CREDIT RATINGS AND THE BIS REFORM AGENDA

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In this paper we have revised and updated our earlier study in order to analyze the most recent draft of the BIS's proposed reforms of bank capital requirements. We focus on three related aspects of the reform proposal: (i) the standardized model for corporate loans, (ii) its predictive ability of capital requirements, and (iii) the calculation of capital requirements under the BIS proposal and under our own alternative bucketing approach, using actual loss distributions of bond defaults. With respect to the standardized model, we find that although the revised BIS guidelines are an improvement over the original ones, several of their rating categories carry under-weighted capital requirements and that banks will continue to be motivated to skew their portfolios toward lower rated loans, *i.e.*, regulatory capital arbitrage. Indeed, our own proposal's bucket weights appear to be too liberal as well and we encourage increased capital requirements at the lower end of the credit quality spectrum.

Introduction

In an earlier paper, Altman and Saunders (2000, 2001) analyzed the initial reform proposals of the BIS released in June 1999. The initial BIS proposals put forward a three-stage plan towards reforming the 8% risk-based capital rule for credit assets of banks. Specifically, a first stage standardized model, with risk-weights based on credit rating agency buckets, was envisaged to be followed by the adoption of internal rating based models (using bank's own risk weighting/grading systems) and potentially, in the future, transition to internal models based on (default) correlations among credit risky assets.

In our earlier paper, we found fault with two aspects of the then proposed standardized model. The first was the inherently lagging nature of agency ratings that could result in capital ratios moving too slowly in cyclical recessions e.g., required capital ratios reaching a peak *after* a recession, when loan default increases had already occurred. The second problem involved the broad degree of granularity in the corporate loan risk weightings in that only three buckets for rated *corporate* loans were envisaged with one additional bucket for unrated loans. We showed that the proposed relative risk weightings of 20% (AAA to AA-), 100% (A+ to B-) and 150% (below B-), along with the 100% for unrated borrowers, were simply to broad and did not reflect the relative risk of unexpected losses on loans in each bucket. In order to show this we utilized data on corporate bond defaults (including prices one year prior to default as well as on default) in the US over the period 1981-1999 (September).

These data, along with different assumptions regarding the shape of loss distributions on loans (bonds), including the normal, actual and Poisson distributions (as

well as using Monte-Carlo experiments),[1] showed that the proposed BIS corporate loan risk weights did not differentiate sufficiently with respect to both the expected and unexpected loss rates in these buckets. Based on these findings we recommended a revised weighting scheme that included splitting the A+ to B- 100% bucket, into two separate buckets, A+ to BBB- and BB+ to B-, with the split reflecting the division between investment and non-investment grade borrowers. Our proposed risk weightings on the revised investment and non-investment grade buckets are listed in Table 1. The rationale for the lower 10% weight for AAA to AA- rated corporate credits was the observation that there has never been a default, within one year, on bonds rated in these two top categories and our updated results (below), continue to show this. We agree, however, that in some unusual cases, a AAA or AA bond could default over a one year horizon.[2] As such, we believe a non-zero risk-weight is prudent, but are not convinced that the 20% weight in the 1999 BIS proposal, and in their new draft, is appropriate. We still prefer the lower 10% owing to the empirical evidence to date.

We also found that the ratio of unexpected losses between investment grade A+ to BBB- bonds, versus non-investment grade BB+ to B- bonds, was roughly between 3 to 5 times greater for the latter. We therefore specified a 30% and 100% weighting for the two new buckets, respectively. Also, recognizing that below B- bonds were far more riskier than those at B or above, we selected a 150% weight, although we felt that this was too low. We are now convinced that both the B and below B categories are under-weighted. Finally, we explored the total elimination of the unrated class and its attendant 100%

[1] See, Saunders (1999) for a description of alternative loss distribution models.

[2] For example, Southern California Edison's bonds were rated AA- as of December 31,2000 and there is, at the time of this writing, a non-trivial probability that the firm could default sometime in the year 2001 due to the regulatory debacle and the sudden increase in fuel cost and lack of energy in California.

weight and suggested that wherever possible, internal credit ratings be utilized. We continue to strongly suggest this approach, especially since the subsequent BIS documents of January 2000 and January 2001 (BIS II), emphasize the eventual need for internal ratings based (IRB) systems for all banks. We cannot see any economic or statistical rationale for clinging to an unrated class with risk-weights that are lower than some of the rated categories.

In the newly amended proposal, released in January 2001, the BIS now proposes a revised standardized model in which an additional bucket is added for corporate loans – see Table 2. Moreover, stage two is replaced by two alternative internal ratings based (IRB) schemes; one called the "foundations" approach, the other the "advanced" approach. The "foundations" scheme requires a default probability (PD) to be calculated for each rating grade from a bank's (granular) rating system, based in part on the historical default experience of the bank. This PD number is then adjusted to reflect both the expected and unexpected probabilities of default, and multiplied by a *standardized* loss given default (LGD) factor and a maturity (M) factor so as to calculate a benchmark risk weight (BRW). The principal difference between the "foundations" and "advanced" approaches is in the bank's internal calculation of LGD, and M, as well as the exposure at default (EAD) in the latter approach.[3]

In Section 2 of this paper we conduct a revised empirical analysis of the new proposed standardized bucket weights using the same period data (1981-1999 September)

[3] There is very little discussion of loan default correlations. Indeed, the standardized as well as the internal rating based schemes appear to ignore internal diversification via correlations. Whether this means that the idea of eventually moving to internal models based on correlations for risk-based capital purposes has been abandoned is unclear. Correlations of default incidence is discussed in the BIS report's section "credit mitigation," especially with respect to credit guarantees and derivatives (see p. 32 of that section). Basically, the use of the "double-default" joint probability correlation argument is rejected.

from our earlier study and then updating the results for year 2000 experience. We then examine the stability of default and loss predictions over time. In particular, we examine the extent to which historical data on PD and LGDs for the 1981-1999 (September) period could predict the PD and LGDs (and hence losses) over a one-year horizon (*i.e.*, the actual default experience of the year 2000[4]). In section 2, we also update the results for our own proposed buckets. The year 2000 data is a particularly important period since the default rate on corporate bonds was relatively high (see our discussion below). In Section 3 we examine the capital requirements that emerge from an internal ratings based system using the BIS's proposed foundations approach with the ratings buckets reflecting alternatively (i) the BIS II proposed standardized buckets (see Table 2) and the Altman-Saunders proposed buckets (Table 1). This allows a calibration of the levels of the risk weights proposed under the foundations approach with actual default and loss given default (LGD) data. Finally in Section 4 we present a summary and conclusions.

While we agree that the revised BIS guidelines are a step in the right direction, we conclude that the standardized risk weight of 150% for the BB- and below bucket is too low and that as a result, banks will continue to substitute low rated assets for the higher rated, lower capital assets (regulatory capital arbitrage activities). And, we find it less than desirable to combine single B with below B rated assets. We now propose a splitting of these two rating class categories as well as retaining our original idea of differentiating between investment and non-investment grade assets. We reach these conclusions via an empirical analysis of on the benchmark risk weights, and the consequent capital

[4] In actual practice the horizon is one quarter longer than a year since our original sample period ended in September of 1999 and we are predicting annual probability of loss experience for the year 2000 (excluding the last quarter of 1999).

requirements, for different rating class assets under the BIS's own IRB "foundations" model approach.

