Article Title: ARCHIVE | Criteria | Insurance | Bond: Understanding The Bond Insurance Capital Adequacy Model Data: (EDITOR'S NOTE: — This criteria article is no longer current. It has been superseded by "Bond Insurance Rating Methodology And Assumptions," published Aug. 25, 2011.) Measuring the capital adequacy of a bond insurer—a challenging task in the analysis of these unique insurance companies—is key to assessing financial strength. Unlike more traditional insurance companies, where policies typically cover short-term risks and losses regularly occur and are somewhat predictable, bond insurers cover risks that extend up to 30 years and losses occur irregularly and are not predictable. Moreover, for bond insurers, losses are expected largely under a worst-case scenario, thereby defining the test that measures a bond insurer's capital adequacy. For many of the types of bonds insured by bond insurers, such as general obligations (GO) and utilities, the worst-case scenarios that apply date back well before the birth of the bond insurance industry in 1971. Other types of bonds, such as Mello-Roos and special assessment districts, as well as many classes of asset-backed securities, are too new to have experienced what analysts would consider a worst-case scenario. For these reasons, measuring the capital adequacy of a bond insurer cannot be accomplished simply by a review of historical financial statements. Only a "what if" simulation that subjects the insurer to economic conditions expected to occur during the most stressful of economic times can measure an insurer's capital adequacy. Such a simulation was the basis of Standard & Poor's original capital adequacy model. The concept was that an insurer had to be able to pay an assumed level of claims that would occur during a period of economic stress and still remain solvent.

Table 1 U.S. Municipal And Corporate Rating Sensitive Capital Charges (%)* And Single-Risk Categories

—UNDERLYING RATING CATEGORY— Sector¶	BB	BBB	A	AA	Single-risk category§
General obligation					
States	15	4	2	2	1
Cities and counties	50	13	7	5	1
Schools - elementary and secondary	20	5	3	2	1
Special district	60	16	8	6	1
Community college district	50	13	7	5	1
TAX-SUPPORTED DEBT					
Sales, gas, excise, gas and vehicle registration Local	75	20	11	8	2
Statewide	40	10	6	4	1
Guaranteed entitlements	50	13	7	5	1
Special assessments, Mello Roos, TIFs	125	33	18	13	4
Hotel/motel	125	33	18	13	4
Personal income <1.0 million population	75	20	11	8	2
>1.0 million population	40	10	6	4	1
Cigarette, liquor	125	33	18	13	4
HEALTH CARE					
Hospitals	175	46	25	18	6
Hospital systems (three or more hospitals with geographic dispersion)	150	39	21	15	5
Hospital equipment loan program (HELP)	175	46	25	18	6
Health maintenance organization (HMO)	175	46	25	18	6
Clinic practices closely affiliated with hospital	175	46	25	18	6
Nursing home	175	46	25	18	6
Nursing home system (three or more homes with geographic dispersion)	150	39	21	15	5
Life-care center	175	46	25	18	6
Life-care center system (three or more centers with geographic dispersion)	150	39	21	15	5
Human service providers	100	26	14	10	3
UTILITIES					
Public power agency (with special project risk) (1)	200	52	28	20	6
Public power agency with high dependence on nuclear (2)	150	39	21	15	5
Public power agency (with no special project risk and little nuclear dependence) (3)	75	20	11	8	2
Water, sewer, electric, and gas systems (revenue-secured)	60	16	8	6	1
Solid waste disposal to energy or landfill project (single site)	125	33	18	13	4
Solid waste system (with landfill and/or waste to energy facility)	100	26	14	10	3
Solid waste transfer stations, trucks (no landfill/waste-to-energy facility)	75	20	11	8	2
SPECIAL REVENUE					
Private colleges and universities and independent schools General obligation	125	33	18	13	4
Auxiliary enterprises	175	46	25	18	6
Public colleges and universities and community college revenue bonds General obligation - unlimited fee pledge	45	12	6	5	1
General obligation - limited fee pledge	50	13	7	5	1
Auxiliary enterprises and related foundations	75	20	11	8	2
Guaranteed student loans	50	13	7	5	1
Not-for-profit and 501(c)3s	175	46	25	18	6
Charter schools	175	46	25	18	6
Airports	60	16	8	6	1
Limited tax-backed	50	13	7	5	1
Passenger facility charge	100	26	14	10	3
Special facility (with rate flexibility)	80	21	11	8	2
Ports	90	23	13	9	2
Limited tax-backed	70	18	10	7	1
Special facility (with rate flexibility)	150	39	21	15	5
Parking	125	33	18	13	4
Toll roads Five-year operating history	100	26	14	10	3
Less than five-year operating history	150	39	21	15	5
Bridges Five-year operating history	125	33	18	13	4
Less than five-year operating history	175	46	25	18	6
Federal grant-secured obligations	80	21	11	8	2
Federal grant-secured obligations with additional credit support	60	16	8	6	1
HOUSING BONDS					
HFA ICRs	75	20	11	8	2
PHA capital fund receivables securitizations	100	26	14	10	3
State agency single-family**	50	13	7	5	1
Local agency single family**	100	26	14	10	3
FHA-insured multifamily**¶¶	3	0.8	0.4	0.3	1
Stand-alone affordable housing/Section 8/student housing	175	46	25	18	6
Mobile home parks/single borrower pools	150	39	21	15	5
Military housing/multiborrower pools	125	33			

