



Target-Date Fund Series Rating and Research Reports Methodology

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Overview

Morningstar has conducted qualitative, analyst-driven research on target-date series since 2009. An essential complement to our database of investment information and our suite of quantitative research tools, Morningstar's target-date series analysis focuses on helping fiduciaries make better investment decisions with plan participants' retirement funds. The purpose of Morningstar's qualitative, analyst-driven research is to:

- ▶ Identify those target-date series that we believe should be able to collectively outperform (across the glide path) their relevant benchmarks and/or peer groups, within the context of the level of risk taken, over the longer term.
- ▶ Help investors understand the suitability of target-date series and the individual funds within a series for retirement savings and give them clear expectations for the likely behavior of these investments in different market environments.
- ▶ Place the series and its funds in historical context in terms of criteria such as expenses, manager tenure, asset allocation, and asset size.
- ▶ Monitor the series for changes that could materially affect its suitability and/or Morningstar's investment opinion.

Business Model

Morningstar is committed to the principle of independence. Morningstar does not charge target-date series or their parent companies to be rated, nor do target-date series commission ratings. Morningstar commercializes its target-date research by including ratings and reports in various products and services and through licensing its intellectual property. Analysts produce their target-date series analysis for the benefit of investors, advisors, and institutions, not the fund companies offering the series.

Morningstar separates its analyst team from commercial activities in order to avoid any real or perceived conflicts of interest. Analysts are focused on providing in-depth, accurate, and useful analysis. This means that Morningstar analysts will deliver their genuine opinion of a target-date series, even when it is negative.

Coverage Decision

Morningstar's goal is to ensure that retirement savers, consultants, plan sponsors, and retirement series providers have access to its analysts' qualitative opinions on a broad spectrum of series that are important to the marketplace and help stakeholders make

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investment decisions. Hence, coverage is not determined by quantitative screens on performance or limited to only a "best of breed" universe (although we do aim to cover and closely monitor what we believe are the best target-date offerings), and analyst teams have ample discretion in determining their coverage universe.

In determining coverage, analysts evaluate target-date series assets under management as one gauge of investor interest, but they also cover new and/or small series if they believe investor interest merits doing so or if they believe investors would otherwise benefit from learning more about a series.

The Morningstar Target-Date Series Reports

Morningstar Target-Date Fund Series Ratings and Research Reports ("The Reports") are designed to help individual investors, financial advisors, plan sponsors, and other interested fiduciaries make informed decisions when evaluating a series of target-date funds.

Target-date funds are marketed as a one-decision, comprehensive investment option for investors' retirement savings. The funds tend to invest heavily in equities in the decades before retirement and shift their asset mixes to short-dated bonds and cash in the years immediately preceding and following retirement. The mutual fund industry refers to this shift in assets as a fund's "glide path."

Target-date funds are by no means a uniform investment type. Depending on the glide-path philosophy, the subasset classes used, the nature and quality of the underlying investments, and a host of other factors, target-date funds can display markedly different risk and return characteristics. The Reports intend to illuminate these differences, so that fiduciaries can have the best possible information at hand for determining plan suitability.

Morningstar Target-Date Fund Series Rating and Research Reports use both quantitative and qualitative assessment methods to analyze target-date funds. The Reports:

- ▶ Make meaningful comparisons across the target-date universe;
- ▶ Provide insight into the factors most relevant to target-date fund series performance;
- ▶ Assess the suitability of target-date fund series for investors with widely varying needs.

The Reports are also unique because they include analyst assessment of the company's stewardship practices. Morningstar's analysts evaluate the family's expertise at managing equities, bonds, and asset allocation; reliance (or not) on in-house management and skill at selecting outside management if relevant; manager investment across the firm; board oversight; and reasonable expenses.

The variety in strategies and structures among target-date fund series inevitably leads to a wide range of outcomes, some favorable and others disappointing. The Reports offer a rational, consistent framework for measuring target-date fund series that permits apples-to-apples comparisons. The goal of the Reports is to ensure that users select and hold target-date fund series that are most appropriate for their particular needs.

The Morningstar Analyst Rating for Target-Date Series

The Morningstar Analyst Rating® for Target-Date Series is the summary expression of our forward-looking analysis of a target-date series. Morningstar Analyst Ratings are assigned on a five-tier scale running from Gold to Negative. The top three ratings, Gold, Silver, and Bronze, all indicate that our analysts think highly of a target-date series' parent organization, management team, and investment process, and that the series' quantitative scores of price, portfolio, and performance beat those of peer offerings. The difference between them corresponds to differences in the level of analyst conviction in a series' investment options' ability to collectively outperform their respective benchmarks and peers through time within the context of the level of risk taken, as well as past risk-adjusted performance, portfolio quality, and reasonable expenses compared to their peers. The Analyst Rating seeks to evaluate each series' investment options within the context of their objectives, appropriate benchmarks, and peer groups.

Note that the Analyst Rating for Target-Date Series is distinct from the Analyst Rating for Funds. A fund in a target-date series may have Analyst Ratings for both its series and the fund itself, and in some cases those ratings may not be identical. Retaining a fund-level rating for target date funds allows analysts to describe in detail cases where a particular fund in a series outshines (or lags) the other offerings. Such detail is relevant information for a fiduciary or investor in a specific fund but may be too granular to feature in the series-level rating or report.