Section 2-Analysis of the BIS Standardized Model and our proposals

2.1 Standardized Risk Weights under BIS II

Table 2 shows the revised risk weights of the standardized model as proposed by the Basel Commission on Bank Supervision. The risk weight for AAA to AA- remains at 20%, even though we could find no corporate bond that had defaulted with such a rating over a one-year horizon for the 1981-1999 (September period) and in 2000. The second original bucket of 100% for A+ to B- has been split into three, as we and perhaps others, had recommended. However, the split chosen is A+ to A-, BBB+ to BB- and below BB-, rather than the more logical investment grade versus non-investment grade split of A+ to BBB-, BB+ to B- and below B- that we suggested in our original article. The relative risk weightings of these three new buckets are 50%, 100%, and 150%. Note that the most risky "rated" bucket starts at below BB- whereas under the original proposal it started at below B-. It should also be noted that unrated corporate borrowers remain with a 100% risk weight as under the original proposal.

The revised BIS buckets, under BIS II, therefore, combine the dominant "junk bond" rating (single B) with the lowest and far less common rating, (CCC/or Caa), and weight this bucket at 150%. This combination is somewhat odd since all the empirical evidence that we have seen shows that the default probability of a triple C bond is much greater, than a single B issue.[5] We can find no *a priori* rationale for the revised bucket weights other than they are less granular than the original proposal's and that the

[5] See (Caouette, Altman and Narayanan, 1998, Chapter 15) who compare S&P, Moody's and Altman's one-year and cumulative default rates.

Commission is responding positively toward the many commentators who advocated increasing the number of buckets for corporate loans.

In order to evaluate the relative accuracy of the standardized model's "risk weights" under the new BIS scheme, we use the same data and methodology as in Altman and Saunders (2001), on bond defaults and loss given default calculations to generate loss distributions and to calculate the expected (mean) and unexpected loss rates (at various percentiles, *i.e.*, 95%, 99%, and 99.97%). Importantly, the BIS now explicitly interprets capital as that equity being sufficient to withstand both expected *and* unexpected losses.[6] The justification for including expected losses in the capital calculation is that loan loss reserves and provisions (up to a maximum of 1.25%) are counted as Tier II Capital as part of the current BIS 8% minimum required capital ratio.

In the analysis that follows we concentrate on the mean (expected) loss rate of each standardized category and the extreme 99.97% (unexpected) loss rate.[7] In Table 3 the relevant expected and unexpected loss rates are shown. As discussed earlier for the AAA to AA- bucket, both the expected and unexpected loss rates are zero over the 1981-1999 (September) period, indicating that a 20% risk weight, and implicity a 20% x 8% = 1.6% capital requirement, exaggerates the risk of default losses for the highest quality corporate borrowers. For the new second bucket (A+ to A-), the expected loss rate is 0.012% and the unexpected losses under the normal and actual loss distributions at the 99.97% confidence level, are respectively 2.142% (normal) and 14.988% (actual). This compares with the new third bucket's (BBB+ to BB-) expected loss rate of 0.163% and

[6] Most analytical work has equated expected losses with loss provisions or reserves, with unexpected losses being insulated by bank capital.

[7] It might be noted that the BIS internal ratings based benchmark weights are explicitly calibrated to the 99.5% level. However, it is unclear what the percentile is for the calibration of the risk weights under the standardized model. Consequently we chose three alternative percentiles: 95%, 99%, and 99.97%.

unexpected loss rates of respectively 7.369% (normal) and 54.837% (actual). Thus the expected loss rate of the new bucket 3 is 13 times larger than bucket 2, while the unexpected loss rate is between *3.4* and *3.6* times larger. Hence, the relative risk weighting in the standardized model of 100% versus 50%, or 2 times higher for bucket 3, appears to underestimate the relative riskiness of the two classes.[8]

Comparing bucket 4 (below BB-) to bucket 3 (BBB+ to BB-) we see that the expected loss rate of bucket 4 was 2.772% versus 0.163% for bucket 3, and the unexpected loss rates were 35.434% versus 7.36% (normal distribution) and 97.228% versus 54.837% (actual distribution). Thus the expected loss rate of bucket 4 is 16 times larger than bucket 3, and the unexpected loss rates are between *4.8* and *1.8* times larger. Again, the risk weighting difference of 150% versus 100%, or 1.5 times larger, implied by the BIS proposed model appears to underestimate the relative riskiness of below BB- borrowers relative to BBB+ to BB- borrowers. That is, the revised standardized BIS capital requirement continues to penalize higher quality relative to lower quality borrowers.

As in our earlier model we re-estimated these loss rates distributions looking at the loss rate experience on only the most senior bond of a defaulted issuer. Arguably, these bond loss rates better reflect the loss rates to be expected on bank loans, since in most cases bankers have considerable seniority compared to other creditors when borrowers default. These results, on fewer default observations, are shown in Table 4 and again reflect a similar pattern, *i.e.*, the AAA to AA- risk weight is too high in absolute

[8] Interestingly, in our original paper (Altman and Saunders (2001)), we had proposed a relative risk weighting between buckets 2 and 3 of 30% versus 100% or bucket 3's risk weighting should be 3.3 times higher. Our buckets were investment grade vs. non-investment grade, however, while the revised BIS buckets combine the two in their third bucket.

value, the relative risk weights (risk differences) between A+ to A- versus BBB+ to BB- and BBB+ to BB- versus BB- and below are simply to small. This reinforces the impression that the new standardized model under BIS II, if adopted, will retain the incentive banks currently have of risk shifting away from relatively safe loans towards relatively risky loans. Since the reduction of this regulatory arbitrage phenomenon was one of the prime objectives of the revised BIS guidelines, we are concerned that this goal will not be achieved.

2.2 Adding the Year 2000 Results

Our earlier study included default data through the third quarter of 1999. We are now in a position to add a relatively large number of observations since 2000 was an extremely high default year. Indeed, the defaulted amounts of corporate bonds in the U.S. exceeded $30 billion, which was almost $7 billion more than the previous record year, 1999, and almost $12 billion more than the early 1990's record years (Table 5). And, the default rate climbed to over 5%. We can add roughly 60 new observations where we were able to gather data on prices and ratings one year prior to default – an increase of almost 10% (comparing Tables 3 and 6).

The mean expected loss rates for the updated larger sample shown in Table 6 are very similar for the A+ to A- and below BB- buckets compared to data through September 1999 (Table 3), but the BBB+ to BB- category had a sizeable increase in both its expected and unexpected loss rates – from 0.163% to 0.251% (expected) and from 7.34% to 11.75% (unexpected). This reflects a higher vulnerability to default of the somewhat better quality credits – at least in 2000.

We also updated the loss distributions of our proposed buckets (see Table 1). These are shown in Table 7. The results are quite similar to those found in our earlier paper, except most of the average loss rates are higher. For example, the expected issuer based loss for the A to BBB bucket increased slightly from 0.036% to 0.043% while the BB to B category decreased slightly.

