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Research Report

Of Passive and Active Equity Portfolios in the Presence of Taxes

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Abstract

In this article, we focus on the impact of taxes on equity management. We introduce the concept of active *tax* management, an endeavor that seeks to maximize after-tax returns from the management of taxes rather than from traditional security selection. We argue that active tax management adds substantial value, whether it is pursued in conjunction with active or passive security selection strategies. To simplify the analysis, we study tax management in a portfolio with passive security selection, and estimate the value of loss harvesting using controlled simulations. We also address practical aspects of tax management, such as risk control and portfolio transition. Finally, we broaden the discussion to address the combination of active security selection and tax management and conclude that the combination of passive stock selection and active tax management is somewhat hard to beat.

1 Introduction

Our goal is to enhance the understanding of portfolio management in the presence of taxes. We introduce the concept of *active tax management*, which seeks to maximize after-tax returns through the management of taxes rather than security selection. In contrast, a portfolio manager is *passive with respect to taxes* if he ignores the tax consequences of trading. We argue that active tax management adds substantial value to a portfolio whether it overlays passive or active stock selection.

Our discussion pertains to a separate account rather than a commingled mutual fund, in which the manager's ability to manage taxation is severely restricted. We begin with definitions and the basic premise of active tax management. By initially eliminating the goal of active security selection and studying the value of active tax management in an indexed portfolio, we are able to bring focus to the subject of careful tax management. In particular, we estimate the value of loss harvesting using controlled simulations. We then discuss some of the practical aspects of tax management, such as risk control, portfolio

transition and lock-up. Finally, we broaden the discussion to address the combination of security selection and active tax management.

2 Definitions

To clarify our ideas, let us start with some precise definitions.

A *passive* portfolio is one that is buy-and-hold. This is an extreme, idealistic definition. Any real portfolio needs attention from a manager to re-invest dividends, to handle corporate actions, and to maintain diversification over time. For a taxable investor, the important feature of a passive portfolio is that it delays the realization of capital gains; this makes it tax-efficient.

An *active* portfolio is one in which the manager routinely changes portfolio holdings in order to seek improved performance. Active portfolio managers use several methods to enhance performance. These methods usually involve the identification of securities, industry groups, countries or asset classes that will out-perform the benchmark. In this paper we refer simply to these as methods of *security selection*. In an active portfolio taxes must be paid each time capital gains are realized.

An *indexed* portfolio seeks to mimic the return of a published index, the average return of a weighted set of stocks. Numerous “paper indexes” are published. Examples are the S&P500, the Dow Jones Industrials, and the MSCI EAFE indexes, etc. A real indexed portfolio seeks to achieve index returns either through full replication of the index or through a sampling method. The returns of an indexed portfolio will diverge slightly from index returns due to transaction costs, fees and other frictions.

From our point of view, a *total-market cap-weighted index (total index)* is the most important type of index. This measures the capitalization-weighted average return of all securities in a specified market. It has three important advantages. First, it is very broadly diversified and implicitly contains the consensus ideas of a large number of active portfolio managers and decision-makers. Second, as long as the securities comprising the

market do not change, an initial investment in a total indexed portfolio remains in lock-step with the index over time and requires no rebalancing in order to stay aligned with the weights as prices move. This means that a total indexed portfolio is buy-and-hold passive and delays the realization of capital gains. Third, the index turnover is usually low, and therefore the tax cost of ongoing portfolio rebalancing is low.

Once again, the concept of a total market index is an idealistic notion, partly because markets are always in flux and cannot be replicated precisely. Many cap-weighted indexes are published. Some of these are designed to measure the performance of a *subset* of the market rather than the whole market. The S&P, Russell, and Wilshire indexes are cap-weighted. However, the Dow Jones Industrial and Value Line indexes are not cap-weighted and thus, are not total indexes in the sense that we have defined. Some specialized indexes, though cap-weighted, are regularly re-constituted and a large portion is added or removed. Examples are the style (value and growth) and size indexes of Russell and S&P/Barra.

Since a total indexed portfolio is not active in terms of stock selection, it is often referred to as being passive. In this paper, we use the term *passive* loosely to refer either to a buy-and-hold portfolio or to a *passive-indexed* portfolio, i.e., a total index portfolio that does not make active security selection decisions. The context should make our use clear.

