

Tax-Aware Optimized Back-Testing Using the Northfield Optimizer and Risk Models

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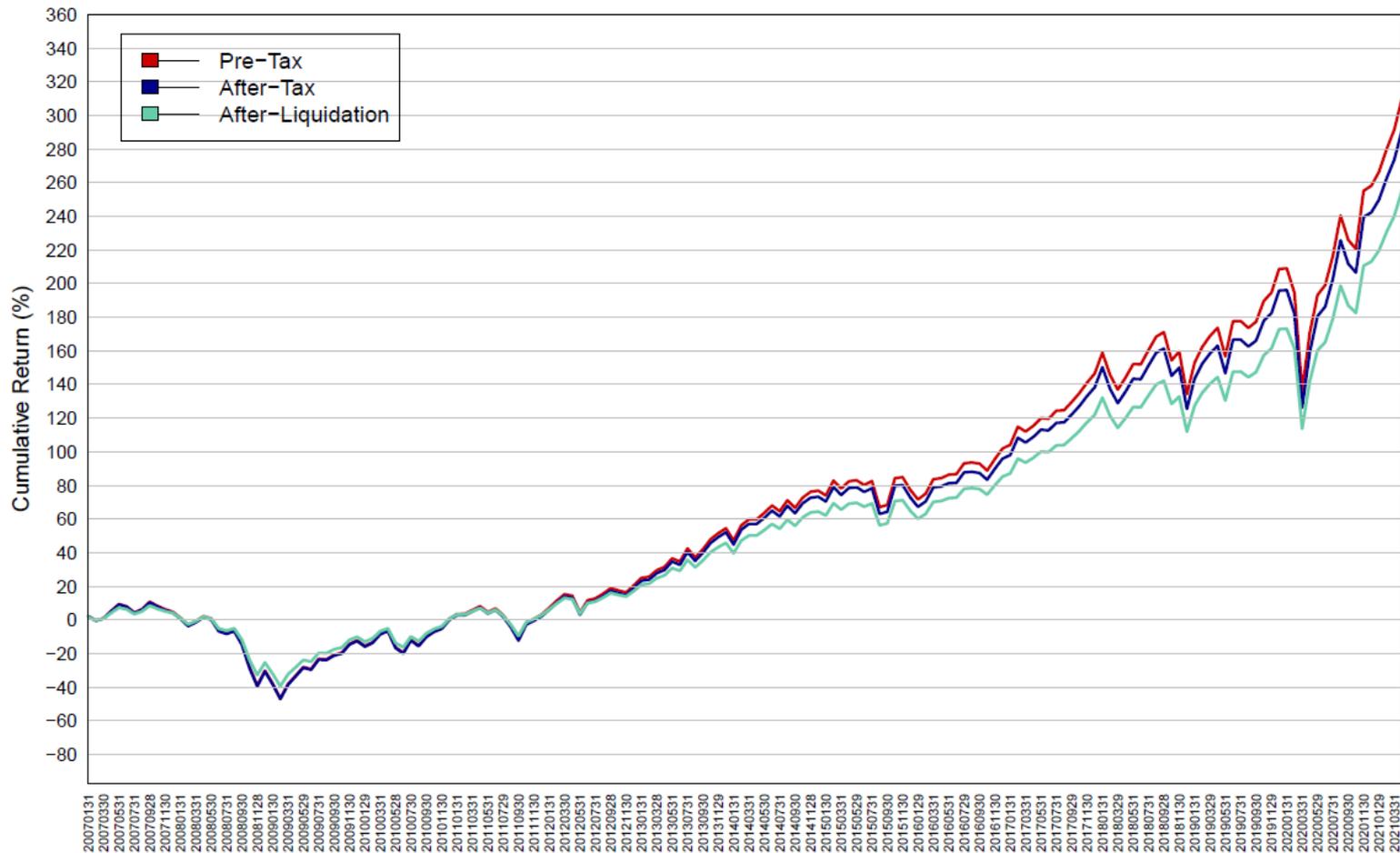
Introduction

- Luke Smith and Mayukh Mukherjee were colleagues at a tax-aware, systematic, US equity market-neutral hedge fund from 2013 to 2020.
- We began using the Northfield optimizer and risk models in 2016. The fund gained more than 30% from 2016 to 2019, but the partners K-1s showed realized capital losses each year.
- We developed a back-testing system to perform historical simulations of our strategy and to evaluate potential improvements.
- When the fund closed in 2020, we decided to offer a back-testing service to other users of the Northfield optimizer.
- The original system was highly customized for our specific strategy and backed by monthly data since 2006 from FactSet. We went back to the drawing board and rebuilt the system to be more generic, flexible, and robust using point-in-time daily data since 1998 from an alternative provider.
- In this presentation, we will demonstrate our back-testing capabilities with a real-life example of “tax alpha” relative to an S&P 500 index fund for a middle-income investor with a modest portfolio.

