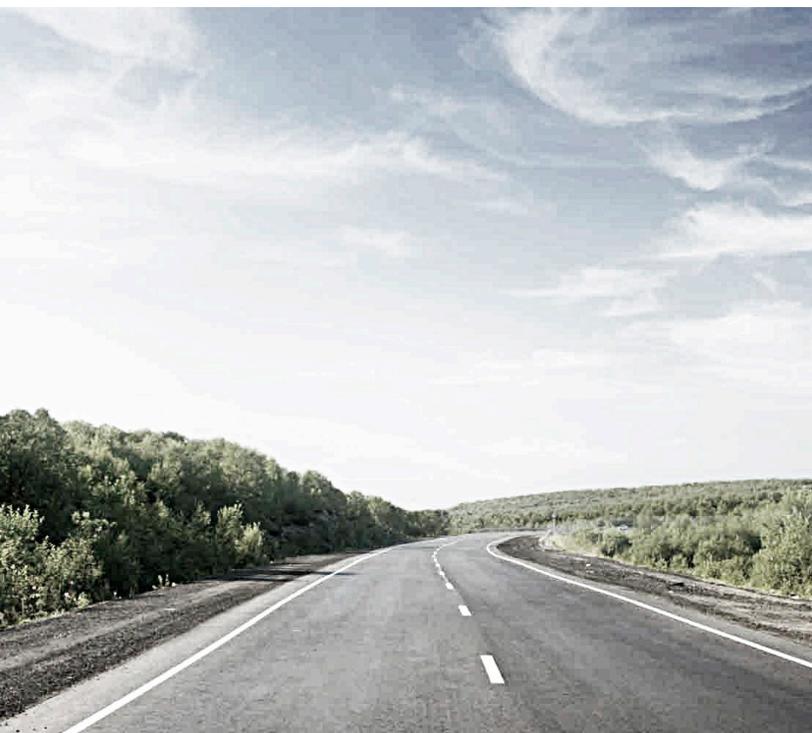




智投贏行



After-Tax Returns

How to estimate the impact of
taxes on ETF performance

Toronto, Ontario
September 2014

If you hold your ETF investments outside registered accounts, taxes can take a big bite out of your returns. Unfortunately, comparing the tax-efficiency of similar ETFs is difficult, because there is no standard method for estimating after-tax returns. In Canada, fund returns are reported on a pre-tax basis, but this can be misleading. As we will see, two funds with similar pre-tax returns can perform very differently when you account for the tax investors would pay on the distributions.

The goal of this paper is to emphasize the need for reliable after-tax return data so investors can make better decisions when selecting ETFs for their portfolios.

Background

In 2001, the Securities and Exchange Commission made it mandatory for U.S. fund companies to supply after-tax return calculations. This standardized reporting helped investors better understand the impact taxes have on the performance of their mutual funds and ETFs. For example, here's how the Vanguard Total Stock Market ETF (VTI) reports performance on its website:

After-tax returns—updated quarterly as of 06/30/2014 View values by: **Market Price** | Net asset value (NAV)

	1 Year	3 Year	5 Year	10 Year	Since Inception 05/24/2001
Total Stock Market ETF					
Returns before taxes	25.24%	16.49%	19.44%	8.42%	6.15%
Returns after taxes on distributions	24.67%	16.03%	19.02%	8.07%	5.79%
Returns after taxes on distributions and sale of fund shares	14.65%	12.97%	15.87%	6.88%	4.96%

Source: The Vanguard Group

Two years later, Amin Mawani, Moshe Milevsky, and Kamphol Panyagometh published a paper in the *Canadian Tax Journal* called [The Impact of Personal Income Taxes on Returns and Rankings of Canadian Equity Mutual Funds](#). The authors calculated the after-tax returns of 343 Canadian mutual funds with at least 10 years of performance data. They discovered that ranking funds based on before-tax and after-tax return produced very different results. For example, the best-performing fund before taxes dropped to 16th place when its after-tax return was compared to others. The authors also found that investors in the highest marginal tax bracket lost about 1.35 percentage points per year to taxes on fund distributions.

More than a decade later, Canadian funds are still not required to publish after-tax returns. Morningstar Canada, a fund data provider, does calculate after-tax returns for a number of mutual funds and ETFs, but only if the fund companies provide the necessary data, and not all of them do.

Methodology

In this paper we share our methodology for calculating after-tax returns, which we have applied to several popular Canadian ETFs. It will not satisfy all critics, but we believe it is a useful starting point, especially since there is no standardized methodology required by Canadian securities regulators.

Our method for calculating the pre-liquidation after-tax return for an ETF is adapted from the [Morningstar After-Tax Return Methodology](#), which was designed for U.S. investors. We have made changes where we felt they were appropriate for Canadian investors.

