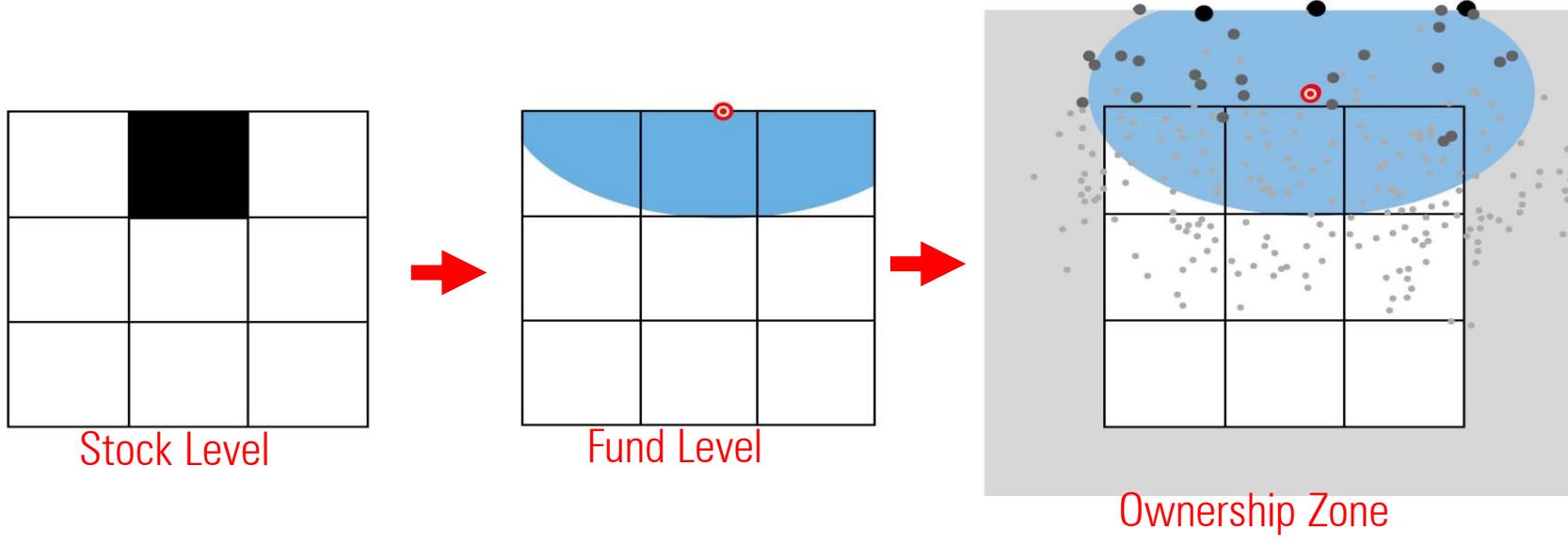


Style Box Enhancements 2020

MORNINGSTAR®

Equity Style Box Views



Ownership Zone

Plot of each stock in the portfolio within the Style Box

- Shaded Area = 75% of fund's assets (Blue Shaded Area)
- Centroid = Weighted average of all the fund's holdings

Overview

Morningstar is keeping the core principles in place and minimizing any adverse impact to users. The same factors that measure value and growth will still be used. We are improving the way we score equities that leads to more intuitive interpretations.

Issues Addressed

- Some “core” indexes have moved into the growth portion of the style box, and some active funds that proclaim to be blend are also consistently placed in the growth box.
- The changes are subtle for most users, and the impact of products should be minimal.

