Can Individual Investors Use Option Strategies and the Tax Code to Their Advantage?

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In the United States, the Internal Revenue Service (IRS) tax code has given individual investors a unique opportunity for long-term investments by offering a reduced tax rate on qualified dividends and long-term capital gains under which any gains/profits on a qualifying investment held for one year or longer is taxed at a reduced rate. As of 2015, the maximum tax rate for these long-term capital gains is 20% for the highest income tax bracket. For example, say an individual purchases stock A for $1,000 on January 30 of last year and sells those shares for $2,000 one year and one day later on February 1. Based on the individual's 2015 income tax rate bracket, this profit of $1,000 would be taxed at a reduced rate of 0%–20% in a taxable trading account, depending on the individual's taxable income. Additionally, the 2015 U.S. tax code states that long-term realized losses can be deducted from an individual's taxable income at up to $3,000 per year. Based on the individual's annual income, this deduction could save him or her up to 39.6% (up to $1,188) in payable taxes each year. For example, if stock B were purchased on January 15 of last year for $5,000 and these shares were sold the next year on January 16 for $2,000, the $3,000 loss on this trade could be deducted from the individual's annual income. Based on the individual's annual income, summarized in Exhibit 1, this deduction could reduce his or her taxes due by up to $1,188 at the end of the year. Moreover, any losses greater than $3,000 can be rolled over and applied to offset next year's gains.

Previous research on using the U.S. tax code has mainly focused on corporate finance (see Hanlon and Heitzman [2010] for a thorough review of the literature), investor trading behavior and strategies (Shefrin and Statman [1985]; O'Dean [1998]; Poterba and Weisbenner [2001]), and optimal consumption and behavior (Constantinides [1984]; Dammon and Spatt [1996]; Dammon, Spatt, and Zhang [2004]). To the best of our knowledge, however, an easy-to-implement option trading strategy for individual investors has not been evaluated in the literature.

The main question of this article addresses whether high-net-worth individual investors can benefit from the current U.S. tax code in their taxable trading accounts. One possible way to aggressively leverage these rules would be to buy long-term (more than one year) at-the-money (ATM) call or put options. The intuition of buying long-term options is that, if they expire out-of-the-money, the premium paid could be written off as a long-term capital loss, which is tax deductible. Additionally, the amount of the premium paid for these options can be controlled each year by the investor and can be altered based on the amount of losses being rolled over. If the options are in-the-money (ITM) as the expiration date nears,

EXHIBIT 1
Federal Income Tax Brackets

Tax Rate	Over	To	Tax Rate on Qualified Dividends and Long-Term Capital Gains
Panel A: Ordinary Income (single)			
10%	$0	$9,225	0%
15%	$9,225	$37,450	0%
25%	$37,450	$90,750	15%
28%	$90,750	$189,300	15%
33%	$189,300	$411,500	15%
35%	$411,500	$413,200	15%
39.6%	$413,200		20%
Panel B: Married Filed Jointly/Qualifying Widow or Widower			
10%	$0	$18,450	0%
15%	$18,450	$74,900	0%
25%	$74,900	$151,200	15%
28%	$151,200	$230,450	15%
33%	$230,450	$411,500	15%
35%	$411,500	$464,850	15%
39.6%	$464,850		20%

Note: The exhibit shows the federal tax rates on ordinary income and qualified long-term capital gains for single and married filed jointly/qualifying widows and widowers tax filers for 2015.

Source: Internal Revenue Service [2015].

an identical option (same underlying, strike price, and maturity date) can be sold. If the option is held for more than one year, the profit earned on this trade can be treated as a long-term capital gain, according to the IRS tax code (Internal Revenue Service [2015]).[1] Such a strategy can be easily executed at minimal cost using a discount broker or a licensed financial advisor.

To test the feasibility of this strategy, we run an initial analysis using the past returns of the previous 50 years, from 1966 to 2015, that buys $3,000 worth of one-year ATM calls or puts annually to determine if it makes economic sense for individuals with various taxable income levels to implement such a strategy. Here, we initially buy ATM call and put options on the S&P 500 (SPY). We find that, on average, call options can provide increased annual performance returns for all income levels. Additionally, we run a Monte Carlo simulation, based on long-term historical returns, standard deviations, and correlations, to test the robustness of the results of the historical returns for a risk-neutral investor. We conclude that not only does the call option strategy consistently earn high annual returns, this strategy also provides excess risk-adjusted returns for high-income earners in the 28% and higher income tax brackets.

