



# Global Bank Credit Rating Methodology

April 2012

## Morningstar Global Bank Credit Rating Methodology

### Credit Score

Like the Morningstar credit rating for nonfinancial companies, the bank credit rating methodology is driven by four key components, or pillars:

1. **Bank Solvency Score** (30% weighting) is a ranking based on a bank's capital adequacy, asset quality, earnings power, and liquidity profile.
2. **Bank Stress Test Score** (30% weighting) is an evaluation of a bank's potential to absorb loan losses while maintaining adequate capital levels.
3. **Bank Business Risk Score** (30% weighting) encompasses various measures of business risk, as well as Morningstar's proprietary Economic Moat and Uncertainty Ratings.
4. **Distance to Default** (10% weighting) is a quantitative ordinal ranking of balance sheet strength based on estimates of the market value of assets, asset drift, and default barrier or market-implied default probability.

The weighted average of a bank's score on all four pillars determines the model-recommended final credit score.

Underlying this rating is a fundamentally focused methodology, a robust, standardized set of procedures, and core financial risk and valuation tools used by Morningstar's securities analysts. Based on other qualitative and quantitative factors (e.g. positive/negative trends in various metrics, upcoming corporate actions, potential for government assistance, etc.), analysts and the credit rating committee will also discuss, and potentially adjust, the recommended score appropriately.

The methodology is virtually the same for both US and non-US institutions. However, due to accounting standard disparities and variability in data availability, the calculations within each pillar differ slightly. Notwithstanding, the weights and scoring scales of each pillar and the thresholds that ultimately dictate the model-driven credit rating are the same.

### I. Bank Solvency Score

The **Morningstar Bank Solvency Score** is a purely quantitative assessment of a bank's health based on bank-specific accounting metrics. Much like the CAMELS rating used by US bank regulators, the Bank Solvency Score measures a bank's most recent performance in four key areas: capital adequacy, asset quality, earnings power, and liquidity. The two qualitative factors evaluated in a CAMELS rating--management quality and sensitivity to market risk--are accounted for in the Bank Business Risk Rating.

In developing the US Bank Solvency Score, Morningstar bank analysts selected six accounting ratios representing the most robust possible measures of capital adequacy, asset quality, earnings power, and liquidity for financial institutions. Each quarter, approximately 1,500 bank holding companies,

representing the vast majority of assets in the US banking system, are ranked on a relative percentile basis, based on each of the selected metrics. A bank's relative ranking in each category is then weighted according to its overall importance, and a final Bank Solvency Score is assigned. For financial institutions other than bank holding companies, such as savings and loan institutions, the company is placed appropriately in the bank holding company distribution, and a pro forma score is calculated based on the same metrics.

For non-US banks, analysts selected a similar array of metrics that qualify institutions based on the same qualities. The main difference is that whereas US firms' scores are based on a relative basis, non-US companies' metrics are scored against a fixed set of thresholds. In each case, there are three thresholds which represent a score of 0%, 50%, and 100%. If a certain metric falls below the 0% level or above the 100% figure, the bank will get zero or full credit for that metric, respectively. If the company's metric falls between these thresholds, the result will be prorated accordingly.

The metrics used to calculate the Bank Solvency Score, their assigned weightings, and the qualities they measure are as follows:

#### Earnings Power (30%)

*US: Pre-tax Pre-provision Earnings to Average Assets*

*Non-US: Pre-tax Pre-provision Earnings to Risk-Weighted Assets*

Pre-tax, pre-provision earnings are a bank's first line of defense against credit losses. As such, it receives the highest weighting in the Bank Solvency Score. The higher a bank's core earnings power, the more losses it is capable of absorbing without affecting its allowance for loan losses or shareholders' equity balance.

#### Asset Quality (20%)

*US: Total Assets to Non-performing Assets and Past-due Loans*

*Non-US: Impaired Loans to Risk-Weighted Assets*

Nonperforming assets and past-due loans represent the troubled portion of a bank's loan book. In gauging "coverage" for US banks, the smaller the percentage of nonperforming assets and past-due loans to total assets, the better. For non-US companies, the ratio is inverted, so a lower ratio is better.

#### Capital (15%)

*US: Tangible Common Equity to Tangible Assets*

*Non-US: Core Tier 1 Equity to Risk-Weighted Assets*

The Tangible Common Equity to Tangible Asset ratio is the most conservative measure of a bank's capital position. Akin to Tangible Common Equity, Core Tier 1 equity is a measure of a firm's capital cushion. In both cases, a high ratio is better since a bank will have more capital to counter losses.