3 Of Tax Management: Passive and Active

The presence of taxes should affect the way a portfolio is managed, but not all portfolio managers are sensitive to tax issues. A portfolio manager who does not focus on the tax effects of his actions can be thought of as being *passive with respect to tax management*. It is useful to think of an active portfolio manager as having an ideal target portfolio that he would like to own in the absence of taxes. Such a manager often finds it difficult to fully consider taxes since doing so requires that he compromise on his security selection ideas.

Similarly, the portfolio manager of a pure passive-indexed portfolio usually seeks total control over portfolio risk, i.e., tracking perfection. As the weights of the holdings diverge from the index, the portfolio develops a *tracking error*¹ and the portfolio manager must incur taxes in order to reduce this.

A tax-sensitive portfolio manager typically has to give up one or both of the objectives, pre-tax excess return or risk management. In addition, it is possible to be *active with respect to tax management* by seeking an after-tax excess return that derives from the management of taxes rather than from security selection. Such a manager has a number of techniques at his disposal:

1. The most fundamental method of increasing tax efficiency is to employ *tax-lot accounting* to identify individual tax-lots at the time of a sale. This allows the manager to avoid selling any security with a short-term gain (typically taxed at a rate higher than that for long-term gains) and to respond to withdrawals and required turnover by selling first the lot with the highest cost basis first if there is an unrealized gain².
2. Systematic *loss harvesting* is a program that realizes capital losses within the portfolio. This enhances after-tax return by matching gains with losses whenever turnover is necessary and by creating an inventory of losses to offset any capital gains which the investor may incur.
3. When a portfolio diverges from its ideal target over time, the portfolio manager can choose to reduce the tax cost of perfect tracking and instead seek a controlled level of tracking error.

¹ We use *tracking error* as the quantitative measure of the similarity of the portfolio to the benchmark. It is a measure of how closely the portfolio is expected to behave compared to the benchmark. It is computed as the standard deviation of estimated excess returns of the portfolio over the benchmark and is based on a mathematical “risk model”. See Grinold and Kahn[1995].

² While FIFO – highest cost basis, first out – is *usually* appropriate, there are times – for example if the tax rates on short and long-term capital gains are different – when identifying a specific a tax lot will lower the tax cost.

4. At the time an investor transfers a portfolio to a new investment manager a tax cost is often incurred. It is important that the manager provide a tax-sensitive transition by building a portfolio that is close to the desired objective at minimum tax cost.

Tax management is easy to understand in principle, but its practice requires a focused attention to detail. Pragmatic questions arise on the management of risks, harvesting losses in the face of transaction costs, avoiding wash sales, and avoiding long-term lock-up. Before discussing these concepts in Section 5, we explore the value of active tax management.

4 How Much is Active Tax Management Worth?

In order to study how much active tax management is worth in ongoing portfolio management, we start by eliminating the complexities of active security selection and consider the simpler management of taxes in a passive-indexed portfolio. To this end, consider the management of an indexed S&P500 portfolio over a ten-year period. We choose the S&P500 because it is a reasonably good approximation of the total U.S. stock market, its data is readily available, and it is widely followed. Our analysis is based on a careful stock-by-stock simulation of the constituents of the S&P500³. Tax rates are assumed to be at the current maximum marginal federal rate of 40% on dividends and

³ Our computer simulation creates a portfolio that perfectly tracks the S&P500 index each month. We use detailed security-level information on dividends, price return and index constituent weights each period. Our accounting tracks the average cost basis of each security. Portfolio evaluation and index re-balancing is performed each month. We assume no trading costs and hold fractional shares. At the beginning, the portfolio is purchased from cash to precisely match the index. Each month-end we evaluate the portfolio. Dividends received during the month are paid into the portfolio as cash after paying taxes, and are re-invested to reduce tracking. Some securities enter or leave the index based either on index re-constitution or on corporate actions. Securities that leave the index are cashed out, incurring a tax consequence. For simplicity and to avoid loss-carryforwards, we assume the investor has other capital gains, which can offset any losses incurred. We credit the portfolio with the value of the tax saving in the case of capital losses. We use any available cash to approach the index, and then determine whether additional transactions are still needed to obtain perfect tracking.

Data is obtained from what we believe to be reliable sources. We have reconciled our pre-tax price return and dividend return sequences with standard S&P sources. As with all simulations, simplifying assumptions are necessary. It is believed that the simplifying assumptions have only a minor effect on our conclusions.

