



Morningstar After-Tax Return Methodology

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Version History

Version	Date	Description
1.1	24 October 2003	Updated to reflect tax law changes from 2003
1.0	29 November 2001	Original publication

Introduction

After-tax returns are measures of fund performance that take into account the taxes a hypothetical investor pays on fund distributions and capital gains. While a fund's total return reflects the performance of the underlying securities, the after-tax return reflects the net gains or losses that an investor receives after paying taxes.

Morningstar introduced after-tax returns in July 1993. Morningstar currently reports after-tax returns for open-end mutual funds, closed-end mutual funds, and exchange-traded funds for the following time periods: year-to-date, one-month, three-month, six-month, one-year, three-year, five-year, 10-year, 15-year, and 20-year.

In 2001, the Securities and Exchange Commission (SEC) began requiring mutual funds to report standardized after-tax returns in their prospectuses. At that time, Morningstar updated its methodology to be consistent with the guidelines published by the SEC. This document reflects Morningstar's interpretation of those guidelines.

This document also reflects the changes that arose from the new tax bill in 2003, the Jobs and Growth Tax Relief Reconciliation Act. This bill lowered the tax rates for capital gains and income, and it introduced a new type of dividend, "qualified dividend income." Morningstar updates effective tax rates whenever there is a tax law change, but the 2003 tax bill prompted additional methodology changes to accommodate distributions of qualified dividend income.

The SEC defined two different measures of after-tax total return:

Pre-Liquidation After-Tax Return (ATR_{pre})

The pre-liquidation return reflects the tax effects of fund distributions, such as short-term capital gains, long-term capital gains, and dividends. Shareholders must pay tax on any distributions they receive from the fund in the year in which those payments are distributed. The pre-liquidation after-tax return does not reflect the capital gains/losses that investors might incur from selling the fund at the end of the time period. Morningstar also refers to this measure as “Return after Tax on Distributions.”

Post-Liquidation After-Tax Return (ATR_{post})

The post-liquidation return reflects the tax effects for an investor who sells the fund at the end of the time period. In this case, the investor owes taxes not only on distributions, but also on any capital gains realized upon selling the fund. If the fund’s price appreciated over the course of the holding period, the investor would owe taxes on those gains. If the fund lost money, the investor might have capital losses that could partially offset other gains. The capital gains/losses can be short-term or long-term, based on the investor’s holding period. Morningstar also refers to this measure as “Return after Tax on Distributions and Sale.”

A Note on Loads

The SEC specified that sales charges should be included in the after-tax calculation. Therefore, these are technically “load- and tax-adjusted returns” and not simply “tax-adjusted returns.” Therefore, a fund’s after-tax return may be lower than its total return because of tax reasons, sales charges, or both. This is relevant for all funds, but especially so for municipal-bond funds. Because municipal-bond dividends are exempt from federal tax, most investors expect municipal -bond after-tax returns to be identical to the total returns. However, the pre-liquidation after-tax return could be noticeably lower if the fund has front- or back-end loads or if it distributed capital gains (which are taxable) during that time period.

What This Means For Investors

Taxes are a significant consideration for many investors who own mutual funds in taxable accounts. Investors pay taxes on dividends and capital gains that are distributed by the fund to them, and they may also pay taxes on capital gains when they sell a fund. As taxes continue to reduce investors' real returns, many investors are searching for better tools to manage and evaluate tax issues.

Tax-adjusted returns help investors understand the tax liabilities associated with owning a fund. Some funds invest in bonds and dividend-paying stocks and therefore distribute a lot of dividends. Shareholders pay taxes on those dividends, but this is not necessarily a bad thing—some investors seek a regular source of income. Other funds make a deliberate effort to minimize taxable distributions. These funds, especially tax-managed ones, limit distributions by investing in stocks that don't pay dividends and by carefully offsetting capital gains with losses.

