A Prolegomenon to Future Capital Requirements

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Since the early 1980s, bank supervisors have made significant strides with regard to capital requirements. The last fundamental change in the United States followed the 1988 Basle Accord, which contained explicit requirements for off-balance-sheet positions as well as more conventional standards based on the balance sheet.

At present, supervisors are contemplating further steps in the refinement of capital requirements. They are considering, among other issues, explicit requirements for market risk, including the use of banks' own risk management models for capital requirement purposes, as well as possible longer run strategies for handling risks other than credit quality and price.[1]

If we assume that the current market risk proposal is successfully implemented, where do we turn next? More generally, what are the long-range goals of capital supervision? This article is intended as a preliminary step—a prolegomenon—in addressing these long-term issues.[2] The object of the article is to persuade those who think that capital requirements are worth studying that it is important to pause a moment and, abstracting from all that has been done, to delineate a set of fundamental principles for future work on capital requirements.

It seems important, at least from time to time, to expand the focus of the analysis of bank capital. If only narrow technical questions were ever posed, it would be difficult to address the broader issues with a satisfactory level of confidence in the results. Thus, the methodology of this article is somewhat unusual in the context of standard economics. The approach is empirical and deductive, but is not based explicitly on hypothetical microeconomic modeling, which is readily available elsewhere.[3] Instead, this article identifies the useful features of capital requirements, past and present, as a means of establishing criteria that we would find desirable in subsequent capital regimes.

As a helpful preliminary, we first draw a distinction between regulatory capital requirements (minimum capital) and the internal risk management and capital allocation of the firms (optimum capital). Although the two

areas overlap in methodology and terminology, they differ greatly as to their goals. Failure to recognize this distinction can lead to unnecessary confusion and has the potential to make capital requirements less useful and institutions' risk management less effective.

This article does not address specific capital proposals nor does it suggest specific new requirements. The framework it provides, however, has implications for possible future refinements in the supervisory approach to capital requirements.

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Minimum Capital

This section defines the concept and the goals of regulatory capital requirements through inherently empirical means. It proposes to identify from past and present capital rules the specific characteristics that have made those rules useful to their intended audiences. These characteristics may then be construed as goals for future minimum requirements.

In very broad terms, capital requirements consist of three basic components: a definition of capital, a measure of the exposure to risk that capital is intended to cover, and a required relationship between those two amounts (typically a minimum ratio). Consider the components in slightly greater detail.

Regulatory capital is defined to include those claims on the value of the firm that are first in line to absorb future losses arising from a broad range of contingencies. Such contingencies correspond generally to the notions of credit risk, price risk, model risk, operational risk, liquidity risk, legal risk, and so forth. Typical examples of capital instruments are equity—the best form of capital—and subordinated debt—which requires an event of default for losses to be absorbed. The primary purpose of these layers of capital is to protect the senior creditors of the firm, especially the depositors in the case of banks.

Exposure to risk, the second component of capital requirements, is the main focus of the current regulatory discussion. Until the late 1980s, exposure was measured for capital purposes by the size of a bank's balance sheet. In a prototypical traditional bank that issues short-term deposits and invests in long-term commercial loans, total assets may be a fine indicator of the institution's risk exposure. Such a portfolio would of course be subject to large potential changes in its liquidation value as a result of changing interest rates. Nonetheless, with historical accounting and smoothing of earnings over time, the major source of risk could be viewed as arising from potential defaults. Stated differently, risk in this case is credit risk.

The experience of high and highly variable inflation and interest rates in the 1970s and 1980s made such a simple representation a wishful anachronism. Furthermore, the rapid development of securitization and of new financial instruments in the 1980s, and the increasing activity of banks in those areas, complicated matters still more. By the mid-1980s, it was painfully obvious that total assets could no longer be assumed to represent the risk exposures of banking institutions.[4]

In part as a response to these issues, the 1988 Basle Accord introduced an additional measure of exposure corresponding to off-balance-sheet instruments and activities. The recognition that large off-balance-sheet exposures exist is arguably the most significant contribution of the 1988 Accord. The framers of the Accord were faced with the problem of handling increasingly complex instruments and risks, and they responded with a methodology that is less straightforward than that of earlier rules. For example, regulators were forced to deal with positions that have little or no current value but have the potential to create significant exposures for a bank in very short order.