18 13 4 INVESTOR-OWNED UTILITIES Electric distribution system 60 16 8 6 1 Water, electric and gas 60 16 8 6 1 Gas distribution 75 20 11 8 2 Telephones 75 20 11 8 2 Natural gas pipeline 225 59 32 23 6 CORPORATES AND FINANCIAL INSTITUTIONS¶¶ Life and property/casualty insurance operating companies 27.7 7.4 3.5 2.9 5 Life and property/casualty insurance holding companies 55.4 14.8 7.1 5.9 6 Bank operating companies 27.7 7.4 3.5 2.9 5 Bank holding companies 55.4 14.8 7.1 5.9 6 Industrial companies 41.6 11.1 5.3 4.4 6 Subordinated debt 55.4 14.8 7.1 5.9 6 *Expressed as a percentage of average annual debt service.¶Moral obligations: a constant adjustment factor of 200% will be used. Lease obligations: a constant adjustment factor of 200% will be used. General fund or non-ad valorem pledges: a constant adjustment factor of 150% will be used. Junior lien bonds: a constant adjustment factor of 120% will be used. §See Table 6. **Top tranche, secondary market transactions only. Primary and mezzanine structures are assessed on individual basis. ¶¶Expressed as a percentage of par. For maturities of one year or less the capital charge is reduced by 75%; for maturities of between one year and three years the capital charge is reduced by 50%; for maturities between three years and five years the capital charge is reduced by 25%. (1) Public power agencies with special project risk, including, but not limited to, troubled nuclear operations and capital additions that fundamentally alter a utility's debt profile and/or represent the adoption of new, unproven, technologies. (2) Public power agencies that are highly dependent on nuclear generation to serve customers' needs. (3) All other public power agencies, including those that do not face special project risk and that do not have a substantial dependence on nuclear resources to serve customers. George Hempel's "An Analysis of Past Defaults on State and Local Debt" formed the basis for the model and defined the level of claims that could be expected to occur. This study showed that, at the peak of the Great Depression, by the fourth year, a cumulative 16% of annual debt service on all outstanding municipal obligations was in default. For nontraditional municipal debt, there is no specific study that underlies the various reserve requirements. In 1984, Standard & Poor's recognized that an evolving mix of issues in the municipal market made it much more complex than during the Great Depression. As a result, Standard & Poor's revised its model to break out the municipal market into a number of sectors, such as state GOs, hospitals, and water and sewer systems, assigning different risk levels to each sector. Thus, the risk assigned to an insurer's portfolio was directly a function of the amount of bonds from each sector that had been insured. In 1996, in response to a widening distribution of underlying ratings, the capital charge system was broadened into a matrix where the capital charge became a function of the sector and underlying rating of a particular issue. In 1997, rating sensitive international capital charges were introduced. The structured finance capital charge methodology was amended in 2000, making these charges more rating sensitive as well. Periodically, capital charges are added or amended to more accurately reflect current credit conditions and trends in the market (minor adjustments were made to public finance capital charges for 2003, and new ones added in 2004 and 2005). Table 2 International Rating Sensitive Capital Charges (%)* And Single-Risk Categories --UNDERLYING RATING CATEGORY-- COUNTRY AND SECTOR BB BBB A AA SINGLE-RISK CATEGORY¶ AUSTRALIA States 15 4 2 2 1 BELGIUM Regions 20 5 3 2 1 Municipalities and provinces 50 13 7 5 1 CANADA Provinces 15 4 2 2 1 Municipalities 50 13 7 5 1 FRANCE Departments/regions 20 5 3 2 1 Municipalities 50 13 7 5 1 Urban communities 50 13 7 5 1 Mixed transportation systems 85 22 12 9 2 Teaching and regional hospitals 100 26 14 10 3 All other hospitals 125 33 18 13 4 Municipal banks 125 33 18 13 4 New towns 125 33 18 13 4 ITALY Municipalities and provinces 30 8 4 3 1 Regions 40 10 6 4 1 JAPAN Prefectures 15 4 2 2 1 PORTUGAL Cities 50 13 7 5 1 SPAIN Autonomous communities and provinces 20 5 3 2 1 Municipalities 50 13 7 5 1 SWITZERLAND Cantons 30 8 4 3 1 UNITED KINGDOM Housing associations 85 22 12 9 2 Mass transit (pre-completion) 150 39 21 15 5 NHS trusts 60 16 8 6 1 NHS PFI projects 90 23 13 9 2 PFI accommodation projects 70 18 10 7 1 Regional electric companies 60 16 8 6 1 Universities 50 13 7 5 1 Local governments 20 5 3 2 1 Note: Capital charges may be adjusted if the insured obligation is denominated in a currency that differs from the insurer's capital base.*Expressed as a percentage of average annual debt service. ¶See Table 6. The various capital charges reflect the likelihood of default by an issuer in a sector, as well as the likely duration and magnitude of such a default if it were to occur. These factors are synthesized into capital charges for numerous sectors. The variations in the capital charge by sector primarily reflect differences in expected durations and magnitudes of default. The least risky municipal sectors are the GO bonds that