The ratings should be interpreted as follows:

Gold: These series are our highest-conviction recommendations and stand out as best of breed for their ability to help retirement savers meet their goals. By giving a series a Gold rating, we are expressing an expectation that the funds in a series as a whole collectively will outperform their relevant performance benchmarks and/or peer groups within the context of the level of risk taken over the long term.

To earn a Gold rating, a series must distinguish itself across the five pillars that are the basis for our analysis. That is, a Gold-rated series should feature seasoned, talented, and successful asset managers or teams of managers; sound, thoughtful investment processes that have been executed skillfully and consistently; portfolios that are in harmony with the series' stated processes asset-allocation philosophy and that are capable of delivering a reward that

The Morningstar Analyst Rating for Target-Date Series

compensates investors for the risks it takes; reasonable expenses; and strong parent organizations that are focused on responsible stewardship of investor assets. Gold-rated series must also do well in quantitative measures of past performance, fund expenses, and portfolio quality.

Silver: Series that fall in this category are high-conviction recommendations. They have notable advantages across several, but perhaps not all, of the five pillars. With those fundamental strengths, we expect these series' constituent funds will collectively outperform their relevant performance benchmarks and/or peer groups within the context of the level of risk taken over the long term. While these are worthy series with many positive features, they don't necessarily rise to the standard of best in breed in all qualitative or quantitative metrics. Series rated Silver may be working their way up the ratings scale as we gain more familiarity and conviction in key pillars, or the quantitative pillar scores improve. Alternatively, series may work their way down based on degradation within specific pillars.

Bronze: These series have advantages that clearly outweigh any disadvantages across the pillars, giving us the conviction to award them a positive rating. As is the case with any series receiving a positive rating, we expect the series' constituent funds to beat their relevant performance benchmarks and/or peer groups within the context of the level of risk taken over a full market cycle, though to a lesser degree than higher-rated series. Series rated Bronze may be working their way up the ratings scale as we gain more familiarity and conviction in key pillars and/or quantitative scores improve, or working their way down based on degradation within specific pillars.

Neutral: These are series for which we don't have a strong positive or negative conviction. In our judgment, these series' investment options aren't likely to deliver standout returns, but they aren't likely to seriously underperform their relevant performance benchmark and/or peer group either. A promising but unproven series may also receive this rating until we see further evidence that its funds have the potential to outperform.

Negative: These series possess at least one flaw that we believe is likely to significantly hamper future performance, such as high fees or an unstable management team. Because of these faults, we believe these series' investment options are inferior to most competitors' and will likely underperform their relevant performance benchmarks and/or peer groups, within the

The Morningstar Analyst Rating for Target-Date Series

context of the level of risk taken, over a full market cycle. For example, a series that combines overly benchmark-conscious strategies with high fees could receive this rating because its investments lend themselves to underperformance.

Morningstar may also use one other designation in place of a rating:

Under Review: This designation means that a change at a rated series requires further review to determine its impact on the rating.

Pillar Ratings

In more than two decades of fund research, Morningstar's global analyst team has identified five key areas that we believe are crucial to predicting the future success of managed investments: People, Parent, Process, Performance, and Price.

These five pillars form the spine of our research approach, and we evaluate each of them when assessing an individual managed investment or group of investments, like a target-date series. We not only evaluate each pillar, but also the interaction between them, which we believe is crucial to understanding the investments' overall merit.

Those familiar with the previous Target Date Methodology may notice some differences in the scoring process for each Pillar. As Morningstar analysts have become more familiar with the target-date industry, we have revised the scoring methodology for each Pillar to incorporate new industry context and, in some cases, newly available data. The following sections each begin with a note summarizing the changes in the scoring of each Pillar.

Process (20% of Rating)

In previous Target Date Series Ratings and Reports, the only evaluation of Process was a quantitative scoring of the series' underlying fund portfolio. Since Morningstar analysts are now more familiar with the asset-allocation and fund-selection processes of target-date series managers, this new methodology includes both a qualitative and quantitative component for Process. *Process: Portfolio* is a quantitative score based on the underlying funds' star ratings, and *Process: Approach* is a qualitative score based on analysts' evaluation of the investment process. They are equally weighted in the Process pillar.

Process: Approach

Morningstar analysts are agnostic to an investment manager's overall style. For multiasset-class funds such as target-date series, a wide range of approaches to asset allocation can succeed.

We look for investment options with an asset-allocation approach, performance objective, and investment process (for both manager selection and portfolio construction) that are sensible, clearly defined, and repeatable. The process must also be implemented effectively. In addition, the portfolio should be constructed in a manner that is consistent with the investment process and performance objective. We seek to understand the context in which managers think about

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risk and how this is expressed when constructing their portfolios. More specifically, we seek to understand:

- ▶ the investment philosophy that underpins the series' glide path;
- ▶ the key "edge" of the process as executed by the options' managers;
- ▶ the investment managers' approach to risk management and diversification;
- ▶ the fit of the process with the resources backing the strategy and with the size of the asset base tied to it (including the available underlying strategies);
- ▶ the risks entailed in the process, from a portfolio-bias point of view and from an ability-to-execute point of view;
- ▶ our expectations for performance in different market environments, assuming the process is adhered to;
- ▶ whether or not we believe the process is capable of adding value across the cycle versus the relevant benchmark and/or peer group on a risk-adjusted basis;
- ▶ the suitability of the funds for different types of retirement savers given the risks we would expect to see in the portfolios.