2.3 Default and Loss Rate Stability

The next issue we address is one of stability. It is of some interest to see the ability of the loss rates over the relatively long 1981-1999 period to predict the loss rates that occurred in the year 2000.

The year 2000 results are shown in Table 8 and can be compared to Table 3 for the 1981-1999 (September) period. It is clear that historical data over-predicted both the expected and unexpected loss rates for the second BIS II standardized bucket (A+ to A-) and under-predicted the losses for the third standardized bucket (BBB+ to BB-). Specifically, both the mean (expected) and unexpected loss rates for bucket two were zero for year 2000, but were respectively 0.012% and 2.142% (normal) for 1981-1999 (September). By comparison, for bucket three, the mean and unexpected loss rates (normal) were 0.813% and 25.578% for the year 2000 versus 0.163% and 7.369% for 1981-1999 (September). That is, the year 2000 showed a significant jump in loss rates relative to the average “across cycle” long-term experience reflected in the historical data. This difference is non-trivial and is of the order of being 4 to 5 times larger for standardized bucket three. Clearly, 2000 was a relatively bad year for BBB+ to BB- issuers with 23 defaults out of 2022 issues. Finally, the 1981-1999 (September) expected

and unexpected loss rates for bucket four (below BB-) are quite close to those that actually materialized in the year 2000.[9]

2.4 The Unrated Bucket

The unrated bucket with its controversial 100% risk weight remains an unfortunate vestige from the 1988 accord. We can find no economic or statistical rationale for the weighting in this category and since the vast majority of credits in the world's banking systems are not rated by rating agencies, this category could dominate the overall required capital held by many banks.

Data for comparing loss rates on unrated bonds, or loans, is almost impossible to get since the "class" is fairly ambiguous and probably encompasses securities of very different quality ratings. Figure 1 does show that nonrated (NR) *institutional loans* issued by publicly owned companies in the United States had a cumulative default rate over the 1996-2000 (Q3) period that was higher than BB but lower than B rated loans. And, the default rate was higher than the average leveraged loan. Leveraged loans are classified as non-investment grade if their yield is 150 basis points over LIBOR. This data is important and relevant since there was a significant number of non-rated loans (276) compared to all leveraged loans issued (542) in the five year period 1995-1999. It should be pointed out that this data is related to the expected probability of default and not the expected or unexpected loss rates. The data also is for a relatively short period of time and probably will become scarcer as an increasing proportion of larger loans are being rated in recent years.

3.0 The Proposed Internal Rating Based (IRB) Approach of the BIS

[9] See Saunders (1999) for a discussion of stress testing.

Instead of using the standardized model, sophisticated banks with the sufficient number of internal credit risk rating grades for performing and non-performing loans[10] and whose borrowers are largely unrated by the major credit rating agencies, may (with regulatory approval) adopt one of two IRB approaches to calculating capital requirements for credit risk.

Under both the "foundations" and "advanced" approaches of IRB capital requirement calculation, benchmark risk weights (BRW) are calculated for different loans. These BRW's can then be multiplied by the relevant minimum BIS I capital ratio (e.g., 8%) to determine regulatory capital. Under the "foundations" approach, the bank calculates the expected (mean) probability of default (PD) for each of its rating classes based on historical experience and, given an assumed LGD of 50% and maturity (M) of loans of three (3) years, the bank then calculates the BRW for each of its loans using the formula below. Note that the only input of the bank is its estimate of the probability of default (PD), which is imputed in decimal form to calculate the BRW:

$$BRW = 976.5 \times N(1.118 \times G(PD) + 1.288) \times (1 + .0470 \times (1 - PD)/PD^{0.44})$$

where N(x) denotes the cumulative distribution function for a standard normal random variable (*i.e.,* the probability that a normal random variable with mean zero and variance of one is less than or equal to x), and where G(z) denotes the inverse cumulative distribution function for a standard normal random variable (*i.e.,* the value x such that N (x) = z). [11]

[10] The suggestion is that at least ten for performing and three for non-performing loans would be adequate.

[11] According to the BIS, the functions N and G are generally available in spreadsheet and statistical packages. For both functions the mean should be set at zero and the standard deviation should be set at one, BIS Consultative Document, New Basel Capital Accord, January 2001, 36 (fn.28).

To calculate the risk weight (RW) on the loan itself, the BRW is then multiplied by an adjustment factor for the size of the LGD (in percentage form).

$$RW = (LGD/50) \times BRW$$

Clearly, if LGD = 50% then RW = BRW. In the "foundations" approach, it is assumed that LGD is indeed 50% for loans, so that RW = BRW. In the advanced approach, the LGD is allowed to be internally calculated as is a loan's maturity (M). In this case, the risk weight (RW) formula is:

$$RW = (LGD/50) \times BRW\ (PD) \times [1 + b\ (PD) \times (M - 3)]$$

Note that b, the size of the sensitivity of the maturity adjustment factor, has yet to be defined by the BIS.

Given this risk-weight calculation framework, we now compare the BIS II buckets (Table 2) with our proposed buckets (Table 1) and with an even finer breakdown of the lower quality loans, using the foundations approach formula discussed above. Essentially, this requires us to compute a historic (mean) probability of default (PD) for each ratings bucket using our bond default data and assuming alternatively that LGD = 50% or LGD = x %, where x % is the actual historic average loss given default in each bucket. The underlying data are drawn from Table 3.

As discussed in the paper our "standardized" bucket approach differs from the BIS approach not in the number of buckets but in breakpoints. In particular, we seek to differentiate more clearly between above and below investment grade credits. This is highlighted by the fact that our second and third buckets are A+ to BBB- and BB+ to B- compared to A+ to A and BBB+ to BB- under BIS II. We will also examine the BRWs for B rated loans separated from below B's (CCC and below).

The results are shown in Tables 9a and 9b, where column 1 calculates the mean annual default rate (PD%), for each bucket, column 2 shows the mean LGD%, columns 3 and 4 calculate respectively the BRW under the foundations approach (assuming LGD = 50%) and LGD = x % (where x % is the actual historic average LGD for the bucket). Columns 5 and 6 calculate the capital requirements for each bucket assuming respectively that LGD = 50% and LGD = its historic bucket average. Finally, columns 7 and 8 show the total capital requirements (E(L) + UE(L)) calculated from the raw data assuming loss distributions are normally distributed and that the relevant unexpected loss percentiles are respectively 99.5% (to which the BIS calibrates its IRB calculations) and 95% (consistent with a RiskMetrics percentile breakpoint). Table 9b shows the same results except columns 7 and 8 are the capital requirements for the actual loss distribution, not assuming a normal distribution.

The key comparisons in Table 9a are found in columns 5 and 7. Column 5 shows the BIS proposed capital requirements calibrated to 99.5% and with a standardized LGD of 50%, as per the "foundations" approach. Column 7 shows the actual E(L) + UE(L) under the normal distribution at the 99.5% level. (Column 8 shows the capital requirements using actual loss data at the 95% confidence level.)