There was no unique way of solving this problem and certainly no perfect one. The method selected was to translate off-balance-sheet exposures such as swaps, forwards, credit guarantees, and lines of credit into credit-equivalent amounts by taking some proportion—varying according to the category of the instrument—of the nominal amount. The result was the inclusion of large, previously unrecognized first-order exposures in the measure of exposure used for capital purposes.

Minimum capital requirements have been successful to the extent that they have reflected these sorts of large first-order exposure. The concept of exposure is distinct from that of risk. Exposure is not defined as corresponding to any particular type of risk, but rather as a measure of the aggregate value that is subject to risks in general. For instance, the face value of a debt instrument may provide a good basic measure of exposure. Analysts may differ as to the precise riskiness of the instrument—its sensitivity to interest rate movements, the likelihood of counterparty default, potential settlement problems, and the like. Nevertheless, the range of values involved in those differences is frequently of second order as compared with the basic exposure of the instrument. Exposure is calculated by means of well-defined rules that are straightforward (though not necessarily simplistic), verifiable, and roughly representative of the overall level of risk.

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Another general feature of the 1988 Accord, the exclusive focus on credit risk and the introduction of credit risk weights, is conceptually and practically more problematical. By identifying one specific risk—one particular source of exposure—this approach led the way to a conceptual disaggregation of exposure into risk-by-risk components. Because the Accord covered explicitly only credit risk, regulators have expressed the need to modify it in order to cover market risk. Moreover, there are other important risks to consider, for instance, settlement risk, operational risk, model risk, liquidity risk, and legal risk. Although it may appear that such disaggregation is likely to increase precision, identifying simple ways of measuring each of the individual risks is generally quite difficult.

This conceptual experiment may result in several complicated components, each representing an attempt at measuring exposure to a particular risk with a certain degree of precision. If taken to its logical conclusion, the process may lead to a very complex measure indeed. Moreover, if compromises are made along the way, or possibly even if they are not, the sum of the parts will not necessarily be more precise than a comprehensive measure of exposure along the lines of the Accord itself or of some of its predecessors. U.S. regulators recognized the potential dangers of disaggregation in 1989 by superimposing a simple leverage ratio requirement (based on a ratio of capital to assets) on the infrastructure of the Accord.[5]

A comprehensive measure of exposure may be successful because any conceivable instrument is subject to some type of risk. The classic commercial loan is subject to credit risk, to be sure. A long-term Treasury bond may have no credit risk, but it can have significant price risk, much beyond that of a short-term loan. A mortgage security may also have little credit risk: the investor has ultimate recourse to collateral and in many cases to government guarantees. Furthermore, because of the mortgage security's amortization feature, its pure interest rate risk is likely to be lower than that of a Treasury instrument of similar maturity. Nevertheless, this type of security is subject to prepayment or convexity risk, which can be fairly intractable and unpredictable. Thus, as a first-order approximation, a comprehensive exposure calculation may be preferable to a much more detailed calculation based on a breakdown of risk factors. The payoff from the latter

approach is attainable only if regulators can and will pursue it to its logical conclusion.

Historically, explicit capital requirements have typically represented attempts to capture first-order exposures, as defined above. More generally, what common characteristics have capital requirements shared that have made them useful to supervisors, regulators, investors, depositors, and the public at large? As argued earlier, a list of such characteristics may be construed to be at the same time descriptive and prescriptive. Among those characteristics, we find the following.

