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**Addendum 4 to the CRI Technical Report, (Version: 2011, Update 1)**

## Changes to Distance-to-Default (DTD) computation and Net Income variable

This write-up serves as an update to the Technical Report (Version: 2011, Update 1) and documents the changes to the Distance-To-Default (DTD) computation and Net Income variable that have been implemented as of the May 2012 calibration that was first used for the probability of default (PD) data for the market close of May 15, 2012.

### DTD

The DTD is a volatility adjusted measure of the leverage of a firm that is an important input in the CRI PD estimation system. The CRI's calculation of DTD is described in Section 3.2 of the Technical Report. One input into the DTD of a firm is the estimated drift $\mu$ of the implied asset value of the firm. It was found that the estimate of $\mu$ was frequently unstable.

For example, suppose a firm has a large drop in its implied asset value in January 2011, so that the estimated $\mu$ is negative for the DTD calculation at the end of December 2011. If there is little change in the company in January 2012, then the drop in implied asset value in January 2011 is no longer within the observation window for the DTD calculation at the end of January 2012. There will be a large increase in the estimated $\mu$, resulting in a substantial improvement of the DTD just because of the moving observation window.

To avoid this problem, we now set $\mu$ to be equal to $\frac{\sigma^2}{2}$. So in calculating DTD, the second term in the numerator of equation (22) of the Technical Report is eliminated.

Empirical analysis shows that this change can increase the accuracy ratio for most of the economies. As an example, after applying this DTD methodology and based on data available up until 2012-03-31, the one year accuracy ratio for firms in the US increased from 0.814 to 0.822.

More detailed results on the performance analysis of the CRI PD will be available in the Technical Report (Version 2012, Update 2) forthcoming in the Global Credit Review, volume 2 (July 2012). This volume of the GCR will also include an article entitled "Measuring Distance-to-Default for Financial and non-Financial Firms" by Jin-Chuan Duan and Tao Wang that will give an in-depth description of the DTD computation with examples for non-financial and financial firms.

### Net Income

The profitability of a firm is accounted for in the CRI's PD estimation system by the ratio of net income to total assets. Before the May 2012 calibration, the ratio was required to be retrieved from annual financial statements. In order to include more timely information on the profitability of a company, the ratio can now be taken from any financial statement.

In order to allow for meaningful comparisons of net income, the net income derived from the financial statement needs to be adjusted according to the fiscal period covered by the financial statement. For example, the monthly net income can be computed from the annual net income divided by 12, the semi-annual net income divided by six and the quarterly net income divided by three.

If there are multiple financial statements with the same period end, priority rules must be followed in the order to determine which to use. The four prioritization rules as stated in Section 3.1 of the Technical Report will be applied. However, for the net income to total assets ratio only, quarterly statements will have higher priority than semi-annual statements which have higher priority than annual statements. This is because, for example, a quarterly statement covers a more recent period than statements for longer periods.