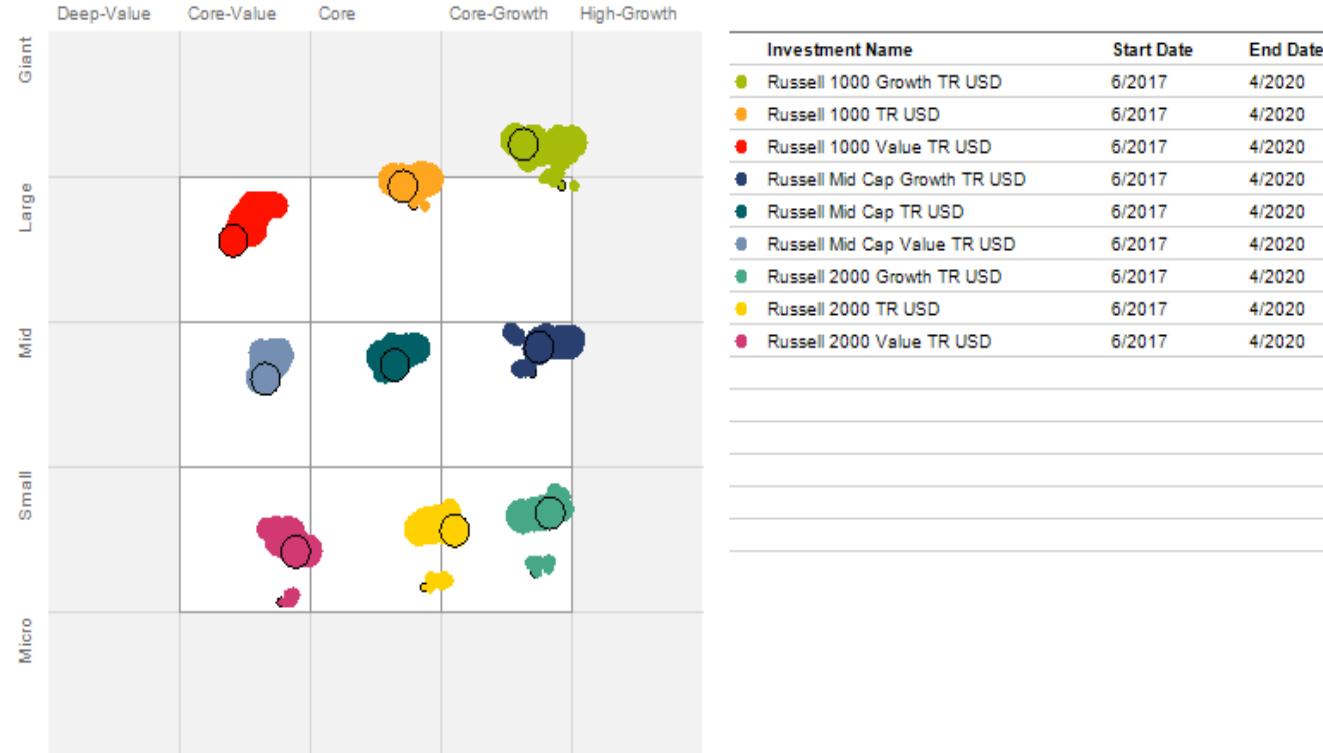
Equity Style Box Process

- Value Factors are relative to Price
- Growth Factors are fundamental variables

The Horizontal Axis Style:

<u>Value Score Components and Weights</u>	<u>Growth Score Components and Weights</u>		
Forward looking measures:		Forward looking measures:	
• Price-to-projected earnings	50.0%	• Long-term projected earnings growth	50.0%
Historical based measures:		Historical based measures:	
• Price-to-book	12.5%	• Historical earnings growth	12.5%
• Price-to-sales	12.5%	• Sales growth	12.5%
• Price-to-cash flow	12.5%	• Cash flow growth	12.5%
• Dividend yield	12.5%	• Book value growth	12.5%

Stocks and Funds Have Drifted Toward Growth



- Some “Core” indexes have moved into the growth portion of the style box, and some active funds that proclaim to be blend are also consistently placed in the growth box.

Key Changes

- Source Style Box Inputs from Morningstar Equity Database Using Trailing Twelve Month Data

We are using our own equity data as much as possible, and getting more timely and accurate information.

- Remove Development Status Market-Capitalization Buffer

We are making the size calculation simpler by reverting back to market convention.

- Replace Factor Bucketing Calculation with a smoother statistical approach

This is a cleaner way to assign individual factor scores to stocks, resulting in smoother distributions.

- Replace the aggregation of factor scores with a smoother distribution

This gives us end scores that are less biased to outliers.