are backed by the taxing authority of the issuer, which has an obligation to raise taxes to meet debt-service needs. At the other end of the municipal spectrum are revenue-backed enterprises, such as hospitals and solid waste disposal facilities whose ability to pay debt service is limited by their ability to generate sufficient net revenues from a service that may be subject to competition, mismanagement, or obsolescence. There is only one set of capital charges that is used for all insurers, regardless of the rating of the insurer. A transaction's expected worst-case default frequency and severity are independent of the insurance company that would insure it. The insurer's rating has no bearing on the performance of any transaction. A simple example can demonstrate this point: A 'BBB'-rated bond is sold without insurance and subsequently, portions of the issue are insured in the secondary market by both 'A' and 'AAA'-rated bond insurers. If this issue defaults, the blocks insured by each of the insurers will perform exactly the same. Each insurer has taken on the same risk. The difference is that the 'A'-rated insurer will have less capital protection against the risk. The model is continually under review for possible improvement. Revised soft capital reinsurance credit criteria, implemented in 2003, are the most recent output of this review process (see "Standard & Poor's commentary: "Standard & Poor's Reassesses Credit Given for Reinsurance and Soft Capital in Its Bond Insurance Capital Adequacy Model," dated Jan. 31, 2003). Table 3 Details Of The Model Standard & Poor's model is a projection of financial results under stressful economic circumstances. Income, balance sheet, and cash flow statements are produced using statutory accounting principles (SAP), based on key assumptions provided by Standard & Poor's. Various key assumptions and relationships of the model are shown in table 3. The same model is used for all insurers regardless of rating. Time frame/business activity. Generally, it is assumed that three years of growth are followed by a four-year depression. During the growth years, new business is assumed to expand at an aggressive pace—the greater of the insurer's business plan or 15% growth in written premiums for municipal and 25% for structured finance. Once the depression starts, no new business is assumed to be written. By allowing no new business, the insurer is prevented from growing its way out of a capital problem. For start-up companies, to allow the insurer's business to mature, five years of growth is assumed before the depression starts. Premium rates assumed are the lower of the current rates or reasonably forecast rates. Insured portfolio composition. The mix of future business by sector, geographic area, and credit quality is assumed to mirror the current distributions. Adjustments are made where significant changes in business mix are anticipated, for example, a certain product line is no longer offered. Expected losses. Each insurer's weighted average capital charge percentage for municipal-backed issues is applied to the average annual debt service of its portfolio to determine the expected losses over the four years of the depression. The range of reported weighted-average municipal capital charges for the various diversified, 'AAA' rated insurers over the past few years has been 7% to 16%. Capital charges for corporates and financial institutions are applied to the par value of insured bonds outstanding. Losses for asset-backed securities (see table 4) are a function of the difference between the first-loss protection provided in the transaction and the level of first-loss protection necessary for the transaction to achieve an 'AAA' rating, the credit gap. (See Structured Finance Capital Charge Formula box for a detailed description and examples of the new structured finance capital charge formula.) Non-investment-grade obligations receive capital charges at least 2x the investment-grade capital charge. Certain obligations may have deteriorated to the extent that a near-term default cannot be ruled out. In these cases, called discrete losses, Standard & Poor's will assume that the transaction defaults immediately and remains in default throughout the life of the depression scenario. In such cases, reserves must be equal to the actual debt service for the given exposure. Similarly, Standard & Poor's assumes that bonds already in default will remain in default unless there is abundant reason to believe the default will be cured. Losses on debt service reserve (DSR) funds are assumed to occur in the year immediately preceding the depression and in the first year of the depression, reflecting the fact that these funds are the first to be used to meet debt service when an issuer defaults. The capital charge for a DSR is 50% of the sector's normal (average annual debt service) charge, applied to the entire amount of the surety policy. Capital charges may also be assessed against diversification efforts. Standard & Poor's will analyze each operation to determine the risk it poses, either directly through financial guaranty insurance policies or indirectly as a potential drain on capital, to the insurance company. Ranges of capital charges developed to date include: investment agreement provider (2.0%-4.0% of

