Report on Calculation and Validation of Insurer Impairment Rates for Demotech, Inc.

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Drs. Barth and Klein's impressive backgrounds included, collectively, more than thirty years at the National association of Insurance Commissioners. Dr. Klein serves on the board of the Insurance Information Institute. Dr. Barth has been an integral part of developing and grading the examinations underlying the Chartered Property Casualty Underwriter, CPCU, designation.

The report as well as a summary of the expertise of the authors follows. Conclusions excerpted from the report include:

"Our analysis shows that the survival rates of companies rated by Demotech (DT) consistently exceed its published expected survival rates for each of its rating categories. Hence, the impairment rates of companies rated by DT are consistently lower than the impairment rates implied by the expected survival rates for each of its rating categories. We note that DT calculated survival and impairment rates using a consistent definition of impairment and employed a conservative approach in its calculations by excluding inactive companies from the impairment rates in the subsequent periods after they became inactive. This conservative approach, commonly referred to as the withdrawal-adjusted static pool method, resulted in calculated impairment rates that were higher than they would have been with a less stringent method."

1. Professors Barth and Klein thought the research and findings within their report rose to such as a level that they distributed the report to the NAIC, each commissioner as well as the chief financial examiner at each of the state's department of insurance.

2. They described their analysis as "unique and unprecedented." It was the first independent verification of an insurer rating agency's impairment or survival rates.

3. They also said "… the report should be use to various stakeholders with an interest in the financial performance and condition of property-casualty insurers, including regulators."

4. When viewing the comparative graph prepared by Dr. M. Douglas Voss, presented below, keep in mind that the average cumulative impairment rates presented as Demotech's have been independently calculated and verified. The average cumulative impairment rates of A. M. Best, although published, have not been independently verified.

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Executive Summary

In this report, we summarize the analysis we conducted for Demotech, Inc. (DT) to independently verify its calculation of impairment and survival rates for insurance companies for which it issues Preliminary Financial Stability Ratings® (PFSRs) and Financial Stability Ratings® (FSRs). Our analysis began with a data set provided by DT that indicated the rating designations it assigned to insurers, by year, over the period 1989-2016. The data provided by DT also indicated the status of companies it had rated (active, inactive, and impaired) as of December 31, 2016. Using various sources of information, our first task was to update and verify the status of each company that had been rated by DT and make adjustments where necessary. After this task was completed, we then calculated impairment and survival rates for companies rated by DT organized by their rating designation using a static pool method. The definitions, methods, and information sources we used are explained in this report along with our findings.

Our analysis shows that the survival rates of companies rated by DT consistently exceed its published expected survival rates for each of its rating categories. Hence, the impairment rates of companies rated by DT are consistently lower than the impairment rates implied by the expected survival rates for each of its rating categories. We note that DT calculated survival and impairment rates using a consistent definition of impairment and employed a conservative approach in its calculations by excluding inactive companies from the impairment rates in the subsequent periods after they became inactive. This conservative approach, commonly referred to as the withdrawal-adjusted static pool method, resulted in calculated impairment rates that were higher than they would have been with a less stringent method.

Consistent with what would be expected, the impairment rates are lowest for the highest-rated insurers and increase over time. We also note that the impaired insurers in this data set were assigned ratings that tended to track downwards through the rating designations over time, indicating that the ratings assigned by DT recognize and include factors that precede impairments and other financial issues.

Introduction

This report summarizes analysis we performed for Demotech, Inc. (DT) to provide independent verification of its impairment and survival rate calculations of insurance companies for which it issues Preliminary Financial Stability Ratings® (PFSRs) and Financial Stability Ratings® (FSRs). Our efforts included validating the data used to perform the calculations as well as independent calculation of impairment and survival rates based on the validated data. There were more than 48,000 PFSRs and FSRs assigned by DT to more than 3,650 insurers over the period 1989 through 2016. We identified 363 impairments associated with these PFSRs and FSRs. Periodically, DT publishes reports to provide a retrospective analysis of the efficacy of its FSRs and PFSRs to distinguish between financially stable and less than financially stable insurance companies. Demotech has prepared three such reports previously. The authors prepared this report. To our knowledge, no other insurer rating agency has secured an independently verified report on its impairment or survival rates of companies for which

they provided ratings. Hence, we believe that this analysis of Preliminary Financial Stability Ratings® (PFSRs) and Financial Stability Ratings® (FSRs) is unique and unprecedented research.