More Timely Data

Source Style Box from Morningstar's Equity Database Using Trailing Twelve Month Data

Source the five-value and five-growth factor calculations from EXOI using Trailing Twelve Month data. This enhances the quality of inputs into the Style Box by comparing monthly data to a monthly price. The previous methodology used Annual Report financial data.

- Use earnings per share from continuing operations instead of net earnings per share
- Use cash flow from operations instead of total cash flow
- For financial stocks, price-to-cash flow is not used for value factor calculation because cash flow from operations data is not meaningful for banks and insurance companies
- Forward Dividend data used for the value-factor calculation

Revert to Region-Oriented Market Size

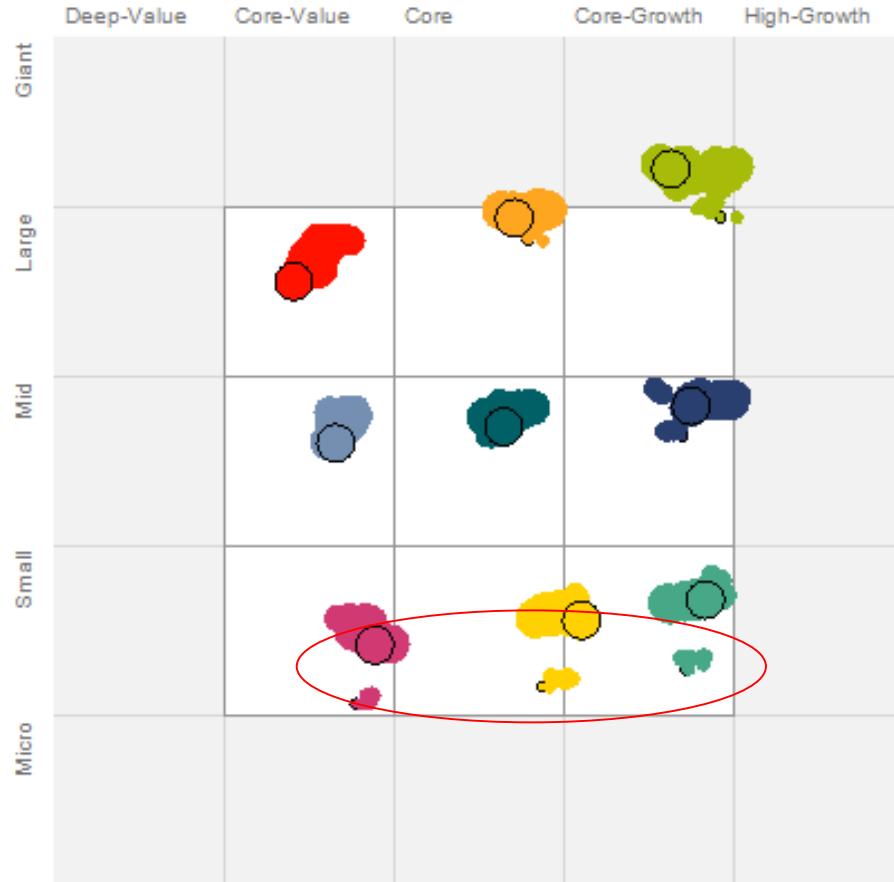
Remove Development Status Market-Capitalization Buffer

We will revert to the market-capitalization methodology used from 2004-2018. In 2018, we incorporated a development status buffer to our size methodology to bring more global consistency and comparability across stocks and funds. However, investors prefer to evaluate their investments in the context of their regions. We will not recalculate Style Box data for periods where the development status buffer was in place (Feb 2018- Oct 2020)

The seven Style Box regions will remain constant:

- United States
- Latin America
- Canada
- Europe
- Japan
- Asia ex-Japan
- Australia/New Zealand

Changes Will Also Revert to Pre-2018 Market Size Methodology



- **Current:** Funds and Stocks more comparable on a global basis
- **New:** Investors prefer seeing market capitalization in the context of their region, Morningstar is reverting back to that methodology

Updated Distribution Methodology: 10 Factors Underlying Each Stock

Replace Factor Bucketing Calculation with Z-Score Approach

Our current factor bucketing approach, which places prospective yields and growth rates into buckets, was disproportionately assigning stocks to the “Plus” bucket for growth-factors and to the “Low” bucket for value-factors. We are replacing this bucketing approach with a Z-Score calculation that more proportionally allocates factor scores from low to high within a scoring group.