#### Asset Quality and Reserves Against Possible Loan Losses (15%)

*US: Allowance for Loan Losses to Nonperforming Assets and Past-due Loans*

*Non-US: Allowance for Loan Losses to Impaired Loans*

A bank's allowance for loan losses represents a bank's second line of defense against expected loan losses. In general, the larger the allowance for loan losses in relation to nonperforming and past-due

loans, the better.

#### Asset Quality and Capital (10%)

*US: Tangible Common Equity to Nonperforming Assets and Past-due Loans*

*Non-US: Core Tier 1 Equity to Impaired Loans*

Tangible common equity (or Core Tier 1 equity) is a bank's third line of defense against credit losses. The more equity a bank holds in relation to nonperforming and past-due assets, the better.

#### Liquidity (10%)

*US: Deposits/Liabilities*

*Non-US: Customer Deposits/Customer Loans*

Deposits, particularly core deposits, are typically the lowest-cost and most stable source of funding for a bank. The higher the proportion of deposits to total liabilities, the better. However, large banks with better access to the capital markets often use this to their advantage, hence the relatively low weight placed on this ratio. For non-US banks, the rationale is the same. The more deposits cover loans, the less the firm will have to borrow from capital markets to fund its assets and the lower its interest expenses will tend to be.

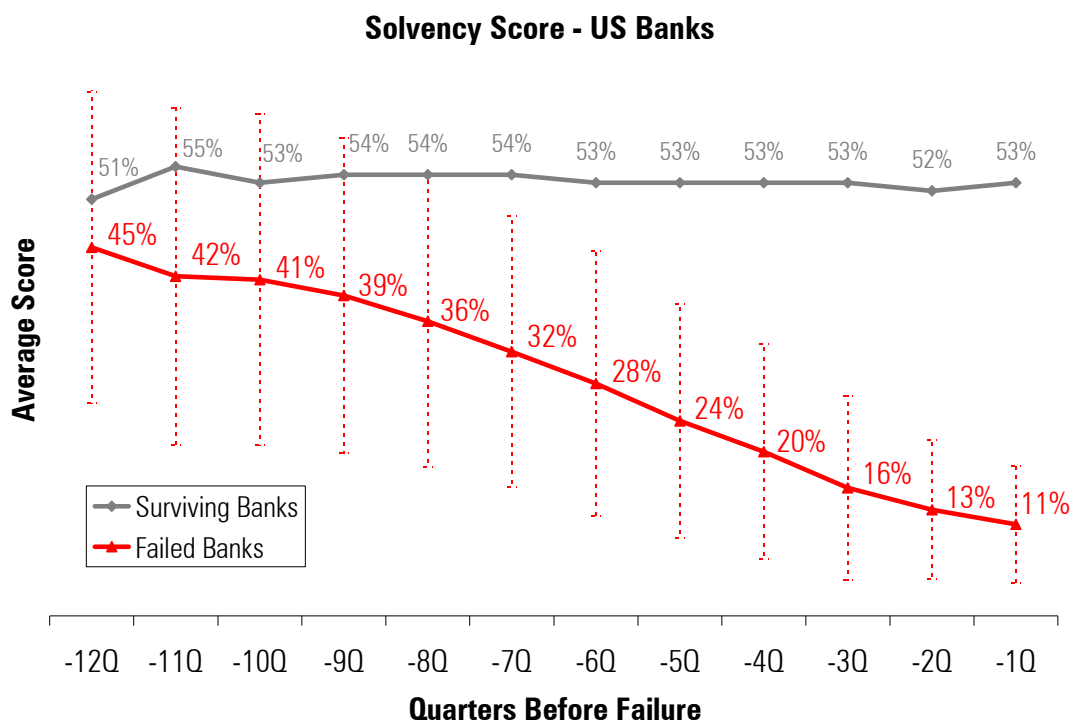
As a weighted average of six individual percentile rankings, the final Bank Solvency Score can range from a minimum of 0.0 to a maximum of 1.0. A sample US Bank Solvency Score calculation, with historical trends, is shown below:

