
Percentile Rank: A Big Problem for Relative TSR Plans with Small Peer Groups

As more publicly traded companies grant performance-based equity awards with total shareholder return (TSR) metrics, best practices continue to evolve for how best to align incentive compensation with shareholder interests. Yet in recent years, we have continued to notice a problematic trend — companies failing to use proper percentile ranking methodology when they implement relative TSR for the first time. It's a seemingly small technical detail with potentially large implications. This is especially true for companies with small peer groups, which have become more common as different parts of the economy are impacted in drastically different ways by macroeconomic events. Selecting a proper percentile ranking methodology can mitigate these issues.

Below, we explore several methodologies and tips for seamless design and implementation.

You Have a Choice: Percentile Rank Methodologies

Believe it or not, there are numerous methodologies for calculating percentile rank but in our experience two stand out as the most logical and widely used. Both methodologies allow easy calculations in Microsoft Excel but their logical foundations are very different. We describe these methods, called “Discrete” and “Continuous,” respectively, in detail below.

The Discrete Percentile Rank Calculation

Under the Discrete ranking methodology, all peers (including the issuing company) are sorted by TSR in descending order, placing the top performer at the 100th percentile and the bottom performer at the 0 percentile. Every percentile is evenly spaced, creating an easily understood distribution of results. This approach is most commonly used with peer groups of more than 20 constituents. The exact formula for Discrete calculations is:

$$P\% = 1 - \frac{(R - 1)}{(N - 1)}$$

Under this method, R equals the company's rank against its peers and N equals the total number of peers, including the company. For example, if the subject company was competing against 10 peers and was ranked in the 6th position, N would equal 11 and R would equal 6, yielding performance at the 50th percentile:

$$P\% = 1 - \frac{(6 - 1)}{(11 - 1)} = 50\%$$

This is equivalent to the PERCENTRANK function in Microsoft Excel, including the subject company in the data array. A sample calculation is depicted below.

Rank	Company	TSR
1	Peer 1	50%
2	Peer 2	48%
3	Peer 3	43%
4	Peer 4	39%
5	Peer 5	38%
6	Company	36%
7	Peer 7	31%
8	Peer 8	30%
9	Peer 9	28%
10	Peer 10	25%
11	Peer 11	19%

Percentile Rank
=PERCENTRANK(\$M\$4:\$M\$14,M9,10)
 50%

The Continuous Percentile Rank Calculation

Under the Continuous approach, each peer company (not including the issuing company) is given a percentile rank using the same formula as in the Discrete approach. The company's performance is then linearly interpolated between the percentile ranks of the two peer companies with TSR immediately above and below that of the subject company. This approach is most frequently used when the peer group size is below 50, since it helps mitigate large swings in payout resulting from changes in company percentile. However, it should be noted that most companies still use the Discrete Percentile Rank calculation for their peer groups regardless of size.

$$P\%_{Company} = P\%_a + (P\%_b - P\%_a) \times \frac{(TSR_a - TSR_{Company})}{(TSR_a - TSR_b)}$$

In this case, P%a and TSRa equal the percentile rank and TSR for the company performing just above the subject company. Conversely, P%b and TSRb equal the percentile rank and TSR for the company performing just below the subject company.

Below is an illustration of this calculation, using the same example as above, with 10 peer companies and a subject company rank of sixth place:

$$P\%_a = 1 - \frac{(5 - 1)}{(10 - 1)} = 56\%$$

$$P\%_b = 1 - \frac{(6 - 1)}{(10 - 1)} = 44\%$$

$$P\%_{Company} = 56\% + (44\% - 56\%) \times \frac{(38\% - 36\%)}{(38\% - 31\%)} = 52\%$$

As seen below, the Continuous approach is equivalent to using the PERCENTRANK function in Excel, with the subject company excluded from the data array.