METHODOLOGY

As previously mentioned, we evaluate the historical returns of the S&P 500 Index from the past 50 years (1966–2015) in our analysis. For this analysis, we also use the annual dividend yield and interest rates. All information was retrieved from French's data library.[2] We calculate call and put option pricing using the Black–Scholes option pricing model (Black and Scholes [1973]) using the historical returns over the entire period. We refrain from using a more complicated generalized autoregressive conditional heteroskedasticity model to calculate implied future volatility because Starica [2003] pointed out that it does not ensure a more accurate forecast of long-term implied volatility.

We add 1% to the implied volatility to better reflect real-world pricing for retail investors, which is consistent with Christensen and Prabhala [1998], who found a 1% difference between the pricing of implied and historical volatility. This adjustment adds 5%–10% to the overall option price.[3] We also add a $12 transaction fee to buy each option strategy and an additional $12 transaction fee to the ITM options needing to be sold before expiration.[4] The option price is based on an option with an expiration date of one year and one day. We evaluate the after-tax annual returns of the aforementioned ATM call and put option strategy that buys $3,000 worth of options against the returns of an individual who invests 100% of his or her portfolio in the stock market (e.g., an S&P 500 exchange-traded fund [ETF], SPY). The dividend yield is added to the price return on the S&P 500 for the unleveraged benchmark stock ETF strategy. Only the price return on the S&P 500 is calculated for the option strategies because dividends are not paid out to long option holders.

We analyze five income tax brackets: 0%, 15%, 25%, 35%, and 39.6%, which include capital gain taxes of 0%, 0%, 15%, 15%, and 20%, respectively. For the sake of completeness, we divide the historical returns into three panels: the overall sample periods and two 25-year subsample periods, from 1966–1990 and 1991–2015, shown in Exhibit 2.

RESULTS

In Exhibit 3, we observe much higher average annual returns for the call option strategy (36.59% compared to the 10.78%), without the inclusion of taxes. These returns are enhanced when the after-tax returns are calculated for individuals in the 15%, 25%, 35%, and 39.6% income tax brackets. At the same time, the volatility of these returns are also noticeably higher. Therefore, we add the capital asset pricing model (CAPM) (Sharpe [1964]) to factor in risk and compare the excess risk-adjusted returns (denoted as alpha). We also determine the Sharpe ratios for each strategy. We find positive alphas for all tax brackets in Panels A and B, though we detect negative alphas in the more recent Panel C for those in the 0% and 15% income brackets. Overall, the Sharpe ratios for the call option strategy dominate the unleveraged stock ETF strategy, though the results in this area are mixed in Panel C. The overall performance of the put option strategies grossly underperforms the benchmark. Although we cannot rule out the possible positive effects of using put options as a hedge for a larger long portfolio consisting of stocks and bonds, we should note that the long-term

EXHIBIT 2
Descriptive Statistics

	Panel A: 1966–2015		Panel B: 1966–1990		Panel C: 1991–2015	
Period	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**
S&P 500 returns	7.79%	16.23	6.63%	15.22	8.91%	17.38
Dividend yield	2.99%	1.20	3.91%	0.86	2.06%	0.65
Risk-free interest rate	6.51%	2.81	8.30%	2.51	4.73%	1.78

Note: This exhibit shows the averages and standard deviation (in terms of percentages) of the annual returns of the S&P 500, dividend yield, and risk-free interest rate for three various long-term time frames.

EXHIBIT 3
Descriptive Statistics on ATM Call and Put Option Strategies

	Invest in 100% Stocks			Call Option Strategy			Put Option Strategy		
Tax	**Return**	**St. Dev.**	**Sharpe**	**Return**	**St. Dev.**	**Sharpe**	**Alpha**	**Return**	**St. Dev.**
Panel A: 1966–2015									
0%/0%	10.78%	16.02	0.27	36.59%	126.54	0.24	0.55	–25.82%	155.96
15%/0%	11.20%	15.24	0.31	41.90%	121.11	0.29	1.20	–14.73%	150.74
25%/15%	9.44%	13.10	0.22	34.64%	103.93	0.27	6.83	–14.56%	129.08
35%/15%	9.73%	12.59	0.26	38.17%	100.37	0.32	8.05	–7.17%	125.65
39.6%/20%	9.18%	11.81	0.23	36.20%	94.19	0.32	10.10	–6.17%	117.99
Panel B: 1966–1990									
0%/0%	10.58%	15.03	0.15	25.19%	115.76	0.15	0.42	–21.88%	139.96
15%/0%	10.99%	14.39	0.19	30.50%	110.23	0.20	2.90	–11.26%	133.81
25%/15%	9.26 %	12.35	0.08	24.95%	94.70	0.18	9.70	–11.52%	143.75
35%/15%	9.53%	11.92	0.10	28.50%	91.08	0.22	11.35	–4.43%	110.79
39.6%/20%	8.99%	11.19	0.06	27.10%	85.45	0.22	13.81	–3.62%	103.96
Panel C: 1991–2015									
0%/0%	10.97%	17.23	0.36	47.54%	137.59	0.31	–1.80	–29.59%	172.76
15%/0%	11.41%	16.32	0.41	52.83%	132.04	0.36	–1.04	–18.07%	168.12
25%/15%	9.62%	14.03	0.35	43.94%	113.24	0.35	3.47	–17.47%	143.75
35%/15%	9.91%	13.45	0.39	47.46%	109.60	0.39	4.00	–9.79%	140.70
39.6%/20%	9.35%	12.61	0.37	44.94%	102.87	0.39	5.61	–8.62%	132.19

