POLICY STUDIES

Weighting for Risk

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Emerging Issues Series
Supervision and Regulation Department
Federal Reserve Bank of Chicago
April 2001 (S&R-2001-1)

FEDERAL RESERVE BANK
OF CHICAGO

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The New Basel Capital Accord seeks to improve on the Current Accord by providing banks with better incentives. For example, the minimum capital requirements of the New Accord take account of default risk. Default risk might be mapped by an external rating (under the Foundation Approach), or by the bank itself (under the Internal Rating-Based Approach, or IRB). In either case, the New Accord, unlike the Current Accord, gives banks an incentive to reduce default risk.

The New Accord also takes account of collateral and seniority. Collateral and seniority give the bank an advantage in a default situation, and therefore reduce the bank's loss given default (LGD). Since LGD affects the risk weight, the New Accord gives banks an incentive to reduce LGD.

But the New Accord goes too far. Its preference for low-LGD lending is so strong that it encourages banks to make low-LGD loans with reduced regard for default risk. This practice, known as "lending on the collateral," gives primary consideration to collateral and LGD, rather than to the borrower's ability to repay. This style of lending has been the traditional specialty of commercial finance companies that usually have more capital than banks. But under Basel 2, banks will find that lending on collateral requires less capital than a more customary bank loan.

This exaggerated incentive can be corrected with a small change in the risk weight function. The preferred function agrees with Basel 2 over a wide range of conditions, but becomes distinctly more conservative when LGD is low. There would be many ways to achieve this result, but the version presented here is particularly simple.

The next section, "Risk weights miss the risk," illustrates the exaggerated incentive using a pair of hypothetical loans. Of the two loans, most bank supervisors identify the first loan as having greater risk, but Basel 2 identifies the second. "The flaw in the function" finds that this reversal of ranking traces back to the structure of the risk weight function. It then introduces the preferred risk weight function, which restores the ranking of the two hypothetical loans. "LGD responds to adversity" notes that the two functions imply different behaviors of LGD. It then compares those behaviors to historical data and observes that the data provides a better match for the preferred approach.

Risk weights miss the risk

A principal goal of Basel 2 is to make regulatory capital requirements more compatible with risk. If this goal is to be achieved, a loan having greater risk should require more capital. Yet this does not seem to be the case. The apparent distortion of incentives is illustrated by two hypothetical loans.

The first hypothetical loan is to an obligor having a one-year probability of default equal to 20%. If such an obligor has a public rating, it is probably lower than B-. To bolster its creditworthiness, this obligor offers substantial over-collateralization, so that in the event

of default the bank expects to lose only 5% of the outstanding amount. Stated as inputs to a risk weight function, this loan has PD equal to 20% and LGD equal to 5%.

The second hypothetical loan represents a common lending situation for many bankers. The obligor has a probability of default equal to 1%. The lending facility is senior but unsecured, and the bank estimates LGD equal to 50%.

Assuming the PDs and LGDs are estimated accurately, which of the two loans has greater risk? Most bankers, and most bank supervisors, would identify the first loan as riskier. In part this is because it represents the practice of "lending on the collateral." The trouble with lending on collateral is that when the obligor defaults, the value of collateral can fall below expectations. Deals like this have generally been financed by commercial finance companies that specialize in collateral analysis and measurement. Commercial finance companies generally have more capital than banks. Therefore, from a capital and risk perspective, prudent bankers would make the second loan in preference to the first.

The Basel 2 risk weights take the opposite view, and encourage making the first loan in preference to the second. As shown in table A, Basel 2 views the first loan as having only half the risk of the second loan.[1]

A. Basel 2 capital requirement for two hypothetical loans.

	PD	LGD	Basel 2 capital requirement
First Loan	20.0%	5.0%	5.0%
Second Loan	1.0%	50.0%	10.0%

Thus, the incentive provided by the Basel 2 risk weights appears to reverse the incentive that a prudent regulator would like to provide. The reversal of incentive is explained in a footnote in the IRB document. There it is assumed that a bank can lose no more than LGD. Since the LGD of the first loan is 5%, capital can be no more than 5%. There is an "LGD ceiling" that is binding for the first loan.

What this overlooks is that LGD varies from year to year. Especially in a high-default year, LGD tends to exceed its long-term average.[2] The conditions that push the default rate higher tend to push LGD higher. Therefore, in a high-default year a bank can lose more than long-term average LGD.

