January 10, 2002

Mr. Alfred Pollard, General Council
Office of Federal Housing Enterprise Oversight
1700 G. Street, N.W., Fourth Floor
Washington, D.C. 20552

Re: OFHEO Risk Based Capital Rules

Dear Mr. Pollard:

At the request of the PMI Group, I have reviewed the proposed amendments to OFHEO's final Risk Based Capital Rules as published in the Federal Register on December 18, 2001.[1] These amendments suggest a number of changes to the original "final rules" as published in the Federal Register on September 13, 2001. A number of these amendments improve upon the original document and OFHEO should be congratulated, specifically in the determination of the size and phase-in period of the "haircuts" applied to both AAA and AA rated counterparties' enterprises. While these amendments improve upon the proposed haircuts, it is my professional opinion that further improvements and modifications should be made to bring into line more realistic levels and distinctions between AAA and AA rated non-derivative counterparties.

My comments will be concerned with the proposed amendments dealing with:

(a) The relevant sample period to consider in setting risk based capital rules and in prescribing the differences between AAA and AA rated counterparties with respect to default probabilities.

[1] **Federal Register**, vol. 66, No. 243, Tuesday, December 16, 2001, 65146-65162.

(b) The assignment of loss severities to the aforementioned default probabilities. Specifically, we will show that while it is prudent to assume that loss severities will be greater in difficult economic periods, it is also prudent to assign a distinction between recoveries on investment grade vs. non-investment grade counterparties.

(c) The comparison between OFHEO's proposed amended capital risk charges and other similar efforts by sophisticated regulators. Specifically, we will show that the Basel Committee on Bank Supervision's (BIS related committee) proposed charges on risk based capital allocations on credit assets are also based on rating equivalents. We will see that the Basel Committee assigns absolutely no distinction between AAA and AA rated securities/loans with respect to expected and unexpected losses.

My Background

I have devoted virtually my entire academic and professional career to study the related fields of bankruptcy prediction models, the analysis of fixed income risk and return attributes, specifically the assignment of realistic and conceptually sound measures of default risk, and to the measurement and management of credit risk. Over more than three decades, I have published more than 100 scholarly articles and over 20 books on these related fields and have been fortunate enough to have received recognition from the academic and practitioner communities. My most recent award was to be inducted into the Fixed Income Analysts Society "Hall of Fame" in 2001, and a collection of my writings on "Bankruptcy, Credit Risk and Junk Bonds" has just been published (Blackwell Publishers, 2002).

I am taking the liberty in attaching a bio-sketch and c.v. of my career. More details on this sketch can be derived from my writings on my website, http://www.stern.nyu.edu/~ealtman.

Relevant Sample Period and Default Rates

OFHEO's amended risk based capital rules draw upon the historical performance of corporate bond defaults from the depression period in the United States, specifically on Moody's Investors Services (Moody's) default rate calculations from their worst annual cohorts formed at the beginning of the years 1929, 1930 and 1931. The ratio of AA vs. AAA rated ten-year cumulative average defaults was 2.6 times, with the AAA average rate being 4.72%.[2] Surprisingly, the *worst* year was 2.2 times (below the average).[3] And, W. Braddock Hickman reported that based on his 1928 cohort (an equally relevant benchmark year), he found that the AA vs. AAA default rate was 1.5 times greater.

Based on the above reference dates, OFHEO concluded that the appropriate default rates for AAA and AA rated counterparties would be 5% and 12.5% respectively, or a ratio of 2.5 to 1. This is slightly reduced from the 3:1 ratio in their earlier proposal (5% and 15%).

While I believe it is not exactly appropriate to equate default loss probabilities of corporate bond issuers to mortgage insurers, I am responding to the corporate bond default results consistent with OFHEO's approach.

Analysis of Default Rates

While it is debatable whether prudent regulation should differentiate at all between AAA vs. AA rated based capital charges (see discussion below on the proposed

[2] Ibid, p. 65147.

[3] I could not replicate Moody's numbers since the only published versions of their depression years data report had detailed results only for the period 1970-1999. See **Moody's**, "Historical Default Rates of Corporate Bond Issuers, 1920-1999," Global Credit Research, January 2000.