Notes: This exhibit shows the average performance, standard deviations, and Sharpe ratios of investing $3,000 annually. Returns, standard deviations, and alpha are depicted in percentages. The call (put) option strategy buys $3,000 of long-term ATM calls (puts) with an expiration of one year and one day. Pricing for the options is derived by the Black–Scholes option pricing model. We add an additional 1% to the implied volatility in the option pricing to better reflect real-world pricing for retail investors, as noted by Christensen and Prabhala [1998]. Transaction fees of $12 are also applied to the buying and selling (if applicable) of the option strategy. The Sharpe ratios denote the nonidiosyncratic risks, and the alpha is derived for the call option strategy using the CAPM model.

tax benefit for such a strategy is prohibited (straddle rule) by the IRS. Exhibit 3 shows that, over the past 50 years, the call option strategy posts excess risk-adjusted returns (denoted by higher Sharpe ratios and positive alphas). These results are not as robust when we analyze the two subperiods. The excess returns in Panel C, from 1991 to 2015, are negative for the 0% and 15% tax brackets. These excess returns increase to 5.61% for the highest tax bracket.

Although the overall average returns of the call option strategy remain significantly higher than the S&P 500 benchmark returns for risk-neutral investors, significant downside risk exists for this strategy. In 14 out of the 50 years in this dataset (28%), the call options would expire out-of-the-money, resulting in the loss of the full $3,000 annual investment. Moreover, 44% of the years (22 out of 50) would result in a net loss return. Based on the general payout profile of this trading strategy, the overall utility for individuals possessing risk/loss aversion (Holt and Laury [2002]; Pratt [1964]; Tversky and Kahneman [1991]) would shift their preference away from this call option strategy to the less volatile unleveraged 100% stock strategy.

Based on the overall historical analysis, we are unsure if the average returns are statistically significantly different from each other. Therefore, in the next section, we seek to evaluate multiple returns based off of the historical information using a Monte Carlo simulation.

Monte Carlo Results

Through the Monte Carlo simulation, we are able to generate 50,000 random S&P 500 returns, dividend yields, and interest rates, based on each of the variables' long-term historical mean, standard deviation, and correlation to the other variables. The correlation matrix is shown in Exhibit 4. From this dataset, we are able to derive 1,000 50-year periods and can analyze the statistical differences of the risk-adjusted returns.

In Exhibit 5, the call option strategy average annual returns are notably lower than in the original dataset. Moreover, the volatility of the returns is higher than in the initial analysis. This suggests that, based on the assumptions made in the Monte Carlo simulation, the likelihood of persistent excess returns is not a sure bet. Based on the simulation results, only 12.7% (20.6%) of the 50-year periods produce positive alphas for individuals in the 0% (15%) income tax bracket.

EXHIBIT 4

Correlation Matrix for Monte Carlo Simulation (1966–2015)

	S&P 500 Returns	Annual Dividend Yield	Annual Interest Rate
S&P 500 Returns	1.00	–0.21	0.03
Annual Dividend Yield	–0.21	1.00	0.78
Annual Interest Rate	0.03	0.78	1.00

Notes: The exhibit shows the correlation matrix for the overall time frame analyzed in this article (1966–2015) among the S&P 500 returns, annual dividend yield, and annual interest rate. These correlations, in addition to the averages and standard deviations, are applied in a Monte Carlo simulation, which generates 50,000 random returns for each of the three variables.