It might then appear that the entire problem with the Basel 2 risk weights is the LGD ceiling, but this is not the case. In fact, the ceiling is hardly binding. Without the ceiling, capital for the first loan equals 5.3%. Thus, even if the LGD ceiling were eliminated, the Basel 2 risk weights strongly favor what appears to be the riskier of the two loans. (The LGD ceiling is ignored in the remainder of this article.)

Another comparison should underline the exaggerated preference that Basel 2 gives to low-LGD lending. Under the Current Accord, the capital charge for a commercial loan is 8%. Under Basel 2, the total capital charge for the first hypothetical loan would probably be less than that, even after adding capital for operational risk. Thus, the Basel 2 risk

weights provide an incentive for lending on the collateral, whether it is compared to the second hypothetical loan or to the average loan at the average bank today.

The Basel 2 favoritism for the low-LGD style of extends to other cases. For example, an obligor whose probability of default equals 10% might provide collateral to reduce LGD to 10%. This would again be considered "lending on collateral"— the lender feels protected by the collateral, but the inherent quality of the borrower is low. Basel 2 requires capital of only 7.7% for such a loan, in preference to the second loan in table A. The Basel 2 favoritism for low-LGD loans also extend to other PDs. In table A, even if the probabilities of default were one-tenth, or one-hundredth, as great as shown, Basel 2 would still encourage banks to make the first loan in preference to the second.

The flaw in the function

Having seen the result of the Basel 2 risk weight function for a specific case, this section turns to the risk weight function itself. The function has a linear response to LGD. Responding to LGD is good, but a linear response is too strong: when LGD becomes low, the risk weight becomes too low. The problem is avoided by changing the response pattern from linear to concave. A concave response pattern produces a more conservative risk weight for low LGD, while still providing banks an incentive to reduce LGD.

For corporate exposures in IRB, the risk weight function is found in ¶156:

(1) RW = (LGD/50) x BRW(PD)

This states that risk weight is a function of two variables, LGD and PD.[3] Figure 1 shows the relation of risk weight to LGD. If LGD falls by half, the risk weight also falls by half—a simple linear relation.

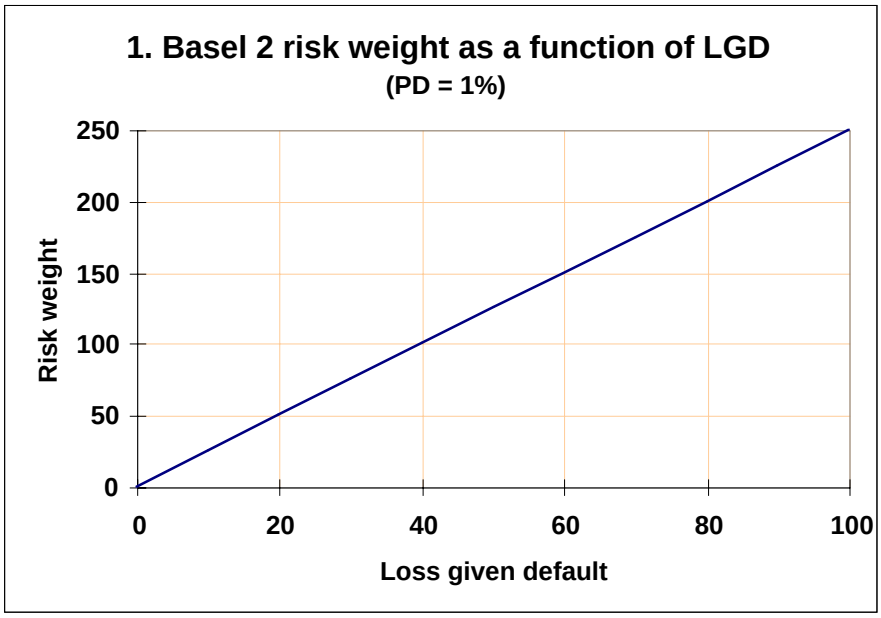
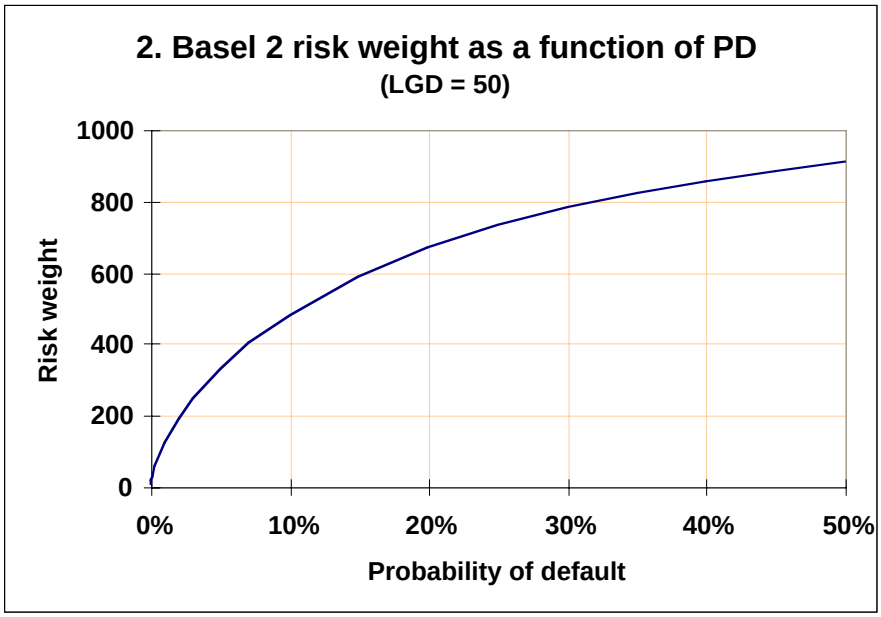


