**Exchange Traded Funds as a Vehicle for Implementing End-of-Month Trading Strategies**

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**Abstract**

An Exchange Traded Fund (ETF) is a retail investment product which is designed to mirror the returns of a basket of assets, typically the stocks which comprise a particular market index. ETFs provide an efficient mechanism for individuals to enter investment positions in a broad market or industry sector index. End-of-Month (EOM) trading involves the timed switching from cash to market exposure and then back to cash, in an attempt to capture higher returns than is available to a buy-and-hold alternative. The effectiveness of EOM has been demonstrated in a number of studies, but transaction costs and, very importantly, regulatory restrictions have been implementation impediments faced by individual investors. In this sturdy, ETFs are examined for implementation efficiency for individual retirement account investors who wish to employ an EOM trading strategy.

**I. Introduction**

An Exchange Traded Fund (ETF) is an investment product that is based on the securities which comprise a particular market index such as the Standard and Poors 500 (S&P). Primary investors, generally institutional investors some of whom are also broker/dealers, deliver baskets of securities which comprise the index to the fund manager who exchanges the baskets for large blocks of registered ETF shares. The broker/dealers then offer the ETF shares to retail investors and commence to make a market in the new security. Arbitrageurs assure that the ETF shares very closely mirror the behavior of the index itself and the market making activities of the sponsoring broker/dealers assure that small lot investors can enjoy not only efficient investment access to the broad index but excellent liquidity as well. ETFs are designed to provide per-share pricing levels that do not discourage small round lot investors and are of sufficient total dollar size to assure that float is sufficient to support very active trading. Indeed, ETF issues have often been among the daily volume leaders on the exchanges where they are traded, and leading index ETFs often display intraday bid-ask spreads of a penny or less.

A market timing strategy is an investor's attempt to outperform a buy-and-hold alternative by systematically moving an investment account balance between two different market exposures, typically comprised of an aggressive "in-the-market" position and a very conservative "cash-equivalent" position. End-of-Month (EOM) strategies generally seek to expose the investment account to market opportunities and risks over the few days surrounding month-end, and safely park the account's balances in cash for the remainder of each month. A number of studies have demonstrated that EOM strategies have the potential to outperform buy-and-hold alternatives. In practice, a number of impediments confound profitable implementation.

First is the tax consequence associated with short-term investment forays designed to capture fleeting excess returns. While buy-and-hold strategies will typically result in long-term capital gain/loss treatment, the taxation of gains from an EOM switching strategy will be all

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short term. For an individual's taxable investment account, an EOM strategy must bear a higher imputed taxation rate than would apply to buy-and-hold. The practical consequence is that EOM switching strategies are generally viewed as appropriate for only retirement accounts. Indeed, early investigations of EOM switching focused on the family of mutual funds that comprise the TIAA-CREF retirement plans available to professionals in higher education and research.

Historically, the alluded EOM strategy using CREF mutual fund accounts was available without transaction costs, but regulatory evolution in the form of restrictions on the number of mutual fund account changes permitted during any calendar quarter effectively quashed that opportunity. In the open market, an EOM program must earn enough excess returns to overcome its transactions costs and historically, that would have been burdensome. Brokerage efficiencies and competition, however, have sufficiently commoditized trading costs that the transaction cost issue for stocks is relatively inconsequential. Indeed, individuals account holders can affect a 200 share round trip trade (into the security and then back out a few days later) for as little as $2.00. ETFs trade like stocks, so the cost advantages of discount brokerage are completely available to EOM strategists.

For generations, investors have sought trading strategies that might outperform a buy-and-hold approach. Systematic switching of account balances between or among two or more investment vehicles is one such strategy. Researchers have identified a number of strategies with the promise of premium returns, but those higher gross returns have generally been accompanied by measurably higher implementation costs. A switching strategy must overcome three obstacles before it can compete successfully with buy-and-hold. First, the switching algorithm must out-perform buy-and-hold by at least the incremental direct costs of trading. Second, in accounts where realized gains and losses are currently taxed, a switching strategy must overcome this tax disadvantage. Third, a switching strategy must avoid institutional and regulatory constraints such as anti-churning rules that characterize, for instance, some mutual fund programs.

