent Predicted		61.18

The probability that the coefficient is not equal to zero in a two-tailed t-test is shown in parentheses below the coefficient. Log L is the log of the likelihood at maximum, X^2 is the Chi-squared distributed statistic for the test of all nonintercept coefficients not equal to zero, and percent predicted is the percentage of correctly predicted within-sample cases, based on the largest probability using estimated coefficients.

The Chi-squared test statistic is significant at the 5 percent level of significance.

- ^a indicates coefficient different from zero at the 1 percent level of significance
- ^b indicates coefficient different from zero at the 5 percent level of significance
- ^c indicates coefficient different from zero at the 10 percent level of significance

However, these results also suggest that the benefits of expanding the definition of capital will not accrue equally to all banks. Larger banks that can issue sufficient volumes of new securities are more likely to substitute debt for equity than are smaller banks. Further, the estimated model provides no insight into banks' choice of mandatory convertible debt versus preferred stock.

Optimal Capital Structure and Regulatory Concerns

The survey of theoretical analyses above suggests that most of the private costs and benefits associated with different capital structures arise because of the differences between debt and equity. The survey of empirical results in Wall and Peterson (1996) as well as the new results presented in the previous section suggest that a significant part of this cost takes the form of transfers from good banks to bad banks. The implication is that regulators could minimize the cost of meeting the capital guidelines to good banks by allowing banks to substitute uninsured debt for equity. The capital standards would not be costless to banks because higher capital standards would still reduce the deposit insurance subsidy to risk taking. However, the capital standards may impose little or no additional private costs to the extent that they allow firms to use debt rather than equity.

Uninsured debt is a potentially viable substitute for equity in limiting deposit insurance losses. In theory, all nondeposit liabilities became a buffer to the insurance fund with the enactment of depositor preference in 1993.²¹ Further, all depositors with more than \$100,000 on deposit should share any remaining losses with the FDIC under the least costly resolution provisions of FDICIA. However, capital regulations continue to focus on a limited set of equity and debt obligations.

One possible explanation for the continuing focus on equity and certain debt contracts is concern about the extent to which deposits over \$100,000 and nonsubordinated liabilities would reduce FDIC losses in the event of a failure. The FDIC may, with the concurrence of the Secretary of the Treasury and the Federal Reserve Board, extend deposit insurance to deposits over \$100,000. Further, nondeposit liabilities that are not contractually subordinated to deposits may be given collateral to reduce the losses on these claims should the bank fail.

Horvitz (1984) and Benston and others (1986) as well as recent speeches by Federal Reserve Governor Ferguson (1998) suggest an alternative that does not have the problems associated with depositor preference. They recommend the increased use of a type of debt called sub-

ordinated debt—debt that is junior or subordinated to all other liabilities if a bank should fail. If subordinated debt is such an easy solution, why do regulators not allow banks to substitute it for equity? Regulatory standards have in fact allowed partial substitution. Both the 1981 standards and the current standards allow subordinated debt as an element of total capital. However, both standards limit the substitution by imposing additional requirements for a narrower definition of capital that does not include ordinary subordinated debt. These requirements are the primary capital guidelines under the 1981 standards and the current tier 1 risk-based and leverage standards. Thus, the real question is why regulators do not allow unlimited substitution. Three possible objections exist to the use of subordinated debt. Two of these objections may be easily addressed within the context of the standards and their implementation. The third is more fundamental.

The first objection is that subordinated debt may not protect the FDIC. Subordinated debt does not have de jure deposit insurance coverage, but subordinated-debt holders have received de facto insurance coverage during some prior bank failures, such as that of Continental Illinois in July 1984. Flannery and Sorescu (1996) examine the extent to which subordinated obligations of banking organizations reflected the riskiness of the issuing organization between 1983 and 1991. Their findings suggest that the prices early in their sample period embed a significant probability that the FDIC would extend its coverage to include uninsured depositors.

The solution to problems posed by de facto insurance coverage is simple; however, the FDIC should not extend deposit insurance to cover subordinated liabilities. Indeed, in more recent failures the FDIC has not covered subordinated-debt holders at failed banks. Consistent with the change in FDIC policies is Flannery and Sorescu's finding that subordinated-debt holders priced individual banking organizations' default risk during the later part of their sample period.

A second objection is that the maturity structure of debt may also be important in determining banks' behavior. As noted above, Flannery argues that the maturity of a bank's debt obligations is important in minimizing conflicts between owners and creditors. Banks pose special problems in terms of debt maturity because a large fraction of their assets is invested in assets that either have a short maturity or are traded in liquid markets or both. Thus, banks are in a position to substantially change the riskiness of their investment portfolio in a matter of months or days (or perhaps even hours in a few cases). Yet the regulations for subordinated debt to be included

21. Depositor preference was passed as a part of the Omnibus Budget Reconciliation Act of 1993. Under this provision, all of the depositors at a bank, insured and uninsured, would be placed ahead of all nondeposit liability holders in the event of a bank's failure. This provision reduces the FDIC's expected losses because in the event the agency makes payments to depositors after a bank failure the FDIC assumes the same priority claim on the remaining assets as the depositors did.

in capital ratios generally require that the debt have an average maturity at issuance of at least five years.