Pre- and Post-Liquidation After-Tax Returns

A **pre-liquidation** after-tax return accounts for taxes paid on distributions before the after-tax proceeds are reinvested in additional units. The investor has little control over these distributions, as they are the result of the fund manager's selections and trading.

A **post-liquidation** after-tax return includes the capital gain or loss realized when investors actually sell their shares. Because investors can usually choose when to sell their shares, post-liquidation after-tax returns will vary greatly among individuals.

Throughout this paper we have limited the discussion to pre-liquidation after-tax returns.

To make our calculations, we created a spreadsheet that allowed us to input the date, amount and character of each distribution paid by the ETF. We also entered the net asset value (NAV) per share on the ex-dividend date of each distribution. The spreadsheet then calculated the before-tax return (both reported and adjusted, as explained below), after-tax return, and tax cost ratio for the ETF over periods of one to 10 years.

We have made our **ZTYH 2013 After-Tax Rate of Return Calculator** for Canadian ETFs [available for download](#). The spreadsheet is protected so the formulas cannot be altered. However, we have included detailed descriptions of these formulas in the appendix.

How to use the spreadsheet

To help you understand and use our downloadable spreadsheet, we'll work through a calculation using the [iShares Core S&P/TSX Composite High Dividend Index ETF \(XEI\)](#).

1. Note the ex-dividend date of each distribution.

Start by visiting the ETF's web page and clicking the "Distributions" tab to view the dates and amounts of each distribution. Record the ex-dividend date for each distribution in 2013, as you will need to enter these into the spreadsheet.

2013 EX-DIVIDEND DATES: XEI

Ex-Date ▼	Payable Date ⓘ	Record Date	Cash Amount	Reinvested ⓘ	Total Distribution ⓘ
Dec 27, 2013	Jan 6, 2014	Dec 31, 2013	0.08000	0.44220	\$0.52220
Nov 22, 2013	Nov 29, 2013	Nov 26, 2013	0.08211	0.00000	\$0.08211
Oct 24, 2013	Oct 31, 2013	Oct 28, 2013	0.08211	0.00000	\$0.08211
Sep 18, 2013	Sep 30, 2013	Sep 20, 2013	0.07488	0.00000	\$0.07488
Aug 23, 2013	Aug 30, 2013	Aug 27, 2013	0.07488	0.00000	\$0.07488
Jul 24, 2013	Jul 31, 2013	Jul 26, 2013	0.07488	0.00000	\$0.07488
Jun 19, 2013	Jun 28, 2013	Jun 21, 2013	0.08116	0.00000	\$0.08116
May 24, 2013	May 31, 2013	May 28, 2013	0.08116	0.00000	\$0.08116
Apr 23, 2013	Apr 30, 2013	Apr 25, 2013	0.08116	0.00000	\$0.08116
Mar 21, 2013	Mar 28, 2013	Mar 25, 2013	0.08152	0.00000	\$0.08152
Feb 21, 2013	Feb 28, 2013	Feb 25, 2013	0.08152	0.00000	\$0.08152
Jan 24, 2013	Jan 31, 2013	Jan 28, 2013	0.08152	0.00000	\$0.08152

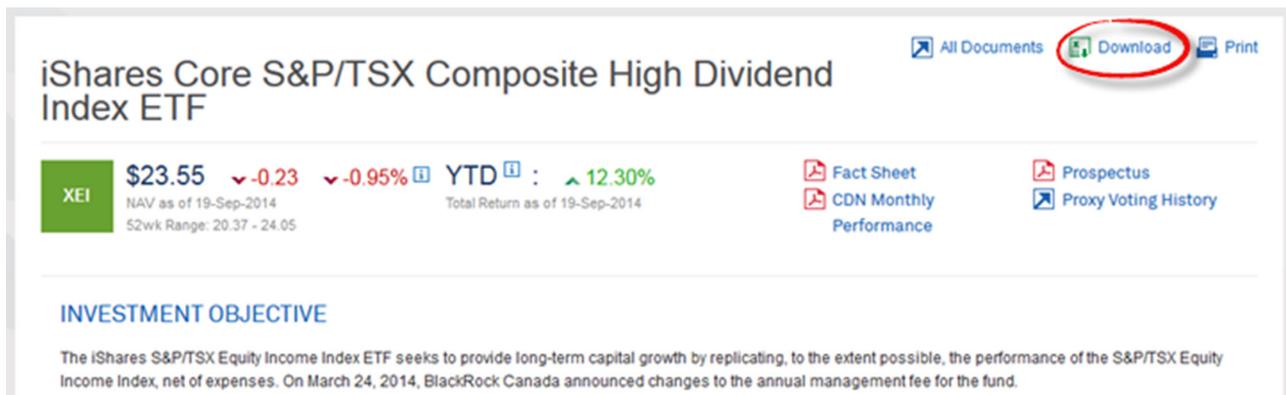
Source: BlackRock Canada

The spreadsheet assumes all distributions are reinvested on the ex-dividend date. In reality an investor would not be able to reinvest the distributions until the payment date; however, most before-tax performance calculations assume dividends are reinvested on the ex-dividend date, so this allows our before and after-tax comparisons to remain consistent.

