

## The Impact of Personal Income Taxes on Returns and Rankings of Canadian Equity Mutual Funds

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## The IFID Centre

- The Individual Finance and Insurance Decisions (IFID) Centre is a non-profit organization located at the Fields Institute, on the campus of the University of Toronto.
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## Background

- This particular research project has been sponsored by AIC Limited, and we would like to thank Tim Cestnick for suggesting the 'problem'.
- The research report will be published in the *Canadian Tax Journal*.
- **Note:** This is joint research with Amin Mawani (Schulich) and Kam Panyagometh (IFID & Schulich).

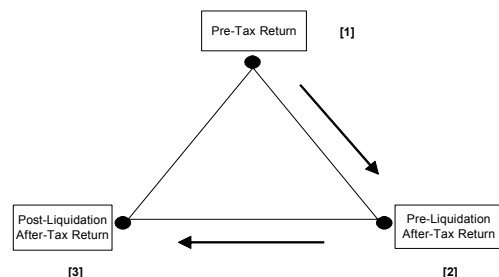
## Agenda

- **Question:** If taxable individual investors are selecting mutual funds based on their relative past-performance, are they looking at the proper ranking?
- **Answer:** Taxes scramble rankings.
- This morning I will try to provide you with the main insights (without requiring an advanced degree in statistics...)

## Main Issue:

- **Question:** How does an investor compute their true after-tax return?
- **Answer:** It depends on three facts:
  1. When did they buy the mutual fund?
  2. What is the history of their tax rate?
  3. Are they currently liquidating or holding?

Exhibit 3: Mutual Fund Return Relationship



### Exhibit 1 : Example of Annual After-tax Return Calculation

For a British Columbia resident investing \$10,000 on January 1, 2001 in a mutual fund that earns 9.01% pre-tax return during the calendar year.

	Distributions and Gains	(Taxes Due*)	After-Tax Return (pre-liquidated)	After-Tax Return (fully liquidated)
<i>Canadian Dividends</i>	\$70.25	$\$70.25 \times 0.360 = \$25.29$	\$44.96	\$44.96
<i>Ordinary Interest Income</i>	\$32.12	$\$32.12 \times 0.487 = \$15.54$	\$16.48	\$16.48
<i>Realized Capital Gains</i>	\$387.11	$\$387.11 \times 0.243 = \$94.07$	\$293.04	\$293.04
<i>Unrealized Capital Gains</i>	\$411.52	\$0	\$411.52	$\$411.52 \times (1 - 0.243) = \$311.52$
<b>Total Dollars</b>	<b>\$901.00</b>	<b>\$135.00</b>	<b>\$766.00</b>	<b>\$666.00</b>
<b>Total Return</b>	<b>9.01%</b>	<b>-1.35%</b>	<b>7.66%</b>	<b>6.66%</b>

\*The highest statutory marginal tax rate for a British Columbia resident in 2001 was 48.7% for interest income, 36% for dividend income (reflecting a gross-up and dividend tax credit), and 24.3% for capital gains (reflecting a 50% inclusion rate).

### Exhibit 2: Relationship between Fund Turnover and Accumulated Portfolio after 15 Years

Fraction of Capital Gains Realized each Year	Amount accumulated after 15 years
0%	\$63,527
10%	\$61,907
20%	\$60,340
30%	\$58,822
40%	\$57,354
50%	\$55,933
60%	\$54,558
70%	\$53,227
80%	\$51,940
90%	\$50,694
100%	\$49,488

Assuming a 15% annual rate of return and a 25% annual marginal tax rate on realized capital gains for the entire period.

## Actual Data...

- We are grateful to FundData and Morningstar for providing us with 10 years of historical NAV and distributions for all Canadian equity and balanced funds during the period 1992 – 2002.
- Numbers were reconciled against Globe & Mail annual mutual fund reports.
- **Note:** Discrepancies are numerous!

