Clustering

Learning Goals

- Understand why Clustering is used in Aapryl
- Understand basic clustering methodology
- Understand how clusters are used throughout Aapryl

Overview

Aapryl's clustering methodology classifies funds or managers into categories using a statistical clustering. This is important to users because:

- Third party databases do not necessarily do a good job of classifying managers
- Proper classification creates better peer groups useful for manager searches and comparisons
- Aapryl's classifications are an essential building block to many of the calculations in the system including Skill Analysis and Skill Screening

Review of Key Terms

- **Statistical Clustering:** This is a statistical method of grouping managers together based on multiple factors in which the average exposure to factors is calculated for all constituents of a universe. Groups or clusters are then formed that minimize the cumulative distance of each constituent from a group's average
- **Quality:** This is one of the primary classifications of managers in Aapryl. Managers are separated into High Quality and Low Quality groupings based on their exposure to commonly used factors such as ROE, Earnings Stability, leverage, dividend yield and momentum
- **Hypothetical Beta Portfolio:** These are established sample portfolios used by Aapryl as measuring stick to group managers. The sample portfolios used are preloaded into the system and are created by the Aapryl team using proprietary methodology
- **Style:** This is one of the primary classifications of managers in Aapryl. Managers are separated into Value, Growth and Blend groupings based on their exposure to commonly used factors

Aapryl's Peer Groups

- Aapryl use statistical clustering techniques to classify managers into one of the following six categories:
  - Cyclical/Low Quality Value
  - Relative/High Quality Value
  - GARP Blend
  - Defensive
  - Cyclical/High Growth
  - High Quality/Stable Growth
- The categories are used as Peer Groups in Aapryl that are essential to Aapryl's skill analysis

Overview of Methodology

- A regression is run for each manager that calculates exposure to commonly used factors
- Each manager's exposures are compared to the exposures of hypothetical portfolios built by the Aapryl team
- Statistical clustering techniques are used to group the managers into the categories described so that difference between a manager's average factor exposure and a group's average factor exposure is minimized

Aapryl Approach

Once categorized, Aapryl is able to provide users with charts and graphs that contain an abundance of useful information which includes the following:

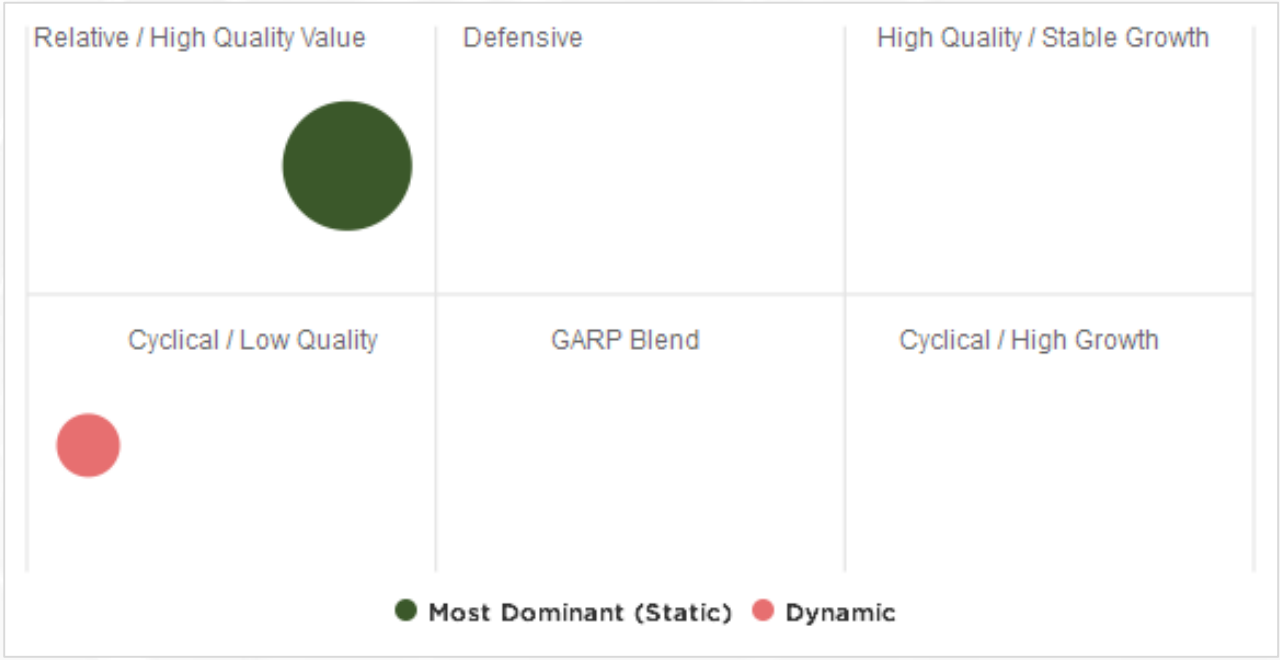
Peer Groups Composition:
Users can see all of the managers included in each of the 6 peer groups defined

Long-Term Classification:
Users can see which group a particular manager has been categorized in based on the manager's exposure over time

Short-Term Classification:
Users can see which group a particular manager has been categorized in based on current exposures