Tax Alpha

- The motivation for our example is the recent proliferation of tax-sensitive portfolio management from the realm of high-net-worth investors and their well-paid advisors to retail “mom and pop” investors with a few thousand dollars in accounts at robo-advisors.
- This spread was enabled by the advent of commission-free trading and the ability to hold fractional shares.
- Rather than holding an S&P 500 index fund or ETF, it is now practical for anyone to purchase all 500 stocks (known as “Direct Indexing”) and seek to outperform the index on an after-tax basis (i.e. generate “Tax Alpha”) by employing the methods that we will demonstrate.
- We will attempt to quantify the amount of tax alpha that is achievable by such an investor.

S&P 500 - \$100,000 Investment, 24% & 15% Tax Rates



After-Tax Returns

- Pre-Tax Return = $(\text{Ending Value} + \text{Dividends}) / \text{Starting Value} - 1$
- Pre-Liquidation After-Tax Return =
 $(\text{Ending Value} + \text{Dividends} - \text{Taxes on Dividends and Realized Gains}) / \text{Starting Value} - 1$
- Post-Liquidation After-Tax Return =
 $(\text{Ending Value} + \text{Dividends} - \text{Taxes on Dividends and Realized Gains} - \text{Taxes on Unrealized Gains}) / \text{Starting Value} - 1$
- The Cumulative Pre-Liquidation After-Tax Return is reduced by the taxes due on any unrealized gains to produce the Cumulative Post-Liquidation After-Tax Return.
- Since a portfolio can only be liquidated once, the Post-Liquidation After-Tax Return only makes sense on a cumulative basis.

After-Tax Returns (continued)

- The Pre-Liquidation and Post-Liquidation After-Tax Returns provide upper and lower bounds on the portfolio's true After-Tax Return.
- The Pre-Liquidation After-Tax Return may overstate the true return because there may be future tax liabilities in the portfolio that are unaccounted for.
- The Post-Liquidation After-Tax Return may understate the true return because it assumes that complete liquidation occurs on the final date of the back-test. The portfolio may not be liquidated until much later and only gradually. In addition, the unrealized gains may never be taxed if the portfolio is donated to a charity or inherited by an heir.

Post-Liquidation After-Tax Return

- The Cumulative Post-Liquidation After-Tax Return can easily be derived from the Cumulative Pre-Liquidation After-Tax Return as follows:

Let EV be the value of the portfolio before liquidation

Let T be the taxes on realized gains at liquidation

$$(1 + \text{Cumulative Post-Liquidation After-Tax Return}) = \\ (1 + \text{Cumulative Pre-Liquidation After-Tax Return}) * [(EV - T) / EV]$$

- The terminal Cumulative Post-Liquidation After-Tax Return can easily be annualized just like any other cumulative return.
- The Cumulative Post-Liquidation After-Tax Return can be calculated at each point in time.
- Periodic returns can be derived from changes in the time series of cumulative returns.
- We work backwards from cumulative returns to periodic returns, not the reverse as is typical.

Capital Gains and Dividend Tax Review

- Short-term realized gains and unqualified dividends are taxed as regular income (i.e. at the investor's marginal income tax rate).
- Preferential rates are provided for realized long-term gains and qualified dividends.
- Realized gains are considered long-term if the position has been held for one year or more.
- Dividends are considered qualified if the stock is held for a 60-day window that includes the record date. In some cases, a dividend cannot be classified at the time it is received.
- Realized gains on short positions are always short-term.
- Wash sales (positions closed at a loss and reacquired within 30 days) are not allowed. The cost basis must be adjusted instead.
- Individuals with a modified adjusted income of \$200,000 or more (\$250,000 if married filing jointly) are subject to an additional 3.8% tax on investment income.
- Each taxpayer is allowed to report up to \$3,000 in realized losses each year. Whether long-term or short-term, this amounts to a deduction from regular income taxed at the same rate as short-term realized gains.

Capital Gains and Dividend Tax Review (continued)

- Long-term and short-term gains must be netted together each year. This means that if one is positive and the other is negative, the one with the larger absolute value is replaced by their sum and the one with the smaller absolute value is replaced by zero.
 - One cannot make \$170 by deducting \$1,000 of short-term losses at 40.8% (\$+408) while simultaneously paying taxes on \$1,000 of long-term gains at 23.8% (\$-238).
- Losses in excess of the \$3,000 allowance are carried over to the following year and added to realized gains for that year before the netting of short-term and long-term realized gains.
- The cost basis of a taxpayer's investments is "stepped-up" to their market value at death. This means that any unrealized gains are eliminated when the assets are inherited or donated to a charity.

