Paired-switching for tactical portfolio allocation

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INTRODUCTION

Paired-switching refers to investing in one of a pair of negatively correlated equities/ETFs/Funds and periodic switching of the position on the basis of either the relative performance of the two equities/ETFs/Funds over a period immediately prior to the switching or some other criterion (for the sake of brevity, we will subsequently abuse the word *equities* to include both ETFs and mutual funds as well). It is based upon the idea that if the returns of two equities are negatively correlated, overlapping of the periods during which the equities individually yield returns greater than their respective mean values will be infrequent. Consequently, if the criterion for switching is even minimally accurate in its ability to identify the boundaries of such periods, there is a possibility of improving the performance of the portfolio consisting of the two equities over the portfolio wherein the two equities are statically weighted on the basis of traditional methods such as, for example, variance minimization.

Trading based on **paired-switching** is fundamentally distinct from *paired-trading*, which seeks enhanced returns by attempting to exploit the *departure* of the behavior of the time series of the actual returns from the prediction of a model based upon historical data and implements a market neutral strategy on the assumption that the prices will ultimately move to conform with the model. In contrast, paired-switching embraces the model – which is just the fact that the returns are negatively correlated - and tries to *ride it out*.

When applied to each equity in a portfolio, paired-switching provides an alternative means of dynamic or tactical portfolio allocation.

Some results of back testing shown below suggest that some very simple criteria for paired-switching can lead to lower volatility without any significant penalty in terms of lower returns.

DATA AND METHOD

We have used weekly adjusted close data from Yahoo Finance for all the calculations and, due to this constraint, all the trades are assumed to be performed at the end of a week.

Starting from the end of the first full week of the year, we look at the performance of the two equities over the prior thirteen weeks (*the ranking period*), and buy the equity that has the higher return during the ranking period. The position is held for thirteen weeks (*the investment period*). At the end of the

investment period the cycle is repeated. Clearly, this process does not require that the position be necessarily switched at the end of an investment period. Thus, the holding times may vary from thirteen weeks to any arbitrary number of investment periods.

Obviously, the number of weeks in the ranking period and the investment period can be varied (independently) to optimize the strategy for a given pair of equities. Although the inevitable concerns on *over-fitting* (a source of error for future performance of the strategy that is referred to as *data mining* in the financial literature) associated with such an optimization can be addressed by means of an appropriate cross-validation methodology, we have made no attempt to tweak these parameters for the examples shown here. It's worth noting here, however, that for some of the examples given below, some other values of the ranking and investment periods do indeed improve the results substantially, but, since our purpose is to illustrate the generality of the approach, such results are not presented here.

As a final caveat, we note that we have considered neither the transaction costs nor the constraints on the holding periods for mutual funds in any of the calculations. However, since the number of transactions for a given pair is no more than four per year, the transaction costs are expected to be a minimal fraction of any reasonably sized portfolio.

RESULTS

The results for some market-wide ETFs are shown in the first three rows of Table 1 below. In each case the ETF is paired with a long term treasury ETF, TLT, whose date of inception is very recent. As a result, the number of years for which the back testing for these pairs was performed is quite small, and, therefore, the substantial improvement in both the returns as well as the volatility and draw-downs, although quite encouraging, cannot be considered definitive or typical.

Equities (Cross-correlation)	**Period**	**PAIR CAGR** (Std, Min)	**EQUITY CAGR** (Std, Min)	**P-Value**
SPY, TLT (-.84)	2003-2011	15.0% (7.6%, 6.7%)	SPY 4.8% (20%,-37%) TLT 6.8% (14%,-22%)	.021
EFA, TLT (-.79)	2003-2011	20.1% (9.5%, 6.2%)	EFA 7.1% (24%,-42%) TLT 6.8% (14%,-22%)	.016
VTI, TLT (-.84)	2003-2011	15.6% (7.6%, 6.9%)	VTI 5.7% (20%,-37%) TLT 6.8% (14%,-22%)	.025
VFINX, VUSTX (-.21)	1991-2011	11.3% (9.3%, -11.9%)	VFINX 8.1% (19%,-37%) VUSTX 8.5% (11%,-12%)	.036

Table 1 Results of back testing for some broad market ETFs and Mutual Funds
Std (Min) is the standard deviation (minimum) of the annual returns.

It is noteworthy, nevertheless, that the low p-values for the Henriksson-Merton timing test ([Henriksson-Merton, 1981], [Chang-Lewellen, 1984]) suggest that the improvement is statistically

significant. The test was performed for the returns for the period 2003-2010, with the SP500 returns used as the market returns and the ten year treasury rates as the risk free rates.

The last row in the table above depicts the result for the Vanguard SP500 mutual fund paired with the Vanguard Long Term Treasury Fund, the data for both of which are available for more than the past twenty years. Once again the paired-switching strategy yields an improvement in both the annualized return and the volatility measures, though the low negative correlation may explain the less significant enhancement in the performance. The p-value for the Henriksson-Merton test for this case is slightly higher than those for the previous cases, but even then is sufficiently low to suggest that the strategy provides statistically significant improvement.

In Table 2, we evaluate the effect of using paired-switching for the so-called lazy portfolios that are designed for passive investors. Each portfolio as usually prescribed contains a bond fund for which we use the long term treasury ETF, TLT, and if the recommended weightings are not equal they are shown in the first column.

For paired-switching, we paired each ETF other than TLT with TLT, and back tested as described in the previous section on data and method. Unlike the recommended portfolios, there was no permanent position in TLT (since paired switching dynamically allocates the fraction of the portfolio to be invested in it), and equal amounts were invested in each pair. It is clear that quarterly (every thirteen weeks) repositioning using paired switching may substantially improve the performance of these portfolios.

Portfolio	Period	Portfolio CAGR (Std, Min)	Paired-Switching CAGR (Std, Min)
60-40 Standard Allocation SPY-TLT (.6,.4)	2003-2011	6.9% (7.64%, -9.65%)	15.9% (7.6%, 6.7%)
Andrew Tobias 3-Fund SPY, EFA, TLT	2003-2011	7.7% (11.0%, -16%)	18.3% (8.0%, 8.3%)
Swensen SPY, VNQ, EFA, TLT (.3,.2,.2,.3)	2005-2011	5.1% (11.7%,-17.5%)	18.6% (7.1%, 7.5%)
Bernstein Basic SPY, IWB, EFA, TLT	2003-2011	7.2% (13.2%,-21.46%)	17.6% (7.7%, 8.0%)

Table 2 Results of back testing for some *lazy* portfolios
Std (Min) is the standard deviation (minimum) of the annual returns

REFERENCES

[Henriksson-Merton 1981] Roy D. Henriksson and Robert C. Merton, On Market Timing and Investment Performance. II. Statistical Procedures for Evaluating Forecasting Skills, The Journal of Business, Vol. 54, No. 4, (Oct. 1981), pp. 513-533

[Chang-Lewellen 1984] Eric Chang and Wlibur Lewellen, Market Timing and Mutual Fund Performance, The Journal of Business, Vol. 57, No. 1, (Jan. 1984), pp. 57-72.