Figure 2 shows the non-linear relation between PD and risk weight. If PD falls by half, risk weight also falls—but it falls by less than half. In this concave relation, the function assigns a significant risk weight to low levels of PD. Thus the Basel 2 risk weight is concave in PD but linear in LGD.



The linear response to LGD is the cause of the exaggerated incentive. When LGD falls, the Basel 2 risk weight falls too quickly. As a mathematical function, this is what leads to the problem identified in the last section.

The problem could be avoided if, instead of a linear response to LGD, the risk weight function had a concave response to LGD. In figure 1, a concave function would be above the straight line for low levels of LGD. That would assign a more conservative risk weight to low-LGD loans.

There are many ways to specify a risk weight function that is concave in LGD. The approach presented here uses the concave function already at hand, BRW. This approach simply moves LGD from outside the BRW function to inside:

(2) Preferred RW = K x BRW(PD x LGD/50)

The factor K would be chosen such that the total capital requirement for the banking industry would be the same in (2) as in (1). In this article, K is assumed to equal 90%, but a careful study might arrive at a different factor.

The preferred risk weight function (2) is explicitly "ad hoc"—it is addressed specifically "to this" problem that arises with low LGDs, rather than being the result of a theoretical

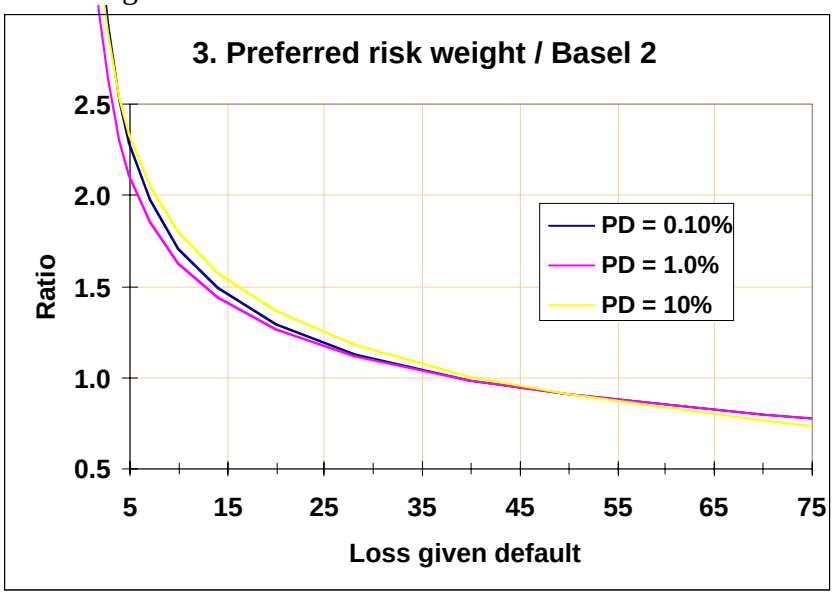
exercise.[4] Though it does not claim to arise from theory, it claims to produce better results. Specifically,

(1) The preferred risk weights restore the ranking of the hypothetical pair of loans.
(2) The preferred risk weights are distinctly more conservative than Basel 2 when LGD is low. They approximate Basel 2 when LGD is moderate.
(3) The preferred risk weights agree, better than the Basel 2 risk weights, with the actual behavior of LGD.

