

IDR Technical working group  
IDR impact study

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## **EXECUTIVE SUMMARY**

This study was conducted by ISDA in conjunction with seven leading international banks, in order to assess the impact of Incremental Default Risk (IDR) on banks' regulatory capital. The key conclusion is that, if IDR is implemented as currently proposed by regulators, **market risk regulatory capital can be expected to almost treble relative to the current VaR-based regime**. By any standard this represents a major revision of the regulatory regime for trading book activities, for which the industry does not recognise a need. Using an IRB-style charge would increase capital requirements even further. The impact of IDR is also assessed using an alternative set of rules suggested by industry members, which would measure default risk consistently with the existing rules for VaR-based RWA in the trading book. Under this alternative regime market risk regulatory capital is estimated to rise by around a third relative to the current rules.

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## INTRODUCTION

The following study complements a technical paper prepared by the Associations for the Accord Implementation Group Trading Book Working Group [AIG TB WG] in January 2007<sup>1</sup>. In this paper, the Associations recommended that the Basel Committee should adopt a capital horizon of 60 days for modelling incremental default risk (IDR) in the trading book (TB), and should permit firms to reflect diversification between default risk and market risk. Failure to align the horizon of the calculation with that used for VaR-based capital in the TB or to allow for diversification between risk types leads to a capital charge which is not risk sensitive and fails the use test.

Because a 60 day horizon is, all else equal, less conservative than the one year horizon required in Basel II<sup>2</sup>, testing the impact on the IDR charge of shortening the horizon of the simulation is key. In a paper published in December 2006, a subset of the AIG TB WG examined the sensitivity of default risk capital to the choice of alternative modelling assumptions<sup>3</sup>. The study was, however, limited in two respects: firstly, it was based on a hypothetical portfolio. Secondly, it did not allow for the comparison of the IDR charge with the market risk charge attributable to the test portfolio. The regulators noted that further research, based on real life portfolios and contrasting the IDR requirement with the market risk charge, would be useful.

In the present memorandum, the Associations report on an impact study undertaken with the aim of providing the AIG TB WG with information missing from their earlier analysis. We hope that our work will assist the regulators in their choice of a suitable capital horizon, and will support the recognition of cross risk diversification.

## OBJECTIVES

Our goals in conducting the study were:

1. Measure the overall regulatory capital impact of Incremental Default Risk
2. Assess the difference between a 60 day IDR charge and a 1 year IDR charge assuming roll-over
3. Assess the impact of diversification.
4. Compare the capital generated by IDR with a full banking book type IRB charge.

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<sup>1</sup> Industry Technical Paper on Incremental Default Risk, January 2007

<http://www.isda.org/speeches/pdf/Industry-TechnicalPaperonIDRCFINAL26Jan07.pdf>

<sup>2</sup> "The Application of Basel II to Trading Activities and the Treatment of Double Default Effects", July 2005

<sup>3</sup> Assessing Alternative Assumptions on Default Risk Capital in the Trading Book, December 2006

PARTICIPATING FIRMS

The following firms participated in this study:

- Bank of America
- Citi
- Credit Suisse
- Deutsche Bank
- Morgan Stanley
- Royal Bank of Scotland
- UBS

Note the ordering of the above list does not correspond to the order in which we have displayed results.

**METHODOLOGY**

The Associations asked member firms to calculate, for their actual trading book portfolios, the IDR charge under both regulators’ draft rules and the industry’s proposed rules, and to compare these with the existing market risk charge and the IRB requirement for the same portfolios.

Seven firms responded. The test portfolios and calculation methodologies employed are described below.

PORTFOLIO COMPOSITION

Respondents have included cash and credit derivative positions (both single name and index related) within the scope of the simulation. They were asked to disclose the share of CDSs in the total. For the 4 firms who supplied this information, derivative positions represent from 30% to 48% of the entire portfolio.

6 out of 7 respondents also reported including structured credit positions, although for 2 of these, the more complex products (MBS-ABS) were excluded.

One firm includes all equity positions. 2 further participants incorporate equities used to hedge convertible bonds.

Underwriting activity is included by 4 respondents, but tends to represent only a small share of the total.

