

The Morningstar Analyst Rating for Funds

Analyzing the Performance of the Analyst Rating Globally

Morningstar Manager Research

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Jeffrey Ptak, CFA
Director, Global Manager Research
+1 312 384-4928
jeffrey.ptak@morningstar.com

Christopher Traulsen, CFA
Director, Ratings, Global Manager Research
+44 20 3107 0061
christopher.traulsen@morningstar.com

James Li
Quantitative Analyst
+1 312 384-4979
james.li@morningstar.com

Introduction

Morningstar has conducted qualitative, analyst-driven research on funds since 1986. An essential complement to our database of investment information and research tools like the Morningstar Rating™, Morningstar's qualitative fund analysis has sought to help users make better investment decisions by:

- ▶ Identifying those funds which analysts believe should be able to outperform a relevant benchmark and/or peer group, within the context of the level of risk taken, over the longer term.
- ▶ Helping investors and fund selectors understand the suitability of funds for an intended purpose based on expectations of the funds' future behavior in different market environments.
- ▶ Facilitating comparison based on criteria such as expenses, manager tenure, investment style, and asset size.
- ▶ Monitoring funds for changes that could materially affect their suitability and future performance.

This forward-looking analysis culminates in the Morningstar Analyst Rating™, which analysts have assigned to more than 4,500 unique funds globally on a five-tier scale (🏆 Gold, 🥈 Silver, 🥉 Bronze, Neutral, and Negative).

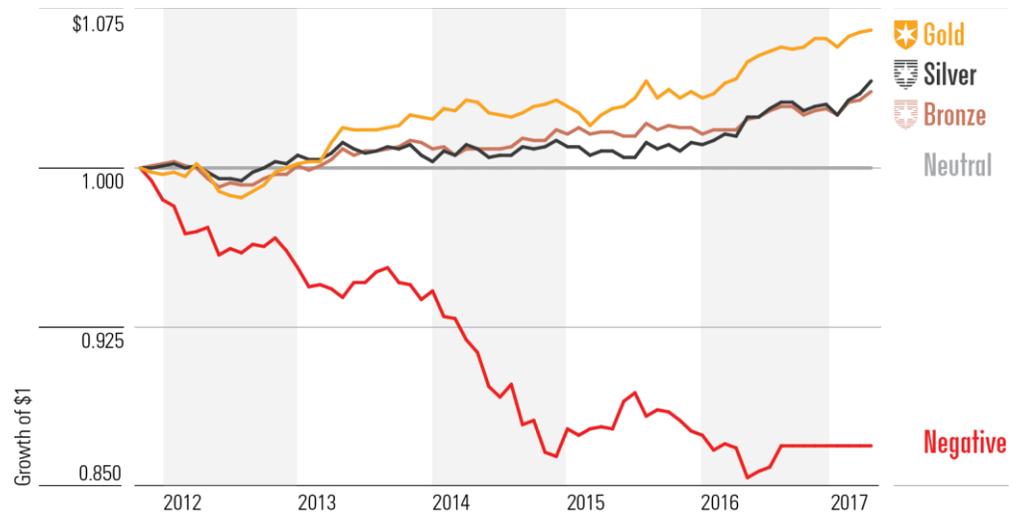
Six years have passed since the Morningstar Analyst Rating debuted in November 2011. The purpose of this paper is to publicly assess the Analyst Rating's performance.

Executive Summary

We analyzed the global performance of the Analyst Rating based on its ability to predict funds' future risk-adjusted returns. We employed two standard approaches to measure the ratings' predictive ability: 1) Fama-MacBeth regressions, and 2) the event study framework. The time frame of ratings is December 2011 through April 2017, and subsequent performance is tracked through October 2017.

Our analysis shows that the Analyst Rating exhibited predictive power during our sample period, though the strength varied between asset class. For equity funds, the Fama-MacBeth regression revealed that Morningstar Medalist funds (Gold, Silver, and Bronze) significantly outperformed after accounting for expenses and common factor exposures (Exhibit 1). Medalists continued to outperform in the allocation asset class, with Silver-rated funds leading the group. In fixed income, our methodology sorted the Silver-, Bronze-, and Neutral-rated funds well, but Gold-rated funds less so.

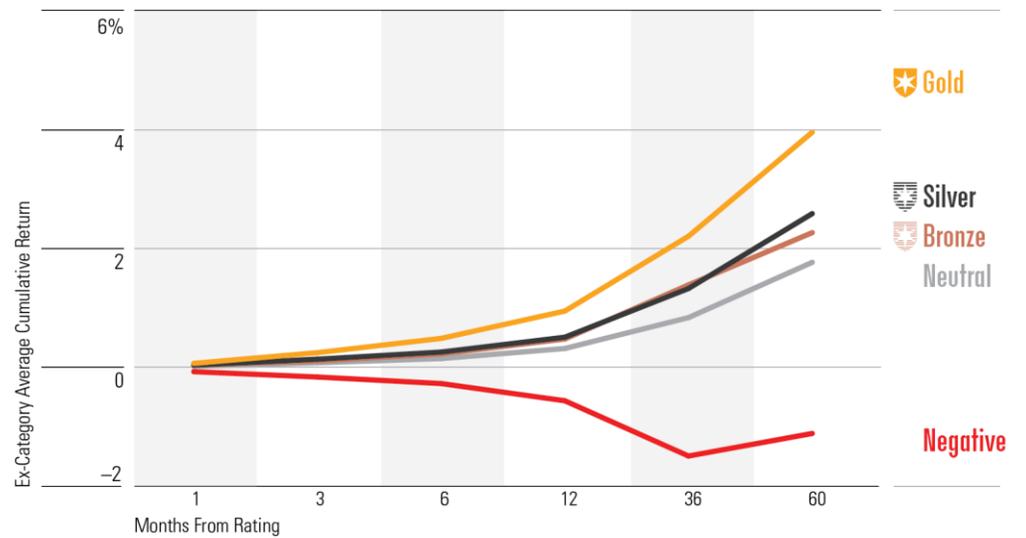
Exhibit 1 Average Return Premiums by Morningstar Analyst Rating in Equities



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

The event study results largely align with the regression findings. In the equity asset class, Gold-rated funds outperformed Silver-, Bronze-, and Neutral-rated funds, which performed more or less in line with each other, and generated higher excess returns than Negative-rated funds. In allocation, Gold- and Silver-rated funds presented the highest excess returns, followed by Neutral- and Bronze-rated funds, and with Negative-rated funds trailing significantly. In fixed income, medalist funds excelled over Neutral- and Negative-rated funds; however, Gold-rated funds lagged other medalists. Taken as a whole, we find that the Analyst Ratings effectively sorted funds based on their average future excess returns (Exhibit 2).

Exhibit 2 Average Excess Return Over Category Average by Morningstar Analyst Rating Over Different Investment Horizons



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Although the ratings have yet to experience a full market cycle, these results showcase that the Analyst Ratings have thus far succeeded in sorting funds' future risk-adjusted returns. We discuss these findings, their calculations, and the underlying data further in this paper.

Section 1: Overview

Launched in November 2011, the Morningstar Analyst Rating is the summary expression of Morningstar's forward-looking analysis of a fund. This contrasts with the backward-looking Morningstar Rating (often referred to as the "star rating"), which assigns 1 to 5 stars based on a fund's past risk-adjusted returns versus category peers. The Analyst Rating advanced Morningstar's ability to provide insights into funds' sustainable advantages and gave investors a tool for assessing their prospects and suitability in a portfolio context.

Morningstar Analyst Rating Methodology

Morningstar's manager research analysts assign the ratings on a five-tier scale with three medalist ratings of Gold, Silver, and Bronze, a Neutral rating, and a Negative rating. The Analyst Rating is based on the analyst's conviction in the fund's ability to outperform its peer group and/or relevant benchmark on a risk-adjusted basis over the long term. If a fund receives a medalist rating of Gold, Silver, or Bronze, it means Morningstar analysts have high conviction in the fund's ability to outperform a relevant category average or index over a full market cycle, while Neutral and Negative ratings denote lower conviction.

The Analyst Rating is not a market call; it is meant to augment investors' and advisors' own work on funds. Indeed, the Analyst Rating accentuates the importance of factors like expenses and manager ownership of fund shares that can get short-shrift under commonly employed techniques for choosing funds, such as past performance.

Morningstar's global team of more than 100 analysts evaluates funds based on five key pillars — Process, Performance, People, Parent, and Price. These five pillars form the spine of our research approach, and we evaluate each of them when assessing a fund.

- ▶ *Process*: What is the fund's strategy, and does management have a competitive advantage enabling it to execute the process well and consistently over time?
- ▶ *Performance*: Is the fund's performance pattern logical given its process? Has the fund earned its keep with strong risk-adjusted returns over relevant time periods?
- ▶ *People*: What is Morningstar's assessment of the manager's talent, tenure, resources, and alignment of their interest with fund shareholders?