SOLVENCY SCORE		Sep-09	Dec-09	Mar-10	Jun-10	Sep-10
<b>Metrics</b>						
Assets/(NPAs + Past-due loans)		47.98	56.13	58.28	68.5 x	70.4 x
Allowance/(NPAs + Past-due loans)		36%	43%	43%	50%	50%
Tangible Common Equity/(NPAs + Past-due loans)		401%	462%	486%	598%	621%
Tangible Common Equity/Tangible Assets		8.7%	8.5%	8.6%	9.0%	9.1%
Deposits/Liabilities		91%	93%	93%	93%	93%
Pre-tax, pre-provision earnings/Average Assets		1.7%	1.8%	1.8%	1.8%	1.8%
<b>Percentiles</b>						
Assets/(NPAs + Past-due loans)	20%	71%	77%	80%	82%	82%
Allowance/(NPAs + Past-due loans)	15%	50%	62%	64%	69%	68%
Tangible Common Equity/(NPAs + Past-due loans)	10%	75%	79%	81%	83%	83%
Tangible Common Equity/Tangible Assets	15%	75%	75%	73%	75%	74%
Deposits/Liabilities	10%	67%	75%	72%	72%	73%
Pre-tax, pre-provision earnings/Average Assets	30%	80%	84%	82%	81%	80%
<b>SOLVENCY SCORE</b>		<b>0.71</b>	<b>0.77</b>	<b>0.76</b>	<b>0.78</b>	<b>0.77</b>

Note that this particular institution scores very well with respect to earnings power and credit quality--better than roughly 80% of all banks tested. In addition, this bank has made very clear improvement in terms of its credit quality, especially with regards to its reserve coverage. Having only an average ratio of allowance/NPA and past due loans in the third quarter of 2009, it beat 68% of the firms one year later. Overall, the bank receives a weighted score of 0.77.

Historical tests on failed US financial institutions have shown a strong relationship between the Morningstar Bank Solvency Score during the quarters leading up to failure, and subsequent financial

distress. A test of the Bank Solvency Score used a sample of 90 bank holding companies that have failed since mid-2008, matched with surviving banks of equivalent asset size. The average Bank Solvency Score of the failed banks tested showed a consistent quarterly decline over the 12 consecutive quarters prior to failure, with significant differences occurring well before failure. The chart below illustrates the average Solvency Score of each group at various points leading up to failure, along with the failed banks scores' standard deviations.



An example of a non-US Bank Solvency Score result appears in the table below. Underneath the scoring table are the thresholds representing the minimum, maximum, and 50% of the total possible score.

SOLVENCY SCORE		Sep-09	Dec-09	Mar-10	Jun-10	Sep-10
<b>Metrics</b>						
Impaired Loans / Risk-Weighted Assets		2.8%	2.9%	2.5%	2.6%	2.4%
Allowance / Impaired Loans		88%	85%	97%	93%	105%
Core Tier 1 Equity / Impaired Loans		406%	405%	437%	401%	431%
Core Tier 1 Equity / Risk-Weighted Assets		11.2%	11.7%	10.8%	10.3%	10.5%
Customer Deposits / Customer Loans		78%	78%	76%	78%	73%
Pre-tax, Pre-provision Earnings / RWA (annualised)		6.1%	6.6%	5.4%	5.4%	5.3%
<b>Scores</b>						
Impaired Loans / Risk-Weighted Assets	20%	47%	46%	51%	49%	52%
Allowance / Impaired Loans	15%	69%	65%	82%	76%	93%
Core Tier 1 Equity / Impaired Loans	10%	81%	81%	87%	80%	86%
Core Tier 1 Equity / Risk-Weighted Assets	15%	92%	97%	88%	83%	85%
Customer Deposits / Customer Loans	10%	47%	47%	44%	47%	39%
Pre-tax, Pre-provision Earnings / RWA (annualised)	30%	100%	100%	100%	100%	100%
<b>SOLVENCY SCORE</b>		<b>0.76</b>	<b>0.76</b>	<b>0.79</b>	<b>0.76</b>	<b>0.80</b>

SOLVENCY SCORE THRESHOLDS			
	0%	50%	100%
Impaired Loans / Risk-Weighted Assets	6.8%	2.5%	1.0%
Allowance / Impaired Loans	40%	75%	110%
Core Tier 1 Equity / Impaired Loans	125%	250%	500%
Core Tier 1 Equity / Risk-Weighted Assets	4.5%	7.0%	12.0%
Customer Deposits / Customer Loans	50%	80%	110%
Pre-tax, Pre-provision Earnings / RWA (annualised)	1.0%	3.0%	5.0%

This particular bank does fairly well, with an overall score of 0.80. The company's high ratio of pre-tax, pre-provision earnings/risk-weighted assets, demonstrates that it is highly profitable before credit losses. In addition, while the level of impaired loans has remained largely unchanged, management has been strengthening the firm's reserves nicely, hence the increasing allowance/impaired loans coverage score. Notwithstanding its healthy earnings, coverage, and capital metrics, the firm does have to rely on outside money to fund its loan book. In particular, the fall in the deposits to loans ratio between June and September of 2010 could signal either modest deposit flight or overzealous credit expansion--both of which could be a sign of future trouble.