Investors can compare the total return, load-adjusted return, and after-tax return of a fund to understand how loads and taxes affect their real returns. For most funds,

$$\text{Total Return} \geq \text{Load-Adjusted Return} \geq \text{Pre-Liquidation After-Tax Return}^1$$

The difference between total return and load-adjusted return reflects what the investor paid in sales charges. For no-load funds, these numbers will be the same. The difference between load-adjusted return and pre-liquidation after-tax return reflects the taxes the hypothetical investor paid on fund distributions. Load-adjusted and pre-liquidation returns will be the same for funds that did not make any distributions during that time period. If the numbers are not the same, it reflects the gains that the investor lost to taxes.

The relationship between pre- and post-liquidation after-tax returns is not as consistent, because while both versions include capital gains, only the post-liquidation version accounts for capital losses. Therefore, if the investor experienced a capital loss upon selling the fund, the post-liquidation return could be higher than the pre-liquidation return if the capital losses offset some distribution gains. Conversely, if the investor experienced capital gains upon selling the fund, the post-liquidation return (which reflects the taxes on those gains) will be lower.

¹ On rare occasions, the pre-liquidation after-tax return can be greater than the load-adjusted return or total return if the fund distributed foreign tax credits, which are included for tax returns but excluded for other performance reporting.

Calculation Assumptions

Morningstar makes the following general assumptions for the after-tax return methodology. Many of these assumptions were outlined in the SEC's guidance to mutual fund companies about this calculation.

- ▶ Distributions are taxed at the highest federal tax-rate prevailing for each type of distribution. After-tax proceeds from those distributions are reinvested.
- ▶ The appropriate current or historical federal tax rate is applied to each distribution based on the distribution date.
- ▶ State and local taxes are ignored.
- ▶ The calculation does not reflect the tax effects of the alternative minimum tax, exemptions, phase-out credits, or any individual-specific issues.
- ▶ The returns reflect all recurring built-in fees and non-recurring charges like sales loads.
- ▶ Sales loads are not applied to reinvested distributions.
- ▶ Front-loads are the only fees charged at the start of an investment period.
- ▶ As per industry practice, the deferred load is applied to the lower of either the beginning NAV or the ending NAV of the original shares purchased.
- ▶ If the deferred load is structured on a sliding, time-based scale, Morningstar uses the lower of the two amounts that straddle a specific time period. For example, if a fund has a scheduled deferred load of 6% for year 0-1 and 5% for year 1-2, Morningstar will apply the 5% load to the one-year after-tax return calculation.²
- ▶ Mutual fund investors may have gains/losses from other investments to offset the gains/losses from the fund at the end of the holding period. However, any gains/losses will be offset within the fund first before being offset against outside gains/losses.

² There is no industry standard for the application of time-based deferred loads; some fund companies lower the load on the anniversary date while others do not drop the load to the next breakpoint until the day after the anniversary of the purchase.

Calculation Variables

The pre-liquidation and post-liquidation after-tax returns are both based on the same common set of variables.

Prices:

P_b	=	price per share (NAV) at the beginning of the holding period
P_e	=	price per share (NAV) at the end of the holding period
P_i	=	the reinvestment price (NAV) for all distributions paid on day i^3

Loads and Fees:

FL	=	maximum front load
DL	=	appropriate deferred load for that time period
RL	=	appropriate redemption fee for that time period
FEE_i	=	periodic (wrap) fees charged to an account *

Regular Distributions:

DIV_i	=	taxable interest income and taxable non-qualified dividends distributed on day i (\$ per share)
QDI_i	=	taxable qualified dividend income distributed on day i (\$ per share) ⁴
EXD_i	=	tax-exempt interest income and dividends distributed on day i (\$ per share)
STG_i	=	short-term capital gains distributed on day i (\$ per share)
MTG_i	=	mid-term capital gains distributed on day i (\$ per share) ⁵
LTG_i	=	long-term capital gains distributed on day i (\$ per share)
ROC_i	=	return of capital distributed on day i (\$ per share) *

³ While it is rare, it is possible that a fund company could select different dates for the payment and reinvestment of a distribution. If the reinvestment date is past the end of the holding period (i.e. the ex-date is before the end of the time period but the reinvestment date is still forthcoming), the reinvestment NAV is assumed to be the ending NAV (P_e).