Also, payment dates may fall in the month following the ex-dividend date, which can lead to confusion when calculating the after-tax rate of return over a specific period using our spreadsheet. For instance, as you can see in the above table, many iShares ETFs had year-end distributions in 2013 that were not paid until January 6, 2014.

2. Look up the ETF's net asset value (NAV) per share on each ex-dividend date on the last day of each year.

An ETF's net asset value per share at the close of each trading day is available on the fund's web page. These historical prices can be downloaded as an Excel file. (After downloading the spreadsheet, click the "Historical" tab to view the correct worksheet.)



iShares Core S&P/TSX Composite High Dividend Index ETF

All Documents Download Print

XEI \$23.55 ▼-0.23 ▼-0.95% YTD : ▲12.30%
NAV as of 19-Sep-2014 Total Return as of 19-Sep-2014
52wk Range: 20.37 - 24.05

Fact Sheet Prospectus
CDN Monthly Performance Proxy Voting History

INVESTMENT OBJECTIVE

The iShares S&P/TSX Equity Income Index ETF seeks to provide long-term capital growth by replicating, to the extent possible, the performance of the S&P/TSX Equity Income Index, net of expenses. On March 24, 2014, BlackRock Canada announced changes to the annual management fee for the fund.

Source: BlackRock Canada

For each ex-dividend date you have collected, look up the historical price per share. Also collect each year-end NAV surrounding the period you will be analyzing. In our example, we would need to collect 12 ex-dividend date NAVs from 2013 as well as two year-end NAVs: one for December 30, 2012 and the other for December 31, 2013.

3. Collect all the distribution data for the ETF.

We created columns on our spreadsheet for each type of distribution an ETF might pay: Canadian dividends (eligible and non-eligible), other income (including interest and income from real estate investment trusts), foreign income, return of capital and capital gains. We also included columns for foreign tax paid (typically withholding tax on dividends) and reinvested distributions.

You can obtain this information from the CDS Innovations [Tax Breakdown Posting service](#). For a complete description of this service, see our earlier white paper: [As Easy as ACB: Understanding and tracking your adjusted cost base with ETFs](#).

We recommend you print the **Statement of Trust Income Allocations and Designations** report for each tax year in order to input the numbers into our spreadsheet.

2013 STATEMENT OF TRUST INCOME ALLOCATIONS AND DESIGNATIONS: XEI

Statement of Trust Income Allocations and Designations																
Select: <input checked="" type="checkbox"/> T3 <input type="checkbox"/> R16		<input type="checkbox"/> AMENDED POSTING		<input type="checkbox"/> SUBSCRIPTION RECEIPTS												
TAXATION YEAR: 2013		Preparer information:				CONTACT NAME: Raw Chelliah		SYMBOL: XEI								
TRUST NAME: iShares S&P/TSX Equity Income Index Fund		DATE PREPARED: 2014/02/05				WEBSITE: www2.blackrock.com/ca		1) CORPORATE ACTIONS								
ADDRESS (1): 161 Bay Street		PHONE: 416-643-4025				FAX: 416-643-4049		2) WAS THERE ANY U.S. SOURCE INCOME DISTRIBUTED IN REPORTING TAX YEAR?: No								
ADDRESS (2): Suite 2500		E-MAIL: raw.chelliah@blackrock.com						3) IS CAPITAL GAINS (BOX 21(A) DISTRIBUTION NR TAXABLE?: No								
CITY: Toronto								4) IS ASSESSABLE DISTRIBUTIONS (ROC BOX 42(M) NR TAXABLE?: No								
PROVINCE: ON																
COUNTRY CODE: CAN																
POSTAL CODE: M5J 2S1																
TIMM: T31108027																
CUSIP#: 46431L113																
QUEBEC TAX ID:																
		CALCULATION METHOD: RATE														
		PER CENT - ALLOCATION MUST ADD TO 100														
		RATE - ALLOCATION TOTAL MUST ADD TO TOTAL INCOME (\$) PER UNIT BEING ALLOCATED														
T3 Box No.	R16 Box No.	Total Distribution (\$)	Distribution 1	Distribution 2	Distribution 3	Distribution 4	Distribution 5	Distribution 6	Distribution 7	Distribution 8	Distribution 9	Distribution 10	Distribution 11	Distribution 12	Distribution 13	Distribution 14
		2013/01/28	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2013/02/28	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2013/03/28	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2013/04/28	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2013/05/28	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2013/06/28	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2013/07/31	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2013/08/27	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2013/09/20	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2013/10/28	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2013/11/26	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2013/12/31	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		
		2014/01/08	0.08152	0.08152	0.08152	0.08116	0.08116	0.08116	0.07488	0.07488	0.07488	0.08211	0.08211	0.52220		