## II. Bank Stress Test Score

The **Morningstar Bank Stress Test Score** evaluates a bank's capacity to handle additional losses in its loan and securities portfolios. This ability depends on both the company's initial capital position and its potential to boost its equity base with earnings.

Compared with the stress tests conducted under the US's Supervisory Capital Assessment Program, the Morningstar Stress Test Score differs in two important ways. First, it is conducted on a rolling basis each quarter. Thus, it continually measures a bank's ability to handle additional stress beyond any already recognized losses. We believe this reduces the need for analysts to forecast precise turning points in the credit cycle, given that the rolling test always incorporates an additional two years of elevated losses. Second, the Bank Stress Test Score uses Morningstar analysts' forecasts of future pre-tax, pre-provision earnings and expenses for individual banks. As an absolute measure of capital, the average Bank Stress Test Score across our coverage universe will increase as total banking system capital increases, and will decrease when financial companies add leverage. This stands in contrast to the relative ranking of capital position when computing the Bank

## Solvency Score.

The Stress Test Score is based on a bank's expected capital position at the end of a two-year period of (hypothetical) elevated losses. Expected losses in various loan and security categories are applied to a bank's most recent reported asset balances. Differences in underwriting standards and credit quality between banks are accounted for by adjusting loss rates based on analyst judgment. Analysts rate a bank's underwriting for each type of loan as "Below Average", "Average", or "Above Average". For banks rated "Below Average", expected losses will be calculated using the high end of the prescribed range. For banks rated "Average", loss rates at the midpoint of the range are used. For banks rated "Above Average," loss rates at the low end of the range are utilized.

In the case of US banks, write-off rates are based on predetermined ranges influenced by the loss rates applied under the "more adverse" economic scenario contemplated by the Supervisory Capital Assessment Test. Understanding that non-US institutions' loan portfolios can have very different loss content than their US equivalents, the loss ranges are wider for these companies. For example, factors such as extremely stringent regulation and government-backed mortgage insurance are likely to produce lower losses than would be experienced at even the most conservative US residential mortgage underwriters. On the other hand, if a crisis were to hit an emerging economy with a nascent mortgage market, losses on loans would probably exceed the most adverse US scenario by a considerable amount.

Naturally, this is not a catch-all approach and special cases are bound to emerge. For some types of loans and securities, analysts have discretion to input an appropriate loss rate. For example, loans covered by FDIC loss-sharing agreements and other loan types which do not fit in a pre-defined category will be subject to analysts' judgment.

For US banks, securities loss rates are applied to a bank's "at-risk" portfolios of trading, available-for-sale, and held-to-maturity securities, with US government and agency securities excluded from the balances subjected to losses. All other securities are assumed to be vulnerable to loss, and subjected to standardized loss rates. Given the lack of disclosure in some other countries and the doubtful creditworthiness of government-backed securities, the totality of non-US banks' securities portfolios are stressed, including the net derivative assets.

In all cases, total losses are subtracted from the bank's last reported capital position. For capital, we use tangible common equity for US banks, whereas for non-US companies we use Core Tier 1 equity.

The loss rates applied to various US loan and security categories are listed below:

STRESS TEST LOSS RATES			
SCAP RATES	ADVERSE CASE		
	Low	Mid	High
First Lien Mortgages	7.0%	7.8%	8.5%
<i>Prime</i>	3.0%	3.5%	4.0%
<i>Alt-A</i>	9.5%	11.3%	13.0%
<i>Subprime</i>	21.0%	24.5%	28.0%
Second/Junior Lien Mortgages	12.0%	14.0%	16.0%
<i>Closed-end Junior Liens</i>	22.0%	23.5%	25.0%
<i>HELOCs</i>	8.0%	9.5%	11.0%
C&I Loans	5.0%	6.5%	8.0%
	0.0%	0.0%	0.0%
CRE	9.0%	10.5%	12.0%
<i>Construction</i>	15.0%	16.5%	18.0%
<i>Multi-family</i>	10.0%	10.5%	11.0%
<i>Non-farm, non-residential</i>	7.0%	8.0%	9.0%
Credit Cards	18.0%	19.0%	20.0%
Other Consumer	8.0%	10.0%	12.0%
Other Loans	4.0%	7.0%	10.0%
<b>MORNINGSTAR ESTIMATES</b>			
Securities Losses - "At-risk" AFS and HTM	2.5%	5.0%	10.0%
Securities Losses - Trading	2.5%	7.5%	12.0%