- ▶ *Parent*: How strong is the investment culture? What priorities prevail at the firm: stewardship or salesmanship? How well does the firm recruit and retain talent?

- ▶ *Price*: Is the fund a good value proposition compared with similar funds — both active and passive — sold through similar channels?

Analysts consider quantitative and qualitative factors, but the ultimate view on the pillars and their interaction is driven by the analyst's overall subjective assessment and further overseen by an Analyst Ratings Committee. The approach serves as an analytical framework ensuring consistency across Morningstar's global coverage universe.

Evaluating the Rating's Predictive Power

The intent of the Morningstar Analyst Rating is to offer a forward-looking perspective; we thus evaluated the rating's efficacy in achieving its objective. We performed our evaluation using two approaches: 1) Fama-MacBeth regressions, and 2) the event study framework. We previously applied these techniques to evaluate the Morningstar Rating for funds and Morningstar Rating for stocks. We expound on these approaches in the next section.

Section 2: Methodology

Data

Our data set encompassed all open-end funds in the equity, fixed-income, and allocation asset classes assigned a Morningstar Analyst Rating. This ranged from 1,892 funds starting in December 2011 to 2,691 funds in April 2017. Monthly returns spanned from January 2012 through October 2017. We excluded the Fund Analyst Picks and Pans that started in the U.S. in 1999, the Analyst Ratings for exchange-traded funds that launched in late 2016, and precursor versions of the Analyst Ratings in the U.K. and Australia prior to the global Analyst Rating inception in November 2011 (these precursor ratings applied a different methodology).

Because of varying degrees of coverage, funds were included in the analysis when at least 20 funds existed in their rating cohort in their asset class at each month-end. This floor aims at distilling a representative sample of ratings performance. We thus excluded the alternatives, commodities, and convertibles asset classes from this study because of the low number of funds rated. Exhibit 3 details the coverage counts.

Exhibit 3 Evaluation Dates and Fund Counts by Asset Class

Asset Class	Start Date	End Date	Start Count	End Count
Equity	12/1/11	4/30/17	1,406	1,554
Fixed Income	12/1/11	4/30/17	297	552
Allocation	12/1/11	4/30/17	189	585

Source: Morningstar, Inc. Data as of Oct. 31, 2017.

The ratings coverage universe is also geographically diverse. At the end of the period, funds domiciled in North America accounted for 47% of the rated universe, EMEA 34%, and Asia-Pacific 19%.

To avoid overweighting funds with multiple share classes, we rolled up share-class-level characteristics to the fund level using share classes' net assets. This produced asset-weighted net expense ratios and factor betas for each fund. Analysts assign ratings at the fund level; thus, combined, each fund is represented once per cross-section.

The data set does not suffer from survivorship bias. Morningstar's global fund databases retain a history of obsolete funds, and our sample included these funds. Moreover, our evaluation technique

incorporated monthly changes in the fund-universe composition: Each monthly snapshot captured any funds that were subsequently merged, liquidated, or removed from analyst coverage.

We addressed survivorship bias by propagating obsolete funds' lifetime returns. Suppose the event horizon starts at time t and a fund becomes obsolete at the $t + 15$ month. We used the fund's actual returns in the one-, three-, six-, and 12-month horizons. We then used the fund's cumulative return over its lifetime (from t to $t + 15$) in the 36- and 60-month calculations.

Fama-MacBeth Regression

The Fama-MacBeth regression is a method used to estimate parameters for asset-pricing models, such as the capital asset pricing model. It is a two-step process: 1) run a time series regression per asset to determine its risk factor exposures, and 2) run a cross-sectional regression across assets to determine the risk premium for each factor. We employed this technique to compute the average return premium for investing in funds at each rating level.

Time Series Regression: Equity

We estimated funds' factor exposures via rolling three-year regressions of share-class-level, net-of-fee returns onto their region-appropriate Fama-French-Carhart factors: market ($RMRF$), size (SMB), value (HML), and momentum (UMD). All returns are sourced from the Kenneth R. French Data Library, in U.S. dollars, and include dividends and capital gains. Appendix 1 describes the construction of the factors. We selected region-appropriate factors based on each fund's Morningstar Category, which is based on the fund's portfolio holdings data.

The regression rolls monthly, producing an alpha, an R-squared, and a set of factor betas for each fund i (after asset-weighting share-class-level results) at each month t estimated from the prior 36 months of returns. The equity asset-class regression takes the form:

$$r_{i,t} = \alpha_i + \beta_{i,rmrf} RMRF_t + \beta_{i,smb} SMB_t + \beta_{i,hml} HML_t + \beta_{i,umd} UMD_t + \epsilon_{i,t}$$

Time Series Regression: Fixed-Income and Allocation

We ran rolling three-year regressions of share classes' returns onto the region-appropriate Fama-French factors ($RMRF$, SMB , HML) as well as interest rate ($TERM$) and credit (DEF) factor return series. We computed the latter two factors in a manner consistent with that set forth in Fama-French (1993); we detail this computation in Appendix 1.

The regression rolls monthly, producing an alpha, an R-squared, and a set of factor betas for each fund i (after asset-weighting share-class-level results) at each month t estimated from the prior 36 months of returns. The fixed-income and allocation asset-class regression takes the form:

$$r_{i,t} = \alpha_i + \beta_{i,rmrf} RMRF_t + \beta_{i,smb} SMB_t + \beta_{i,hml} HML_t + \beta_{i,term} TERM_t + \beta_{i,def} DEF_t + \epsilon_{i,t}$$

Cross-Sectional Regression

We used the cross-sectional regression technique to determine the return premium per rating level. By examining the cross-section of funds at a month, we assessed if funds with higher Analyst Ratings achieve higher risk-adjusted returns. Funds' factor betas from the time series regression serve to control for different levels of risk exposure, and funds' net expense ratios control for differences in fees.

The cross-sectional regression is run every month by asset class. The cross-sectional regression for equities takes the form:

$$r_{i,t+1} = \gamma + \Omega_t \text{Analyst}_{i,t} + \phi_{t,rmrf} \beta_{i,rmrf} + \phi_{t,smb} \beta_{i,smb} + \phi_{t,hml} \beta_{i,hml} + \phi_{t,umd} \beta_{i,umd} + \lambda_t \text{Expense}_{i,t} + \varepsilon_{i,t+1}$$

The cross-sectional regression for fixed income and allocation takes the form:

$$r_{i,t+1} = \gamma + \Omega_t \text{Analyst}_{i,t} + \phi_{t,rmrf} \beta_{i,rmrf} + \phi_{t,smb} \beta_{i,smb} + \phi_{t,hml} \beta_{i,hml} + \phi_{t,term} \beta_{i,term} + \phi_{t,def} \beta_{i,def} + \lambda_t \text{Expense}_{i,t} + \varepsilon_{i,t+1}$$

In both regressions, $r_{i,t+1}$ is the return for fund i for time $t + 1$, $\text{Analyst}_{i,t}$ is a categorical variable indicating the Analyst Rating for fund i at time t , β_i are the factor coefficients from the time series regression running from $t - 36$ months ago to time t , and $\text{Expense}_{i,t}$ is the equivalent all-in expense for fund i at time t .

The categorical variable $\text{Analyst}_{i,t}$ equates to the rating assigned to fund i at time t . Regressions involving a categorical variable must define a base category; we naturally chose the Neutral rating as our base. As a result, the Ω_t coefficient for the Gold rating can be interpreted as the average return of a Gold-rated fund above/below a Neutral-rated fund after controlling for the other variables. The Ω_t coefficients for the other ratings are interpreted in the same manner.

We further note that manager research analysts may publish their ratings any weekday of the month. For this study, we used funds' prevailing month-end ratings, allowing us to align with funds' monthly returns and exposures.

Analyst Rating Return Premium

Running the cross-sectional regression per month produces a monthly series of premiums for the ratings (Ω_t) and factors (ϕ_t). The final estimates of the premium and their variance are calculated according to the Fama-MacBeth methodology as such:

$$\begin{aligned}\widehat{\Omega} &= 1/T \sum \widehat{\Omega}_t \\ \widehat{\phi} &= 1/T \sum \widehat{\phi}_t \\ \widehat{\lambda} &= 1/T \sum \widehat{\lambda}_t \\ \sigma(\widehat{\Omega}) &= 1/T^2 \sum (\widehat{\Omega}_t - \widehat{\Omega})^2 \\ \sigma(\widehat{\phi}) &= 1/T^2 \sum (\widehat{\phi}_t - \widehat{\phi})^2 \\ \sigma(\widehat{\lambda}) &= 1/T^2 \sum (\widehat{\lambda}_t - \widehat{\lambda})^2\end{aligned}$$

Here, we discuss the error-in-variables condition for interested readers. The error-in-variables problem refers to the regression design where the independent variables are themselves estimates rather than known with certainty. In this study, the factor betas were calculated from the time series regressions and used as independent variables in the cross-sectional regressions. The Shanken correction (1992) propagates the standard errors from the first estimation procedure to produce standard errors for the hypothesis testing of the final premiums estimates. We calculated Shanken standard errors for quality assurance but do not report them here.