agreements outstanding) and asset management companies (0%-2.0% of assets under management). Investment income. New investments earn at assumed conservative rates of interest throughout the forecast period. During the depression years, investment income is reduced to reflect defaults on non-'AAA' rated bonds held for investment. Common stocks and all securities rated below 'A' are assumed to become worthless at the beginning of the depression. Losses from the sale of investments are recognized in the first two years of the depression because of assumed interest rate movements that result in an inverted yield curve and long-term rates rising at least 600 basis points and throughout the depression on certain less-than-top-rated instruments to reflect reduced liquidity in the markets.

Table 4 Representative Capital Charges For Asset-Backed Securities

ASSET TYPE AS COLLATERAL	CAPITAL CHARGE (% OF PAR VALUE)
"Super-AAA" tranches of CDOs	0.1
Trade receivables	1.0 - 1.5
Prime auto loans	0.5 - 3.0
Sub-prime auto loans	2.0 - 6.0
Residential mortgages	1.0 - 6.0
Sub-prime home equity loans	2.5 - 6.0
High-yield bonds	4.0 - 8.0

Table 5 Loss Tolerance

Statutory Net Income
+ Taxes
- Refunded earned premiums
+ Lowest 5-year refunded earned premiums
- Capital gains
+ Capital losses
- Miscellaneous earnings
+ Miscellaneous losses
= Core single-risk earnings
X Two
= Single-Risk Loss Tolerance