BIS rules), one can accept that the historical record does show that AA rated, non-derivative securities do default with greater frequency and slightly earlier over a 10-year cumulative period than do AAA rated securities. But, whether the appropriate benchmark period is the greatest depression that this country has experienced, under a vastly different economic and regulatory environment from the current period and a far less developed capital market regime, is not at all clear. Indeed, it is my professional opinion that the appropriate way to "stress" average default experience is not to observe the worst ever period when rating standards may have been different from more recent periods and certainly the ability of our economic and financial regulators to mitigate economic stress was far less sophisticated and demonstrably less effective. In addition, the recent use of proven restructuring strategies as firms and their outstanding indebtedness migrate toward default has reduced the probability of default and softened losses if default does occur. And, our current service oriented economy is certainly more stable than the manufacturing dominated economy of seventy years ago. The more appropriate stress methodology is to observe the most recent, but still relatively long period of capital market performance, covering both benign and severe financial intervals, and then to stress the average results to some appropriate confidence level (say the 99% level, or even more). In this way, we gain the benefit of observing the entire distribution of results, as well as the average, over a relevant period in our capital market's history.

Essentially, all who report on default rates in the U.S. capital markets have currently selected the three-decade, or less, most recent period on which to concentrate their results on. I have been studying and reporting on default rates in the corporate bond

market since 1985[4] and in 1989 published the first cumulative annual default rates covering a ten-year period after the bonds' issuance. This "mortality rate" methodology and results have been updated every year and currently cover the thirty-year period 1971-2000.[5] Moody's first published their own 10-year cumulative average default rates in 1990 and, I believe, in two of their annual updates (1998-1999), published results covering defaults as far back as 1920.[6] Their most recent version has again covered only the period since 1970. It is reasonable to conclude that as the data becomes more remote, the degree of confidence in the accuracy and comprehensiveness of the data becomes more questionable. Since Moody's, S&P, and FITCH are all concerned in providing appropriate criteria for rating individual corporate debt securities, as well as structured financial products such as collateralized debt obligations (CDOs), their choice of the most recent three-decades (or less in the case of S&P's 1981-2000 sample period) is revealing. Still, I would agree that this 30-year period's <u>average</u> performance, although it does cover several extremely stressful years 1989-1991 and 2000, should be stressed further to have confidence that counterparties have sufficient capital to withstand their own stressful periods.

So, lets examine the evidence from Moody's, S&P, and from my own studies. The Moody's average cumulative default rates, by letter rating from 1970-2000, is shown

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[4] E. Altman and S. Nammacher, "The Default Rate Experience on High Yield Debt," **Financial Analysts Journal**, July/August 1985. For this article, we were fortunate to receive the prestigious Graham & Dodd Scroll.

[5] E. Altman and B. Karlin, "Default & Returns in the High Yield Bond Market: Results Through 2000 and Default Outlook," **NYU Salomon Center Working Paper**, January 2001. The original mortality rate paper was "Measuring Corporate Bond Mortality and Performance," **Journal of Finance**, vol. XLIV, #4, September 1989, 909-922. These rates are now being used by a large number of practitioners and by the Department of Transportation in their assessment of the appropriate government subsidies and loans in the Airline Bailout Plan under the "Air Transport Safety & System Stabilization Act" of 2001.

[6] See Footnote #3, above.

in Table 1, for Investment Grade securities, 1-10 years after the rating cohort is formed. This is called their "dynamic cohort" approach for corporate senior unsecured bond equivalents for 1, 2, - - - 10 years after the cohort is formed. The results are therefore based on 30 cohorts, although the 10-year results are only based on 20 cohorts, 1970-1990.

In the same Table 1, I also list the comparable results from Standard & Poor's for the 1981-2000 period and my own mortality rate results for the 1971-2000 period. S&Ps approach is called the "static pool" method and is essentially identical to Moody's, only based on S&P rated issuers, as opposed to Moody's rated issuers, and for the shorter 1981-2000 two-decade period. My own results are based on rating categories at the time of issuance, not as of January 1st of each year - - the latter is the Moody's and S&P approach. As such, my mortality approach captures the aging effect of corporate bond defaults more precisely than do the rating agencies.

Note that for all three approaches, there were no defaults for AAA or AA bonds for several years after the cohort was formed. In the case of Moody's, the first AAA default in any annual cohort, was in the fourth year and in the case of S&P, in the third year. For Aa (double A), defaults start in year 1 for Moody's and in year 4 for S&P.

Moody's ten-year average cumulative default rate for Aaa and Aa rated cohorts was 0.67% and 0.83% respectively. The corresponding percentages for S&P were 0.51% and 0.60%. The double A rate with notching modifiers (e.g., Aa1, Aa2, Aa3 or AA+, AA, and AA-) ranged from 0.35% to 1.01% for Moody's and from 0.47% to 1.16% for S&P – not shown in Table 1).