2021 Tax Brackets and Rates

2021 Federal Income Tax Brackets and Rates

Rate	For Unmarried Individuals	For Married Individuals Filing Joint Returns	For Heads of Households
10%	\$0 to \$9,950	\$0 to \$19,900	\$0 to \$14,200
12%	\$9,951 to \$40,525	\$19,901 to \$81,050	\$14,201 to \$54,200
22%	\$40,526 to \$86,375	\$81,051 to \$172,750	\$54,201 to \$86,350
24%	\$86,376 to \$164,925	\$172,751 to \$329,850	\$86,351 to \$164,900
32%	\$164,926 to \$209,425	\$329,851 to \$418,850	\$164,901 to \$209,400
35%	\$209,426 to \$523,600	\$418,851 to \$628,300	\$209,401 to \$523,600
37%	\$523,601 or more	\$628,301 or more	\$523,601 or more

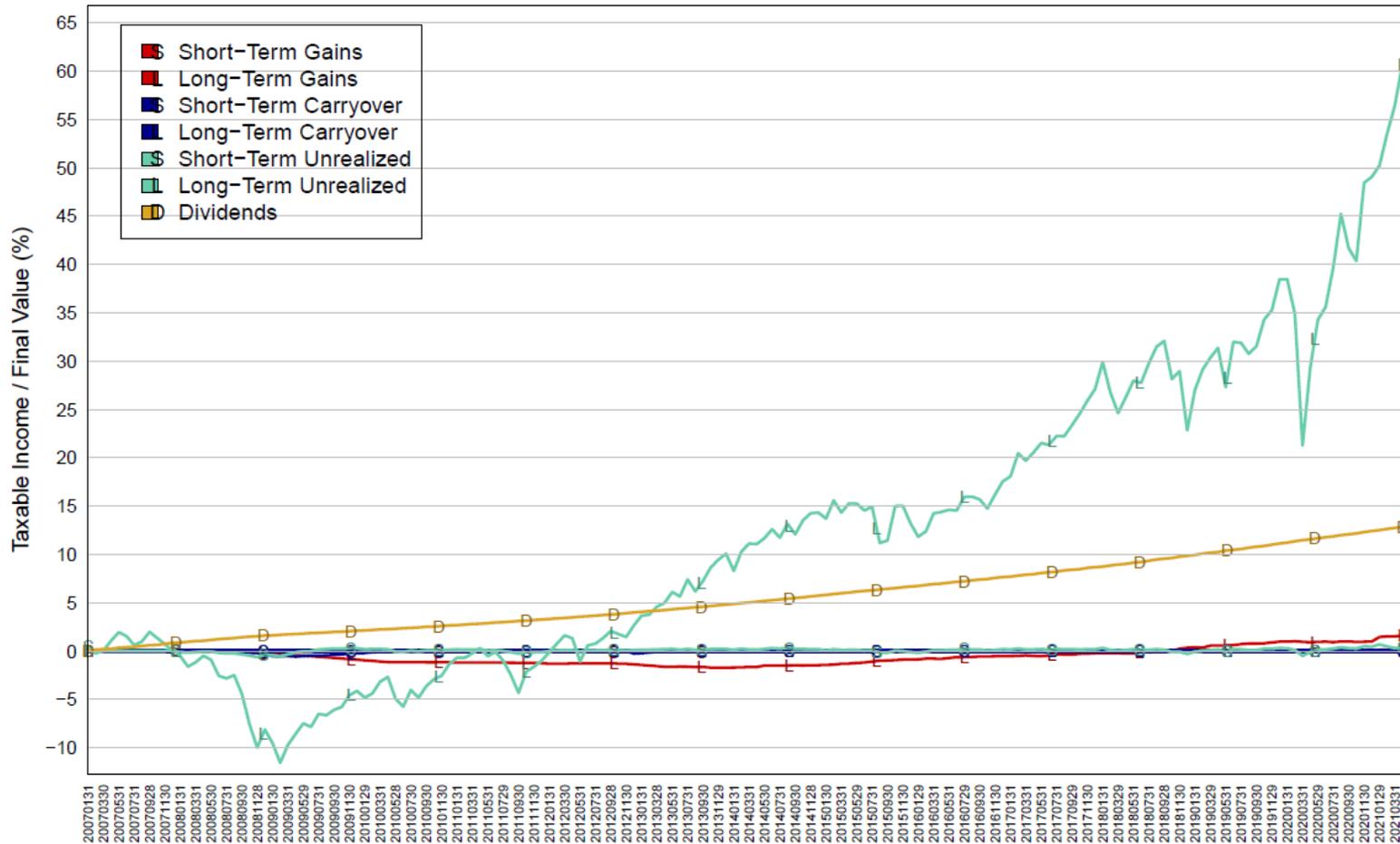
2021 Federal Capital Gains Tax Brackets and Rates

Rate	For Unmarried Individuals, Taxable Income Over	For Married Individuals Filing Joint Returns, Taxable Income Over	For Heads of Households, Taxable Income Over
0%	\$0	\$0	\$0
15%	\$40,400	\$80,800	\$54,100
20%	\$445,850	\$501,600	\$473,750