Variables Four key variables in the Standard & Poor's model are listed in descending order of sensitivity: Capital charge. The weighted average capital charge is the most important variable, by a wide margin. This is not surprising, given the critical importance of the underwriting function, which not only approves an individual issue as eligible for insurance but also provides direction to the development of the risk portfolio in terms of sector and geographic dispersion. Average annual debt service. The original maturity of a municipal issue will determine its average annual debt service. Given the model's focus on years of debt service in default, the more debt service that can be in default during the worst-case years, the greater the aggregate claims. This variable is not as important for corporate or asset-backed transactions, because defaults on these issues are not measured in terms of debt-service payments lost but are on par value or collateral value. Premium rates. Premium rates will have a meaningful impact on capital adequacy over time, although much less than the first two variables. Because of intense competition among insurers for many years, premium rates became a focus of attention regarding the ability of insurers to maintain their capital adequacy. More recently, many insurers have exhibited greater pricing discipline, with the result that premium rates have increased to higher levels. Standard & Poor's model picks up a significant amount of the effect of changing premium rates, because it forces the insurer to write new business for three years before the depression starts, and because the unearned premium reserves are updated to capture the effect of historic refunding activity. The full effect of changed rates can be measured only over the life of the insured issues. Investment yields. Of all the key variables, investment yields have the least impact on capital adequacy. One hundred or 200 basis-point changes in investment yield on new investments will have only a modest impact on capital adequacy because of the substantial base of existing investments earning at their historical rates. A similar shift in investment yields for the entire portfolio could significantly affect capital adequacy. Margin Of Safety The primary output of the model is the ending statutory capital position of the company. While significant on its own, this key value provides greater analytical insight when expressed in the context of the scale of the company, particularly the level of claims expected during the stress years. The margin of safety accomplishes this by relating total claims-paying resources (ending statutory capital plus losses) to losses. Thus, a margin of safety of 1.25x signifies that ending capital exceeded losses by 25%. Stated another way, losses could have been 25% larger without driving the statutory capital to zero. The minimum margin of safety for 'AAA' rated bond insurers is 1.25x. For 'AA' and 'A' rated insurers the minimums are 1.0x and 0.80x, respectively. These minimum values may be adjusted slightly lower where the insurer is owned by a single high-rated entity that has expressed continued support for the company. A margin of safety of less than 1.0x suggests the possibility that the insurer will become insolvent before all claims are met in the event of an extremely severe period of economic stress. Single-Risk Capital adequacy must also account for risks associated with an excessive concentration of exposure to any one source of repayment. Regardless of the ability of the insurer to meet all claims during a depression, an inordinately large exposure to a defaulting issuer or issue could threaten its rating, particularly in a nondepression environment where the default is an isolated event and is not related to a general economic downturn. For this reason, Standard & Poor's has insurer-specific, single-risk guidelines that

limit exposures to individual issuers or issues in the case of asset-backed transactions. The approach is not to model possible large single-risk defaults, but to assume that any issuer or issue could default, despite "zero-loss underwriting standards," and to measure the possible loss against the earnings power of the company. The criteria for maximum single-risk exposure is based on two key assumptions: that the maximum loss allowable is a function of how much a bond insurer could write off and still maintain its existing rating, and that the expected loss on any issuer is a function of the issuer's market sector. The loss tolerance relating to a single issuer is equal to twice the company's core earnings (see table 5). Core earnings include adjustments for taxes, advanced refundings, capital gains and losses, and non-recurring income statement items. This approach conservatively identifies potential earnings net of any non-recurring items. Since any large loss would shelter a significant amount of earnings from taxes, pre-tax earnings are used in the calculation. In addition, since refunded earned premiums can vary greatly, refunded earned premiums for the base year are compared against the lowest level of premiums earned from refundings over the prior five years. The lower amount is included in the core single-risk earnings calculation. This methodology normalizes some of the income statement components (thereby reducing loss tolerance variability) and facilitates the single-risk planning process.

Table 6 Maximum Principal Exposure To A Single Issuer

CATEGORY (WORST-CASE LOSS, % OF PAR)	UNSEASONED MONOLINE % OF SURPLUS	SEASONED MONOLINE MULTIPLE OF LOSS TOLERENCE
1 (25%)	100	4
2 (37.5%)	67	2.67
3 (50%)	50	2
4 (60%)	42	1.67
5 (75%)	33	1.33
6 (100%)	25	1