20% on capital gains⁴. The program pays all taxes on dividends and realized capital gains from the portfolio and re-invests after-tax dividends.

For a portfolio starting with a \$1,000,000 investment at 1/1/1987, Table 1 shows end-of-period values and returns for the perfectly indexed S&P500 portfolio on 12/31/1996.

During this ten-year period the index turnover averages about 4% per year.

Table 1: Perfectly Indexed S&P500 Portfolio, 1/1/1987-12/31/1996

	Final Value	Return per year
Pre-tax	\$4,061,000	15.0%
After-tax:		
Market value	\$3,551,000	13.5%
Final cost basis	\$1,573,000	
Liquidation value	\$3,148,000	

Now, let us introduce tax management. During the period some capital gains are realized even though the portfolio is relatively passive. Taxes arise, for example, because of corporate actions or index changes. When capital gains are realized each year, we can often find other portfolio holdings that have incurred a capital loss and sell enough of these, replacing them by approximately equivalent securities, so as to maintain tight tracking. This is *loss matching*, and its value is shown in Table 2. With loss matching, annual turnover increases substantially, but tracking remains very tight.

Table 2: After-tax loss matching, 1/1/1987-12/31/1996

	Final Value	Return per year
Market value	\$3,598,000	13.7%
Final cost basis	\$1,495,000	
Liquidation value	\$3,177,000	

Finally, it is possible to be more aggressive with respect to tax management. Many investors own a variety of assets that produce capital gains outside the portfolio, and

⁴ While tax rates over the historical period were different than these rates, we view the current rates as a better estimate of what future tax rates will be. We use the 20% rate on short-term capital gains in order to provide a conservative approximation to the tax benefits described.

many others wish to unwind low cost basis holdings. In a passive portfolio with diverse holdings there is an opportunity to improve economic value by aggressively realizing capital losses, i.e., by *loss harvesting*. In simulating this, we allow the portfolio to deviate from perfect tracking so that when a security leaves the index we choose to hold it in the portfolio and delay its taxation. On the other hand, we re-invest dividends in order to more closely track the index over time. The value of loss harvesting, taking credit for the economic value of losses realized, is shown in Table 3. While turnover increases beyond the basic 4% per year, it is below that of loss matching. Turnover is particularly heavy in first year, but drops below index turnover in later years. The tracking error grows from zero to 1.5% per year, averaging .75% over the period⁵.

Table 3: After-tax loss harvesting with controlled tracking, 1/1/1987-12/31/1996

	Final Value	Return per year
Market value	\$3,756,000	14.2%
Final cost basis	\$1,158,000	
Liquidation value	\$3,236,000	

While the benefit from loss harvesting is relatively modest compared to the returns of the market over the period, the economic benefit is not trivial. It justifies the tracking error of .75% per year incurred.

In reviewing these simulation results, note that they err on the side of caution. The simulation program does not identify individual tax-lots of securities, but works with the average cost basis of each security held, harvests losses only once a year, and uses the conservative tax rate of 20% for both short-term and long-term capital gains.

The excess return potential of tax management depends on a number of factors. It depends on the stock market return over the period – in periods of high market return, the loss harvesting opportunities are lower than in periods of low return. It depends on the volatility of the stocks being considered – higher volatility stocks (e.g., those of smaller

⁵ When a portfolio no longer tracks perfectly, its performance may differ from index performance due to random stock price fluctuations. The simulation results displayed here have been adjusted for any such performance difference.

size) provide more opportunities for loss harvesting. Finally, it depends on the index turnover level – an index that turns over at a high rate provides greater opportunities, but the tracking error is likely to be higher⁶. Using a Monte-Carlo simulation of stock price movements based on historical data from the U.S. stock markets, Table 4 estimates the value added by tax management for scenarios that are less generous than that simulated in Table 3. It also estimates the value added when the securities are more volatile⁷. For these cases, the opportunity increases to the range of 1-1.5% per year over a ten-year period.