Readers should note that various terms are used in our report that will be defined and explained. It is helpful here to briefly explain how DT develops empirical measurements of the accuracy of its PFSRs and FSRs. DT, as do other rating agencies, seeks to develop appropriate ratings of the financial stability or strength of the insurance companies that they review. The several rating agencies have their own rating designations with specific criteria for, and characterizations of, each of these designations. Companies assigned higher ratings (A″, A′, A, and S for DT) are deemed to be more financially stable than companies with lower ratings (M and L for DT). There is an expectation that only a very small fraction of companies with the highest ratings will ultimately become impaired or insolvent in the near term; among companies with lower ratings it is expected that the incidence of impairment or insolvency will be higher. Indeed, with the exception of its "L" rating, for each of its rating designations, DT presents its expectations regarding the percentage of companies that will remain solvent, i.e., have positive surplus, 18 months from the date of their rating assignments or affirmations.[1] DT established their expected survival rates in 1989. This aspect of DT's methodology is also unique to their process. Appendix 1 contains a comparison of the actual to expected survival rates for rating years 1989 through 2015. We calculated the actual survival rates that are presented in this comparison and confirm that the ratings performance exceeds the stated expectations. Appendix 2 shows average cumulative survival rates (calculated using the additive approach described in the next section) by rating category by development year for ratings issued in rating years 1989-2016.

We calculated impairment and survival rates for insurance companies grouped by their rating designation assigned by DT and by the year the PFSR was issued using a static pool method (described below) for each rating year and each development year subsequent to the rating year. The impairment rate for a given set of companies and FSR year-subsequent year is equal to the number of companies that became "impaired" (defined below) divided by the number of "active" or "surviving" companies (also defined below). The survival rate is equal to one minus the impairment rate.

Static Pool Approach

Static pool analysis is a widely used risk management metric. To perform the measurement, the first step is to identify a pool, which is held constant for the duration of the analysis. For example, a static pool might consist of all insurers rated by Demotech in a specific calendar year. In each subsequent development year, that same original group of insurers in the static pool is examined and then classified as either active, inactive, or

[1] For example, for its highest rated (A″) companies, DT expects that 100% of these companies will have positive surplus as of 18 months after the assignment or affirmation of their ratings; for its next highest rated (A′) companies, DT expects that at least 99% of these companies will have positive surplus as of 18 months after the assignment or affirmation of their ratings; etc. The expected survival rate for each rating category is shown in Appendix 1.

impaired at the end of the subsequent development year. Those insurers from the original static pool that become impaired or inactive in subsequent development years drop out of the pool so that the impairment rate in the subsequent years becomes the ratio of insurers that become impaired in that year divided by the remaining static pool members as of that development year that were still subject to becoming impaired. The practice of dropping inactive and impaired insurers from the developed pool is called the withdrawal-adjusted static pool approach.