ZTYH 2013 AFTER-TAX RATE OF RETURN CALCULATOR: XEI

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	U	W	Y
	智投贏行 NAV				Canadian Dividends CDV _t	Eligible Dividends EDV _t	Non Eligible Dividends NDV _t	Other Income INC _t	Foreign Income FIN _t	Foreign Tax Paid FTP _t	Return of Capital ROC _t	Capital Gains CAP _t	Reinvested Distribution RDS _t	Total Distribution	(1+ BTD /P) _t Reported	(1+ BTD /P) _t Adjusted	(1+ ATD /P) _t
119	December	31	2012	19.64	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000			
120	January	24	2013	20.40		0.07578					0.00498	0.00076			1.00400	1.00400	1.00265
121	February	21	2013	20.15		0.07578					0.00498	0.00076			1.00405	1.00405	1.00268
122	March	21	2013	20.33		0.07578					0.00498	0.00076			1.00401	1.00401	1.00266
123	April	23	2013	19.86		0.07545					0.00496	0.00075			1.00409	1.00409	1.00271
124	May	24	2013	20.70		0.07545					0.00496	0.00075			1.00392	1.00392	1.00260
125	June	19	2013	19.81		0.07545					0.00496	0.00075			1.00410	1.00410	1.00271
126	July	24	2013	20.61		0.06960					0.00458	0.00070			1.00363	1.00363	1.00241
127	August	23	2013	20.42		0.06960					0.00458	0.00070			1.00367	1.00367	1.00243
128	September	18	2013	20.65		0.06960					0.00458	0.00070			1.00363	1.00363	1.00240
129	October	24	2013	21.24		0.07633					0.00502	0.00076			1.00387	1.00387	1.00256
130	November	22	2013	21.47		0.07633					0.00502	0.00076			1.00382	1.00382	1.00253
131	December	27	2013	21.52		0.07437					0.00489	0.44294	0.44220		1.00372	1.00372	0.99733
132	December	31	2013	21.58	0.00000	0.88952	0.00000	0.00000	0.00000	0.00000	0.05849	0.45109	0.44220	1.39910			

Time Period	Tax Cost Ratio	Before-Tax Return Reported	Before-Tax Return Adjusted	After-Tax Return
10-Year	N/A	N/A	N/A	N/A
9-Year	N/A	N/A	N/A	N/A
8-Year	N/A	N/A	N/A	N/A
7-Year	N/A	N/A	N/A	N/A
6-Year	N/A	N/A	N/A	N/A
5-Year	N/A	N/A	N/A	N/A
4-Year	N/A	N/A	N/A	N/A
3-Year	N/A	N/A	N/A	N/A
2-Year	N/A	N/A	N/A	N/A
1-Year	2.06%	15.10%	15.10%	12.73%

Sources: BlackRock Canada, CDS Innovations Inc.

The spreadsheet will calculate the total annual distributions of each type. You may find it helpful to compare these totals to the annual summary on the ETF's website. If the totals don't match, go back and make sure you haven't mistyped something.

Year ▼	Total Distribution per Unit for Tax Purposes	Eligible Dividends	Capital Gains	Return of Capital	Foreign Income	Foreign Tax Paid
2013	1.39910	0.88952	0.45109	0.05849	-	-
2012	0.92470	0.70701	0.06302	0.15467	-	-
2011	0.56672	0.40065	0.04342	0.12265	-	-

Source: BlackRock Canada

Understanding the Tax Cost Ratio

The simplest way to measure the tax-efficiency of an ETF is to divide the after-tax return by the before-tax return. This will produce its "tax-efficiency ratio," a number between 0 and 1 indicating the proportion of the before-tax return the investor gets to keep.

For example, in 2013 the iShares U.S. High Yield Bond Index ETF (CAD-Hedged) (XHY) had an after-tax return of 3.74% and a before-tax return of 6.85%, resulting in a tax-efficiency ratio of 0.546. This means the investor kept 54.6% of the before-tax return and lost 45.4% to taxes.

