Frequently Asked Questions about the Fixed Income Exposure Analysis Tool

Overview

The Grid in the web-based version of Morningstar Direct[SM] allows users investigating fixed-income funds to see a curated collection of calculated data points such as credit rating, effective duration, modified duration, and more. Most of these calculated fixed income data points offer both an average value, and a breakdown of data by portfolio weight. Seeing these data points juxtaposed, however, does not aid in a deeper analysis and true understanding of a manager's strategy for the portfolio, as well as what true risks lay in wait for investors and how their returns may be impacted.

For example, two funds may seem to have similar weightings to various credit rating classifications and effective duration breakdowns, but the actual breakout of this data among the holdings in the funds could be wildly different. The new Fixed Income Exposure Analysis (FIEA) tool allows users to see how a variety different fixed-income attributes intersect with one another. Thus, the tool offers users much more detailed information to understand how risk exposures may be amplified or balanced in a fund's portfolio. This information provides a more precise analysis into the underlying contributors of risk and return, allowing meaningful differentiation between managed investment alternatives.

This manual offers the following explanations about the FIEA tool:

The term "attributes" describes the analytic characteristics and calculations users can combine in the tool. They become the rows and columns within the FIEA table. These attributes are recognizable to many fixed income investors due to their widespread adoption and offer a menu of choices covering major contributors of risk and return. The FIEA tool includes the following attributes:

What is an attribute, and what fixed income attributes are available?

Attribute	Number of breakdown classifications
Effective Duration	16
Modified Duration	16
Effective Maturity	17
Yield to Maturity	16
Credit Rating	8
Super Sector	7
Primary Sector	18
Secondary Sector	116
Economic Development	3
Region	14
Country	~250

Some of the attributes are related in a hierarchical relationship, but they can be used in any combination. The hierarchies are as follows:

Can the attributes be used in any combination?

Sectors:

1. Super Sector – Level 1
2. Primary Sector – Level 2
3. Secondary Sector – Level 3

Economic Regions:

1. Economic Development Region – Level 1
2. Country – Level 2

Geographic Regions:

1. Region- Level 1
2. Country- Level 2

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The following **Super Sectors** are available:

- ► Cash & Equivalents
- ► Corporate
- ► Derivative
- ► Government
- ► Municipal
- ► Securitized, and
- ► Unknown.

**What sectors
are available?**

The following **Primary Sectors** are available:

- ► Cash & Equivalents
- ► Bank Loan
- ► Convertible
- ► Corporate Bond
- ► Preferred
- ► Future/Forward

- ► Option/Warrant
- ► Swap
- ► Government
- ► Government Related
- ► Municipal (Taxable)
- ► US Municipal/Tax Advantaged

- ► Agency Mortgage Backed
- ► Asset Backed
- ► Commercial Mortgage Backed
- ► Covered Bond
- ► Non-Agency Residential Mortgage Backed
- ► Unknown

The following **Secondary Sectors** are available:

- ► Municipal (Taxable) - Education
- ► Municipal (Taxable) - General Obligation State & Local
- ► Municipal (Taxable) - Health
- ► Municipal (Taxable) - Housing
- ► Municipal (Taxable) - Industrial
- ► Municipal (Taxable) - Tobacco
- ► Municipal (Taxable) - Transportation
- ► Municipal (Taxable) - Utilities
- ► Municipal (Taxable) - Water & Sewer
- ► Municipal/Tax Advantaged - Misc Revenue
- ► Municipal (Taxable) - Misc Revenue/Unspecified
- ► Municipal/Tax Advantaged - Advance Refunded
- ► Municipal/Tax Advantaged - Education
- ► Municipal/Tax Advantaged - General Obligation State & Local
- ► Municipal/Tax Advantaged - Health
- ► Municipal/Tax Advantaged - Housing
- ► Municipal/Tax Advantaged - Industrial
- ► Municipal/Tax Advantaged - Tobacco

- ► Municipal/Tax Advantaged - Transportation
- ► Municipal/Tax Advantaged - Utilities
- ► Municipal/Tax Advantaged - Water & Sewer
- ► Agency Mortgage Backed - Agency ARM
- ► Agency Mortgage Backed - Agency CMO
- ► Agency Mortgage Backed - Agency Pass Thru
- ► Agency Mortgage Backed - Unspecified
- ► Asset Backed - Auto
- ► Asset Backed - CBO/CDO
- ► Asset Backed - Credit Card
- ► Asset Backed - Home Equity
- ► Asset Backed - Student Loan
- ► Asset Backed- Other
- ► Commercial Mortgage Backed
- ► Covered Bond
- ► Non-Agency Residential Mortgage Backed
- ► Unknown

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Morningstar uses the following economic regions:

- ▶ Emerging
- ▶ Developed, and
- ▶ Not Classified.

Users can read more about regions from this methodology paper.

**How are the economic
regions defined?**

Morningstar uses the following geographic regions:

- ▶ Africa
- ▶ Asia - Developed
- ▶ Asia - Emerging
- ▶ Australasia
- ▶ Canada
- ▶ Europe - Emerging
- ▶ Europe - ex-Euro
- ▶ Eurozone
- ▶ Japan
- ▶ Latin America
- ▶ Middle East
- ▶ Not Classified
- ▶ United Kingdom, and
- ▶ United States.

Users can read more about regions from this methodology paper.

**How does Morningstar
classify different
geographic regions?**

Exposures represent the different analytic perspectives a user can leverage to evaluate or measure the intersection of various fixed income attributes. For example, what percentage of a fund's A-rated bonds have an effective duration of 1-2 years? With most traditional breakdowns, the exposure is simply the portfolio weight of the securities having a certain attribute. For FIEA, the following table details the distinct exposures available:

What is an exposure, and what exposures are available?

