Morningstar Fixed-Income Style Box™
Methodology for Chile

Morningstar Methodology
Effective 31 October 2016

Contents

Introduction

The Morningstar Style Box was introduced in 1992 to help investors and advisors determine the investment style of a fund. Different investment styles often have different levels of risk and lead to differences in returns. Therefore, it is crucial that investors understand style and have a tool to measure their style exposure. The Morningstar Style Box provides an intuitive visual representation of style that helps investors build better portfolios and monitor them more accurately.

Morningstar classifies bond funds in its style box according to interest-rate sensitivity and average credit quality. The groups are limited, moderate, and extensive, as measured by the average effective duration of the fund's holdings, and high, medium, and low based on letter (or alphanumeric) credit ratings of bond holdings by third-party credit-rating agencies. The nine possible combinations of these characteristics correspond to the nine squares of the Morningstar Style Box--quality is displayed along the vertical axis and sensitivity to interest rates along the horizontal axis.

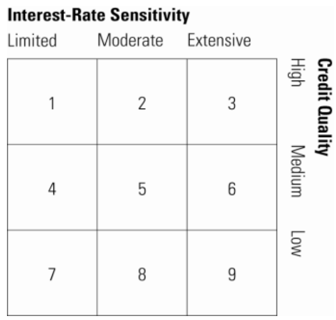
This document applies the main Morningstar Fixed-Income Style Box Methodology to funds issued and sold locally in Chile. For the calculation of average credit quality of funds, Morningstar uses the credit quality of the bond holdings. Under the main methodology, bonds not rated by the Nationally Recognized Statistical Rating Organizations, or NRSROs, are assumed to have the same default rate as a B rated bond. However, this assumption does not provide helpful information when a fund sold exclusively in a local market such as Chile invests primarily in bonds issued locally that are not rated by an NRSRO. To provide meaningful information about such funds, this document addresses how the fixed-income style box is calculated for Chilean funds.

Fixed-Income Style Box

Overview

The model for the fixed-income style box is based on the two pillars of fixed-income performance: interest-rate sensitivity and credit quality. As depicted in the image below, the three interest-rate sensitivity groups are limited, moderate, and extensive, and the three credit-quality groups are high, medium, and low. These groupings display a portfolio's effective duration and third-party credit ratings to provide an overall representation of the fund's risk orientation given the interest-rate sensitivity and credit rating of bonds in the portfolio.

Exhibit 1 The Fixed-income Style Box



Source: Morningstar Direct. Data as of dd/mm/yyyy.

Horizontal Axis: Interest-Rate Sensitivity

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The horizontal axis of the style box represents the interest-rate sensitivity of the bond fund. Interest-rate sensitivity is measured by average effective duration. Duration is generally defined as the approximate percentage change in a bond's price for a 100-basis-point change in yield. The horizontal axis of the style box for Chilean funds follows the main fixed-income style box methodology without customization. A summary is provided below.

Funds in Chile, like all non-U.S. domiciled funds, use static duration breakpoints defined in the main methodology. Bond funds with durations of 3.5 years or less are considered to have limited sensitivity to interest-rate changes. Those with durations of more than 3.5 years but less than 6.0 years are considered to have moderate sensitivity to interest-rate changes. Bond funds with durations of more than 6.0 years are considered to have extensive sensitivity to interest-rate changes.

Morningstar asks fund companies to calculate and send average effective duration (also known as option-adjusted duration) for each of their fixed-income or allocation funds. Morningstar asks for effective duration because that measure typically gives the best estimation of how the prices of bonds with embedded options will change as a result of changes in interest rates, taking into account the likelihood that embedded options will be exercised.

For funds in Chile, like all non-U.S. domiciled funds, Morningstar accepts surveys returned with modified duration (and no effective duration provided) for fixed-income funds not in a convertible-bond category. Modified duration is generally defined as the approximate percentage change in a bond's price for a 100-basis-point change in yield, assuming that the bond's expected cash flows do not change when the yield changes. Modified duration works well as an estimator for modest interest-rate shifts that occur during a short period of time for bonds without embedded options.