### Exhibit 4: Data Summary

	#funds	Mean	Median	StDev	Max	Min
Pre-Tax Return <sup>a</sup>	343	9.01%	9.10%	4.45%	21.56%	-16.16%
Pre-Liquidation After-Tax Return <sup>b</sup>	343	7.66%	7.81%	4.35%	18.84%	-16.77%
Post-Liquidation After-Tax Return <sup>c</sup>	343	6.66%	6.78%	3.90%	16.21%	-16.77%
Tax Loss to Distribution <sup>d</sup>	343	1.35%	1.25%	1.12%	7.13%	0.00%
Tax Loss to Liquidation <sup>d</sup>	343	1.00%	1.02%	0.62%	2.63%	0.00%
Tax Efficiency <sup>e</sup>	329	84.91%	86.75%	12.80%	100.00%	25.31%
Tax Overhang <sup>f</sup>	329	11.98%	12.93%	5.37%	22.95%	0.00%

a: Based on compound annual returns from 343 funds over the period Dec 31, 1991 to Dec 31, 2001

b: Numbers calculated using the highest tax rates in Canada (excluding Quebec for 1992 to 1997)

c: (Pre-Tax Return) - (Pre-Liquidation After-Tax Return)

d: (Pre-Liquidation After-Tax Return) - (Post-Liquidation After-Tax Return)

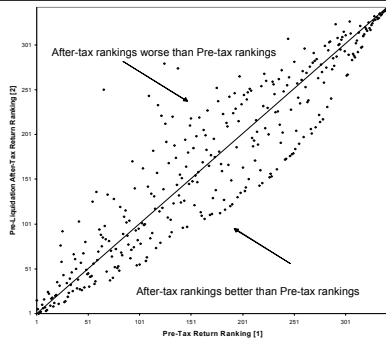
e:  $1 - [(\text{Tax Loss to Distributions}) / (\text{Pre-Tax Return})]$

Note: when calculating Tax Efficiency, funds with negative returns are excluded.

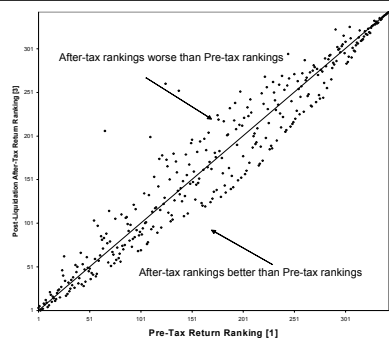
f:  $(\text{Tax Loss to Liquidation}) / (\text{Pre-Liquidation After-Tax Return})$

Note: when calculating Tax Overhang, funds with negative returns are excluded.

### Exhibit 5: Pre-Tax Return [1] vs. Pre-Liquidation After-Tax Return [2] Rankings



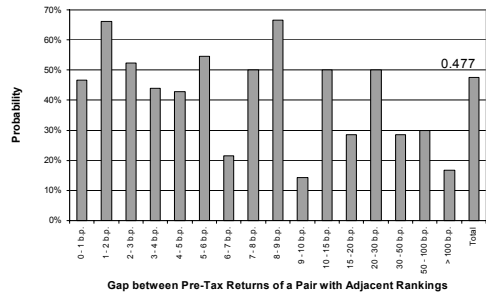
### Exhibit 6: Pre-Tax Return [1] vs. Post-Liquidation After-Tax Return [3] Rankings



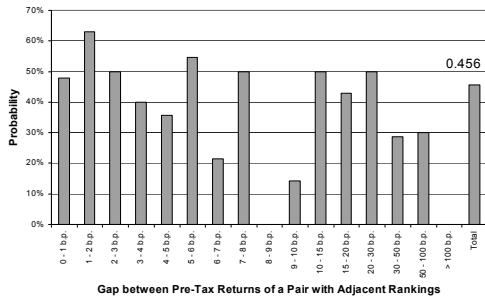
## Explanation

- If income taxes did not impact relative rankings, the dots would all appear in the line, since the pre and post tax position would be the same.
- The farther the dots from the line, the greater the scrambling impact.
- It is rare for bottom-quartile funds to become top-quartile funds and vice versa.