Rank	Company	TSR
1	Peer 1	50%
2	Peer 2	48%
3	Peer 3	43%
4	Peer 4	39%
5	Peer 5	38%
7	Peer 7	31%
8	Peer 8	30%
9	Peer 9	28%
10	Peer 10	25%
11	Peer 11	19%

Percentile Rank

=PERCENTRANK(\$M\$17:\$M\$26,M28,10)

52%

6	Company	36%
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Additionally, we'd be remiss if we did not remind readers that two other percentile rank functions— PERCENTRANK.INC and PERCENTRANK.EXC— exist in Microsoft Excel. The PERCENTRANK.INC function yields the same result as PERCENTRANK and can safely be used for calculating percentile ranking under either the Discrete or Continuous methodology. PERCENTRANK.EXC, however, differs drastically from the PERCENTRANK function, especially when used with the Continuous approach. We generally do not recommend using this approach for calculating percentile rank because the formula excludes the minimum (0) and maximum (100th) values from the possible range of percentile ranks, which is typically not the intended behavior in most statistical contexts.

Other Methodologies

The two approaches outlined above are used by a large majority of relative TSR plans in the marketplace, as shown below, yet other approaches exist. For example, companies with peer groups of less than 10 constituents will sometimes opt to measure performance according to rank instead of converting to percentiles — which means assigning a specified payout to each Discrete ranking. This is uniquely common with ultra-small peer groups as there is a very limited scope, which enables a straightforward interpretation of rankings.



Rank	Company	TSR
1	Peer 1	50%
2	Peer 2	48%
3	Peer 3	43%
4	Peer 4	39%
5	Peer 5	38%
6	Company	36%
7	Peer 7	31%
8	Peer 8	30%
9	Peer 9	28%
10	Peer 10	25%
11	Peer 11	19%

Rank

=RANK(M36,\$M\$31:\$M\$41,1)

We consider all other approaches to be flawed in some manner when used in the context of calculating relative TSR results, even if they are mathematically valid.

Discrete vs. Continuous

In the table below, we’ve presented our research of public filings and Aon’s PeerTracker client data showing the prevalence of the Discrete and Continuous ranking methodologies in the United States. Discrete is the most widely used by a large margin.

Location ¹	Percentile Rank Approach	Peer Group Size			
		Less than 20	21-50	More than 50	Overall
United States	Discrete	79%	79%	90%	83%
	Continuous	18%	19%	6%	14%
	Other	4%	4%	4%	3%

Why is Discrete so popular in the United States? For many companies, the Discrete approach is more administratively convenient and is often considered the easiest to understand by plan participants. For other companies, the answer likely lies in the differences between actual outcomes of Discrete vs. Continuous percentile rank calculations and the implications of each with peer groups of different sizes.

Let's consider several examples below using a sample firm named "Company ABC" and the following payout schedule, where payouts are interpolated linearly between threshold, target and maximum performance:

¹ This information was provided through Aon’s 2024 Relative TSR Plan Survey Summary & Analysis Report. Aon’s TSR Survey represents a significant sampling of more than 400 outstanding relative TSR plans in the United States.

Relative TSR Percentile Rank	Payout as a Percentage of Target
Maximum – 90 th Percentile	200%
Target – 50 th Percentile	100%
Threshold – 25 th Percentile	50%
Below 25 th Percentile	0%

For our first example, Company ABC ranks third against a 10-firm peer group. Using the Discrete percentile rank approach, it receives a percentile rank of 80% and using the Continuous percentile rank approach it lands at 87%. As a result, the Discrete formula yields a final payout of 175% of target and the Continuous formula yields a final payout of 193% of target.

The difference in percentile ranks is seven percentage points and the difference in payouts is 18 percentage points.

Example 1-10 Peers						
Percentile Rank Approach	1 st Place	2 nd Place	3 rd Place	4 th Place	...	11 th Place
Discrete	100%	90.0%	80.0%	70.0%		0.0%
Continuous	100%	88.9%	87.3%	77.8%		0.0%

In our second example, Company ABC ranks 6th against a peer group of 20. Using the Discrete percentile rank approach, it receives a percentile rank of 75% and, using the Continuous percentile rank approach, it lands at 78%. As a result, the Discrete formula yields a final payout of 163% of target and the Continuous formula yields a final payout of 170% of target. The difference in percentile ranks is three percentage points and the difference in payouts is seven percentage points.