Minimum capital is *objective and verifiable.* The basic information and formulas used to compute the required amounts are generally well defined in advance. The procedures are mechanical and, once in place, they are applied without the intervention of ongoing value judgments. One advantage accruing from this fact is that the rules are easily verifiable by anyone with expertise and access to the relevant information. An auditor should be able to replicate the calculations, and any observer should be able to reconstruct a portion of the computations if the required data are available.

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Almost corollary to the preceding is that minimum capital is *comparable across institutions and across time and bears a stable relationship to the underlying positions.* Capital rules generally yield the same result for the same portfolio, independently of the random vagaries of the markets and of any subjective decisions on the part of the firm or the supervisor. Since minimum capital is also generally *public knowledge*, the above comparisons may be performed not only by the institution and its supervisors, but also by investors, investment analysts, competitors, and any other interested parties.

Minimum capital is generally *based on somewhat rough—though ideally comprehensive—calculations*. Its function is to measure first-order exposures in an informative but approximate way. The conflict between accuracy and simplicity is more often than not resolved in favor of the latter, though carefully constructed requirements can achieve—in the aggregate—some accuracy as well. The calculations required should be straightforward in order to achieve the benefits discussed earlier. For instance, the gamma of an options portfolio may be sufficiently straightforward for these purposes, even if there are those who would not see sufficient simplicity in the calculation of a weighted average of second derivatives of an assortment of option pricing formulas.

The foregoing discussion raises the question whether it is possible to achieve the goals set forth for minimum capital. How can all the recent inventive instruments be handled, and how will future instruments—now unknown—be incorporated in the framework? It is unrealistic to expect that a permanent solution to this problem exists; periodic review of any rule is advisable. However, the current rules, having served as one of the key models in the discussion, are not far from the ideals outlined above. For example, total assets have been seen as a useful basic component of exposure in present and previous regulatory regimes in the United States. The tougher question pertains to the treatment of off-balance-sheet positions, but a good start has been made already in this respect within the 1988 Accord. The principal difficulty with the methods of the Accord is their lack of flexibility in accommodating new instruments. An adequate discussion of this point would be too detailed and technical and would divert us from the focus of this article. Nevertheless, a claim may be stated—without proof—that regulators could use information on contractual or expected cash flows associated with new and existing instruments to define nominal amounts for capital purposes.

Minimum capital is a guidepost. It *represents a minimum required level that is seldom directly binding*. Ideally, it is related to the positions that account for the bulk of a

firm's exposure to risk in an objective and predictable way and is thus generally understandable. It was not and is not intended as a level toward which the firm should aim nor as a standard for internal risk management. Because it is meant to be only a rough minimum standard, such interpretations could be unsafe. Instead, the actual capital of the firm should appreciably exceed the minimum. Beyond that, it is difficult to give precise rules as to how large the excess should be, although the next section provides some general guidelines. It is clearly not in the interests of regulators, depositors, and taxpayers to allow a bank's net worth to deteriorate to socially costly negative levels. A minimum capital level provides an early warning of such an event. For these reasons, minimum capital is not a proxy for some other elusive concept, it is of interest in and of itself.

Optimum Capital

In this article, we refer to the level of capital that a firm determines is prudent, desirable, and achievable in the short run as "optimum capital." The firm's own decision as to what level of capital is desirable is predicated on its views regarding the trade-off between the costs and benefits of capital. Capital is costly, generally more so than other claims. At a point in time, and given the particular risks faced by the firm, management may specify a given level of capital that meets its subjective goals for coverage. This calculus is hardly exact, especially since some risks are very difficult to model and quantify. Moreover, the firm may in some cases exercise considerable discretion regarding the nature and level of risks it faces. Nevertheless, using all the detailed information available, management should be able to specify some ultimate capital goal, as well as a plan to move swiftly toward that goal in the near term.

The development and application of optimum capital are fundamental components of a market-oriented approach to capital. Even at present, a firm's actual level of capital is frequently disclosed and is regarded by the investing public as a fairly direct result of the firm's management policies. Thus, the motivation for the firm to maintain adequate prudential capital derives not only from its own internal judgment and that of its supervisors, but also from the force of public scrutiny.