Switching strategies which exploit a perceived turn-of-month (TOM) effect in the returns of U.S. equity securities have received some research attention. Equity indices have been the focus of much of that interest. For a number of hypothesized reasons, indices such as the S&P are thought to display higher returns in the few days surrounding each month-end, and revert to more modest average daily returns during the remainder of the month. A TOM switcher establishes a long position in the index just prior to the month-end, maintains the position over the calendar change, and liquidates it shortly thereafter. The proceeds are held at money market rates for the ensuing weeks until a second TOM investment is launched at the next calendar event. The investment returns to such a switching strategy, after transaction costs have been deducted, are compared to the indicated returns from a simple buy-and hold strategy.

For taxation purposes, investment gains are generally deferred until realized through the sale of an investment position. Thus, gains accruing in a buy-and-hold portfolio escape current taxation while gains that are realized through a switching algorithm face current tax levies. The potential acceleration of tax obligations is a second hurdle that a TOM switcher must overcome.

The availability of exchange traded funds permit a switcher to easily clear the third hurdle, namely the regulatory and administrative restrictions that seek to limit churning in mutual

fund accounts. ETFs based on broad market indices allow a TOM trader to implement his strategy as simply as by buying and selling an individual stock.

**II. The Literature**

Calendar based effects have been observed in the return streams of U.S. equities and switching strategies have been suggested to exploit these effects. Wachtel (1942) described a January effect where above average returns were attributed to the first month of the year. Tax motivated December sales, followed by aggressive re-investment in January is generally thought to explain the phenomenon. Kunkel and Compton (1998) summarize the January effect literature, noting the findings by Riepe (1998) that opportunities to exploit the effect appear to have diminished over time.

Cross (1973) documented an observed negative Monday effect in the returns of equities. Kamara (1997) showed that the intensity of the Monday effect in stock prices, and by extension it's potential as a profitable basis for a switching strategy, has also diminished over time.

Ariel (1987) described a month-end pattern in the returns of stock portfolios. His dichotomous study showed that returns for the first half of the month exceed, on average, returns for the latter half. Subsequently, Lakonishok and Smidt (1988) and Ogden (1990) narrowed the range for superior returns to the few days surrounding month-end and advanced hypotheses that liquidity issues motivated those excess returns. First, institutional investors seek to reposition portfolios before month end, resulting in a concentrated month-end sell-off of some positions. Second, near month-end in-flows of investable funds to the household sector stimulates a short-lived surge in demand for investments at the beginning of the next month. Henzel and Ziemba (1996) found that this TOM effect could be profitably exploited by switching between an S&P 500 portfolio and a money market account. Their study of the S&P 500 from 1928 to 1993 revealed that average daily returns were positive during a TOM interval (defined in this study to be the last trading day of the month plus the first four trading days of the next month) and the first half of the month. The second half of the month saw negative returns. They concluded that "the cumulative wealth effects of investment during various time periods magnify the effects. The results indicate that the total return from the S&P 500 over this sixty-five-year period was received mostly during the turn of the month. The strategy of being long the S&P 500 during the TOM or the FH and long T-bills otherwise has very high total returns … When risk is considered this strategy dominates all the strategies considered …"

The CREF Stock Fund is an investment option available to academicians and others who invest retirement savings through TIAA-CREF. Kunkel and Compton (1998) examined the CREF Stock fund to see if participants could exploit TOM to earn higher returns while reducing overall risk. They simulated a TOM strategy that was long the CREF Stock Account from day -4 to day +2 (four trading days before the end of the month through the second trading day of the next month) and switched out to CREF's Money Market Account the rest of the time. Their CREF Stock and Money Market portfolio earned an average annual return of 17.7% compared with a 15.6% annual return for a CREF Stock Fund buy-and-hold strategy.