Calculation:

Uses a recursive trimming method to remove all stocks are that are outside of three weighted standard deviations outside the weighted median to calculate the weighted average used in the below calculation

$$F_i = 50 \times \left(1 + \frac{x_i - \mu}{3\sigma}\right)$$

where:

F_i = Percentile Score for Individual Factor

x_i = Stock Factor Value

μ = Float Market-Cap Weighted Factor Average

σ = Float Market-Cap Weighted Factor Standard Deviation

Updated Distribution Methodology: Style Score for Each Stock

Replace Raw X Coordinate Calculation with Z-Score Approach

The effects of the disproportional factor percentile scoring were surfacing on the Raw X coordinate assignment level. These coordinates are used to place stocks and funds on the style axis of the Style Box. The Z-Score approach of Raw X coordinate assignment is mathematically communicative with the new factor-percentile scoring and ensures a more balanced calculation of scores across scoring groups.

Calculation:

Within a scoring group, the stock with the lowest standard deviation (of net value-core-growth score) will score closest to 150 (the middle of the style box)

Stocks with standard deviation closest to -.5 and .5, will score 100 and 200 (the value and growth borders of the Style Box).

$$Raw\ X\ =\ (100\ \times\ \frac{(G - V)\ -\ \mu_i}{\sigma_i}) + 150$$

Where

G = Growth Score

V = Value Score

μ_i = Scoring Group VCG Average

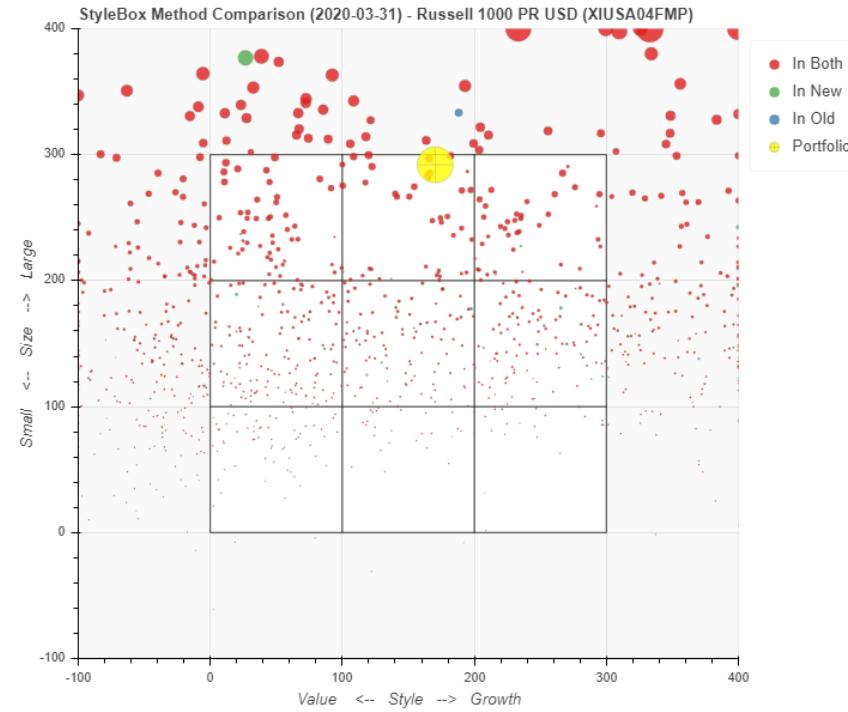
σ_i = Scoring Group Standard Deviation

Changes for US Equity Style Box Scoring Groups

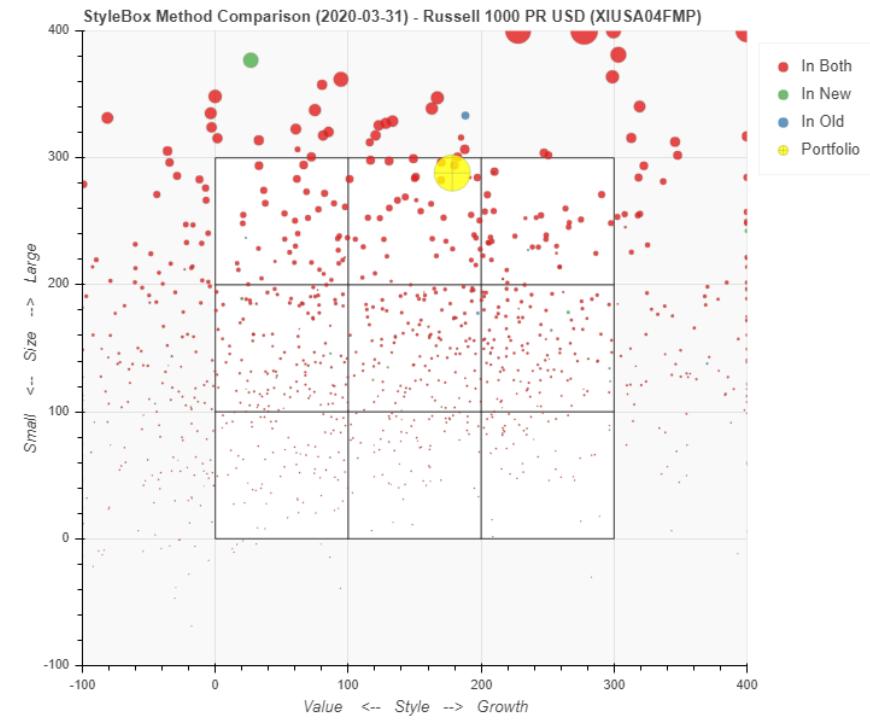
Data as of 5/31/2020		October 2020 Morningstar Style Box Release								
		Large Value	Large Blend	Large Growth	Mid Value	Mid Blend	Mid Growth	Small Value	Small Blend	Small Growth
Current	Large Value	51%	26%		14%	9%				
	Large Blend	8%	66%	6%	1%	18%	1%			
	Large Growth		6%	73%		2%	20%			
	Mid Value				54%	16%		13%	17%	
	Mid Blend				8%	60%	3%	2%	24%	4%
	Mid Growth				2%	22%	55%	0%	4%	16%