Table 1. Example of Impairment Rate Calculations

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Development Year	Number of Active Unimpaired Insurers at the Start of the Development Year	Number of Insurers that Became Inactive During the Development Year	Number of Insurers that Became Impaired During the Development Year	Number of Active Unimpaired Insurers at the End of the Development Year (2)-(3)-(4)	Insurers Subject to Impairment During the Development Year (3)+(4)+(5)	Impairment Rate for the Development Year (4)/(6)	Cumulative Impairment Rate (Additive)	Cumulative Impairment Rate (Multiplicative)
1	2,000	25	8	1,967	2,000	0.40%	0.40%	0.40%
2	1,967	29	12	1,926	1,967	0.61%	1.01%	1.01%
3	1,926	21	13	1,892	1,926	0.67%	1.69%	1.68%
4	1,892	11	9	1,872	1,892	0.48%	2.16%	2.14%
5	1,872	25	13	1,834	1,872	0.69%	2.86%	2.82%
6	1,834	18	10	1,806	1,834	0.55%	3.40%	3.35%
7	1,806	19	8	1,779	1,806	0.44%	3.84%	3.78%
8	1,779	23	9	1,747	1,779	0.51%	4.35%	4.27%
9	1,747	30	7	1,710	1,747	0.40%	4.75%	4.65%
10	1,710	15	6	1,689	1,710	0.35%	5.10%	4.99%

The hypothetical example in Table 1 illustrates the year-by-year marginal impairment rate calculation and the cumulative impairment rate calculation for a static pool of 2,000 insurer ratings over ten development years. During the course of development, some insurers become inactive through mergers or voluntary withdrawals from the market. Other insurers become financially impaired. The marginal impairment rate (column 7 in the table) is the number of insurers that became financially impaired during the development year (column 4) divided by the number of insurers that could have become financially impaired (column 6). At the end of each development year, those insurers that have become impaired and those that have become inactive are removed from the pool, so in the next development year the original static pool is smaller because it has been adjusted to reflect the withdrawals.

The marginal impairment rate for each development year is the number of impairments during that development period divided by the number of insurers that were subject to impairment over that same period. The cumulative impairment rate over multiple development years can be calculated two ways. The additive method simply adds the marginal impairment rate for the current development year to the sum of the marginal impairment rates for all prior development years. The multiplicative method calculates the current year's cumulative impairment rate as [1- (1 – current year marginal impairment rate)*(1 – prior year cumulative impairment rate)]. For example, using the

marginal impairment rates from column 7 of the table, the additive cumulative impairment rate for development year 5 is calculated as:

$$(0.40\%+0.61\%+0.67\%+0.48\%+0.69\%) = 2.86\%$$

The multiplicative cumulative impairment rate for development year 5 is calculated as:

$$[1-(1-0.40\%)(1-0.61\%)(1-0.67\%)(1-0.48\%)(1-0.69\%)] = 2.82\%$$

While the multiplicative rate is mathematically more accurate, the additive method tends to produce a slightly higher cumulative impairment rate and is easier to explain to end-users of the information. In practice, both methods produced virtually identical results.

Insurer rating agencies face a number of challenges in developing ratings for the insurance companies they review. These challenges include asymmetric information. An insurance company is expected to have more and better information about its financial condition and risk than what a rating agency can obtain from public sources or directly from the company. Further, there will be a time lag between the information obtained by a rating agency and current conditions at an insurance company. Additionally, events can occur after a rating is issued that can cause an insurer to become financially distressed or insolvent that could not have been reasonably predicted at the time its rating was issued. Hence, the impairment rate can be higher than expected for a set of companies for a particular time-period even if the ratings for these companies were based on a proper assessment of the best available information at the time the companies were rated.

It also should be noted that a rating agency could achieve or exceed its targeted survival rates simply by issuing lower ratings to companies, all other things equal. However, such a practice would not serve the users of such ratings. In other words, giving a company a lower rating than it deserves undermines the objectives of the rating designation process. The objective should be to provide the most accurate rating possible for each company based on established standards.

Identifying Active, Inactive, and Impaired Companies

To begin our work, DT provided us with a data set on insurance companies for which it had issued FSRs and PFSRs for the years 1989 through 2016.[2] The data provided by DT included its rating for each company for each year it received a rating from DT as well as the status (active, inactive, or impaired) of each company as of December 31, 2016. Our initial task was to update and validate the status of each of these companies and make adjustments if necessary. Our principal focus was identifying impaired and active companies, as the information for these companies would be used in the calculation of impairment and survival rates.