Event Study Framework

The event study framework produces an analysis more straightforward and closer to the typical investor experience. At each month-end, we calculated share classes' excess return to their category averages that month in USD. We asset-weighted these share-class-level excess returns to the fund-level using share classes' net assets at the beginning of the month. We then compounded these monthly returns for forward-looking one-, three-, six-, 12-, 36-, and 60-month horizons. Lastly, we grouped these funds by their Analyst Rating and calculated the equal-weighted average fund return by event horizon and Analyst Rating. Therefore, positive ex-category average returns indicated funds' category-relative outperformance. We repeated this process by reconstituting the rating groups for each month-end between December 2011 and April 2017, calculating the forward-looking excess returns, and averaging across the month-ends to produce a final estimate. Like the Fama-MacBeth regressions, we split our analysis by asset class; we also calculated the results for the entire rated universe.

Additional results are shown for ex-category index returns (subtracting share classes' category index return in USD), CAPM alpha to category index (Appendix 2), and ex-category average returns by region (Appendix 4). CAPM alpha is calculated using a univariate regression running share-class-level, net-of-fee returns against their category index returns, both net of the relevant risk-free rate, with all returns in USD. The regression is rolled monthly using 12-, 36-, and 60-month windows. Share classes' alphas are asset-weighted to the fund-level using net assets at the beginning of the event horizon. We then calculated the equal-weighted average fund alpha by event horizon and Analyst Rating. This

methodology is meant to reflect the alpha an investor would have attained if he had held an equal-weighted portfolio of funds with Analyst Ratings at each month-end.

Section 3: Results

Hypothesis Testing of Analyst Rating Premiums

As described in Section 2, the coefficients from the Fama-MacBeth cross-sectional regressions represent the monthly return premiums/discounts attributable to the Analyst Ratings after controlling for factor exposures and fund expenses. We examined the times series of rating premiums to test the hypothesis that they are nonzero.

Exhibit 4 displays the average coefficients, standard errors, and t-statistics of the cross-sectional regression for each asset class. In equities, the mean coefficients revealed that medalist-rated funds achieved higher risk-adjusted returns. The t-statistics support the hypothesis that Gold-rated funds outperformed Neutral-rated funds in a statistically significant manner. Likewise, Negative-rated funds underperformed Neutral-rated funds at a statistically significant level. (While Silver- and Bronze-rated equity funds outperformed as well, these findings were not statistically significant.)

Exhibit 4 Fama-MacBeth Regression Statistics

Asset Class	Statistic	 Gold	 Silver	 Bronze	Negative
Equity	Mean	0.10	0.06	0.05	-0.21
	SE	0.04	0.04	0.03	0.09
	TStat	2.22	1.67	1.83	-2.39
Allocation	Mean	0.08	0.09	0.04	-0.01
	SE	0.04	0.03	0.03	0.02
	TStat	2.23	2.69	1.42	-0.55
Fixed Income	Mean	0.02	0.06	0.04	-0.01
	SE	0.04	0.03	0.02	0.02
	TStat	0.60	1.84	1.75	-0.38

Source: Morningstar, Inc. Data as of Oct. 31, 2017.

In the allocation asset class, we observed again the skillful performance of medalist funds, in particular led by Gold- and Silver-rated funds' statistically significant, positive differences from the Neutral-rated cohort.

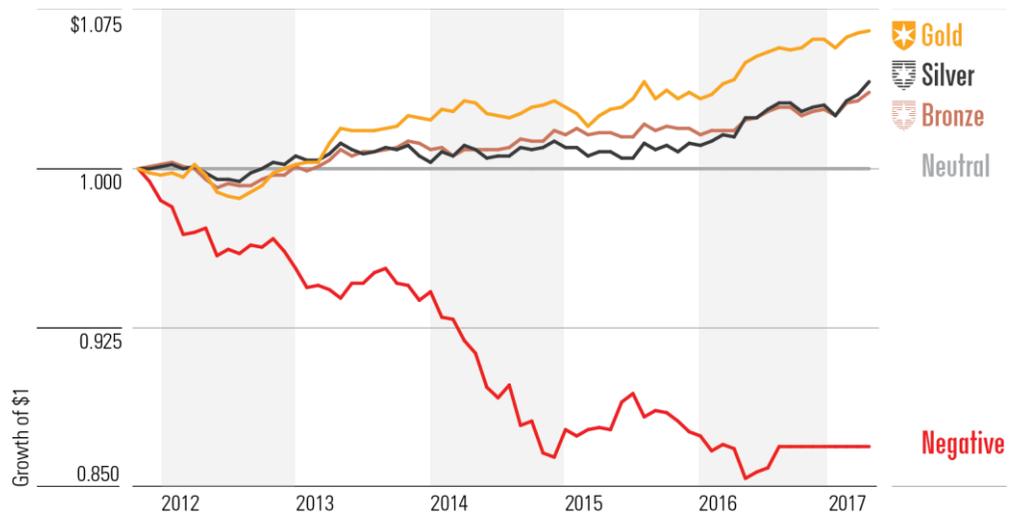
We found the weakest delineation among fixed-income funds. Silver-rated funds shone based on examining the mean result, but no general directionality emerged across the ratings.

Growth of \$1 of Analyst Rating Premiums

While hypothesis testing examined the significance of the mean effect over a time horizon, we further examined the path-dependent realization of the premiums in relation to time. We charted the growth of \$1 by compounding the monthly premium series for each rating tier per asset class.

Exhibit 5 shows the cumulative returns of \$1 invested in the Analyst Rating premium series of equity funds over time. After controlling for common factors, we discovered the appreciable strength of Gold-rated funds contrasted with the sizable underperformance of Negative-rated funds. Altogether, the rating tiers culminate in a final monotonic rating.

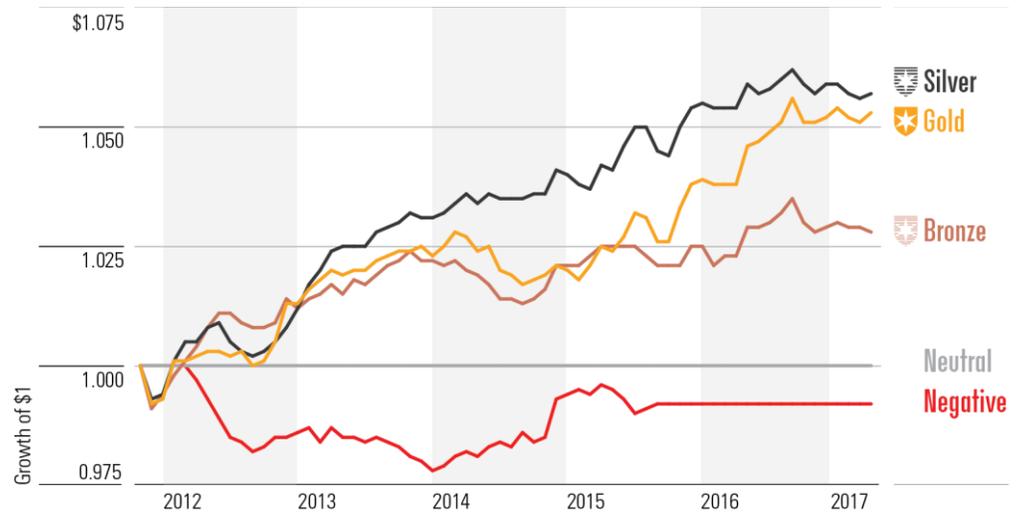
Exhibit 5 Analyst Rating Premiums for Equity Funds



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Exhibit 6 shows the results for allocation funds. Like in equities, medalist funds outperformed nonmedalist funds on average, led by the strong performance of the Gold- and Silver-rated cohorts. (Note: The flat curve for the Negative-rated cohort is due to its fund count falling below the minimum of 20 as specified in the methodology section. This applies to Exhibit 7 as well.)