In this section, we focus on the firm's determination of its optimum capital level. To be sure, the banking industry is sufficiently remote from the theoretical model of perfect competition to raise questions about the general welfare implications of individually determined optima. Some of those questions are considered in the next section.

Optimum capital is an idiosyncratic construct of the firm and is quite distinct from minimum capital as defined earlier. In fact, the relevant definition of capital, that is, the range of instruments considered as capital, need not be the same as for minimum capital. For example, a viable ongoing firm would generally wish to rely on equity capital to absorb losses rather than on potentially costly defaults. The firm is also likely to view capital more broadly as a source of financing for its activities, rather than exclusively as protection for its depositors, leading to a broader conception of capital.

The determination of optimum capital entails continually facing tough questions and decisions about goals, means, and consequences. Optimum capital itself is a conceptual goal more than an objective reality. It is pursued not because the firm will know and attain the thing in itself, but because it imposes a discipline and a sense of direction that are conducive to responsible management.

Although disaggregation may be counterproductive in calculating minimum capital, an approach based on a detailed breakdown of risks and risk factors may be perfectly appropriate in the case of optimum capital. Clearly, the firm itself has access to all the information it needs regarding its own positions. In addition, the firm can go a long way on the road to complexity if it so chooses, something many large institutions are already in the process of

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doing. It seems preferable not to impose on the firm a specific methodology for determining optimum capital, but rather to allow it to be developed from within, according to the firm's own conception of its business goals and perception of its environment.[6]

As in the case of minimum capital, we may derive empirically some generalizations about the determination of optimum capital. That is, we may use the observed helpful characteristics of optimum capital to develop a set of goals for its determination. Among those characteristics, we find the following.

Optimum capital is *subjective, hence difficult to replicate and validate.* Many tough decisions must be faced in coming up with an optimum capital amount. Such determinations may seem objective because of the quite substantial mathematical and statistical apparatus that frequently underlies them. However, mathematics is only an aid in portions of the process and contributes to the modeling of some of the relationships, not necessarily to the accuracy of the resulting numerical levels, which remain subjective. The decision maker cannot escape responsibility for the ultimate judgments about the goals of the exercise and the level of coverage desired. The firm must also attain a deep understanding of the construction of optimum capital and of the related risk management system and must track the system's output and performance on a continuous basis. This role is intrinsic to the firm, and it is neither practical nor appropriate for others to assume it.

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Optimum capital is *internal to the firm*. In determining optimum capital, firms draw on proprietary information that they may not wish to disseminate for reasons of business competitiveness. Furthermore, the methodology itself may be proprietary. Given the present state of the art in risk management, there are many different ways of measuring risk, and the discovery of accurate, tractable methods may be of much value to their developers. The public may be aware of the estimated level of optimum capital only to the extent that the firm is able to attain that level on an ongoing basis, in which case it would be reflected in the publicly reported actual capital level. In general, however, the figure is most meaningful to the firm itself and to its supervisor, who is likely to be familiar with the full methodology leading to the ultimate results.

Optimum capital *involves no expectation or presumption of comparability across institutions or across time and is unstable in relation to the underlying positions*. The subjectivity of the measure clearly makes comparisons across institutions difficult or impossible. Moreover, many of the methods applied to calculate, say, price risk are dependent on fluid measures of market values or instrument volatilities. Such measures change from minute to minute, certainly from day to day, with resulting changes in the computed riskiness of a portfolio even if its composition remains essentially intact. Ultimately, results can be interpreted only in the full context of the process from which they are derived.

Because optimum capital is subjective and firm-specific, it is difficult for an outsider, even for a primary supervisor, to gauge the appropriateness of a particular level. In this connection, the minimum capital level plays a useful role because it furnishes the outside observer with an objective frame of reference for examining the less transparent optimum measure. It is clear, however, that no simple rules of thumb are available for evaluating capital levels; if they were, the whole optimum process could be avoided.