Rayhorn, Janson, and Drosen (2009) examined the TOM effect in broad-based U. S. market indices and found that the effect persists through 2008. They also found that the CREF

account strategy proposed by Kunkel and Compton would still be profitable, if anti-churning rules for mutual fund investments had not been strengthened.

**III. The Studies**

This paper reports the results of our investigations into the efficacy of TOM switching strategies implemented though two prominent ETFs. One fund is the SPDR S&P 500 ETF which tracks the performance of the common equity of 500 of the largest United States firms and trades on the AMEX under the symbol SPY. The ETF is managed by State Street Global Advisors (SSgA), trades on the American Stock Exchange (AMEX) under the symbol SPY, and offers shares that are affectionately known as Spiders. The second is the Diamonds Trust Series 1, which is a unit investment trust that itself owns shares of each of the 30 firms which comprise the Dow Jones Industrial Average. The Diamonds Trust is designed to closely track the average. SSgA also manages the Diamonds ETF, which shares trade on the New York Stock Exchange under the symbol DIA.

In each case, we compare the returns from a buy-and-hold strategy that invests in a broad market ETF, with the returns generated by a TOM switching strategy employing a Money Market Fund as its baseline investment and the same ETF for short-duration market exposure over the month-end.

For each study, we created a daily returns series from the reported closing prices of the ETF. For the Spiders, the return series spans 29 January 1993 through 11 September 2009, while returns for the Diamonds were computed from 20 January 1998 through 11 September 2009. These series support the calculation of buy-and-hold performance metrics for each ETF. For the TOM switching strategies, baseline money market returns are also needed. We created a surrogate money market return series from daily closing prices of the current 3-month U.S. Treasury bill.

First, we coded each ETF daily returns series observation with an indexing variable that reflects its displacement from the first day of the month. Thus, the observed return for the first trading day of June would be coded as day +1, while the return for the third trading day of April would be coded as day +3. Similarly, a return observed on the last trading day of August would be coded as day -1, while the return seen on the fourth to the last trading day of October would be coded as day -4. Our first tests of significance addressed the question of possible concentrations in the returns earned on particular index days. Following the formulation of Kunkel, Compton and Beyer (2003) we tested the significance of average returns obtained on days organized according to this indexing scheme. For each ETF, Ordinary Least Squares regression was used to estimate the model:

$$R_t = \beta_{-11}D_{-11,t} + \beta_{-10}D_{-10,t} + \ldots + \beta_{+10}D_{+10,t} + \beta_{+11}D_{+11,t} + \beta_{other}D_{other,t} + e_t$$

where $R_t$ is the return on trading day t, and D is a dummy variable for the trading days -11 to +11 and other. 'other' is the occasional day(s) in a month where you have more than 22 trading days. $D_{-2,t}$, for instance, will be set to one if the day t happens to be the second to the last trading day of a month, and set to zero for all other days. The effect of the dummy variables will be to group and average the returns to holding the ETF that are enjoyed on a particular day,

relative to the turn-of-the month. Testing the parameters, $\beta$, of this regression is analogous to conducting individual T-tests of the null hypotheses that the average daily return for a particular index day is not significantly different from zero. As observed by other researchers, we also found significant returns concentrated around the TOM event. Notably, our analysis suggests that the intensity of the TOM effect on day +1 may have diminished in Spiders since 2000 but remains relatively pronounced in Diamonds through 2009. Tables I and II summarize the OLS estimates for the Spiders and Diamonds models, respectively.