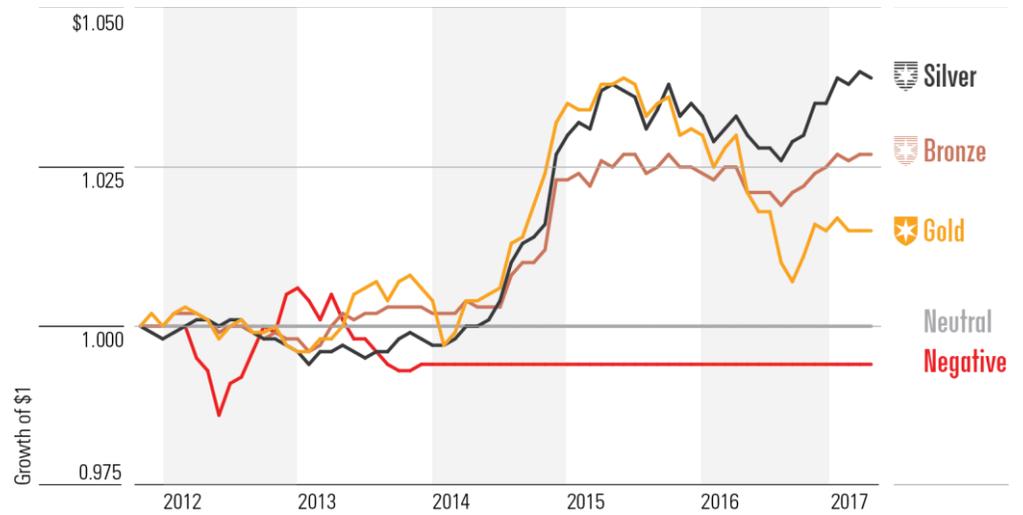
Exhibit 6 Analyst Rating Premiums for Allocation Funds



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Lastly, Exhibit 7 shows the results for fixed-income funds. Gold-, Silver-, and Bronze-rated funds continued to outpace Neutral- and Negative-rated funds, though Gold-rated funds demonstrated the least consistent performance.

Exhibit 7 Analyst Rating Premiums for Fixed-Income Funds



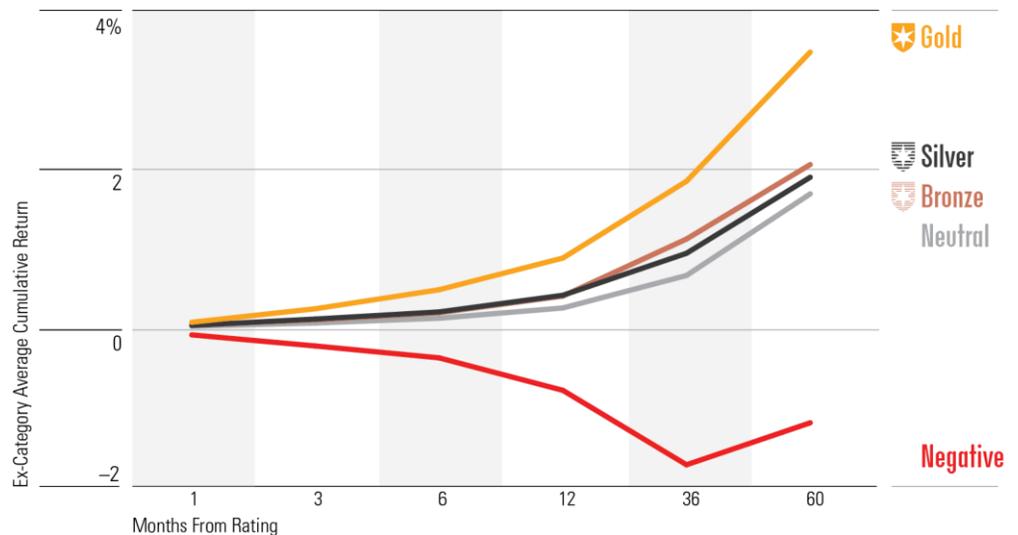
Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Event Study Cumulative Excess Returns: Ex-Category Average

The growth of \$1 charts in the previous section show compounded monthly return premiums per Analyst Rating level after controlling for factor exposures. In contrast, the event study tracked funds' cumulative return above or below their category average over a longer horizon — from one month to five years — after the month-end Analyst Rating is published. We intended to identify when the sorting power of the Analyst Rating system is realized. The numbers behind the following charts can be found in Appendix 3.

Exhibit 8 displays the event study results for the equity asset class. The excellent performance of Gold-rated funds paired with the stark underperformance of Negative-rated funds highlights analysts' ability to differentiate the best and worst equity funds within categories. The dichotomy further strengthens over time. However, the ratings' predictive power diminishes for sorting Silver-, Bronze-, and Neutral-rated equity funds (Note: this sorting improves when excess returns are adjusted for beta risk; see Exhibit 16).

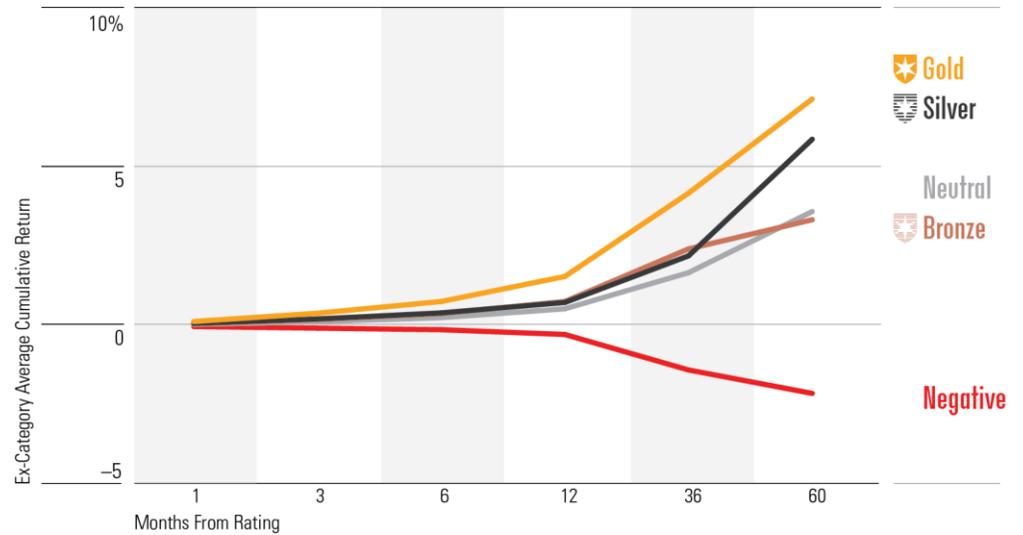
Exhibit 8 Event Study for Equities: Ex-Category Average



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Exhibit 9 shows the cumulative excess returns of allocation funds. The return differential is larger than in equities, with a difference of 9.3% between the Gold- and Negative-rated cohorts by year five. A monotonic ranking is close but lacking at the 60-month, post-rating horizon because of Bronze and Neutral trading ranks.

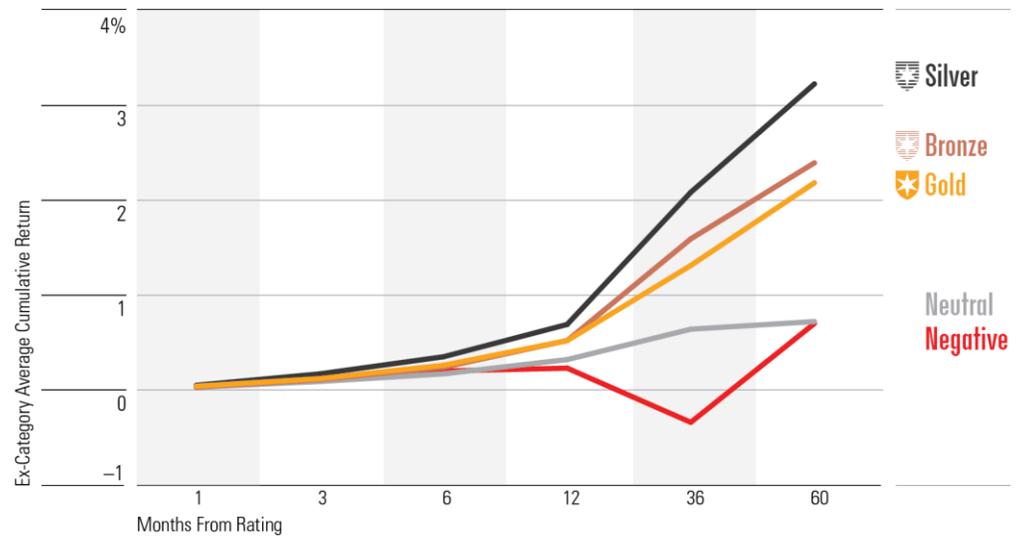
Exhibit 9 Event Study for Allocation: Ex-Category Average



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Exhibit 10 displays the event study results for the fixed-income asset class. The primary distinction exists between medalist funds and nonmedalist funds, where the former group soundly outperformed the latter as time passed. However, the stratification within these groups is less clear-cut: Silver-rated funds excelled at all time horizons, while Gold-rated funds trailed the Bronze cohort.