Process: Portfolio

Our analysts make extensive use of Morningstar's global database and holdings-based analytical capabilities to evaluate the target-date series' portfolios, as most target-date funds are structured as funds of mutual funds.

Morningstar examines the quality of the underlying holdings in each target-date fund series, based on the Morningstar Rating for mutual funds (the "star rating") of those underlying funds. The star rating compares a fund's risk-adjusted performance with that of its peers in the same Morningstar Category, and a fund must have at least three years of performance history in order to receive a star rating. For more information on the star rating, please refer to the Morningstar Rating Methodology document.

Morningstar calculates a weighted-average star rating for each target-date fund series using the star ratings of the holdings underlying each target-date fund in the series. When an underlying holding belongs to a share class that does not have a long enough performance history to receive a star rating, its extended performance star rating is used as a proxy. This is

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accomplished by extending the performance of the younger share class beyond the inception date, substituting the performance of the oldest share class, and adjusting for a fee differential if the younger share class has a higher expense ratio. For more information on extended performance, please refer to the Morningstar Extended Performance Methodology document. In cases where Morningstar has included extended performance in the star-rating calculation for a target-date series holding, the star rating is represented with hollow stars in the data table associated with the Morningstar Target-Date Fund Series Research Report's Performance section.

Under extremely rare circumstances, an extended performance star rating is not available, but a star rating is available for the oldest share class of the same fund. In these cases, the oldest share class' star rating is used instead. As not all underlying holdings receive a star rating, only those holdings with star ratings are included in the calculation. The formula is as follows:

$$SR_{Fam} = \frac{\sum_{i \in Fam} MV_i \cdot SR_i}{\sum_{i \in Fam} MV_i},$$

where

SR_{Fam}	=	Star rating for target-date fund series Fam
MV_i	=	Market value of underlying holding i
SR_i	=	Star rating for underlying holding i

At least 50% of the underlying holdings in a target-date fund, as measured by market value, must earn a star rating (standard, extended performance, or oldest share class) in order for that fund to be included in the Portfolio-rating calculation.

Some target-date fund series do not use a fund-of-funds structure; in such cases, the Morningstar analyst's qualitative Process: Approach score will be scaled up to represent the entire Process pillar.

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Based on this overall star rating, Morningstar's analysts assign a Portfolio rating to each series. The analysts review the Portfolio rating quarterly.

Price (20% of overall rating)

Morningstar and independent academic research has shown that investment expenses are one of the better predictors of future outperformance even when evaluating net-of-fee returns. Given this, costs cannot be ignored. In the previous Target Date Rating and Report methodology, a series' Price rating was based on the ratio of its selected share class expense ratio with the industry average expense ratio. We used the selected share class, or lowest-cost share class with at least 10% of series assets, to preserve the rating's relevance to most investors while consistently choosing lower-cost share classes, despite differences in share class types, for all rated series.

Since then, Morningstar has released the Morningstar Fee Level – Distribution, which measures fund expenses compared to other funds in the same asset class and distribution channel. Crucially, the Morningstar Fee Level – Distribution includes Retirement share classes, which are heavily represented in the target-date industry. A fund can receive a Morningstar Fee Level – Distribution Percentile Rank between 1 (cheapest in its peer group) to 100 (most expensive in its peer group). The Morningstar Fee Level – Distribution is a better measure of fund expenses given its peer group, so the new Price score uses this data point instead of the selected share class expense ratio.

To approximate target-date series' costs compared with peers, Morningstar calculates the asset-weighted Morningstar Fee Level Percentile Rank for all share classes in the series. The formula is as follows:

$$P_{Fam} = \sum_{i=1}^n \frac{NA_i F_i}{TNA},$$

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where

P_{Fam}	=	Asset-weighted Morningstar Fee Level – Distribution percentile rank of the target-date series.
NA_i	=	Net assets of share class i in the target-date series.
F_i	=	Morningstar Fee Level Distribution percentile rank of share class i in the target-date series.
TNA	=	Total net assets in the target-date series.

The variable P_{Fam} can take on values between 1 and 100, which are mapped to an integer point value between 1 and 20. This is the Price score. Lower values of P_{Fam} will receive higher Price scores, while higher values of P will receive lower Price scores.

Performance (20% of overall rating)

Morningstar assesses how well a target-date fund has performed historically relative to its peers. Backward-looking views of target-date fund performance are imperfect measures of suitability, as most target-date series have not been in existence for a full market cycle. In addition, the performance figures do not address many other items that may be important to a fiduciary. For that reason, Performance makes up a relatively modest 20% of the fund series' total rating. Like the Performance score in the previous target-date methodology, this quantitative assessment evaluates and aggregates the load-adjusted Morningstar Risk-Adjusted Return of each fund in a series compared to category peers. However, the new methodology normalizes series' aggregate risk-adjusted performance based on the dispersion of market returns before assigning a Performance rating.