Morningstar categorizes any fixed-income instrument with less than 92 days to maturity as cash for the purposes of calculating a fund's asset-allocation breakdown. These short-term fixed-income securities and other cash instruments are included in the calculation of effective duration.

Vertical Axis: Credit Quality

The vertical axis of the fixed-income style box represents the average credit quality of the bond fund. Morningstar expresses average credit quality in letter grades: AAA, AA, A, BBB, BB, B, and Below B. These average credit quality letter grades are mapped to three style box positions: high, medium, and low.

The average credit quality letter grade of a fund is calculated based on the Morningstar letter grade ratings of the fund portfolio's constituent bond holdings, and the main methodology provides a mapping of NRSRO ratings to these constituent bond letter grades. However, the main methodology presents challenges for Chilean funds because bonds that are issued and sold in the Chilean market often are not rated by a NRSRO. In order to provide meaningful credit quality information to Chilean investors, for the purpose of calculating average credit quality and style box position for Chilean funds, Morningstar maps Chilean bond risk classification for individual bond holdings to the credit quality letter grade system.

As required by law, Ley de Mercado de Valores, publicly offered fixed-income securities in Chile are assigned risk classifications, or Clasificaciónde Riesgo. According to Article 88 of the law, long-term fixed-income vehicles are assigned to one of the following nine categories in order of increasing risk: AAA, AA, A, BBB, BB, B, C, D, and E. Short-term instruments, those issued with maturities of 12 months or less, are classified into the following five categories in order of increasing risk: N-1, N-2, N-3, N-4, and N-5. In the absence of NRSRO ratings, this regulatory requirement presents the closest substitute for differentiating the credit quality risk of fixed-income issues.

Table 1 shows how the Chilean risk classification categories are mapped onto Morningstar's credit quality letter grades (please refer to the Appendix of the main Morningstar Fixed-Income Style Box Methodology for Morningstar's considerations in developing this mapping). For example, a short-term instrument with an N-3 Chilean risk classification is mapped to Morningstar's BBB letter grade. Similarly, a long-term instrument with AAA Chilean risk classification is mapped to Morningstar's AAA letter grade.

Exhibit 2 Credit Grades

Morningstar Bond Quality	Chile Risk Category for Long-Term Instruments	Chile Risk Category for Short-Term Instruments
AAA	AAA	N-1+
AA	AA	N-1
A	A	N-2
BBB	BBB	N-3
BB	BB	—
B	B	—
Below B	C, D, E	N-4, N-5
Not Rated	Not Rated	Not Rated
AAA	AAA	N-1+

Source: Morningstar.

Once constituent holdings are mapped to these letter grades according to their Chilean risk categories, the portfolio composition in each Morningstar letter grade is fed into Morningstar's main methodology for the calculations of average credit quality rating and style box position. The main methodology calculates the average credit quality rating of a fund based on the portfolio composition in each letter grade and the default rate associated with each letter grade, taking into account that default rates of each grade rise at an increasing rate (a mathematical property called convexity). This assumption is implemented in the main methodology by converting each bond quality grade into a relative default rate on a scale from 0 for AAA to 100 for Below B according to Table 2. This same assumption is applied to constituent holdings in Chilean fixed-income funds because empirical default rate information is not available for the Chilean fixed-income market. For detailed information on empirical default rates and Morningstar's convex two-segment quadratic spline model that converts the empirical default rates to relative default rates, please refer to the Appendix of the main Morningstar Fixed-Income Style Box Methodology.

Exhibit 3 Relative Default Rates for Bonds

Morningstar Bond Quality	Relative Default Rate
AAA	0.00
AA	0.56
A	2.22
BBB	5.00
BB	17.78
B	49.44
Below B	100.00
Not Rated	49.44
AAA	0.00

Source: Morningstar.

Next, the fund portfolio's weighted-average relative default rate is calculated. For example, if a portfolio consisted of two bonds, the first rated AAA and accounting for 45% of the portfolio and the second with a B rating accounting for 55% of the portfolio, the resulting weighted-average relative default rate would be $0.00 \times 45\% + 49.44 \times 55\% = 27.19$. In the final step of the methodology, using the mapping in Table 3, a bond portfolio with the average relative default rate of 27.19 is assigned an average credit quality rating of BB and a style box position of Low Quality. Table 3 follows Morningstar's main methodology for the calculations of average credit quality rating and style box position, and these portfolio average relative default rate cutoffs are developed based on the convex two-segment quadratic spline default rate curve. For detailed information, please refer to the Appendix of the main methodology.

