

Topics in Corporate Finance

Perspectives on the Regulation of the Financial Services Industry

NUMBER 2

Topics in Corporate Finance

Perspectives on the Regulation of the Financial Services Industry

Topics in Corporate Finance

Perspectives on the Regulation of the Financial Services Industry

With contributions of:

Edward I. Altman and Anthony Saunders
Arnoud W.A. Boot, Todd T. Milbourn and Silva Dezelan

ISBN 90-805728-2-9
ISSN 1567-7664

© 2000, Amsterdam Center for Corporate Finance

All rights reserved

PREFACE

The well-being of the financial sector is a primary concern to national and international policy makers. Particularly banks are singled out and subjected to extensive regulatory scrutiny. Regulation, however, does not come without cost. Moreover, today's dynamic environment of banking may very well undermine its effectiveness and ask for a careful (re-)examination of regulatory practices.

This publication of the Amsterdam Center for Corporate Finance (ACCF) focuses on the design and future of regulation. In the first contribution professors Ed Altman and Tony Saunders evaluate the latest BIS proposals on capital adequacy. In particular, they focus on the suggestion to use external credit ratings for improving the existing risk-based capital requirements. While their main conclusion is that the use of credit ratings may not be desirable, they do support the BIS in its attempts to improve the risk-based weighting of capital requirements. In the second contribution, Boot, Dezelan and Milbourn focus on the broader issue of optimal regulatory design in the increasingly competitive and dynamic environment of banking. The question they address is what type of regulation is sustainable and causes minimal competitive distortions? They advocate setting minimum requirements, basically certification requirements, complemented with discretionary controls to monitor the integrity and viability of financial institutions.

Together both contributions help understand the important role of regulation in the financial services sector. We hope that you enjoy reading it.

A.W.A. Boot
J.E. Ligterink
May, 2000

CONTENTS

Preface v

AN ANALYSIS AND CRITIQUE OF THE BIS PROPOSAL ON CAPITAL ADEQUACY AND RATINGS
by Edward I. Altman and Anthony Saunders

1. Introduction 1
2. The BIS Stage 1 Proposal 2
3. Empirical Results 3
4. Summary and proposal 9

References 11
Tables 12
Figures 21
Note on the Contributors 23

REGULATION AND THE EVOLUTION OF THE FINANCIAL SERVICES INDUSTRY
by Arnoud W.A. Boot, Todd T. Milbourn and Silva Dezelan

1. Introduction 25
2. Competitive Environment of Western Banking 28
3. Regulatory Considerations 30
4. Optimal Regulatory Design 34
5. Regulation in Transition Economies 36
6. Conclusion 39

References 40
Note on the Contributors 42

An Analysis and Critique of the BIS Proposal on Capital Adequacy and Ratings

by Edward I. Altman and Anthony Saunders

1. Introduction[1]

In June 1999, the BIS released its long awaited proposal on reform of the 8% risk-based capital ratio for credit risk that has been in effect since 1993.[2] The 8% ratio has been criticized on at least three major grounds. First, it gives an equal risk-weighting to all corporate credits whether of high or low credit quality. Second, it fails to incorporate potential capital savings from credit (loan) portfolio diversification. The latter is a result of its simple additive nature. And third, it has led to extensive regulatory capital arbitrage which adds to the riskiness of bank asset portfolios.

In its June 1999 draft, the BIS proposed a three-stage reform process.[3] In the first stage, the 8% risk based ratio (where all loans receive the same 100% risk-weighting) would be replaced by weightings based on the external credit agency rating of the borrower (we discuss this proposal in more detail in Section 2 of the paper). In the second stage, at some unspecified time in the future, when some sophisticated banks have developed their own internal rating systems for loans, a transformation may be made to calculating capital requirements based on a bank's allocation of its loans to the various grades/ratings in its own internal loan rating system. Finally, in the third stage, given appropriate model and data base development and testing, some banks may be able to use their own internal credit risk models to calculate capital requirements. Importantly, these internal models allow for portfolio diversification effects.

A number of issues have been raised about stages two and three of the reform proposal e.g., how will the internal rating systems of different banks — especially if they continue to develop independently of each other — be grouped into some standardized set of capital risk weights; that is will a rating of 1 for Citigroup be the same as a 1 for BankAmerica or will a rating of 1 for a bank in the United States be equivalent to a 1 for a bank in Germany?[4] Also, what is the appropriate mapping of the internal rating model

1 The authors wish to thank several individuals from Standard & Poor's and Moody's for their data assistance. The computational assistance of Vellore Vishore and Sreedar Bharath are also acknowledged as well as the coordination by Robyn Vanterpool. The opinions presented are solely of the authors. This paper's drafts have been prepared for two symposia on the proposed new guidelines; the first held at the University of Frankfurt on December 2, 1999 and the second at the NYU Salomon Center's Stern School of Business forum, held on February 25, 2000.

2 The 8% ratio was phased-in over the 1988-1992 period, following the 1988 Basel Accord. Some countries have actually adopted a capital adequacy ratio of over 8% (e.g., Brazil uses 11%). In all cases, the level of capital is to help to ensure a banks solvency against unexpected losses.

3 The discussion period for the proposal runs until March 2000. A revised proposal will then be distributed with a subsequent second, probably shorter, discussion and commentary period.

4 See W. Tracey and M. Carey (1998) for a discussion and survey of banks' internal ratings systems. A more recent discussion paper by the Basel Committee on Banking Supervision (2000) examines the range of Banks' internal rating systems.

with external ratings? While these are important issues, this paper concentrates on the first stage of the proposal. In particular, we raise a number of concerns (backed by data) regarding the use of rating agencies rating systems in a reformed capital adequacy system in the manner that the 1999 BIS proposal stipulates.

Section 2 of this paper briefly outlines the BIS stage-one proposal. Section 3 presents some empirical evidence that questions the proposal and shows that similar "risk-shifting" incentives (i.e., regulatory capital arbitrage) exist under the new plan as under the current 8% risk-based capital ratio. These empirical tests are supplemented by simulations on sample data to better assess expected and unexpected losses form actual bond portfolios. We will show that the current Basel "one size fits all" approach is not sufficiently modified in the new approach. Finally, Section 4 provides our recommendation to enlarge the number of "buckets" with different risk weightings to better approximate actual loss experience and risk categories.

2. The BIS Stage 1 Proposal

Table 1 shows the proposed reform of the 8% ratio in stage 1 of the new plan. As noted in the introduction, currently all corporate loans have the same 100% risk-weight (for risk adjusted assets) implying the same minimum capital requirement (e.g., 8%). Under the new proposal, corporate borrowers rated AAA to AA – by S & P, or the equivalent authorized rating agencies (see Table 2), will have a risk weight of 20%. This implies a capital ratio of .2 x 8% = 1.6%; much lower than at present for "high quality" loans. In what follows, we shall label this category "bucket 1." For corporate borrowers rated A+ to B-, the risk weight will remain at 100%, i.e., they will continue to have a capital ratio of 8%; we will call this group of borrowers "bucket 2." For those borrowers rated below B-, the risk weighting increases to 150%, implying a capital ratio of 1.5 x 8% = 12%. It might be noted that, somewhat paradoxically, unrated corporate borrowers are given a lower 100% risk weight and thus an 8% capital requirement. A similar, but less broad bucketing approach is adopted for sovereigns and banks. In particular, the current system of a zero risk weight for OECD countries and a 100% risk-weight for all other countries is replaced by four new buckets based on agency ratings.

In the next Section, we use data on bond ratings, defaults and loss rates to more closely examine the three-bucket approach for corporate borrowers. We do this with two questions in mind. First, does this approach lead to bank capital reserves rising prior to recessions, i.e., before the realization of loan losses typically occurs – as should happen under an "ideal" system? In particular, a well-designed regulatory system should see capital rising during periods of high profitability and earnings for banks (which normally coincides with periods of business expansions) and falling during recessions as "unexpected losses" are written off against capital. At the very least, the size of the capital reserve should be coincident with the business cycle even if it does not lead it.

Second, does the bucketing system make economic sense? That is, how homogeneous in terms of risk are the different buckets. For example, bucket 2 encompasses both investment grade debt (A and BBB) as well as below investment grade debt (BB and B). Moreover, if they are not homogenous, what relative risk-weighting scheme would these data suggest?

3. Empirical Results

In this section we use data from Moody's and Standard & Poor's and from the NYU Salomon Center's data base on Corporate bond defaults[5] and losses on defaults in order to gain insight into these two questions.

3.1 The Lead-Lag Relationship of Capital Reserves

As discussed above, ideally, capital reserves for unexpected losses should be accumulated during periods of high bank profitability and business expansion. Banks find it much more difficult, if not impossible, to add substantially to their capital reserves when profits are low and the economy is in recession. And, reserves should be adequate prior to, not after defaults and losses increase.

In Figure 1, we have used Moody's bond ratings to group bonds outstanding over the March 1989 to March 1999 period into the three buckets implied by the Moody's equivalents to the S&P ratings shown in Table 1. The period 1989-1991 is a period of recession while the period of the current expansion begins post-1992. Although these data include only one recession, they are representative of a number of recent critiques that have found that rating agencies move slowly and their ratings are often inflexible. As a result, external ratings' ability to predict default with a long (if any) lead has been questioned. Indeed, Figure 1 suggests that a capital adequacy system built around traditional agency ratings might even follow, rather than lead, the business cycle. As can be seen, the proportion of bonds in bucket 2 appear to fall continuously over the March 1989 to March 1991 period, while those in Buckets 1 and 3 appear to rise continuously. Specifically, the proportion of bonds in bucket 3, with the 150% risk weight, peaks in September 1991, near the end of the recession rather than at the beginning.

Figure 2 shows a similar result for S&P ratings. As can be seen, while the percentage of bonds in bucket 3 is small, its proportion still rises over the 1990 to 1991 period. If risk weights and capital requirements were tied to these buckets, this could have meant (had the new proposal been in effect during the 1989-1991 recession) that some banks would

5 The data includes defaults on straight (non-convertible) corporate bonds over the period 1971-1999, ratings and prices on the defaulting issues at birth, one year and one month prior to default as well as just after default.

6 The years 1990 and 1991 saw defaults rise dramatically in both the corporate loan and bond markets. Indeed, corporate bond default rates in each of those years were over 10% of the outstanding bonds at the start of each year (see Altman, Cooke & Kishore, 1999).

have had to build up their minimum reserve requirements during the recession with a peak minimum capital ratio being achieved at or near the recession's end.[6] That is, rather than leading the recession, minimum capital requirements would have been lagging it and also the rising wave of loan defaults.

This suggests that alternatives to the rating agencies' bucket approach be assessed. For example, there are a number of rating and default forecasting approaches that have been developed in the last decade. These include ones by Jonsson & Fridson (1996), Moody's (1999), and Altman (1989). The first two utilize the existing rating proportions and add macroeconomic variables to the forecasting regression. The latter assumes a stable default aging frequency by original rating, and forecasts defaults based on the previous thirty years of default aging experience, in essence a regression-to-the-mean approach.

A second possibility is that the individual issuers of loans be subjected to a micro-default probability model and the aggregate of this bottom-up approach be assessed for expected and unexpected (capital) losses of the loan portfolio. Approaches with this objective include equity value option models (expected default frequencies) and multivariate models which involve financial statement and market equity variables.[7]

A final idea exploits the use of credit spreads to define the buckets. It can be empirically demonstrated that credit spreads were particularly accurate forecasters of subsequent default rates at the start of 1990 and again at the start of 1991.[8] The credit spread indicator is a commonly used barometer of risk in financial systems and for economic cycles by both the government and banks.

3.2 Bucket Risk Homogeneity

To analyze the second question, bucket risk homogeneity, we examined data on bond issues (and issuers) over the 1981-1999 (September) period. Our focus of attention was the degree of homogeneity (heterogeneity) of unexpected loss rates over the sample period. Following most approaches of economic capital and loan loss reserve calculations, loan loss reserves are meant to cover expected (or mean) losses while economic capital reserves are meant to cover unexpected losses.

To undertake this study, we collected data on bond issues and issuers that did and did not default, the ratings of those defaulting issues one-year prior to default, the price and coupon of the bonds one year prior to default and the price of the bonds just after default. The price (and coupon) one year prior to default (P_{t-1} and C_{t-1}) and the price (and lost coupon) on default (P_t and C_t) allowed us to calculate a loss rate for each bond default (i.e., $[P_t - (P_{t-1} + C_{t-1}/2)]/P_{t-1}$). The total number of defaulting bonds over the

7 A survey of these methods can be found in Altman and Saunders (1997).

8 On December 31, 1989 the yield-spread between high yield corporate bonds and ten-year U.S. Treasury bonds was 7.24% and one year later it was 10.50% (Table 3). These were the highest levels for several decades and the subsequent annual default rates (10.1% and 10.3%) were the highest default rates on high yield "junk" bonds ever recorded. It should be noted that the highest dollar amount of defaults ($23.5 billion) in this market, perhaps in the commercial loan market as well, occurred in the most recent year (1999), see Altman, *et al* (2000). Of course, the size of these markets are much greater in 1999 than in the early 1990's. Still recent default experience highlights the cyclical nature of default rates and marks the end of the benign credit cycle of most of the 1990s.