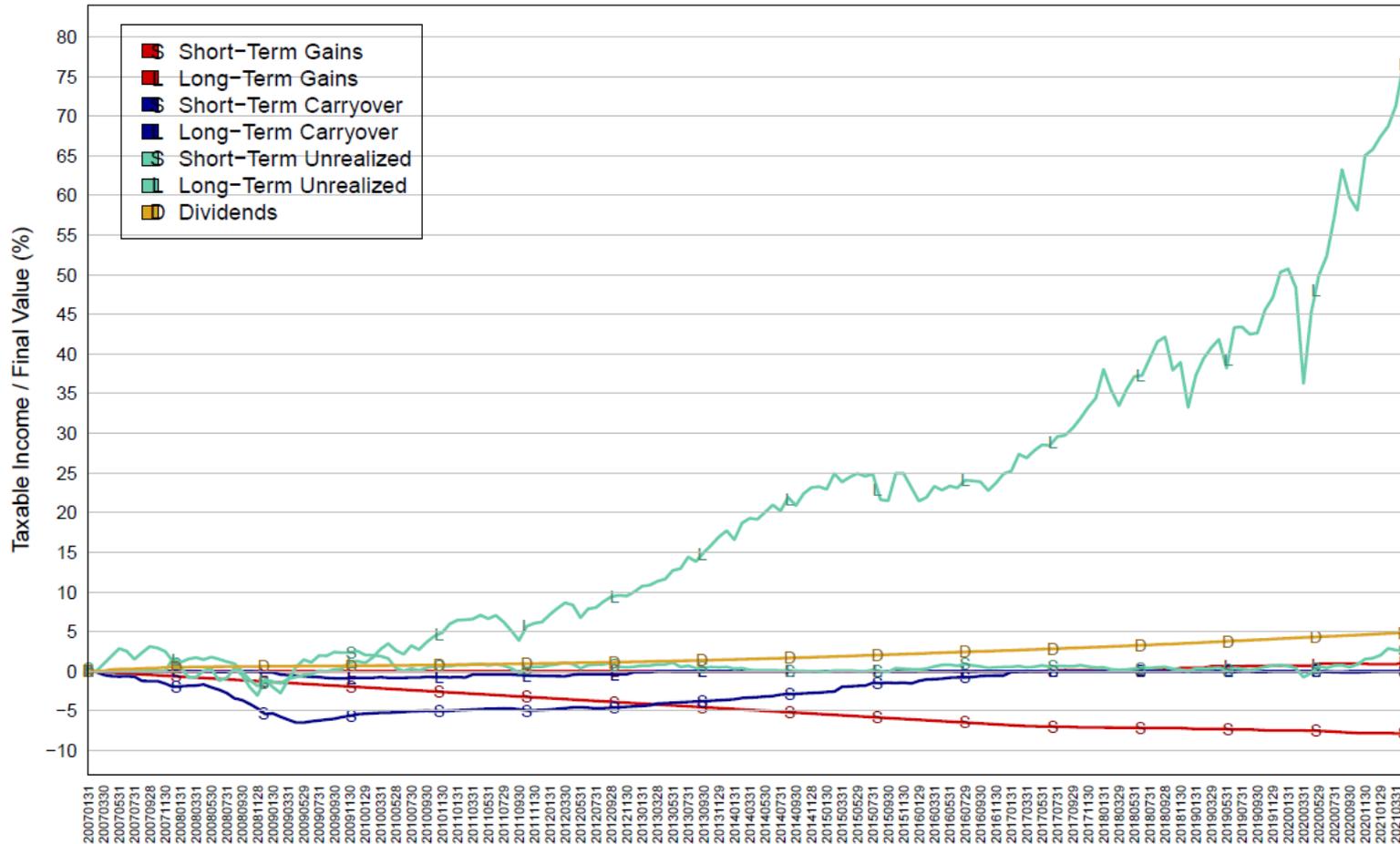
Improving After-Tax Returns

- Seek income that is taxed at preferential rates
 - Long-term realized gains and qualified dividends
- Avoid income that is taxed at ordinary income tax rates
 - Short-term realized gains and unqualified dividends
- Defer income
 - Avoid realizing gains for as long as possible
 - Substitute deferrable capital gains for dividends if possible
- Accelerate losses
 - Realize at least \$3,000 in losses each year