Respondents also had to provide a breakdown of their portfolio by rating. We asked firms to submit two sets of percentages, one based on net long positions only, the other including both net long and net short exposures (in the latter case it is of course possible for firms to have net negative exposure to a particular rating bucket):

<b>Rating</b>	<b>Firm 1</b>	<b>Firm 2</b>	<b>Firm 3</b>	<b>Firm 4</b>	<b>Firm 5</b>	<b>Firm 6</b>	<b>Firm 7</b>	<b>Average</b>
AAA	2.0%	21.1%	25.0%	20.3%	1.0%	N/A	9.0%	13.1%
AA	7.0%	27.1%	19.0%	19.5%	8.5%		40.8%	20.3%
A	28.0%	19.5%	19.0%	22.0%	29.7%		21.6%	23.3%
BBB	25.0%	14.4%	22.0%	22.3%	43.5%		17.0%	24.0%
BB	16.0%	5.4%	9.0%	6.0%	8.3%		6.7%	8.6%
B	21.0%	4.4%	5.0%	8.7%	7.4%		3.0%	8.3%
CCC	0.0%	1.3%	1.0%	1.2%	1.8%		0.7%	1.0%
unrated		6.8%					1.3%	1.4%

**Table 1: Breakdown of Portfolio by Rating (long only)**

Rating	Firm 1	Firm 2	Firm 3	Firm 4	Firm 5	Firm 6	Firm 7	Average
AAA	2.0%	10.0%	35.0%	29.6%	-0.2%	N/A	-60.8%	2.6%
AA	6.0%	47.6%	24.0%	30.4%	11.0%		126.0%	40.8%
A	31.0%	17.6%	10.0%	23.6%	34.8%		26.8%	24.0%
BBB	41.0%	3.5%	16.0%	1.7%	46.4%		-10.2%	16.4%
BB	10.0%	1.2%	8.0%	-1.3%	1.7%		5.4%	4.2%
B	9.0%	5.9%	6.0%	13.1%	5.5%		6.6%	7.7%
CCC	2.0%	2.4%	1.0%	2.9%	0.8%		2.0%	1.9%
unrated		11.8%					4.2%	2.7%

**Table 2: Breakdown of Portfolio by rating (longs and shorts)**

As can be seen from the tables above, firms’ portfolios tend to be investment grade, with average credit quality equivalent to “A” for 4 participants, and “BBB” for two. One firm chose not to supply rating information.

CALCULATION METHODOLOGY

Firms were asked to compute regulatory capital under the following regimes:

- (i) The market risk charge, defined under Basel I as three times the 10-day VaR from market risk plus a Specific Risk Surcharge. Firms computed this number for their entire Trading Book, not limited to credit sensitive exposures. One respondent did not submit this figure.
- (ii) A 3 months’ IDR charge on the basis proposed in the Industry Technical Paper on Incremental Default Risk. Key assumptions follow:
  - a. The capital horizon and the liquidity horizon for all exposures was set at three months. Note that firms therefore assumed that positions were held over the capital horizon of three months, and did not use a constant level of risk assumption within this period.
  - b. The charge was calculated for two different sets of 3 months’ PDs:
    - The “regulatory” PDs reported on page 10 of the December 2006 AIG TB WG’s paper.
    - Firms’ internal 3 months’ PDs, detailed in the table below. These vary significantly between respondents, particularly at the higher end of the credit quality spectrum.

**3 months’ corporate PDs used by participants**

rating	Firm 1	Firm 2	Firm 3	Firm 4	Firm 5	Firm 6	Firm 7	Reg PDs	participants’ average	stdev	stdev/average
AAA	0.0032%	0.0032%	0.0017%	0.0000%	0.0050%	0.0038%	0.0075%	0.0032%	0.0057%	0.005%	96.8%
AA	0.0032%	0.0032%	0.0060%	0.0000%	0.0080%	0.0100%	0.0075%	0.0032%	0.0054%	0.003%	63.8%
A	0.0040%	0.0032%	0.0160%	0.0050%	0.0100%	0.0200%	0.0120%	0.0032%	0.0100%	0.006%	63.9%
BBB	0.0294%	0.0230%	0.0380%	0.0454%	0.0700%	0.0425%	0.0530%	0.0223%	0.0430%	0.016%	36.1%
BB	0.1210%	0.1800%	0.2000%	0.1120%	0.2180%	0.2509%	0.2960%	0.1799%	0.1968%	0.066%	33.7%
B	1.4130%	1.0200%	1.2700%	1.4317%	2.0040%	1.9965%	1.9390%	1.0179%	1.5820%	0.396%	25.0%
CCC	9.3059%	6.7400%	5.7690%	7.0200%	7.5730%	5.0000%	6.2870%	6.7390%	6.8136%	1.384%	20.3%

**Table 3: 3 Month PDs for corporate issuers used by each firm**

4 out of 7 firms obtain 3 months' PDs from the 4<sup>th</sup> root of a suitable transition matrix, in most cases based on an average of historic S&P matrices. Note that the observation period for computing the matrix fluctuates from one respondent to the next. Two participants scale 1 year PD down assuming constant default intensity, on the understanding that this approach yields a conservative measure of short term PD. One last firm uses the regulatory PDs.