Altman's mortality rate results show that the 10-year cumulative mortality rates for S&P rated securities from 1971-2000 were 0.03% for AAA and 0.59% for AA. The *mortality loss data*, adjusting for recoveries and lost interest, were 0.00% and 0.16%, respectively (not shown in Table 1).

Since OFHEO's risk based capital haircuts are for all counterparties regardless of when their own debt was issued, the appropriate benchmark is the Moody's/S&P data, not my own.

Stressing the Default Rates

The results shown in Table 1 and discussed above are average results and cover the last 30 years. For the reasons mentioned above, this most recent period should be considered to be more relevant than the depression period for benchmarking capital rate "haircuts." The apparent rationale of the OFHEO proposed rates for using stressed reference dates as the worst ever results going back to 1928-1931 is that this period could occur again. But, that economic and financial market scenario is very removed from the current situation and there is a better way to achieve the same desired result.

An alternative method for stressing average results is to increase default rates by a multiple of the standard deviation of observed 10-year rates. Granted that the distribution of individual year cohorts is not normal and that each cohort's results are not independent of the others, we still believe it is instructive to calculate the variability of average rates, stress the averages with highly extreme standard deviation multiples and observe the resulting default rates and confidence levels. The fact that the annual cohorts are not independent, i.e., that the same default could impact a number of different cohorts, if anything biases the average cumulative default rate upward.

Table 1

Average 1-10 Year Cumulative Default Rates For Investment Grade Securities From Various Sources

1. Moody's Dynamic Cohort (1970-2000)[1]

	1	2	3	4	5	6	7	8	9	10	Std. Deviation[2] of 10-Year Rates
Aaa	0.00%	0.00%	0.00%	0.04%	0.12%	0.21%	0.31%	0.42%	0.54%	**0.67%**	**1.07%**
Aa	0.02%	0.04%	0.08%	0.20%	0.31%	0.43%	0.55%	0.67%	0.76%	**0.83%**	**0.77%**
A	0.01%	0.05%	0.18%	0.31%	0.45%	0.61%	0.78%	0.96%	1.18%	**1.43%**	**-----**
Baa	0.14%	0.44%	0.83%	1.34%	1.82%	2.33%	2.86%	3.39%	3.97%	**4.56%**	**-----**

2. S&P Static Pool (1981-2000)[3]

AAA	0.00%	0.00%	0.03%	0.06%	0.10%	0.18%	0.26%	0.40%	0.45%	**0.51%**	-----
AA	0.00%	0.00%	0.00%	0.03%	0.09%	0.16%	0.30%	0.42%	0.57%	**0.60%**	-----
A	0.05%	0.11%	0.17%	0.22%	0.37%	0.51%	0.62%	0.79%	0.99%	**1.17%**	-----
BBB	0.22%	0.52%	0.74%	1.12%	1.50%	1.76%	2.00%	2.27%	2.56%	**2.89%**	-----

3. Altman's Cumulative Mortality Rates (1971-2000)[4]

AAA	0.00%	0.00%	0.00%	0.00%	0.03%	0.03%	0.03%	0.03%	0.03%	**0.03%**	-----
AA	0.00%	0.00%	0.35%	0.54%	0.54%	0.54%	0.54%	0.54%	0.57%	**0.59%**	-----
A	0.00%	0.00%	0.02%	0.09%	0.12%	0.20%	0.25%	0.34%	0.40%	**0.40%**	-----
BBB	0.12%	0.60%	1.14%	1.73%	2.28%	2.85%	3.55%	3.70%	3.75%	**3.98%**	-----

Sources and Footnote to Table 1

[1] **Moody's**, Default and Recovery Rates of Corporate Bond Issuers: 2000, Global Credit Research, February 2001, Exhibit 41.

[2] Standard Deviation of the individual year cohorts' 10-year cumulative default rates, Calculations done by the author from [1] above, Exhibit 43.

[3] **Standard & Poor's**, "Rating Performance 2000; Default, Transition, Recovery, and Spreads," Research from S&P's Risk Solutions, January 2001.

[4] E. Altman and B. Karlin, "Defaults and Returns on High Yield Bonds: Analysis Through 2000 and Default Outlook," New York University Salomon Center Working Paper, January 2001.