In practice, a supervisor's level of comfort depends on the minimum required level of capital, on the excess of actual capital over that level, on the transparency of the firm's methods and reporting, on the firm's attitude

toward risk in general, and on any other indicators of financial condition that can be factored in, even if impressionistically. If a firm's actual capital level is a large multiple of the required minimum, the supervisor will generally be more comfortable than if it just exceeds the minimum. Even so, a large multiple might provide limited comfort with a firm that has complex, opaque operations and a marked tendency toward risk taking. Similarly, a small excess cushion might be acceptable for a conservative firm in a rebuilding period at the end of a general economic contraction.

Finally, optimum capital *represents an attempt at precision, and—as an optimum goal—is necessarily binding*. The level of precision may depend on the component of optimum capital being estimated. The methods applied to price risk, such as the mathematically intensive value-at-risk measures, may be fundamentally different from those applied to credit risk or liquidity risk. Legal risk is likely to be difficult to quantify, but may be significant. However determined, the final result is by definition binding. The firm should approach it as quickly as possible given market conditions. Nevertheless, each institution faces cost and timing considerations, and at any time the institution is more likely to be on a path leading to the optimum than at that point itself.

Optimum Capital and the "Social Optimum"

The banking industry, like others in the financial sector, is subject to extensive regulation and supervision. In and of itself, such close scrutiny would seem to be an incentive for firms to determine and hold optimal levels of capital, as defined in the preceding section. From a public policy perspective, however, it is not immediately clear that a socially optimal capital structure would result. If firms do maintain individually optimal capital levels, are those levels consistent with socially optimal amounts? Moreover, are there competing incentives that would discourage firms from maintaining individually or socially optimal levels?

There is no simple answer to the first question. Although it is conceivable in theory that an optimal allocation of capital across firms may exist, it would be presumptuous to assume that such an optimum is readily quantifiable. Thus, it seems reasonable to adopt the market solution to this issue, namely, to assume that in the absence of perverse incentives, individually determined optima are acceptable for public policy purposes. This brings us to the second question: do such perverse incentives exist? Frequently cited in this context are the elements of the "safety net": special arrangements provided by official authorities because of the special nature of the banking business. The benefits of the safety net, if not properly priced, have the potential to generate undesirable behavior.

An example of the concerns associated with the safety net is provided by deposit insurance, whose primary purpose is the protection of small depositors. A typical

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account of the misuse of deposit insurance proceeds as follows. Firms have access to government-provided deposit insurance at a flat rate that is not reflective of each institution's potential risks.[7] The mispriced insurance then leads to moral hazard: the institution can hold inordinately risky assets without driving away the protected depositors. Eventually, the risky assets collapse, the firm becomes insolvent, the depositors are made whole by the insurance fund, and the insurer and the taxpayers incur large losses. This sort of scenario is often cited in connection with the U.S. thrift predicament of the 1970s and 1980s.[8]

One might attribute this chain of events to too much risk. Alternatively, however, one might conclude that there was too little capital. Normally, a firm is concerned with self-preservation. There are various incentives

for management, shareholders, debtholders, and depositors to favor the firm's continued existence over the dissipation of its net worth.[9] In the absence of other complications, the firm's view of its optimum level of capital should be consistent both with the actual riskiness of its activities and with the objective of attaining a certain prudent likelihood of the preservation of firm value.

Realistically, other complications do exist, such as deposit insurance and real or perceived implicit guarantees of the "too-big-to-fail" variety. If the firm takes the benefits of these provisions into account in determining its optimum capital, and if the corresponding price structure for those benefits is deficient, the probability of failure increases and the explicit or implicit insurer is left to bear the risks.