To calculate the fund series' performance ratings, Morningstar compares each target-date fund series' overall Morningstar Risk-Adjusted Return with the average MRAR of the target-date universe. MRAR adjusts a fund's total return by deducting a "risk penalty" based on its month-to-month variation in return. The MRAR calculation for target-date funds removes the effect of sales loads and redemption fees as those fees are not paid by the majority of target-date fund investors—that is, those who invest in the funds through a retirement plan. Specifically, the Load-Adjusted Return is replaced by Total Return in calculating MRAR. Morningstar provides MRAR statistics for funds with at least three years of performance history. For the Target Date

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Performance Rating, a fund's lowest-cost share class with at least 36 months of performance history is used in the calculation.

If a fund has less than 36 months of performance history, it is eliminated from the fund series when determining the Performance rating.

The Performance rating is peer-comparison based. Funds are subdivided into peer groups based on their Morningstar Category, and each of these are subdivided into two groups based on whether funds have at least five years of performance history. For the purpose of simplifying terminologies, we will call these two subgroups "sibling" peer groups. Funds in each "sibling" peer group are compared with the peer group's Industry Average MRAR.

For funds with less than five years of performance history, its Industry Average MRAR is the average of its constituents' three-year MRAR. The adjusted three-year MRAR is used as a proxy wherever a standard three-year MRAR is not available. For a fund in this universe, its relative performance is the difference between the fund's three-year MRAR and the industry average MRAR. The formulas are as follows:

$$MRAR_{Ind5} = \frac{\sum_{f=1}^m 0.6 \cdot MRAR_{f,5Yr} + 0.4 \cdot MRAR_{f,3Yr}}{m},$$

$$RP_f = \begin{cases} (0.6 \cdot MRAR_{f,5Yr} + 0.4 \cdot MRAR_{f,3Yr}) - MRAR_{Ind5} & \text{if } m \geq 6 \\ MRAR_{f,3Yr} - MRAR_{Ind3} & \text{if } m < 6 \end{cases},$$

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where

$MRAR_{Ind5}$	=	Industry average MRAR for a peer group of funds with at least five years of performance history
RP_f	=	Relative performance for target-date fund f which is a fund that has at least five years of history
$MRAR_{f,5Yr}$	=	Five-year MRAR for target-date fund f
$MRAR_{f,3Yr}$	=	Three-year MRAR for target-date fund f
m	=	Total number of target-date funds in a peer group of funds with at least five years of history
$MRAR_{Ind3}$	=	Industry average MRAR for the sibling peer group (group with less than five years of history)

The relative performance of a target-date fund series is the simple average of the relative performance measures of its constituent target-date funds:

$$RP_{Fam} = \frac{\sum_{f \in Fam} RP_f}{Z_{Fam}},$$

where

RP_{Fam}	=	Relative performance for target-date fund series Fam
RP_f	=	Relative performance for target-date fund f
Z_{Fam}	=	Total number of funds in a target-date fund series Fam that have a relative performance measure

Morningstar analysts calculate a modified Z -score for each series based on its Relative Performance. The modified Z -score divides a series' Relative Performance by the standard deviation of all series' Relative Performance records. This normalizes each series' Relative Performance based on the dispersion of returns across all the series and helps analysts identify series that have truly out- or underperformed their peers. Based on the Z -score, Morningstar's analysts assign a Performance rating to each series. The analysts review this Performance rating quarterly.

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People (20% of overall rating)

The overall quality of the investment managers running the target-date series is a significant key to the investments' ability to deliver superior performance relative to their benchmarks and/or peers. Previously, analysts arrived at the People rating by qualitatively evaluating the management team and quantitatively evaluating manager incentives. In contrast, the People rating is now a completely qualitative assessment. Manager ownership is now incorporated in the Parent rating, which addresses the culture of coinvestment at the firm level.

Evaluating the investment teams behind the target-date series requires that analysts assess several relevant items. It's extremely important to establish which individuals make the key asset-allocation, manager-selection, and portfolio-construction decisions for the series; how conflicts are resolved if there is more than one person or team in charge; which resources directly support their work on the strategy; and which resources they access that are not part of the team.

In addition, Morningstar analysts will also incorporate assessments of the managers who run the underlying funds and strategies within a target-date series. Where possible, they will rely on existing Morningstar ratings and research on individual funds or similarly run strategies.

The relevant unit(s) are then judged along several axes:

- ▶ experience and ability
- ▶ stability
- ▶ fit and structure
- ▶ manager workload
- ▶ communication/information flow
- ▶ temperament

Parent (20% of overall rating)

We believe the parent organization—in this case, the fund firm offering the series—is of utmost importance in evaluating investments. Although other factors may have more immediate impact, they would not be sustainable without backing from the fund firm. Further, the fund firm and its management set the tone for key elements of our evaluation, including

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capacity management, risk management, recruitment and retention of talent, and compensation. We believe that assessment of the parent organization is particularly important for target-date series, as investors are potentially entering into a lifelong investment. For this reason, the Parent rating for the Target Date Ratings and Reports now use the same methodology and analysis as the Parent rating for the Morningstar Analyst Rating for Funds.