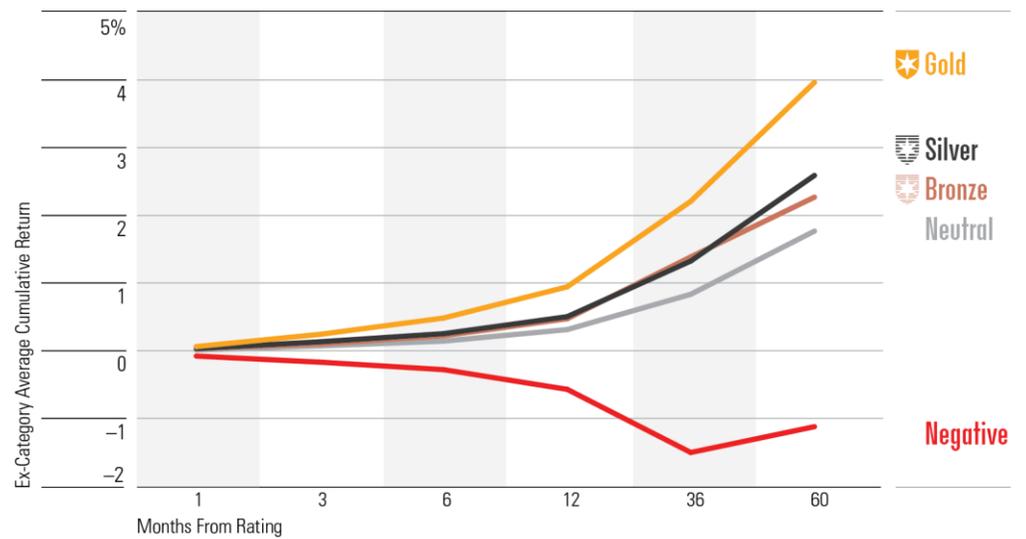
Exhibit 10 Event Study for Fixed Income: Ex-Category Average



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Lastly, Exhibit 11 presents the cumulative ex-category average returns for the entire rated universe of funds—that is, across all asset classes. We recognize the final monotonic ranking at the five-year horizon as well as the substantial differential between Gold- and Negative-rated funds, an outperformance of 5.1% cumulatively. Ultimately, these results show that the Morningstar Analyst Rating delivers predictive ability in sorting future excess returns.

Exhibit 11 Event Study Across Rated Universe: Ex-Category Average



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

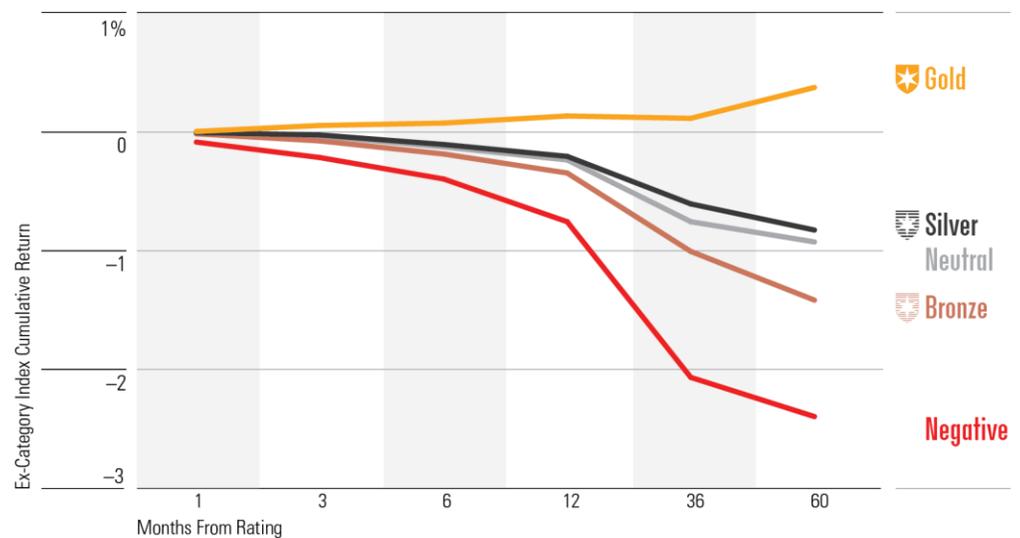
Event Study Cumulative Excess Returns: Ex-Category Index

The previous section showed the event study results for funds compared with their category averages, which are net of the fees that funds charge. To evaluate the performance of funds with Analyst Ratings versus a costless index, we present the event study for funds compared with their category index. (Every fund is assigned a category index that corresponds to its Morningstar Category classification at the time.) The numbers behind the following charts can be found in Appendix 3.

Exhibit 12 displays the event study results for the equity asset class. Like in the ex-category average results for equities, Gold-rated funds strongly outperformed while Negative-rated funds heavily underperformed, and the differential grows over time. We further observed that only the Gold-rated funds have consistently beaten their category index over the various event horizons, highlighting that this rating tier has excelled versus both the category average and costless category index.

It is worth noting that the Silver and Bronze cohorts consistently lagged their category indexes over the various event horizons. While the shortfall for Silver-rated funds was small, the magnitude for Bronze-rated funds surpassed that of Neutral-rated funds. These cohorts will be the subject of further study to improve their performance and differentiation.

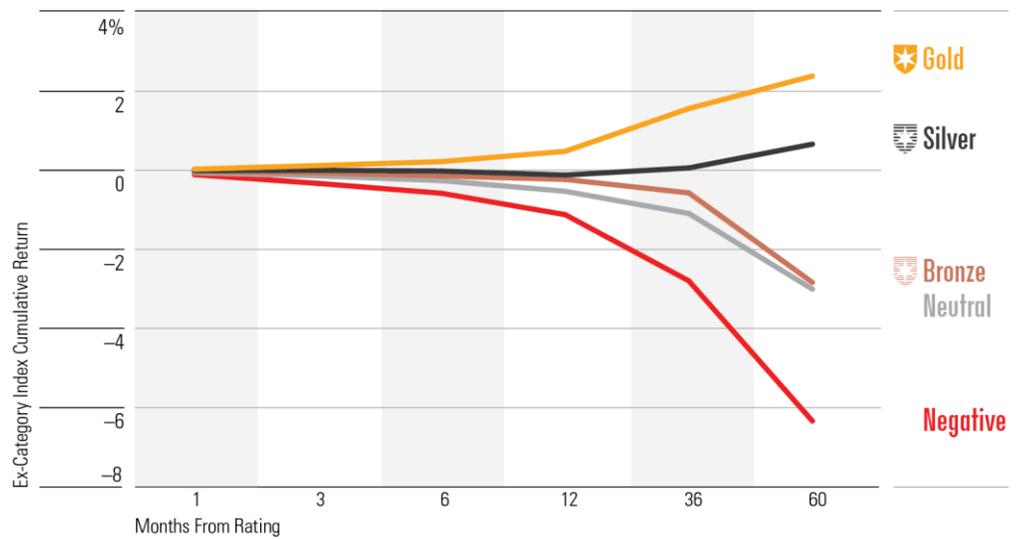
Exhibit 12 Event Study for Equities: Ex-Category Index



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Exhibit 13 shows the cumulative excess returns of allocation funds relative to their category indexes. Again, Gold-rated funds consistently outperformed their category index while Negatives significantly underperformed, leaving an 8.7% return differential. Overall, these rating tiers finished with a monotonic ranking. Nonetheless, the performance of Bronze-rated funds left room for improvement, as this cohort lagged their category indexes over all event horizons, albeit by a smaller margin than that of Neutral- and Negative-rated funds.

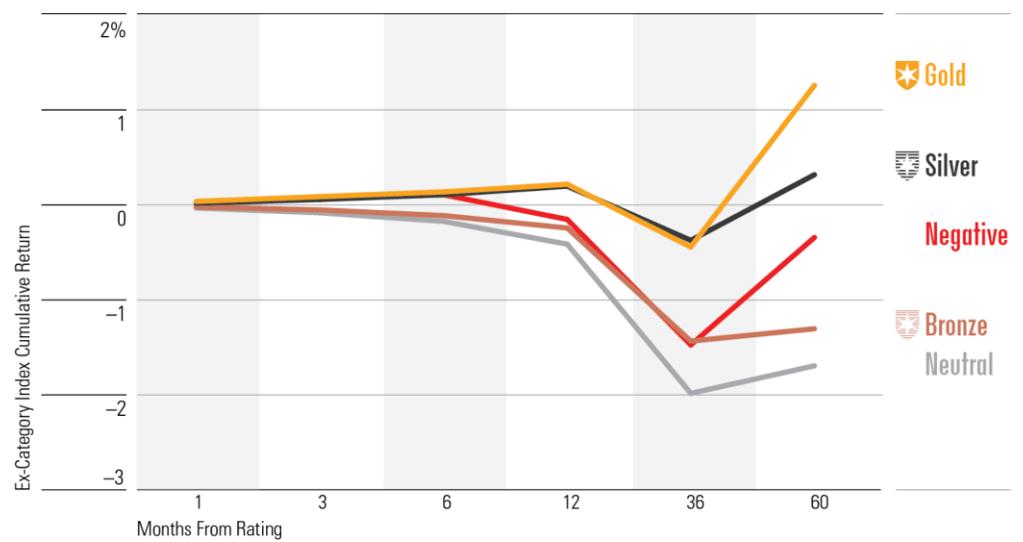
Exhibit 13 Event Study for Allocation: Ex-Category Index



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Exhibit 14 displays the event study results for the fixed-income asset class versus the relevant category indexes. Compared with the outcomes of rated fixed-income funds versus the category averages (see Exhibit 10 and the accompanying summary), we found improved sorting from Gold to Neutral here. Gold-rated funds excelled over the category index, and Silver-rated funds earned positive, excess returns as well. Bronze-, Neutral-, and Negative-rated funds fell behind the index. Supplementary analysis reveals that the outperformance of Negatives owed mostly to Negative-rated high-yield muni offerings taking on more credit risk than the category index in a period exceptionally favorable to such tactics.