One way to approach this problem is to insist that the firm not reduce its estimate of optimum capital as a result of unpriced or mispriced benefits from the safety net. In the absence of such a requirement, and strictly from the individual firm's point of view, the existence of the safety net may represent an opportunity for the firm to hold a lower level of capital without jeopardizing its funding or its expected internal profit. Ignoring such benefits in the determination of the optimum is akin to establishing an insurance premium or reserve within the firm in the form of additional capital. This reserve would reduce the likelihood of firm insolvency approximately to the level that would obtain in the absence of the safety net and would correspondingly limit the costs to the official authorities and to the public interest. From a public policy perspective, this solution has the advantages of being preventive rather than palliative and of freeing the authorities from any precommitment as to the precise nature and extent of any subsequent rescue efforts.

What incentives do firms have to establish optimum capital goals in this manner, and how can such an approach be enforced? A strong and informed supervisory system can be the key in providing the requisite incentives and deterrents. The benefits associated with the safety net, as well as other benefits such as authorization to participate in a variety of activities, can be made available as incentives to well-capitalized institutions. Although the determination of optimum capital is usually complex and highly subjective, a well-informed supervisor may determine whether the approach to optimum capital is reasonable and whether it avoids reductions corresponding to any unpriced benefits of the safety net. Contact between the firm and its supervisor at both the technical and management levels can help eliminate any differences of opinion that may arise.

As to deterrents, U.S. bank supervisors already have at their disposal a series of enforcement actions that can be used selectively even in cases where problems are not yet dangerously acute. In implementing either incentives or deterrents, the official examinations staff will face significant demands. However, such demands seem unavoidable in arrangements where the supervisory authority retains any substantive responsibility for the solvency of particular institutions or of the system as a whole.

Actual Capital and Its Life Cycle

The discussion has focused so far on the development of a frame of reference for capital. We can think of minimum capital and optimum capital as two guideposts for the evaluation of the actual level of capital held by a firm. The first is stable and objective and should always be exceeded; the second is variable and subjective and the institution should always strive to attain it. At least two questions suggest themselves. First, is the framework internally consistent? Second, how is actual capital to be gauged in reference to the framework at different points in time and for different firms?

If the supervisor and the institutions coincide in their basic understanding of the world, minimum and optimum capital should be mutually consistent. The minimum requirement would be calibrated as a lower bound for normal optimum levels. If estimated optimum capital turns out to be less than minimum capital, either the initial judgments that led to the formulation of the minimum were too strict or the ongoing judgments involved in the determination of the optimum are too lax. The frequency of such occurrences would indicate which possibility is more likely. Even if the framework is internally consistent, there may be some pathological cases in which the firm's determination of the optimum cannot be taken at face

value. A classic example is the insolvent firm. Because such firms have nothing to lose, they may find it optimal to assume inordinately large risks without commensurate capital levels. Nevertheless, a cursory look at banks' recent actual capital levels, if these are interpreted as indicative of internally determined optima, suggests that firms are content to hold large multiples of the minimum levels under appropriate circumstances.

Given the two guideposts of minimum and optimum capital, where should an institution's actual capital level be? By definition, in all cases, it should be as close as possible to the optimum level. But the optimum may be highly variable over time, so that the desirable excess over the minimum required level depends on various time- and firm-specific factors such as the riskiness of the firm's positions, the economic condition of the firm, the sector in which it operates, and the state of the economy as a whole. In good times, it will generally be optimal for the firm to build up its capital, which is at those times easier to come by. Retained earnings will be drawn from a more plentiful earnings base, and new issuance of capital in the markets will be relatively inexpensive.

In bad times, . . . it would be unwise either to place undue pressure on individual firms to raise relatively expensive capital too quickly or to extract onerous penalties that could impair the firm's successful recovery and ongoing viability.

In bad times, some capital will be absorbed by the occurrence of normal losses, that is, losses resulting from taking prudent risks. Capital ratios will be predictably lower, though still above the minimum requirements. At these times, when firms have lower retained earnings and face more expensive new issuance markets, it would be unwise either to place undue pressure on individual firms to raise relatively expensive capital too quickly or to extract onerous penalties that could impair the firm's successful recovery and ongoing viability. If the purpose of capital is to absorb losses arising in the normal course of business, it should not be viewed as an anomaly when it predictably does just that. Of course, the supervisor must be ready to act firmly if supernormal losses ensue, and comparing actual capital with the minimum level can be helpful in developing early signals of impending difficulties.

