

CR Ratings Methodology Bulletin: Calculating Brand Reliability Weights

Consumer Reports first integrated predicted reliability ratings into its overall product scores in 2018. The organization decided to include predicted reliability ratings in these scores in order to be responsive to CR members, who have reported on the importance of reliability in their purchase decisions. By doing this, CR is helping its members make more well-informed purchase decisions with all the criteria they will need in one score, which also accounts for numerous performance attributes and owner satisfaction. Predicted reliability ratings are based on CR members' responses about the products they own, collected via the Quarterly Questionnaires.

The inclusion of predicted reliability in CR's overall product scores necessitated the development of a model for calculating how much weight to assign to this attribute relative to tested performance attributes and owner satisfaction (also a survey-based attribute) that go into these overall scores.

- **The weight assigned to predicted reliability** varies by product supercategory (e.g., dishwashers, vacuums, TVs), meaning the weight given to predicted reliability in the overall scores of refrigerators can be different than that for washing machines or televisions. Currently, across product supercategories, predicted brand reliability ratings can account for anywhere from 10 to 20 percent of a product's overall score.
 - The exact weight of predicted reliability in each product supercategory's overall scores is based mainly on the importance that CR members place on reliability, relative to performance and price, in their purchase decisions for that type of product.
 - The survey results show that for CR members, *reliability outranks performance and price* when it comes to major appliance purchases. Therefore, the weight assigned to predicted reliability in the overall scores of products like refrigerators, washing machines, and dishwashers is fairly high (at the higher end of the 10 to 20 percent range).
 - In contrast, in electronics purchase decisions CR members tell us they rate the importance of *reliability on-par with performance*. Therefore, the weight assigned to reliability in the overall scores of televisions and cameras is typically at the lower end of the 10 to 20 percent range.
- CR gives the performance factors tested for in each product category much greater combined weight than reliability in its overall score. This is because performance factors can be measured and tested at a product's *model* level, while reliability is determined at

a product's *brand* level. (Read more about how CR's reliability ratings are calculated [here](#).)

Reliability weighting determinants

One of the key determinants in weighting predicted reliability is how CR members respond to a survey question asking them to rank the relative importance of reliability vs. performance vs. price in their purchase decisions regarding a specific type of product. For example, the relative importance of reliability in refrigerator purchase decisions is based on member responses to the following question:

When it comes to buying a refrigerator, how would you rank the relative importance of each of the following factors in your buying decision?

Click your highest-ranked priority first, the 2nd most important factor second, and the 3rd most important factor third. If you change your mind, click on each box to clear your answers and rank again.

A TOP NOTCH refrigerator maintains consistent cooling temperatures, has large usable capacity for the refrigerator and freezer, is easy to use, and is quiet.

A VERY RELIABLE refrigerator will not require repair within its first five years of ownership.

- ☐ A top-notch model that contains the highest-quality performance attributes for a refrigerator
- ☐ A very reliable model that will not require repairs within its first five years of ownership
- ☐ A reasonably-priced, affordable model

In addition to the relative importance of reliability as determined by responses to the above question, CR includes several other factors in its model for calculating reliability weights:

- Action Rate = the repair rate of products that have experienced a problem
- Correlation coefficient (Kendall's tau-b) between our ProbEver variable (i.e., dichotomized instances of reported problems v. no reported problems) and a dichotomized version of our satisfaction variable (i.e, top-box vs. all other responses on a 6-point scale ranging from "completely satisfied" to "completely dissatisfied")
 - ProbEver is based on responses to one of the following questions depending on the product category:
 - For **major appliances and TVs**: "Did this product ever break or stop working as well as it should?"
 - For **countertop microwaves**: "Did this microwave ever have any problems? Examples include problems with the heating, door lock, turntable, interior lights, or control panel."

- For **smartphones**: “Which of the following best describes the reliability of this smartphone during the time you have owned it?”
- Median Predicted Problem Rate = the median brand reliability estimate predicting the likelihood of experiencing a problem by the end of the 2nd year of ownership, using a common slope model with no covariates for brands with 250+ cases (a common slopes model incorporates the average trend of all brands in CR’s predictive model to minimize the impact of attrition and sampling error)
- Predicted Reliability Range = the difference between the least reliable brand’s problem rate and the most reliable brand’s problem rate in a product category

The steps for calculating reliability weights by product category are:

1. Determine the results for each of the five weighting factors for that product supercategory
2. Run the reliability weighting calculation including the additional factors above, using the current formula: $\text{Weight} = (0.225 \times \text{Action Rate}) + (0.225 \times \text{Reliability Rank}) + (0.1 \times \text{Kendall's tau-b correlation coefficient}) + (0.225 \times \text{Median Predicted Problem Rate}) + (0.225 \times \text{Predicted Reliability Range})$
3. Transpose the weighting calculation sums to a 10 to 20 point scale

Reassessing reliability weights by product category

The “reliability ranking question” used to determine the relative importance of reliability in purchase decisions for each product category will be run in CR’s quarterly member survey every three years. This enables CR to regularly reassess consumer sentiment regarding the importance of reliability in purchase decisions for each product supercategory. Should these reassessments show shifts in consumer sentiment, reliability weights would shift to reflect that. Shifts in problem and repair rates in a product category are also possible over time, thus weights for all product categories are recalculated every three years.