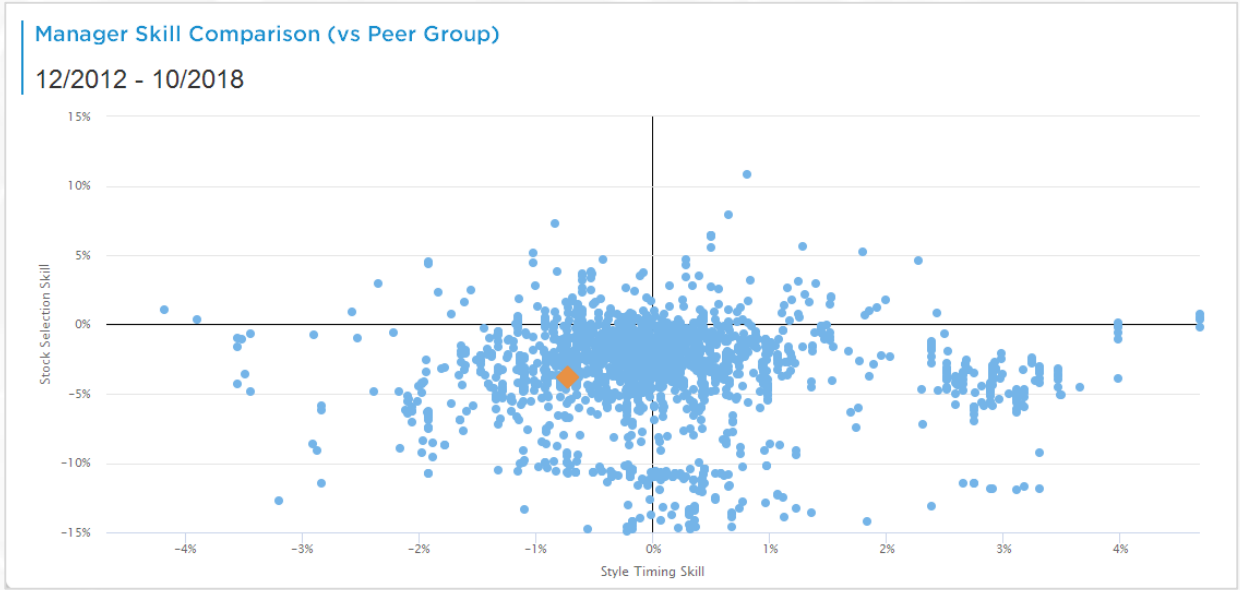
Aapryl's Cluster Box

- The chart shows the various clusters and where a manager is classified
- The green circle represents the manager's most dominant cluster over its full history
- The red circle shows the manager's cluster over the last 36 months



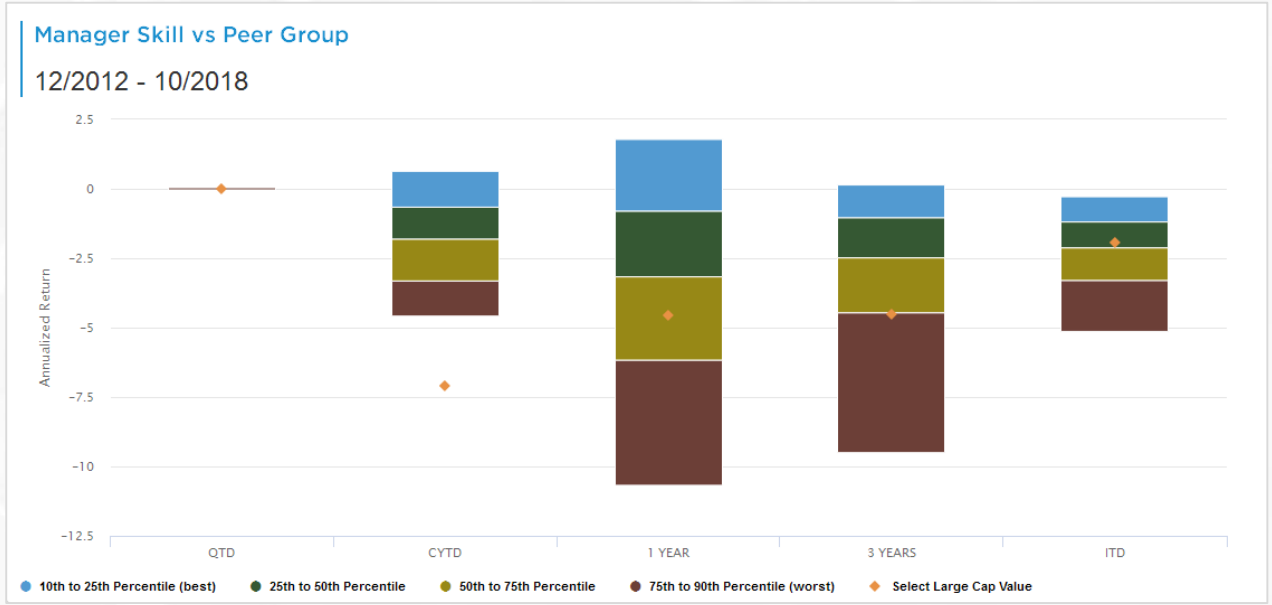
Comparing Managers' Skill

- Aapryl compares the manager's return from various elements of skill to that of the peer group to determine various skill score
- Users can see all members of a peer group in this chart
- Each dot represents a manager and users can see who each manager is by hovering over a dot



Peer Group Analysis

- Manager performance is compared to their Aapryl peer groups to provide context on the manager's performance
- Aapryl uses this information to create the manager's skill score

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