Unfortunately, if the fund has a negative before-tax return, the tax-efficiency ratio would not make any sense. In 2013, for example, the iShares Canadian Universe Bond Index ETF (XBB) had an after-tax return of -3.10% and a before tax return of -1.47%, resulting in a tax-efficiency ratio of +2.11 or +211%, which is obviously incorrect.

A different measure, the [tax cost ratio](#), was popularized by Morningstar as a way to measure the proportion of a fund's annualized return that is lost to taxes on distributions. It produces a useful value whether the returns are positive or negative. Where ATR is the after-tax return and BTR is the before-tax return, the equation for the tax cost ratio is

$$\text{Tax Cost Ratio} = 1 - \left[\frac{(1 + \text{ATR})}{(1 + \text{BTR})} \right]$$

A taxable investor who is comparing two similar funds that have the same before-tax return would prefer the fund with the lower tax cost ratio.

Note, however, that the tax cost ratio can be distorted by differences in management fees and unrecoverable foreign withholding taxes. For a full explanation, see the Appendices.

Comparing ETFs on an After-Tax Basis

Calculating after-tax returns allows you to compare two or more ETFs with similar before-tax returns and investment holdings. Sometimes this produces surprising results.

In our sample calculation we saw that XEI had a before-tax return of 15.10% in 2013. The [iShares Canadian Value Index ETF \(XCV\)](#) performed almost identically that year with a before tax-return of 15.07%. These two ETFs also have similar holdings.

Their after-tax returns, however, were significantly different: XCV had an after-tax return of 13.80% and a tax cost ratio of 1.10%. XEI had an after-tax return of 12.73%, with a tax cost ratio of 2.06%. (This was largely due to the realization of significant capital gains by XEI during 2013.)

To be fair, these are only one-year figures: a longer measurement period should be used for these types of comparisons.

ZTYH 2013 AFTER-TAX RATE OF RETURN CALCULATOR: XCV

Sources: BlackRock Canada, CDS Innovations Inc.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	U	W	Y
	智投贏行	NAV	Canadian Dividends CDV _t	Eligible Dividends EDV _t	Non Eligible Dividends NDV _t	Other Income INC _t	Foreign Income FIN _t	Foreign Tax Paid FTP _t	Return of Capital ROC _t	Capital Gains CAP _t	Reinvested Distribution RDS _t	Total Distribution	(1+BTD _t /P _t) Reported	(1+BTD _t /P _t) Adjusted	(1+ATD _t /P _t)		
119	December	31	2012	20.47	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000				
120	January		2013										1.00000	1.00000	1.00000		
121	February		2013										1.00000	1.00000	1.00000		
122	March	21	2013	20.90		0.21376							1.01023	1.01023	1.00654		
123	April		2013										1.00000	1.00000	1.00000		
124	May		2013										1.00000	1.00000	1.00000		
125	June	19	2013	20.12		0.17632							1.00876	1.00876	1.00560		
126	July		2013										1.00000	1.00000	1.00000		
127	August		2013										1.00000	1.00000	1.00000		
128	September	18	2013	21.61		0.18166							1.00841	1.00841	1.00537		
129	October		2013										1.00000	1.00000	1.00000		
130	November		2013										1.00000	1.00000	1.00000		
131	December	27	2013	22.80		0.08071							1.00354	1.00354	1.00226		
132	December	31	2013	22.84	0.00000	0.65245	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.65245				
133																	
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Time Period	Tax Cost Ratio	Before-Tax Return Reported	Before-Tax Return Adjusted	After-Tax Return
10-Year	N/A	N/A	N/A	N/A
9-Year	N/A	N/A	N/A	N/A
8-Year	N/A	N/A	N/A	N/A
7-Year	N/A	N/A	N/A	N/A
6-Year	N/A	N/A	N/A	N/A
5-Year	N/A	N/A	N/A	N/A
4-Year	N/A	N/A	N/A	N/A
3-Year	N/A	N/A	N/A	N/A
2-Year	N/A	N/A	N/A	N/A
1-Year	1.10%	15.07%	15.07%	13.80%

Comparing the tax cost ratio of funds in different asset classes can also help investors make better [asset location](#) decisions. For example, the [iShares Canadian Universe Bond Index ETF \(XBB\)](#) had a 10-year tax cost ratio of **2.01%**, nearly twice that of the [iShares Core S&P/TSX Capped Composite Index ETF \(XIC\)](#), which came in at around **1.02%**.

In the tables below we've included the after-tax returns and tax cost ratios of ETFs in 13 different asset classes.