[2] Note that a given company may have been issued a rating by DT for all of these years or only some of these years and that there are periods where a company was rated for a series of years, not rated for a period of time, and then was rated again. Our static pool analysis included every rating issued by DT in any year.

The term "impairment" can be ambiguous; however, we have tried to be as objective as possible in classifying insurers into this status. A broad definition of "impairment" suggests that an insurer should be considered impaired when there is some material impediment that could result in the insurer not fulfilling its obligations to stakeholders, e.g., policyholders, third-party claimants, stockholders, creditors, etc. Using a much narrower definition, an insurer would be deemed impaired when it has defaulted on its obligations to at least some of its policyholders because of its financial condition, e.g., it is insolvent (its liabilities exceed its assets). However, neither definition is suitable for our or a rating agency's purposes. The first definition is too broad and subjective and the second definition is too restrictive, as it would exclude insurers that are in financial distress with adverse consequences for its stakeholders. We should note that our principal concern was how an insurer's financial condition affects its policyholders and third-party claimants against the insurer's policyholders, with the understanding that other stakeholders (e.g., creditors) may also be adversely affected by an insurer's financial distress. Ultimately, we had to settle on a definition of impairment that was as objective as possible and that could be verified using public sources of information.

The definition of insurer impairment found in Investopedia has two elements: 1) a heightened probability that the insurer will be unable to meet its financial obligations; and 2) formal regulatory action.[3] Formal regulatory actions for solvency include orders of conservation, rehabilitation, and liquidation. This suggests that in order to be considered impaired, an insurer's financial risk is deemed high enough or it is in financial distress to the point where regulators feel compelled to intervene to restrict its business decision-making. A.M. Best (AMB) designates an insurer as a Financially Impaired Company (FIC) upon the first official regulatory action taken by an insurance department that puts restrictions on a company's ability to operate.[4] However, this definition presents a problem for our purposes because formal regulatory actions against insurance companies are not always made public. When a regulator files an order for rehabilitation or liquidation, the information becomes public and is in the public domain. Other formal regulatory actions, including orders of conservation, are often not made public. Additionally, an insurer may be subject to informal regulatory actions for reasons that are not publicized.

Consequently, for our purposes, we identified an insurance company as being impaired if it had been subjected to one or more formal regulatory actions for solvency reasons and this (these) regulatory action(s) were available from public sources. We also used the date of the first such regulatory action as the date of an insurer's impairment.

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[3] Available at https://www.investopedia.com/terms/i/impaired-insurer.asp.

[4] *Best's Impairment Rate and Rating Transition Study - 1977 to 2016*. According to A.M. Best, such state actions include involuntary liquidation because of insolvency as well as other regulatory processes and procedures such as supervision, rehabilitation, receivership, conservatorship, a cease-and-desist order, suspension, license revocation, administrative order, and any other action that restricts a company's freedom to conduct its insurance business as normal. Companies that enter voluntary dissolution and are not under financial duress at that time are not considered to be financially impaired by A.M. Best.

We used several sources of information to identify impaired insurers and the date of their impairments. Our primary source for identifying impaired insurers was the National Association of Insurance Commissioners' (NAIC) Global Receivership Information Database (GRID) that contains public information on insurance company conservations, rehabilitations, and liquidations. The database was first released in 2008 and is available to the public at https://i-site.naic.org/grid/gridPA.jsp. The information in GRID is provided to the NAIC voluntarily by the state insurance regulators. As of July 2017, there was information on 1,474 receivership actions dating back to 1971.[5] There are three main types of receivership actions (including the dates of these actions) reported in GRID: conservation, rehabilitation, and liquidation.

