Harvesting Capital Gains, Losses, and Rebalancing the Portfolio:
Historically Testing an Investment Strategy

Owen Rosebeck and John Zuk

I.Introduction

"Buy low, sell high" is the most concise and (in)famous investment advice of all time. In principle it is exactly correct. Investors should determine the intrinsic value of some financial or physical asset, purchase the asset if its price is below its intrinsic value, enjoy the generated cash flows, and only sell the asset for a price greater than or equal to its intrinsic value. Unfortunately, this advice is just about as useful as a basketball coach telling his or her players to score more points than an opposing team by playing excellent offense and defense. It provides no detailed information about how to do as the advice says.

This paper explores the historical performance of a more practical investment strategy for a stock portfolio that is—with one exception—rooted in the ethos of buying low and selling high. The strategy includes the following provisions: (a) realizing all capital losses, (b) realizing some portion of the capital gains of the best performers in the stock portfolio, and (c) using the proceeds from selling the best performers to further rebalance the portfolio. Realizing the gains of the best stock performers aligns well with selling high. Rebalancing the portfolio, which necessitates buying stocks that have performed poorly, aligns well with buying low. However, locking in capital losses—selling low—does not at all conform to this traditional investing advice. So why do it?

Harvesting capital losses is beneficial because it makes additional funds available for investment and, in some cases, results in a tax credit that can be used to either reduce taxable income or to offset the taxes generated by realizing capital gains. Locking in losses results in a tax credit of up to $3000 per year—with excess losses carrying over to the following year(s)—

when an investor experiences a negative taxable gain. In the context of buying low and selling high, realizing capital losses is beneficial because it makes more funds available to buy stocks at low prices and reduces the tax consequences of selling winners. In aggregate, this investment strategy provides one practical way to buy stocks at low prices and to sell them after their price appreciates.

Previous research demonstrated the outperformance of this strategy relative to other investment strategies (e.g., buy and hold, realizing capital gains in alternate years) by using Monte Carlo simulations (Smith & Smith 2008). Here, rather than using Monte Carlo simulations, we use monthly return data from the CRSP database to test the historical performance of this investment strategy between 2000 and 2019 for a portfolio composed of the stocks in the Dow Jones Industrial Average (DJIA) in the year 2000. We implement the strategy at the end of every year and analyze the overall performance at the end of the nineteen year horizon. We also compare its performance to that of other investment strategies in order to determine its relative effectiveness. In aggregate, we aim both to test the practicality of implementing this investment strategy and to observe whether or not the outperformance demonstrated by the Monte Carlo simulations is also reflected by historical data.

This paper is structured as follows: in Section II we provide a brief overview of previous scholarship. In Section III we introduce our data and explain our methodology. In Section IV, we review our results. In Section V, we discuss and suggest plausible reasons for our results. We then close with a brief conclusion summarizing our findings and offering opportunities for further research.

II.   Literature Review

Arnot, Berkin and Ye's *Loss Harvesting and What's it Worth to the Taxable Investor* (2001) provides the basis and logic of much of the analysis contained within our work. The authors describe the loss harvesting strategy that investors may use which possibly decreases taxable capital gains to zero for the fiscal year while providing some possible carryover for future tax years. To introduce the potential value of this strategy, the authors describe the difficulties that an active financial manager may encounter when attempting to increase their year to year performance. Many of these active strategies involve the buying and selling of assets in a fiscal year which can bring about unfavorable tax implications. The harvesting losses strategy seeks to eliminate this problem, potentially dominating any active strategies.

In order to test this theory, the authors implemented Monte Carlo simulations. These simulations were designed to model the returns of various assets within the broader financial market by sampling daily returns from a theoretical distribution of returns over a 25-year time horizon. After implementing this strategy on a yearly basis, its returns were compared to other portfolios that implemented other common strategies used by investors such as buy-and-hold. The harvesting loss strategy proved to be remarkably robust in this theoretical model, proving to add an additional 27% in comparison to a traditional buy and hold mentality in typical market conditions. The results further proved that in volatile, quiet, strong and soft market conditions that this strategy outperform all others over a long-time horizon. The paper concludes with a list of "do's" that every investor should consider in their endeavors: harvest losses, actively manage your portfolio at the margins, tend towards high volatility assets and reduce fees by becoming a more passive investor.