(1) is easily established. For the hypothetical pair of loans, the preferred risk weights imply capital of 13.9% and 9.0%, respectively. The preferred weights recognize the first hypothetical loan as substantially more risky.

Note the way that the ranking is restored. For the second loan, the preferred risk weights reach almost the same judgement as Basel 2. (The preferred weight is 10% lower than Basel 2, because the factor K has been assumed equal to 90%.) But for the first loan, the preferred approach allocates 13.9% capital rather than 5.3%, or about 2.6 times as much. This makes the first loan riskier than the second, and riskier than the current 8% standard. For the hypothetical example, the preferred risk weights are more conservative than Basel 2 only when LGD is low.

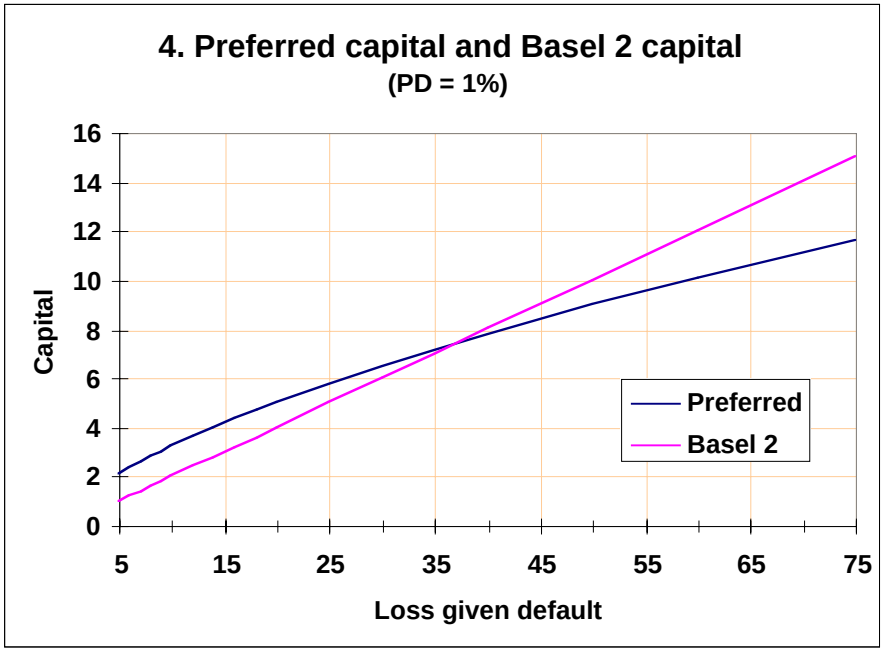
To establish (2) more generally, figure 3 shows the ratio of the preferred risk weight to the Basel 2 risk weights, for three levels of PD. When the ratio is near 1.0, the preferred risk weights are near the Basel 2 risk weights. Figure 3 shows that the ratio is near 1.0 for moderate levels of LGD. Specifically, for LGD between 25 and 70, the ratio is between 0.75 and 1.25, which means that the preferred weight is within 25% of Basel 2. This holds for all three levels of PD, 0.1%, 1.0%, and 10%. Figure 3 also shows that the preferred risk weights are distinctly more conservative than Basel 2 when LGD is low. For example, if LGD equals 5%, the preferred risk weight is more than double the Basel 2 risk weight.



In figure 3 it is perhaps surprising that the three lines, reflecting three very different levels of PD, are close to each other across the entire spectrum of LGD. This simply means that when it comes to the ratio depicted in figure 3, the level of PD has little effect.

The preferred risk weights can therefore be seen as multiples of the Basel 2 risk weights, where the size of the multiple depends principally on LGD. For moderate LGD, the multiple is near 1.0. For LGD below 25%, the multiple rises rapidly, which results in a more conservative capital requirement for low-LGD style lending.

This behavior establishes Claim 2. The preferred risk weights are in broad agreement with Basel 2 for moderate LGD, but become distinctly more conservative for low LGD. In passing, figure 3 shows a practical effect of the preferred risk weights as they would contrast to Basel 2. Foundation IRB institutions, which cannot recognize LGD below 40%, would find capital requirements moderately reduced. Advanced IRB institutions would find capital decreased for some assets and increased for others.