The NAIC does not warrant that the information in GRID is either complete or completely accurate as state insurance departments provide it voluntarily. For this reason, we supplemented the information we obtained from GRID from other sources to identify companies that had become impaired and the dates of their impairments. We also had access to data from AMB and S&P Global (formerly SNL Financial) on insurer impairments. In some cases, one or two of these sources show a company becoming impaired while the other(s) do not. In these cases, if any source indicated that a company had become impaired, we classified it as impaired. Where there was a date conflict between GRID, AMB, and/or S&P Global with respect to when an insurer became impaired, we used the earliest date. In some instances, there was no information available from any of these three sources and we then relied on other public sources of information on the status of companies such as regulatory filings, news reports, trade press articles, state insurance department websites, and guaranty association information. Where we were unable to identify a specific official regulatory intervention for a company for which no source indicated that it was active, we classified the company as inactive rather than impaired.

We also used a number of sources of information, including AMB and S&P Global, to identify active companies; if we could not find information that indicated that a company was impaired or active, we classified it as inactive. AMB's Key Rating Guides (KRG) provide various data items for most but not all property-casualty, health, and life insurance companies. These data items include a company's "business status" and "business status reason." Essentially, the KRG indicates whether a company is either "actively underwriting" or "not underwriting" (and the reason it is not actively underwriting). If the KRG indicated that a company is actively underwriting, then we classified it as active. If a company's status could not be determined from the KRG, we utilized other sources, such as S&P Global, to attempt to determine a company's status.

S&P Global does not indicate whether a company is active or inactive per se but it does indicate whether it is currently following a company or not. S&P Global provides multiple data items for each company in its databases that it obtains from the NAIC and

[5] We purchased a download of data in GRID as of July 7, 2017 from the NAIC to facilitate our analysis. Consequently, our data for receivership actions that we obtained from the NAIC would have been current as of this date.

other sources. For the companies it is currently following, S&P Global provides data obtained from the most current sources available including companies' most recent annual and quarterly statutory financial statements filed with the NAIC. Hence, for these companies we could review their direct premiums written (DPW) and surplus as regards policyholders as of June 30, 2017. For companies not reporting positive DPW or surplus, we checked other sources to determine if the company was still active or impaired. For companies that S&P Global is not currently following, it provides historical data if it had followed the company at all. For these companies, we sought to determine from other sources if the company was still active or not, and if not still active, when the company became inactive.

We should note there were companies rated by DT that do not file their financial data with the NAIC, e.g., county mutual insurance companies, etc. For these companies, DT provided us with current financial reports obtained directly from the companies to validate that they were active.

Impairment Rate and Survival Rate Calculations

For our impairment analysis, the static pool for any given year consists of all DT insurance company ratings issued for that year. In addition to tracking the entire group as a single pool, we also track subpools for each DT rating group (A″, A′, A, S, M, and L). The static pool results for each calendar year are then converted into development years. In our development year data, then, Development Year 1 results include ratings issued on 6/30/1989 and measured over the period 7/1/1989 through 6/30/1990; ratings issued on 6/30/1990 and measured over the period 7/1/1990 through 6/30/1991; ratings issued on 6/30/1991 and measured over the period 7/1/1991 through 6/30/1992, and so forth. Development Year 2 would include those same ratings measured over the following twelve-month period. We then measure the marginal impairment rates for each available development year. Calculating the marginal impairment rates by development year allows the results to be generalized to the future, so that for any given set of calendar year ratings, the number of future impairments after "X" development years can be estimated based on the probabilities derived from the historic results.

Table 2. Cumulative Impairment Rates During First Five Development Years

	Development Year 1	Development Year 2	Development Year 3	Development Year 4	Development Year 5
A"	0.00%	0.00%	0.09%	0.17%	0.26%
A'	0.01%	0.07%	0.29%	0.55%	0.85%
A	0.17%	0.60%	1.13%	1.64%	2.25%
S	0.38%	0.86%	1.45%	2.13%	2.91%
M	1.23%	3.08%	4.28%	5.44%	6.41%
L	3.58%	7.00%	9.90%	12.43%	14.59%
Total	0.41%	0.95%	1.52%	2.08%	2.66%

While we report the impairment rate over all available development years in Appendix 2, it is reasonable to focus on the three-to-five year impairment rates for each subpool because that is considered the near-term future. Table 2 shows the cumulative impairment rates for development years 1 through 5 for each rating subpool group.