- c. Firms used their own estimates of LGD and correlation. LGD is either fixed for all positions, or determined exposure by exposure. LGDs for senior unsecured positions vary between 50% and 65%, with most firms using 60% for a majority of exposures.

Three approaches to defining default correlation are observed in the sample: 2 firms use a fixed correlation parameter (12% and 14% respectively), 2 apply the Basel II correlation formula, and 3 use internal factor model based correlations.

- d. Firms were asked to compute the IDR charge on both a standalone and diversified basis. In accordance with industry's proposal for placing VaR and the IDR charge on a common footing, firms were asked to interpret their existing VaR charge (including regulatory multiplier) as a risk measure defined at 99.9% and over a time horizon of 3 months. This is done, as explained in the Industry technical paper, by using the approximate relation:

$$\text{VaR at 99.9\% over 60 days} \approx 3 \times \text{VaR at 99\% over 10 days}$$

which holds because the combined multipliers for time horizon and percentile are  $(3.09/2.33) \times \sqrt{(60/10)} = 3.25 \approx 3$ . Having brought the VaR and IDR charges to a common framework, firms able to perform the aggregation were then asked to select a risk-sensitive methodology for doing so, i.e. one that they would regard as suitable in principle for internal risk management application. Five firms have developed such a methodology, the aggregation methodology employed by each is described in the table below:

		Aggregation Methodology	
		60 day IDR	1 year IDR
Firm 1	N/A		N/A
Firm 2	Model the joint distribution of default losses and market P&L. Approach is based on credit spreads in firm's VaR model.		Scale the market risk P&L to 1 year and model joint distribution. IDR is set equal to the incremental increase in risk relative to one year market risk only VaR at 99.9%.
Firm 3	N/A		N/A
Firm 4	Assume perfect correlation between market losses and systemic default.		Computed by scaling one-year standalone number by the ratio of 60 day diversified to standalone IDR.
Firm 5	Root sum square based aggregation.		Root sum square based aggregation.
Firm 6	Root sum square based aggregation.		Root sum square based aggregation.
Firm 7	20% correlation assumed between market risk charge and IDR charge.		20% correlation assumed between market risk charge and IDR charge.

**Table 4: Summary of Aggregation Methodologies**

- (iii) The 1 year IDR charge, assuming constant level of risk. This part of the study was designed to produce capital numbers close to those which the participating firms would report to their regulators under the current Basel II Incremental Default Risk Principles. Key to computing the IDR charge is the choice of a liquidity horizon. All respondents considered that trading book positions should be assigned liquidity horizons below one year, but 3 did not have the ability to model roll-over, and consequently set the liquidity horizon at 1 year. Among the 4 remaining respondents, 3 firms used a 60 day liquidity horizon, and one chose 10 days.

In the case of the 1 year IDR charge calculated according to the draft rules, as explained in the Industry technical paper, no risk sensitive methodology for aggregating the inconsistently defined IDR and VaR charges can exist. In this case firms were asked merely to choose a “reasonable” methodology that is directionally correct, these are summarised in Table 4.

We emphasise that, as explained in the introduction to this document, firms participating in this study do not regard it as good practice to use inconsistent risk measures, do not regard the currently proposed 1 year IDR charge as appropriate relative to the use test, and support the industry proposed 60 day time horizon as the correct solution to reconcile the VaR and IDR frameworks.

- (iv) The IRB charge, with maturity set at 1 year, own LGDs, Basel II consistent default correlation factors, and 1 year “regulatory” PDs (set equal to the PDs featuring on page 10 of the AIG TB WG’s December 2006 paper). Two possible interpretations of the IRB rules were examined, as follows:

- a. in the first, net short positions per issuer attract a zero capital charge, consistent with the traditional view of credit risk in the banking book
- b. in the second, these positions are allowed to offset long positions, as the IRB model (focused on systematic default risk) implies. **Note that the netting rules as they are actually applied to the banking book under Basel 2 allow for much less netting than we have assumed here**, thus leading to larger charges. It was not possible for participants to compute the capital arising from the application of full banking book rules to their trading books within the timeframe of this study.