A promising method for dealing with capital variations and fluctuations is embodied to a significant degree in the "prompt regulatory action" provisions of the 1991 banking act.[10] The provisions establish a relationship between a firm's level of capital and the degree to which it is subject to regulatory constraints, for example, on lines of business. A well-capitalized institution is allowed to participate in risky activities with a minimum of additional regulatory intervention. Other institutions (or the same one at a different point in time) that just meet the capital requirements are subject to close scrutiny in applying for new activities, and those applications could be summarily denied. In the extreme, firms that fail to meet some minimum level of capital may be forced to shut down. In the design of such a system, care must be exercised so that the restrictions for firms with declining capital are not equivalent to the onerous penalties mentioned above, which could deal a mortal blow to an otherwise viable firm. In addition, it may be misleading to use capital as the single source of information for the operation of the system. Capital should be interpreted in light of various key factors, both cross-sectional and cyclical, such as the condition of the firm and the state of the economy.

Supervisory Use of Minimum and Optimum Capital

Minimum capital and optimum capital have peculiar characteristics that make each inherently useful but different from the other in fundamental ways. To be sure, some of the methods used in the development of the two constructs overlap. For example, the computation of minimum capital can include sophisticated calculations—frequently used for optimum capital—if they are straightforward and well defined. Nonetheless, an attempt to bring the two con-

structs closely in line could backfire. It could undermine the useful objectivity of minimum capital and deprive firms of the flexibility they need to determine optimum capital levels.

The separateness of minimum and optimum capital is necessary because, as noted in earlier sections of this article, their objectives are very different and their useful characteristics are mutually contradictory. In the economic analysis of the choice between two goods, two conflicting objectives are customarily fused by means of some unspecified or arbitrary relative weighting scheme. The result is that the optimal choice is normally a single combination containing some of each of the two goods. In the case of capital, such an interior solution is suboptimal because the firm and the supervisor need not limit themselves to a single construct. They can have both minimum capital and optimum capital rather than a hybrid construct that would disregard valuable information. The separate objectives need not be fused; they can both be satisfied.

Thus, the supervisor could monitor periodically—as frequently as feasible—compliance with the minimum requirements. In evaluating the excess of actual over minimum capital, the supervisor could take into account that different levels may be advisable for different firms and for a given firm at various points in the economic cycle. The supervisor may also wish to monitor firms more closely when minimum levels are approached, so that it may act swiftly and decisively should those levels be breached.

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The supervisor may supplement the effectiveness of direct capital requirements by ensuring that the firm makes its best effort to determine an optimum level of capital and to approach that level as quickly as possible. Although the supervisor can make constructive use of information bearing on the optimum capital of the firm (for example, in evaluating the excess of actual over minimum capital), the development and determination of the optimum are best left to the firm. A single regulator is at an obvious comparative disadvantage in determining which particular methodology and assumptions are best suited for each of a multitude of idiosyncratic firms. Each firm is in the best position to make its own detailed decisions and should be responsible for doing so in a prudent manner.

Concluding Remarks

This article identifies two constructs—minimum and optimum capital—that provide a framework for evaluating a financial firm's actual level of capital. The basic conclusions are derived from a review of the successful measures employed in the past and the present by both regulators and institutions. Furthermore, the article argues that the distinct uses and characteristics of minimum and optimum capital make it inadvisable to combine them into a single measure, for they are so naturally contradictory that a hybrid would be much less informative than the two individual measures. This point may be confirmed by simply summarizing and reviewing the properties of the two constructs.