From Table 1, we observe that the standard deviation of the 10-year average cumulative default rates are about 1% for both Aaa and Aa bonds (actually 1.07% and 0.77% respectively). If we multiply the average default rates (0.67% and 0.83%) by six standard deviations, i.e., to get the 99.97% confidence interval and be confident that the counterparty has sufficient capital to justify its AA-rating,[7] then the resulting capital rates would be 7.11% for AAA and 5.45% for AA's. Using the six-standard deviation criteria, according to the Bank of America study, we can be confident that there is no more than 3 chances in 10,000 that Aaa and Aa counterparties with 5-7% capital "reserves" will not be sufficient to cover their obligations. The seemingly perverse, but still very similar, results for Aaa vs. Aa stressed capital percentages indicate that the two rating classes are very similar in their risk characteristics and any difference in their default rates are caused by non-systematic factors, or a single default where the amounts outstanding are relatively great. In the case of AA defaults, Texaco's unique litigation related bankruptcy in 1987 had over $3 billion of AA rated bonds. My mortality rates are weighted by the amount outstanding, unlike Moody's and S&P issuer weights.

In my opinion, the 5.5 - 7.0% capital results (derived from the six standard deviation criterion) are more stringent than necessary for both AAA and AA rated securities and the choice by OFHEO of a 5% Stress Test Default Rate for AAA rated, non-derivative counterparties is prudent. Four standard errors will get you to the 99% confidence level, and this criteria results in a capital rate of 4.9% for Aaa (4 x standard deviation of 1.07 plus the average 10-year rate of 0.67%). But, the ratio of 2.5 to 1.0 for Aa vs. Aaa is far too high. If Aa rated securities are to be treated as statistically more

[7] See E. Zaik, J. Walter and J.G. Kelling, "RAROC at Bank of America: From Theory to Practice," **Journal of Applied Corporate Finance**, Summer 1996, pp. 83-93.

risky than their Aaa counterparts, then something like a 6.25% default rate probability under stressed conditions is more appropriate - - a Aa/Aaa ratio of 1.25 to 1.0 [Moody's actual 10-year cumulative averages Aa vs. Aaa ratio is just 1.24 to 1.00]. At the outside, a ratio of 1.5 to 1.0 may be appropriate to be more conservative.

As we will also show in the next section, appropriate recovery levels for investment grade securities, when factored into our analysis, results in prudent maximum capital haircuts of: Aaa = 3.0%

Aa = 3.75 - 4.50%

Analysis of Recovery and Loss Severity Rates

OFHEO's amended proposal wisely has incorporated recovery rates on defaulted securities into the analysis. After observing that the historic average recovery rate on defaulted bonds of all seniorities and all credit rating grades has been 40%, but that recovery rates in economically distressed period can be expected to be below average, OFHEO proposes to specify a recovery rate of 30 percent (70 percent loss severity rate) for all non-derivative counterparties and securities with investment grade ratings. Therefore, their proposed capital rate haircuts are Aaa = 3.5% and Aa = 8.75%, a ratio of 2.5 to 1:0 and at a slightly lower absolute level than their earlier proposal.

I support the intuitive notion that recovery rates can be expected to be lower in stressful default periods. Indeed, in our recently completed comprehensive study on the correlation between default and recovery rates on corporate bonds, we show convincingly that the two are highly significantly negatively correlated.[8] We find that overall recovery rates in high default years, e.g., 1990, 1991, 2000 and 2001, average out to between 20-

[8] We just submitted our report to the International Swaps & Dealers Association, see E. Altman, A. Resti and A. Sironi, "Analyzing and Explaining Default Recovery Rates," **ISDA**, January 2002. Copies are available from the author, his website http://www.stern.nyu.edu/~ealtman, or ISDA's website.

30%. By applying our multi-variate econometric analysis, we expected 2001's default rate of approximately 8.5-10% of the high yield market to result in a recovery rate of about 23 cents on the dollar. For the first three quarters of 2001, the actual rate was about 28%.[9]

So, a lower than average default recovery rate is appropriate and prudent to be used in OFHEO's rates. But, what was not considered in their December 13, 2001 amendment, is that the expected average recovery rate and its downside possibilities are considerably higher for investment grade securities compared to the "all securities average." The following study's results shows this clearly.

Table 2 lists the average and median recovery rate results for corporate bond defaults based on the original rating of the issue. The study covers the period 1971-2000 for over 1000 corporate bond defaults. The recovery rate is based on the prices of defaulted bonds just after the default date. The price just after

Table 2

Average and Median Recovery Rates
On Defaulted Bonds by Original Rating (1971-2001)

Original Rating	Number of Observations	Average Recovery	Median Recovery	Weighted Avg. Recovery
AAA	7	68.34%	71.88%	76.99%
AA	26	57.66%	54.25%	75.28%
A	69	66.70%	62.00%	71.46%
BBB	128	47.36%	46.02%	48.92%
BB	122	35.76%	37.25%	33.20%
B	697	30.71%	33.00%	26.07%

Source: Updated from E. Altman and B. Karlin, "Defaults and Returns in the High Yield Bond Market: Analysis Through 2000 and Default Outlook," NYU Salomon Center Working Paper, January 2001.