Beyond these operational areas, we prefer firms that have a culture of stewardship and put investors first to those that are too heavily weighted to salesmanship. The former tend to operate within their area of expertise, do a good job of aligning manager interests with those of funds owners, charge reasonable fees, communicate well with fund owners, and treat fund owners' capital as if it were their own. The latter might be characterized by their view of fund investors as sales opportunities—they tend to offer trendy products in an attempt to gather assets, and have higher charges and incentive programs that do a poor job of aligning managers' interests with those of fund investors.

Although relatively few firms fall obviously at one extreme or another, determining where a fund company falls on the spectrum is a key part of our research approach.

Key areas of evaluation include:

- ▶ recruitment and retention of talent
- ▶ organizational structure
- ▶ capacity management
- ▶ organizational and business strategy
- ▶ alignment of interests with fund investors
- ▶ regulatory compliance

Key Features

In more than two decades of fund research, Morningstar's global analyst team has identified five key areas. The Key Features section of the Morningstar Target-Date Fund Series Research Reports shows the following statistics for the target-date fund series:

Asset-Weighted Annual Expense Ratio

The fund series' asset-weighted annual expense ratio weighs each share class' expense ratio based on the amount of assets in the share class. This figure gives readers an idea of how much the "typical" investor in the strategy pays for the investment.

Active/Passive Exposure

This figure shows readers what percentage of the fund series' assets are actively managed, meaning the funds' managers do not keep the portfolio closely tied to a benchmark index, and what percentage of the series' assets are passively run, adhering closely to an index. To determine the active/passive split, Morningstar looks to fund series' holdings, which are typically funds, to see whether they are labeled as index funds in the Morningstar database. By summing the assets in index funds, Morningstar determines the proportion of assets that is passively managed. The remaining portion is the proportion of assets that is actively managed.

Morningstar considers a fund series' Active/Passive Exposure to be not applicable (NA) if a fund series owns individual securities instead of funds. In practice, at least 90% of a fund series' assets by market value must be identified as a fund in order for the Active/Passive Exposure figure to be assigned. The formulas for passive and active exposure measures are as follows:

$$PExp_{Fam} = \frac{\sum_{i \in Index_{Fam}} MV_i}{\sum_{i \in Index_{Fam}} MV_i + \sum_{i \in NotIndex_{Fam}} MV_k},$$

$$AExp_{Fam} = 1 - PExp_{Fam},$$

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where

$PExp_{Fam}$	=	Passive exposure for target-date fund series Fam
$AExp_{Fam}$	=	Active exposure for target-date fund series Fam
MV_i	=	Market value of underlying holding i
MV_k	=	Market value of underlying holding k
$Index_{Fam}$	=	Subset of underlying holdings that are index funds, within all target-date funds that belong to fund series Fam
$NotIndex_{Fam}$	=	Subset of underlying holdings that are not index funds, within all target-date funds that belong to fund series Fam

Open/Closed Architecture

This figure is determined by Morningstar fund analysts based on their analysis of the target-date fund series' construction. Series with open architecture are those that include at least some subadvisors or management teams that are not owned or controlled by the series' advisor. Conversely, the series that include managers and funds run solely by the advisor or its affiliates have some or all of the assets in a closed architecture.

To determine the percentage of the series' assets run by the advisor's managers, the analyst looks at the target-date funds' underlying holdings. In most cases, these underlying holdings are mutual funds. If all of those underlying holdings are run by managers owned or controlled by the series' advisor, the analyst designates the series as 100% closed architecture. If a portion of the assets are run by subadvisors or managers not owned or controlled by the series' advisor, the analyst sums the assets under such management across all of the funds in the series and divides by the series' total assets to determine the percentage of assets earmarked for open architecture. The formulas for open and closed architecture figures are as follows:

$$OA_{Fam} = \frac{\sum_{j \in Open_{Fam}} NA_j}{TNA_{Fam}},$$

$$CA_{Fam} = 1 - OA_{Fam},$$

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where:

OA_{Fam}	=	Open architecture statistic for target-date fund series <i>Fam</i>
CA_{Fam}	=	Closed architecture statistic for target-date fund series <i>Fam</i>
NA_j	=	Net assets of underlying holding <i>j</i> that is open architecture
$Open_{Fam}$	=	Subset of underlying holdings that are considered open architecture, within all target-date funds that belong to fund series <i>Fam</i>
TNA_{Fam}	=	Total net assets of target-date fund series <i>Fam</i>

Total Net Assets

The total net assets figure is the aggregate of net assets of all funds and all their share classes in a target-date fund series.

Strategic Glide Path

The glide path of a target-date fund refers to its asset allocation over time, based on the number of years to and beyond the target date. The funds tend to invest more aggressively in the decades before retirement and shift their asset mixes so they are more conservative in the years immediately preceding and following retirement. The mutual fund industry refers to this shift in assets as a fund's "glide path." Morningstar depicts the glide path in increments of five years. The glide-path asset allocation is obtained from surveys to fund companies or from the prospectus, and it represents the strategic policy asset allocation of the target-date fund series.

The strategic policy allocation is classified into three asset types: stock, bond, and cash. The stock type represents a fund series' strategic allocation to equity securities from the U.S. and other developed and emerging countries. The bond type includes strategic allocation to fixed-income securities of various maturities, security types, and credit quality from the U.S. and other developed and emerging countries. The cash type represents strategic allocation to cash and cash-equivalent securities as well as ultrashort-term bonds. The allocation percentage to each strategic allocation type is referred to as the breakdown value. Note that breakdown values of stock and other strategic allocation types (e.g. commodities and real estate) are aggregated to form total equity exposure in a strategic glide path.