18 year sample period, for which we had full price and rating information, was 588. For an additional 104 bonds, we only had the rating and not the price, one year prior to default. For these bonds, we assumed that their default experience mirrored the distribution of losses of the bonds in each rating class for which we did have loss data. Finally, there were over 100 bonds that were unrated and which we had no price data. We placed them in the unrated category (see Table 1). Since we are only looking at the relative loss experience for rated bonds, these unrated bonds played no further part in our study.

We then applied a number of models to calculate unexpected loss rates (or "economic" capital requirements) for bonds of different ratings one-year prior to default,[9] so as to calculate loss rates at various confidence intervals. Three distribution models were used to initially calculate loss rates; (i) a normal distribution (ii) the actual distribution and (iii) a Poisson distribution (with a stable mean). The first two models are similar to those used in JP Morgan's CreditMetrics® and the third is a simplified version of the model assumed in CSFP's CreditRisk^{+}®. Tables 4-9 show the results for the full sample period for rating classes A through CCC and below. Note that BIS bucket 2 is represented here by the ratings A, BBB, BB and B and bucket 3 is represented by the CCC and lower category. Bucket 1 is not shown because of non-existent defaults in the AAA to AA ratings range at one year prior to default.

In addition, we carried out a set of Monte-Carlo simulations. Since most formal credit-risk models – such as CreditMetrics® and CreditRisk^{+}® contain certain parametric assumptions (e.g., about correlations) embedded in their structures, these formal models' results reflect, in part, these untested assumptions. Monte-Carlo simulations, by contrast, allow estimation of the size of losses in the tail of loan loss distributions conditional only on assumptions made about the composition of bank portfolios. In the simulations, we follow Carey (1998) and look at a number of portfolios. The first reflects the allocation for US life insurance company privately placed bonds. In this allocation, approximately 13% are below investment grade. The second reflects the suggested allocation by Carey for US banks commercial loan portfolios. This reflects, on average, a much lower credit quality than that adopted by life insurers, with some 50% being below investment grade. In addition to these two portfolios, we look at loss distributions for portfolios that contain respectively only AAA, AA and A bonds (portfolio 3), BBB bonds (portfolio 4), BB bonds (portfolio 5), B bonds (portfolio 6) and CCC and lower (portfolio 7).

In conducting the Monte-Carlo simulation, a portfolio aggregate size is chosen (here $1 billion) and assets are drawn at random subject to the composition of the portfolios conforming to the representative portfolios discussed above (until the target aggregate portfolio size is reached). The loss rate on the portfolio is then calculated. For each portfolio (1 to 7) the simulation is repeated 50,000 times and the frequency distribution of losses forms an estimate of the relevant loss distribution. From that loss distribution, loss rates at different quantiles can be analyzed, and by implication the capital reserves needed to absorb the level of unexpected losses are determined. Unexpected losses are the difference between the loss rate at a given quantile and the mean, or expected, loss rate.

9 The one-year horizon is consistent with the horizon adopted by most internal credit risk models.

3.3 Empirical Results of Loss Distributions

Table 4 shows that, for A-rated bonds, 12,115 issuers did not default over this period, while seven A rated issuers defaulted within one year of being rated A. Of the seven, two defaults had a loss rate in the 1% to 10% range, two had loss rates in the 11% to 20% range, two had loss rates in the 21% to 30% range and one had a loss rate in the 51% to 60% range. The mean loss rate (the expected loan loss reserve) for the entire A-rated sample was .012%. Recall, we do not observe any one year losses for AAA or AA rated bonds; hence, no tables are presented.

For capital or unexpected loss calculations, different quantiles were used to describe extreme losses. The more conservative the banker or the regulator, the higher the quantile chosen. For the normal distribution, we calculated the 95% (1.64485σ), 99% (2.32634σ) and 99.97 (3.431925σ) unexpected loss rates. As can be seen for single A bonds, these unexpected loss rates were respectively 1.021%, 1.448% and 2.142%. These are well below the current 8% capital requirement (actually quite close to the proposed guideline for AAA/AA credits). However, as is well known, the loss distribution of loans is highly non-normal, so the second calculation, also shown in Table 4, uses the actual distribution of bond losses. To calculate a particular quantile's loss rate involves counting backwards under the actual default distribution and finding the loss rate coincident with the default that just matches the quantile. For example, to find the unexpected loss rate consistent with the 99.97% quantile (i.e., where capital is sufficiently large to meet all but 3 losses out of 10,000[10]), we calculate that .03% of 12,122 is 3.6 issuers. We then count backwards under the A-rated bond distribution and find that 3.6 defaults are coincident with a loss range of 11% to 20%. In all cases, we take the mid-point of the loss range (here 15%) to reflect the unexpected loss. To net out the loan loss reserve, we deduct from 15% the expected or mean loss rate (here .012%) to get an unexpected loss rate at the 99.97% quantile of 14.988%. This is clearly much larger than the current 8% ratio of the BIS. Note, however, at the less conservative quantiles of 99% and 95%, the unexpected loss rates (and hence capital ratios) are actually zero.

Table 4 carries out a similar exercise to the one discussed above for BBB, BB, B and CCC (and lower) bonds. In addition, a "total" column aggregates across all of the rating classes.[11]

We can use these calculations to examine the degree of homogeneity (heterogeneity) across the four rating grades A, BBB, BB and B entering into bucket 2. Using the 99th percentile, or its equivalent, as a standard for comparison, we can see that, under the normal distribution assumption, the capital requirements for the four ratings classes are respectively 1.448%, 2.323%, 7.102% and 17.030%. Even under the highly unrealistic assumption of normally distributed loss rates, B rated bonds' risk is more than 10 times that of A rated bonds.[12] Looking at the actual distribution of losses at the 99th per-

10 Alternatively, where the bank will have sufficient capital to survive all but 3 years out of the next 10,000 years.

11 Interestingly, the total mean or expected loss rate of 0.598% is quite close to the level of banks' average loan loss reserve holdings in recent years.

centile, a similar degree of heterogeneity emerges. Specifically, the capital requirements are respectively 0%, 0%, 4.7% and 43.266%, indicating a very clear distinction between unexpected loss rates of investment grade borrowers (those rated A and BBB) and below investment grade borrowers (those rate BB and B). Thus, Table 4 suggests that if we use external rating agency buckets, as the current proposal suggests, for capital requirement risk-weights, the degree of granularity is far too coarse.

Finally, what can be said about the relative risk weightings of buckets 2 and 3. Under the BIS proposal, bucket 2 has a 100% risk-weight while bucket 3 has a 150% risk weight – implying that loans in bucket 3 are 11/2 times "more default risky" than those in bucket 2. As can be seen from Table 4, even where we use, for bucket 2, the lowest rating grade (B), and unexpected loss rates are used to compare with bucket 3 loss rates, the *normal* distribution suggests a risk-weighting ratio of 3.2 times (i.e., 55.455% divided by 17.030%) at the 99% level. The equivalent 99% relative risk-weighting was 1.64 times using the *actual* distribution. Of course, these relative risk-weightings are far larger when either A, BBB, or BB are used to compare to loss rates in bucket 3. Overall, these results suggests that for the new BIS proposal, the degree of a loan's credit risk in bucket 3 may be relatively underpriced (under capitalized) to the that of a loan in bucket 2.

3.4 Robustness Checks

We decided to carry out a number of additional robustness checks to examine how the degree of heterogeneity in bucket 2 changes under "alternative" assumptions. In Table 5, we recognize that Table 4's findings are biased towards finding higher capital ratios and may be confounding loan losses with bond losses (the latter is what we actually measure). Both biases occur, in part, because for non-defaulters we have used the number of issuers (i.e., implicitly assuming one bond per issuer), while the defaults reflect the number of defaulted issues (i.e., one issuer may default on a number of bonds).[13] This bias is corrected in Table 5 where we only analyze the loss rate on the most senior bond or note of each defaulting issuer. As a result, the total number of defaults falls from 692 to 334.[14] This has the additional advantage of making bonds look more like loans, since most bank loans have covenants and/or collateral backing that make them highly senior in the debt repayment structure—especially on default.

Again we find a considerable degree of heterogeneity persisting. For example, at the 99% quantile (2.3264σ), and assuming the normal distribution, the unexpected loss rates vary widely: i.e., 0.446% (A), 5.619% (BBB), 8.306% (BB), 24.694% (B). At the same 99% percent quantile, under the actual distribution, the unexpected loss rates are respectively 0%, 0%, 0%, and 72.874%.

12 This compares to an expected loss rate ratio of about 100 times greater for B vs. A rated bonds (see the cumulative loss rates in Altman, et al. (1999). For example, the five year cumulative loss rate for bonds rated A upon issuance is 0.12%, while the B rated bonds' loss rate is 13.9%. The fifth year's marginal (one year) loss rate is 0.04% for A rated bonds compared to 3.36% for B rated bonds.

13 The rating agencies only report the number of issuers for each grade rating category in each of the years in our sample period. See, for example, Table 16 in S&P (1999).

14 The most senior bond is defined as the one with the highest price one-year prior to default.

Table 6 repeats a similar exercise as Table 5 but assumes defaults follow a Poisson distribution with a stable mean.[15] For bucket 2, the simple Poisson model produces similar results as those in Tables 4 and 5. In particular, the unexpected loss rates at the 99% quantile are respectively: 0% (A), 0%(BBB), 0.205% (BB) and 17.011%(B).

Finally, Table 7 repeats a similar exercise to those above except that it replaces the number of issuers in the no default category with an estimate of the number of issues.[16] This considerably increases the number of non-defaults and reduces the mean or expected loss rate. The unexpected loss rates are also affected because of the larger total sample size. As can be seen from Table 7, however, using estimated issues instead of issuers for the non-defaulting class leaves the basic conclusions unchanged. Specifically, again using the 99th percent quantile, the unexpected loss rate under the normal distribution is 0.604% for A rated borrowers versus 9.550% for B rated borrowers, while using the actual distribution the relative unexpected loss rates for A versus B are respectively 0% versus 33.912%. Table 8 shows a similar "lack of granularity" using the Poisson distribution. In this case 0% versus 8.704%.[17]

3.5. Simulation Results

Table 9 looks at the loss rates generated from Monte-Carlo simulations of the seven different portfolios discussed earlier (US life insurer-type portfolio, US bank-type portfolio, and different agency ratings). Each loss distribution is based on 50,000 simulations and an aggregate portfolio size of $1 billion. In recent years, $1 billion in asset size has been viewed as representative of medium-sized US banks.[18]

From Table 9, it can be seen that at the 99% quantile, the unexpected loss rates suggest capital requirements much lower than 8% in all cases, even the most risky rating class. For the insurance company portfolio (portfolio 1), the unexpected loss rate (99% loss rate minus the mean loss rate) suggests a capital ratio of 0.673% - 0.109% = 0.564%. For the riskier bank loan portfolio (portfolio 2), the implied capital ratio is 1.077%. Looking at the question of bucket homogeneity, which is the key focus of this paper, it can be seen that unexpected loss rates for BBB vs. BB vs. B differ significantly, *i.e.,* specifically, 0.235% vs. 0.769% vs. 1.765%.[19] The simulation results clearly show that the unexpected loss rate of the investment grade components (A and BBB) of bucket 2 is much lower than the below investment grade components of bucket 2 (BB and B). Even for the

15 The CreditRisk$^{+®}$ model assumes defaults follow a Poisson distribution around a shifting mean. Specifically, the mean default rate is assumed to follow a gamma distribution. The Poisson distribution is a simple distribution in that its mean equals its variance. Assuming a stable mean will tend to underestimate the "fat-tailedness" of the distribution and thus unexpected loss rates will be understated.

16 This was done by taking three monthly samples (for December 1987, December 1992 and February 1999) on the number of issues per issuer from S and P bond guides, calculating an average number of issues per defaulting issuer in each rating category and multiplying the number of issuers row in Table 1 by the resulting average number of issues per issuer.

17 Similar conclusions, regarding the relative risk weights of buckets 2 and 3, to those discussed earlier are also reached by analyzing Tables 5 through 8. The large risk weighting differences between rating classes (and lower) are particularly evident.

18 Interestingly, the results of our simulations were quite insensitive to asset portfolio size assumptions beyond the $1 billion size range.

19 In this test, A was combined with AA and AAA to be comparable with the Carey (1998) paper.

CCC and lower portfolio (bucket 3) the unexpected loss rate is 15.2% - 10.119% = 5.08%. This may imply that the suggested BIS capital ratio for bucket 3 (12%) is perhaps too high.[20] Overall, the Monte-Carlo simulations confirm the results of the parametric approaches discussed in Tables 4-8 – especially the heterogeneity of bucket 2.