After-Tax Returns and Tax Cost Ratios:

All periods ending December 31, 2013

ISHARES CANADIAN SHORT TERM BOND INDEX ETF (XSB)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	1.47%	2.54%	3.03%	3.95%
After-Tax Return	0.12%	1.06%	1.42%	2.07%
TAX COST RATIO	1.33%	1.44%	1.56%	1.81%

ISHARES CANADIAN UNIVERSE BOND INDEX ETF (XBB)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	-1.47%	3.62%	4.44%	4.94%
After-Tax Return	-3.10%	1.84%	2.51%	2.84%
TAX COST RATIO	1.66%	1.72%	1.84%	2.01%

ISHARES CANADIAN REAL RETURN BOND INDEX ETF (XRB)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	-13.41%	1.50%	5.71%	-
After-Tax Return	-15.62%	-0.51%	3.88%	-
TAX COST RATIO	2.55%	1.98%	1.73%	-

ISHARES U.S. HIGH YIELD BOND INDEX ETF (CAD-HEDGED) (XHY)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	6.85%	8.21%	-	-
After-Tax Return	3.74%	4.70%	-	-
TAX COST RATIO	2.92%	3.25%	-	-

ISHARES J.P. MORGAN USD EMERGING MARKETS BOND INDEX ETF (CAD-HEDGED) (XEB)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	-7.48%	-	-	-
After-Tax Return	-9.48%	-	-	-
TAX COST RATIO	2.15%	-	-	-

ISHARES S&P/TSX CANADIAN PREFERRED SHARE INDEX ETF (CPD)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	-3.03%	2.29%	7.57%	-
After-Tax Return	-4.48%	0.79%	6.05%	-
TAX COST RATIO	1.49%	1.47%	1.41%	-

ISHARES CANADIAN SELECT DIVIDEND INDEX ETF (XDV)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	18.96%	10.23%	15.63%	-
After-Tax Return	17.11%	8.31%	13.92%	-
TAX COST RATIO	1.55%	1.75%	1.48%	-

ISHARES S&P/TSX CAPPED REIT INDEX ETF (XRE)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	-5.99%	9.72%	19.79%	9.61%
After-Tax Return	-8.56%	7.64%	17.84%	7.93%
TAX COST RATIO	2.72%	1.90%	1.63%	1.53%

ISHARES GLOBAL REAL ESTATE INDEX ETF (CGR)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	8.29%	9.86%	11.13%	-
After-Tax Return	7.03%	8.29%	9.29%	-
TAX COST RATIO	1.17%	1.42%	1.66%	-

ISHARES CORE S&P/TSX CAPPED COMPOSITE INDEX ETF (XIC)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	12.74%	3.14%	11.58%	7.93%
After-Tax Return	11.56%	2.22%	10.62%	6.82%
TAX COST RATIO	1.04%	0.89%	0.86%	1.02%

ISHARES CORE S&P 500 INDEX ETF (CAD-HEDGED) (XSP)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	32.91%	16.00%	16.98%	5.10%
After-Tax Return	31.74%	14.48%	15.50%	3.92%
TAX COST RATIO	0.88%	1.32%	1.26%	1.12%

ISHARES MSCI EAFE INDEX ETF (CAD-HEDGED) (XIN)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	25.58%	9.33%	10.21%	3.87%
After-Tax Return	23.94%	7.77%	8.70%	1.82%
TAX COST RATIO	1.31%	1.43%	1.37%	1.97%

ISHARES MSCI EMERGING MARKETS INDEX ETF (XEM)	1-YEAR RETURN	3-YEAR ANNUALIZED RETURN	5-YEAR ANNUALIZED RETURN	10-YEAR ANNUALIZED RETURN
Before-Tax Return	2.63%	-0.26%	-	-
After-Tax Return	1.56%	-1.18%	-	-
TAX COST RATIO	1.05%	0.92%	-	-

APPENDICES

Prices

In our after-tax return calculations, the price per share at is labeled as follows:

- P_e = the price per share (NAV) at the end of the holding period
 P_b = the price per share (NAV) at the beginning of the holding period
 P_i = the price per share (NAV) on the ex-dividend date

Our formulas for after-tax distribution accounts for the different tax rates that apply to the various types of investment income. We have labeled them as follows:

Investment Income

- INC_i = taxable interest income distributed on day i (\$ per share): **T3 Box No. 26**
 FIN_i = taxable foreign income distributed on day i (\$ per share): **T3 Box No. 25**
 CDV_i = taxable Canadian dividends distributed on day i (\$ per share): **T3 Box No. 23 (pre-2006)**
 EDV_i = taxable eligible dividends distributed on day i (\$ per share): **T3 Box No. 49 (post-2005)**
 NDV_i = taxable non-eligible dividends distributed on day i (\$ per share): **T3 Box No. 23 (post-2005)**
 CAP_i = capital gains distributed on day i (\$ per share): **T3 Box No. 21**
 ROC_i = return of capital distributed on day i (\$ per share): **T3 Box No. 42**
 RDS_i = reinvested distributions on day i (\$ per share): **Total non cash distribution per unit (\$)**
 FTP_i = foreign tax paid on distributions on day i (\$ per share): **T3 Box No. 34**