Industry average, maximum, and minimum total equity exposure statistics are presented in conjunction with the glide path of each target-date fund series. They allow one to gauge the aggressiveness of a target-date fund series' asset allocation compared with peers. This peer group consists of fund series and funds that meet the criteria stated in the Price section of this document. The peer group is subdivided based on the funds' target date, so a subset is formed for each five-year increment. The industry average total equity exposure for a particular retirement date is the simple average of total equity exposure statistics of the subset of funds in the peer group with the same retirement date. Maximum and minimum total equity exposure figures are also derived from the total equity exposure numbers from the same subset of funds.

Target Date Funds Risk-Adjusted Returns

The Target Date Funds Risk-Adjusted Returns +/- Category Average graph illustrates the Morningstar Risk-Adjusted Return described in the Performance section of this document. The graph is based on the MRAR for each fund in the series. The standard three-year MRAR is used when a target-date fund has at least three years of performance history. The adjusted three-year MRAR described in the Performance section of this document is used as a proxy when a target-date fund has a performance track record between 18 months and three years..

Consistent with the criteria for the Performance rating, the following three types of target-date funds are eliminated from the calculation of a fund's three-year MRAR:

- ▶ Target-date funds with less than 18 months of performance history;
- ▶ Funds for which no Morningstar Lifetime Moderate Index of equivalent maturity date exists;
- ▶ Target-date funds that do not meet the fund and fund-series criteria stated in the Price section of this document.

The category average three-year MRAR is the equally weighted average of three-year MRAR (or adjusted MRAR) of all funds that qualify for inclusion in fund-series calculations within a given category; in other words, funds that are not eliminated based on the three criteria stated above.

When a five-year MRAR is available for a fund, it is also included in the calculation for this graph, with 60% of the performance calculation based on the five-year MRAR and 40% of the calculation based on the three-year MRAR.

The graph's zero line represents the category average MRAR for each target-date category. If a fund's MRAR exceeds the category average, its outperformance is represented by a green bar. The green bar's height represents the percentage points of performance above the category average MRAR. Similarly, if a fund's MRAR falls short of the category average, its underperformance is represented by a red bar. The red bar's depth represents the percentage points of underperformance relative to the category average MRAR.

Attribution Analysis

Introduction

Each Report also contains an analysis of the target-date funds' performance relative to a custom benchmark over the past two years. Series that have a total attribution greater than zero have outperformed the benchmark, while series with negative totals have underperformed. From there, the report illustrates which factors—glide path, cost, and selection—caused the fund to beat or lag the index. Factors with positive numbers helped performance, and factors with negative numbers detracted from performance. The combination of the three factors equals the fund's total attribution relative to the index.

These statistics are not directly used in the Performance rating as they provide details that in aggregate are captured in the performance measures that comprise the rating.

Attribution analysis is first performed on each target-date fund before results are computed for each target-date fund series. Calculations are in quarterly frequency, and attribution statistics for the past eight quarters are compounded and annualized to form trailing two-year results for the fund series. Morningstar's attribution methodology is peer-comparison-based. A peer group is a subset of a U.S. target-date mutual fund Morningstar category. Funds in each peer group receive equal weights, and they are selected for inclusion based on the following criteria:

- ▶ Is a U.S. open-end target-date mutual fund;
- ▶ Has a prospectus net expense ratio;
- ▶ Belongs to a target-date series where at least half of the funds in the series have a performance track record of at least three years;
- ▶ Belongs to a target-date series that has offerings with target dates of 2040 or later;
- ▶ Is deemed performance ready, operation ready, and active (not IPO or obsolete) by Morningstar at the end of the desired quarter; for example, a fund that is terminated in May 2009 is included in quarterly attribution analysis through the first quarter of 2009;
- ▶ Is the lowest-cost share class with at least three years of performance history;
- ▶ Must have an inception date that is at least three years prior to the date of the report;
- ▶ Must have strategic asset-allocation information in Morningstar's database;

Each attribution factor is described in more detail, including the calculation formulas, in the next few sections. Please note that formulas assume that the individual constituents of the formulas

Attribution Analysis

and their results are expressed in decimal format. For example, the number 0.15 represents 15%.

Glide Path

Glide-path attribution measures the portion of a target-date fund's relative performance to the benchmark that is attributable to strategic asset allocation. As described in the Strategic Glide Path section of this document, glide path refers to a fund's strategic policy allocation in three types: Stock, Bond, and Cash. The benchmark refers to a customized peer group of like funds.

The glide-path attribution result is positive when a fund's strategic policy assigns a higher allocation than its peers to allocation types that have outperformed and a lower allocation to those that have underperformed. As a simplified example, let us assume that stocks have performed better than bonds in the past three years; a fund with a strategic allocation that is higher in stocks and lower in bonds compared with the strategic allocations of its peers would have a positive glide-path attribution statistic. This demonstrates the intuitiveness of attribution analysis, as it makes sense that good results stem from investing more in something that did well and less (or even nothing) in something that did not.