**RESULTS**

IDR CAPITAL VERSUS MARKET RISK CAPITAL

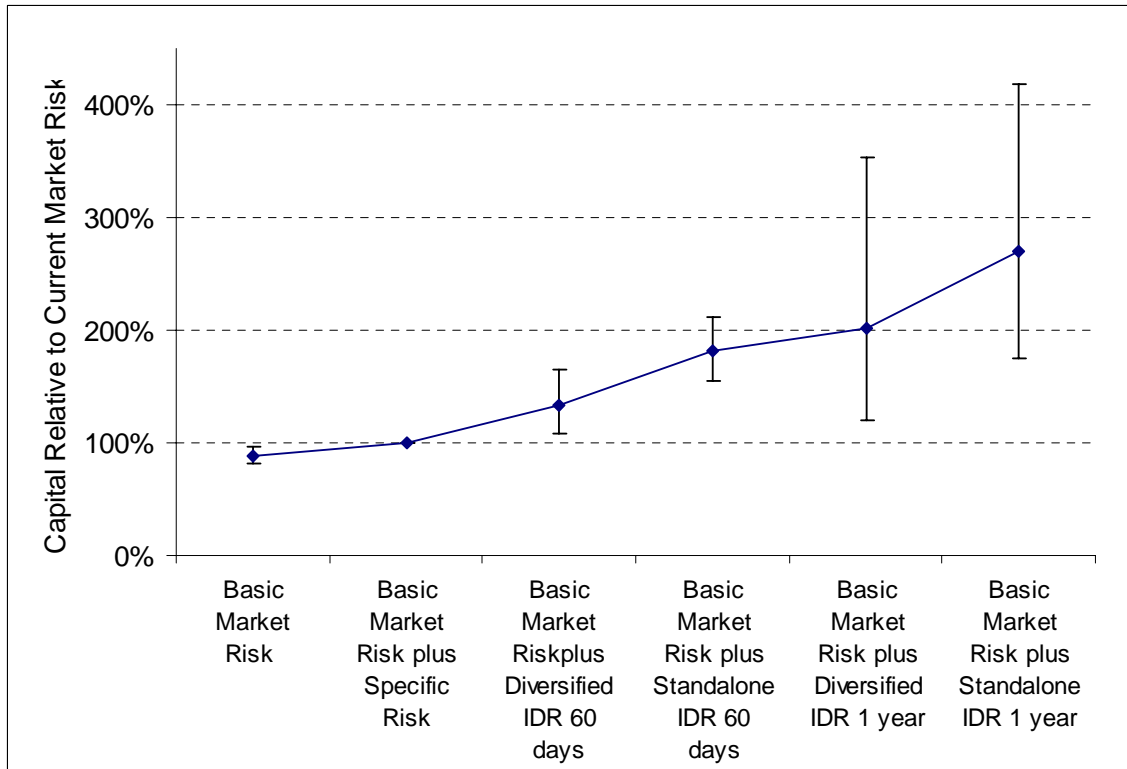
Table 5 and Figure 1 show the key result of this study: the impact of IDR with and without diversification and at a capital horizon of both 60 days and 1 year, relative to ‘Basic Market Risk Capital’ (i.e.  $3 \times \text{VaR}_{99\%, 10\text{-day}}$ ) and relative to the existing total market risk charge (i.e.  $3 \times \text{VaR}_{99\%, 10\text{-day}} + \text{Specific Risk Surcharge}$ ). In all cases firms have normalized their results so that current market risk capital equals 100%. The numbers highlighted in bold correspond to the industry’s proposed set of rules (IDR diversified over a 60 day horizon) and regulators’ draft rules (IDR standalone over 1 year). The IDR results here and in Table 6 are computed using Firm’s internal PDs from Table 3 (results using the regulatory PDs were generally similar).