4. Summary and Proposal

This paper has examined two specific aspects of stage 1 of the BIS's proposed reforms to the risk-based capital ratio. It has been argued that relying on "traditional" agency ratings could produce cyclically lagging rather leading capital requirements, resulting in an enhanced rather than reduced degree of instability in the banking and financial system. In addition, even if risk-weights were to be tied to traditional agency ratings, the current bucketing proposal lacks a sufficient degree of granularity. In particular, lumping A and BBB (investment grade borrowers) together with BB and B (below investment grade borrowers) severely misprices risk within that bucket and calls, at a minimum, for that bucket to be split into two.

Table 10 repeats the calculations of Table 5, but groups together A and BBB for comparison with BB and B. If we take the most conservative regulatory view and require capital to be sufficient to meet the 99.97% quantile test, then we can calculate some relative risk-weightings as examples for a split bucket 2. Specifically, in Table 10, which is based on senior bond defaults, (the bond default data that most closely resembles loans), we observe 14 defaults out of 19,658 observations in the A/BBB investment grade bucket and 227 out of 10,535 in the non-investment grade BB/B bucket within the one-year time horizon. At the 99.97% level, for the actual distribution results, the ratio of unexpected losses between the two buckets is 1.65 (90.846/54.96). Under the normal distribution assumption for all levels of confidence (95% to 99.97%), the ratio is about 5.4 (e.g., 28.240/5.208 for 3.43σ or the 99.97% quantile).[21] Hence, we find a considerable difference in risk between these buckets, as expected. The CCC and lower bucket is considerably more risky under the normal distribution assumption – about 2.5 times the BB/B bucket.[22] Since the CCC and lower category has so few observations (387), we cannot be as confident as we would like to be about its exact risk compared to other buckets.

4.1 A Revised Bucket Proposal

A bucket system with four categories, and with a weighting system something like that shown in Table 11, would accomplish much of what the BIS proposal is attempting to do, and also comes closer to capturing the reality of actual relative default losses by ratings.

20 This assumes that appropriate reserves for the high expected losses (e.g., over 10%) are deducted from the profit and loss accounts.

21 The 99.97% level is actually not shown but is essentially identical to the 99.9% level.

22 The results for the CCC and lower bucket was about the same as the BB/B for the actual distribution, since both were near the maximum loss possible at the 99.97% level.

We constructed this Table based on the following logic. We felt constrained to choose a non-zero weighting for the first bucket (AAA/AA), although our results (over the last 19 years) clearly show that no defaults have actually taken place within one year for bonds in these two highest ratings. The choice of 10% for bucket 1 is therefore arbitrary but still less than the BIS proposal's 20%. A second consideration was that we felt it appropriate to give the new BB/B non-investment grade bucket a full 100% weighting.[23] This left us with a decision as to the appropriate A/BBB classification. We decided to use a ratio of about 3.33 to 1 when comparing the BB/B bucket with this A/BBB bucket. This is about the midpoint between the normal distribution and actual distribution's results at the 99.97% quantile (1.65 and 5.40), Hence, the designation of 30% for our bucket 2. Note that this 30% weighting is considerably lower than the BIS proposal and the 100% weighting for bucket 3 is the same as their earlier proposal. Finally, we adopt the same 150% weighting for below B- credits (bucket 4).

4.2 The Unrated Class

Note that we do not propose any specific weighting for the category "unrated." We feel that the appropriate weighting system that bank regulators sanction will be based on a combination of external and internal ratings. Using internal ratings obviates the need for an "unrated" class since banks should be rating all customers. Also, the currently proposed BIS unrated class is essentially a classification that assumes no clear risk analysis. That is not very helpful in a world where most assets are unrated by external rating agencies; hence, the inevitable sanctioning of internal systems.

4.3 Final Comment

We are aware that our proposals are not prefect, but they appear to resemble more closely the existing data on unexpected losses. Although we do not expect regulatory capital arbitrage to cease completely, we are convinced that it will be reduced with our modifications and will bring regulatory capital closer to economic capital estimates.

23 One could actually argue for a higher weighting in this bucket but this would almost surely cutoff most lending to firms in this bucket — a bucket which we believe now represents a very high proportion of current loans outstanding.

References

Altman, E.I., (1989), Measuring Corporate Bond Mortality and Performance, *The Journal of Finance*, 44(4), 909-922.

Altman, E.I. and A. Saunders, (1997), Credit Risk Measurement: Developments Over the Last 20 Years, *Journal of Banking & Finance*, 21(11), 1721-1742.

Altman, E.I., D. Cooke and V. Kishore, (1999), Defaults and Returns on High Yield Bonds: Analysis through 1998 & Default Outlook for 1999-2001, *NYU Salomon Center Special Report*. Update January 2000.

Basle Committee on Banking Supervision, (1999), *Credit Risk Modeling: Current Practices and Applications*, Basle, April.

Basle Committee on Banking Supervision, (1999), *A New Capital Adequacy Framework*, Basle, June.

Basle Committee on Banking Supervision, (2000), *Range of Practice in Banks' Internal Ratings Systems*, Basle, January.

Carey, M., (1998), Credit Risk in Private Debt Portfolios, *The Journal of Finance*, 1363-1387.

Caouette, J.B., E.I. Altman and P. Narayanan, (1998), *Managing Credit Risk: The Next Great Financial Challenge*, John Wiley & Sons, New York.

CreditMetrics, (1997), J.P. Morgan, April.

Credit Suisse Financial Products, (1997), Credit Risk^{+}: A Credit Risk Measurement Framework, London.

Jonsson, J.G. and M. Fridson, (1996), Forecasting Default Rates on High Yield Bonds, *Journal of Fixed Income,* 6.

Moody's, (1999), Predicting Default Rates: A Forecasting Model for Moody's Issuer-Based Default Rates, Special Comment, Global Credit Research, August.

Saunders, A., (1999), *Credit Risk Measurement: New Approaches to Value at Risk and Other Paradigms*, John Wiley & Sons, New York.

Standard & Poor's, (1999), Rating Performance 1998: Stability & Transition, *S&P Special Report*, March.

Treacy, W. and M. Carey, (2000), Credit Rating Systems at large US Banks, *Journal of Banking & Finance*, 24, 167-201.

Table 1: Proposal BIS Risk Weighting System for Bank Loan Credits

Claim	Assessment					
	AAA to AA-	**A+ to A-**	**BBB+ to BBB-**	**BB+ to B-**	**Below B-**	**Unrated**
Sovereigns	0%	20%	50%	100%	150%	100%
Banks						
- Option 1[1]	20%	50%	100%	100%	150%	100%
- Option 2[2]	20%	50%	50%[3]	100%[3]	150%	50%[3]
Corporates	20%	100%	100%	100%	150%	100%

1 Risk weighting based on risk weighting of sovereign in which the bank is incorporated.
2 Risk weighting based on the assessment of the individual bank.
3 Claims on banks of a short original maturity, for example less than six months, would receive a weighting that is one category more favorable than the usual risk weight on the

Table 2: Rating Agencies Extreme Credit Quality Categories

Credit Assessment Institution	Very High Quality Assessment	Very Low Quality Assessment
Fitch IBCA	AA- and above	Bellow B-
Moodyís	Aa3 and above	Below B3
Standard & Poorís	AA- and above	Below B-
Export insurance agencies	1	7

Source: Basel Committee on Bank Supervision (June 1999)

Tabel 3: Annual Returns, Yields and Spreads on Ten-Year Treasury (Treas) and High Yield (HY) Bonds* (1978-1999)

	Return(%)			Promised Yield (%)		
Year	**HY**	**Treas**	**Spread**	**HY**	**Treas**	**Spread**
1999	1.73	-8.41	10.14	11.41	6.44	4.97
1998	4.04	12.77	-8.73	10.04	4.65	5.39
1997	14.27	11.16	3.11	9.2	5.75	3.45
1996	11.24	0.04	11.2	9.58	6.42	3.16
1995	22.4	23.58	-1.18	9.76	5.58	4.18
1994	-2.55	-8.29	5.74	11.5	7.83	3.67
1993	18.33	12.08	6.25	9.08	5.8	3.28
1992	18.29	6.5	11.79	10.44	6.69	3.75
1991	43.23	17.18	26.05	12.56	6.7	5.86
1990	-8.46	6.88	-15.34	18.57	8.07	10.5
1989	1.98	16.72	-14.74	15.17	7.93	7.24
1988	15.25	6.34	8.91	13.7	9.15	4.55
1987	4.57	-2.67	7.24	13.89	8.83	5.06
1986	16.5	24.08	-7.58	12.67	7.21	5.46
1985	26.08	31.54	-5.46	13.5	8.99	4.51
1984	8.5	14.82	-6.32	14.97	11.87	3.1
1983	21.8	2.23	19.57	15.74	10.7	5.04
1982	32.45	42.08	-9.63	17.84	13.86	3.98
1981	7.56	0.48	7.08	15.97	12.08	3.89
1980	-1	-2.96	1.96	13.46	10.23	3.23
1979	3.69	-0.86	4.55	12.07	9.13	2.94
1978	7.57	-1.11	8.68	10.92	8.11	2.81
Arithmetic Annual Average:						
1978-1999	12.16	9.28	2.88	12.82	8.27	4.35
Compound Annual Average:						
1978-1999	11.54	8.58	2.96			

*End of year yields.

Source: Salomon Smith Barney Inc.'s High Yield Composite Index; Altman et al (2000).

Table 4: Frequency Distribution of Losses (Principal and Coupon), (1981 - 9/1999) By Rating One Year Before Default (Normal and Actual Loss Distributions)

Range of Default Losses	Midpoint	A		BBB		BB		B		CCC & Lower		Total	
0	0	12115		7529		5311		4997		294		30246	
0.01 - 0.10	0.05	2		26		11		81		43		163	
0.11 - 0.20	0.15	2		16		15		89		18		140	
0.21 - 0.30	0.25	2		4		18		81		36		141	
0.31 - 0.40	0.35	0		1		8		62		24		95	
0.41 - 0.50	0.45	0		0		8		29		24		61	
0.51 - 0.60	0.55	1		0		3		17		18		39	
0.61 - 0.70	0.65	0		0		1		10		21		32	
0.71 - 0.80	0.75	0		0		0		2		5		7	
0.81 - 0.90	0.85	0		0		0		4		6		10	
0.91 - 0.94	0.92	0		0		0		0		0		0	
0.95 - 0.98	0.96	0		0		0		0		1		1	
0.99	0.99	0		0		0		0		0		0	
1	1	0		0		0		0		3		3	
Total		**12122**		**7576**		**5375**		**5372**		**493**		**30938**	
Mean		**0.012%**		**0.067%**		**0.298%**		**1.734%**		**14.079%**		**0.598%**	
Median		**0.000%**		**0.000%**		**0.000%**		**0.000%**		**0.000%**		**0.000%**	
St.Dev		**0.628%**		**1.027%**		**3.181%**		**8.066%**		**29.890%**		**5.001%**	
3.43192sigma-E(L)		**2.142%**		**3.458%**		**10.619%**		**25.947%**		**88.501%**		**16.566%**	
2.32634sigma-E(L)		**1.448%**		**2.323%**		**7.102%**		**17.030%**		**55.455%**		**11.037%**	
1.64485sigma-E(L)		**1.021%**		**1.623%**		**2.051%**		**11.533%**		**35.085%**		**7.628%**	
99.97%		**14.988%**	**3.6**	**24.933%**	**2.3**	**54.702%**	**1.6**	**83.266%**	**1.6**	**85.921%**	**0.1**	**84.402%**	**9.3**
99.00%		**0.000%**	**121.2**	**0.000%**	**75.8**	**4.702%**	**53.8**	**43.266%**	**53.7**	**70.921%**	**4.9**	**24.402%**	**309.4**
95.00%		**0.000%**	**606.1**	**0.000%**	**378.8**	**0.000%**	**268.8**	**13.266%**	**268.6**	**50.921%**	**24.7**	**0.000%**	**1546.9**

Source: Standard & Poorís NYU Salomon Center Default Data Base

Table 5: Frequency Distribution of Losses (Principal and Coupon), (1981 - 9/1999) By Rating One Year Before Default (Normal and Actual Loss Distributions) (Based on Number of Issuers)

Range of Default Losses	Midpoint	A	BBB	BB	B	CCC & Lower	Total
0	0	12115	7529	5311	4997	294	30246
0.01 - 0.10	0.05	0	0	0	14	4	18
0.11 - 0.20	0.15	2	1	0	11	8	22
0.21 - 0.30	0.25	0	1	1	18	11	31
0.31 - 0.40	0.35	0	1	5	19	11	36
0.41 - 0.50	0.45	0	1	2	22	11	36
0.51 - 0.60	0.55	0	3	3	32	9	47
0.61 - 0.70	0.65	0	0	3	33	17	53
0.71 - 0.80	0.75	0	4	1	28	12	45
0.81 - 0.90	0.85	0	0	1	19	7	27
0.91 - 0.94	0.92	0	0	2	11	1	14
0.95 - 0.98	0.96	0	0	1	1	2	4
0.99	0.99	0	1	0	0	0	1
1	1	0	0	0	0	0	0
Total Default		**2**	**12**	**19**	**208**	**93**	**334**
Total Non-Default		**12115**	**7529**	**5311**	**4997**	**294**	**30246**
Total		**12117**	**7541**	**5330**	**5205**	**387**	**30580**
Mean		**0.002%**	**0.091%**	**0.205%**	**2.126%**	**12.078%**	**0.574%**
Median		**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
St.Dev		**0.193%**	**2.454%**	**3.658%**	**11.529%**	**24.521%**	**6.028%**
3.43192sigma-E(L)		**0.659%**	**8.332%**	**12.351%**	**37.440%**	**72.077%**	**20.114%**
2.32634sigma-E(L)		**0.446%**	**5.619%**	**8.306%**	**24.694%**	**44.967%**	**13.450%**
1.64485sigma-E(L)		**0.314%**	**3.946%**	**5.813%**	**16.837%**	**28.256%**	**9.342%**
99.97%		**0.000%** **3.6**	**74.909%** **2.3**	**91.795%** **1.6**	**89.874%** **1.6**	**83.922%** **0.1**	**91.426%** **9.2**
99.00%		**0.000%** **121.2**	**0.000%** **75.4**	**0.000%** **53.3**	**72.874%** **52.1**	**72.922%** **3.9**	**14.426%** **305.8**
95.00%		**0.000%** **605.9**	**0.000%** **377.1**	**0.000%** **266.5**	**0.000%** **260.3**	**62.922%** **19.4**	**0.000%** **1529.0**

Sources: Standard & Poor's. NYU Salomon Center Default Data Base.