As one would expect, the impairment rates are lowest for the highest-rated insurers and the impairment rates increase over time. However, it should be noted that the cumulative impairment rates would be expected to increase over time naturally, all other things equal, as insurers' conditions change and/or are subject to events that cause them to become either impaired or inactive. We also note that the PFSR assigned to a company in any given period may, and often does, respond to company changes over time.

In other words, the static pool method takes a snapshot of a group of companies at a point in time and then tracks them into the future, but those insurers continue to be rated in those subsequent years. Those future ratings reflect more updated information about the insurer's financial condition, but static pool analysis looks only at the trinary outcomes for individual insurer ratings from a specific year. That means that there are multiple events that may trigger a future impairment that are omitted from the analysis for a specific year. For example, suppose an insurer is rated as A″ in 2017. However, in 2018, under new management, the company begins taking on new underwriting risk and territorial expansion, and the rating slips to A′ in 2018 and then to A in 2019 and then to S in 2020 and finally to L in 2021, and after regulatory intervention the insurer is classified as impaired at the end of 2021.

	2017	2018	2019	2020	2021
Rating by Year	A″	A′	A	S	L
Impairment Year	2021	2021	2021	2021	2021
Development Year	DY5	DY4	DY3	DY2	DY1

The static pools for rating years 2017-2021 will each register an impairment in 2021, but the impairment will appear in different subpools for each year. The 2017 A″ subpool will reflect an impairment in 2021 (DY5) but the events that actually caused that impairment occurred subsequent to the issuance of the 2017 A″ rating. The 2018 A′ pool will register an impairment at DY4, the 2019 A subpool will register an impairment in DY3, and so forth. Although sometimes insurers maintain the same rating year after year, we did note that the impaired insurers in the DT data set tended to track downwards through the rating designations over time, similar to what is shown in this example.

The reliance on public data for establishing impairments will also influence the measured impairment rates. There are a handful of "zombie insurers" (e.g., insurers with negative surplus) that are still listed as active in our dataset simply because there are no public regulatory interventions to date. In some instances, regulators have chosen to allow the companies to continue to operate, while in other instances state regulators have been precluded from taking action through special legislation. There are some insurers that were classified as inactive as of the ratings effective date (June 30th of each calendar year), in which case those insurers were dropped from the pool. In still other instances,

there may actually be orders of conservation in place, but those orders are not currently in the public domain, or the order may become public right at the time that the ratings are being issued. The conservations may be successful, allowing the insurer to be released from conservation in the future, reflecting successful regulatory intervention efforts. These quiet successes are usually not reflected in the impairment rates, although they would normally be reflected in the ongoing financial strength ratings or financial stability ratings provided by the private rating agencies.

As noted earlier in our report, A. M. Best designates an insurer as a Financially Impaired Company upon the first official regulatory action taken by an insurance department that puts restrictions on a company's ability to operate. Accordingly, utilizing "official regulatory action" as a criterion may undercount the true impairment rate. An insurer may become voluntarily inactive as an alternative to beginning a formal liquidation. Unless there has been a formal, documented intervention by state authorities, we are presuming that inactive insurers dropped out of the pool voluntarily or were merged with another insurer. A more stringent impairment rate standard would be to measure whether an insurer was still active in subsequent years, which would be a true survival rate calculated in the same manner as a life insurance mortality table, where there is a binary outcome: active or not active. However, in the case of a merger where one insurer is simply folded into another without official regulatory action, there may be a counter-argument that the insurer's obligations to policyholders continue to be met, albeit in an altered state. In this case, counting inactive companies as impaired would overstate the impairment rate, as not all inactive companies were impaired prior to when they became inactive.