* These types of fees and distributions are possible, but they are fairly unusual for mutual funds.

⁴ Qualified dividends were introduced as part of the 2003 tax bill and were effective starting January 1, 2003. Qualified dividends are those that are issued by domestic corporations and some foreign corporations, subject to certain requirements.

⁵ Mid-term capital gains were effective from July 29, 1997 through Dec. 31, 1997, for investments held for more than one year but not more than 18 months.

Special Types of Distributions:

LMB _i	=	qualified five-year gain distributed on day i (\$ per share)*. ⁶
RCG _i	=	retained capital gain distributions on day i (\$ per share) *
FTC _i	=	foreign-tax credit related to DIV _i distributed on day i (\$ per share) *

Tax Rates:

TXI _i	=	the maximum federal income tax rate at time i
TXD _i	=	the maximum federal qualified dividend income tax rate at time i
TXS _i	=	the maximum federal short-term capital gain tax rate at time i
TXM _i	=	the maximum federal mid-term capital gain tax rate at time i
TXL _i	=	the maximum federal long-term capital gain tax rate at time i
TX5 _i	=	the maximum federal tax rate on qualified five-year gains at time i
TCORP _i	=	the maximum federal corporate tax rate at time i

⁶ Qualified five-year gains were introduced in 2001. The tax law of 2003 repealed the lower tax rates for these gains, although the lower rates will be reinstated in 2009 when the 2003 tax benefits are scheduled to disappear.

The after-tax distribution on day i is made up of two components: the distributions paid to the investor minus the periodic fees charged to the investor.

$$[1] \quad ATD_i = ATD'_i - FEE_i$$

ATD_i	=	the net after-tax per-share distribution/fee on day i
ATD'_i	=	the after-tax per-share distribution on day i
FEE_i	=	the periodic per-share fee charged to the investor on day i ⁷

ATD_i represents the net amount that is reinvested in the fund on day i. Reinvested distributions will increase the number of shares held by the investor; fees alone will reduce the number of shares.

After-Tax Per-Share Distribution

The after-tax per-share distribution, ATD'_i , is calculated as follows:

$$[2] \quad ATD'_i = \left\{ \begin{array}{l} (DIV_i + FTC_i) \times (1 - TXI_i) + QDI_i \times (1 - TXD_i) + \\ STG_i \times (1 - TXS_i) + MTG_i \times (1 - TXM_i) + LTG_i \times (1 - TXL_i) + \\ LMB_i \times (1 - TX5_i) + RCG_i \times (TCORP_i - TXL_i) + \\ EXD_i + ROC_i \end{array} \right\}$$

This formula applies the relevant tax rates for day i to each different type of distribution. It reduces the full distribution by the amount of tax applicable to each per-share distribution. Neither tax-exempt dividends (EXD_i) nor return of capital (ROC_i) are subject to tax, so those distributions are not adjusted and the full amount is added to ATD'_i .

For example, if a fund had a \$1.20 long-term capital gain (taxed at 15%) and a \$0.30 tax-exempt dividend (taxed at 0%) on day i, ATD'_i would be \$1.32.

$$ATD_i = \$1.20 \times (1 - 0.15) + \$0.30 = \$1.32$$

⁷ This fee is different than the fund's expense ratio. This fee represents account fees above and beyond any fund management fees, such as a brokerage account fee.

Periodic Per-Share Fee

Most periodic fees are expressed as a percentage of total assets. This account-level fee, F_p , is converted into a per-share fee, FEE_i . The periodic fee is not charged at the start of the investment period.

F_p = periodic per-account fee charged to the total account value

For example, if the account charges 25 basis points annually, and the fee is applied monthly, $F_p = 0.0025/12$. This fee will be taken from the investment periodically based on the agreement between the investor and the fund company.