Table 4: Monte Carlo Estimates of the Value of Tax Management as a Function of Market Return and Stock Volatility

Market Return	Large U.S. Stocks Stddev. 25% per year	Small and international stocks Stddev. 32% per year
15%	.7%	1.0%
8%	1.2%	1.5%
4%	1.5%	1.8%

Much of the benefit from active tax management described here comes from the optionality of the capital gains tax. The investor has an option to pay a capital gains tax either at the present time or at some point in the future. This option has a value which is higher when the underlying security has higher volatility (see Constantinides [1984]). A portfolio manager who acts as “Maxwell’s Demon,⁸” realizing losses when they occur and letting gains ride, can obtain an after-tax advantage.

It is clear that the opportunity for tax loss harvesting declines over time as securities increase in value beyond their cost basis. How long does the opportunity last? For the case of our 1987-1996 simulations in Table 3, the size of the loss realized (as a fraction of

⁶ It can be argued that an index that turns over at a high rate is not appropriate as a benchmark for a taxable investor; it is no longer passive in the sense of buy-and-hold.

⁷ In table 4, we are using 25% and 35% per year as the average volatility of large and small stocks respectively; these were estimated from historical data.

⁸ In thermodynamics, an idealistic demon of Maxwell opens a trap door between two chambers of air, separating low-energy molecules from high-energy molecules, and so creates an efficient engine.

the market value of the portfolio) decreases from about 7% in the first year to about .10% in the tenth year. By contrast, in a weaker 8% return environment (Table 4), the loss realized decreases from 7% in the first year to about 1% in the tenth year. In this case there are valuable harvesting opportunities even after ten years.

How often should losses be harvested? In the simulations described we harvest once a year. More detailed quarterly and monthly simulations show that while the after-tax benefit increases with the frequency of harvesting, it does level off; harvesting too frequently does not enhance return significantly but leads instead to higher levels of turnover and transaction costs.

5 Active Tax Management in Practice

5.1 Loss Harvesting in Practice

While the controlled simulations of Section 4 provide insight into the benefits of tax management, the management of real portfolios is more complex and requires attention to many details of portfolio structure and trading. We explore the question of whether it is practical to manage taxes aggressively in the fashion described here. There are many issues, including:

1. A portfolio manager typically controls risk by constraining the portfolio exposures along a number of “risk factors” such as beta, yield, economic sectors and security-specific exposures. Risk controls may substantially reduce loss harvesting potential⁹.
2. Wash-sale rules specified in the tax code prohibit some losses from being recognized¹⁰.

⁹ To control risk, the portfolio manager may be forced to defer the realization of some losses or to realize some gains. For example, consider a portfolio that tracks the S&P 100 closely, and suppose that a holding in Microsoft, which is over 8% of this index (July, 1999), has losses. Risk characteristics of the portfolio will diverge substantially from the benchmark if the portfolio manager sells Microsoft and buys other securities as a replacement. To avoid this situation, he may need to restrict loss harvesting. Similarly, he may have to sell securities which have gains in order to control tracking error.

3. Transaction costs hinder a harvesting program by making it impractical to fully replicate the index or to liquidate a large position in order to realize a small loss.

It turns out that these issues can be resolved, albeit at a loss of tracking control. This is analogous to an active portfolio manager who incurs a tracking risk relative to the benchmark as he seeks to outperform via security selection.

Working with real portfolios during the 1996-1999 years we have been able to realize losses of about 8% of portfolio value per year. This loss represents an annual tax benefit of at least 1.6%. These realized losses have been higher than those estimated by the more conservative simulations. We have found it possible to realize losses far more frequently than once a year, doing so whenever the portfolio has unrealized losses that are large enough. In addition, recent market performance has been more volatile than historically and there has been a large dispersion of stock prices both across stocks and through time.

In real portfolios we have found it best to harvest losses based on opportunities in the portfolio rather than on a fixed time schedule. Losses need to be harvested more intensively during the first 12-18 months in portfolios that start from cash. There are two reasons for this: the opportunities for loss harvesting are larger since securities have a market value that is close to cost basis, and, at the higher short-term tax rate, the economic benefit of a short-term loss is larger.

A final pragmatic topic is the effect of stock price reversal on loss harvesting. Some research indicates that stocks that incur short-term under-performance tend to bounce back. A serious loss harvesting program may need to deal with this, for example by delaying the realization of losses or by purchasing a new tax-lot in advance of selling an earlier one. Further discussion of this topic is beyond the scope of this paper.

¹⁰ A wash sale occurs if a) a security is sold at a loss and then bought back within the next 30 days or b) a security is bought and *another* lot of the same security is sold at a loss within the next 30 days.