Finally, we did note some instances of obvious data errors in the publicly available data. The online GRID database often includes links to court documents that include the dates of regulatory actions. In some instances, the dates in the orders did not match the dates recorded in the database. While the data entry errors are not common, they do exist. We also noted instances where state regulatory datasets provided conflicting dates for actions against multistate insurers. Although the discrepancies we found were rare, they do exist and researchers should be made aware of the voluntary nature of the data being recorded and maintained in the GRID database.

Concluding Thoughts

Overall, our analysis indicates that the survival rates of companies rated by DT consistently exceed its published expected survival rates for each of its rating categories. Consequently, the impairment rates of companies rated by DT are consistently lower than the impairment rates implied by the expected survival rates for each of its rating categories. DT calculates survival and impairment rates using a consistent definition of impairment and factors conservatism into its calculations by excluding inactive companies from the impairment rates in the period that they became inactive. This conservatism results in reported impairment rates that are higher than they would be with a less stringent method.

As anticipated, the impairment rates are lowest for the highest-rated insurers and increase over time. It is also worth noting that the impaired insurers in this data set were assigned

ratings that tended to track downwards through the rating designations over time, indicating that the ratings assigned by DT recognize and include factors that precede impairments and other financial issues.

Appendix 1
Comparison of Actual 18 Month Survival Rates to Demotech Benchmarks

This table values show the 18-month survival rate for the insurers in each static pool, based on the authors' calculations. The survival rate depicted in the table is the percentage of rated insurers that did not become financially impaired within the 18-month period following the issuance of the Financial Stability Rating from Demotech.

DT Rating	Expected Survival Rate	Rating Year 1989	Rating Year 1990	Rating Year 1991	Rating Year 1992	Rating Year 1993	Rating Year 1994	Rating Year 1995	Rating Year 1996
A″	**100%**				100.0%	100.0%	100.0%	100.0%	100.0%
A′	**99%**		100.0%	100.0%	99.6%	100.0%	100.0%	100.0%	100.0%
A	**97%**	100.0%	100.0%	100.0%	99.9%	100.0%	100.0%	99.8%	99.1%
S	**95%**			100.0%	100.0%	100.0%	100.0%	99.8%	98.7%
M	**90%**				100.0%	97.4%	97.0%	99.5%	97.7%
L	**n/a**				100.0%	99.1%	96.7%	98.7%	96.4%

DT Rating	Expected Survival Rate	Rating Year 1997	Rating Year 1998	Rating Year 1999	Rating Year 2000	Rating Year 2001	Rating Year 2002	Rating Year 2003	Rating Year 2004
A″	**100%**	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
A′	**99%**	100.0%	100.0%	99.8%	99.8%	100.0%	100.0%	100.0%	100.0%
A	**97%**	100.0%	99.7%	99.0%	99.0%	99.6%	99.1%	99.9%	99.2%
S	**95%**	100.0%	99.4%	96.4%	97.9%	90.4%	100.0%	98.8%	100.0%
M	**90%**		100.0%	96.2%	97.1%	95.9%	96.8%	96.1%	93.5%
L	**n/a**		99.0%	89.8%	90.5%	92.0%	94.0%	95.1%	93.7%

DT Rating	Expected Survival Rate	Rating Year 2005	Rating Year 2006	Rating Year 2007	Rating Year 2008	Rating Year 2009	Rating Year 2010	Rating Year 2011	Rating Year 2012
A″	**100%**	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
A′	**99%**	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
A	**97%**	99.7%	100.0%	99.9%	99.4%	99.3%	99.6%	99.3%	99.7%
S	**95%**	98.8%	100.0%	100.0%	100.0%	99.6%	99.5%	99.2%	99.4%
M	**90%**	98.3%	100.0%	100.0%	97.4%	99.2%	95.6%	97.9%	97.8%
L	**n/a**	97.9%	95.1%	100.0%	96.2%	97.7%	96.4%	95.3%	88.8%