Table 6: Frequency Distribution of Losses (Principal and Coupon), (1981 - 9/1999) By Rating One Year Before Default (Normal and Actual Loss Distributions) (Based on Number of Issuers) - Poisson Process for Defaults

Range of Default Losses	Midpoint	A	BBB	BB	B	CCC & Lower	Total
0	0	12115	7529	5311	4997	294	30246
0.01 - 0.10	0.05	0	0	0	14	4	18
0.11 - 0.20	0.15	2	1	0	11	8	22
0.21 - 0.30	0.25	0	1	1	18	11	31
0.31 - 0.40	0.35	0	1	5	19	11	36
0.41 - 0.50	0.45	0	1	2	22	11	36
0.51 - 0.60	0.55	0	3	3	32	9	47
0.61 - 0.70	0.65	0	0	3	33	17	53
0.71 - 0.80	0.75	0	4	1	28	12	45
0.81 - 0.90	0.85	0	0	1	19	7	27
0.91 - 0.94	0.92	0	0	2	11	1	14
0.95 - 0.98	0.96	0	0	1	1	2	4
0.99	0.99	0	1	0	0	0	1
1	1	0	0	0	0	0	0
Total Default		**2**	**12**	**19**	**208**	**93**	**334**
Total Non-Default		**12115**	**7529**	**5311**	**4997**	**294**	**30246**
Total		**12117**	**7541**	**5330**	**5205**	**387**	**30580**
Mean		**0.002%**	**0.091%**	**0.205%**	**2.126%**	**12.078%**	**0.574%**
Median		**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
St.Dev		**0.193%**	**2.454%**	**3.658%**	**11.529%**	**24.521%**	**6.028%**
99.97%		**0.000%** **1**	**0.091%** **2**	**0.409%** **3**	**23.391%** **12**	**495.178%** **42**	**2.869%** **6**
99.00%		**0.000%** **0**	**0.000%** **1**	**0.205%** **2**	**17.011%** **9**	**410.636%** **35**	**1.721%** **4**
95.00%		**0.000%** **0**	**0.000%** **1**	**0.000%** **1**	**12.759%** **7**	**374.403%** **32**	**1.148%** **3**
Default rate m per 100 loans in the portfolio		**0.017**	**0.159**	**0.356**	**3.996**	**24.031**	**1.092**
		99.997%	**99.965%**	**99.949%**	**99.976%**	**99.979%**	**99.979%**
		99.178%	**99.194%**	**99.421%**	**99.671%**	**99.182%**	**99.001%**
		99.178%	**99.194%**	**94.972%**	**96.975%**	**96.454%**	**94.921%**

Sources: Standard & Poor's NYU Salomon Center Default Data Base.

Table 7: Frequency Distribution of Losses (Principle and Coupon), (1981 - 9/1999) 1 Year Before Default By Rating One Year Before Default (Normal and Actual Loss Distributions) (Based on Number of issues)

Range of Default Losses	Mid point	A		BBB		BB		B		CCC & Lower		Total	
0	0	67507		34525		12137		8187		487		122843	
0.01 - 0.10	0.05	2		26		11		81		43		163	
0.11 - 0.20	0.15	2		16		15		89		18		140	
0.21 - 0.30	0.25	2		4		18		81		36		141	
0.31 - 0.40	0.35	0		1		8		62		24		95	
0.41 - 0.50	0.45	0		0		8		29		24		61	
0.51 - 0.60	0.55	1		0		3		17		18		39	
0.61 - 0.70	0.65	0		0		1		10		21		32	
0.71 - 0.80	0.75	0		0		0		2		5		7	
0.81 - 0.90	0.85	0		0		0		4		6		10	
0.91 - 0.94	0.92	0		0		0		0		0		0	
0.95 - 0.98	0.96	0		0		0		0		1		1	
0.99	0.99	0		0		0		0		0		0	
1	1	0		0		0		0		3		3	
Total Default		**7**		**47**		**64**		**375**		**199**		**692**	
Total Non-Default		**67507**		**34525**		**12137**		**8187**		**487**		**122843**	
Total		**67514**		**34572**		**12201**		**8562**		**686**		**123535**	
Mean		**0.002%**		**0.015%**		**0.131%**		**1.088%**		**10.118%**		**0.150%**	
Median		**0.000%**		**0.000%**		**0.000%**		**0.000%**		**0.000%**		**0.000%**	
St.Dev		**0.261%**		**0.286%**		**1.421%**		**4.573%**		**20.549%**		**2.488%**	
3.43192sigma-E(L)		**0.892%**		**0.967%**		**4.747%**		**14.605%**		**60.406%**		**8.390%**	
2.32634sigma-E(L)		**0.604%**		**0.651%**		**3.176%**		**9.550%**		**37.687%**		**5.639%**	
1.64485sigma-E(L)		**0.427%**		**0.456%**		**2.207%**		**6.434%**		**23.683%**		**3.943%**	
99.97%		**0.000%**	**20.3**	**14.985%**	**10.4**	**54.869%**	**3.7**	**83.912%**	**2.6**	**89.882%**	**0.2**	**64.850%**	**37.1**
99.00%		**0.000%**	**675.1**	**0.000%**	**345.7**	**0.000%**	**122**	**33.912%**	**85.6**	**74.882%**	**6.9**	**0.000%**	**1235.4**
95.00%		**0.000%**	**3375.7**	**0.000%**	**1728.6**	**0.000%**	**610.1**	**0.000%**	**428.1**	**54.882%**	**34.3**	**0.000%**	**6176.8**

Sources: Standard & Poor's. NYU Salomon Center Default Data Base

Table 8: Frequency Distribution of Losses (Principle and Coupon), (1981 - 9/1999) By Rating One Year Before Default (Normal and Actual Loss Distributions) (Based on Number of Issuers) - Poisson Process for Defaults

Range of Default Losses	Midpoint	A	BBB	BB	B	CCC & Lower	Total
0	0	67507	34525	12137	8187	487	122843
0.01 - 0.10	0.05	2	26	11	81	43	163
0.11 - 0.20	0.15	2	16	15	89	18	140
0.21 - 0.30	0.25	2	4	18	81	36	141
0.31 - 0.40	0.35	0	1	8	62	24	95
0.41 - 0.50	0.45	0	0	8	29	24	61
0.51 - 0.60	0.55	1	0	3	17	18	39
0.61 - 0.70	0.65	0	0	1	10	21	32
0.71 - 0.80	0.75	0	0	0	2	5	7
0.81 - 0.90	0.85	0	0	0	4	6	10
0.91 - 0.94	0.92	0	0	0	0	0	0
0.95 - 0.98	0.96	0	0	0	0	1	1
0.99	0.99	0	0	0	0	0	0
1	1	0	0	0	0	3	3
Total Default		**7**	**47**	**64**	**375**	**199**	**692**
Total Non-Default		**67507**	**34525**	**12137**	**8187**	**487**	**122843**
Total		**67514**	**34572**	**12201**	**8562**	**686**	**123535**
Mean		**0.002%**	**0.015%**	**0.131%**	**1.088%**	**10.118%**	**0.150%**
Median		**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
St.Dev		**0.261%**	**0.286%**	**1.421%**	**4.573%**	**20.549%**	**2.488%**
3.43192sigma-E(L)		**0.892%**	**0.967%**	**4.747%**	**14.605%**	**60.406%**	**8.390%**
2.32634sigma-E(L)		**0.604%**	**0.651%**	**3.176%**	**9.550%**	**37.687%**	**5.639%**
1.64485sigma-E(L)		**0.427%**	**0.456%**	**2.207%**	**6.434%**	**23.683%**	**3.943%**
99.97%		**0.000%** **1**	**0.015%** **2**	**0.393%** **4**	**13.055%** **13**	**485.668%** **49**	**0.449%** **4**
99.00%		**0.000%** **0**	**0.000%** **1**	**0.262%** **3**	**8.704%** **9**	**414.841%** **42**	**0.300%** **3**
95.00%		**0.000%** **0**	**0.000%** **0**	**0.131%** **2**	**7.616%** **8**	**374.369%** **38**	**0.150%** **2**
Default rate m per 100 loans in the portfolio		**0.010**	**0.136**	**0.525**	**4.380**	**29.009**	**0.560**
		99.996%	**99.971%**	**99.979%**	**99.967%**	**99.979%**	**99.987%**
		99.115%	**99.288%**	**99.792%**	**99.629%**	**99.037%**	**99.862%**
		99.115%	**88.303%**	**98.368%**	**97.098%**	**94.853%**	**98.790%**

Sources: Standard & Poor's. NYU Salomon Center Default Data Base

Table 9: Monte-Carlo Simulation of Loss Rates Using Data 1981 - 6/1999
Simulated loss rates (%)

			Confidence Level					
Portfolio	**Portfolio size ($b)**	**mean**	**95%**	**97.5%**	**99%**	**99.5%**	**99.9%**	**99.95%**
1. 13% < BBB (P.P.)	1	0.109	0.468	0.55	0.673	0.767	1.007	1.112
2. 50% < BBB (Loans)	1	0.409	1.106	1.28	1.486	1.657	2	2.18
3. AAA. AA. A	1	0.003	0	0	0.05	0.25	0.55	0.55
4. BBB	1	0.015	0.15	0.15	0.25	0.3	0.4	0.4
5. BB	1	0.131	0.55	0.7	0.9	1	1.25	1.35
6. B	1	1.085	2.2	2.5	2.85	3.05	3.6	3.8
7. CCC & lower	1	10.119	13.6	14.35	15.2	15.95	17.1	17.56

Table 10: Frequency Distribution of Losses (Principle and Coupon), (1981 - 9/1999) By Rating One Year Before Default (Normal and Actual Loss Distributions) (Based on Number of Issuers)