We find that minimum capital is objective, verifiable, public, and comparable across institutions and across time. It bears a stable relationship to the underlying positions, is generally based on somewhat rough—though ideally comprehensive—calculations, and represents a minimum required level of capital that is seldom directly binding. In contrast, optimum capital is subjective, hence difficult to replicate and validate, and internal to the firm. It is neither expected nor presumed to be comparable across institutions or across time, is unstable in relation to the underlying positions, represents an attempt at precision, and—as an optimum goal—is necessarily binding.

These two constructs, supplemented with other relevant information explaining differences in optimal cap-

ital levels across institutions and time, will give supervisors a workable framework for gauging the capital adequacy of a firm or group of firms. The approach requires adopting a specific direction in moving forward from the present regulatory regime, but it has the advantage of not requiring any drastic initial regulatory changes. Many appealing features of the current system could be retained. Over the longer run, however, the new direction could result in a substantially simpler, more responsive regulatory structure.

ENDNOTES

1. See, for example, Basle Committee on Banking Supervision (1993, 1995) and Council of European Communities (1993).

2. In the 1783 book *Prolegomena to Any Future Metaphysics*, Immanuel Kant sketched out his solution to all the fundamental issues in that branch of philosophy. As in Kant, the Greek term "prolegomenon" denotes here a critical discussion that sets the stage for further work in a given field. In contrast to Kant's ambitious agenda, the present claims are somewhat more modest.

3. An excellent recent review of the microeconomic literature on bank capital, with numerous references, is found in Santomero (1991).

4. See Bank for International Settlements (1986) and Edwards and Mishkin (1995).

5. See Board of Governors of the Federal Reserve System (1989).

6. For a helpful discussion of the current status of the risk management systems of financial institutions, see Group of Thirty (1993).

7. As a result of the 1991 banking act, deposit insurance premiums are currently based on various factors, including capital adequacy, related to the risk of losses to the insurance fund. See Section 302 of the Federal Deposit Insurance Corporation Improvement Act of 1991 and Federal Deposit Insurance Corporation (1992).

8. See, for example, White (1989).

9. See, for example, Santomero (1991).

10. See Section 131 of the Federal Deposit Insurance Corporation Improvement Act of 1991 and Board of Governors of the Federal Reserve System (1992).

REFERENCES

Bank for International Settlements. 1986. RECENT INNOVATIONS IN INTERNATIONAL BANKING. April.

Basle Committee on Banking Supervision. 1993. "The Prudential Supervision of Netting, Market Risks and Interest Rate Risk." April.

Basle Committee on Banking Supervision. 1995. "Proposal to Issue a Supplement to the Basle Capital Accord to Cover Market Risks." April.

Board of Governors of the Federal Reserve System. 1989. "Capital Adequacy Guidelines." Washington, D.C., March.

Board of Governors of the Federal Reserve System. 1992. "Legal Developments: Final Rule—Prompt Corrective Action." FEDERAL RESERVE BULLETIN, November.

Council of European Communities. 1993. "Council Directive 93/6/EEC on the Capital Adequacy of Investment Firms and Credit Institutions." Brussels, March.

Edwards, Franklin R., and Frederic S. Mishkin. 1995. "The Decline of Traditional Banking: Implications for Financial Stability and Regulatory Policy." FEDERAL RESERVE BANK OF NEW YORK ECONOMIC POLICY REVIEW 1, no. 2 (July).

Federal Deposit Insurance Corporation. 1992. News Release PR-129-92, September 15.

Group of Thirty. 1993. DERIVATIVES: PRACTICES AND PRINCIPLES. Washington, D.C., July.

Santomero, Anthony. 1991. "The Bank Capital Issue." In C. Wihlborg, M. Fratianni, and T.D. Willett, eds., FINANCIAL REGULATION AND MONETARY ARRANGEMENTS AFTER 1992. Amsterdam: North Holland.

White, Lawrence J. 1989. "The Reform of Federal Deposit Insurance." JOURNAL OF ECONOMIC PERSPECTIVES 3, no. 4 (Fall): 11-29.