Before turning to (3), figure 4 compares capital requirements for a borrower with PD = 1.00%.[5] The straight line shows the linear response of capital under Basel 2. The concave, less steeply sloped line shows capital under the preferred approach. Either approach offers an incentive to reduce LGD. The preferred approach is more conservative than Basel 2 when LGD is low.

(3) compares the two risk weight functions to data from defaulted debt losses. This is the subject of the next section, which begins by highlighting the central feature observed in the data.

LGD responds to adversity

The Basel 2 risk weight function embeds an assumption regarding what we call the "response of LGD to the adverse year." This idea has received little attention in the credit literature.

What we call the adverse year is simply the year in which bank credit loss is at its 99.5 percentile. In the adverse year, firms default at a rate greater than their long-term probabilities of default. Data from the adverse year does not exist, and Basel 2 uses a model to project the response of the default rate to the adverse year.

The issue being raised is the response of LGD to the adverse year. If long-term average LGD is say, 10%, what can we expect in the adverse year? This section shows that the Basel 2 risk weights expect that all LGDs rise 56% above their long-term averages. The preferred risk weights embed a different assumption, which makes the response of LGD sensitive to the level of LGD. A low LGD can therefore rise by much more than 56% in the adverse year. This section then shows that the latter assumption—that the response of LGD is not uniform—is a better fit for loan and bond data.

To see the assumption embedded in the Basel 2 function, multiply (1) by 8% to obtain capital, substitute the BRW function from IRB paragraph 171, and gather together the constant factors:

(3) Capital = 8% x (LGD/50) x BRW(PD)
= 8% x (LGD/50) x 976.5 x N[1.118 x G(PD) + 1.288] x (1 + 0.047 x (1-PD) / $PD^{0.44}$)
= 1.56 x LGD x N[1.118 x G(PD) + 1.288] x (1 + 0.047 x (1-PD) / $PD^{0.44}$)
= (A) x (B) x (C) x (D)

Each of the four factors in this expression has a well-defined identity. Factor (A) is a number that makes regulatory capital equal to 8% for a specified reference loan (PD = 0.7% and LGD = 50%). Factor (B) is long-term expected LGD. Factor (C) is the function that projects the response of the default rate to the adverse year, employing considerable theory and assumptions.[6] Factor (D) is an ad hoc adjustment from the one-year loans assumed by factor (C) to the three-year loans assumed by Basel 2.

To show how equation (3) works in a concrete example, we re-calculate the capital required by Basel 2 for the first hypothetical loan discussed above:

(4) Capital = 1.56 x 5.0% x 63.6% x 1.08 = 5.3%

Assuming that factor (D) does its job of correcting for the difference between three-year loans and the one-year analysis horizon, the Basel 2 function is saying that to protect itself against default loss, a bank should hold capital equal to

(5) Capital = 1.56 x LGD x Default rate in the adverse year

By contrast, the default loss in the adverse year equals LGD in the adverse year times the default rate in the adverse year. Therefore, ***the amount of capital in (5) is accurate only if, at every point along the LGD spectrum, LGD in the adverse year is 1.56 times its long-term expectation.***

Thus, the Basel 2 risk weights implicitly assume that in the adverse year, all LGDs respond the same, and rise 56% above their long-term averages. An LGD of 10% would rise to 15.6%, an LGD of 50% would rise to 78%, and an LGD of 75% would rise to 117%.

Of course, average LGD cannot rise above 100%, so we seem to have arrived at a logical contradiction in the Basel 2 approach. The contradiction might be overcome with a bit of reinterpretation, but the fundamental problem—the linear response to LGD—remains.

The preferred risk weights embed a different assumption regarding LGD in the adverse year. It can be simply stated, since the Basel 2 risk weights implicitly assume that LGD rises by 56%:

(6) Adverse year LGD / Expected LGD = 1.56 x Preferred RW / Basel 2 RW

For the preferred risk weights, equation (6) shows that the response of LGD to the adverse year equals 1.56 times the ratio that was charted in figure 3. That ratio depends principally on the level of LGD. Thus, the preferred approach assumes that LGD response depends on LGD, and Basel 2 assumes that LGD response is insensitive to LGD. The two assumptions will next be compared to the available data from defaulted debt recoveries.