5.2 *Portfolio Transition*

An investor incurs a cost, which is often not made explicit, when he chooses to replace an active portfolio manager. A new manager who is active with respect to stock selection typically has strong opinions about the prospects for existing holdings and seeks to liquidate many of them. A similar tax cost arises with the transfer of shares from one mutual fund to another because a change in ownership and liquidation results in the payment of taxes.

A tax-sensitive portfolio manager should examine the tax consequences of a transition very carefully. As before, it is worthwhile to study the transition to a passive portfolio as this allows us to explicitly focus on the transition cost and to understand the issues involved. A powerful feature of a separately managed passive-indexed portfolio is that it is possible to transfer assets in kind and to construct a new portfolio around existing holdings. An active portfolio manager should carefully evaluate his transition cost relative to this passive approach, and examine a trade-off between his extra tax cost and the security selection benefit he aims to provide.

As a concrete example of the tax cost of a transition to a passive-indexed portfolio, consider the portfolio whose characteristics are shown in Table 5. The initial portfolio contains 60 securities and has an estimated tracking error of 6.4% with respect to the Russell 3000 index. The tracking error reflects an initial growth style exposure. The initial portfolio has a lower yield and a higher beta than the benchmark, as well as a larger weight in small-cap stocks. The initial portfolio has a market value of \$19.33 million and net unrealized gains of \$11.72 million. There are \$0.81 million (4.2% of portfolio value) of short-term gains, \$11.15 million (57.7%) of long-term gains and \$0.24 million (1.2%) of losses. Were the investor to liquidate the portfolio and buy the Russell 3000 (investing in an indexed mutual fund, for example), the tax cost would be \$2.48 million (or 12.8% of the portfolio value). This is a heavy price to pay.

Consider, instead, a portfolio re-balance that will reduce the estimated tracking error to 2% at the lowest possible tax cost. We do this with a mathematical optimization program,

and Portfolio 1 of Table 5 shows the solution to be a substantially reduced cost of \$70,000 (0.4%). Portfolio 1 has 272 securities, and fundamental exposures that are more similar to the Russell 3000. The key to the transition is that gains and losses are realized asymmetrically. While all of the losses are realized, only a fraction of the gains are realized in the transition. The tracking error of Portfolio 1 is 2% and it still has some exposures, including a large-cap bias. Portfolio 2 of Table 5 takes this transition a step further by further reducing the exposures. The tracking error here is about 1% and the tax cost is \$700,000 (3.6%).

This example highlights some of the issues involved in a tax-sensitive portfolio transition. In general, there is a tradeoff between the tax cost and the diversification achieved. The type of the trade-off depends on the nature of the initial portfolio holdings and their cost basis. If there are no major systematic or security-specific exposures in the portfolio, and if the investor is comfortable with a small tracking error, he may not need to pay the price of perfect tracking.

Table 5: Tax sensitive transition analysis, an example

Portfolio Characteristics	Benchmark R3000	Initial portfolio	Portfolio 1	Portfolio 2
Number of securities	2740	60	272	375
Beta	1.03	1.10	1.00	1.03
Yield (annualized)	1.24%	1.0%	1.26%	1.26%
Weighted average cap size	93B	80B	85B	90B
Tracking error (annualized)	–	6.2%	2.0%	0.9%
Valuation measures				
Market value	–	\$19.33m (100%)	\$19.33m (100%)	\$19.33m (100%)
Cost basis	–	\$7.61m (39.4%)	\$7.94m (41.1%)	\$10.8m (55.9%)
Short-term gains	–	\$0.81m (4.2%)	\$0.67m (3.5%)	\$0.41m (2.1%)
Long-term gains	–	\$11.15m (57.7%)	\$10.73m (55.5%)	\$8.13m (42.1%)
Short-term losses	–	\$0.12m (0.6%)	\$0.01m (0.1%)	\$0.01m (0.0%)
Long-term losses	–	\$0.12m (0.6%)	\$0.00m (0.0%)	\$0.00m (0.0%)
Cost of transition				
Liquidation cost	–	\$2.48m (12.8%)		
Transition cost	–		\$0.07m (0.4%)	\$0.69m (3.6%)

5.3 Long-term Issues: Portfolio Lock-up and Concentration

Equity portfolios are expected to appreciate over time and a passive portfolio will then develop unrealized capital gains. As time passes, the investor may be faced with a problem of portfolio *lock-up*, when the cost basis of each tax lot is substantially below its market value and to sell any security requires a large tax cost.