Similarly, the glide-path attribution result is negative when a fund's strategic policy assigns a higher allocation than its peers to allocation types that have underperformed and a lower allocation to those that have outperformed. Following the same example where stocks outperformed bonds in the past three years, a fund with a strategic allocation higher in bonds and lower in stocks compared with peers would have a negative glide-path attribution measure.

The intuitive concept behind glide-path attribution analysis is illustrated below; a plus sign denotes conditions that produce positive attribution results, and a minus sign indicates negative results:

	Underperform	Outperform
Overweight	—	+
Underweight	+	—

Attribution Analysis

In order to perform the glide-path attribution calculation, we must first define the components of the formula: fund breakdown value, benchmark breakdown value, and benchmark return. Breakdown value refers to the policy weighting in each strategic asset-allocation type. Benchmark is composed of peer-based breakdown values and index returns. Their formulas are as follows:

$$v_{s,t}^f = \sum_{a \in S} v_{a,t}^f,$$
$$v_{s,t}^B = \frac{\sum_{f=1}^n v_{s,t}^f}{n},$$

$$R_t^B = \sum_{s=1}^m v_{s,t}^B \cdot R_{s,t}^B$$

where

$v_{s,t}^f$	=	Target-date fund's breakdown value in strategic allocation s at the beginning of quarter t
$v_{s,t}^B$	=	Benchmark breakdown value in strategic allocation s at the beginning of quarter t
R_t^B	=	Total benchmark return in quarter t
$v_{a,t}^f$	=	Target-date fund's breakdown value in subasset class a at the beginning of quarter t
n	=	Total number of target-date funds in the peer group
m	=	Total number of strategic allocation types, which is currently three
$R_{s,t}^B$	=	Benchmark return for strategic allocation s in quarter t

Note:

- Morningstar performs attribution analysis using breakdown values from the beginning of the period. For example, in performing attribution analysis for the second quarter of the year, returns are based on the period from April 1 to June 30, while breakdown values are as of the beginning of the quarter, which is March 31.

Attribution Analysis

- ▶ Morningstar began collecting glide path information in 2009. Therefore, for the purpose of attribution analysis, Morningstar assumes that the first set of glide-path information has been in place since the inception of the fund series.

The benchmark return for each strategic allocation is based on the following indexes:

Strategic Allocation	Benchmark Return
Stock	75% Morningstar US Market TR USD + 25% MSCI EAFE NR USD
Bond	BarCap US Agg Bond TR USD
Cash	USTREAS T-Bill Auction Ave 3 Mon

The blended benchmark for the Stock strategic allocation type is rebalanced on a quarterly basis.

Glide-path attribution for a target-date fund series is determined in three steps. Morningstar determines each target-date fund's quarterly attribution, computes the fund series' quarterly attribution measure as the equally weighted average results of the underlying target-date funds, and calculates the fund series' three-year annualized statistic:

$$SA_t^f = \frac{\sum_{s=1}^m (v_{s,t}^f - v_{s,t}^B) \cdot (R_{s,t}^B - R_t^B)}{1 + R_t^B},$$

$$SA_t^{Fam} = \frac{\sum_{h \in Fam} SA_t^h}{N^{Fam}},$$

$$SA_{Ann}^{Fam} = \left[\prod_{t=1}^{12} 1 + SA_t^{Fam} \right]^{\frac{1}{3}} - 1,$$

Attribution Analysis

where

SA_t^f	=	Glide path attribution effect for target-date fund f in quarter t
SA_t^{Fam}	=	Glide path attribution effect for target-date fund series Fam in quarter t
SA_{Ann}^{Fam}	=	Glide path attribution effect for target-date fund series Fam , trailing three-year annualized
N^{Fam}	=	Total number of target-date funds in target-date fund series Fam that are included in attribution analysis

Cost

Cost attribution measures a target-date fund series' expense ratio relative to those of its peers. The concept is the same as that of the Price rating described in the Ratings section of this document. However, the ratio between a fund series' average expense ratio and that of its peers is computed differently so that fund series with lower-than-peer-average expense ratios show positive cost attribution results, while those with higher expense ratios have negative attribution statistics.

The cost attribution formula is defined below:

$$C_{Ann}^{Fam} = \frac{1 - E_{Fam}}{1 - E_{Ind}} - 1,$$

where

C_{Ann}^{Fam}	=	Cost attribution effect for target-date fund series Fam , expressed in annual format
E_{Fam}	=	Asset-weighted expense ratio for target-date fund series Fam
E_{Ind}	=	Simple average of E_{Fam} for all target-date fund series

Attribution Analysis

Selection

Selection attribution measures the portion of a target-date fund's relative performance to the benchmark attributable to factors other than strategic asset allocation and cost. The primary purpose is to assess the ability of a target-date fund or fund series manager to select underlying funds that outperform. Also included in this measure are other factors such as diversification and tactical decisions. Diversification refers to investing in subasset classes of different market capitalization, maturity, credit quality, asset type, domicile, and so forth within each strategic asset allocation type. Examples of tactical decisions are deviating from the funds' strategic policy allocation, rebalancing the fund's assets within an allowed period of time, and allocating assets dynamically among underlying funds.