Very little data is available at present. Some studies find that LGD responds to a high-default period, but to distinguish the alternatives we need more. Specifically, we need to know the difference between the response of low LGD assets and the response of high LGD assets. The author is aware of only one study of bank loans that addresses this difference. This bank internal study compares the LGD of several collateral types within two periods, an overall period spanning 1989 to 1999, and a high-default sub-period spanning 1989 to 1991. The data appears in table B.[7]

B. Response of loan LGDs to a high-default period.

	Average LGD	Average LGD	Response to
Collateral type	Overall period	High-default period	High-default period
(1)	16%	50%*	213%*
(2)	20%	56%*	180%*
(3)	22%	37%	68%
(4)	30%	53%	77%
(5)	38%	59%	55%
(6)	40%	58%	45%

* Based on small number of defaults

Although table B reflects the experience of only one bank, it tells an important story from the standpoint of choosing a set of risk weights. First, LGDs do not respond uniformly to a high-default period, but rather, the last column shows a range of response from 45% to 213%. Second, lower LGDs generally respond more strongly than do higher LGDs. Third, most of the collateral types show a response greater than 56%.

All three features contradict the assumption implicit in the Basel 2 risk weights. The greater-than-56% responses, combined with the increased responsiveness of low- LGD loans, should raise warning flags for Basel 2, because they suggest the potential for a serious understatement of regulatory capital.

As well as investing in loans, banks invest in bonds, and risk weights apply to them. Bonds and loans differ in many ways, but bonds are generally subordinated to loans. This is a principal reason that bond LGDs tend to exceed loan LGDs. The bond LGD data comes from the Moody's Default Risk Service database, and reflects the same selection criteria established in "Depressing Recoveries." For bonds of three seniority levels, table C displays both the average LGD on the overall period of 1983-1997 and the average LGD in the high-default sub-period of 1990-1991.

C. Response of bond LGDs to a high-default period.

	Average LGD	Average LGD	Response to
Seniority	Overall period	High-default period	High-default period
Senior secured	37%	50%	35%
Senior unsecured	50%	58%	16%
Subordinated	63%	71%	13%

As with the loan data, bond LGDs do not respond uniformly to a high-default period, and lower LGDs show a stronger response. These features undermine the Basel 2 assumption of a uniform response. In contrast to the loan data, the bond LGD responses are much less than the 56% assumed by Basel 2. Unless loan LGDs respond much more strongly than bond LGDs, this feature suggests that Basel 2 may be too conservative for high LGD loans, such as subordinated lending under Foundation IRB, which has LGD set to 75%.

Thus, both in loans and in bonds, LGD responds to high-default periods. Assets with lower LGDs show a greater response, contrary to Basel 2, which imagines that every LGD responds by 56% to the adverse year. This suggests the Basel 2 function is too conservative for high-LGD lending and not conservative enough for low-LGD lending.