A second approach for assessing index day significance involved moving averages. Binary variables were employed to structure the observed data. For each series, a 19 trading-day moving average return was calculated, and the return for a particular day was then compared to the moving average centered on that day. Essentially, this filter attempts to extract above-trend or below-trend performance from the series. If a particular day's return exceeded its centered 19-day moving average, its binary variable will be coded as 1, and if its return fails to exceed the moving average, its binary variable will be coded as 0. Under a null hypothesis of no TOM effects, these variables (for any specific trading day) should be independent Bernoulli variables with p=0.5. Deviations from that expected level for a particular index day suggest the presence of systematic abnormal returns (TOM effects) and warrant significance testing. Sample proportions and their z-scores were calculated for Diamonds, Spiders and the Money Market surrogate and the later period results are reported in Panel A of each table, III through V, respectively. Notably, the Spider and Diamond returns showed a fairly significant z-score for day +1.

Moving averages were replaced with the 19-day median return, and the observations were recoded. Again, under the null hypothesis of no systematic excess returns, the binary variables should be independently distributed Bernoulli variables with p=0.5. Panels B of tables III, IV and V report the median return performance. For Spiders, excess day +1 performance is confirmed, but for Diamonds the TOM jump appears to be most significant on day -1.

Each of the descriptive tests confirms the existence of significant excess returns on trading days near the turn-of-the-month in the price series of prominent index-based ETFs. This confirmation motivates the design of an investment strategy which might exploit these effects.

To investigate the relative strength of a timed trading strategy involving switching into and then out of broad-market ETF, we constructed four portfolios and replicated the portfolio structures over the Spider and Diamond ETFs. Wealth relatives (WR), representing the cumulative returns of each portfolio, were calculated for two holding periods for each of the ETFs. For each fund, the period from contract inception through 1999 was designated as the early era and is generally considered to be reflective of bullish sentiment. For both Diamonds and Spiders, the period from 2000 through 2009 was designated as the late era and is generally thought to be reflective of more bearish sentiment. Comparisons of the WRs generated by the four portfolios in each of the eras provide insight into the capacity of a TOM timed trading strategy to generate excess returns and the potential defensive efficacy of such a strategy.

The first portfolio in each study is a simple money market account which serves as a baseline for riskless investment. For this portfolio, WRs are surrogated by the price series of 3-

month Treasury Bills. As reported in Table VI, the Money Market (MM) portfolio produces a WR of 1.26 over the early Spider period 1993-1999 (ESP), a score of 1.07 over the early Diamonds period 1998-1999 (EDP), and a WR of 1.22 for the subsequent bearish 2000-2009 period (LBP).

Next, a buy-and-hold portfolio was structured for each ETF. Again, from Table VI, a Spider investment over the ESP produced a WR of 3.79, surpassing the MM portfolio by a wide margin. In the LBP, however, the Spider buy-and-hold WR of 0.83 was crushed by the more conservative MM. Likewise, the Diamonds buy-and-hold strategy produced WR of 1.51 in EDP, which dwarfed the MM's 1.07. Again, in the LBP, buy-and-hold Diamonds posted WR of just 1.01, while the more defensive MM strategy posted a 1.22 score.

Inspection of the descriptive results in tables I through V suggests that one efficacious TOM strategy might involve switching from defensive MM to aggressive ETF once a month, and that the duration of the switch might plausibly be for six trading days. Since this design moves the investor's wealth between aggressive and defensive strategies, with the aggressive stance selected approximately 27% (6 ETF days / 22 trading days) of the time, we sought a baseline for the performance to be expected from portfolios that are, once each month, switched into an ETF for six days, and then switched back out. Our third portfolio is a random period switching structure (RANDOM). For each month, we selected at random, six daily returns from the ETF price series, and replaced the MM returns for those days with the ETF returns. As seen in Table VI, the RANDOM Spider portfolio expressed a WR during the ESP (1.44) that reflected an averaging of the performances of the conservative MM (1.26) and the aggressive Spider Buy & Hold (3.79). Surprisingly, however, the RANDOM Spider portfolio (1.33) outperformed both the MM (1.22) and Buy & Hold (0.83) during the LBP of 2000-09. For Diamonds, the early period RANDOM (1.04) trailed both the conservative and aggressive strategies. In the late period, however, RANDOM Diamonds (1.46) surpassed both the MM and Diamonds Buy & Hold.