Tax Rates

- TXI_i = the maximum combined federal / provincial income tax rate at time i
 TXC_i = the maximum combined federal / provincial Canadian dividend income tax rate at time i
 TXE_i = the maximum combined federal / provincial eligible dividend income tax rate at time i
 TXN_i = the maximum combined federal / provincial non eligible dividend income tax rate at time i
 TXG_i = the maximum combined federal / provincial capital gain tax rate at time i

Equations

After-Tax Distribution Per Share:

$$\frac{(1 - TXI_i)}{(1 - TXC_i)} \frac{(1 - TXE_i)}{(1 - TXN_i)} (1 - TXG_i)$$

Pre-Liquidation After-Tax Return:

$$\left\{ - \prod (1 - \text{---}) \right\}$$

where

- n = number of distributions in the holding period

Tax Assumptions

We have assumed our hypothetical investor is taxed at the maximum combined federal/provincial rate during each tax year. For example, in 2004 residents of Newfoundland and Labrador paid the highest rate on all sources of investment income relative to residents of other provinces or territories. However, in 2013 Nova Scotians paid the highest taxes on all income except non-eligible dividends, where that honour went to residents of Manitoba.

It is unlikely any Canadian would pay the highest marginal tax rate on all sources of income in a year when these were split between two or more provinces. But this method allows investors to view a worst-case scenario for after-tax returns and compare it to their before-tax return. In practice, an investor's returns will generally fall somewhere between these two values.

MAXIMUM COMBINED FEDERAL / PROVINCIAL INCOME TAX RATES: 2004–2013

TAX RATES	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Income	48.64%	48.64%	48.64%	48.25%	48.25%	48.25%	48.25%	50.00%	50.00%	50.00%
Capital Gains	24.32%	24.32%	24.32%	24.13%	24.13%	24.13%	24.13%	25.00%	25.00%	25.00%
Eligible Dividends	-	-	32.52%	30.63%	29.69%	29.69%	30.68%	34.85%	36.06%	36.06%
Non-Eligible Dividends	-	-	37.32%	36.75%	37.40%	38.21%	39.66%	41.17%	41.17%	39.15%
Canadian Dividends	37.32%	37.32%	-	-	-	-	-	-	-	-

Source: Deloitte

PROVINCIAL SOURCE	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Income	NF	NF	NF	NS						
Capital Gains	NF	NF	NF	NS						
Eligible Dividends	-	-	NF	NF	QC	QC	QC	NS	NS	NS
Non-Eligible Dividends	-	-	NF	MB	MB	MB	PEI	PEI	PEI	MB
Canadian Dividends	NF	NF	-	-	-	-	-	-	-	-

Source: Deloitte

The Impact of Foreign Withholding Taxes

The **ZTYH 2013 After-Tax Rate of Return Calculator** generates two types of before-tax returns, which we have labeled "Reported" and "Adjusted." The difference between these figures comes about due to foreign withholding taxes.

Many countries impose a tax on dividends paid to foreign investors: for example, the U.S. government levies a 15% tax on dividends paid to Canadians. These taxes are withheld before the dividends are paid in cash.

In non-registered accounts, investors are subject to withholding taxes levied by the countries where the stocks are domiciled, whether that is the U.S. or an overseas market. We refer to this as **Level I** withholding tax.

When international stocks are held indirectly via a Canadian-listed ETF that holds a U.S.-listed ETF, investors may also be subject to what we've called **Level II** withholding tax. This is an additional 15% withheld by the US government before the U.S.-listed ETF pays the dividends to Canadian investors.

(For a full discussion, see our white paper, [Foreign Withholding Taxes: How to estimate the hidden tax drag on US and international equity index funds and ETFs.](#))

When ETFs report their before-tax returns, they presume these withholding taxes are lost. However, the final level of foreign withholding taxes (which is designated as foreign tax paid in box 34 of your T3 slip) is generally recoverable when the ETF is held in a taxable account. So we felt it was necessary to add this back before calculating the ETF's tax cost ratio.

In our calculations, we have adjusted the before-tax distribution per-share calculation (relative to what is posted on the ETF provider's websites) by adding the foreign tax paid (FTP) to each distribution before reinvesting it. The result is higher before-tax returns, as well as a higher tax cost ratio. The after-tax return remains unchanged.