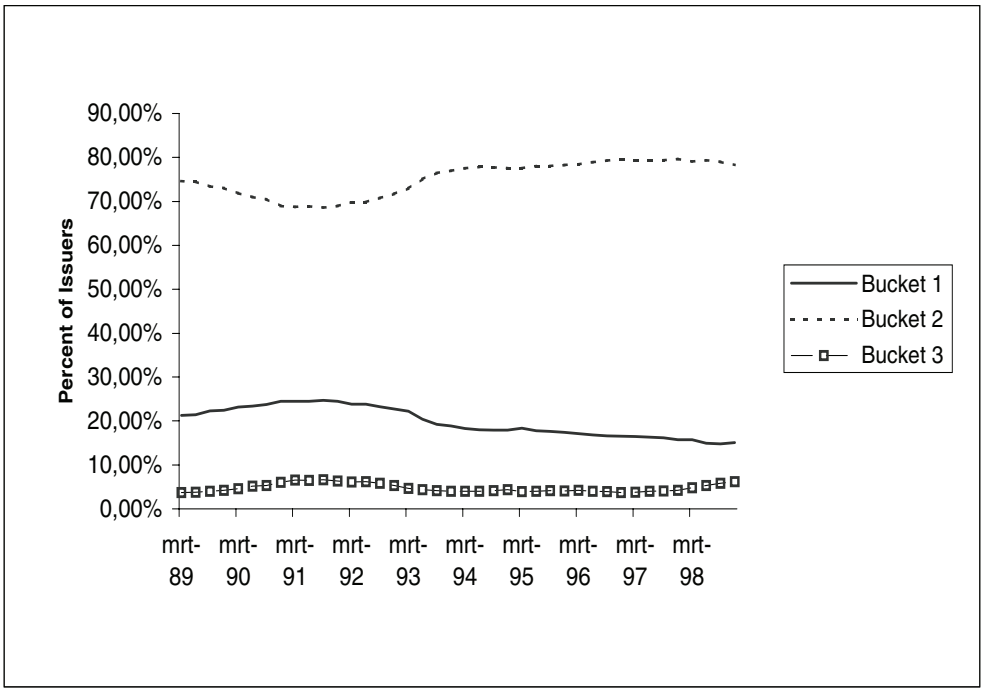
Range of Default Losses	Midpoint	A & BBB		BB & B		CCC & Lower		Total	
0	0	19644		10308		294		30246	
0.01 - 0.10	0.05	0		14		4		18	
0.11 - 0.20	0.15	3		11		8		22	
0.21 - 0.30	0.25	1		19		11		31	
0.31 - 0.40	0.35	1		24		11		36	
0.41 - 0.50	0.45	1		24		11		36	
0.51 - 0.60	0.55	3		35		9		47	
0.61 - 0.70	0.65	0		36		17		53	
0.71 - 0.80	0.75	4		29		12		45	
0.81 - 0.90	0.85	0		20		7		27	
0.91 - 0.94	0.92	0		13		1		14	
0.95 - 0.98	0.96	0		2		2		4	
0.99	0.99	1		0		0		1	
1	1	0		0		0		0	
Total Default		**14**		**227**		**93**		**334**	
Total Non-Default		**19644**		**10308**		**294**		**30246**	
Total		**19658**		**10535**		**387**		**30580**	
Mean		**0.036%**		**1.154%**		**12.078%**		**0.574%**	
Median		**0.000%**		**0.000%**		**0.000%**		**0.000%**	
St.Dev		**1.528%**		**8.565%**		**24.521%**		**6.028%**	
3.43192sigma-E(L)		**5.208%**		**28.240%**		**72.077%**		**20.114%**	
2.32634sigma-E(L)		**3.519%**		**18.771%**		**44.967%**		**13.450%**	
1.64485sigma-E(L)		**2.477%**		**12.934%**		**28.256%**		**9.342%**	
99.97%		**54.964%**	**5.9**	**90.846%**	**3.2**	**83.922%**	**0.1**	**91.426%**	**9.2**
99.00%		**0.000%**	**196.6**	**53.846%**	**105.4**	**72.922%**	**3.9**	**14.426%**	**305.8**
95.00%		**0.000%**	**982.9**	**0.000%**	**526.8**	**62.922%**	**19.4**	**0.000%**	**1529.0**

Sources: Standard & Poor's. NYU Salomon Center Default Data Base

Table 11: An Alternative Risk Weighting Proposal for Bank Corporate Loans

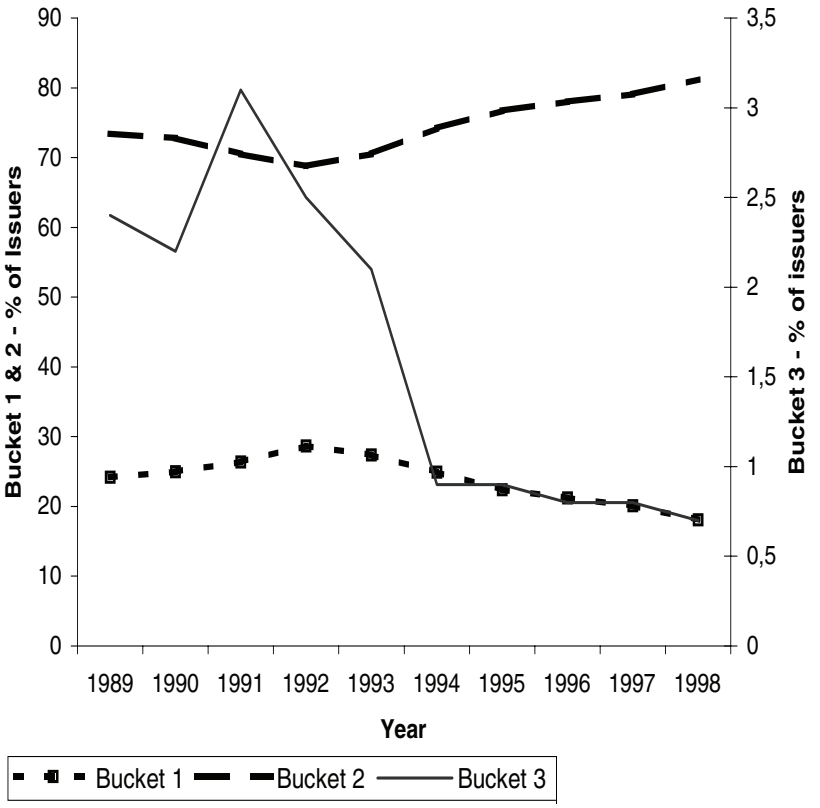
	AAA to AA-	A+ to BBB-	BB+ to B-	Below
Corporates	10%	30%	100%	150%

Figure 1: Proportion of Bonds in Different BIS Proposed Buckets (1989-1998)



Source: Moody's Investor Services, New York

Figure 2: Proportion of Bonds in Different BIS Proposed Buckets (1989-1998)



Source: Moody's Investor Services, New York

Note on the Contributors

Edward I. Altman is the Max L. Heine Professor of Finance at the Stern School of Business, New York University. Since 1990, he has directed the research effort in Fixed Income and Credit Markets at the NYU Salomon Center and is currently the Vice-Director of the Center. Prior to serving in his present position, Professor Altman chaired the Stern School's MBA Program for 12 years. He has been a visiting Professor at the Hautes Etudes Commerciales and Universite de Paris-Dauphine in France, at the Pontificia Catolica Universidade in Rio de Janeiro, at the Australian Graduate School of Management in Sydney and Luigi Bocconi University in Milan.

Dr. Altman has an international reputation as an expert on corporate bankruptcy and credit risk analysis. His primary areas of research include bankruptcy analysis and prediction, credit and lending policies, risk management in banking, corporate finance and capital markets. He has been a consultant to several government agencies, major financial and accounting institutions and industrial companies and has lectured to executives in North America, South America, Europe, Australia-New Zealand, Asia and Africa. He has testified before the U.S. Congress, the New York State Senate, and several other government and regulatory organizations and is a Director and a member of the Advisory Board of a number of corporate, publishing, academic and financial institutions. He is currently an advisor to the Centrale dei Bilanci in Italy and a member of its Scientific and Technical Committee and to several foreign central banks. Dr. Altman was named to the Max L. Heine endowed professorship at Stern in 1988.

Professor Altman is one of the founders and an Executive Editor of the international publication, the *Journal of Banking and Finance* and Advisory Editor of a publisher series, the *John Wiley Frontiers in Finance Series*. Professor Altman has published over a dozen books and over 100 articles in scholarly finance, accounting and economic journals. He is the current editor of the *Handbook of Corporate Finance* and the *Handbook of Financial Markets and Institutions* and the author of the recently published books *Recent Advances in Corporate Finance*; *Investing in Junk Bonds*; *Default Risk, Mortality Rates* and the *Performance of Corporate Bonds*; *Distressed Securities: Analyzing and Evaluating Market Potential and Investment Risk*; *Corporate Financial Distress and Bankruptcy* and *Managing Credit Risk: The Next Great Financial Challenge (1998).*

Anthony Saunders is the John M. Schiff Professor of Finance, and Chairman of the Department of Finance at the Stern School of Business, New York University. Professor Saunders received his PhD from the London School of Economics and has taught both undergraduate and graduate level courses at NYU since 1978. Throughout his academic career, his teaching and research have specialized in financial institutions and international banking. He has served as a visiting professor all over the world, including INSEAD, the Stockholm School of Economics, and the University of Melbourne. He is currently on the Executive Committee of the Salomon Center of the Study of Financial Institutions, NYU.

Professor Saunders holds positions on the Board of Academic Consultants of the Federal Reserve Board of Governors as well as the Council of Research Advisors for the Federal National Mortgage Association. In addition, Dr. Saunders has acted as a visiting scholar at the Comptroller of the Currency and at the Federal Monetary Fund. He is the editor of the *Journal of Banking and Finance* and the *Journal of Financial Markets, Instruments and Institutions,* as well as the associate editor of eight other journals, including *Financial Management* and the *Journal of Money, Credit and Banking.* His research has been published in all of the major money and banking journals and in several books. He has just published a book on *Financial Institutions Management: A Modern Perspectives* for Irwin/McGraw-Hill Publishers and *Credit Risk Measurement: Value-At-Risk and Other New Paradigms.*

Regulation and the Evolution of the Financial Services Industry

by Arnoud W.A. Boot, Todd T. Milbourn and Silva Dezelan

1. Introduction

The future of regulation of the financial services industry is certainly an important topic in the current policy debate. To date, the concern about the safety and soundness of the financial system has led to intrusive regulatory interference. However, developments in information technology, the proliferation of financial markets, the blurring distinction between banking and non-banking financial institutions and the continuous barrage of new product innovations have put banking in a state of perpetual flux. This more competitive and dynamic environment may not be compatible with traditional regulatory structures, including deposit insurance, limits on permissible activities and controls such as intrusive capital and liquidity reserve requirements. The key question is how to adapt the regulatory framework to the increasingly competitive environment of banking.

Traditionally, bankers and regulators worked in concert to safeguard the financial services sector, thereby maintaining the stability of the financial system. To this end, *direct* and *indirect* approaches to regulation can be distinguished. Direct regulation seeks to reduce discretion on the part of banks (and regulators) by explicitly prescribing and dictating the activities banks can engage in. The Glass-Steagall Act in the U.S. (separating commercial from investment banking)[1] and the enforced separation between banking and insurance, as observed in many countries, are examples of this approach. The indirect approach relies primarily on price and non-price incentives that are designed to induce the desired behavior of financial institutions. Risk-based capital requirements would be an example of this approach.[2]

Both direct and indirect forms of regulation are costly, particularly in a more competitive environment where issues of a level playing field and regulatory-arbitrage become of primary concern. In particular, direct regulation seems very costly in a competitive, rapidly changing environment. This regulatory structure runs the risk of being outdated constantly by new developments. The recent wave of expansion of scale and scope in banking underscores the lesser emphasis put on this type of regulation. Indirect regulation has thus gained importance, witness for example the increased emphasis put on further refining the risk-based capital requirements and other control instruments. But in a competitive environment, these *control* instruments must be delicately and constantly fine-tuned such that they do not cause competitive distortions. Hence, the applic-

1 Recently, new U.S. banking law relaxes these constraints.

2 It is imporant to note that not all forms of regulation can be classified as either direct or indirect. That is, lump sum capital requirements and different types of certification requirements (as discussed later) may not be part of either direct or indirect regulation.

ability of the indirect, control-oriented approach to regulation is also strained. As a consequence, the effectiveness of both direct and indirect forms of regulation has suffered.

In this paper, we identify two structural dimensions that are of primary importance for the optimal regulatory design. These dimensions are the competitive environment of banking and the state of development of the financial system. In the context of a well-developed system, we argue that the distortions associated with direct and indirect approaches to regulation induce a shift in regulatory design. In our view, the increasingly competitive and dynamic environment redirects the focus of regulation to setting basic minimum standards, essentially certification requirements. These standards dictate basic requirements that viable financial institutions should meet. As we will argue, these observations are not inconsistent with some of the observed regulatory changes and current proposals for change.

We do *not* take the position that the role of regulators and supervisors would be limited to only setting and verifying compliance with the certification requirements, albeit timely intervention in the case of non-compliance should be *the* primary objective of supervision. While the objective and non-discretionary nature of this type of regulation is a nice feature, there remains scope for some subjective intervention. Additionally, discretionary supervision is needed to monitor the integrity and viability of financial institutions. We will argue that this puts great emphasis on the banking industry itself, where aligning the internal incentives of financial institutions should become a primary concern. Internal supervision and appropriate control systems therefore will gain in importance. This helps explain the emphasis that the Bank of England and BIS have put on internal control systems. Lastly, we believe that the reputation of financial institutions will become increasingly important, which could also mitigate regulatory concerns. However, in our view, this alone will not adequately substitute for the loss in effectiveness of regulation.[3] This puts even greater weight on the importance of aligning internal incentives in the regulatory design.

The suggestions for regulatory design echo observations made by some in the financial services industry. Kupiec and O'Brien (1997) propose a pre-commitment approach to setting capital requirements. Similarly, the Group of Thirty in its report, "Global Institutions, National Supervision and Systemic Risks", proposes voluntary standards. These proposals could be interpreted as self-regulation.[4] Self-regulatory elements are very limited in our approach. Banks need to impose adequate internal control systems to facilitate the transition to certification requirements. The dependence on internal control systems has a self-regulatory flavor to it. However, external regulators should set the certification requirements, monitor compliance as well as engage in timely intervention. This is consistent with recent regulatory developments. For example, the U.S. Federal Deposit Insurance Corporation Improvement Act (FDICIA, 1991) stipulates prompt cor-

3 In this regard, we are not as optimistic as R.W. Ferguson, member of the Board of Governors of the US Federal Reserve System. He supports the idea of having minimum regulation and supervision such that they are consistent with maintaining safety and soundness of the banking system and financial stability. He goes on to argue that the marketplace is the best regulator and it should be looked to for guidance (BIS Review 24/1998).