Now with RANDOM Spiders and RANDOM Diamonds established as baselines, we investigate the performance of a similar once-monthly, in–and-out trading strategy that calibrates its entry and exit points to the trading day calendar. Specifically, we define a TOM portfolio to be a MM based account that is switched into ETF on trading day -4 and switched back to MM on day +2. In the early period, TOM Spiders (1.73) outperform RANDOM Spiders (1.44), while in the later bearish period, the TOMs (2.48) are also much better (RANDOM = 1.33). For Diamonds, the early period TOMs (1.02) are comparable to RANDOM (1.04), but in the late period, the TOMs (2.32) are much stronger than RANDOM (1.46).

## IV. Discussion

In the early "bullish" period before 2000, TOM Spiders outperformed MM and RANDOM Spiders, but, by parking in MM for much of the time, missed much of the price appreciation that was captured by Buy & Hold Spiders. Early period TOM Diamonds were even less impressive, with Buy & Hold Diamonds and MM both beating the TOM portfolio. In the later "bearish" period from 2000 to 2009, however, the potential value of a TOM ETF strategy is apparent. In these years, our TOM Spiders solidly advanced (WR=2.48) while MM gained much less (WR=1.22) and Buy & Hold Spiders actually lost value (WR=0.83). During the same

bearish period, TOM Diamonds advanced (WR=2.32) much more than the defensive MM (WR=1.22) and relatively static Buy & Hold Diamonds (WR=1.01).

The mixed reviews of TOM during market expansion suggests that positive effects posited to surround the monthly turning of the calendar page may be overwhelmed by the general rise in the market motivated by randomly appearing positive news. Buy & Hold alternatives capture the full rise, while TOM sits out 73% of the time. Quite strikingly, though, TOM charges ahead of its competitors when market sentiment is less enthusiastic. By sitting out 73% of the time, TOM misses the declines that accompany the receipt of a lot of bad news, but, by being in the market during the critical turn-of-month period, is the beneficiary of systematic TOM events.

**V. Conclusion:**

While earlier research has shown that opportunities to profitably exploit calendar effects such as the January effect and the week-end effect have waned in recent years, this study suggests that opportunities remain to capture excess returns from the Turn-of-Month (TOM) effect. We find compelling evidence, especially during periods of bearish sentiment, that a TOM motivated switching strategy can be profitably applied in a discount brokerage IRA utilizing broad market ETFs.

Table I

SPDR Average Daily Returns For All Trading Days

1% is light shadow dark font, underlined and italics; 5% is dark shadow white font; 10% medium shadow dark font