Exhibit 14 Event Study for Fixed Income: Ex-Category Index

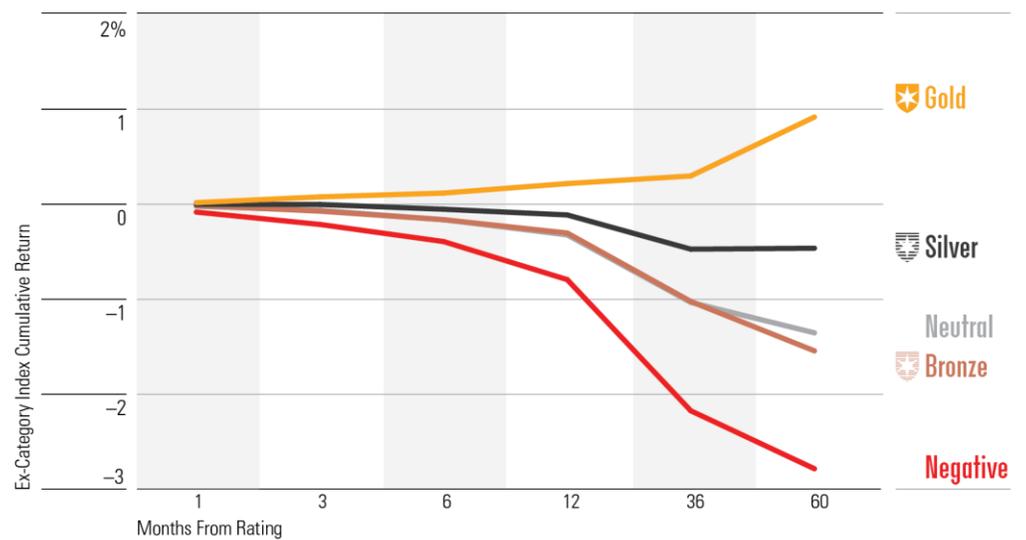


Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Lastly, Exhibit 15 presents the cumulative excess returns for the entire rated universe of funds (across all asset classes) versus their category indexes. We observe again the substantial excess return differential between Gold- and Negative-rated funds, an outperformance of 3.7% cumulatively. Gold-rated funds surpassed their category index across all event horizons, underscoring the consistency of their performance against both the category index and the category average.

Encouragingly, the other rating tiers sorted more or less monotonically. Indeed, the lackluster performance of Bronze-rated funds, which fell below their category indexes by more than Neutral-rated funds did at the 36- and 60-month horizons, deserves closer scrutiny to identify opportunities for enhancement.

Exhibit 15 Event Study Across Rated Universe: Ex-Category Index



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Event Study Annualized Alphas to Category Index

The previous two sections highlighted the excess returns achieved by Analyst Rating cohorts relative to their category average and category index. Using another measure of risk-adjusted performance, we analyzed funds' average CAPM alpha to their category index by rating cohort.

As not to overwhelm the event study discussion, we show the annualized, mean alphas by rating tier for the equities, allocation, and fixed-income asset classes in Exhibits 16-18 in Appendix 2. For the rated universe in Exhibit 19, we observed the strong, monotonic sorting ability of the ratings over each event horizon, where medalist funds achieved more alpha than Neutral- and Negative-rated funds. At the 60-month horizon, the average Gold-rated fund generated 0.9% more alpha annually than the average Negative-rated fund. Beyond the relative ranking, we underscore that, on average, medalist funds achieved positive alphas over the 60-month event horizon while Negative-rated funds produced negative alphas.

The above findings generally held across asset classes (furthermore, supplemental analysis of pre-fee CAPM alpha underscores that the dispersion is not primarily attributable to fee differences between cohorts). We do note that the positive alphas of Negative-rated fixed-income funds as well as the less differentiated performance of Bronze- and Neutral-rated equity funds indicate areas for improvement. Altogether, it appears that the Analyst Ratings have succeeded in sorting funds by CAPM alpha.

Section 4: Conclusion

The regression and event study results suggest that the Morningstar Analyst Rating is predictive of funds' future risk-adjusted returns. Its predictive power varies between asset classes: It is strongest in equities and allocation while less-strong in fixed income.

These findings offer encouragement that our ratings framework can help investors make better investment decisions. By the same token, this study also indicates there are opportunities to improve the rating in some areas. In that spirit, we look forward to updating this paper's data on a regular basis for investors' benefit and to further our own knowledge of the rating's strengths and deficiencies.

Appendix 1: Factors

The Kenneth R. French Data Library provides Fama-French-Carhart factors calculated for the following regions: global, global ex-U.S., Europe, Asia-Pacific ex-Japan, Japan, and North America. Each regional set of factors contains:

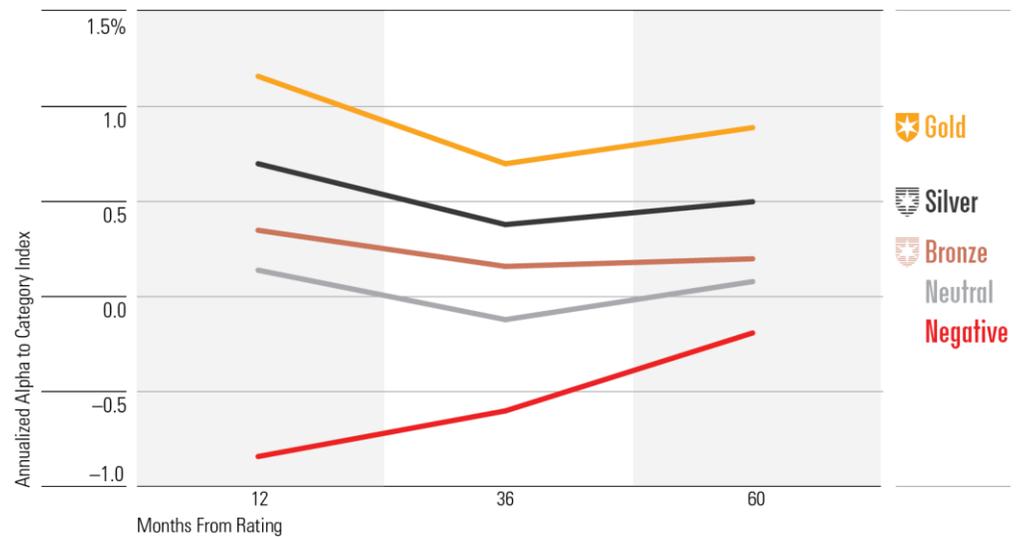
- ▶ *RMRF* (also known as “excess return on the market”) is the excess return of the region-specific market portfolio, calculated as each region’s market-cap-weighted portfolio return minus the regional risk-free rate (the one-month U.S. Treasury bill).
- ▶ *SMB* (“small minus big,” or small-cap minus large-cap) and *HML* (“high [ratio of book value to price] minus low,” or value minus growth) portfolio returns represent factor portfolios designed to proxy a common risk in equity returns arising from cross-sectional differences in market capitalization and valuation. To construct the *SMB* and *HML* factors, stocks in a region are sorted into two market-cap and three book/market equity, or B/M, groups at the end of June each year. “Big” stocks are those above the median of June market cap for the region, and “small” stocks are those below the median. The B/M breakpoints for a region are the 30th and 70th percentiles of B/M for that region’s “big” stocks. *SMB* is the equally weighted average of the returns on the three “small” stock portfolios for the region (small value, small core, and small growth) minus the average of the returns on the three “big” stock portfolios (large value, large core, large growth). *HML* is the equally weighted average of the returns for the two high B/M portfolios for a region (small value and large value) minus the average of the returns for the two low B/M portfolios (small growth, large growth).
- ▶ *UMD* (“up minus down”) is a factor portfolio designed to proxy an observed return pattern of momentum in equities where recent winners keep winning and recent losers keep losing. The 2x3 sorts on size and lagged momentum to construct UMD are similar to those used for value/growth, but the size-momentum portfolios are formed monthly (instead of annually). For portfolios formed at the end of month $t - 1$, the lagged momentum return is a stock’s cumulative return for month $t - 12$ to month $t - 2$. The momentum breakpoints for a region are the 30th and 70th percentiles of the lagged momentum returns of the “big” stocks of the region. *UMD* is the equally weighted average of the returns for the two winner portfolios (large and small) for a region minus the average of the returns for the two loser portfolios (large and small).
- ▶ *TERM* (term premium) is a factor portfolio designed to proxy a common risk in bond returns arising from unexpected changes in interest rates. The portfolio return is calculated by going long the Bloomberg

Barclays U.S. Treasury 10-20 Year TR USD Index and shorting the Bloomberg Barclays U.S. Treasury Bill 1-3 Month TR USD Index, consistent with Fama-French's motivation.