The following formulas determine the per-share fee at any given point in time. The periodic per-account fee is multiplied by a price-per-share that has been adjusted for the initial front load and any additional distributions. The adjusted price-per-share represents the account value-per-share on day i .

[3] For $i = 0$ (the fund did not pay any distributions up to and including day i), the adjusted price-per-share reflects only the initial front load.

$$\underbrace{FEE_i}_{\text{per-share fee}} = F_p \times \underbrace{P_i \times (1 - FL)}_{\text{Adjusted price per share}}$$

where

i = the cumulative count of fee or distribution events since the beginning of the time period

[4] For $i = 1$ (the fund paid one single distribution at day i , but no distributions prior to that time), the adjusted price-per-share reflects the initial front load and the distribution from day i .

$$FEE_i = F_p \times \underbrace{P_i \times (1 - FL) \times \left(1 + \frac{ATD'_i}{P_i}\right)}_{\text{Adjusted price per share}}$$

- [5] For $i > 1$ (the fund had multiple distributions and/or fee events prior to and including day i), the adjusted price-per-share reflects all such events.

$$FEE_i = F_p \times P_i \times (1 - FL) \times \left(1 + \frac{ATD'_i}{P_i}\right) \times \prod_{j=1}^{i-1} \left(1 + \frac{ATD_j}{P_j}\right)$$

where

j = another cumulative count of fee or distribution events since the beginning of the time period

Pre-Liquidation After-Tax Return

The pre-liquidation after-tax return reflects the sales charges from buying and selling a fund and the maximum federal tax rates on the distributions at the time the distributions are reinvested. It does not reflect the tax effects of the capital gains/losses incurred upon selling the fund (not liquidating for tax purposes⁸).

Since this version is pre-liquidation, there is no consideration of individual capital gains or tax basis.

[6]

$$ATR_{pre} = \frac{\left\{ P_e \times (1 - FL) \times (1 - RL) \times \prod_{i=1}^n \left(1 + \frac{ATD_i}{P_i} \right) - DL \times (1 - FL) \times \text{MIN}(P_b, P_e) \right\}}{P_b} - 1$$

where

n = number of distribution events in a holding period.

⁸ Pre-liquidation does not strictly mean that the hypothetical investor did not sell the fund. For load purposes, the calculation assumes that the investor sold the fund and paid any applicable deferred loads or redemption fees. For tax purposes, the same calculation assumes that the investor did not sell the fund and therefore was not subject to capital gains taxes on the price appreciation.

Post-Liquidation After-Tax Return

The post-liquidation after-tax return reflects the sales charges from buying and selling a fund, the maximum federal tax rates on the distributions at the time the distributions are reinvested, and the appropriate (short- and long-term) capital gain tax from selling the fund.

$$[7] \quad ATR_{post} = \frac{\left\{ P_e \times (1 - FL) \times (1 - RL) \times \prod_{i=1}^n \left(1 + \frac{ATD_i}{P_i} \right) - DL \times (1 - FL) \times \text{MIN}(P_b, P_e) - TCGT \right\}}{P_b} - 1$$

where

TCGT = a per-share representation of the total tax on capital gains/losses from the sale of the investment

The capital gains/losses from the sale of the security can be short-term (holding period less than 12 months) or long-term (holding period greater than 12 months). The post-liquidation methodology determines the number of shares acquired and the cost basis of those shares in order to calculate the gain/loss for both the short-term and long-term periods. Then, the net gains/losses are taxed at the appropriate short- or long-term tax rates.

Number of Shares Acquired

First, determine the number of shares at the end of the holding period and then break that into the long-term and short-term acquisitions. Assume that the investor started with one single share (minus any portion paid for front loads).