*Assumes 12.5% return on surplus

For unseasoned financial guarantors—those that have yet to develop a significant level of core earnings—the maximum allowable exposure to a loss from a single issuer is expressed as a percentage of original surplus. The percentage used is equal to twice the predictable, yet conservative, rate a seasoned bond insurer could earning on its existing surplus for one year. Currently, a 12.5% rate of return is assumed for these purposes. Single-risk limits for unseasoned companies remain based on original surplus adjusted for subsequent capital infusions until core earnings are sufficient to generate a higher computed loss tolerance. The single-risk categories for each sector are shown in tables 1 and 2. Based on the relative degree of risk between the categories and the earnings power of a seasoned company or the assumed 12.5% rate of return for an unseasoned company, the maximum exposures to a single-risk by category are shown in table 6. These relationships imply that category 3 obligations are considered to have twice the loss potential of category 1, while category 6 obligations are considered to have four times the loss potential of category 1. In other words, the lower the risk sector, the greater the insured principal amount of debt that an insurer can cover relative to the insurer's earnings or capital base. Single-risk loss potentials for asset-backed securities are determined on a case-by-case basis using the same credit-gap concept employed to determine capital charges. A company's earnings power or capital base is used to determine its loss tolerance for each transaction.

Liquidity Uses And Resources

Standard & Poor's liquidity analysis for bond insurers examines the ratio of current liquidity resources to the insurers' largest possible claim or other payments due in a given year. The aggregation of claims is in no way meant to suggest that those payments are expected. Our exercise is theoretical. This exercise differs in concept from Standard & Poor's capital adequacy model, which measures a theoretical widespread depression level of future worst-case losses against future claims-paying resources. The liquidity test assumes occasional large losses may occur in the context of rating stability and the current economic environment. Uses. In addition to predictable and routine uses of cash, such as salaries and rents, which are captured in the financial statement's net cash flow from operations calculation, bond insurers face potential unanticipated cash outflows that represent potential demands on liquidity. For purposes of this analysis, we assume cash payments are required to address a default or other cash need in each of the insurance sectors and cash sensitive non-insurance businesses in which the bond insurer operates. The list of possible cash requirements is: The default of a municipal obligor and associated net payments (largest such exposure in a given year); Largest net bullet maturity default (potentially includes investor-owned utilities, international bonds, or "guaranteed" maturity bonds); Largest debt services reserve draw; For the asset-backed sector, 90 days of payments associated with the default of the insurer's largest servicer; Largest non-insurance business obligation, if applicable, such as largest unscheduled draw on a municipal investment contract; Holding company debt and dividend-servicing needs; and Other. Assuming a cash need in each of these operating

sectors is very conservative, for example, a default by a municipal issuer, regardless of rating, with the greatest potential claim size, is included as a potential use of cash. Simultaneously, a potential payment arising from a default by the insurer's largest asset-backed or mortgage-backed servicer is estimated and included as a potential cash use. The sum of all theoretical potential payments in each operating sector is then aggregated and compared against cash resources. Resources. We assume that in a non-depression situation, insurers would choose, with respect to converting financial assets to cash, to use the reverse repurchase (repo) market, rather than dealing with the tax, earnings, reinvestment issues, and transaction costs associated with a forced sale of bonds. Essentially a collateralized loan, the repo market is a very large and liquid market and usually provides attractive financing rates. Since repo market participants (money market investors) are quite conservative in terms of eligible collateral, municipal bonds and other less liquid financial assets like small business administration debt are, regardless of rating, not an acceptable source of security. They are nonetheless noted as a secondary cash resource. We include corporate and asset-backed debt as a resource but, in view of less than universal acceptance by all market participants and conservative margin requirements, we haircut this asset class at 50%. Treasury, FNMA, and FHLMC bonds are also conservatively haircut at 10%. Bank lines are another source of cash, albeit sometimes clouded by restrictions or "outs" such as material adverse change language. Some lines also allow the bank to cancel a facility in the event of a rating change. For purposes of this analysis we take into consideration the fact that the scenario we have presented may not necessarily jeopardize existing ratings: Cash resources are: Cash and short-term investments, Treasury and government agency fixed-income securities, Corporate and ABS/MBS bonds, Bank lines of credit, Other, and Municipal bonds (informational/back-up only). Historically we have observed, and continue to expect, that discounted cash resources exceed the sum of theoretical claims and other payments in any given year. Conservative investment practices common to the industry that emphasize highly rated fixed-income assets play a major role in the industry's sound liquidity profile. Likewise, the nature of the payment risk as defined in the policy, limiting claim obligations on defaulted insured debt to principal and interest as it comes due, also supports the bond insurers' strong liquidity positions. Barring exceptional circumstances, the ratio of cash resources to possible uses of cash should be greater than 100%.