For non-US institutions, the loss rate bands are wider. In addition, the analyst has the latitude to explicitly estimate the stress case loss rates for the "other" categories, both in the domestic and foreign portfolios, as shown below:

STRESS TEST LOSS RATES			
MORNINGSTAR ESTIMATES	ADVERSE CASE		
	Low	Mid	High
<b>Loan Loss Estimates</b>			
Commercial	3.8%	6.5%	12.0%
Commercial Real Estate	6.8%	10.5%	18.0%
Other Commercial	3.0%	7.0%	15.0%
Consumer Real Estate	2.3%	3.5%	6.0%
Other Consumer	6.0%	10.0%	18.0%
< other domestic 1 >			
< other domestic 2 >			
< other domestic 3 >			
< other domestic 4 >			
< other foreign 1 >			
< other foreign 2 >			
< other foreign 3 >			
< other foreign 4 >			
<b>Securities Loss Estimates</b>			
Securities Losses - AFS and HTM	1.9%	5.0%	15.0%
Securities Losses - Trading	1.9%	7.5%	18.0%
Securities Losses - Derivatives	1.9%	7.5%	18.0%

Estimates of pre-tax, pre-provision earnings (net interest income + non-interest income - operating expenses) get a trim of 5%, 25%, or 50% depending on how resilient the company's income is, as assessed by the analyst. These three haircut rates are in line with how banks have fared in past

crises. For example, an institution with a very healthy mix of interest and fee income will usually see smaller falls in revenues during a crisis. In contrast, a bank that largely depends on its interest income will tend to experience a much more pronounced fall in its top line as more loans enter nonaccrual status during a crisis. Finally, forecasted changes in the allowance for loan losses are added or subtracted as necessary to the curtailed core earnings for the next two years. In quarters other than the final quarter of the fiscal year, analysts' annual forecasts are prorated over the appropriate time period. Once losses are subtracted and forecasted earnings are added to a bank's current capital position on an after-tax basis, a final score is awarded based on the bank's expected capital position at the end of the two-year period.

For US firms, the score is measured by both post-stress test Tangible Common Equity to current Risk-Weighted Assets (TCE/RWA) and post-stress test Tangible Common Equity to current Tangible Assets (TCE/TA). The two scores are averaged and scaled to a final Stress Test Score ranging from 0.0 to 1.0. Points are awarded for the expected capital ratios based on the following scales:

Tangible Common Equity to Risk-Weighted Asset Ratio

0.0 points: Less than 0.0%  
 0.0 - 5.0 points (prorated): 0.0% - 15.0%  
 5.0 points: Greater than 15.0%

Tangible Common Equity to Tangible Asset Ratio

0.0 points: Less than 0.0%  
 0.0 - 5.0 points (prorated): 0.0% - 10.0%  
 5.0 points: Greater than 10.0%

Non-US banks use post-stress test Core Tier 1 equity to risk-weighted assets and the scores are prorated according to the following thresholds:

0.0 points: Less than 0.0%  
 0.0 - 2.5 points: 0.0% - 4.5%  
 2.5 - 4.0 points: 4.5% - 7.0%  
 4.0 - 5.0 points: 7.0% - 14.0%  
 5.0 points: Over 14.0%

As with the US banks, the non-US points are scaled to a 0.0 - 1.0 scale. In both cases, the final Stress Test Score makes up 30% of the final recommended credit score.

A sample Bank Stress Test calculation for a US bank is shown below:

STRESS TEST SCORE		Scale
Tangible Common Equity	1,556,452	
Risk-weighted Assets	10,760,025	
Tangible Assets	17,400,745	
Tangible Common Equity / Risk-weighted Assets	14.5%	
Post-stress TCE / Risk-weighted Assets	13.3%	
Post-stress TCE / Tangible Assets	8.2%	
TCE / RWA Score	4.4	Scaled between: < 0% = 0 and > 15% = 5
TCE / TA Score	4.1	Scaled between: < 0% = 0 and > 10% = 5
<b>STRESS TEST RAW SCORE</b>	<b>0.86</b>	