Total Shares =	total number of shares at the end of the holding period assuming all after-tax distributions are reinvested.
ST Shares =	shares accumulated in the last 12 months of the holding period
LT Shares =	shares accumulated prior to the last 12 months of the holding period
n =	number of distribution events in a holding period.
m =	number of distribution events in a holding period excluding the last 12 months. If the holding period is 12 months or less, m=0. This number is used to track the number of shares that are over 12 months old and the cost basis associated with those shares.

$$[8] \quad Total\ Shares = (1 - FL) \left\{ \prod_{i=1}^n \left(1 + \frac{ATD_i}{P_i} \right) \right\}$$

[9] If the holding period is 12 months or less
 $LT\ Shares = 0$

[10] If the holding period is longer than 12 months
 $LT\ Shares = (1 - FL) \left\{ \prod_{i=1}^m \left(1 + \frac{ATD_i}{P_i} \right) \right\}$

Determine the number of short-term shares.

$$[11] \quad ST\ Shares = Total\ Shares - LT\ Shares$$

Cost Basis for Investments Held for Less than 12 Months

Next, determine the cost basis of the investment.

ST Basis = basis accumulated in the last 12 months of the holding period

LT Basis = basis accumulated prior to the last 12 months of the holding period

If the holding period is 12 months or less:

[12] $LT\ Basis = 0$

[13] For $n = 0$ (the fund did not pay any distributions), the short-term basis is the same as the beginning price.

$$ST\ Basis = P_b$$

[14] For $n = 1$ (the fund paid one distribution), the short-term basis is the beginning price plus the after-tax distribution amount (after the adjustments for fees, loads and certain distributions).

$$ST\ Basis = P_b + (1 - FL)(ATD_1 + FEE_1 + (1 - TCORP_1) \times RCG_1 - ROC_1)$$

[15] For $n > 1$ (the fund paid multiple distributions), the short-term basis is the beginning price plus all the reinvested after-tax distributions (after the adjustments for fees, loads and certain distributions).

$$ST\ Basis = P_b + (1 - FL) \times \left\{ \begin{aligned} &ATD_1 + FEE_1 + (1 - TCORP_1) \times RCG_1 - ROC_1 + \\ &\sum_{i=2}^n \left[(ATD_i + FEE_i + (1 - TCORP_i) \times RCG_i - ROC_i) \times \prod_{j=1}^{i-1} \left(1 + \frac{ATD_j}{P_j} \right) \right] \end{aligned} \right\}$$

Cost Basis for Investments Held For More than 12 Months

If the holding period is longer than 12 months, split the calculation over two periods: short-term period (the last 12 months of the holding period) and long-term period (holding period minus the short-term period).

During the long-term period

$$[16] \quad ST \text{ Basis} = 0$$

[17] For $m = 0$ (the fund did not pay any long-term distributions prior to the last 12 months), the long-term basis is the same as the beginning price.

$$LT \text{ Basis} = P_b$$

[18] For $m = 1$ (the fund paid one long-term distribution prior to the last 12 months), the short-term basis is the beginning price plus the after-tax distribution (after the adjustments for fees, loads and certain distributions).

$$LT \text{ Basis} = P_b + (1 - FL)(ATD_1 + FEE_1 + (1 - TCORP_1) \times RCG_1 - ROC_1)$$

[19] For $m > 1$ (the fund paid more than one long-term distribution prior to the last 12 months), the short-term basis is the beginning price plus all after-tax distributions (after the adjustments for fees, loads and certain distributions).

$$LT \text{ Basis} = P_b + (1 - FL) \times \left\{ ATD_1 + FEE_1 + (1 - TCORP_1) \times RCG_1 - ROC_1 + \sum_{i=2}^m \left[(ATD_i + FEE_i + (1 - TCORP_i) \times RCG_i - ROC_i) \times \prod_{j=1}^{i-1} \left(1 + \frac{ATD_j}{P_j} \right) \right] \right\}$$

During the short-term period

- [20] If $n = m$ (the fund did not pay any distributions during the last 12 months), the short-term basis is zero (no shares were purchased during that time).