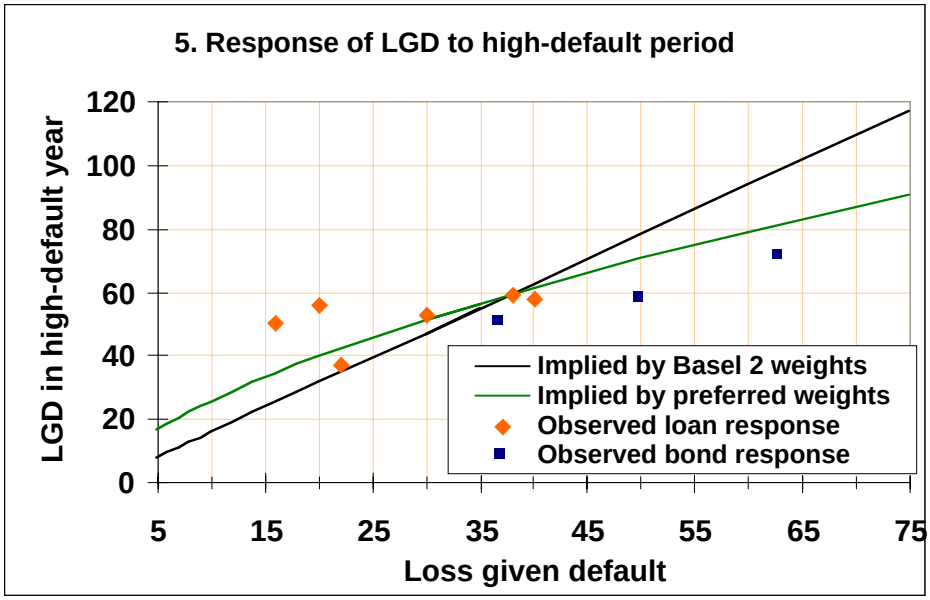


Figure 5 brings together the elements discussed in this section: the loan data and the bond data appear as points, and the assumptions embedded in Basel 2 and in the preferred approach appear as lines. In figure 5, the horizontal axis shows long-term expected LGD. The vertical axis shows LGD in the high-default period (for the loan and bond data) and LGD projected for the adverse year (for the two sets of risk weights). Thus, the straight line shows the linear assumption implicit in Basel 2: regardless of level, each LGD responds to the adverse year by rising 56%. The concave, less steeply sloped line shows the assumption implicit in the preferred approach.

The pattern of the data points agrees better with the preferred approach. In fact, the data pattern appears less steeply sloped than either projection. This suggests little danger that the preferred approach overstates the response of LGD.

If one wished to ignore the two leftmost data points (which are based on a small number of defaults), and to ignore the two rightmost data points (which are drawn from bond data that might differ from loan data), and to ignore the illogically high levels of LGD produced on the Basel 2 line, it might seem that the Basel 2 risk weights are good enough, because the central five data points fit the two lines equally well. But the real issue for capital standards is not the data that that has arisen until now, but the data that will arise in the adverse year. That data will differ from figure 5 in two important respects: it will involve lower levels of LGD, and it will involve a more adverse economic climate.

Figure 5 does not reflect assets with the lowest LGDs, which are the main concern. Nonetheless, the pattern in figure 5 is clear: assets with lower expected LGD display a greater percentage response to a high-default period. We must assume that a loan with a long-term expected LGD of 5% or 10% would have a greater response, and possibly a substantially greater response, than 56%.

Further, figure 5 does not reflect the adverse year. The adverse year is at the 99.5 percentile of bank loss. Unless someone recovers accurate and relevant LGD data from an extremely severe default environment of the past, any idea about the adverse year will be an extrapolation. We must extrapolate that LGDs from the adverse year will exceed those of the last recession, just as those from the last recession exceeded long-term average LGD. In terms of figure 5, we must assume that data points for an adverse year would be above most of the loan and bond data points that appear now.

In using data to help choose between the two sets of risk weights, we must therefore extrapolate twice: to lower LGD assets, and to more adverse financial conditions. The Basel 2 risk weights perform the extrapolation by assuming that LGDs of all levels will respond to the adverse year by rising 56%. The preferred risk weights project a low percentage response for high LGDs, and a high percentage response for low LGDs. This non-uniform response provides a better match for the data we have and for the conditions we can imagine.

Objections and responses

A number of objections might be raised to the proposal presented above. This section responds to several of them.

Objection: This proposal has little effect, because low LGD loans do not exist. Response: Many banks are devising LGD ratings and quantification systems, and some of these systems have buckets that map to LGD = 5% and LGD = 10%. Especially if the risk weights of Basel 2 are adopted, banks will have a strong incentive to analyze their historical data to discover the characteristics that have led to low average LGDs, and then to pursue business that has those characteristics.

Objection: Low LGD loans exist, but bank regulators will not allow classification into very low LGD grades. Response: Regulators will allow banks to use any level of LGD that they can adequately support.

Objection: Loans having low LGD also have low collateral risk, so the potential to respond to the adverse year is not great. Response: Some obligors pledge cash or T-Bill collateral on some loans, and regulators may choose to allow lower capital for these low-response loans. But regulators should not conclude that every low-LGD loan is a low-response loan. An increasing share of low-LGD exposure is to asset-backed lending, which achieves a low LGD through over-collateralization. The collateral is rarely if ever cash or T-Bills, and it probably has risk equal to other collateral.

Objection: It is too soon to adopt the preferred risk weights, because we have insufficient data to be certain that they are optimal. Response: As a practical matter, regulation will not wait for the data. In particular, regulation cannot wait to experience the adverse year. A judgement must be made, aided by the evidence that is available. Part of the evidence,

which will not change with the passage of time, is that Basel 2 encourages banks to lend on collateral.

Objection: It is too late to adopt the preferred risk weights, because the Basel Committee has already published the risk weight function to be used. Response: We are now in the comment period. Now is the time to put forward an alternative, and, if it is better, for the Basel Committee to adopt it.