We use Poterba and Weisbenner's *Capital Gains Tax Rules, Tax Loss Trading, and Turn of the Year Returns* (1998) to discover the impact of investors utilizing the harvesting losses strategy. This paper attempts to answer whether there is a market response or adjustment to this strategy. It is hypothesized that most investors would take advantage of this tax benefit near the end of the year, meaning that there could be a large selloff of assets in December. This would be followed by a repurchasing of those same assets, or similar assets 30 days later. Poterba and Weisbenner use linear regression models to show that this strategy is one of the reasons for the abnormally high returns observed during the end of December and throughout January.

One of the author's key findings was found by comparing returns in January where the previous year had experienced slow or negative growth and years where there had been substantial positive growth. They were able to find that following years of relative slow or negative growth, returns in January had been higher than in those years that had experienced strong positive growth. These findings are consistent with the posited hypothesis. In years with negative growth there are more opportunities for investors to realize capital losses, meaning that in January there are more assets that are repurchased to conclude the strategy. In years with strong positive growth, the opportunities to realize capital losses are more limited, meaning the effect of repurchasing assets in January is not nearly as large.

Meziana and Yang (2012) assess the reliability of harvesting capital losses for trading exchange traded funds (ETFs) under conditions of severe market volatility. Specifically, they focus on the volatile period between 2007 and 2011, positing that the implementation of such a strategy during this time would prove difficult. They cleverly avoid the "wash-sale" rule—a provision of the tax code that prohibits investors from selling a security at a loss and repurchasing it or another substantially identical security within thirty days in order to receive a

tax credit—by swapping their money between two ETFs, SPY and IVV, both of which replicate the returns of SPX but are not considered substantially identical. They conclude that during this highly volatile period, a strategy of harvesting capital losses in order to offset gains outperformed a strategy of deferring both capital losses and gains.

Meyer and Pagel (2019) explore how investors behave in practice after realizing capital gains and losses. Using a unique panel dataset on the daily trading of 113,031 retail investors in Germany over a ten-year period, and examining their mutual fund liquidations in particular, they determine that investors reinvest approximately 83% of every dollar generated from a capital gain but only 40% of every dollar received from a capital loss. Meyer and Pagel find that although this behavior is inconsistent with portfolio theory and tax considerations, it can be explained by certain behavioral phenomena, including both mental accounting—investors tend to experience a larger drop in utility for a realized loss than an increase in utility for a gain of the same size—and the realization effect—individuals tend to take on less risk than they did previously after realizing a loss.

III.   Data & Methodology

We collected all data from the Center for Research in Security Prices (CRSP). We first created a portfolio consisting of the thirty stocks in the DJIA on December 31, 1999, allocating $10,000 to each security. We then gathered the monthly return data for each of these thirty stocks between the years 2000 and 2019. Using this monthly return data, we calculated the performance of the total portfolio and the stocks within it for each calendar year.

In order to better understand the composition of the portfolio from year-to-year, we divide the portfolio into three groups: low, average, and high performing assets. Low performing

assets are those securities that exhibit a negative return in a given year. We defined high

performing assets in the following way:

1. Create a distribution of the asset allocations of each security in the portfolio in a given

    year.

2. Calculate the standard deviation of this distribution.

3. Any asset in the portfolio whose allocation exceeded the mean allocation by at least one

   standard deviation is a high performing asset.

Medium performing assets are all other assets that do not fit the parameters of the low or high

performing assets.

On the final day of the trading year, assuming a 20% long-term capital gains tax rate, we

selectively liquidate the portfolio, realizing all capital losses generated by the low performing

assets so as to maximize and account for any tax credit that may have been generated throughout

the year. Then, we selectively realize capital gains from high performing assets. The goal of this

strategy is to maximize our potential tax benefit, ensure that returns are not excessively eroded

by the capital gains tax over time, and to rebalance the portfolio in order to reduce risk.

Our next task is to rebalance the portfolio. This is done in different ways for each

category of performer. However, the main goal is to transfer funds from high performing assets

to low performing assets. After a thirty-day period (in order to avoid the wash-sale rule), the

funds generated from selling both low performing and high performing assets are reallocated to

the low performing securities. Specifically, the low performing assets are reallocated an amount

equal to their final net asset value from the previous period in addition to a portion of the funds

generated by selling the high performers (the money generated from selling the high performing

assets is divided equally among the low performers). The high performing assets are sold until

their allocations are equal to their value from the previous period. The medium performing assets remain untouched.