STRESS TEST					
Underwriting Quality		Last Quarter Reported - Date	Mar-11		
(1 = conservative, 2 = average, 3 = aggressive)		Last Quarter Reported (1-4)	1		
LOSS ESTIMATES	Quality Rating	PROJECTED LOSSES	EXPOSURE (%TCE)		
			MORE ADVERSE		
<b>COMMERCIAL</b>					
General Commercial (lines of credit, working capital loans, etc.)	1	3,723,244	186,162	239%	
Construction	1	825,438	123,816	53%	
Real Estate	1	2,410,760	216,968	155%	
Lease Finance			0	0%	
Other Commercial Loans	2	17,310	1,212	1%	
< other commercial 2 >			0	0%	
< other commercial 3 >			0	0%	
Total Commercial Loans and Leases		6,976,752	528,158	448%	
<b>CONSUMER</b>					
Real Estate (mortgage)	1	298,339	8,950	19%	
Home Equity (Amortizing HE loans, HELOC, Jr. Liens)	1	462,525	55,503	30%	
Credit Cards/Unsecured Lines			0	0%	
Vehicle Loans			0	0%	
Other Consumer Loans	2	307,812	30,781	20%	
< other consumer 2 >			0	0%	
< other consumer 3 >			0	0%	
Total Consumer Loans and Leases		1,068,676	95,234	69%	
Other			0		
<b>Total Loans and Leases</b>		<b>8,045,428</b>	<b>623,392</b>	<b>517%</b>	
Unearned discount		(20,348)			
Allowance for loan losses (Reserves)		(124,321)			
<b>Net Loans and Leases</b>		<b>7,900,759</b>		<b>508%</b>	
<b>SECURITIES</b>					
Securities - Available for Sale		5,662,211		364%	
Less: Federal Government and Agency AFS Securities		3,547,416		228%	
At-Risk Securities - Available for Sale	1	2,114,795	52,870	136%	
Securities - Held to Maturity		341,034		22%	
Less: Federal Government and Agency HTM Securities		251,761		16%	
At-Risk Securities - Held to Maturity	1	89,273	2,232	6%	
Securities - Trading		20,746		1%	
Less: Federal Government and Agency Trading Securities				0%	
At-Risk Securities - Trading	2	20,746	1,556	1%	
<b>Total At-Risk Securities</b>		<b>2,224,814</b>	<b>56,658</b>	<b>143%</b>	
<b>CUMULATIVE LOSS ESTIMATES</b>			<b>680,050</b>	<b>44%</b>	
<b>ANALYST PROJECTIONS</b>					
		Year 1	Year 2	Year 3	
Net Interest Income		586,512	635,914	707,355	1,929,780
Non-interest Income, Including Gains on Sale		297,200	309,387	328,624	935,211
Non-interest Expense		548,976	560,104	593,418	1,702,499
Pre-tax, Pre-provision Income		<b>334,735</b>	<b>385,196</b>	<b>442,561</b>	1,162,492
Post-Stress Allowance / Total 2-Year Credit Losses	50.0%			(340,025)	
Stressed Pre-tax, Pre-provision Income Capital Generation	1	238,499	365,936	105,108	709,543
Less: Change in Allowance for Loan Losses					(215,704)
Less: Total Losses, More Adverse Scenario					(680,050)
Tax Rate - After-tax Change in Capital	35.0%				(121,037)

In the "Loss Estimates" section, potential losses (a total of \$680 million in this case) are calculated based on the "Underwriting Quality Rating" assigned by the analyst for each individual loan category and the range of potential losses given in the previous table. The "Analyst Projections" section pulls income forecasts from the analyst's discounted cash flow model.

The "After-tax Change in Capital" (-\$121 million loss) --the sum of the analyst's trimmed pre-tax, pre-provision income forecasts, the expected change in the allowance for loan losses, and the cumulative loss estimate-- is then added to the bank's current tangible common equity position (\$1.56 billion). Post-stress TCE/RWA (13.3%) and TCE/TA (8.2%) ratios are calculated using *current* tangible asset and risk-weighted asset balances for purposes of conservatism, though both amounts would likely decline in a severe loss scenario. The final Stress Test Score (0.86) is a scaled average of the TCE/RWA score (4.4 out of five points) and the TCE/TA Score (4.1 out of five points).