It is clear that the assumptions made about the LGD will be crucial for the overall level of capital requirements of banks. Looking at the final row of both the BIS and Altman–Saunders panels, it can be seen that the foundations approach with LGD = 50% produces an overall capital requirement of 13.66% versus 12.88% from the actual loss data under the normal distribution at the 99.5% level. If the actual LGDs are substituted for the LGD = 50%, however, the required capital requirement under the IRB approach

drops dramatically from 13.66% to 7.31% and is then quite close to the current 8% ratio. Note, however, that the 7.31% is much below the implied 99.5% E(L) plus UE (L) using actual data (12.88%). Overall, the LGD = 50% assumption, aligned with the foundations approach model (column 5), comes quite close to capturing the required capital implied by actual bond loss data experience under the normal distribution (column 7 of Table 9a) but under-estimates the capital requirement using the actual distribution of losses (see column 7 of Table 9b).

With respect to BIS II compared with the Altman–Saunders buckets, both appear to show similar patterns in under-or over-estimating the capital required in each bucket. Taking the benchmark LGD = 50%, the BIS benchmark risk weights are 21% (column 3) for the A+ to A- bucket 2 (versus the proposed 50%), 113% for the BBB+ to BB- bucket 3 (versus the proposed 100%), and 477% for the below BB- bucket 4 (versus the proposed 150%). These translate into capital requirements at the 99.5% level (column 5) of respectively, 1.67%, 9.07%, and 38.167%. Note that the capital required using actual E(L) and UE(L) figures (and the normal distribution) for these buckets are respectively 1.61%, 5.65%, 28.68% (column 7 table 9a) whereas for the actual distribution the capital requirements are respectively .012%, 15.0% and 65.0% (see column 7 Table 9B). That is, the capital requirements calculated from the BIS standardized buckets using the IRB foundations model tends to be slightly more conservative than those implied by the normal distribution at the same critical 99.5% cut off, but under-estimates required capital using the actual loss distribution, which is not unreasonable since we fully expect loss distributions to have “fat tails.”

Quite similar results are found using the Altman–Saunders buckets. From column 3 (lower panel), the BRW for Altman–Saunders bucket 2, A+ to BBB-, is 55% (versus the proposed 30%), for bucket 3, BB+ to B-, 295% (versus the proposed 100%) and for bucket 4, below B-, 860% (versus the proposed 150%). These translate into capital requirements for these buckets of respectively 4.4%, 23.6% and 68.8% (column 5). By comparison, the capital requirements implied by the actual E(L) and UE(L) (under the normal distribution and 99.5%)) are respectively, 2.1%, 15.4%, 59.4% (column 7 of Table 9a) and respectively .033%, 45% and 100% under the actual distribution (column 7 of Table 9b). The capital requirements under the actual distribution are much higher at the "low quality" end than either the BIS IRB model projections or those using the normal distribution.

4.0 Summary, Conclusions and Proposals

In this paper, we have revised and updated our earlier study to analyze the most recent draft of the BIS's proposed reforms of bank capital requirements. We focused on three aspects of the reform proposal: (i) the standardized model for corporate loans, (ii) the predictive ability of the standardized model, and (iii) the calculation of capital requirements under the proposed IRB model.

With respect to the standardized model, we continue to find it problematic. While the addition of an extra risk bucket is a positive development, the size of the relative risk weights will continue to induce banks to risk-shift towards more risky borrowers. Indeed, the standardized model's risk weight of 150% for the lowest rated bucket 4 (BB- and below) is far too low. This is clear both from a calibration of actual loss data, as well as from utilizing the BIS's own "foundations" model approach. Retaining the below BB-

bucket's risk weight at 150% (when the data in Table 9 suggests it should be at least twice as large) will fail to significantly mitigate the current trend of banks towards "bottom fishing" for loans, with all the associated solvency and systemic risks such incentives imply.

If the proposed BIS buckets are unchanged in the final guidelines, we strongly suggest that, in the final version of the standardized model, the BB- and below risk weight is adjusted significantly upward. Or even better, an even finer categorization of credit risks at the low quality end of the spectrum should be introduced into the standardized model. For example, having separate categories for B rated and below B rated (*i.e.,* CCC) loans with the risk weights on the latter being significantly higher than those on the former. Indeed Table 9a, (and 9b) panel B, suggests a benchmark risk weight on CCC credits alone (*i.e.,* those rated below B-) of between 436% and 860% (depending on the assumption made about the LGD). This is between nearly three and six times larger than the current 150% risk weight being proposed for the lowest quality rated bucket under BIS II. Consequently, Tables 10a and 10b Panel B of the paper presents the results for the BIS standardized buckets, except with the below BB- bucket split into two: (i) a B bucket and (ii) a below B bucket (*i.e.,* CCC and below). As can be seen, the BRW is approximately two times larger for the below B rated bucket compared to the B bucket.

Our own proposed buckets also clearly show an under-weighting for the below B- category and also for the BB and B category. Keep in the mind that the data in our study are based on actual loss results in the bond market, where the recovery rates are lower

than on comparable senior loans (see Figure 2).[12] But, we are now convinced that perhaps some adjustment of our proposed risk weights upward is also reasonable, especially for the non-investment grade buckets. We still believe, however, that while the revised BIS buckets are an improvement over the original buckets, there remains no clear justification for combining investment and non-investment grades (BBB and BB) and also for lumping B with CCC rated assets, especially since the latter have significantly higher expected and unexpected loss rates under both the normal and actual distributions (as shown in Table 10a and 10b column 7) and thus higher required capital for such losses.

[12] Numerous studies have reported that recoveries on bank loans are significantly higher than comparably rated corporate banks; for example Miller (2001), Gupton, Gates and Carty (2000) and Van de Castle and Keisman (1999).

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Table 1

An Alternative Risk Weighting Proposal for Bank Corporate Loans*

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

* From Altman & Saunders (2000, 2001)

Table 2

Proposed BIS Standardized Model for Corporate Loans, January 2001

Credit Assessment	**AAA to AA-**	**A+ to A-**	**BBB+ to BB-**	**Below BB-**	**Unrated**
Risk Weights	20%	50%	100%	150%	100%

Source: BIS, 2001

Table 3
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	Mid point	AAA to AA-	A+ to A-	BBB+ to BB-	Below BB-	Total
0	0	11041	12115	12840	5291	41287
0.01 - 0.10	0.05	0	2	37	124	163
0.11 - 0.20	0.15	0	2	31	107	140
0.21 - 0.30	0.25	0	2	22	117	141
0.31 - 0.40	0.35	0	0	9	86	95
0.41 - 0.50	0.45	0	0	8	53	61
0.51 - 0.60	0.55	0	1	3	35	39
0.61 - 0.70	0.65	0	0	1	31	32
0.71 - 0.80	0.75	0	0	0	7	7
0.81 - 0.90	0.85	0	0	0	10	10
0.91 - 0.94	0.92	0	0	0	0	0
0.95 - 0.98	0.96	0	0	0	1	1
0.99	0.99	0	0	0	0	0
1	1	0	0	0	3	3
Total Default		**0**	**7**	**111**	**574**	**692**
Total Non-Default		**11041**	**12115**	**12840**	**5291**	**41287**
Total		**11041**	**12122**	**12951**	**5865**	**41979**
Mean		**0.000%**	**0.012%**	**0.163%**	**2.772%**	**0.598%**
Median		**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
St.Dev		**0.000%**	**0.628%**	**2.195%**	**11.133%**	**5.001%**
3.43192sigma-E(L)		**0.000%**	**2.142%**	**7.369%**	**35.434%**	**16.566%**
2.32634sigma-E(L)		**0.000%**	**1.448%**	**4.943%**	**23.126%**	**11.037%**
1.64485sigma-E(L)		**0.000%**	**1.021%**	**3.447%**	**15.540%**	**7.628%**
99.97%		**0.000%** **0**	**14.988%** **3.6**	**54.837%** **3.9**	**97.228%** **1.8**	**84.402%** **9.3**
99.00%		**0.000%** **0**	**0.000%** **121.2**	**0.000%** **129.5**	**52.228%** **58.7**	**24.402%** **309.4**
95.00%		**0.000%** **0**	**0.000%** **606.1**	**0.000%** **647.6**	**22.228%** **293.3**	**0.000%** **1546.9**