| Trade Day | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 | 2000 | 1999 | 1998 | 1998-2009 | 2000-2009 | 1993-1999 | 1993-2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 0.73% | -0.86% | -0.04% | 0.28% | 0.05% | 0.05% | 0.03% | 0.78% | -0.52% | 0.48% | -0.26% | -0.21% | 0.03% | 0.08% | 0.06% | 0.07% |
| 9 | -0.22% | 1.38% | 0.37% | -0.19% | -0.10% | -0.21% | 0.45% | -0.03% | 0.32% | -0.15% | -0.21% | 0.15% | 0.14% | 0.17% | 0.12% | 0.15% |
| 8 | 0.48% | -0.68% | 0.04% | -0.08% | 0.11% | -0.13% | 0.45% | 0.07% | 0.13% | -0.93% | -0.03% | 0.51% | -0.03% | -0.07% | 0.04% | -0.02% |
| 7 | 0.08% | -0.58% | -0.46% | -0.23% | -0.18% | 0.28% | -0.23% | -0.73% | -0.16% | -0.11% | -0.31% | 0.28% | **-0.22%** | **-0.24%** | 0.05% | -0.12% |
| 6 | 0.06% | -0.38% | 0.26% | 0.17% | -0.01% | -0.27% | -0.25% | 0.42% | -0.59% | -0.19% | -0.02% | **-0.73%** | -0.10% | -0.08% | -0.11% | -0.09% |
| 5 | 0.20% | -0.25% | -0.19% | -0.15% | 0.00% | -0.19% | -0.16% | -0.35% | 0.01% | 0.23% | 0.16% | **0.67%** | 0.00% | -0.09% | 0.15% | 0.01% |
| 4 | -0.55% | -1.15% | 0.46% | 0.00% | 0.21% | 0.15% | 0.32% | 0.21% | -0.15% | 0.05% | 0.30% | 0.20% | 0.01% | -0.03% | 0.06% | 0.01% |
| 3 | 0.27% | -0.70% | -0.27% | -0.04% | -0.06% | -0.03% | 0.04% | -0.47% | 0.04% | 0.37% | 0.74% | -0.44% | -0.04% | -0.09% | **0.18%** | 0.02% |
| 2 | 0.44% | -0.11% | 0.00% | 0.14% | 0.07% | 0.16% | 0.30% | -0.56% | 0.23% | -0.57% | 0.14% | -0.10% | 0.00% | 0.00% | 0.13% | 0.05% |
| 1 | 0.30% | -0.40% | 0.12% | 0.11% | 0.23% | ***0.42%*** | 0.79% | -0.02% | 0.09% | 0.52% | 0.28% | **0.77%** | 0.27% | 0.21% | ***0.38%*** | ***0.28%*** |
| -1 | -0.40% | 0.40% | 0.13% | -0.07% | 0.05% | 0.04% | 0.13% | -0.10% | 0.07% | 0.42% | 0.14% | ***-1.20%*** | -0.01% | 0.10% | **-0.18%** | -0.02% |
| -2 | -0.38% | 0.10% | -0.14% | 0.19% | 0.23% | 0.03% | -0.06% | 0.45% | 0.01% | -0.15% | -0.23% | 0.48% | 0.06% | 0.04% | 0.06% | 0.05% |
| -3 | -0.21% | 0.05% | 0.31% | **0.30%** | 0.08% | 0.14% | 0.31% | -0.54% | -0.44% | -0.03% | 0.06% | -0.07% | 0.00% | 0.00% | 0.08% | 0.03% |
| -4 | **1.25%** | 1.83% | -0.23% | 0.06% | -0.03% | 0.20% | 0.19% | 0.04% | 0.14% | -0.13% | -0.07% | -0.62% | 0.19% | 0.30% | 0.00% | 0.18% |
| -5 | 0.09% | -0.06% | -0.41% | 0.18% | -0.16% | 0.25% | -0.18% | -0.16% | 0.48% | 0.44% | 0.21% | 0.08% | 0.06% | 0.05% | 0.08% | 0.06% |
| -6 | -0.32% | -1.15% | 0.19% | 0.06% | 0.05% | -0.10% | -0.51% | -0.01% | -0.15% | -0.44% | -0.01% | 0.59% | -0.15% | **-0.23%** | 0.03% | -0.12% |
| -7 | 0.51% | -0.73% | 0.06% | -0.18% | 0.04% | 0.00% | 0.35% | 0.04% | -0.79% | **-0.75%** | -0.33% | 0.07% | -0.16% | -0.17% | -0.05% | -0.12% |
| -8 | 0.63% | -0.21% | 0.14% | 0.10% | -0.31% | -0.09% | -0.48% | **-0.89%** | 0.02% | -0.25% | 0.55% | 0.20% | -0.07% | -0.16% | 0.16% | -0.03% |
| -9 | **-1.31%** | -0.06% | 0.18% | 0.18% | 0.29% | -0.12% | 0.06% | -0.69% | 0.26% | 0.69% | -0.25% | 0.07% | -0.02% | -0.01% | -0.12% | -0.06% |
| -10 | 0.44% | -0.79% | -0.08% | -0.11% | 0.03% | -0.05% | 0.10% | 0.11% | -0.07% | -1.02% | 0.39% | 0.47% | -0.07% | -0.16% | 0.22% | 0.00% |
| other | -0.13% | 1.11% | -0.20% | 0.37% | -0.18% | 0.33% | 1.07% | -0.65% | 0.45% | **1.50%** | -0.45% | 0.61% | **0.34%** | 0.42% | -0.01% | **0.23%** |
| 11 | -0.91% | -2.28% | -0.52% | ***0.98%*** | -0.08% | -0.04% | -0.45% | 0.59% | -0.14% | 0.93% | 0.76% | 1.38% | 0.11% | -0.12% | ***0.47%*** | 0.14% |
| -11 | 1.22% | 1.92% | 0.63% | -0.17% | -0.23% | 0.54% | -0.67% | 0.95% | -0.86% | -0.14% | 0.64% | 0.37% | 0.32% | 0.28% | | 0.30% |