Before-Tax Distribution Per-Share Adjusted:

Before-Tax Return Adjusted:

$$R = \left\{ - \prod (1 - \text{---}) \right\}$$

where

n = number of distributions in the holding period

For example, assume a U.S. equity ETF received gross dividends of 2%, of which 15% (or 0.3 percentage points) was withheld at source, resulting in net dividends of 1.7%. If the fund's net asset value also grew by 5%, the reported before-tax return would be 6.7%. Assuming a 50% tax rate on foreign income, the reported and adjusted amounts would differ as shown below (the after-tax return in both examples would be 6%).

EXAMPLE: IMPACT OF REPORTED FOREIGN TAX PAID ON THE TAX COST RATIO

	REPORTED	ADJUSTED
Foreign Income	2.00%	2.00%
<i>minus</i> Foreign Tax Paid Box 34 @ 15%	0.30%	0.00%
<i>equals</i> Net Foreign Income	1.70%	2.00%
<i>plus</i> Unrealized Capital Gains	5.00%	5.00%
<i>equals</i> Before-Tax Return	6.70%	7.00%
After-Tax Return*	6.00%	6.00%
Tax Cost Ratio	0.66%	0.93%

*After-Tax Return is calculated as 2.00% × (1 - 0.50) + 5.00% = 6.00%

Moreover, when a Canadian-domiciled ETF holds a U.S.-listed ETF of international or emerging markets stocks, another layer of unrecoverable foreign withholding tax will apply in a taxable account. Unfortunately, our before-tax return calculation adjustment does not account for this additional layer of foreign withholding taxes. The result is that the adjusted before-tax return still understates what the investor should actually receive. The actual tax cost ratio is also higher than the adjusted tax cost ratio.

In the example below, we've assumed a 3% dividend, a 4% unrealized capital gain, estimated and reported foreign withholding taxes of 7.5% and 15% respectively, as well as a 50% tax rate on foreign income. Our adjusted before-tax calculation leads to a better estimate of the tax cost ratio, but the calculation still underestimates the actual before-tax return and actual tax cost.

EXAMPLE: IMPACT OF UNREPORTED FOREIGN TAX PAID ON THE TAX COST RATIO

	REPORTED	ADJUSTED	ACTUAL
Foreign Income	3.00%	3.00%	3.00%
<i>minus</i> Foreign Tax Paid <i>estimated</i> @ 7.5%	0.23%	0.23%	
<i>equals</i> Net Foreign Income <i>estimated</i>	2.78%	2.78%	
<i>minus</i> Foreign Tax Paid Box 34 @ 15%	0.42%	0.00%	
<i>equals</i> Net Foreign Income Box 34	2.36%	2.78%	
<i>plus</i> Unrealized Capital Gains	4.00%	4.00%	4.00%
<i>equals</i> Before-Tax Return	6.36%	6.78%	7.00%
After-Tax Return*	5.39%	5.39%	5.39%
Tax Cost Ratio	0.91%	1.30%	1.51%

*After-Tax Return is calculated as $2.78\% \times (1 - 0.50) + 4.00\% = 5.39\%$

The Impact of Fees on the Tax Cost Ratio

ETF managers use the fund's income to pay fees and expenses and then pass on what's left to unitholders. That means funds with higher management expense ratios (MERs) typically make smaller distributions, which results in a lower amount of tax payable by the investor.

As a result, when two otherwise comparable funds have different fees, the one with the higher MER may have a lower tax cost ratio. Although low taxes are desirable, most rational investors would prefer not to pay less in taxes because they paid more in fees.

We've illustrated this for a pair of funds with similar investment objectives, gross dividend yields of 3%, unrealized gains of 4%, and MERs of 0.30% and 0.80% respectively. We've assumed no foreign withholding taxes and a personal marginal tax rate of 50%.

Note that the higher-MER fund appears to have an advantage with a lower tax cost ratio. However, the after-tax return (which is more important) is higher for the lower-MER fund.

	LOWER MER FUND	HIGHER MER FUND
Foreign Income	3.00%	3.00%
<i>minus</i> Management Expense Ratio (MER)	0.30%	0.80%
<i>equals</i> Net Foreign Income	2.70%	2.20%
<i>plus</i> Unrealized Capital Gains	4.00%	4.00%
<i>equals</i> Before-Tax Return	6.70%	6.20%
After-Tax Return*	5.35%	5.10%
Tax Cost Ratio	1.27%	1.04%

*After-Tax Returns are calculated as $2.70\% \times (1 - 0.50) + 4.00\% = 5.35\%$ and $2.20\% \times (1 - 0.50) + 4.00\% = 5.10\%$