Exposure Name	Description
Portfolio Weight	The portion of portfolio assets represented by the intersection, expressed as a percentage
Count	The number of holdings represented by the intersection, expressed as a number
Weighted Exposure	A modification of Portfolio Weight, adjusted based on an attribute, calculated by multiplying holding weight by the attribute's numeric value and expressed as a percentage. For example, a user may see that x% of a portfolio's total duration comes from a certain geographic region.
Contribution	The portion of a numeric attribute's total value (where total value = portfolio average = sum of all contribution values) represented by the intersection, expressed as a number, with units determined by attribute type. For example, a user may see that x years of a portfolio's average duration come from a certain sector.
Average	The average value represented by the intersection, expressed as a number, with units determined by attribute type. For example, a user may see that a certain credit rating grouping has an average duration of x years.

☞ Note: Portfolio Weight and Count are available for all attributes, while Weighted Exposure, Contribution, and Average are applicable only when one of the chosen attributes is a numerical measure (for example, Effective Duration or Yield to Maturity).

The FIEA tool incorporates the following types of methodology:

▶ The way attribute intersections are measured, or "Exposures"
▶ The way holding weights within a portfolio are calculated, which is called "Basis"
▶ The way holding weights are treated within a combination based on the prioritization of an attribute by the user, and
▶ The way underlying holdings of a portfolio are determined.

For more information, be sure to read the Fixed Income Exposure Analysis methodology paper.

Is a methodology paper available describing how the intersection calculations are made?

Morningstar collects information from asset managers on the holdings within a fund or portfolio, including the market value of each holding and of the total portfolio. From this information, a holding weight value for each security is determined, as a percentage of the total portfolio.

Given that the analytics in the FIEA tool are specific to fixed income, however, a different weighting methodology is applied so the analytics take into account only the fixed income holdings within the portfolio. This methodology is a form of rescaling based on asset type and analytic applicability and is fundamentally different from the standard value rescaling implemented in Morningstar products.

"Asset Class Rescaling" takes only the holdings belonging to the asset class being analyzed, in this case fixed income, and uses that as the basis for determining the denominator to calculate holding weights. This concept is further refined by using an applicability test based on specific attributes, because not all holdings meeting the general asset class test as fixed income securities exhibit all fixed income attributes. For example, credit default swaps have no effective duration associated with them. Within the FIEA tool, this extra layer of rescaling is accounted for using a concept called "Basis."

How are a fund's holding weights determined?

"Basis" describes which portfolio holdings are included when determining holding weights and calculating exposures. Essentially, in order to show data broken out into parts, a way of measuring the whole is needed. Put another way, the denominator used to calculate holding weights as percentages needs to be determined. Due to some attributes not applying to some holding types, certain holdings may be excluded when summing up assets to include in the denominator.

For example, because credit default swaps have no duration, if a user is evaluating duration as a primary attribute, only those holdings for which duration is applicable would be included when determining holding weight percentages — assets in credit default swaps would not be included in the denominator.

The following distinct Basis categories are employed in the FIEA tool:

- ▶ All fixed income holdings (for example, those aligned with the Sector attributes)
- ▶ Cash flow calculation attributes (for example, duration or yield)
- ▶ Credit ratings, and
- ▶ Geographic attributes.

The Morningstar Detailed Investment Type classification is assigned to all holdings to determine inclusion for the purpose of Basis.

Which fund holdings serve as the basis for the data shown in the FIEA tool?

All of the information available within the FIEA tool is based on the holdings-based analytics in the web-based version of Morningstar Direct, which have been available for fixed income portfolios since 2017. No analytic data collected through the Morningstar Fixed Income Survey or other analytic data self-reported by asset managers is incorporated into the tool, besides the fund/portfolio holdings data previously referenced.

What is the source of data for the tool?

What types of investments can be analyzed in the tool?

Only managed investments are included; individual bonds and portfolio objects (model portfolios, custom benchmarks) cannot be analyzed. All universe types except for indexes are included. Only a single fund/portfolio can be analyzed at a time.

If an investment owns another fund, can the tool "look through" that holding to understand its holdings?

In some cases when Morningstar collects holdings from asset managers, a fund's portfolio may hold another fund. These are referred to as a "fund holdings." Rather than ignore these cases for analysis, the FIEA tool can "look through" to the underlying holdings within those fund holdings. By doing so, the underlying holding attributes can be aggregated along with the other, individual security holdings.

This capability is quite robust and can be applied to a depth of 10 levels of funds held by other funds in a parent-to-child relationship. This greatly expands the ability to calculate attribute exposures, thereby enhancing coverage and accuracy of the analytics produced.

Can a previous portfolio for a fund be analyzed in the tool?

The underlying architecture used to produce data in the FIEA tool is a dynamic, "on-the-fly" process, so only the most recent portfolio date for an investment is available.

Is the behavior of the tool the same in the component and Morningstar Report?

Two distinct component types are available: one in the Morningstar Report, and another in the web-based version of Morningstar Direct. Both are tabular displays of information. Data visualizations and/or charts will be released in future phases.

The Morningstar Report offers a limited number of attributes, a single level of combination, and just two exposure types.

The web-based version of Morningstar Direct offers all initial attributes, up to a three levels of combinations for columns and rows, and all exposure types.

What are the default settings for the tool?

When the Exposure Analysis tab is first selected, the following settings are in place:

- ▶ Single level of combination
- ▶ Rows = Credit Rating
- ▶ Columns = Effective Duration
- ▶ Sale Position = Net
- ▶ Exposure = Portfolio Weight, and
- ▶ Show Holdings = Suppressed.

How can I learn more about using this tool?

To practice using this tool in a variety of practical exercises, please see the Fixed Income Exposure Analysis exercise guide.

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