

A Comparative Assessment of the Consistency of Solvency Ratings for Insurers
Demotech and A. M. Best
R-CORE, LLC
December 1, 2015

Goal: Compare the consistency of insurer ratings assigned by Demotech to ratings of A M Best.

Methods: Conditional probabilistic methods to establish correlation to establish a correlation between and among A. M. Best's published ratings to specific carriers that are also co-rated by Demotech, who uses a different scale.

Output: The following statistical Contingency Table was the ultimate output of the analysis:

Demotech	AMB Classification									Totals
	A++	A+	A	A-	B++	B+	B	B-	C	
A"	0	265	75	60	0	0	0	0	0	400
A'	0	5	40	75	35	5	15	10	5	190
A	5	10	5	85	60	85	30	15	0	295
Totals	5	280	120	220	95	90	45	25	5	885

Author: The report was prepared by Richard P. Vento, Retired Faculty, Columbus State Community College. Masters, Nuclear Physics.

Demotech's observations:

	Demotech	
A. M. Best Rating	at its A or better	%
A- or better	625	70.60%
B++ or better	720	81.30%
B+ or better	810	91.50%
B or below	75	8.50%
Population	885	

Although more than 70% of the population rated A or better by Demotech, Inc. was rated A- or better, A. M. Best rated 29.4% of the insurers below A-. However, 91.5% of the population rated A or better by Demotech was rated Secure, B+ or better, by A. M. Best. Why the difference?

A review of the dual rated carriers indicated that those rated A or better by Demotech yet rated B or below by A. M. Best were smaller, mutual insurers. The Kaminski study, 1999, demonstrated statistically that smaller, mutual carriers were likely to be disadvantaged by A. M. Best's rating process while Demotech, Inc. did not directly factor corporate structure and size into its ratings. Accordingly, Demotech believes that the outliers in this analysis by R-CORE, LLC are due to the bias of A. M. Best toward size and corporate structure, as demonstrated by Kaminski.

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Prepared By R-CORE, LLC
Author R. P. Vento
Retired Adjunct Faculty
Columbus State Community College

Report #1

Abstract:

The published solvency ratings of A. M. Best are widely known as the industry standard for assessing the financial stability of a range of commercial enterprises. They are used herein for developing Demotech's Insurance Risk Model, as a comparable, convenient and less expensive surrogate analysis. While A. M. Best specifically disclaims that its ratings are in no way a guarantee of the solvency of a rated entity, it does provide the industry backbone for the basis of carrier selection in an overwhelming number of cases. R-CORE adopts the same disclaimer in this analysis and report.

In this analysis, the goal is to provide a statistically significant, yet far less involved method of assessing the financial viability of an insurance carrier. Demotech provides such assessments, since every policy holder needs to know if the accepted or adjudicated claims of liability can be met by his or her insurance company. This is a necessary condition for the purpose of purchasing insurance. A carriers' insolvency or inability to meet claims has a detrimental, rippling effect, on the insurees' personal assets and the assets of any co-dependent economy.

Methods:

We use conditional probabilistic methods to establish a correlation between and among A. M. Best's published ratings of specific carriers that are also co-rated by Demotech, who uses a different scale. In effect, we develop a novel modelling method by transforming the categorical ratings provided by A. M. Best (AMB) into an ordinal model, and correlate those rankings with a weighted and averaged ordinal model of Demotech (D). Our approach numerically rank-orders each raters' categorical class, it also develops a metric of the "allowable" distance a Demotech evaluation differs from its AMB rating and this is done with use of Confidence Intervals.