S&P 500 - Decomposition of Taxable Income



Tax-Aware – Decomposition of Taxable Income



Impact of the \$3,000 Loss Allowance

Account	Limit	Marginal Tax Rate on Regular Income							
		10%	12%	22%	24%	32%	35%	37%	40.8%
NAV	\$3,000								
\$10,000	30.00%	3.00%	3.60%	6.60%	7.20%	9.60%	10.50%	11.10%	12.24%
\$20,000	15.00%	1.50%	1.80%	3.30%	3.60%	4.80%	5.25%	5.55%	6.12%
\$30,000	10.00%	1.00%	1.20%	2.20%	2.40%	3.20%	3.50%	3.70%	4.08%
\$40,000	7.50%	0.75%	0.90%	1.65%	1.80%	2.40%	2.63%	2.78%	3.06%
\$50,000	6.00%	0.60%	0.72%	1.32%	1.44%	1.92%	2.10%	2.22%	2.45%
\$60,000	5.00%	0.50%	0.60%	1.10%	1.20%	1.60%	1.75%	1.85%	2.04%
\$70,000	4.29%	0.43%	0.51%	0.94%	1.03%	1.37%	1.50%	1.59%	1.75%
\$80,000	3.75%	0.38%	0.45%	0.83%	0.90%	1.20%	1.31%	1.39%	1.53%
\$90,000	3.33%	0.33%	0.40%	0.73%	0.80%	1.07%	1.17%	1.23%	1.36%
\$100,000	3.00%	0.30%	0.36%	0.66%	0.72%	0.96%	1.05%	1.11%	1.22%
\$200,000	1.50%	0.15%	0.18%	0.33%	0.36%	0.48%	0.53%	0.56%	0.61%
\$300,000	1.00%	0.10%	0.12%	0.22%	0.24%	0.32%	0.35%	0.37%	0.41%
\$400,000	0.75%	0.08%	0.09%	0.17%	0.18%	0.24%	0.26%	0.28%	0.31%
\$500,000	0.60%	0.06%	0.07%	0.13%	0.14%	0.19%	0.21%	0.22%	0.24%
\$600,000	0.50%	0.05%	0.06%	0.11%	0.12%	0.16%	0.18%	0.19%	0.20%
\$700,000	0.43%	0.04%	0.05%	0.09%	0.10%	0.14%	0.15%	0.16%	0.17%
\$800,000	0.38%	0.04%	0.05%	0.08%	0.09%	0.12%	0.13%	0.14%	0.15%
\$900,000	0.33%	0.03%	0.04%	0.07%	0.08%	0.11%	0.12%	0.12%	0.14%
\$1,000,000	0.30%	0.03%	0.04%	0.07%	0.07%	0.10%	0.11%	0.11%	0.12%
\$2,000,000	0.15%	0.02%	0.02%	0.03%	0.04%	0.05%	0.05%	0.06%	0.06%
\$3,000,000	0.10%	0.01%	0.01%	0.02%	0.02%	0.03%	0.04%	0.04%	0.04%
\$4,000,000	0.08%	0.01%	0.01%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%
\$5,000,000	0.06%	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%
\$6,000,000	0.05%	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%
\$7,000,000	0.04%	0.00%	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%
\$8,000,000	0.04%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.02%
\$9,000,000	0.03%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
\$10,000,000	0.03%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%

Outside Gains and After-Tax Returns

- When calculating and presenting after-tax performance, it is common for practitioners to ignore the \$3,000 limit on allowable capital losses and assume that they are unlimited.
- The justification for this approach is the assumption that the investor will always have sufficient short-term realized gains from other sources to utilize all losses generated by the tax-aware portfolio.
- The taxes thus avoided on the outside investments are added to the reported returns of the tax-aware portfolio as $(\text{taxes avoided} / \text{tax-aware portfolio value})$.
- This assumption is extremely valuable because it means that all realized losses can be used immediately to offset short-term gains.
- Although the taxes saved by offsetting outside gains are real, presenting them as a percentage of the tax-aware portfolio value is problematic. The existence of outside gains implies that the tax-aware portfolio is only a component of a larger overall portfolio. The denominator for the taxes saved should be the unknown total portfolio value, not just the tax-aware component.
- Furthermore, the outside gains assumption is almost certainly invalid in years like 2008.

Theoretical Limits on Tax Alpha vs. S&P 500 (2007-2021)

A	NAV	\$100,000	\$1,000,000		
B	Short-Term Rate	24%	40.8%		
C	Long-Term Rate	15%	23.8%		
S&P 500 Annualized Returns:					
D	Pre-Tax	10.35%	10.35%		
E	Pre-Liquidation After-Tax	9.99%	9.71%		Dividends & Realized Gains
F	Post-Liquidation After-Tax	9.25%	8.51%		Unrealized Gains
Taxes:					
G	Total Tax, Pre-Liquidation	0.36%	0.64%	D-E	
H	Total Tax, Post-Liquidation	1.10%	1.84%	D-F	
I	Dividends	0.31%	0.49%	C * 2.04%	2.04% Average Dividend Yield
J	Capital Gains, Pre-Liquidation	0.05%	0.15%	G-I	3.22% Average Annual Turnover
K	Capital Gains, Liquidation	0.74%	1.20%	E-F	
Maximum Tax-Alpha:					
L	Avoid Dividends	0.31%	0.49%	I	Risky tilt to small-cap growth
M	\$3,000 Loss Allowance	0.72%	0.12%	B*(\$3,000/A)	
N	Avoid Pre-Liquidation Capital Gains	0.05%	0.15%	J	Not all discretionary
O	Offset Outside Gains	0.00%	0.00%		No cheating!
P	Maximum Pre-Liquidation "Tax Alpha"	1.08%	0.76%		
Defer for 15 Years:					
Q	Pre-Tax Return + Max Loss-Allowance	11.07%	10.47%	D+M	
R	Compound for 15 Years	383.00%	345.46%	(1+Q)^15-1	
S	% Unrealized Gains	111.75%	101.30%	(R+(\$45,000/A))/R	100% of return + \$3,000/yr is unrealized gains
T	Multiply by (1 - %UG*LT Gains Rate)	318.80%	262.17%	R*(1-S*C)	
U	Annualize	10.02%	8.96%	(1+T)^(1/15)-1	
V	Maximum Post-Liquidation "Tax Alpha"	0.77%	0.45%	U-F	

The Objective Function

- Maximize: $(\text{Return} - \text{Costs} - \text{Quadratic Penalties}) - (\text{SVar} / \text{SRAP} + \text{UVar} / \text{URAP})$
 - i.e. $\text{Utility} = \text{Return} - \text{Risk/RAP}$
- Return
 - The weighted average of the user-provided alpha forecasts for each stock. These are zero in the case of passive direct indexing.
- SVar and UVar
 - The variance predicted by the risk model separated into systematic (factor exposures) and unsystematic (stock-specific) components.
- SRAP and URAP
 - The risk-acceptance parameters that control the trade-off between risk and return.
 - They are usually the same but can be different for systematic and unsystematic risk.