- ▶ *DEF* (default) is a factor portfolio designed to proxy a common risk in bond returns arising from shifts in economic conditions that could change the likelihood of default. The portfolio return is calculated by going long the Bloomberg Barclays U.S. Corporate High Yield TR USD Index and shorting the Bloomberg Barclays U.S. Government TR USD Index, consistent with Fama-French's motivation.

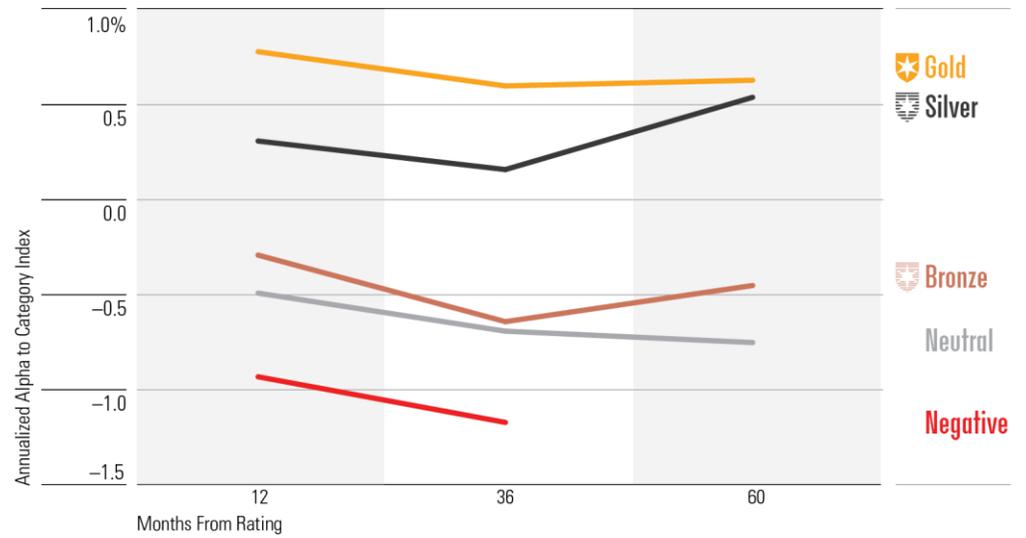
Appendix 2: Event Study for CAPM Alpha

Exhibit 16 Event Study for Equities: CAPM Alpha to Category Index



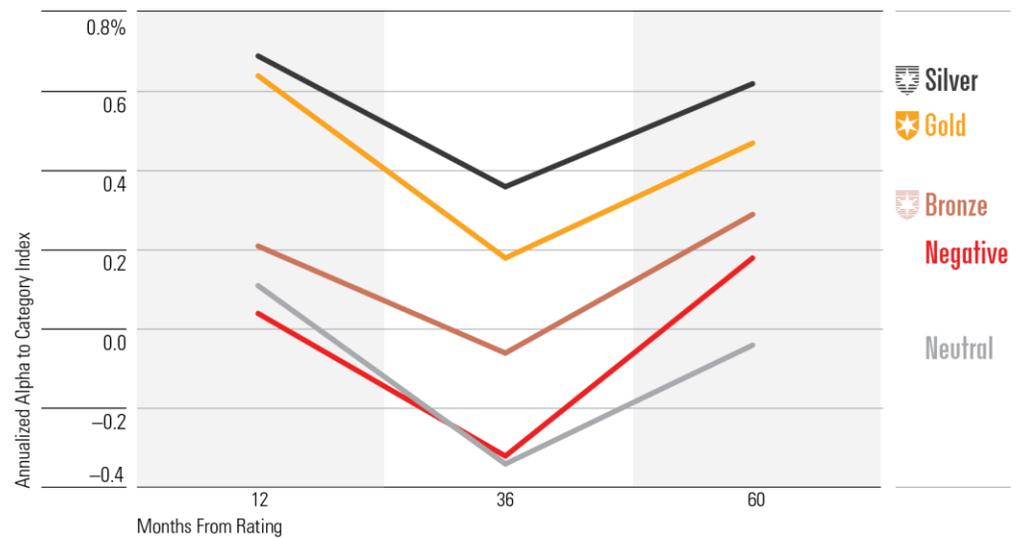
Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Exhibit 17 Event Study for Allocation: CAPM Alpha to Category Index



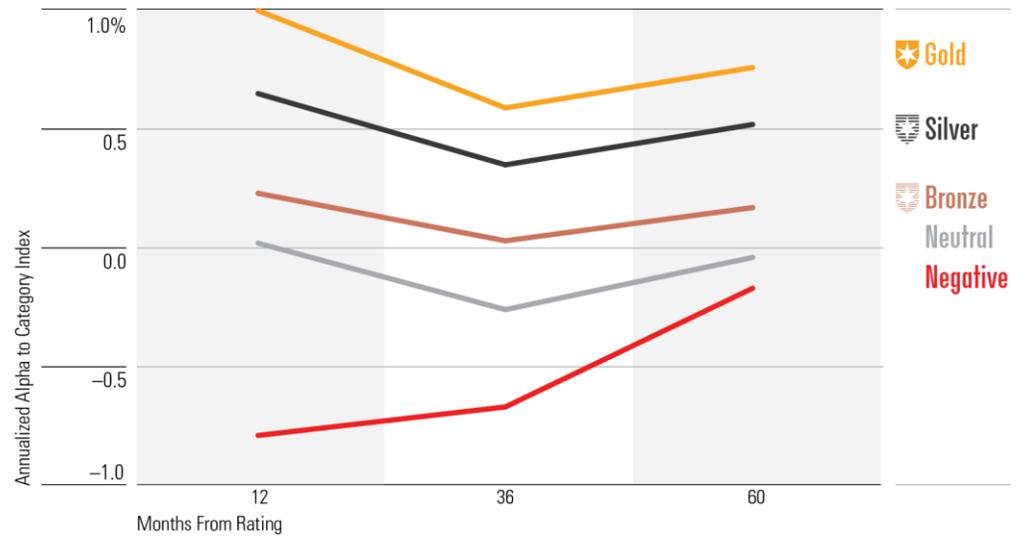
Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Exhibit 18 Event Study for Fixed Income: CAPM Alpha to Category Index



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Exhibit 19 Event Study Across Rated Universe: CAPM Alpha to Category Index



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Appendix 3: Event Study Excess Returns and Alpha

Exhibit 20 Event Study: Cumulative Ex-Category Average Returns (%)

Asset Class	Months From Rating	 Gold	 Silver	 Bronze	Neutral	Negative
Equity	1	0.08	0.04	0.04	0.03	-0.08
	3	0.25	0.12	0.11	0.07	-0.22
	6	0.49	0.21	0.20	0.13	-0.37
	12	0.89	0.42	0.41	0.26	-0.78
	36	1.86	0.95	1.13	0.67	-1.72
	60	3.49	1.91	2.07	1.70	-1.19
Allocation	1	0.13	0.07	0.06	0.04	-0.03
	3	0.39	0.21	0.19	0.12	-0.08
	6	0.76	0.40	0.38	0.25	-0.13
	12	1.55	0.73	0.76	0.53	-0.28
	36	4.18	2.20	2.42	1.67	-1.40
	60	7.15	5.88	3.34	3.60	-2.14
Fixed Income	1	0.05	0.06	0.04	0.04	0.04
	3	0.13	0.18	0.12	0.10	0.13
	6	0.27	0.36	0.25	0.18	0.21
	12	0.53	0.70	0.53	0.33	0.24
	36	1.32	2.09	1.60	0.65	-0.33
	60	2.19	3.23	2.40	0.73	0.71
Universe	1	0.08	0.05	0.05	0.03	-0.06
	3	0.26	0.15	0.12	0.09	-0.15
	6	0.50	0.27	0.24	0.16	-0.26
	12	0.96	0.52	0.49	0.33	-0.55
	36	2.22	1.34	1.40	0.85	-1.48
	60	3.97	2.60	2.28	1.78	-1.10

Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Exhibit 21 Event Study: Cumulative Ex-Category Index Returns (%)

Asset Class	Months From Rating	 Gold	 Silver	 Bronze	Neutral	Negative
Equity	1	0.01	0.00	-0.01	0.00	-0.08
	3	0.06	-0.02	-0.07	-0.03	-0.21
	6	0.08	-0.10	-0.18	-0.12	-0.39
	12	0.14	-0.20	-0.34	-0.23	-0.75
	36	0.12	-0.60	-1.00	-0.75	-2.06
	60	0.38	-0.82	-1.41	-0.92	-2.39
Allocation	1	0.04	0.00	-0.02	-0.05	-0.10
	3	0.13	0.01	-0.06	-0.13	-0.32
	6	0.23	-0.01	-0.13	-0.25	-0.57
	12	0.49	-0.11	-0.22	-0.52	-1.11
	36	1.57	0.07	-0.56	-1.08	-2.78
	60	2.39	0.67	-2.82	-2.99	-6.32
Fixed Income	1	0.04	0.02	-0.02	-0.03	0.01
	3	0.09	0.06	-0.05	-0.08	0.07
	6	0.14	0.11	-0.11	-0.17	0.11
	12	0.22	0.20	-0.24	-0.41	-0.15
	36	-0.44	-0.37	-1.43	-1.98	-1.47
	60	1.26	0.32	-1.30	-1.69	-0.34
Universe	1	0.02	0.00	-0.01	-0.02	-0.08
	3	0.08	0.00	-0.07	-0.06	-0.21
	6	0.12	-0.05	-0.16	-0.16	-0.39
	12	0.22	-0.11	-0.30	-0.32	-0.79
	36	0.30	-0.47	-1.02	-1.03	-2.17
	60	0.92	-0.46	-1.54	-1.35	-2.78

Source: Morningstar, Inc. Data as of Oct. 31, 2017.

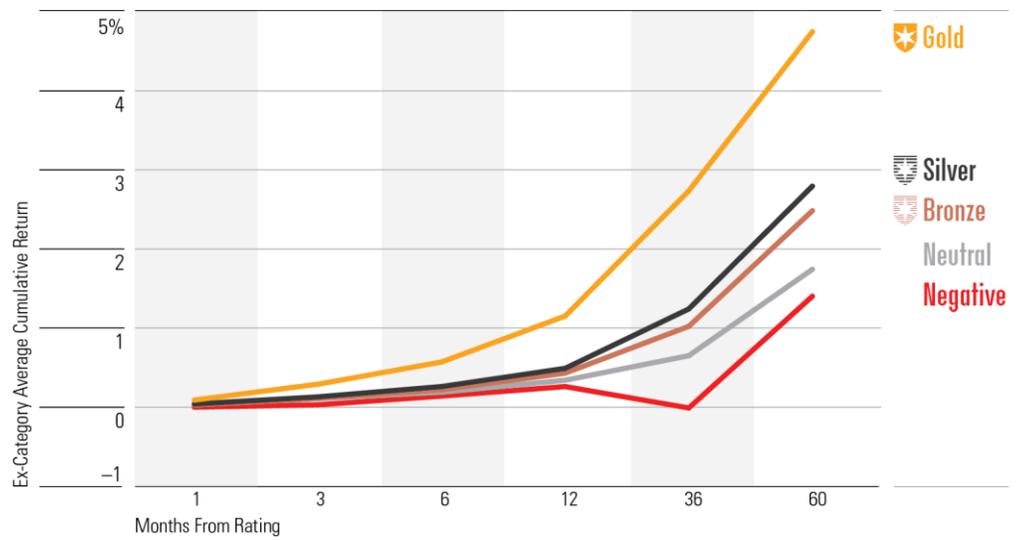
Exhibit 22 Event Study: Annualized Alpha to Category Index (%)

Asset Class	Months From Rating	 Gold	 Silver	 Bronze	Neutral	Negative
Equity	12	1.16	0.70	0.35	0.14	-0.84
	36	0.70	0.38	0.16	-0.12	-0.60
	60	0.89	0.50	0.20	0.08	-0.19
Allocation	12	0.78	0.31	-0.29	-0.49	-0.93
	36	0.60	0.16	-0.64	-0.69	-1.17
	60	0.63	0.54	-0.45	-0.75	—
Fixed Income	12	0.64	0.69	0.21	0.11	0.04
	36	0.18	0.36	-0.06	-0.34	-0.32
	60	0.47	0.62	0.29	-0.04	0.18
Universe	12	1.00	0.65	0.23	0.02	-0.79
	36	0.59	0.35	0.03	-0.26	-0.67
	60	0.76	0.52	0.17	-0.04	-0.17

Source: Morningstar, Inc. Data as of Oct. 31, 2017.

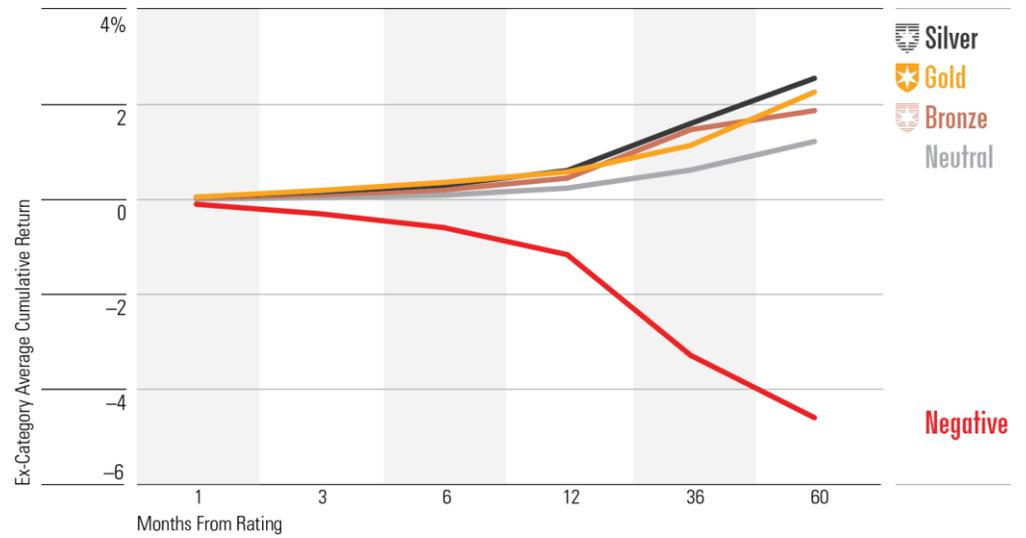
Appendix 4: Event Study by Region

Exhibit 23 Event Study for North America: Ex-Category Average



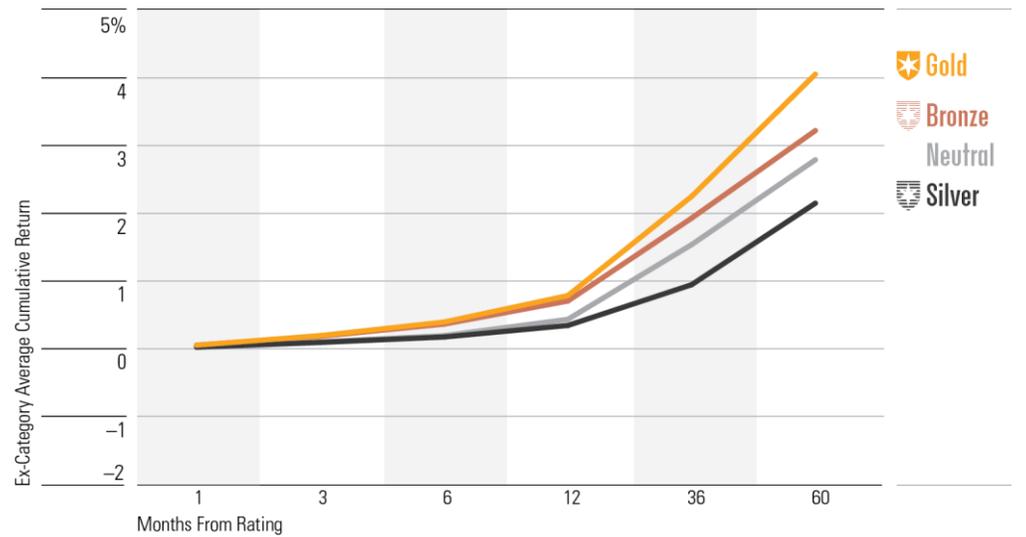
Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Exhibit 24 Event Study for EMEA: Ex-Category Average



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Exhibit 25 Event Study for Asia-Pacific: Ex-Category Average



Source: Morningstar, Inc. Data as of Oct. 31, 2017.

Appendix 5: References

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For More Information

Mike Laske
Product Manager, Manager Research
+1 312 696-6394



22 West Washington Street
Chicago, IL 60602 USA

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