4 See also *Euromoney*, September 1997, "Can bankers be their own cops?", pp 125-128. However, observe that in the pre-commitment approach banks face detailed rules and guidelines that limit the degree of effective self-regulation.

rective action provisions for capital deficient banks. This is a move in the direction of the certification requirements that we advocate. Like FDICIA, the European Community's Capital Adequacy Directive also primarily focuses on capital-contingent corrective actions. Certification-based regulation should, however, encompass more than just verifying the level of capital. For example, the bank's internal control systems should be "certified" by stress-testing against pre-specified standards.[5]

The dependence on certification requirements and internal control systems presupposes a well developed financial sector, including clearly specified property rights, well-defined and enforceable legal and regulatory structures, strong disclosure requirements, government integrity and highly skilled human capital. These define the second structural dimension of optimal regulatory design (recall that the first dimension is the competitive environment). As we will argue, underdeveloped financial systems, such as those in the emerging economies in Eastern and Central Europe, are facing very different issues. In many of these countries, the regulatory framework and supervisory mechanisms are in their infancy; trained personnel is lacking, both in the banks and in the regulatory agencies; and the legal framework within which contracts need to be enforced is often unclear and unfinished. Moreover, the uncertain environment, lack of a civil service tradition and severe decline in income that characterizes some regions trigger serious problems of corruption and fraud, problems to which the financial sector by the nature of its business is particularly vulnerable. In these situations, intrusive regulation (both direct and indirect) may be necessary. Once reputable financial institutions are in place, regulation could be transformed along the lines discussed in the context of a well-developed financial sector. These arguments underscore that regulatory design not only depends on the competitive environment, but also on the degree of development of the financial system.[6]

The remainder of our paper is organized as follows. We first focus on regulatory design in developed countries. Section 2 surveys some of the recent changes in the competitive environment of Western banking. Section 3 contains a discussion of issues at stake in the regulation of financial systems, the various approaches to regulation and the effect of competition on the optimal regulatory design. Section 4 describes our recommendations for optimal regulatory design. The issue of regulatory design in transition economies is contained in Section 5. Section 6 concludes.

5 In this paper, we ignore complementary suggestions for regulatory reform that seek to limit the scope of regulation by separating (or isolating) particular contagious activities of financial institutions. For example, Flannery (1999) has advocated secure collateral-based payment and settlement systems. Similarly, narrow-bank type resolutions may contain the scope of the safety net provided by deposit insurance and promote market discipline on the non-narrow bank activities (see Boot and Greenbaum (1993)).

6 In a related paper, Llewellyn (1999) makes a similar point. He argues that financial regulation should be based in the context of what he calls the *regulatory regime*. This includes the legal and governance characteristics of the economy in which the banks operate.

2. Competitive Environment of Western Banking

Across Western countries there are striking variations in the configurations of financial systems. In some countries, such as the U.S. and U.K., financial markets have been very important for the allocation of resources. In others, such as most Continental European countries, banks have played a more prominent role and financial markets are less developed. In many countries, banks do not hold major equity stakes in industrial companies, while in others, notably Germany, banks are among the largest shareholders. These differences have a long history and could be purely coincidental, but more likely depend on each country's evolution of industrial structure. The varying extent of government involvement could also explain some of these differences. This is particularly true in the U.S. where rigid regulatory structures have fragmented its banking system.

The U.S. regulatory structure was (and still largely is) characterized by a government sponsored deposit insurance system, a separation of investment banking and commercial banking, and pervasive entry barriers including limitations on inter- and intra-state branching. This structure dates bank to the 1930's and is contained in the Banking Act of 1933, also known as the Glass-Steagall Act. Complementary legislation sought to reduce competition even further. In particular, regulatory caps on deposit rates, known as Regulation Q were in effect into the 1980's.

The three pillars of the Banking Act of 1933 – federal deposit insurance, restrictions on bank empowerments and entry barriers – guaranteed stability for over forty years. However, recent environmental and competitive changes have disturbed the balance provided by the Glass-Steagall Act. The volatile environment made regulatory caps on deposit interest rates too costly for bank depositors, prompting the diversion of savings to the largely unregulated money-market mutual funds that offered more competitive interest rates. This forced banks to borrow at costlier market interest rates, thereby posing a real threat to the banks' protected franchises. Further, their traditionally best customers increasingly sought access to equity and bond markets, elevating the risk of the banks' remaining clientele. Higher and more volatile funding costs also coaxed the banks into the business of writing off-balance sheet guarantees and trading in a host of financial derivatives. Collectively, these changes elevated the banks' risks in virtually all aspects of their business.

Advances in information technology facilitated the circumvention of regulation and tilted the competitive advantage away from the "opaque" financial institutions, such as deposit takers and insurance companies, towards both more "transparent" intermediaries, such as mutual funds, and direct financing in the capital markets. As a consequence, there has been a proliferation of specialized non-bank financial institutions.

The banks' loss of market share is a manifestation of increased competition on both the asset and liability sides of the balance sheet. Finance companies, like GE Capital in the U.S., have for decades been increasing their share of business and consumer lending. In addition, the commercial paper and bond markets have captured larger pieces of the business credit market. On the liability side, investment companies and their mutu-

al funds have taken an ever-increasing share of the banks' traditional funding. The frequency of bank failures in countries like the U.S., Israel and the Scandinavian countries, provides yet another reflection of rising competitive pressures. Declining credit ratings -- in an environment where ratings have gained importance – similarly illustrate the challenges that traditional banks face.

While oligopolistic practices (including those preserved by the recent consolidation wave) may temporarily hide the competitive deterioration of traditional banking institutions, they will soon face the new realities. The same is true for the regulatory framework. Under the earlier bank-government nexus, public regulation inhibited both the establishment of new banks and the termination of impaired institutions. The latter is still much in evidence in the form of governmental deposit insurance that continues to deter bank failures under the banner of protecting depositors. With the rapidly decreasing costs of computing and communicating, all types of non-bank financial institutions successfully encroach on the banks' traditional markets. Artificial life-support measures and the preservation of inefficient operations are becoming increasingly costly.

With some notable exceptions, such as the Scandinavian countries, other Western European countries were spared the banking turmoil. European banks are better diversified, both geographically and functionally, than their U.S. counterparts. They typically operate nationwide, often have substantial cross-border operations, and engage in both commercial and investment banking activities. In addition, the greater concentration among European banks in their home markets may help protect their rents. Thus, Europe may have not yet faced the unbridled competitive pressures that increasingly characterize U.S. banking. Moreover, the most recent consolidation and despecialization (increasing scope) among European banks – especially in Spain, Scandinavia and The Netherlands – can be seen as a pre-emptive response to the threat of increased foreign competition. As a result, the market share of European banks in their home markets has reached unprecedented levels with the larger institutions absorbing smaller and often more specialized ones.

For example, commercial banks previously focused almost exclusively on corporate clients, while eschewing the retail sector. This allowed smaller savings banks to control considerable market share in mortgages, consumer loans and deposits. But the larger banks have now entered these markets, often by acquiring established retail-oriented institutions. The acquisition strategy deters foreign entry and protects local franchises. Anti-trust concerns are dismissed alluding to the presumed importance of the national identity of banks.[7] Thus, "opaqueness" is growing; something that may not sit well with the competitive realities that Europe may soon encounter. This implies that West European banks have not yet faced the entire effects of a more competitive environment and the imminent dissipation of monopoly rents. However, the European Monetary Union, and in particular the introduction of the Euro, have become a catalyst to increased (cross-border) competitive pressures.

The key public policy question is therefore how to design a regulatory structure for the increasingly competitive environment.

7 See Boot (1999) for a discussion of the political dimension behind the conglomeration wave.

3. Regulatory Considerations

3.1 The Role of the Financial System: Stability and Competitiveness as Joint Objectives

The primary function of the financial system is to facilitate the transfer of resources from savers to those who need funds. The objective is to have an efficient allocation and deployment of resources. Efficiency in this context is interpreted broadly and presumes both stability and competitiveness of the financial system. Stability is needed to guarantee the orderly flow, allocation and deployment of resources. It is generally recognized that fragility of the financial system would come with great cost, since disruptions have potentially severe consequences for the economy at large. An efficient financial system should also minimize transaction costs; interpreted broadly as resources that dissipate or evaporate in the process of allocating resources. This generally necessitates a certain degree of competitiveness.

But stability and competitiveness are very likely to be *conflicting* rather than complementary objectives, thus presenting regulators with a difficult trade-off. In the popular view, restrictions on competition would improve banks' profitability, reduce failure rates and hence safeguard stability (Keeley (1990) and more recently Demsetz, Saidenberg and Strahan (1996) make this point). The experience of Western Banks is noteworthy here. Until recently, they operated in a cozy, symbiotic relationship with governmental regulators who restrained competition, supporting the profitability of established institutions. Commercial banks were accorded a centrality among financial intermediaries; they safeguarded public savings, provided working capital and longer term credit to businesses, managed the payments system, and served as a conduit for monetary policy initiatives of the central bank. In return for a protected status, banks accepted regulatory scrutiny and restrictions that constrained their activities.

The special status of banks has been called into question: record-shattering inflation and interest rates in the 1980's undermined the banks' protected franchises. In particular, these developments spurred the growth of non-banking financial institutions that could largely circumvent existing regulatory constraints (e.g., money market mutual funds bypassing interest-rate controls on deposits). Together with the arguments presented in Section 2, these considerations pose an important challenge: how does one design a sustainable regulatory environment in banking?

3.2 Deposit Insurance: Rationale and Implications

The regulatory interference that characterizes banking suggests that banks are considered "special" or different from other firms. Obviously, regulation has made them special. But what is different about their operations that justifies this "special" regulatory treatment? This question needs to be addressed before we can derive the structure of the optimal regulatory response, if any. A starting point is the observation that banks typically have a

very fragmented deposit base; bank debt ("deposits") is typically held by many different agents, none of whom holds a very large fraction of the total debt of the bank. This creates a gap in governance; while equity holders may have sufficient incentive to monitor the managers in good states of nature, they do not have such incentives in the bad states since the benefits of monitoring and imposing governance would mostly accrue to debt holders. With a normal debt structure, the latter fact will be enough of an incentive for debt holders to start monitoring management. However, with a very fragmented deposit base, obvious free-rider problems would prevent the emergence of an active monitoring role played by debt holders. Thus, one should expect bank managers to engage in excessively risky behavior in bad states of nature, as the fragmented nature of the deposit base destroys governance mechanisms in those situations (Dewatripont and Tirole (1993)).[8]

The special – fragmented – nature of bank debt only highlights a lack of governance. It is widely believed that the potential fragility of banks stems from another feature of bank debt, that is, their vulnerability to runs rooted in the withdrawal-upon-demand and sequential-service-constraint features of the deposit contract. The fear is that excessive withdrawals would force a bank to liquidate assets and thereby incur substantial liquidation costs that undermine the bank's ability to honor its remaining deposits. The excessive withdrawals could be triggered by concern about the bank's well-being. However, the bank's demise could then become a self-fulfilling prophecy: once a depositor thinks that others will withdraw, he will withdraw too. This is optimal given the presence of the sequential service constraint. These arguments explain potential runs on *individual* banks, but of real concern are systemic crises. Chari and Jagannathan (1988) show that a little uncertainty about the nature of a run may trigger a system-wide collapse or a panic. The social cost of bank failures may then be considerable.[9] Bhattacharya, Boot and Thakor (1998) provide a comprehensive overview of the rationales for regulation in the context of the fragility of financial intermediaries.

The potential vulnerability of deposit-funded banks to runs and the banking system's vulnerability to panics are often used as motivation for regulation, and in particular for deposit insurance (Diamond and Dybvig (1983)). It is generally thought that private arrangements are beset with free-rider problems and therefore could not cope with these problems. Most countries have therefore enacted "lender of last resort" and deposit insurance (DI) arrangements which guarantee that banks and certain other credit institutions can meet their commitments to depositors. As long as the insurance system is credible and fully guarantees each depositor's funds, bank runs will not materialize.

But deposit insurance, while safeguarding depositors, widens the gap in governance; depositors no longer have any incentive to monitor the bank. Therefore, it exacerbates the problem of excessive risk taking by bank managers since only the tax payer – the ultimate financier of the DI system – bears the consequences of any increase in downside risk. The existence of DI then necessitates *further* regulation, in particular on the lend-

8 Observe that deposits are not traded. This implies that valuable price-information is not available which could amplify the governance problem.

9 An important consideration is the stability of the payment system. Bank failures may disrupt the payment system which may have great social cost (see Freixas and Rochet (1997)).

ing side to contain the risk-taking incentives. These arguments could explain why extensive deposit guarantees – as observed throughout the world – have induced governments to severely regulate the banks' operations.