The Objective Function (continued)

- Costs
 - Transaction Costs + (LTRG * LTRG Tax Rate) + (STRG * STRG Tax Rate)
 - Note that these are dollar values for a single rebalance. To convert to an annualized percentage, an annual turnover expectation must be provided. The costs in dollars are divided by the portfolio value and multiplied by (Expected Annual Turnover / Current Turnover)
- Quadratic Penalties = Sum of Scale[i] * (Exposure[i] – Goal[i])²
 - These penalize deviations from target portfolio exposures
 - An unlimited number of penalties may be specified
 - The user must specify a goal and scale for each
 - The scale defines the return equivalent of the squared deviation
 - The quadratic nature of the function prevents large unwanted exposures while allowing insignificant ones
 - Preferable to “hard” constraints with discrete bounds

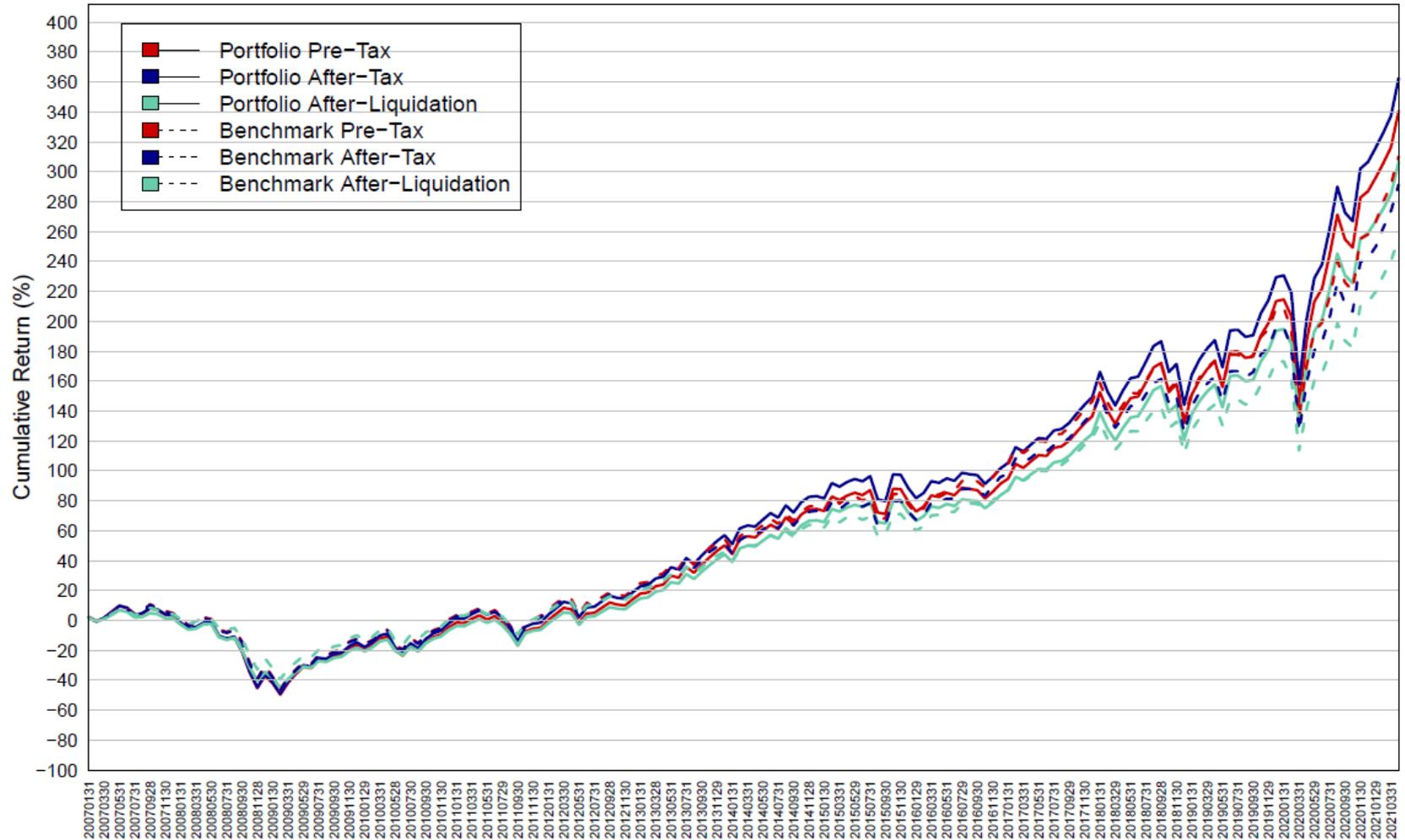
Incorporating Taxes on Dividends

- Taxes on dividends are not included in the objective function, but can easily be introduced by setting the alphas or expected returns for each stock to:
 - (Dividend Tax Rate * Annual Dividend Yield)
- If the strategy includes user-provided alphas, those alphas are adjusted for taxes on dividends as follows:
 - Alpha' = Alpha – (Dividend Tax Rate * Annual Dividend Yield)