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

Table 4
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	Mid point	AAA to AA-	A+ to A-	BBB+ to BB-	Below BB-	Total
0	0	11041	12115	12840	5291	41287
0.01 - 0.10	0.05	0	0	0	18	18
0.11 - 0.20	0.15	0	2	1	19	22
0.21 - 0.30	0.25	0	0	2	29	31
0.31 - 0.40	0.35	0	0	6	30	36
0.41 - 0.50	0.45	0	0	3	33	36
0.51 - 0.60	0.55	0	0	6	41	47
0.61 - 0.70	0.65	0	0	3	50	53
0.71 - 0.80	0.75	0	0	5	40	45
0.81 - 0.90	0.85	0	0	1	26	27
0.91 - 0.94	0.92	0	0	2	12	14
0.95 - 0.98	0.96	0	0	1	3	4
0.99	0.99	0	0	1	0	1
1	1	0	0	0	0	0
Total Default		**0**	**2**	**31**	**301**	**334**
Total Non-Default		**11041**	**12115**	**12840**	**5291**	**41287**
Total		**11041**	**12117**	**12871**	**5592**	**41621**
Mean		**0.000%**	**0.002%**	**0.138%**	**2.815%**	**0.422%**
Median		**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
St.Dev		**0.000%**	**0.193%**	**3.012%**	**13.100%**	**5.173%**
3.43192sigma-E(L)		**0.000%**	**0.659%**	**10.200%**	**42.143%**	**17.333%**
2.32634sigma-E(L)		**0.000%**	**0.446%**	**6.870%**	**27.660%**	**11.613%**
1.64485sigma-E(L)		**0.000%**	**0.314%**	**4.817%**	**18.732%**	**8.088%**
99.97%		**0.000%** **0**	**0.000%** **3.6**	**91.862%** **3.9**	**93.185%** **1.7**	**91.578%** **12.5**
99.00%		**0.000%** **0**	**0.000%** **121.2**	**0.000%** **128.7**	**72.185%** **55.9**	**0.000%** **416.2**
95.00%		**0.000%** **0**	**0.000%** **605.9**	**0.000%** **643.6**	**12.185%** **279.6**	**0.000%** **2081.1**

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

TABLE 5

HISTORICAL DEFAULT RATES – STRAIGHT BONDS ONLY
EXCLUDING DEFAULTED ISSUES FROM PAR VALUE OUTSTANDING
1971 – 2000 ($ MILLIONS)

YEAR	PAR VALUE OUTSTANDING (a)	PAR VALUE DEFAULTS	DEFAULT RATES
2000	$597,200	$30,248	5.065%
1999	$567,400	$23,532	4.147%
1998	$465,500	$7,464	1.603%
1997	$335,400	$4,200	1.252%
1996	$271,000	$3,336	1.231%
1995	$240,000	$4,551	1.896%
1994	$235,000	$3,418	1.454%
1993	$206,907	$2,287	1.105%
1992	$163,000	$5,545	3.402%
1991	$183,600	$18,862	10.273%
1990	$181,000	$18,354	10.140%
1989	$189,258	$8,110	4.285%
1988	$148,187	$3,944	2.662%
1987	$129,557	$7,486	5.778%
1986	$90,243	$3,156	3.497%
1985	$58,088	$992	1.708%
1984	$40,939	$344	0.840%
1983	$27,492	$301	1.095%
1982	$18,109	$577	3.186%
1981	$17,115	$27	0.158%
1980	$14,935	$224	1.500%
1979	$10,356	$20	0.193%
1978	$8,946	$119	1.330%
1977	$8,157	$381	4.671%
1976	$7,735	$30	0.388%
1975	$7,471	$204	2.731%
1974	$10,894	$123	1.129%
1973	$7,824	$49	0.626%
1972	$6,928	$192	2.786%
1971	$6,602	$82	1.242%

			Standard Deviation
ARITHMETIC AVERAGE DEFAULT RATE	1971 TO 2000	2.713%	2.484%
	1978 TO 2000	2.948%	2.683%
	1985 TO 2000	3.719%	2.829%
WEIGHTED AVERAGE DEFAULT RATE (b)	1971 TO 2000	3.482%	2.558%
	1978 TO 2000	3.503%	2.563%
	1985 TO 2000	3.582%	2.565%
MEDIAN ANNUAL DEFAULT RATE	1971 TO 2000	1.656%	

Notes

(a) As of mid-year

(b) Weighted by par value of amount outstanding for each year.

Source: Authors' Compilation and Salomon Smith Barney Estimates

This table is part of a Special NYU Salomon Center Report on "Defaults and Returns in the High Yield Bond Market: Analysis Through 2000 and Default Outlook," January 2001, by E. Altman & B. Karlin.

Table 6
FREQUENCY DISTRIBUTION OF LOSSES
(PRINCIPAL AND COUPON), (1981 - 2000)
BY RATING ONE YEAR BEFORE DEFAULT
(NORMAL AND ACTUAL LOSS DISTRIBUTIONS)

Range		AAA to AA-	A+ to A-	BBB+ to BB-	Below BB-	Total
0	0	11887	13330	14861	6304	46382
0.01 - 0.10	0.05	0	2	37	124	163
0.11 - 0.20	0.15	0	2	31	109	142
0.21 - 0.30	0.25	0	2	22	119	143
0.31 - 0.40	0.35	0	0	9	90	99
0.41 - 0.50	0.45	0	0	9	53	62
0.51 - 0.60	0.55	0	1	5	37	43
0.61 - 0.70	0.65	0	0	3	35	38
0.71 - 0.80	0.75	0	0	16	13	29
0.81 - 0.90	0.85	0	0	1	11	12
0.91 - 0.94	0.92	0	0	1	8	9
0.95 - 0.98	0.96	0	0	0	6	6
0.99	0.99	0	0	0	0	0
1	1	0	0	0	3	3
Total Default		**0**	**7**	**134**	**608**	**749**
Total Non-Deftiult		**11887**	**13330**	**14861**	**6304**	**46382**
Total		**11887**	**13337**	**14995**	**6912**	**47131**
Mean		**0.000%**	**0.011%**	**0.251%**	**2.691%**	**0.478%**
Median		**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
St.Dev		**0.000%**	**0.598%**	**3.498%**	**10.992%**	**4.788%**
3.43192sigma-E(L)		**0.000%**	**2.042%**	**11.753%**	**35.032%**	**15.955%**
2.32634sigma-E(L)		**0.000%**	**1.381%**	**7.886%**	**22.880%**	**10.662%**
1.64485sigma-E(L)		**0.000%**	**0.973%**	**5.502%**	**15.389%**	**7.398%**
99.97%		**0.000%** **0.0**	**14.989%** **4.0**	**74.749%** **4.5**	**97.309%** **2.1**	**91.522%** **14.1**
99.00%		**0.000%** **0.0**	**0.000%** **133.4**	**0.000%** **150.0**	**62.309%** **69.1**	**14.522%** **471.3**
95.00%		**0.000%** **0.0**	**0.000%** **666.9**	**0.000%** **749.8**	**22.309%** **345.6**	**0.000%** **2356.6**