Results

In *Table 1* we record the results for buying and holding the thirty stocks of interest between 2000 and 2019. Although no stocks were sold, both General Motors and Eastman Kodak went bankrupt (GM in 2008, EK in 2012), wiping out the invested capital in both. Additionally, in 2005 SBC Communications and AT&T merged. We combined the individual positions of the two companies in November 2005 at the time of the merger. On the basis of annualized returns, Philip Morris performed the best of the individual securities in the portfolio, returning an annualized 18.92% before taxes. Excluding the two companies that went bankrupt, Citigroup performed the worst, returning an annualized -6.24%. On the basis of risk-adjusted returns, Johnson & Johnson was the top performer, posting a Sharpe ratio of 0.76. The portfolio of the thirty stocks returned an annualized 6.95% after taxes, outperforming the S&P 500 by 393 basis points (bps). Buying and holding the thirty DJIA stocks also outperformed buying and holding an S&P 500 index on the basis of risk-adjusted returns, with the former strategy posting a Sharpe ratio of 0.53 and the latter strategy posting a Sharpe ratio of 0.36.

In *Table 2* we record the beginning and end-of-year portfolio NAVs as well as the amount of realized capital gains and losses experienced each year as a result of realizing all capital losses and rebalancing gains. As expected, we see a large number of securities were sold to realize capital losses after the burst of the dot-com bubble—17 in 2001 and 21 in 2002— and during the Great Recession—27 securities in 2008. As a result of these realized capital losses, the maximum tax credit of $3,000 was available every year to offset capital gains. The net tax expense each year was relatively small ($2,803.78).

As we demonstrate in *Table 3*, buying and holding the thirty stocks in the DJIA outperformed the strategy of realizing capital losses and rebalancing gains both on the basis of annualized returns and risk-adjusted returns. Buying and holding returned an annualized 6.95% vs. the strategy's 6.08% annualized return, an outperformance of roughly 85 bps. The former strategy posted a Sharpe ratio of 0.53 while our investment strategy only achieved a Sharpe ratio of 0.38. Both strategies outperformed the S&P 500 on a risk-adjusted and annualized basis.

These findings—gathered from the analysis of return streams of real stocks—are in conflict with the results generated by Monte Carlo simulations in Smith & Smith (2008). Despite having a $3,000 tax credit available in virtually every year throughout this period, the strategy failed to generate an after-tax return greater than what could be achieved by simply buying-and-holding the thirty stocks in the DJIA as of December 31, 1999.

One plausible reason for the underperformance of the strategy is the magnitude of trading costs each year. In Smith & Smith (2008), their net tax expense was never positive while ours is $2,803.78 on average. Too many securities each year meet our criteria for being "high performers," resulting in the sale of too many stocks, and thus the generation of a yearly tax expense that negatively affects the after-tax performance of the portfolio at the end of the eighteen years. This could be a result of the remarkable bullish market conditions under which the strategy was implemented. When buying and holding generates such high returns (less than 50% of the stocks in the portfolio outperformed the entirety of the portfolio), it is difficult to generate outperformance.

Tables

Table 1 Returns for Buy-and-Hold Strategy 2000-2019					
Company	Total Return (%)	Annualized Return (%)	Average Annual Return (%)	Standard Deviation (%)	Sharpe Ratio
S&P 500 Index	75.91%	3.02%	6.61%	17.24%	0.36
Total Portfolio	258.51%	6.95%	9.13%	16.61%	0.53
Alcoa	-54.45%	-4.05%	4.25%	40.61%	0.10
American Express	233.21%	6.54%	12.47%	38.03%	0.32
AT&T	214.03%	6.21%	15.86%	58.84%	0.26
Boeing	1110.67%	14.03%	18.57%	35.06%	0.52
Caterpillar	970.23%	13.29%	16.54%	31.89%	0.51
Citigroup	-70.63%	-6.24%	2.49%	37.01%	0.06
Coca-Cola	223.69%	6.38%	7.18%	15.46%	0.44
Eastman Kodak	-100%	-100%	N/A	N/A	N/A
E.I. du Pont de Nemours	19.22%	0.93%	4.02%	25.86%	0.14
Exxon	198.08%	5.92%	6.75%	16.04%	0.40
General Electric	-59.37%	-4.63%	0.69%	30.03%	0.01
General Motors	-100%	-100%	N/A	N/A	N/A
Hewlett-Packard	32.13%	1.48%	8.06%	39.22%	0.20
Home Depot	369.03%	8.47%	12.27%	28.66%	0.42
Honeywell	406.85%	8.92%	11.80%	26.06%	0.44
Intel	126.28%	4.39%	9.73%	35.72%	0.26
International Business Machines	85.35%	3.30%	5.74%	24.09%	0.22
International Paper Company	57.39%	2.42%	8.57%	39.73%	0.21
Johnson & Johnson	420.83%	9.07%	9.19%	11.73%	**0.76**
JP Morgan	609.30%	10.86%	13.21%	25.70%	0.50
McDonald's	703.24%	11.59%	13.58%	23.84%	0.56
Merck & Co.	186.53%	5.70%	8.61%	25.16%	0.33
Microsoft	320.05%	7.85%	12.96%	31.84%	0.40
Minnesota Mining & Manufacturing	488.33%	9.78%	11.27%	21.71%	0.50
Philip Morris	**2589.30%**	**18.92%**	**20.87%**	27.83%	0.74
Proctor & Gamble	289.83%	7.42%	7.95%	13.92%	0.55
SBC Communications	N/A	N/A	N/A	N/A	N/A
United Technologies	591.12%	10.71%	12.23%	21.85%	0.54
Wal-Mart	147.05%	4.88%	5.96%	17.17%	0.33
Walt Disney	536.81%	10.23%	12.43%	24.95%	0.48