Back-Testing vs. Historical Simulation

- Back-testing frequently provokes scorn and skepticism.
- This is often justifiable due primarily to look-ahead bias and cherry picking.
- Look-ahead bias usually manifests itself in return forecasts but also in constraints and other settings that are specified with some foresight of market dynamics during the back-test window that would not have been knowable in real time.
- Cherry picking occurs when numerous trials are run but the results of only one (the best?) or a few are shown.
- The “tax-alpha” scenarios that we will show do not involve alpha forecasts and have few variable parameters, so are not generally subject to these concerns.
- As such, they may be more appropriately termed “historical simulations”.

Tax Alpha Simulation Results



Tax Alpha Simulation Results

	Portfolio			Benchmark			Relative			Tax Alpha	
	Pre-Tax	After-Tax	Liquidation	Pre-Tax	After-Tax	Liquidation	Pre-Tax	After-Tax	Liquidation	Tax Alpha	Liq Alpha
Return	10.90	11.28	10.28	10.35	9.99	9.25	0.55	1.29	1.03	0.74	0.48
Volatility	18.49	18.48	16.09	17.99	17.99	15.28	2.82	2.81	2.79	0.11	1.00
Semi-Vol	21.48	21.31	19.02	21.68	21.50	18.38	2.85	2.83	2.82	0.11	1.36
Information Ratio	0.59	0.61	0.64	0.58	0.56	0.61	0.19	0.46	0.37	0.26	0.17
Sortino Ratio	0.51	0.53	0.54	0.48	0.46	0.50	0.19	0.45	0.37	0.26	0.17
Sharpe Ratio	0.55	0.57	0.59	0.53	0.51	0.55	-0.09	0.17	0.08	-0.68	-0.33
Max Drawdown	54.04	53.46	48.43	51.88	52.02	44.15	14.94	10.51	10.30	5.06	5.37
Cumulative Return	340.45	362.47	306.46	310.16	291.32	255.34	30.30	71.14	51.12	40.85	20.82
2007	3.45	3.77	1.37	4.84	4.25	4.07	-1.39	-0.47	-2.70	0.92	-1.31
2008	-39.04	-38.55	-35.27	-33.34	-33.47	-28.26	-5.70	-5.08	-7.01	0.62	-1.31
2009	32.56	33.88	24.60	25.75	26.05	20.48	6.81	7.82	4.12	1.01	-2.69
2010	14.15	15.02	14.30	14.54	14.33	12.02	-0.39	0.69	2.28	1.08	2.67
2011	-0.25	0.38	0.27	2.51	2.18	2.07	-2.76	-1.80	-1.79	0.96	0.97
2012	19.89	20.55	18.77	16.75	16.35	13.88	3.15	4.20	4.89	1.05	1.75
2013	31.58	32.13	29.51	28.26	27.99	24.46	3.32	4.14	5.05	0.82	1.73
2014	16.26	16.62	15.81	14.46	13.93	12.81	1.80	2.69	3.00	0.88	1.20
2015	2.61	2.87	3.00	0.26	-0.28	0.26	2.35	3.15	2.74	0.80	0.39
2016	6.78	7.04	6.81	13.86	13.35	12.33	-7.08	-6.31	-5.52	0.77	1.55
2017	23.64	23.63	22.35	22.10	21.65	19.85	1.54	1.98	2.50	0.45	0.96
2018	-1.93	-2.07	-1.69	-4.97	-5.37	-4.52	3.04	3.30	2.84	0.26	-0.20
2019	35.11	34.97	32.88	31.76	31.20	28.74	3.35	3.77	4.14	0.42	0.79
2020	23.46	23.40	22.28	16.01	15.71	14.73	7.45	7.69	7.55	0.24	0.10
2021	13.83	13.77	13.22	14.54	14.33	13.52	-0.71	-0.56	-0.30	0.15	0.41
Mean	12.14	12.49	11.22	11.16	10.81	9.76	0.99	1.68	1.45	0.69	0.47
Stdev	18.58	18.60	16.80	16.08	16.08	13.89	4.08	4.04	4.10	0.32	1.39
IR	0.65	0.67	0.67	0.69	0.67	0.70	0.24	0.42	0.35	2.19	0.34

Active vs. Absolute

- The CAPM explicitly assumes that there are no taxes.
- The S&P 500 may not be an appropriate benchmark for a tax-aware strategy.
- An absolute return strategy needs an expected return, otherwise there is no incentive to invest.
- We assumed an equity risk premium of 4% and calculated Alpha as $RF + (\text{Beta} * 4\%)$.
- Investable: Market Cap \geq \$250M and MDV \geq \$2.5M \Rightarrow 2,000+ stocks