$$ST \text{ Basis} = 0$$

- [21] If $n > m$ (the fund paid distributions during the last 12 months), the short-term basis is the sum of all after-tax distribution amounts (after adjustments for fees, loads, and certain distributions).

$$ST \text{ Basis} = (1 - FL) \times$$

$$\left\{ \sum_{i=m+1}^n \left[\left(ATD_i + FEE_i + (1 - TCORP_i) \times RCG_i - ROC_i \right) \times \prod_{j=1}^{i-1} \left(1 + \frac{ATD_j}{P_j} \right) + (ROC_i) \times \prod_{j=1}^m \left(1 + \frac{ATD_j}{P_j} \right) \right] \right\}$$

Lastly, return of capital distributions lower the investor's cost basis, because they return to the investor a portion of their original investment. If the fund paid return of capital distributions during the short-term period, these need to be subtracted from the long-term basis, as calculated in equations [17], [18] or [19].

$$[22] \quad LT \text{ Basis} = LT \text{ Basis} - (1 - FL) \left\{ \sum_{i=m+1}^n \left[(ROC_i) \times \prod_{j=1}^m \left(1 + \frac{ATD_j}{P_j} \right) \right] \right\}$$

Calculation of Realized Gain/Loss at Liquidation

The short- and long-term gains/losses per share are calculated by subtracting the respective cost basis from the ending value of the account (price × shares), less any applicable redemption fees or deferred loads.

If the holding period is longer than 12 months:

$$[23] \quad \text{Long Term Gain} = \text{LTG} = \left[\begin{array}{l} (1 - RL) \times \text{LT Shares} \times P_e - \\ DL \times (1 - FL) \times \text{MIN}(P_b, P_e) - \text{LT Basis} \end{array} \right]$$

$$[24] \quad \text{Short Term Gain} = \text{STG} = (1 - RL) \times \text{ST Shares} \times P_e - \text{ST Basis}$$

If the holding period is 12 months or less:

$$[25] \quad \text{Long Term Gain} = \text{LTG} = 0$$

$$[26] \quad \text{Short Term Gain} = \text{STG} = (1 - RL) \times \text{ST Shares} \times P_e - DL \times (1 - FL) \times \text{MIN}(P_b, P_e) - \text{ST Basis}$$

Calculation of Capital Gain Tax at Redemption

The total amount of capital gain taxes due at liquidation is a combination of both short and long-term gains/losses.

TXS_e = The short-term capital gain tax rate at the end of the holding period.

TXL_e = The long-term capital gain tax rate at the end of the holding period.

There are three different possible scenarios:

[27] Case 1: When both STG and LTG are positive or both are negative, the total gains/losses are the sum of the respective amounts multiplied by the respective tax rates.

$$TCGT = (TXS_e \times STG) + (TXL_e \times LTG)$$

[28] Case 2: When one (STG or LTG) is negative, the other is positive and $|STG| < |LTG|$, the long-term portion offsets the short-term portion. For example, if $STG = -2$ and $LTG = 5$, the long-term gain is reduced by the short-term loss and the remaining \$3 long-term gain is taxed at the long-term rate.

$$TCGT = TXL_e \times (LTG + STG)$$

[29] Case 3: When one (STG or LTG) is negative, the other is positive and $|STG| > |LTG|$, the short-term portion offsets the long-term portion. For example, if $STG = -6$ and $LTG = 1$, the short-term loss is reduced by the amount of the long-term gain and the remaining \$5 short-term loss is taxed at the short-term rate.

$$TCGT = TXS_e \times (LTG + STG)$$

This final amount of TCGT (the per-share tax on the gains/losses associated with the sale of the security) is incorporated into the formula for the post-liquidation after-tax return.

Conclusion

Morningstar calculates after-tax returns for open-end funds, closed-end funds, and exchange-traded funds using the guidelines set forth by the Securities and Exchange Commission. Investors can compare a fund's total returns, load-adjusted returns, and after-tax returns to understand how loads and taxes reduce their real returns.