DT Rating	Expected Survival Rate	Rating Year 2013	Rating Year 2014	Rating Year 2015	Total, All Rating Years
A″	**100%**	100.0%	100.0%	100.0%	100.0%
A′	**99%**	100.0%	100.0%	100.0%	100.0%
A	**97%**	99.9%	99.9%	100.0%	99.7%
S	**95%**	100.0%	100.0%	100.0%	99.4%
M	**90%**	98.6%	100.0%	100.0%	97.8%
L	**n/a**	87.8%	92.9%	94.8%	94.7%

Appendix 2
Cumulative Impairment Rates by Demotech FSR Rating Category

This table shows the cumulative impairment rate for each Demotech Financial Stability Rating® category for Development Years 1 through 28, based on the results from over 48,000 ratings issued during rating years 1989 through 2016. The impairment rates represent the percentage of rated insurers that will become financially impaired over time.

Demotech Rating	DY1	DY2	DY3	DY4	DY5	DY6	DY7	DY8	DY9	DY10
A″	0.00%	0.00%	0.09%	0.17%	0.26%	0.31%	0.43%	0.50%	0.63%	0.78%
A′	0.01%	0.07%	0.29%	0.55%	0.85%	1.06%	1.30%	1.62%	1.83%	2.02%
A	0.17%	0.60%	1.13%	1.64%	2.25%	2.88%	3.53%	4.14%	4.81%	5.36%
S	0.38%	0.86%	1.45%	2.13%	2.91%	3.88%	4.97%	6.09%	6.95%	7.79%
M	1.23%	3.08%	4.28%	5.44%	6.41%	7.66%	8.96%	10.58%	12.28%	14.02%
L	3.58%	7.00%	9.90%	12.43%	14.59%	15.62%	16.80%	17.69%	18.38%	19.61%
Total	0.41%	0.95%	1.52%	2.08%	2.66%	3.19%	3.78%	4.36%	4.91%	5.44%

Demotech Rating	DY11	DY12	DY13	DY14	DY15	DY16	DY17	DY18	DY19	DY20
A″	0.99%	1.17%	1.45%	1.62%	1.83%	1.91%	2.06%	2.13%	2.50%	2.50%
A′	2.16%	2.43%	2.66%	2.88%	3.11%	3.24%	3.47%	3.61%	3.85%	3.92%
A	5.95%	6.31%	6.63%	7.00%	7.30%	7.63%	8.03%	8.37%	8.61%	8.93%
S	8.43%	8.92%	9.44%	9.85%	10.33%	10.65%	11.13%	11.68%	12.16%	12.91%
M	14.82%	16.10%	16.74%	17.41%	18.17%	19.31%	20.17%	21.30%	21.81%	22.37%
L	20.76%	21.58%	22.22%	22.82%	23.16%	23.59%	24.13%	25.06%	27.10%	27.72%
Total	5.92%	6.32%	6.68%	7.01%	7.34%	7.63%	7.99%	8.37%	8.78%	9.17%

Demotech Rating	DY21	DY22	DY23	DY24	DY25	DY26	DY27	DY28
A″	2.50%	2.50%	2.50%	2.50%	2.50%	n/a	n/a	n/a
A′	4.00%	4.10%	4.25%	4.25%	4.25%	4.25%	4.25%	n/a
A	9.34%	9.73%	10.23%	10.47%	10.88%	10.88%	12.35%	12.35%
S	13.44%	14.04%	14.52%	15.10%	17.76%	67.76%	n/a	n/a
M	23.33%	23.82%	24.18%	24.18%	24.18%	n/a	n/a	n/a
L	28.67%	29.09%	29.09%	31.02%	n/a	n/a	n/a	n/a
Total	9.59%	9.96%	10.34%	10.60%	11.08%	11.47%	12.88%	12.88%