Initial Investment = \$100,000 Tax Rates = 24%/15%

Strategy	Universe	Alpha	Characteristics						Risk Exposures			Returns			Relative Returns			Tax Alpha		IR		SIPE		
			E[Return]	E[Risk]	Turnover	# Held	Beta	Dividend Yield	Size	Yield	Growth	Pre-Tax	After-Tax	After-Liq	Pre-Tax	After-Tax	After-Liq	After-Tax	After-Liq	After-Tax Vol	After-Tax IR	After-Tax	After-Liq	
Active vs. S&P 500:																								
S&P 500	S&P 500	None	0.00	0.00	3.22	504	1.02	2.04	2.30	0.18	0.04	10.35	9.99	9.25							17.99	0.56	6.99	6.25
C.G. Tax-Aware	S&P 500	None	0.00	0.00	18.75	492	1.02	2.05	2.30	0.18	0.04	10.49	10.51	9.65	0.14	0.52	0.40	0.38	0.26		17.96	0.59	7.52	6.66
C.G. & Div. Tax-Aware	S&P 500	None	-0.11	2.50	43.78	159	1.05	0.71	2.09	-0.33	0.15	10.90	11.28	10.28	0.55	1.29	1.03	0.74	0.48		18.48	0.61	8.20	7.20
C.G. & Div. Tax-Aware	Investable	None	-0.11	2.39	39.92	256	1.05	0.72	1.89	-0.22	0.15	11.05	11.38	10.39	0.70	1.39	1.14	0.69	0.44		18.15	0.63	8.36	7.37
Absolute Risk & Return:																								
Tax-Agnostic	Investable	CAPM	5.34	22.88	60.43	383	1.25	2.00	0.19	0.14	-0.05	8.27	7.57	7.17							22.61	0.33	3.80	3.40
Tax-Aware	Investable	CAPM	5.22	22.54	52.46	207	1.25	0.83	0.29	-0.29	0.06	9.15	9.34	8.50	0.88	1.77	1.33	0.89	0.45		22.29	0.42	5.63	4.79

Challenges in Multi-Period Simulations

- A single optimization starts with an initial portfolio and creates an optimal portfolio and list of trades that specify the transition between the two.
- There are three main challenges to doing this iteratively through time:
 1. Trade execution prices will differ from the prices used in the optimizations.
 2. Changes to the portfolio that occur between rebalance dates due to corporate actions.
 3. Accurately measuring all aspects of portfolio performance including taxation.
- Warning: Do not try this at home!

Trade Prices

- Optimizations are performed using the previous day's closing prices, but we cannot trade today at yesterday's close.
- We typically use the next-day's close but also have the open, high, low, and volume, so could use the mid or any other combination or function of these data items.
- If the market impact model is in use, then the execution prices are further adjusted by the estimated impact:
 - Buy prices are increased
 - Sell prices are decreased
 - These adjustments reduce capital gains and the relevant taxes to a small degree

Corporate Actions

- Stocks in the previous optimal portfolio are often no longer trading on the next rebalance date and their disposition must be known in order to accurately measure performance and to create the initial portfolio for the next iteration:
 - Mergers and acquisitions for cash and/or stock
 - Delisting / Bankruptcy
 - CUSIP changes
- Other events that alter the portfolio between rebalances:
 - Dividend payments
 - Spin-offs
 - Splits
- All have performance and tax implications that must be accounted for.

Performance

- Price Changes (a.k.a. Capital Gains)
- Dividends
- Transaction Costs
 - Commissions reduce cash and are added to the cost basis and deducted from sale proceeds
 - Market impact increases purchase price and reduces sale price
- Borrow Fees
- Financing Fees
 - Debit balances pay a short-term rate plus a spread
 - Credit balances receive a (sometimes different) short-term rate less a spread
- Taxes on Dividends and Realized Gains
- Management Fees
- Performance Fees

The Back-Test Cycle

- Create the Investment Universe (index constituents and/or screen on security attributes)
- Create the Benchmark (market-cap weight the constituents)
- Apply any Cash Flows to the Portfolio
- Generate/Read Alphas
- Create the Project File for the Optimizer (specifies all settings and inputs)
- Generate Input Files for the Optimizer (prices, alphas, buy list, min/max weights, ...)
- Optimize
- **Read the Optimal Portfolio / Trades**
 - **Update cost bases and cash to reflect trading at next day's prices and market impact**
- **Time Elapses to the Next Rebalance Date ...**
- **Adjust the Portfolio Holdings and Cost Bases for Corporate Actions**
- **Re-Price the Portfolio and Calculate Performance for the Period**

Back-Testing Capabilities

- Any combination of the following:
 1. Long-Only, Long Extension (ex. 130/30), or Long-Short
 2. Absolute or Relative-to-Benchmark
 3. Tax-Aware or Tax-Agnostic
- Currently limited to U.S. equities.
- Price, dividend, and corporate action information on more than 19,000 securities from 12/1/1998 forward.
- Acquisition details start in 2007, we are working on extending them back to 1999.
- Borrow fees are available from Data Explorers from 2007 onward.
- Currently offering back-testing as a service.
- A web-based product is a future possibility.

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