**Exhibit 7: Probability of Reversal in Ranking Based on Pre-Liquidation After-Tax Returns: Comparing [1] vs. [2]**



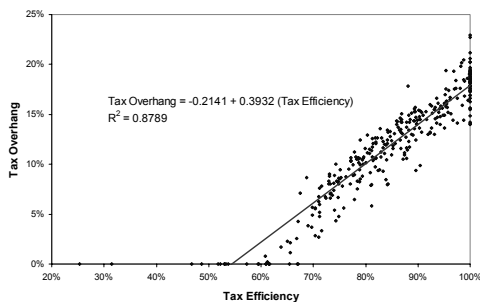
**Exhibit 8: Probability of Reversal in Ranking Based on Post-Liquidation After-Tax Returns: Comparing [1] vs. [3]**



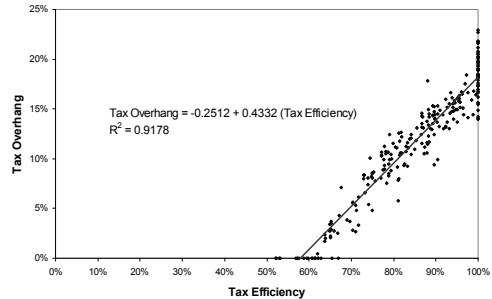
## Explanation

- If Fund A was better than Fund B on a pre-tax basis, what is the probability that Fund A was worse than Fund B on an after-tax basis?
- We label this the 'odds of reversal' phenomena for adjacent funds.
- Result: If the relative returns are close, there is a 50/50 chance of reversal.

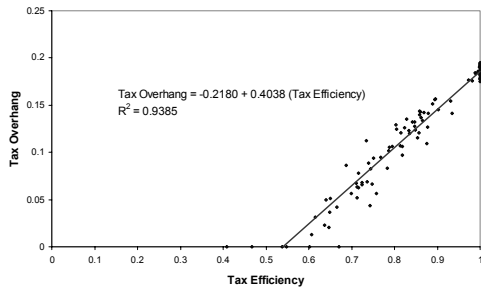
**Exhibit 9: Equity and Balanced Funds: Relationship Between Tax Efficiency and Tax Overhang**



**Exhibit 9A: Equity Funds Only: Relationship Between Tax Efficiency and Tax Overhang**



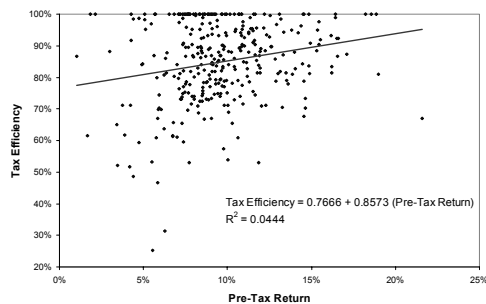
**Exhibit 9B: Balanced Funds Only:  
Relationship Between Tax Efficiency and Tax Overhang**



## Explanation

- As you might suspect, tax efficient funds -- defined on a pre-liquidation basis -- have a high tax overhang as well.
- Thus, you face two risks.
- First. If you are forced to sell, the after-tax return will drop more than average.
- Second. 'Pregnant' funds can give birth pre-maturely.

**Exhibit 10: Equity and Balanced Funds:  
Relationship Between Pre-Tax Return and Tax Efficiency**



## Explanation

- There is a weak – but positive – relationship between pre-tax investment returns and post-tax investment returns.
- Good managers (in terms of performance) are aware of income tax effects.
- Furthermore, tax efficiency can't save a lousy fund manager.
- Remember, the relationship is weak.

## Conclusion

- Taxes scramble fund rankings.
- The after-tax algorithm is straightforward.
- The inputs are investor & time specific.
- We believe our pre-liquidation and after-liquidation numbers are valuable since they provide worst case scenarios.
- Fund managers can control taxes more than they can control the market.

## Final Caveats

- There is (probably) no investor in Canada to whom these exact historical numbers applied.
- Data quality is a big concern.
- Short-term (i.e. monthly or quarterly) tax efficiency measures are meaningless and can be easily manipulated.
- The next important step is to create after-tax benchmarks to measure relative returns and value added.
- Although this might not appear relevant to those holding mutual funds inside tax shelters, there might be some gains from swapping.