Example 2-20 Peers						
Percentile Rank Approach	4 th Place	5 th Place	6 th Place	7 th Place	...	21 st Place
Discrete	85.0%	80.0%	75.0%	70.0%		0.0%
Continuous	84.2%	79.0%	78.1%	73.7%		0.0%

In our third example, Company ABC ranks 9th against a 50-peer group. Using the Discrete percentile rank approach, it receives a percentile rank of 84% and, using the Continuous percentile rank approach, it lands at 85%. As a result, the Discrete formula yields a final payout of 185% of target and the Continuous formula yields a final payout of 188% of target. The difference in percentile ranks is one percentage point and the difference in payouts is three percentage points.

Example 3-50 Peers						
Percentile Rank Approach	7 th Place	8 th Place	9 th Place	10 th Place	...	51 st Place
Discrete	88.0%	86.0%	84.0%	82.0%		0.0%
Continuous	87.8%	85.7%	85.4%	83.7%		0.0%

As the examples above illustrate, the magnitude of this difference in results driven by percentile ranking methodology is at its greatest when the number of peers is very small. As the number of peers increases, the results under the two ranking methodologies begin to converge. This is the biggest reason why the Continuous methodology is most common for peer groups of 50 constituents or fewer. Since the two methods yield very similar results with large numbers of peers, Discrete becomes the obvious choice for larger peer groups, as it is less mathematically complex and easier to communicate to participants. Peer groups in the U.S. tend to be larger, so U.S. firms most often opt for the Discrete approach.

But what if the company had an ultra-small peer group with fewer than 10 constituents? As discussed above, companies in this scenario often use definitive rankings instead of percentiles. Let's consider the following payout schedule:

TSR Rank	Payout as a Percentage of Target
1 st Rank	200%
2 nd Rank	175%
3 rd Rank	150%
4 th Rank	125%
5 th Rank	100%
6 th Rank	75%
7 th Rank	50%
8 th Rank	25%
9 th Rank	0%

If Company ABC ranks third against an eight-firm peer group, the company would simply pay out of 150% without linear interpolation, since the peer group is small enough for each potential result to have an explicitly stated payout, making for easy communication, calculation, and comprehension of the way the plan works.

Conclusions and Recommendations

Given that the Discrete and Continuous percentile ranks can differ significantly as peer group sizes change, choice of methodology should generally be dictated by peer group

size. Doing some historical peer group testing to determine the most appropriate approach is recommended, particularly for companies using smaller peer groups.

- **The Discrete approach is favored in the U.S. because it is more transparent and works well with larger peer groups, which are easier to develop in the country.** There are usually more peers to select from when developing custom peer groups, and stock market indices tend to be larger (e.g., the S&P 500 in the U.S. vs. the FTSE 100 in the U.K.). In small peer groups, a change in TSR as small as 2% can create large changes in final payouts under the Discrete methodology, an effect that is unlikely when peer groups approach 50 companies or more.
- **The Continuous approach is more prevalent in the plans that have smaller peer groups (e.g., in UK markets).** The biggest advantage of the Continuous approach is that it serves to eliminate situations where a very small change in TSR has an excessive effect on final payouts. This approach captures the magnitude of a company's TSR performance relative to its closest peers, and, as a result, allows changes in payouts to better align with small changes in TSR. All of these effects are more pronounced with smaller peer groups. Of course, the Continuous approach is more complex from a communication and calculation perspective, and likely not worth the effort unless truly needed.
- **The definitive rank approach is only prevalent in ultra-small peer groups.** Similar to the Continuous approach, one of the biggest advantages of utilizing definitive rank is that it serves to eliminate situations where a very small change in TSR has an excessive effect on final payout. However, if the peer group has fewer than 10 constituents, determining payout based on definitive rank often has the edge. This is due to its simple calculation and straightforward results. However, using definitive rankings to determine payout is often not recommended for larger peer groups as there is a larger scope, which may benefit from a more calculated methodology to determine payout.

In our opinion, it is best practice to choose percentile rank methodologies based on peer group size, in an effort to balance plan simplicity and reasonable changes in payouts for small changes in performance. This is an appropriate and relatively easy plan design step that protects award holders and shareholders from unintended plan design consequences. It's worth the effort even if there is a fairly narrow range of results where differences between the methodologies are noticeable.

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