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

Table 7
FREQUENCY DISTRIBUTION OF LOSSES
(1981-2000) by ISSUERS
BY RATING ONE YEAR BEFORE DEFAULT
(NORMAL AND ACTUAL LOSS DISTRIBUTIONS)
(as per PROPOSED BUCKETS in ALTMAN-SAUNDERS (2001))

Range of Default Losses	Mid point	AAA to AA-	A+ to BBB-	BB+ to B-	Below B-	Total
0	0	11887	21998	12129	368	46382
0.01 - 0.10	0.05	0	0	14	4	18
0.11 - 0.20	0.15	0	3	12	9	24
0.21 - 0.30	0.25	0	1	20	12	33
0.31 - 0.40	0.35	0	1	27	11	39
0.41 - 0.50	0.45	0	1	26	11	38
0.51 - 0.60	0.55	0	3	36	9	48
0.61 - 0.70	0.65	0	1	38	18	57
0.71 - 0.80	0.75	0	5	31	14	50
0.81 - 0.90	0.85	0	1	21	7	29
0.91 - 0.94	0.92	0	0	18	1	19
0.95 - 0.98	0.96	0	0	2	4	6
0.99	0.99	0	1	0	0	1
1	1	0	0	0	0	0
Total Default		**0**	**17**	**245**	**100**	**362**
Total Non-Default		**11887**	**21998**	**12129**	**368**	**46382**
Total		**11887**	**22015**	**12374**	**468**	**46744**
Mean		**0.000%**	**0.043%**	**1.073%**	**10.942%**	**0.414%**
Median		**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
St.Dev		**0.000%**	**1.691%**	**8.305%**	**23.923%**	**5.183%**
3.43192sigma-E(L)		**0.000%**	**5.761%**	**27.429%**	**71.159%**	**17.374%**
2.32634sigma-E(L)		**0.000%**	**3.892%**	**18.247%**	**44.711%**	**11.644%**
1.64485sigma-E(L)		**0.000%**	**2.739%**	**12.588%**	**28.407%**	**8.112%**
99.97%		**0.000%** **0**	**74.957%** **6.6**	**90.927%** **3.7**	**85.058%** **0.1**	**91.586%** **14.0**
99.00%		**0.000%** **0**	**0.000%** **220.2**	**53.927%** **123.7**	**81.058%** **4.7**	**0.000%** **467.4**
95.00%		**0.000%** **0**	**0.000%** **1100.8**	**0.000%** **618.7**	**64.058%** **23.4**	**0.000%** **2337.2**

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

Table 8
FREQUENCY DISTRIBUTION OF LOSSES
YEAR 2000 ONLY
BY RATING ONE YEAR BEFORE DEFAULT
(NORMAL AND ACTUAL LOSS DISTRIBUTIONS)

Range of Default Losses	Mid point	AAA to AA-	A+ to A-	BBB+ to BB-	Below BB-	Unrated	Total
0	0	846	1215	2022	1012	482	5095
0.01 - 0.10	0.05	0	0	0	0	0	0
0.11 - 0.20	0.15	0	0	0	2	0	2
0.21 - 0.30	0.25	0	0	0	2	0	2
0.31 - 0.40	0.35	0	0	0	4	2	4
0.41 - 0.50	0.45	0	0	1	0	0	1
0.51 - 0.60	0.55	0	0	2	2	5	4
0.61 - 0.70	0.65	0	0	2	4	3	6
0.71 - 0.80	0.75	0	0	16	6	4	22
0.81 - 0.90	0.85	0	0	1	1	7	2
0.91 - 0.94	0.92	0	0	1	8	2	9
0.95 - 0.98	0.96	0	0	0	5	3	5
0.99	0.99	0	0	0	0	2	0
1	1	0	0	0	0	0	0
Total Default		**0**	**0**	**23**	**34**	**28**	**57**
Total Non-Default		**846**	**1215**	**2022**	**1012**	**482**	**5095**
Total		**846**	**1215**	**2045**	**1046**	**510**	**5152**
Mean		**0.000%**	**0.000%**	**0.813%**	**2.238%**	**4.127%**	**0.777%**
Median		**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
St.Dev		**0.000%**	**0.000%**	**7.690%**	**13.091%**	**17.664%**	**7.675%**
3.43192sigma-E(L)		**0.000%**	**0.000%**	**25.578%**	**42.688%**	**56.494%**	**25.563%**
2.32634sigma-E(L)		**0.000%**	**0.000%**	**17.076%**	**28.215%**	**36.965%**	**17.078%**
1.64485sigma-E(L)		**0.000%**	**0.000%**	**11.836%**	**19.294%**	**24.927%**	**11.847%**
99.97%		**0.000%**	**0**	**0.000%**	**0**	**91.187%**	**0.6**	**93.762%**	**0.3**	**94.873%**	**0.2**	**95.223%**	**1.5**
99.00%		**0.000%**	**0**	**0.000%**	**0**	**54.187%**	**20.5**	**89.762%**	**10.5**	**87.873%**	**5.1**	**34.223%**	**51.5**
95.00%		**0.000%**	**0**	**0.000%**	**0**	**0.000%**	**102.3**	**0.000%**	**52.3**	**50.873%**	**25.5**	**0.000%**	**257.6**

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

Table 9a

CAPITAL REQUIREMENTS USING THE IRB MODEL
(as per PROPOSED BIS BUCKETS and)
(as per PROPOSED BUCKETS in ALTMAN-SAUNDERS (2001))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
							Actual Data - Normal Distribution	
BIS Bucket	PD (%)	Actual LGD(%)	based on LGD = 50% BRWc	based on Actual LGD BRWc	BIS Capital (99.5%),LGD=50%	BIS Capital (99.5%),Actual LGD	E(L)+UE(L) 99.5%	E(L)+UE(L) 95.0%
AAA to AA-	0.000%	0.000%	0.000	0.000	0.000%	0.000%	0.000%	0.000%
A+ to A-	0.058%	20.714%	20.887	8.653	1.671%	0.692%	1.617%	1.033%
BBB+ to BB-	0.857%	18.964%	113.415	43.016	9.073%	3.441%	5.653%	3.610%
Below BB-	9.787%	28.321%	477.090	270.229	38.167%	21.618%	28.676%	18.311%
Total	1.648%	26.743%	170.830	91.369	13.666%	7.310%	12.883%	8.227%
Altman-Saunders Bucket								
AAA to AA-	0.000%	0.000%	0.000	0.000	0.000%	0.000%	0.000%	0.000%
A+ to BBB-	0.274%	12.037%	55.037	13.250	4.403%	1.060%	2.071%	1.322%
BB+ to B-	4.085%	24.863%	295.033	146.710	23.603%	11.737%	15.404%	9.836%
Below B-	40.365%	34.879%	859.637	435.992	68.771%	34.879%	59.415%	37.940%
Total	1.648%	26.743%	170.830	91.369	13.666%	7.310%	12.883%	8.227%

