Ranking System Computations

Basically, rank computation is a straightforward task. For each factor (or formula), we sort companies from best to worst (with the user choosing, in each case, whether higher or lower tallies are to be deemed better) and then convert each to a percentile score, a scale of 100 for the best to zero for the worst. When multiple factors are used, we combine them into an overall rank based on user-supplied weights.

There are, however, two important subtleties that must be understood to know how we calculate the exact numbers.

Re-normalization When Factors Are Combined

It appears, to many, factors should be combined through a simple weighted average:

Table 1

	Earnings Yield (75%)	Sales % Ch PYQ (25%)	Overall (Weighted Avg.)
AAPL	80	0	60
MSFT	60	20	50
GOOG	40	40	40
FB	20	80	35
AMZN	0	60	15

That, however, is not the case. Here are the actual ranks, assuming this is a self-contained five-stock universe:

Table 2

	Earnings Yield (75%)	Sales % Ch PYQ (25%)	Actual Rank
AAPL	80	0	80
MSFT	60	20	60
GOOG	40	40	40
FB	20	80	20
AMZN	0	60	0

The weighted averages computed in Table 1 are relevant. But instead of using those raw tallies as ranks, we normalize them to percentile ranks ranging from zero to 100. These normalized weighted averages are the final ranks.

The computation becomes a bit more complex if a ranking system contains multiple composites. In this case, each composite rank would be computed as described above. To compute the overall rank, we first compute the weighted average of each composite rank and then normalize this final set of figures.

Here's an example:

Ranking System

- Value (65%)
  - Earnings Yield (60%)
  - Price/Sales (40%)
- Growth (35%)
  - Sales % change PYQ (70%)
  - Sales % change TTM (30%)

Table 3 shows how we compute the ranks for the Value composite:

Table 3 – Value Composite

	Egs. Yield (60%)	Price/Sales (40%)	Overall (Weighted Avg.)	Final Ranks (normalized weighted averages
AAPL	80	60	72	80
MSFT	60	40	52	60
GOOG *	40	20	32	40
FB	20	0	12	0
AMZN *	0	80	32	40

* note that the final percentile ranks reflect a tie scores in the overall weighted averages.

Table 4 shows how we compute the ranks for the Growth composite:

Table 4 – Growth Composite

	Sales % Ch PYQ (70%)	Sales % Ch TTM (30%)	Overall (Weighted Avg.)	Final Ranks (normalized weighted averages
AAPL	0	0	0	0
MSFT	20	20	20	20
GOOG	40	40	40	40
FB	80	80	80	80
AMZN	60	60	60	60

Finally, Table 5 shows how we combine the two composite ranks into our final rank.

Table 5 – Overall Rank

	Value Composite (65%)	Growth Composite (35%)	Overall (Weighted Avg.)	Final Ranks (normalized weighted averages
AAPL	80	0	52	80
MSFT	60	20	46	40
GOOG	40	40	40	20
FB	0	80	28	0
AMZN	40	60	47	60

Handling "NA" Items

NA stands for "Not Available."

In an ideal world, data would be available for every factor for every company.

Unfortunately, that's not the case in reality. We very often encounter situations where important data items are nonexistent for some companies. These are reported in portfolio123 as NA. A good example is PE, which is undefined for almost 60% of our nearly 8,000 stock universe (because of negative EPS or EPS at such low levels as to result of PEs in the hundreds or thousands).

When a screening rule encounters an NA item, it is assumed that the company failed the test and, hence, is omitted from the screen. Ranking systems present more complex challenges since, unlike screens, the factors are not all-or-nothing. All companies are ranked somewhere on a best to worst scale. We therefore need to decide what NA means in terms of best-to-worst.

The traditional portfolio123 approach puts NA values at the bottom of the sort, in the worst position. But while we do penalize companies for NA items, we do so with a sense of moderation. When it comes to translating NA to a number, we don't assign it a value of zero or one. Instead, for each factor in the ranking system, we consider all companies with NA as being in a tie, and the number assigned is just below the rank of the worst company that had meaningful data. The extent of the NA penalty varies from item to item. If NA is a rarity for a particular factor, a company that has one will be penalized sharply. If NA is commonplace, the penalty will be mild, but still a penalty.

Let's examine this by ranking PEs in a hypothetical five-stock universe.

All ranks are on a 0-100 percentile basis. Because the universe has only five stocks, the possible scores will be 100, 80, 60, 40 and 20.

The lowest (best) PE earns the highest rank, 100. The next best merits a score of 80 and the third best is scored 60. Now suppose there are two companies whose PEs are NA. These two are tied, and they'll get the numeric score that would have been assigned to the fourth company had it had a meaningful PE, which in this case would have been 20.

Table 6

Ticker	Ratio	Rank	Comments
A	20	80	Rank increment is 20 since there are 5 values: 100/5 = 20
B	5	60	
C	2	40	
D	NA	20	Rank never reaches 0 because of a tie.
E	NA	20	

As you see, NA values do count against a company when it comes to computing its rank. This can be important when rankings are computed relative to industries, some of which may be very small.

It can also have a more general impact. Financial companies in particular are prone to being pushed downward in ranking systems that use several factors that don't exist for them because of the way they report (e.g., turnover). And where financials are still able to pass user models (because they are

sufficiently strong in the non-NA factors), they're more likely to hover near the borderline and fall out of portfolios more easily when rebalancing takes place.
Portfolio123 users can, if they wish, modify this situation and choose to have NA play a neutral role in rank computations.

The default status is as described above, with NAs having a negative impact on ranks. But if users opt for the alternative, the neutral approach, all NA values will, when the computation process begins, be put to the side. Percentile rankings from zero to 100 will be computed for all firms that have the necessary data. Then, at the end of the process, all NA companies will be assigned a rank in the middle of the valid ranks, a perfectly neutral score. The rank assigned to NA's will usually be around 50, except when the there are very few ranked stocks (such as in a small universe or industry).

The more NA rank factors a company has, the harder it will be for the firm to appear in any of your rank-driven result sets. That's because it will be harder for the company to come in near the top and harder for the company to come in near the bottom (as you might seek if you are looking to short poorly ranked stocks).

Let's look how the example above changes.

Table 7

Ticker	Ratio	Rank	Comments
A	20	66.66	Rank increment is 33.3 since there are 3 values: 100/3 = 33.3
B	5	33.3	
C	NA	33.3	NA's are neutral
D	NA	33.3	
E	2	0	Lowest Value is reached

This approach should not change long-oriented systems since they pick from the top, where you'll mostly find stocks with valid values. This would be most useful is in a long/short system that buys top ranked stocks and shorts lower ranked stocks using the same ranking system. In this example a long/short system of the best/worst stock would go long A and short C, all with valid values. In the first example the long would be A, and the short either D or C (each with NA).