



Rescaling the Centroid of a Fund

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Introduction

This document supplements the methodology document for the Morningstar Style Box™. This provides additional information about how to rescale the size score for a fund. The rescaling process for value-growth scores (x coordinates) is very straightforward for stocks and for funds. Likewise, the rescaling process for size scores is very straightforward for an individual stock. See appendix B of *The Morningstar Style Box Methodology* for more details.

The process of rescaling the size score for a fund is more complicated. Because stocks are classified as giant, large, mid, small, or micro relative to seven different areas of the world ("style zones")¹, the rescaling process for size scores uses market cap breakpoints for each specific area. Because a fund is a collection of stocks (usually from different areas of the world), we need to define what parameters to use to rescale a fund's size score.

The Style Box methodology document outlines the parameters that are used in the rescaling equation for size (page 35). Market-caps for each breakpoint for each style zone are converted into raw size scores (equation 13 on page 24 of the style box methodology) and these correspond to different rescaled values on the Style Box.

Parameter	Typical Range for Parameter (raw)	Breakpoint	Cumulative Market Cap of the Style Zone	Typical USD Range (different for each style zone)	Corresponds to Rescaled Size Score
y3	285 to 315	Between giant- and large-cap stocks	40%	\$8B to \$48B	300
y2	Always 200	Between large- and mid-cap stocks	70%	\$2B to \$9B	200
y1	Always 100	Between mid- and small-cap stocks	90%	\$0.5B to \$1.5B	100
y0	0 to 25	Between small- and micro-cap stocks	97%	\$0.1B to \$0.4B	0

The final two y parameters are ybot and ytop and these are derived from y0, y1, y2, and y3 (see page 35 of the style box methodology).

¹ The style zones are United States, Canada, Latin America, Europe, Japan, Australasia, and Asia ex-Japan.

In order to rescale a fund centroid, we need to calculate a weighted average of the parameters above for the fund under consideration. The steps are as follows:

- 1) Get the monthly USD market cap breakpoints for each size level for each of the seven style zones.
- 2) Calculate all the y parameters (ytop, y3, y2, y1, y0, ybot) for each of the seven style zones by inserting the market caps into the equation for raw y.
- 3) Determine the fund's percent of assets in each of the seven style zones. (Morningstar's 13 regions roll up to the seven style zones.)
- 4) Calculate a weighted average of the y parameters, using the fund's percent of assets in each style zone as the weights.
- 5) Use those parameters to rescale the fund's size score. Use parameters from the same date as the fund portfolio date.
- 6) Repeat steps 3-5 for other funds.

This process affects only those funds with size scores near the giant-large breakpoint or near the small-micro breakpoint. Essentially, we are trying to determine whether those fund centroids should be plotted just above the line or just below the line. For example, across the different style zones, the y3 parameter ranges from 285 to 315. If a fund has a size score of 298, where should it be plotted? If you use 285 as the breakpoint between giant- and large-cap, this particular fund will be plotted just above the line. If the weighted average of all y3 scores is 305, this fund will be plotted just below the line.

Morningstar does not classify funds as being "giant-cap" or "micro-cap." Our style box labels are simply large, mid-cap, or small. So, there are few consequences to whether the fund's centroid is plotted just slightly above or just slightly below the giant-large and small-micro lines.