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

Table 9b

CAPITAL REQUIREMENTS USING THE IRB MODEL
(as per PROPOSED BIS BUCKETS and)
(as per PROPOSED BUCKETS in ALTMAN-SAUNDERS (2001))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BIS Bucket	**PD (%)**	**Actual LGD(%)**	**based on LGD = 50% BRWc**	**based on Actual LGD BRWc**	**BIS Capital (99.5%),LGD=50%**	**BIS Capital (99.5%),Actual LGD**	**Actual Data, Actual E(L)+UE(L) 99.50%**	**Loss Distrbn E(L)+UE(L) 95.0%**
AAA to AA-	**0.000%**	**0.000%**	**0.000**	**0.000**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
A+ to A-	**0.058%**	**20.714%**	**20.887**	**8.653**	**1.671%**	**0.692%**	**0.012%**	**0.012%**
BBB+ to BB-	**0.857%**	**18.964%**	**113.415**	**43.016**	**9.073%**	**3.441%**	**15.000%**	**0.163%**
Below BB-	**9.787%**	**28.321%**	**477.090**	**270.229**	**38.167%**	**21.618%**	**65.000%**	**25.000%**
Total	**1.648%**	**26.743%**	**170.830**	**91.369**	**13.666%**	**7.310%**	**35.000%**	**0.598%**
Altman-Saunders Bucket								
AAA to AA-	**0.000%**	**0.000%**	**0.000**	**0.000**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
A+ to BBB-	**0.274%**	**12.037%**	**55.037**	**13.250**	**4.403%**	**1.060%**	**0.033%**	**0.033%**
BB+ to B-	**4.085%**	**24.863%**	**295.033**	**146.710**	**23.603%**	**11.737%**	**45.000%**	**1.016%**
Below B-	**40.365%**	**34.879%**	**859.637**	**435.992**	**68.771%**	**34.879%**	**100.000%**	**65.000%**
Total	**1.648%**	**26.743%**	**170.830**	**91.369**	**13.666%**	**7.310%**	**35.000%**	**0.598%**

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

Table 10a

CAPITAL REQUIREMENTS USING THE BIS IRB MODEL
(as per REVISED BIS BUCKETS and PROPOSED BIS BUCKETS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BIS Bucket	**PD (%)**	**Actual LGD(%)**	**based on LGD = 50% BRWc**	**based on Actual LGD BRWc**	**BIS Capital (99.5%),LGD=50%**	**BIS Capital (99.5%),Actual LGD**	**Actual Data - Norm Distribution E(L)+UE(L) 99.5%**	**E(L)+UE(L) 95.0%**
AAA to AA-	**0.000%**	**0.000%**	**0.000**	**0.000**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
A+ to A-	**0.058%**	**20.714%**	**20.887**	**8.653**	**1.671%**	**0.692%**	**1.617%**	**1.033%**
BBB+ to BB-	**0.857%**	**18.964%**	**113.415**	**43.016**	**9.073%**	**3.441%**	**5.653%**	**3.610%**
Below BB-	**9.787%**	**28.321%**	**477.090**	**270.229**	**38.167%**	**21.618%**	**28.676%**	**18.311%**
Total	**1.648%**	**26.743%**	**170.830**	**91.369**	**13.666%**	**7.310%**	**12.883%**	**8.227%**
Suggested New BIS Buckets								
AAA to AA-	**0.000%**	**0.000%**	**0.000**	**0.000**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
A+ to A-	**0.058%**	**20.714%**	**20.887**	**8.653**	**1.671%**	**0.692%**	**1.617%**	**1.033%**
BBB+ to BB-	**0.857%**	**18.964%**	**113.415**	**43.016**	**9.073%**	**3.441%**	**5.653%**	**3.610%**
B	**6.981%**	**24.840%**	**399.004**	**198.225**	**31.920%**	**15.858%**	**20.038%**	**12.795%**
Below B	**40.365%**	**34.879%**	**859.637**	**435.992**	**68.771%**	**34.879%**	**59.415%**	**37.940%**
Total	**1.648%**	**26.743%**	**170.830**	**91.369**	**13.666%**	**7.310%**	**12.883%**	**8.227%**

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

Table 10b

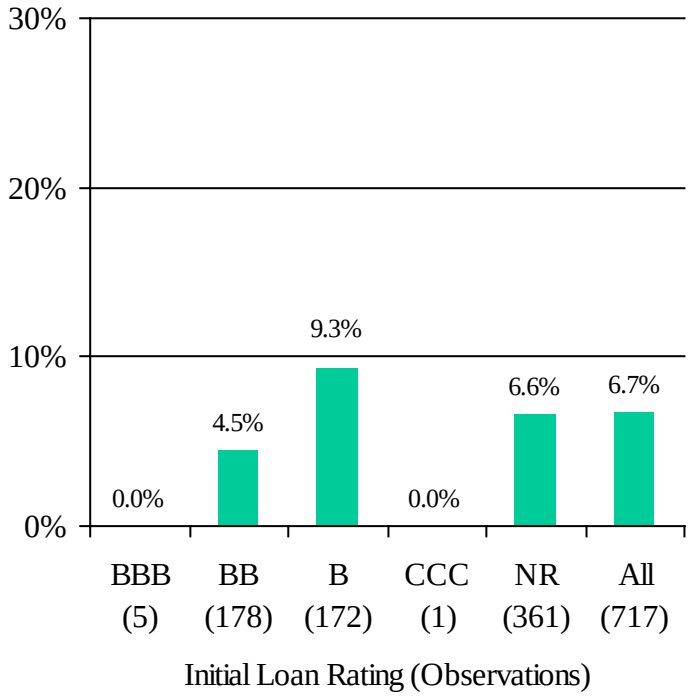
CAPITAL REQUIREMENTS USING THE BIS IRB MODEL
(as per REVISED BIS BUCKETS and PROPOSED BIS BUCKETS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BIS Bucket	**PD (%)**	**Actual LGD(%)**	**based on LGD = 50% BRWc**	**based on Actual LGD BRWc**	**BIS Capital (99.5%),LGD=50%**	**BIS Capital (99.5%),Actual LGD**	**Actual Data, Actual E(L)+UE(L) 99.50%**	**Loss Distrbn E(L)+UE(L) 95.0%**
AAA to AA-	**0.000%**	**0.000%**	**0.000**	**0.000**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
A+ to A-	**0.058%**	**20.714%**	**20.887**	**8.653**	**1.671%**	**0.692%**	**0.012%**	**0.012%**
BBB+ to BB-	**0.857%**	**18.964%**	**113.415**	**43.016**	**9.073%**	**3.441%**	**15.000%**	**0.163%**
Below BB-	**9.787%**	**28.321%**	**477.090**	**270.229**	**38.167%**	**21.618%**	**65.000%**	**25.000%**
Total	**1.648%**	**26.743%**	**170.830**	**91.369**	**13.666%**	**7.310%**	**35.000%**	**0.598%**
Suggested New BIS Buckets								
AAA to AA-	**0.000%**	**0.000%**	**0.000**	**0.000**	**0.000%**	**0.000%**	**0.000%**	**0.000%**
A+ to A-	**0.058%**	**20.714%**	**20.887**	**8.653**	**1.671%**	**0.692%**	**0.012%**	**0.012%**
BBB+ to BB-	**0.857%**	**18.964%**	**113.415**	**43.016**	**9.073%**	**3.441%**	**15.000%**	**0.163%**
B	**6.981%**	**24.840%**	**399.004**	**198.225**	**31.920%**	**15.858%**	**55.000%**	**15.000%**
Below B	**40.365%**	**34.879%**	**859.637**	**435.992**	**68.771%**	**34.879%**	**100.000%**	**65.000%**
Total	**1.648%**	**26.743%**	**170.830**	**91.369**	**13.666%**	**7.310%**	**35.000%**	**0.598%**