	Small Value							82%	16%	2%
	Small Blend							28%	62%	10%
	Small Growth							6%	33%	61%

- The above chart shows stock level changes across Style Box assignments with the upcoming methodology release
 - For example, for Large Blend:
 - 66% of stocks are going to remain in their current assignment
 - 8% will move to Large Value
 - 6% will move to Large Growth
 - 18% will move to Mid Blend
 - 1% will move to Mid Value
 - 1% will move to Mid Growth

Current Production



Future Production



- The above charts show the shifts for the Russell 1000 Index across Current Production and Morningstar's upcoming October 2020 release based on 3/31/2020 data. The yellow circle represents the index and the red, green, and blue circles represent the underlying stocks

Impact

The Morningstar Equity Style Box updates is integral in providing accurate and stable classifications for equities and funds. While the Style Box remains a useful tool in portfolio construction for both investors and asset managers alike, there are some key impacts that users will need to be aware of upon release:

- Release
 - Updated Stock and Fund Level Style box assignments will be released for assignments effective 10/30/2020 onwards
- Category Changes
 - No Morningstar Category assignment will be changed upon release of the methodology
 - New scores will fold into the existing Morningstar Category Appeal process which utilizes a confluence of qualitative and quantitative data to review fund category assignments
 - The Category Appeal process can be utilized by fund managers who are interested in learning more about their Category assignment
- Integration of improved Equity Data
 - While we're leveraging the existing mechanisms to deliver Equity Style Box data to products, our coverage has improved since previous Style Box enhancements
 - Atlas delivers more timely and updated equity level data to fuel Style Box calculations
- Questions can be directed to your Morningstar Client Service Manager