Table II

DIAMOND Average Daily Returns For All Trading Days

1% is light shadow dark font, underlined and italics; 5% is dark shadow white font; 10% medium shadow dark font

| Trade Day | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 | 2000 | 1999 | 1998 | 1998-2009 | 2000-2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 0.0074 | -0.0073 | 0.0003 | 0.0031 | 0.0000 | -0.0004 | 0.0009 | 0.0050 | -0.0033 | 0.0033 | 0.0012 | 0.0010 | 0.0007 | 0.0006 |
| 9 | -0.0025 | **0.0133** | 0.0040 | -0.0021 | -0.0010 | -0.0018 | 0.0047 | -0.0022 | 0.0029 | -0.0038 | -0.0018 | 0.0003 | 0.0009 | 0.0013 |
| 8 | 0.0041 | -0.0061 | 0.0003 | -0.0004 | 0.0024 | -0.0009 | 0.0035 | 0.0020 | 0.0016 | -0.0065 | -0.0003 | 0.0037 | 0.0001 | -0.0001 |
| 7 | 0.0007 | -0.0051 | -0.0041 | -0.0018 | -0.0018 | 0.0023 | -0.0006 | -0.0070 | 0.0003 | 0.0010 | -0.0033 | 0.0006 | -0.0016 | -0.0017 |
| 6 | -0.0011 | -0.0039 | 0.0024 | 0.0018 | 0.0000 | -0.0031 | -0.0007 | 0.0038 | -0.0049 | 0.0001 | -0.0007 | -0.0051 | -0.0009 | -0.0005 |
| 5 | 0.0024 | -0.0030 | -0.0013 | -0.0002 | 0.0007 | -0.0018 | -0.0009 | -0.0024 | 0.0003 | -0.0011 | 0.0034 | ***0.0099*** | 0.0004 | -0.0008 |
| 4 | -0.0059 | -0.0098 | 0.0030 | -0.0008 | 0.0021 | 0.0009 | | 0.0024 | -0.0016 | -0.0015 | **0.0055** | 0.0021 | 0.0000 | -0.0008 |
| 3 | 0.0023 | -0.0073 | -0.0021 | 0.0004 | -0.0002 | -0.0001 | 0.0002 | -0.0037 | 0.0034 | 0.0042 | 0.0070 | -0.0035 | 0.0000 | -0.0004 |
| 2 | 0.0035 | 0.0001 | 0.0001 | 0.0009 | 0.0002 | 0.0016 | 0.0032 | -0.0034 | 0.0025 | -0.0024 | 0.0026 | -0.0008 | 0.0006 | 0.0005 |
| 1 | 0.0030 | -0.0043 | 0.0015 | 0.0017 | 0.0013 | 0.0030 | ***0.0071*** | 0.0010 | 0.0038 | 0.0050 | **0.0054** | ***0.0087*** | ***0.0030*** | **0.0023** |
| -1 | -0.0025 | 0.0024 | 0.0016 | 0.0000 | -0.0005 | -0.0006 | 0.0013 | -0.0011 | -0.0005 | -0.0005 | -0.0009 | ***-0.0127*** | -0.0011 | 0.0001 |
| -2 | -0.0029 | 0.0023 | -0.0014 | 0.0011 | 0.0014 | 0.0004 | -0.0015 | 0.0036 | 0.0005 | 0.0008 | -0.0027 | 0.0034 | 0.0005 | 0.0006 |
| -3 | -0.0033 | 0.0002 | 0.0026 | ***0.0036*** | 0.0012 | 0.0010 | 0.0024 | -0.0038 | -0.0037 | -0.0010 | -0.0004 | -0.0010 | -0.0001 | 0.0000 |