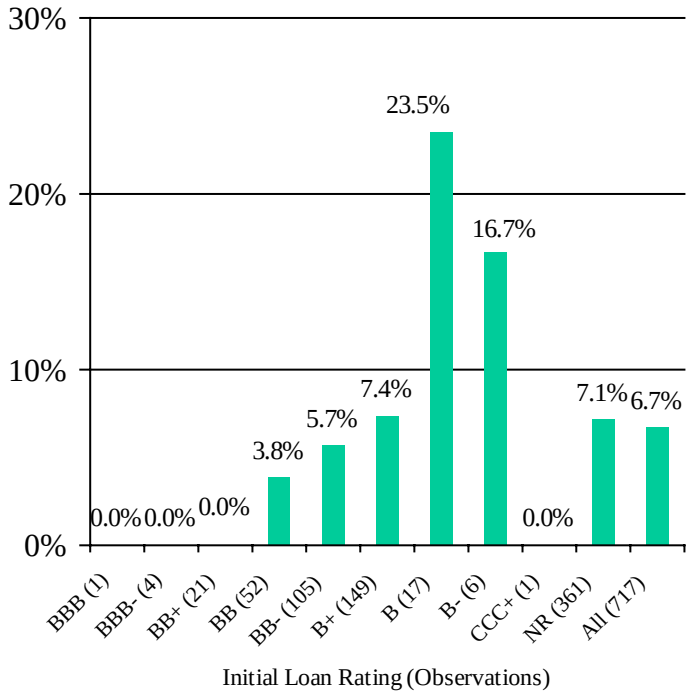
Sources: Standard & Poor's, NYU Salomon Center Default Data Base

Figure 1
Cumulative Institutional Loan Defaults Rate by Initial S& P Loan Rating
Comprises Institutional Loans closed between 1995-2/15/01 for Issuers that File Publicly

by Broad Rating

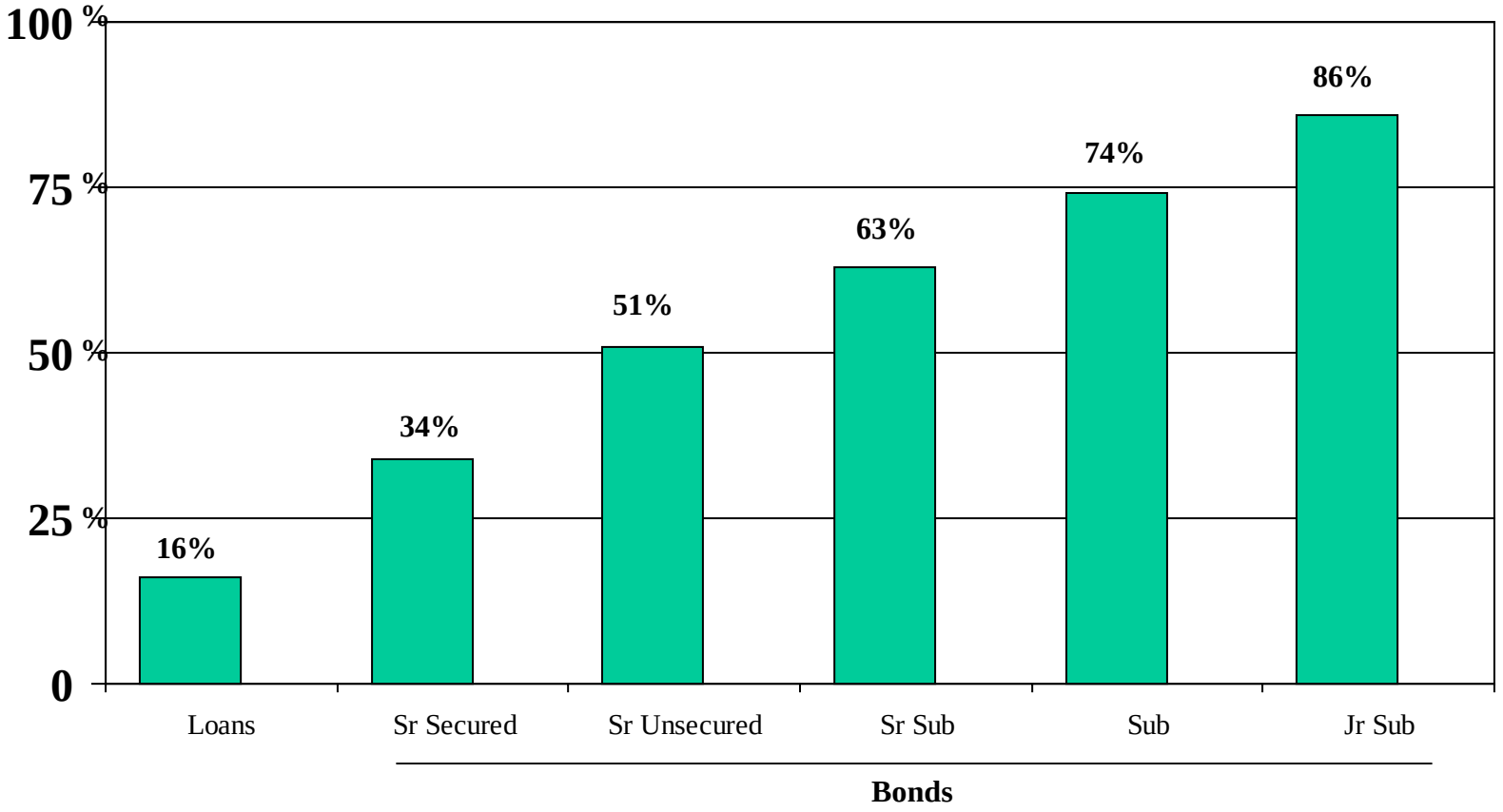


by Narrow Rating



Source: S&P/Portfolio Management Data; "Q3 00 Institutional Loan Default Review," February 15, 2001.

Figure 2
Average Loss Given Default
By Asset Class



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