Lock-up is more of a problem in a concentrated portfolio than in a diversified portfolio. A concentrated portfolio contains fewer securities and there is a narrower dispersion in its stock returns. Consider the extreme case of a single-stock investment. If the stock initially appreciates, there may never be an opportunity to harvest a loss, and the chance of becoming locked into the position is quite high. On the other hand, a diversified initial portfolio with a large number of stocks will very likely provide an opportunity to harvest losses even when the aggregate portfolio appreciates. It follows that, for the same value of realized losses, a concentrated portfolio will become locked-up more quickly.

It is important that a portfolio be broadly diversified before it becomes locked-up. Otherwise, the investor faces a difficult problem. He can diversify his portfolio only at a large tax cost, or he can retain the current portfolio but bear inefficient risk. To avoid this situation, portfolios should be very carefully managed when unrealized gains are relatively low. In particular, we recommend that an initial portfolio invested from cash be broadly diversified.

The dynamic conflict between lock-up and diversification is crucial to the management of portfolios in the presence of taxes. Often, an investor is inhibited from making asset allocation changes or replacing investment managers because of lock-up. In addition, the more tax efficient the portfolio management, the more quickly lock-up develops.

Upcoming work of ours will discuss this subject in greater depth.

6 Combining Tax Management with Security Selection

In much of this paper it has been convenient to consider tax management in a passive-indexed portfolio. We have discussed how a portfolio manager is able to seek a tax-managed excess return (alpha) relative to a perfectly indexed portfolio, but that he must incur a tracking risk to do so. Now, let us introduce the subject of security selection. We first briefly discuss active security selection with passive tax management, and then the combination of active security selection and active tax management. Finally, we introduce an approach to attributing an active manager's returns to his security selection and tax management abilities.

6.1 The Active Management Hurdle

A portfolio manager who seeks added value through security selection while being *passive* with respect to taxes often loses value after taxes. In order to justify his fees, he must outperform a passive strategy (also with passive tax management) on an after-tax basis. How big is the hurdle that he must overcome? It has been estimated by other authors that many managers need to achieve 2% - 3% or more in pre-tax excess return per year (see Jeffrey and Arnott [1993], Stein and Garland [1998])¹¹. The size of the hurdle depends on the tax rate, the rate of realization of capital gains, and on the market environment.

6.2 Types of Portfolio Manager

There are four extreme types of portfolio manager with alpha goals as depicted in Table 6, depending on the source of the alpha.

¹¹ The primary difference in tax cost derives from the difference in capital gains realization rates. A passive manager turns over the portfolio only in response to index reconstitution and corporate actions, whereas an active manager typically turns over a larger portion of the portfolio.

Table 6: Four Types of Portfolio Manager

		Tax Management	
		Active	Passive
Security Selection	Active	$\alpha_s > 0, \alpha_t > 0$ Tax managed active	$\alpha_s > 0, \alpha_t \leq 0$ Tax exempt active
	Passive	$\alpha_s = 0, \alpha_t > 0$ Tax managed passive-index	$\alpha_s = 0, \alpha_t = 0$ Passive management, “pure indexing”

At the southeast corner is an index-fund manager, who seeks no stock-selection alpha, and tracks perfectly; he is insensitive to taxes. At the northeast corner is an active tax-exempt manager, who seeks a stock selection alpha, and is also insensitive to taxes. As discussed, being passive or insensitive to taxes in this case means that he will lose after-tax value if he applies his active processes directly to taxable portfolios. At the southwest corner, we have the case discussed in Sections 4 and 5 of this paper – that of a tax managed-passive indexed portfolio. At the northwest, we have the ideal manager who seeks to add value through both stock selection and tax management.

The classification of tax management styles into active and passive is clearly analogous to that of security selection. But, there are two important differences. First, while passive security selection – a passive-indexed portfolio – provides average stock-selection performance, being passive with respect to tax management is very likely to destroy after-tax value. Second, while a security selection alpha is uncertain (the investor gets only the *chance* of an alpha in return for his fees, taxes and tracking error), in contrast the tax-managed alpha is *certain* and the investor incurs only a (typically small) tracking error.