Exhibit 4 Fund Average Credit Quality Rating and Style Box Position

Portfolio Average Relative Default Rate	Quality Rating	Style Box Position
0 to 0.13889	AAA	High Quality
0.13889 to 1.25000	AA	High Quality
1.25000 to 3.47223	A	Medium Quality
3.47223 to 9.02778	BBB	Medium Quality
9.02778 to 31.25000	BB	Low Quality
31.25000 to 72.36112	B	Low Quality
$\geqslant$ 72.36112	Below B	Low Quality

Source: Morningstar.

Appendix: Considerations in Mapping Chilean Risk Categories to Letter Grades

When mapping Chilean long-term risk categories to the Morningstar credit quality letter grade system in Table 1, Morningstar consulted regulatory guidelines for helpful information. The Superintendencia de Valores y Seguros, or SVS, is the Chilean regulator. Although the SVS does not give guidance on how Chilean risk categories map to NRSRO ratings, it provides an equivalency guideline for mapping foreign-issued bonds with NRSRO ratings to Chilean risk classification in Circular 1.217, dated May 29, 1995:

Chilean AAA: Aaa, AAA
Chilean AA: Aa1, Aa2, Aa3, AA+, AA, AA-
Chilean A: A1, A2, A3, A+, A, A-
Chilean BBB: Baa1, Baa2, Baa3, BBB+, BBB, BBB-
Chilean BB: Ba1, Ba2, Ba3, BB+, BB, BB-
Chilean B: B1, B2, B3, B+, B, B-
Chilean C: Caa1, Caa2, Caa3, CCC+, CCC, CCC-, CC, C
Chilean D: Ca, DDD, DD, D
Chilean E: Moody's C

Although not originally intended for mapping Chilean risk categories to NRSRO ratings, this equivalency serves as a foundation for understanding the intended risk differentiation among risk categories and is instrumental in helping Morningstar develop the mapping of Chilean long-term risk categories to its letter grade system.

When mapping Chilean short-term risk categories to the Morningstar credit quality letter grade system in Table 1, Morningstar consulted Article 88 of the Chilean law 18.045 Ley de Mercado de Valores. It states that when broader categories A, B, C, D, and E are referred to, they correspond to the following long- and short-term classifications:

A. corresponds to categories AAA, AA, and N-1
B. corresponds to categories A and N-2
C. corresponds to categories BBB and N-3
D. corresponds to categories BB, B, C, D, and N-4
E. corresponds to categories E and N-5

By grouping long- and short-term risk categories together in the same bucket, the law implies an equivalency between Chilean long- and short-term classifications. Having established the relationship between the Morningstar letter grade system and Chilean long-term risk category in the previous paragraph, and knowing how Chilean long- and short-term classifications are viewed in equivalency terms by Chile's own law, Morningstar has the information necessary to create the mapping between its letter grades and Chilean short-term risk categories. In the case of short-term category N-1, where the Chilean law groups together the AAA and AA long-term classifications, Morningstar could map N-1 to either its AAA or AA credit quality grade. This is also true for the short-term category N-1+ used in the marketplace to further differentiate short-term bonds of higher quality. Upon examining the definition of the short-term category N-1 against the definitions of the AAA and AA long-term classification in Article 88 of the Chilean law 18.045 Ley de Mercado de Valores, it is clear that the definition is identical between N-1 and AAA, and it would appear that the best way is to map N-1 to AAA. However, Morningstar observes that in the market, investors consider N-1+ equivalent to AAA but view N-1 as AA. Therefore, Morningstar maps N-1+ to its AAA credit quality grade and N-1 to its AA credit quality grade in Table 1, in accordance with the industry standard.

Recent Changes

Effective Date: Oct. 31, 2016
Changed Cash & Cash Equivalents definition from "Less than one year to maturity" to "Less than 92 days to maturity"