	Basic Market Risk Capital	Basic Market Risk Capital plus Specific Risk Surcharge	Basic Market Risk Capital plus Diversified IDR over 60 days	Basic Market Risk Capital plus Standalone IDR over 60 days	Basic Market Risk Capital plus Diversified IDR over 1 year	Basic Market Risk Capital plus Standalone IDR over 1 year
Firm 1	N/A*	N/A*	<b>N/A*</b>	N/A*	N/A*	<b>N/A*</b>
Firm 2	97%	100%	<b>123%</b>	182%	152%	<b>249%</b>
Firm 3	83%	100%	<b>N/A</b>	197%	N/A	<b>295%</b>
Firm 4	85%	100%	<b>144%</b>	161%	163%	<b>186%</b>
Firm 5	81%	100%	<b>125%</b>	185%	219%	<b>297%</b>
Firm 6	87%	100%	<b>108%</b>	155%	121%	<b>175%</b>
Firm 7	93%	100%	<b>165%</b>	212%	354%	<b>419%</b>
Mean	88%	100%	<b>133%</b>	182%	202%	<b>270%</b>
Median	86%	100%	<b>125%</b>	184%	163%	<b>272%</b>

**Table 5: Total VaR-based regulatory capital under each potential regime, relative to total current capital**

The IDR charge based on a 1-year capital horizon and without diversification with market risk represents a huge increase in regulatory capital for market risk. The average estimate is that total capital will almost treble ( $3 \times \text{VaR}_{99\%, 10\text{-day}} + \text{Standalone IDR 1 year} = 270\%$  of current capital), with estimates ranging from a doubling to a quadrupling of VaR-based capital. IDR under the draft rules is fifteen times larger than the current specific risk add-on (current surcharge = 12%, Standalone IDR 1 year = 182%).

\* Firm 1 were able to compute IDR numbers, but did not submit a value for VaR-based capital and hence their results are omitted from Table 5.



**Figure 1: Total regulatory capital under the various regimes, percentage of current capital. Mean +/- Max/Min**

The participants regard their trading books as being fairly typical of the industry. Assuming that a typical firm holds VaR-based regulatory capital of around \$1bn, moving from Basel I market risk VaR to Basel II market risk VaR plus IDR as per draft principles would lead to a regulatory capital increase of some \$1.7bn per firm.

Setting the capital horizon of the IDR simulation at 60 days and allowing firms to model diversification reduces the level of the IDR charge considerably in comparison with the draft rules. This charge nevertheless remains significant: the diversified 60-day IDR requirement is, on average, around 33% of current VaR-based capital, corresponding to a typical increase in capital of around \$330mn per firm. Also note that the industry’s proposed rules yield IDR capital which is around four times greater than the current specific risk surcharge (current add-on = 12%, Diversified IDR 60 days = 45%).

IDR CAPITAL VERSUS IRB CAPITAL

We now present our results on the size of IDR relative to the IRB charge. We chose to include these results since regulators have expressed a desire that IDR be computed “to a soundness standard comparable to that of the IRB based approach for credit risk”. However, it is important to understand that this is a somewhat difficult exercise, since it is not at all clear how the banking book rules would translate to the trading book.

For example, should net short positions (i.e. those realising positive P&L in the event of a default) attract negative capital? Under the asymptotic single risk factor model that underlies the Basel 2 formulas they should, but it is highly unlikely that regulators would allow this in practice. In this case we have computed two sets of ‘IRB’ numbers, one with negative capital and one with short positions floored at zero. Even with the floor the numbers below permit much more generous netting than would be possible in practice, and hence the larger of the two figures computed by firms would be a lower bound for the regulatory capital under the full banking book rules.

	Standalone IDR over 60 days	Standalone IDR over 1 year	IRB Full Netting by Issuer	IRB Netted by Issuer (floored at 0)
Firm 1	44%	126%	53%	100%
Firm 2	47%	85%	58%	100%
Firm 3	33%	61%	63%	100%
Firm 4	27%	36%	32%	100%
Firm 5	44%	92%	47%	100%
Firm 6	30%	38%	N/A	100%
Firm 7	N/A	N/A	N/A	N/A
Mean	38%	73%	51%	100%
Median	39%	73%	53%	100%

**Table 6: Impact of IDR relative to an IRB-style charge with and without negative capital**

Table 6 shows the magnitude of standalone IDR capital relative to an IRB-style charge with short exposures floored at zero. The 1-year IDR charge in general stands above the IRB charge with full netting. This can reflect the use of conservative internal PDs, but principally results from (i) differences in the modelling of default correlation, and (ii) the lack of account taken of concentration risk in the IRB charge.

Only two respondents have used the Basel II IRB correlation formula to compute the IDR charge. Firm 7 did not supply data on the IRB charge, since the presence of large securitisation positions means that the result would not be representative.

Standalone IDR 60 days represents on average approximately 75% of the IRB charge with full netting. This further contributes to showing that reducing the capital horizon of IDR modelling from one year to 60 days would not entail a catastrophic loss of regulatory capital.