Mathematically, selection attribution is the residual of a fund's gross-of-fees return after accounting for the glide-path attribution effect. Similar to glide-path attribution, selection attribution for a target-date fund series is determined in three steps. Morningstar determines a quarterly attribution statistic for each target-date fund, computes quarterly results for each fund series, and calculates the fund series' three-year annualized statistic as follows:

$$SS_t^f = \frac{1 + R_t^f}{(1 + R_t^B) \cdot (1 + SA_t^f)} - 1,$$

$$SS_t^{Fam} = \frac{\sum_{h \in Fam} SS_t^h}{N^{Fam}},$$

$$SS_{Ann}^{Fam} = \left[\prod_{t=1}^{12} 1 + SS_t^{Fam} \right]^{\frac{1}{3}} - 1,$$

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where

SS_t^f	=	Selection attribution effect for target-date fund f in quarter t
SS_t^{Fam}	=	Selection attribution effect for target-date fund series Fam in quarter t
SS_{Ann}^{Fam}	=	Selection attribution effect for target-date fund series Fam , trailing three-year annualized
R_t^f	=	Target-date fund's gross return in quarter t
R_t^B	=	Total benchmark return in quarter t
SA_t^f	=	Strategic allocation attribution effect for target-date fund f in quarter t
N^{Fam}	=	Total number of target-date funds in target-date fund series Fam that are included in attribution analysis

Total Attribution

The total attribution statistic is the combination of three attribution factors: glide path, cost, and selection. Target-date fund series that have total attribution greater than zero have outperformed the custom benchmark, while those with negative totals have underperformed:

$$TS_{Ann}^{Fam} = (1 + SA_{Ann}^{Fam}) \cdot (1 + C_{Ann}^{Fam}) \cdot (1 + SS_{Ann}^{Fam}) - 1,$$

where

TS_{Ann}^{Fam}	=	Total score of attribution effects for target-date fund series Fam , trailing three-year annualized
SA_{Ann}^{Fam}	=	Glide-path attribution effect for target-date fund series Fam , trailing three-year annualized
C_{Ann}^{Fam}	=	Cost attribution effect for target-date fund series Fam , expressed in annual format
SS_{Ann}^{Fam}	=	Selection attribution effect for target-date fund series Fam , trailing three-year annualized

Attribution Analysis

Industry Highest, Lowest, and Average

The Attribution Analysis graph in Morningstar Target-Date Fund Series Reports depicts the highest, lowest, and average results of all peer fund series included in this analysis. This peer group consists of target-date fund series that meet the criteria described in the Attribution Analysis Introduction section. The average peer results are defined as follows:

$$SA_{Ann}^{Ind} = \frac{\sum_{Fam=1}^P SA_{Ann}^{Fam}}{P},$$

$$C_{Ann}^{Ind} = E_{Ind},$$

$$SS_{Ann}^{Ind} = \frac{\sum_{Fam=1}^P SS_{Ann}^{Fam}}{P},$$

$$TS_{Ann}^{Ind} = \frac{\sum_{Fam=1}^P TS_{Ann}^{Fam}}{P},$$

where

SA_{Ann}^{Ind} = Glide-path attribution effect for target-date fund series industry average, trailing three-year annualized

C_{Ann}^{Ind} = Cost attribution effect for target-date fund series industry average, expressed in annual format

SS_{Ann}^{Ind} = Selection attribution effect for target-date fund series industry average, trailing three-year annualized

TS_{Ann}^{Ind} = Total score of attribution effects for target-date fund series industry average, trailing three-year annualized

P = Total number of target-date fund series in attribution analysis

SA_{Ann}^{Fam} = Glide path attribution effect for target-date fund series *Fam*, trailing three-year annualized

E_{Ind} = Simple average of all series' asset-weighted expense ratios

SS_{Ann}^{Fam} = Selection attribution effect for target-date fund series *Fam*, trailing three-year annualized

TS_{Ann}^{Fam} = Total score of attribution effects for target-date fund series *Fam*, trailing three-year annualized

Series Holding-Based Style Map—Equity

This graph in the Portfolio section is based on the top 500 domestic equity holdings in each target-date series' underlying funds, or individual securities, if the series does not use a fund-of-funds structure. The green oval-shaped area—the Morningstar Ownership Zone, or the Zone—shows where 75% of these holdings fall in Morningstar's Style Box. The fund centroid—the center of the Zone—represents the weighted average of these holdings based on investment style.

Equity and Fixed-Income Allocation

In the Equity Allocation and Fixed-Income Allocation sections, the Morningstar Target-Date Fund Series Rating and Research Reports provide information on actual equity and fixed-income allocations. These are actual allocations based on current security holdings of the funds underlying each target-date fund. These sections provide further insight into how fund assets are allocated among various subasset classes of different market capitalization, security types, credit quality, domicile, and so forth.

A target-date fund's actual equity allocation is broken down into the following subasset classes:

- ▶ U.S. Large Cap
- ▶ U.S. Mid/Small Cap
- ▶ Non-U.S. Developed
- ▶ Non-U.S. Emerging
- ▶ Other

A target-date fund's actual fixed-income allocation breaks down into the following subasset classes:

- ▶ U.S. Treasury Inflation-Protected Securities (TIPS)
- ▶ U.S. Government
- ▶ U.S. Investment Grade
- ▶ U.S. High Yield
- ▶ Foreign
- ▶ Cash
- ▶ Other