6.3 *The Attribution of Returns to Stock Selection and Tax Management*

What do we get when we cross a skilled stock selector (his stock selection alpha is α_s) with a skilled tax manager (his tax management alpha is α_t)? The maximum possible alpha that such a manager can achieve is $\alpha_s + \alpha_t$. However, the dual goals of seeking a security selection alpha and a tax managed alpha work against one another and we conjecture that this upper bound cannot be achieved in practice. An active manager who is tax sensitive should be willing to address the subject of how much he gives up on his security selection and how much he is seeking in tax management.

How can we determine α_s and α_t in practice? Consider a portfolio p measured against a benchmark b , both before and after taxes¹².

Let:

R_p^0 be the pretax return of the portfolio

R_p^{at} be the after-tax return of the portfolio

R_b^0 be the pretax return of the benchmark

R_b^{at} be the after-tax return of the benchmark.

Then,

The pre-tax excess return is $xs^0 = R_p^0 - R_b^0$

The after-tax excess return is $xs^{at} = R_p^{at} - R_b^{at}$

Let us think of the portfolio's after tax excess return as being the sum of a security selection and a tax managed component, i.e., $xs^{at} = \alpha_s + \alpha_t$. Let us define the security selection alpha as $\alpha_s = xs^0$, the pre-tax excess return of the portfolio over its benchmark.

Then, algebraically, the tax alpha α_t is $\alpha_t = xs^{at} - xs^0$.

¹² The performance measurement of the portfolio and its benchmark before taxes are standard. It is also possible to measure the return of the portfolio and its benchmark after taxes, and Stein et al [1999] suggest a method.

Let us check whether our attribution of the return into these two components is both intuitive and reasonable. For a manager who does no security selection and achieves passive pre-tax market returns (i.e. $xs^0 = 0$), we have $\alpha_t = xs^{at}$. That is, all of the excess return comes from tax management. As an example, consider a portfolio that outperforms the benchmark by 1.5% on a pre-tax basis and returns 2% above the benchmark on an after-tax basis. Using our framework, $\alpha_s = 1.5\%$ and $\alpha_t = .5\%$. On the other hand, consider a portfolio that outperforms by 1.5% on a pre-tax basis but loses 1% on an after-tax basis. Here, $\alpha_s = 1.5\%$ and $\alpha_t = -2.5\%$; the manager has lost his security selection benefit, and then some, to taxes.

As with almost all performance attribution, this decomposition of total alpha is not flawless. For example, it is not always clear why a manager makes a decision. Does he hold a stock because he thinks it will out-perform the market or because the tax hurdle to selling it is too high? Or, consider a manager who has no stock picking ability but happens to out-perform the index because his active tax management forces him to incur a tracking risk. Our approach attributes his difference in pre-tax returns to security selection, even though in this case it was due to noise. Over a long period of time, the effect of such noise should, on average, be zero. This is analogous to an unskilled stock selector being lucky; long-term performance analysis should be able to determine whether the out-performance was due to skill or to luck.

7 Conclusion

The goal of this paper has been to enhance the understanding of managing a separate account in the presence of taxes. In particular, we have introduced the subject of active tax management, and have argued that it adds substantial value, regardless of whether it is pursued in conjunction with active or passive security selection strategies. Tax management is important at portfolio initiation (at the time assets are transferred to a new manager), and during ongoing portfolio management using methods such as loss management and the tax-sensitive control of portfolio risks. Additionally, it has a value at portfolio termination – for example when assets are transferred to heirs or to trust or charitable vehicles – but the benefits are harder to quantify.

Our exploration of tax management has taken a number of directions. We have used computer simulations to estimate the value of tax management. We have used examples to show the benefits of a tax-sensitive transition. And, we have analyzed the interplay between tax management and security selection, and have proposed a method for attributing a manager's returns to these two aspects of his decision making.

Much of this paper has exploited the notion of passive-indexed portfolios in order to focus more clearly on tax management. While passive-indexed portfolios are very useful in principle, it turns out that they are very powerful in practice as well. Others, too have made this point (Jeffrey and Arnott [1993], Jacob[1995], Stein and Garland [1998]). We have seen here that active tax management provides tangible additional benefits. Overall, tax-managed passive-indexed portfolios are hard to beat.

8 References

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