[9] See E. Altman and P. Arman, "Default Rates and Returns in the High Yield Bond Market: 1970-2001," NYU Salomon Center Working Paper, January 2002, for the full 2001 results.

default is not the same as the ultimate recovery at the time of emergence from Chapter 11, liquidation, or an out-of-court restructuring. Another study by Altman and Eberhart (1994) showed that senior secured and senior unsecured bonds recover considerably more upon emergence than at the time of default.[10] Since virtually all Triple-A and Double-A securities are senior obligations, the price at default is already a lower-bound estimate compared to the ultimate recovery.

The results in Table 2 show clearly that the average/median recovery rates on AAA and AA defaulting issues are in the 60-70% range, and even higher based on the weighted average recovery, while the non-investment grade issues average is in the 30-35% range. These results are consistent with a number of studies, including this author's, and the conclusion in OFHEO's risk-based capital proposal, that "historically, corporate bond recoveries have averaged about 40% (i.e., a 60% loss rate)." OFHEO then takes that 40% recovery average and appropriately reduces it for "unusually stressful times," when default rates are greater. They settle on a 30% expected recovery, which is 25% lower than the historic average of 40%. Or, another way of specifying the difference between the average vs. stressful times recovery rate is a 10% (40% to 30%) reduction.

If we apply the same logic to the average 60% - 70% recovery for AAA/AA/A rated securities, then a 25% reduction results in a more appropriate 45%-50% average recovery rate on investment grade defaults. Using a 10% reduction results in a similar revised recovery rate of about 50%.

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[10] Indeed, we show that the average annualized returns on senior obligations over the restructuring period varies between 20% and 30% per year. See E. Altman and A. Eberhart, "Do Seniority Provisions Protect Bondholders Investments?," **Journal of Portfolio Management**, Summer 1994.

Since a 50% recovery seems generous to me, even for senior investment grade defaults, a prudent conservative, but very realistic, lower bound could even be 40% - - a rate that has been manifested in certain stressful individual years for senior securities of all ratings in the past (e.g., 1990, 1999-2000).

Applying the 40% recovery (60% loss rate) in stressful times to our earlier default rate discussion, results in the following capital haircuts:

		Default Rate		Loss Rate		Stress Test Non-Derivative Haircut
AAA	=	5.0%	x	60.0%	=	3.0%
AA	=	6.25%	x	60%	=	3.75%

My conclusion is that AAA and AA rated counterparties, if treated differently, should have "haircuts" of 3.0% and 3.75% respectively. Again, at the outside, I could understand a more conservative 4.50% for AA, but I recommend 3.75%.

BIS Capital Requirements

A parallel effort by regulators to ensure the safety and soundness of the global commercial bank system is now proposing revised capital standards on credit assets owned by the banks. The basis for these proposals is clearly the credit quality of the underlying security (equivalent to OFHEO's counterparty analysis) as depicted by its external bond rating. Everyone now agrees that the original Basel Accord's 8% rate for all assets did not discriminate for risk and that change is required. The Basel Commission's original proposal of June 1999, and its revised amended proposal of January 2001, is shown in Table 3. We also include our own commentary summary in the Table. The percentages shown are "percents of the minimum capital requirement

benchmark" for any country's banking system regulation. So, for example, a 20% factor on an 8% minimum requirement results in a capital allocation of 1.6%.

What is interesting to note is that in both the original proposal and in the revised document, AAA and AA rated securities are treated identically. Apparently, the bank regulators treat these two classes as having equivalent expected and unexpected default loss risk. This assertion is consistent with extensive discussions with bank regulators both in the U.S. and abroad, as well as in the BIS published documents. Note also that Altman and Saunders (2001) believe that the 20% AAA/AA capital adequacy risk weight (1.6% capital requirement) is too high, and we also lump the AAA and AA assets into the same "bucket." Our recommendation is for a 10% (0.8% capital requirement).

The OFHEO explicit differentiation between AAA and AA counterparties is perhaps justified over a 10-year horizon, but the proposed ratio of 2:5 to 1:0 is neither appropriate nor backed by relevant contemporary data.

Conclusion

I respectfully conclude that a slightly lower AAA rated capital haircut of 3% be applied to non-derivative contract counterparties and that the appropriate amount for AA counterparties is in the 3.75% - 4.5% range.

Sincerely,

Edward I. Altman
Max L. Heine Professor of Finance
NYU Stern School of Business

January 2002