| -4 | **0.0118** | ***0.0168*** | -0.0015 | -0.0002 | -0.0004 | 0.0020 | 0.0010 | 0.0000 | 0.0004 | -0.0011 | 0.0011 | -0.0045 | **0.0018** | 0.0026 |
| -5 | -0.0007 | -0.0005 | -0.0027 | 0.0011 | -0.0017 | 0.0024 | -0.0024 | -0.0011 | 0.0067 | 0.0026 | 0.0003 | 0.0010 | 0.0004 | 0.0004 |
| -6 | -0.0048 | -0.0096 | 0.0017 | 0.0001 | -0.0002 | -0.0016 | **-0.0056** | -0.0001 | -0.0012 | 0.0022 | -0.0002 | 0.0061 | -0.0012 | -0.0018 |
| -7 | 0.0050 | -0.0042 | 0.0010 | -0.0007 | -0.0003 | 0.0002 | 0.0036 | 0.0024 | ***-0.0099*** | -0.0054 | -0.0028 | -0.0026 | -0.0016 | -0.0010 |
| -8 | 0.0039 | -0.0032 | 0.0010 | 0.0002 | -0.0029 | -0.0009 | -0.0045 | -0.0075 | -0.0004 | -0.0026 | 0.0047 | 0.0026 | -0.0013 | -0.0019 |
| -9 | -0.0091 | -0.0022 | 0.0007 | **0.0029** | 0.0023 | -0.0014 | 0.0002 | -0.0066 | 0.0018 | 0.0060 | -0.0045 | -0.0018 | -0.0010 | -0.0002 |
| -10 | 0.0028 | -0.0064 | 0.0002 | -0.0004 | -0.0003 | -0.0010 | 0.0015 | 0.0016 | -0.0032 | ***-0.0092*** | **0.0055** | 0.0033 | -0.0009 | -0.0016 |
| other | -0.0038 | 0.0113 | -0.0012 | 0.0045 | -0.0009 | 0.0034 | ***0.0094*** | -0.0071 | 0.0041 | ***0.0169*** | -0.0054 | 0.0057 | **0.0032** | 0.0044 |
| 11 | -0.0030 | -0.0186 | -0.0041 | ***0.0096*** | 0.0000 | 0.0006 | -0.0022 | 0.0052 | -0.0008 | 0.0094 | 0.0068 | ***0.0133*** | 0.0020 | 0.0001 |
| -11 | 0.0047 | 0.0147 | 0.0042 | -0.0003 | -0.0021 | 0.0061 | -0.0011 | 0.0095 | -0.0066 | -0.0078 | 0.0037 | 0.0027 | 0.0017 | 0.0019 |

Table VI

Wealth Relatives various periods SPDR

| Time Period | T-Bill WR | Buy/Hold WR | Random WR | TOM WR |
|---|---|---|---|---|
| 93-2009 | 1.53 | 3.16 | 1.92 | 4.2820953 |
| 2000-09 | 1.22 | 0.83 | 1.33 | 2.4756301 |
| 1993-1999 | 1.26 | 3.79 | 1.44 | 1.7296991 |

Wealth Relatives various periods DIA

| Time Period | T-Bill WR | Buy/Hold WR | Random WR | TOM WR |
|---|---|---|---|---|
| 98-2009 | 1.30 | 1.52 | 1.52 | 2.36 |
| 2000-09 | 1.22 | 1.01 | 1.46 | 2.32 |
| 1998-1999 | 1.07 | 1.51 | 1.04 | 1.02 |

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