### III. Bank Business Risk Score

The **Business Risk Score** for banks is similar to the scoring system used for nonbanks, with several important distinctions. The Business Risk Rating for US banks incorporates six criteria: Size, Economic Moat Rating, Equity Uncertainty Rating, Geographic and Business Line Concentration, Management, and Dependence on Capital Markets. In addition, there is a seventh element, Country Risk Score, which is based on the current sovereign debt CDS spread. Points are awarded according to the following scale:

#### Size (0-5 points): 10% of final Business Risk Score

Larger banks not only tend to have better access to capital markets, they are also more likely to receive governmental support. We assign a score based on asset size as follows:

- 0 points: Less than \$1B in assets
- 1 point: \$1B to \$9.9B in assets
- 2 points: \$10B to \$49B in assets
- 3 points: \$50B to \$99B in assets
- 4 points: \$100B to \$999B in assets
- 5 points: More than \$1T in assets

#### Economic Moat Rating (0-4 points): 20% of final Business Risk Score

An essential part of our company analysis is the Economic Moat rating, which encapsulates our view of a company's competitive advantage and its ability to earn excess returns on capital.

- 0 points: No Moat
- 2 points: Narrow Moat
- 4 points: Wide Moat

#### Uncertainty Rating (0-4 points): 10% of final Business Risk Score

We assign a score based on a company's Uncertainty Rating, as determined by our analysts.

- 0: Extreme
- 1: Very High
- 2: High
- 3: Medium
- 4: Low

Geographic and Business Line Concentration (0-4 points): 10% of final Business Risk Score

An important factor in the stability of a company's future revenue and profits is the diversification of both its product portfolio and its customer base. Other things equal, a company with a wide variety of products and a variety of end markets is less subject to economic or regulatory shocks than a more focused company. Banks are awarded one point for the presence of each of the following diversification factors, according to analyst judgment.

- + 1: Noninterest income makes up a significant percentage of net revenue (e.g. deposit fees)
- + 1: Loan book diversified across several loan categories
- + 1: Loan book diversified geographically
- + 1: Nonbanking income makes up a significant percentage of net revenue (e.g. payment processing, asset management, etc.)

Management Grade (0-4 points): 15% of final Business Risk Score

The Management Grade captures our view of a firm's management team as steward of bondholder capital, transparency, board independence, incentives and ownership, and investor friendliness.

- 0: Poor
- 1: Below Average
- 2: Average
- 3: Above Average
- 4: Excellent

Dependence on Capital Markets (0-4 points): 25% of final Business Risk Score

Our analysts score each company on its need to access the capital markets over our five-year forecast horizon. Because capital markets are inherently unpredictable, a company whose survival depends on them is more at risk than a company that can ignore the market's whims. While financial institutions are all dependent on capital markets to some extent, some sources of capital are more stable than others.

- 0 points: Dependent on short-term debt
- 1 point: Dependent on the securitization market
- 2 points: Dependent on brokered deposits or similar "hot money"
- 3 points: Dependent on term debt or FHLB loans
- 4 points: Funded to a large extent by core deposits

Country Risk (0-4 points): 10% of final Business Risk Score

We use a market-based indicator to reflect the creditworthiness of the firm's home country. This

score is based on the quoted 5-year sovereign CDS spread. Points are assigned according to the following table:

- 4 points: less than 120 basis points
- 3 points: between 120 and 210 basis points
- 2 points: 210 - 330 basis points
- 1 point: 330 - 540 basis points
- 0 points: over 540 basis points

The point totals are then multiplied by their respective weightings, and scaled to a final Business Risk Score ranging from 0.0 to 1.0. The final Business Risk Score makes up 30% of the final recommended credit score.

#### **IV. Bank Distance to Default Score**

Co-authored by Vahid Fathi

##### *Introduction*

Merton describes the rationale and methodology for structural models of default<sup>1</sup>. Suffice it to say that the underlying premise in such models is that default occurs when the market value of the firm's assets falls below a certain level of the firm's liabilities, or "default barrier". Since the market value of the firm's assets cannot be observed, a modified European call option for dividend paying stocks is used to establish a relationship between the market value of the firm's assets, its volatility, and market value of shareholders' equity.

As long as the firm's market value of assets is less than the book value of its liabilities, the market value of shareholders' equity is zero, and firm's assets are claimed by bondholders. On the other hand, if the market value of the firm's assets exceeds the firm's liabilities, assumed to be equivalent to the notional principal of a risk-free zero-coupon bond, shareholders receive the residual value, while their payoff increases linearly with the firm's market value of its assets.