For high-income earners in the 28% and above tax brackets, the simulation results show statistically significant positive alphas. Our results indicate that these excess returns are not guaranteed, however: The likelihood of positive alphas ranges from 56.1% for the 28% income bracket up to 78.5% for individuals in the top income bracket. For individuals and households in the top income tax bracket, a statistically significant excess Sharpe ratio persists, increasing 13.6% from 0.22 to 0.25. Overall, these simulation results indicate that excess returns generally exist for high-income, risk-neutral earners, but these excess returns are significantly negative for individuals in the lower income brackets (0% and 15%).

DISCUSSION AND CONCLUSION

In this article, we tested whether it makes sense for high-income earners to annually exploit the asymmetric U.S. tax treatment of long-term capital gains and losses using ATM options. We ran an initial historical analysis that tested the returns of the previous 50 years (1966–2015); the analysis buys $3,000 of one-year ATM call options on the S&P 500 (SPY) to determine excess risk-adjusted returns for individuals at various taxable income levels who implement such a strategy. Additionally, we ran a Monte Carlo simulation, based on long-term historical returns, standard deviations, and correlations, to test the robustness of the results of the historical returns for a risk-neutral investor. We found that long-term ATM call options can provide increased annual performance returns for all income levels. Furthermore,

EXHIBIT 5
Monte Carlo Simulation Results (1966–2015)

		Invest in 100% Stocks			Call Option Strategy					
Tax Rate	***N***	**Return**	**St. Dev.**	**Sharpe**	**Return**	**St. Dev.**	**Sharpe**	**Excess Sharpe**	**Alpha**	**Prob. Excess Alpha**
50-Year Periods										
0%/0%	1,000	10.79%	15.96	0.27	32.02%	142.04	0.17	–0.10*	–10.61%*	12.7%
15%/0%	1,000	11.15%	15.38	0.30	38.26%	136.67	0.22	–0.08*	–7.28%*	20.6%
25%/15%	1,000	9.41%	13.18	0.22	31.38%	117.14	0.20	–0.02*	0.19%	52.7%
28%/15%	1,000	9.48%	13.06	0.23	32.63%	116.08	0.22	–0.01*	0.86%*	56.1%
33%/15%	1,000	9.60%	12.88	0.24	34.70%	114.32	0.24	–0.002	1.99%*	62.0%
35%/15%	1,000	9.65%	12.80	0.25	35.53%	113.62	0.25	0.00	2.44%*	64.6%
39.6%/20%	1,000	9.10%	12.02	0.22	33.77%	106.67	0.25	0.03*	5.22%*	78.5%

Notes: This exhibit shows the average performance, standard deviations, and Sharpe ratios of investing $3,000 annually in a Monte Carlo simulation comprising 50,000 generated results for each variable. Returns are reported as the average returns of 1,000 50-year periods. Returns, standard deviations, and alpha are depicted in percentages. Excess Sharpe ratios are denoted as the difference of the Sharpe ratio of buying a stock ETF and using the call option strategy. The Prob. Excess Alpha variable shows the probability of a positive alpha for the call option strategy denoting excess returns in the capital asset pricing model. Statistical significance levels are based on paired two sampled means t-tests (excess Sharpe ratios) and the CAPM regression model: $r - R_f = beta * (K_m - R_f) + alpha$.

**99% statistical significance.*

we conclude that not only does the call option strategy consistently earn high annual returns, it also provides excess risk-adjusted returns for high-income earners in the 28% and higher income tax brackets.

It should be noted that the simulation in this article evaluated risk-neutral investors only. Because this strategy involves high-risk, high-reward payouts, its overall utility for individuals with risk/loss aversion should be addressed before executing this strategy. We also advise individuals to check with their financial advisor and tax professional before implementing this strategy. Furthermore, this article only evaluated ATM call options. Further research could evaluate the feasibility for similar call option strategies that buy various amounts of long-term ITM or out-of-the-money call options.

ENDNOTES

[1]It should be noted that individuals seeking to implement such a strategy should first consult with their financial advisor as well as a tax professional.

[2]French's data library can be found at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[3]We used CRSP to check recent options of similar length to expiration and found similar long-term implied volatility when the VIX was lower than its historical average. For example, on June 4, 2015, the 210.00 June 17, 2016, call ($0.03 ITM) traded with an implied volatility of 15.91%. The VIX closed at 14.71 that day. Even when the VIX spikes above its historical average, the long-term implied volatility gravitates toward the average long-term implied volatility. For example, during the trading day on January 7, 2016, a 196.00 January 20, 2017, call that is ITM by $0.26 could be bought at $14.33, which implies a volatility of 16.48%. The VIX at the time was 23.83.

[4]These prices are generally in accordance with those of most discount brokers in the United States as of 2015.

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