Table 2 After-Tax Portfolio NAV and Realized Capital Gains & Losses 2000-2019					
Year	Beginning of Year Portfolio NAV ($)	End of Year After-Tax Portolio NAV ($)	Number of Securities Sold to Realize Capital Gains	Realized Capital Gains ($)	Number of Securities Sold to Realize Capital Losses	Realized Capital Losses ($)
2000	$300,000.00	$288,681.00	4	$24,185.55	18	$46,224.04
2001	$288,681.00	$256,690.80	5	$6,469.38	17	$55,610.08
2002	$256,690.80	$214,324.80	3	$5,997.55	21	$54,382.01
2003	$214,324.80	$285,765.30	5	$37,084.89	6	$10,437.58
2004	$285,765.30	$297,410.80	5	$30,638.26	10	$39,207.05
2005	$297,410.80	$302,871.70	5	$14,647.98	12	$40,057.76
2006	$302,871.70	$358,647.20	4	$14,039.89	7	$8,580.01
2007	$358,647.20	$390,432.60	5	$26,980.09	12	$25,480.54
2008	$390,432.60	$250,362.40	1	$1,970.54	27	$145,346.37
2009	$250,362.40	$355,476.80	1	$50,016.75	6	$16,275.16
2010	$355,476.80	$405,062.50	0	$39,718.25	5	$52,764.83
2011	$405,062.50	$398,924.70	4	$10,710.36	12	$55,505.06
2012	$398,924.70	$439,121.80	5	$17,970.87	11	$25,703.64
2013	$439,121.80	$574,782.70	4	$36,594.66	4	$8,896.30
2014	$574,782.70	$638,753.30	6	$50,065.98	7	$40,565.78
2015	$638,753.30	$621,473.60	4	$33,138.59	17	$85,462.53
2016	$621,473.60	$751,845.40	4	$62,438.84	8	$33,364.61
2017	$751,845.40	$892,988.10	4	$73,976.16	10	$66,802.54
2018	$892,988.10	$772,805.10	3	$14,714.12	20	$148,183.49
2019	$772,805.10	$920,356.40	5	N/A	8	N/A

Table 3 After-Tax Return Comparison 2000-2019					
Strategy	Total Return (%)	Annualized Return (%)	Average Annual Return (%)	Standar Deviation (%)	Sharpe Ratio
Realize Capital Losses & Rebalance Gains	206.79%	6.08%	7.42%	18.68%	0.38
Buy and Hold	258.51%	6.95%	9.13%	16.61%	0.53
S&P 500 Index	75.91%	3.02%	6.61%	17.24%	0.36

Bibliography

Arnott, R.D., Berkin, A.L., & Ye, J., 2001. Loss Harvesting: What's it Worth to the Taxable Investor? *Journal of Wealth Management*, 3(4), pp.10-18.

Meyer, S. & Pagel M., 2019. Fully Closed: Individual Responses to Realized Gains and Losses. *National Bureau of Economic Research*, Working Paper 25542, pp. 1-47.

Meziana, A.S. & Yang J., 2012. Assessing the Value of Tax Efficient Rebalancing Using ETFs: Is it Always Better than a Tax Deferred Strategy? *International Research Journal of Applied Finance*, 3(9), pp. 1274-1284.

Poterba, J.M. & Weisbenner S.J., 1998. Capital Gains Tax Rules, Tax Loss Trading, and Turn-of-the-Year Returns. *National Bureau of Economic Research*, Working Paper 6616, pp. 1-38.

Smith, G., Smith, M.H., 2008. Harvesting Capital Gains and Losses. *Financial Services Review*, 17(4), pp. 309-321.