Percentile Ranks, Fractional Ranks and Absolute Ranks

Morningstar Methodology Paper
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Methodology

Percentile Ranks

Morningstar uses the following formula to determine the percentile rank of an item in a series. It is commonly used for calculating an investment's total return percentile rank against others in its Morningstar Category. With this method, percentile ranks always range from 1 (best) to 100 (worst) with all intermediate values spread evenly over that range.

All observations are ranked in the desired order (usually descending). Percentile ranks are assigned as follows:

$$PctRank = \begin{cases} i & \text{for } i = 1 \\ FLOOR[99*(i\text{-}1)/(n\text{-}1)+1] & \text{for } i > 1 \end{cases}$$

where:

n	=	Total number of distinct observations
i	=	Rank of each distinct observation
Floor	=	A function that rounds down to the next integer (e.g., 89.83 rounds down to 89)

To deal with observations with identical values, n is set as the total number of distinct observations. For example, if there are 50 observations, and four of them have the same value as other observations, n = 46.

Morningstar does not require a minimum number of items in order to percentile rank a set of data. For example, if there are only three funds in a category for a certain time period, we will percentile rank those three (1, 50, 100).

Percentile ranks can be mapped into deciles and quartiles in the following manner.

Range	Decile
0 < Percentile Rank <= 10	1
10 < Percentile Rank <= 20	2
20 < Percentile Rank <= 30	3
30 < Percentile Rank <= 40	4
40 < Percentile Rank <= 50	5
50 < Percentile Rank <= 60	6
60 < Percentile Rank <= 70	7
70 < Percentile Rank <= 80	8
80 < Percentile Rank <= 90	9
90 < Percentile Rank <= 100	10

Range	Quartile
0 < Percentile Rank <= 25	1
25 < Percentile Rank <= 50	2
50 < Percentile Rank <= 75	3
75 < Percentile Rank <= 100	4

Fractional Ranks

For some calculations, such as those related to the Morningstar Rating, Morningstar ranks investments based on the number of distinct portfolios in a category, rather than giving equal weight to each share class. This ensures that funds with multiple share classes do not have a disproportionate weight compared to single-share funds.

When several funds are merely different share classes of the same underlying portfolio, each share class is counted as a fraction of a fund. For example, if the same portfolio can be bought in the form of five share classes, each share class is counted as one-fifth of a fund.

Fractional ranks are simply the fund's raw rank in a peer group (the cumulative weight of all funds up to and above it) divided by the total number of distinct portfolios in that group. For example, fractional ranks for Morningstar Risk-Adjusted Return are calculated as follows:

Name	Morningstar Risk-Adjusted Return 3 Yr	Fractional Weight	Cumulative Weight	Number of Distinct Portfolios	Fractional Rank
Emerging Growth Fund	26.10	1	1	50	2.0
Growth Fund A	25.14	0.25	1.25	50	2.5
Large-Cap Fund Inst	24.55	0.50	1.75	50	3.5
Large-Cap Fund Inv	24.19	0.50	2.25	50	4.5
Index Growth Fund Inv	23.45	0.33	2.58	50	5.2
Growth Fund B	21.50	0.25	2.83	50	5.7
Trends Growth Fund	21.24	1	3.83	50	7.7
Index Growth Fund A	20.46	0.33	4.17	50	8.3
Growth Fund C	19.81	0.25	4.42	50	8.8
Index Growth Fund Y	19.55	0.33	4.75	50	9.5

Absolute Ranks

In addition to percentile ranks, Morningstar also offers absolute ranks. With this method, absolute ranks range from 1 (best) to the last share class in the category (worst).

The following procedure is used for assigning absolute ranks to funds:

1. Pull in the returns for the time period being ranked for all funds in a category.
2. Sort the returns in descending order.
3. Assigned a value of 1 to the highest return value.
4. When two share classes or two distinct portfolios share the same return assign the same absolute rank to the share class or distinct portfolio.

Name	Tot Ret Annlzd 3 Yr	Absolute Rank
AXP Global Technology A	1.8386	36
AXP Global Technology Y	1.8386	36

5. For the next return that has a different value assign a rank equally to the absolute rank of the previous fund plus the number of share classes or distinct portfolios that shared the same return. In the example below two share classes shared the same return 1.8386.

Name	Tot Ret Annlzd 3 Yr	Absolute Rank
AXP Global Technology A	1.8386	36
AXP Global Technology Y	1.8386	36
Fidelity Select Software & Comp	1.7194	38

6. Continuing counting until the last absolute rank is assigned. The last absolute rank value should be equal to the number of share classes in the category.