The moral hazards created by a fixed-rate, risk-insensitive deposit insurance system are widely acknowledged. There also seems to be considerable support for the notion that these incentives have contributed to the financial crises experienced in Western banking. However, this consensus seems at odds with the apparent stability of DI arrangements for most of the 1935-1980 period. Various authors, such as Keeley (1990), argue that the inclination toward risk was restrained for almost half a century by the economic rents earned in banking. In recent decades, however, rents have eroded significantly. This has exposed the latent design flaws of deposit insurance.

On a more fundamental level, we may conclude that a system of deposit insurance distorts the relation between a bank and its providers of funds. In particular, it reduces or undermines market discipline. Depositors knowing that their funds are insured will feel little inclination to monitor their investment by evaluating the banks' activities. While, as we have emphasized, depositors are generally small and may not have a sufficient economic incentive to monitor even in the absence of deposit insurance, it is likely that in a world without deposit insurance, market-rooted solutions would develop to facilitate monitoring. There would also be a real sense of urgency because without these solutions, funding might not be forthcoming. However, the potential for these solutions should not be overstated. Specifically, these "solutions" may severely hamper the transformation and liquidity-provision roles of financial intermediaries. The fact of the matter is that even ignoring the issue of deposit insurance arrangements, banks are often still considered "special" and bank failures socially costly.[10] A bank safety-net may thus be *implicitly* present even in the absence of deposit insurance.

A potential solution is rooted in the banks' incentives to develop a reputation. A sufficient reputation could convince the market that a bank would not exploit problems of unobservability and moral hazard. The bank would then benefit and obtain a lower cost of funds. Once a reputation is established, a bank has a powerful incentive to behave prudently to preserve its reputation. An important observation is that the banks' reliance on deposit insurance fixes their costs of (insured) funds at the risk-free rate, and also guarantees the availability of those funds. Reputation then no longer benefits the banks' costs or availability of funds, and the banks' incentives to develop reputations would accordingly be diminished (see Boot and Greenbaum (1993)). Their prudential operation would then be compromised (unless Keeley's (1990) monopoly rents are sizable).

The conclusion is that historically, monopolistic benefits provided banks with compelling incentives to follow low-risk strategies, despite the presence of deposit insurance. Market discipline was not necessary, and regulation and supervision were only of secondary importance; rents were the primary defense against moral hazard. With the dis-

10 As we have pointed out (see also Hoenig (1997)), the integrity of the payment system is a key public policy concern. Banks plan an important role in the functioning of the payment system. This could help rationalize regulatory interference.

sipation of rents, rigid regulatory structures like the Glass Steagall Act in the U.S. were subjected to unique challenges. The viability of the financial system now hinged upon regulation and supervision.

In our view, this analysis is incomplete at best. We believe that reputation-building incentives have simultaneously improved owing to changes in the banking business, partially alleviating the increased pressures on regulatory design. What we have in mind is that the ever-increasing importance of credit ratings in banking suggests that reputation is gaining in importance.[11] The important insight is that more recently, banking has been transformed from a solely "on-the-balance-sheet" business to one that is extensively "off-the-balance-sheet". Guarantees, letters of credit, absorption of counter-party risk, and various other contingent liabilities are becoming increasingly important. A bank's credibility in these activities depends to a large extent on its solidity, and thus reputation. Reputation-building incentives in banking therefore have improved.[12] This is good news for regulators and for the regulatory design of banking in general. Prudent behavior might in fact be less at risk than suggested by the overly simplistic moral hazard story of deposit insurance.

3.3 Direct and Indirect Approaches to Regulation

A key issue in the design of regulation is whether it *stipulates* behavior or seeks to *induce* the desired behavior. A direct approach consists of explicitly restricting the activities banks can undertake. While this has the benefit of clearly restricting possible outcomes, such a regulatory structure runs the risk of being outdated by new developments. The questionable sustainability of the separation between commercial and investment banking in the U.S. is one example. The alternative approach, indirect regulation, does not prescribe behavior (i.e., permissible activities), but rather establishes incremental price and non-price incentives that are designed to elicit socially desired choices by financial institutions. Ultimately, indirect regulation aims at making undesirable activities more expensive. Risk-based capital adequacy rules are one example; rather than prohibiting risky activities, they seek to mitigate risk-taking incentives by making risky lending more expensive to fund than safe lending. The problem here is, of course, fine-tuning the price incentives. As a further illustration, the indirect approach would sensitize deposit insurance premia to risk in order to encourage low-risk strategies, whereas the direct approach would prohibit high-risk strategies funded with insured deposits. In both cases, compliance would need to be monitored.

Existing bank regulatory practices incorporate both direct and indirect elements. The separation of investment and commercial banking in the U.S. and Japan, restric-

11 This could be linked to Keeley's (1990) analysis that showed that monopoly rents as a source of franchise value have become less important. Our arguments suggest that reputation may have replaced monopoly rents as a source of franchise value.

12 This appears to depart from the views expressed in Boot and Greenbaum (1993). However, there the sole focus is on a bank's reputation-building incentives in the context of bank lending activity. For smaller banks, the funding role may still dominate and reputation-building incentives might be small. This may also help explain the higher levels of capital observed in smaller banks.

tions on branching and insurance, and bank holding company limitations all illustrate direct restrictions. On the other hand, risk-based capital requirements and liquidity reserve requirements illustrate indirect controls. The former approach elicits the desired behavior by "brute-force". The latter would reach the desired outcome by inducement, provided the regulator is sufficiently informed to price correctly. However, it could be costly if informational deficiencies loom large enough. This is particularly true in an environment where competitive distortions could be substantial. Moreover, banks might seek to exploit the discretion that indirect regulation grants them. Regulators will also be granted discretion and need to be supervised themselves, if only to contain corruption. Indirect regulation thus requires a well-defined regulatory and legal structure.

3.4 Implications

The traditional regulatory approach to Western banking implicitly guaranteed stability by reducing competitiveness. The competitive reality of today makes this approach no longer viable. Banking is in flux. It is thus important that one (re)examines the issues of competitiveness and stability. Given the distortions associated with intrusive direct and indirect forms of regulation, it is important to design a banking structure and regulatory framework that make the operations of financial institutions minimally dependent on regulation and supervision.

4. Optimal Regulatory Design

4.1 Recommendations for Regulatory Design

The preceding paragraphs highlight the distortionary costs of direct and indirect regulation, particularly in a more competitive environment.[13] As stated above, structural changes in banking have rendered these approaches untenable, and may explain a shift towards more hands-off, certification-type regulatory structures.[14]

How do certification requirements work, and how should they be implemented? Certification requirements by their very nature only impose minimum standards on the industry. Supervision is needed to verify compliance, and timely intervention is also important. Above all, certification requirements aim at providing a more hands-off approach, and seek to minimize regulatory interference in the operations of the financial sector.

Such a regulatory framework can only function if there is sufficient confidence in the stability and prudential operations of financial institutions. We concluded earlier that

13 In a complementary paper (Boot, Dezelan, and Milbourn (1999)), we provide an analysis of these distortions in an industrial organization model.

14 It is important to observe that we ignore the potential causality between the type of regulation and the competitive environment. In particular, the common direct and indirect approaches to regulation often seek to soften competition, for example by creating entry barriers and protecting established institutions.

reputation-building incentives in banking may well have improved, which would foster confidence in the assessment of the operations of financial institutions. While important, this is still inadequate and an insufficient foundation for supporting certification requirements as the main regulatory instrument. What is needed is a broader balance between certification requirements, complementary supervision (including timely intervention[15]) and market discipline on the one hand, and internal control systems and internal supervision on the other. The latter are needed to create the right incentives *within* financial institutions, and are particularly important given the increased opaqueness of banking institutions.

We will first discuss the importance of internal control systems and supervision, and then add further detail to the design of a regulatory system based on certification requirements.

4.2 The Broader Context of Certification Requirements: The Importance of Internal Supervision and Internal Incentives

The noteworthy – and much publicized – internal control failures in recent years clearly point at the importance of internal supervision. However, internal supervision will not be effective or sufficient unless the *incentives* within the organization are aligned. For financial institutions, this has become even more important with the changing nature of activities that allows institutional risk profiles to be changed overnight. Also, the increasing diversity of bank activities – with (short-term) transaction-oriented proprietary trading activities and (long-term) relationship-oriented lending activities at the extremes – elevates the potential for diverging incentives, particularly considering the differences in risk profiles. Internal capital allocation schemes – including VAR and RAROC based approaches – could serve a useful purpose by charging each activity a risk-based cost of funding.[16] Similarly, more traditional accounting approaches, like activity-based costing could be interpreted as aimed at aligning internal incentives. As the cultural clashes between bonus-oriented traders and conservative relationship bankers within today's financial institutions show, much more might be needed to align incentives. This would include not only remuneration systems, but also promotion opportunities, among other things.

The cost of failing to align incentives could be enormous. Organizations themselves may then have to "brute-force" desired behavior by using rigid rules. These rules would come with substantial cost, particularly because they would "bite" more often than desired.[17] In this context, the emphasis that external regulators have put on the banks' internal control systems and integrity is justified. Misaligned incentivesforce regulators to implement (intrusive) direct and indirect forms of regulation, with their associated costs.

15 See Kwast (1996).

16 Internal capital allocation systems are a step in the right direction in that these help the different activities/departments in a bank internalize the costs of risk-taking. In designing such a system, it is important to note that the cost per unit of capital depends on the risks that unit is exposed to. In other words, capital does not have one price. Thus, the internal allocation of capital should not be based on the average price of capital of the institution, but should differentiate the cost according to the risks faced by the different activities.

17 This also highlights the importance of corporate culture. With the right corporate culture, internal checks and balances are "automatically" in place and rigid rules might be superfluous.

4.3 The Design of the Regulatory System: Evaluation of Reform Proposals

One interpretation of our analysis is that we have provided a foundation for more hands-off approaches to regulation. From this perspective, how should we evaluate the various (reform) proposals to regulatory design?

There have been several proposals put forth recently that stress an individual bank's involvement in settings its level of capital (see also the Introduction). One is the pre-commitment approach to capital regulation. It advocates that banks should set their individual capital ratios, based on their own (superior) information set. Alternatively, internal control systems (e.g., VAR and RAROC) could be used to dictate the level of capital. If the actual level of capital is then too low, the banks in question will be fined.[18] The pre-commitment approach to capital regulation could potentially mitigate the distortions associated with direct and indirect forms of regulation. The main concern lies in the imposing of penalties. Generally, there is a need to penalize when capital levels have become low. But how can it be time-consistent to fine banks in such states? Moreover, as Bliss (1995) observes, this approach may cause "gaming" in the choice of internal control systems.

Our approach does not have the self-regulatory flavor of the pre-commitment approach, but seems complementary to proposals that explicitly give a role to internal control systems. We advocate a well-defined role for regulators: they set the "certification" levels that need to be maintained for retention of the bank's license. Falling below certification levels should induce swift regulatory intervention. Along this dimension there is little discretion for either banks or regulators. However, certification requirements (and the swift and timely non-discretionary intervention in case of violation) should not exclude complementary *discretionary* supervision. As the guardian of the integrity of the financial system, regulators need to be able to intervene when they believe it is warranted. That is, intervention is sometimes needed on qualitative grounds alone. The possibility of these interventions requires accountability on the part of regulators, but a discretionary element can, in our view, not be totally excluded.[19]

5. Regulation in transition economies

5.1 Some Relevant Characteristics

The design of regulation in emerging and underdeveloped financial systems should differ from the one in established and developed financial systems. The rationale for the differences in regulation comes from the specific economic environment that many of

18 Effectively, this approach lets each bank choose from a menu of contracts. Each level of capital is then complemented with its own fine for non-compliance (see Prescott (1997).

19 These observations are also put forward in Estrella (1998). He warns against exclusive reliance on mechanical rules. Qualitative assessments are needed as well.

these countries are facing. One of their characteristics is that it is hard to disentangle the banking sector from the rest of the economy. That is, there is either little distance between the banks and the rest of economy (i.e., banks take equity positions in the corporate sector) or the financial market is of little importance. Consequently, information problems are typically much larger, with more dramatic changes taking place on the borrowers' side. The information systems are also underdeveloped, the banking sector has no reputation and corruption poses a serious problem. Moreover, the shortage of skilled and experienced bank supervisors is extreme. All of this calls for different regulation than the environments where financial systems are highly competitive.[20]

In addition, excessive concentration, preferential treatment by governments and limited entry stymie the progress of banks in transition economies (Claessens (1997)). Because of a weak legal infrastructure, highly leveraged financial intermediaries, limited institutional development, great uncertainty and inside information, the role of banks and financial markets is likely to remain limited in many transition economies.[21]

5.2 Regulatory Considerations

The common feature for the regulation of transition and other emerging economies should be increased disclosure and transparency, and strengthened incentives (through personal liability, for example) of the owners and managers. The regulatory structure should give the right incentives to managers of banks to take responsibility for their own actions (see Caprio (1996)).[22] Sound fundamentals can only be maintained through high capital adequacy and liquidity ratios, prudent loan classification and provisioning, and sound risk management. Increased disclosure and transparency are necessary to reduce market uncertainty and limit the risk of contagion.