##### *Methodology*

For banks, we revise our general structural model of default for nonfinancial firms to better represent the highly leveraged business model of banks. More specifically, for US banks, we adjust the default barrier in our structural model to account for banks' regulatory capital requirements as opposed to the more customary default barrier that accounts only for the firm's liabilities, and which therefore tend to overstate the distance to default and understate the probability of default for banks. Depending on the actual required regulatory capital, the distance to default for banks can decline measurably. Assuming zero regulatory capital requirements, the distance to default for both banks and nonbanks will be equal.

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<sup>1</sup> Merton, R. C., On the Pricing of Corporate Debt: The Risk Structure of Interest Rates, *Journal of Finance*, 29 (1974), 449-70.

Due to accounting, currency, regulatory, and benchmark differences between US and non-US banks, we use a different method for non-US institutions. We use a market-based approach that incorporates 5-year CDS spreads or an equivalent spread dependent on the company's bond yields.

#### *Determining the Default Barrier for US Banks*

In our structural model of default for US banks, we adjust our standard default barriers for a minimum 4% capital adequacy ratio. We currently define minimum capital adequacy as 4% of banks' total tangible assets (subtracting out goodwill and intangibles). As the regulatory landscape changes, we plan to alter the default barrier as necessary.

#### *Benchmarking*

For the purpose of estimating asset drift, our general distance to default model is benchmarked to a representative broad market index. For our US bank-centric model, the calculation of asset drift is based on a bank-specific benchmark. We use the SPDR KBW Bank ETF (KBE), an ETF tracking the performance of publicly-traded US bank and thrift stocks.

#### *Scoring & Ranking Procedure for Distance to Default Ranks*

Our bank Distance to Default scores are dynamic in nature, and meant to serve as ordinal ranking measures. We rank-order the raw Distance to Default values from high to low and bucket the results for our US bank universe of nearly 400 firms. Banks are then ranked into one of 9 buckets (a lower rank is better). These buckets are refreshed daily.

For non-US institutions we use 5-year CDS spreads instead of the traditional Distance to Default quantitative score. We rank order the CDS spreads for the world's forty or so largest financial institutions and partition the list into nine separate buckets. We then compare a particular bank's CDS spread and see in which bucket it falls. In case there is not an active market for a company's CDS, we derive an equivalent spread using its corporate bond yield. This exercise is performed on a monthly basis. However, if market volatility warrants it, revisions could certainly be more frequent.

Any changes in relative standing of banks that may cause a rating change will be monitored and reviewed by the Morningstar credit rating committee. Such changes in banks' Distance to Default scores may not necessarily dictate an immediate rating change. The credit committee reviews Distance to Default in the context of the bank's historical trends.

For both US and non-US banks, we use the following formula to map banks' Distance to Default rank into a raw score:

$$\text{Distance to Default Score} = (\text{Firm rank} - 1)/8$$

The Distance to Default score makes up 10% of the final quantitative raw credit score.

### **Recommended Credit Ratings**

During the penultimate step of the credit rating process (followed only by discussions between the analyst and members of the credit rating committee), a model-driven rating is obtained. To be consistent with Morningstar's credit rating scoring systems in other industries, where a lower score

is better, every pillar's score, with the exception of the Distance to Default raw score, is subtracted from 1. The resulting four components are weighted (30% for Bank Solvency Score, Bank Stress Test Score, and Bank Business Risk Score, and 10% for Distance to Default) and summed to achieve a final score ranging from 0.0% to 100.0%. A recommended credit score is then obtained according to the following scale:

RECOMMENDED CREDIT RATING				
Minimum		RATING		Maximum
N/A		<b>AAA</b>		N/A
N/A		<b>AA+</b>		N/A
0.0%	<=	<b>AA</b>	<	5.0%
5.0%	<=	<b>AA-</b>	<	15.0%
15.0%	<=	<b>A+</b>	<	20.0%
20.0%	<=	<b>A</b>	<	25.0%
25.0%	<=	<b>A-</b>	<	40.0%
40.0%	<=	<b>BBB+</b>	<	45.0%
45.0%	<=	<b>BBB</b>	<	55.0%
55.0%	<=	<b>BBB-</b>	<	60.0%
60.0%	<=	<b>BB</b>	<	70.0%
70.0%	<=	<b>B</b>	<	80.0%
80.0%	<=	<b>CCC</b>	<	90.0%
90.0%	<=	<b>CC</b>	<=	100.0%

The highest possible recommended credit score for a financial institution is "AA", indicating "very low default risk". In general, we expect financial institutions to score lower than nonfinancial companies, owing to their higher leverage and dependence on potentially unstable funding arrangements.