For each insurer in the dataset, we map a Demotech rating D_j into any member of a finite collection of AMB ratings, the collection of which we term $\bigcup_{i=1}^{i=k} A_i$. The result is a conditional probability, obtained via the formula $\Pr(\bigcup_i A_i | D_j)$. What this formula means is given an independent and pre-calculated Demotech rating D_j is there an AMB A_i that is "conditioned" upon it. One such example may be characterized by the following formula: $\Pr(A^{++} \cup A^+ \cup A | D_j) = \Pr(A^{++} | D_j) + \Pr(A^+ | D_j) + \Pr(A | D_j)$

Our analysis has the character of a relation mapping, rather than that of a function mapping. What this means is that a Demotech rating of say A' may stochastically condition a set of AMB ratings such as A^{++} or A^+ , or A , and so on. Both rating methods are highly dependent upon the capitalization adequacy of the insurers. Furthermore, since both AMB and Demotech independently analyze financial ratios from relevant public data, it is impossible to have a low Demotech rating stochastically conditioning a high AMB rating or a high Demotech rating stochastically conditioning a low AMB rating.

The Datasets:

Several datasets were iterated, in a time consuming fashion from the primary dataset, in order to isolate the congruence of Demotech ratings as a conditional surrogate of A M Best's and to provide a forum for various data manipulations.

(1) The primary dataset "**SNLDataPull20151118.xlsx**" was initially provided by Demotech for the analyses. It consists of 13,452 rows (cases) and 135 columns mostly of numerical financial data covering various categories. The first column represents the 4-1/2 year time period of the financial data in each of the cases (rows) extending from 2011YE to 2014YE plus the second quarter results of 2105Q2. Column two represents the NAIC code of the insurer, and column three the name of the Insuring Entity. Columns four

through eight depict respectively the rating agencies A M Best, Demotech, Fitch, Moody's, and S&P. The remaining columns represent the categorical headers for the financial measures.

(2) In order to simplify comparative analysis, the dataset "**SNLDataPull20151118 Demo_AMB Paired.xlsx**" was modified, with the Fitch, Moody's and S&P rating columns eliminated, as well as two cases that lacked the 4.5 years of financial time series. Any data that did not include a head-to-head Demotech vis-à-vis AMB comparison were also removed. The resulting spreadsheet consists of 885 cases of AMB ratings side-by-side with Demotech's, or equivalently 177, separate cases (885/5). One very important point is obvious from this comparative approach. No insurer lost its original rating from either Demotech or AMB over the 4.5 year period. This indicated a robustness of the measure developed by the two rating agencies discussed herein for the individual insurers.

(3) A third iteration consists of the dataset "**SNLDataPull20151118 Demo_AMB_Avg.xlsx**" where the time series financial data are averaged (extrapolated) across an augmented row for each insurer. The result is a summary performance for each of the 177 insurers. Both Demotech and AMB are using the same financial data for each insurer. What this means is that for each insurer over the time series period, the categorical Demotech rating D_i corresponds to exactly one of the categorical AMB ratings A_i . This dataset will later be iterated with each AMB summary row augmented with its Demotech comparison directly beneath it, in order to obtain a row-by-row correlation.

(4) The 4th iteration resulted in spreadsheet "**SNLDataPull20151118 Demo_AMB_Avg_Isolated.xlsx**" where the data between Demotech Ratings and those of AMB were row-condensed.

(5) The 5th spreadsheet iteration "**SNLDataPull20151118 Categorical Ranked B.xlsx**" compiled all the ratings of the 177 carriers over their five time periods of comparison resulting in 885 total data points. In this spreadsheet each time period was included in counting the comparisons per each rating pair.

(6) This analysis resulted in a detailed development of a statistical Contingency Table, "**Demotech AMB Contingency Table.xlsx**", which allows Demotech to review the comparisons directly. It has been cut and pasted below.

	AMB Classification									
Demotech	A++	A+	A	A-	B++	B+	B	B-	C	Totals
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R-CORE provides this document and any subsequent data it has developed for Demotech to use in any manner it wishes perhaps to secure new clients for its rating system. Collectively this write up and accompanying spreadsheets provide an historical and foundational basis for comparing various insurers' solvency ratings provided to the public by the two rating agencies compared herein.

A second report (to follow in **December 2015**) will develop graphical analysis and Conditional Probabilities as reliability measures of these paired comparisons. Subsequent reports, as requested or needed, will work to improve the Demotech rating algorithm through detailed analysis of relevant, specific, financial measures.

Richard P. Vento

R-CORE, LLC
1 Dec 2015

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