The diffuse situation existing in most transition economies makes these forms of intrusive regulation indispensable. Indirect regulation, however, seems less desirable. Such an approach depends crucially on the ability of regulators to fine-tune price signals, and grants them substantial discretion on whether or not to intervene. Both issues are likely to create major problems in transition economies. Informational problems are clearly much bigger there, often with the entire corporate sector going through a transformation process with both a highly uncertain outcome and direction.

The high degree of regulatory discretion that indirect approaches lead to is also a problematic aspect in emerging economies. Most countries lack a strong civil service tradition, pay their civil servants little and also have a legal environment that often lacks clarity. All this makes indirect approaches very prone to corruption. This problem is exacerbated by the common structure of vesting enforcement authority in the same institution that is charged with supervision, the Central Bank. While it is natural to place

20 See also Boot and Van Wijnbergen (1995) for a discussion of these issues in the context of Eastern Europe.

21 Claessens (1997) suggests that in the short run, self-finance, intermediation among enterprises, and financing via non-bank financial institutions might be preferable for many transition economies.

22 Honohan and Vittas (1995) also emphasize that transition economies primarily need to establish basic mechanisms and incentive structures.

supervision responsibility in the Central Bank, it is less clear that enforcement responsibility should rest there too. There is certainly an argument to be made to separate the two. Since the need to intervene to enforce regulation often suggests that prior supervision efforts have failed, an institution that is responsible for both supervision and intervention is likely to hesitate too much with intervention so as not to admit that it failed in its prior duty to supervise (Boot and Thakor (1993)).

A case can therefore be made to vest enforcement authority with a Banking Commission, where, like in Mexico, several agencies are represented. Such a set-up will reduce the cover-up incentives built in the currently more widely adopted model of the Central Bank acting as both supervisor and enforcer. It would also make the system much less susceptible to corruption because more than one institution is involved in the decision. For obvious reasons, a committee of only loosely related persons is much harder to bribe than a single individual.

But even such a change in structure, advisable as it may be in fraud-prone environments, is unlikely to solve all problems with the indirect approach to regulation. How is capital adequacy evaluated? This requires risk assessment and valuation of on- and off-the-balance sheet assets and liabilities. But with the much higher degree of uncertainty, how could we ever feel confident about the assessment of the value of contingent liabilities such as those incurred in insurance activities? Similarly, activities in corporate restructuring, while clearly requiring banks, will often involve taking equity stakes. However, given that most companies' shares are untraded, evaluating such stakes for capital adequacy assessment is an impossible task. The problem is thus threefold: greater informational distortions than in Western banking, many more exceptional transactions and a weakly developed regulatory and legal structure.

Indirect regulation therefore imposes an unrealistic informational burden on the regulator. With the values of so many bank assets inherently ill-defined, the regulator's assessment of an institution's risk, on which so many requirements are to be conditioned, is simply too fragmentary. These unrealistic informational requirements of indirect regulation will inevitably degenerate into a dependence on intrusive, discretionary, fraud-prone supervision. It is therefore the discretion-armed regulators, not regulation per se, that subverts banks in their competitive pursuits.

A strong case can be made for a substantially larger direct element in bank regulation than can currently be found in Western banking. The main objective is to augment the transparency of the banks' activities, not to unduly restrict the banks' activities. Therefore, it does not necessarily conflict with the granting of universal banking licenses. Even when such licenses are granted, direct regulation could still stipulate that insurance activities and corporate restructurings be placed in separate subsidiaries, which will then fall under specialized regulatory agencies where necessary.

6. Conclusion

Our main conclusions on how the competitive environment and the degree of development of the financial system affect the desirable design of regulation are summarized in Table 1. Moving to the top in the case of a developed system (upper left hand side of the table) shows that the more competitive the environment, the less intrusive the regulation should be. We have characterized this type of regulation as certification-oriented (certification requirements). This hands-off approach to regulation goes hand in hand with supervision to monitor compliance and provide timely intervention. Moreover, feasibility dictates adequate internal control systems.

The certification orientation is not sustainable in case of underdeveloped financial systems (right hand side of the table). A control-oriented and intrusive direct approach to regulation may then be necessary. Excessive competition in an undeveloped system is not advisable, but will generally not be feasible in such an imperfect environment anyway. As we have concluded in Section 5, in these emerging economies the emphasis should be on transparency. Improving disclosure and accountability are paramount.

Table 1: Competition, the Development of Financial System and Regulatory Design

Competitive Environment	**Developed Financial Systems**	**Underdeveloped Financial Systems**
Highly competitive environment	Certification requirements	No excessive competition
Intermediate and low competition	Direct and indirect forms of regulation are feasible Monopoly rents help control incentives.	Mainly direct regulation, but supplemented with some indirect controls.

The main message of our analysis is that the hands-off approach to regulation – as embodied in the certification requirements – is desirable for Western banking. Beneficiaries would be the existing banking institutions that can better face (imminent) competitive threats. Society, however, would gain most. It would face a more efficient financial system. The ball is in the court of the financial institutions; they should put their internal control systems in order to facilitate a shift to certification requirements as the main regulatory tool.

References

Bhattacharya, S., A.W.A. Boot and A.V. Thakor, (1998), The Economics of Bank Regulation, *Journal of Money, Credit and Banking* 30(4), 745-770.

BIS Review, (1998), Mr. Ferguson looks at bank supervision from the consulting perspective, 24, March 1998.

Bliss, R.R., (1995), Risk-Based Capital: Issues and Solutions, *Federal Reserve Bank of Atlanta Economic Review* 80 (September/October), 32-40.

Boot, A.W.A., (1999), European Lessons on Consolidation in Banking, *Journal of Banking and Finance*, 23, 609-614.

Boot, A.W.A., S. Dezelan, and T.T. Milbourn, (1999), Regulatory Distortions in a Competitive Financial Services Industry, forthcoming *Journal of Financial Services Research*.

Boot, A.W.A. and S.I. Greenbaum, (1993), Bank-Regulation, Reputation and Rents: Theory and Policy Implications, in C. Mayer and X. Vives, eds, *Capital Markets and Financial Intermediation*, Cambridge University Press.

Boot, A.W.A. and A.V. Thakor, (1993), Self-Interested Bank Regulation, *American Economic Review*, 83, 206-212.

Boot, A.W.A. and S. van Wijnbergen, (1995) Financial Sector Design, Regulation and Deposit Insurance in Eastern Europe, in Jacek Rostowski, ed, *Banking Reform in Central Europe and the Former Soviet Union*, Central European University Press.

Caprio, G., (1996) Bank Regulation: The Case of the Missing Model, World Bank Policy Research Working Paper 1574.

Chari, V.V. and R. Jagannathan, (1988), Banking Panics, Information, and Rational Expectations Equilibrium, *The Journal of Finance*, 43, 749-761.

Claessens, S., (1997), Banking Reform in Transition Countries, World Development Report 1996, World Bank.

Demsetz, R.S., M.R. Saidenberg and P.E. Strahan, (1996), Banks With Something to Lose: The Disciplinary Role of Franchise Value, *Federal Reserve Bank of New York Economic Policy Review*, 2, 1-14.

Dewatripont, M. and J. Tirole, (1993), Efficient Governance Structure: Implications for Banking Regulation, in C. Mayer and X. Vives, eds, *Capital Markets and Financial Intermediation*, Cambridge University Press.

Diamond, D. and P. Dybvig, (1983), Bank Runs, Deposit Insurance and Liquidity, *Journal of Political Economy*, 91, 401-419.

Estrella, A., (1998), Formulas or Supervision? Remarks on the Future of Regulatory Capital, *Federal Reserve Bank of New York Economic Policy Review*, 191-200.

Euromoney, (1997), Can Bankers Be Their Own Cops?, 128, September.

Flannery, M., (1999), Financial Convergence: An Overview, University of Florida Working Paper.

Freixas, X. and J.C. Rochet, (1997), *Microeconomics of Banking*, MIT Press.

Hoenig, T.M., (1997), Bank Regulation: Asking the Right Questions, *Federal Reserve Bank of Kansas City Economic Review*, 82 (First Quarter), 5-10.

Honohan, P. and D, Vittas, (1995), Bank Regulation and the Network Paradigm: Policy Implications for Developing and Transition Economies, The World Bank Policy Research Working Paper.

Keeley, M.C., (1990), Deposit Insurance, Risk and Market Power in Banking, *American Economic Review*, 80, 1183-1201.

Kupiec, P.H. and J.M. O'Brien, (1997), Deposit Insurance, Bank Incentives, and the Design of Regulatory Policy, *FEDS Finance and Economics Discussion Series*, No. 98-10.

Kwast, M.L, (1996), Supervising the Universal Bank, in A. Saunders and I. Walter, eds, *Universal Banking: Financial System Design Reconsidered*, Irwin.

Llewellyn, D.T. (1999), Alternative Approaches to Financial Regulation, paper presented at the 1999 Institute of Economic Affairs Financial Regulation Lecture, Royal Society of Arts, London.

Prescott, E.S., (1997), The Pre-Commitment Approach in a Model of Regulatory Banking Capital, *Federal Reserve Bank of Richmond Economic Quarterly*, 83 (Winter), 23-50.

Note on the Cotributors

Arnoud W.A. Boot is Professor of Corporate Finance and Financial Markets and Associate Dean of the Faculty of Economics and Econometrics at the University of Amsterdam. He is also a Director of the Tinbergen Institute in Amsterdam and Research Fellow at the Centre for Economic Policy Research (CEPR) in London and at the Davidson Institute of the University of Michigan. Prior to his current position, he was on the faculty of the J.L. Kellogg Graduate School of Management at Northwestern University in Chicago. Arnoud Boot held visiting appointments at several universities. Recently, he was Bertil Danielsson Visiting Professor at the Stockholm School of Economics in Sweden and Olin Fellow at Cornell University in the U.S. He has taught in a number of MBA programs and in a variety of executive education programs. His research focuses on corporate finance and financial intermediaiton. He has written on regulation of financial institutions, the design of securities, capital structure, corporate divestitures and take-overs, rescheduling of sovereign debt and corporate governance.
In addition to his academic activities, professor Boot is consultant to several financial institutions and corporations. His consultancy activities concern the regulation and organisational structure of financial institutions, the organisation of risk management activities, corporate governance and the ownership and financial structure of corporations. For these activities, he recently established the Amsterdam Center for Corporate Finance, a 'think tank' designed to improve the interaction between theory and practice. Professor Boot is co-editor of the *Journal of Financial Intermediation*, and associate editor of several other journals, including the *Journal of Banking and Finance* and the *Journal of Corporate Finance*. His research has been published in prominent academic journals, including the *Journal of Finance*, *American Economic Review*, *Economic Journal* and *International Economic Review*.

Silva Dezelan is a PhD candidate at the Faculty of Economics and Econometrics of the University of Amsterdam, also affiliated with the Tinbergen Institute. Prior to her current position she was a teaching assistant at the University of Ljubljana, Faculty of Economics, in Slovenia.
In addition to financial regulation, her research interests include the role and development of bond and stock markets in transtition economies, and their efficiency. At the moment, she is writing a dissertation on the impact of institutional investors on the capital markets and their liquidity.

Todd T. Milbourn is Assistant Professor of Finance at the Graduate School of Business of the University of Chicago. Todd Milbourn has consulted and lectured on advanced corporate finance issues in a variety of organizations, including several Fortune 500 and London-FTSE 100 companies, as well as several global investment banks and consultancy firms. Both his research and teaching interests are generally centered around corporate finance topics, but he focuses his research primarily on issues of managerial com-

pensation design, performance measurement and capital budgeting schemes. He has over ten publications in various financial and managerial journals that span these topics. Todd Milbourn received his PhD in Finance at Indiana and holds a Bachelor of Arts degree from Augustana College, Illinois, where he majored in economics, mathematics and finance. While completing his PhD, Todd was awarded two school-wide awards for excellence in teaching. Todd Milbourn went on to spend three years on the finance faculty of the London Business School and one year at the University of Chicago's Graduate School of Business. He will soon join the John M. Olin School of Business at Washington University in St. Louis as a full-time member of the finance faculty.

Amsterdam Center for Corporate Finance

The Amsterdam Center for Corporate Finance (ACCF) is a thinktank specializing in the financial management of corporations and the operations of the financial sector. The ACCF promotes high quality research on the interface between financial theory and corporate policy. With a variety of activities, it provides a forum for dialog between academics and practitioners. The ACCF is an independent foundation and is supported by major financial and industrial corporations, consultancy agencies and (semi) government bodies.

Directors
A.W.A. Boot
J.E. Ligterink

Board
Jhr. A.A. Loudon
R. Soeting
A. Verberk

Address
Roetersstraat 11
1018 WB Amsterdam
The Netherlands
Phone: +31 20 525 4162
Fax: +31 20 525 5285
E-mail: office@accf.nl
http://www.accf.nl