Once again, a solution seems clear: allow or require banks to issue subordinated debt with a short maturity. Benston and others (1986) advocate that banks regularly have subordinated debt issues rolling over and that some small percentage might be redeemable. Evanoff (1992) developed a proposal in which part of the outstanding subordinated debt matures on a regular basis (such as every six months). Calomiris (1997, 1998) provides for both regular rollovers and limits on the rate the debt could pay above the riskless rate of interest. Wall (1989) developed an entire proposal he called puttable subordinated debt that would allow subordinated-debt holders to “put” their debt back to the bank, in effect simulating the discipline imposed by demand depositors in the absence of deposit insurance.²² These various proposals for redemption of subordinated debt either at regular intervals or upon demand by subordinated creditors would allow subordinated creditors to effectively substitute debt for equity in protecting the FDIC while giving subordinated creditors a mechanism for protecting their own interests from risk-increasing strategies by equityholders.

The third possible objection to subordinated debt arises from the goal of capital requirements. If the goal of capital requirements is to protect the FDIC, then it is possible to structure subordinated obligations that will fulfill this objective. However, subordinated obligations are unlikely to help if the goal of capital requirements is to reduce the probability of failure after a bank has incurred significant losses. Subordinated debt does not provide a cushion that can absorb losses without causing failure. If the promised payments to subordinated creditors are not made in a timely manner, then the bank is illiquid and will be closed. Allowing or requiring banks to issue subordinated obligations that have a short maturity, that are partially rolled over on a regular basis, or that are puttable only increases the risk that obligated payments to subordinated-debt holders will push a weak bank into failure.

However, the argument that subordinated debt increases a bank’s probability of failure after it incurs a large loss does not necessarily imply that substituting subordinated debt for equity would make the banking system less stable. Equityholders receive both the larger payout associated with risks that succeed as well as part of the losses if the gamble fails. Subordinated-debt holders cannot obtain a higher rate of return than their promised interest rate but are exposed to failed gambles. Thus, subordinated creditors are likely to provide greater incentives for banks to avoid taking excessive risks *ex ante*.

Thus, Horvitz (1984) points out that greater reliance on subordinated debt is likely to reduce the *ex ante* probability that a bank will take excessive risks that would raise the probability of its failure.

Moreover, why should regulators care about the failure of an individual bank? The failure of any individual bank is not a public policy problem *per se*. A bank failure becomes a problem only if it causes significant losses to the FDIC or significantly reduces aggregate real (nonfinancial) economic activity. Properly structured subordinated debt protects the FDIC from losses in a manner similar to equity at insolvent banks. Moreover, a variety of studies have examined the consequences of bank failure for the real economy, and many of these studies argue that most of the adverse consequences of a bank’s failure for the real economy may be offset with appropriate monetary policy.²³

Conclusion

Banks around the world are or have been under intense regulatory pressure to raise or maintain capital levels in response to international risk-based capital guidelines. This article examines the factors that determine the type of capital banking organizations will raise by studying U.S. banks’ response to the primary capital guidelines announced in December 1981.

The empirical findings suggest that asymmetric information and the costs associated with small issue size are important determinants of the security issuance decision. Bank regulators may reduce the cost of asymmetric information by allowing banks to issue qualifying debt securities to comply with all parts of the capital regulation. However, to the extent that the cost of issuing new types of securities is high, such a regulatory change may be of little value to smaller banking organizations.

Given the potential of subordinated debt to reduce the costs of regulatory compliance for at least some banks, what justification might be given for the existing focus on equity capital? This discussion considers three possible reasons: subordinated debt may not protect the FDIC, the maturity structure of debt is important in minimizing the costs of conflicts between owners and creditors, and subordinated debt is unable to reduce the probability of a bank’s failure after it absorbs substantial losses. The first two objections may be easily addressed during the regulatory implementation of new rules permitting the use of subordinated debt. The third objection holds, but it ignores the role of subordinated debt in reducing the probability that a bank will incur substantial losses and the role of other mechanisms in limiting the impact of a bank’s failure on the real economy.

22. *Redemption of the subordinated debt in Wall’s proposal is contingent on the bank remaining in compliance with the capital standards after redemption. Thus, the subordinated-debt holders could not avoid taking losses from a bank’s failure merely by requesting redemption immediately prior to its failure.*

23. *For a survey of this literature arguing that the macro costs of bank failure need not be high, see Benston and Kaufman (1995).*

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