Objection: The preferred risk weights cannot be adopted, because a good model does not support them. Response: A good model, and good statistical analysis, lead to a risk weight function resembling equation (2). As discussed in Depressing Recoveries, capital involves the product of separate functions that project LGD and PD to their adverse levels, and, to a high degree of accuracy, the product of these functions can be approximated by a function of the product of LGD and PD. No doubt, the regulatory risk weight function will evolve as theory develops and data accumulates. But for the time being, the simplicity of using a single function makes it appear preferable.

Conclusion

This article addresses the capital requirement for bank credit exposures. It finds that the risk weight function of the New Basel Capital Accord should be more conservative for low-LGD exposures.

If regulatory risk weights provide a meaningful incentive to banks, the weights that appear in the consultative document will have distorting effects on bank lending. They will encourage banks to engage in a form of lending more appropriate to specialized, better-capitalized finance companies. They will encourage "lending on collateral," contrary to the instincts of most bank supervisors. They will encourage banks to accept, through reliance on collateral, greater systematic risk than is prudent. Most importantly, if the level of LGD rises sharply at the same time as the rate of default, they might leave banks with insufficient capital to survive the adverse year when it arrives.

The preferred risk weight function is distinctly more conservative for low-LGD loans. It gives banks an incentive to reduce LGD, but a more moderate incentive. It agrees with the data we have from loans and bonds, and with reasonable ideas of what is apt to happen in an adverse financial environment. It is by no means the only remedy, nor can it be proven, with the paucity of data currently available, to be the best remedy. But it represents an improvement.

Jon Frye is Senior Economist in the Policy Group at the Federal Reserve Bank of Chicago. **He thanks Mark Carey and Marc Saidenberg for extremely valuable conversations. For helpful comments on earlier versions, he thanks Mike Atz, Matthew Foss, Dale Klein, Cathy Lemieux, Dennis McLaughlin, and the members of the FRB-Chicago Regulatory Capital Comment Group. The views expressed are**

the author's and do not necessarily represent the views of the management of the Federal Reserve Bank of Chicago or the views of the Federal Reserve System.

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Do Markets React to Bank Examination Ratings? Evidence of Indirect Disclosure of Management Quality Through BHCs' Applications to Convert to FHCs *Linda Allen, Julapa Jagtiani and James Moser*	**S&R-2000-9R**
Predicting Inadequate Capitalization: Early Warning System for Bank Supervision *Julapa Jagtiani, James Kolari, Catharine Lemieux, and G. Hwan Shin*	**S&R-2000-10R**
Merger Advisory Fees and Advisors' Effort *William C. Hunter and Julapa Jagtiani*	**S&R-2000-11R**
Impact of Independent Directors and the Regulatory Environment on Merger Prices and Motivation: Evidence from Large Bank Mergers in the 1990s *Elijah Brewer III, William E. Jackson III and Julapa A. Jagtiani*	**S&R-2000-12R**
Market Discipline Prior to Failure *Julapa Jagtiani and Catharine Lemieux*	**S&R-2000-14R**

[1] The calculations and functions referenced in this article are provided in a spreadsheet on request. Please send E-mail to Jon.Frye@chi.frb.org, using as the subject field "Weighting for Risk."

[2] This has been detected in Depressing Recoveries and in an unpublished study by Edward Altman, and has been observed at banks.

[3] In Basel 2 documents, RW and LGD are each expressed as assumed percents; for example, LGD = 50 means that a bank expects to lose half the exposure amount in the event of default.

[4] A theoretical analysis could begin with the debt recovery equations presented in Collateral Damage or Depressing Recoveries, normalized to the regulatory assumption that correlations equal 20%. This analysis would produce a risk weight function that employs a concave function of LGD, rather than LGD itself, to multiply a concave function of PD. The practical disadvantage is that the resulting function does not appear in closed form.

[5] As figure 3 suggests, other levels of PD produce a similar appearance, except for a change in the range of the vertical axis.

[6] The "N" function denotes the cumulative distribution of a standard normal variable, and the "G" function denotes its inverse. Factor (C) is derived in numerous publications. Using the notation of equation (3) in Depressing Recoveries, the Basel 2 risk weights employ $\rho^2 = 0.20$ and $X = -2.5758$, which represents the 0.5 percentile of the standard normal.

[7] The complete list of collateral types includes most of the common categories. Some of these collateral types had only a small number of observations in the low-default sub-period and were eliminated from the analysis. No identification is made of the collateral types appearing in table B.