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A Simple and Effective Trading Rule for Individual Investors

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This study advocates the use of a simple trading strategy that is shown to outperform a passive buy and hold the market strategy. Based on prior studies that find long-term stock price responses to economic news, the strategy utilizes the announcement of discount rate changes to predict (and profit from) market movements. Statistical testing indicates that the strategy correctly predicts market movements. Furthermore, the results indicate that the proposed trading strategy produces higher risk adjusted returns than a buy and hold strategy. Thus individual investors may reasonably expect to profit by following this easy to implement trading strategy.

I. INTRODUCTION

Many individual investors have a basic knowledge of financial economics in terms of understanding the inverse relationship between interest rates and security prices. Yet these same investors may also be aware of efficiency issues regarding financial markets, which suggest that information is quickly reflected in security prices (thus negating any profit opportunities from trading based on interest rate changes). Astute investors may feel frustrated in that they understand price and interest rate behavior but are unable to capitalize on their knowledge. The results of this study suggest that individual investors may in fact be able to realize above market returns and lower their risk exposure by following a trading strategy based on movements in the discount rate.

The purpose of this study is to provide individual investors with a simple trading rule based on fundamental economic principles. Using historical data, the investment strategy tested here is shown to be successful in predicting market trends and provides a method for reducing risk without sacrificing return. While some market strategists may seek greater sophistication and detailed development in their models, a key advantage of the successful strategy proposed here is its simplicity. The main limitation of this strategy is that historical market responses to discount rate changes may not continue, which could undermine its

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future effectiveness. The historical data used for testing the trading rule, however, encompasses a very long time period, and the rationale underlying the strategy is based on fundamental economic principles. The following discussion highlights the key features of the trading rule.

The investment strategy examined here presumes that discount rate changes provide signals to enter and exit the stock market, providing the basis for a trading rule that relies on discount rate change announcements. The simple trading rule entails buying the market on an initial discount rate cut, remaining fully invested through any subsequent cuts and selling the market on an initial discount rate increase (and remaining out of the market through any subsequent increases). When not fully invested in the stock market, investors hold short-term Treasury instruments (T-bills), which are held until a rate cut signal is received. This simple strategy may be easily executed by all types of investors ranging from the novice to the experienced. As with any decision rule, those attempting to benefit from the proposed strategy must follow it consistently in terms of both the buy and sell indicators.

II. LITERATURE REVIEW

Many economic studies consider stock price reaction to monetary policy changes. Waud (1970) first documented this relationship by finding announcement effects where rate decreases (increases) are associated with positive (negative) stock market reaction. Additionally, Smirlock and Yawitz (1985), Hafer (1986), and Hardouvelis (1987) analyze stock price changes surrounding discount rate announcements. They also cite evidence of a significant announcement effect. In particular, they find that stock prices react swiftly to discount rate changes suggesting that financial markets deem this type of information important.

While most studies provide consistent evidence that monetary policy changes (and specifically discount rate changes) impact stock returns, some disagreement exists concerning the speed of the adjustment process. Examining economic news events Pearce and Roley (1985) find that the stock price response to new information may continue beyond the announcement day. Focusing strictly on discount rate announcements, Jensen and Johnson (1995) analyze the long-term impact of rate changes on stock indices. They find that average stock returns are higher (lower) in those periods following discount rate decreases (increases). Although their findings do not suggest causality between stock returns and interest rates, the mere notion of long-term market movements being associated with discount rate changes may provide a basis for a profitable investment strategy.

The success of the proposed strategy demonstrates forecasting ability, yet a number of widely cited studies including Treynor and Mazuy (1966), Jensen (1968), Kon and Jen (1978) and Henriksson (1984) have generally concluded that mutual fund managers are not able to capitalize on directional changes in the stock market. Reviewing these and other subsequent studies, Ippolito (1993) argues that mutual fund performance net of expenses is comparable to that of the market and that competent funds clearly outperform the market while inept ones do not. Competent investing may result from the use of sound economic reasoning with the possibility of beating the market also providing a basis for the proposed discount rate trading strategy.

A trading rule based on discount rate changes may be justified by the fact that these changes represent clear and unequivocal signals that the Federal Reserve (the Fed) is committed to changing monetary conditions and business activity. A cut in rates suggests improved future cash flows to businesses, signaling an expected upward trend in the stock market, and is thus a buy indicator. By contrast, a rate increase reflects reduced future cash flows, indicating an expected down market trend, thus providing a sell signal. Individual investors following the basic trading strategy are, therefore, abiding by fundamental principles of financial economics and attempting to act in a manner consistent with those studies that find a long-term market response to economic news.

To validate the trading rule, we use historical data to test and report the results of the investors' strategy and compare it to a passive buy and hold strategy. The analysis of the proposed strategy does not consider transaction costs; however, as noted later in the paper, trading associated with the strategy is relatively infrequent, and the inclusion of these costs would not significantly alter the results. The future efficacy of the investors' strategy will depend upon the continuation of documented long-term market reactions associated with discount rate changes. Furthermore, the strategy must be consistently followed, since only partial adherence to it may result in foregone opportunities.

III. DATA AND METHODOLOGY

Discount rate changes and their impact on the stock market are analyzed over the period from April 7, 1933 to May 17, 1994. The dates for discount rate changes are published in the *Federal Reserve Bulletin*, but we assume that investors gather information daily from the *Wall Street Journal* (WSJ) and then trade on the date that the discount rate change is published in the WSJ. Thus the investors do not capture the announcement day (day = 0) effects. In addition, the WSJ publication date occasionally lags (by one day) the Fed announcement date in those cases where the information is revealed before or during trading hours. Thus the returns from the investors' trading strategy are conservatively stated, if the discount rate changes impact the market as expected (i.e., rate cuts boost the market, while rate increases depress it). When discrepancies exist among the twelve Federal Reserve Banks enacting a rate change, the initiating bank's action published in the WSJ is used as the definitive information source.

Table 1 contains the dates of the Fed announced discount rate changes that initiated trading activity, the discount rate immediately preceeding a change, the new discount rate, the trading strategy implication and the Dow Jones Industrial Average (DJIA) on the trading date. The investors' trading strategy is evident from Table 1. For example, the trading strategy goes into effect on April 7, 1933 when the discount rate is cut from 3.5% to 3.0%. This initial cut, when reported in the WSJ, causes investors to buy into the market. Subsequent cuts in the 1930s and 1940s leave the investors' strategy unchanged (in-market) for nearly fifteen years until January 10, 1948 when the Fed raises the discount rate to 1.25% from 1.0%. Investors then sell out of the market and hold Treasury Bills for the next six years (1948-1954). These holdings would be to maturity and include rollovers until February 5, 1954 when the T-bills are sold, and the investor buys back into the market. The most recent signal examined here is a sell (the market), which occurred on May 17, 1994 when the Fed raised the discount rate from 3.0% to 3.5%.

TABLE 1
Dates Of The Federal Reserve Discount Rate Changes That Initiate Trading Activity, Discount Rates Before and After Changes, Trading Signal And Dow Jones Industrial Average Associated With Discount Rate Changes.

Date of Rate Change Reversals	*Discount Rate Prior to Change*	*Discount Rate After Change*	*Signal*	*DJIA*
04/07/33	3.50	3.00	Buy	58.78
01/10/48	1.00	1.25	Sell	180.20
02/05/54	2.00	1.75	Buy	293.97
04/15/55	1.50	1.75	Sell	421.57
11/15/57	3.50	3.00	Buy	439.35
09/12/58	1.75	2.00	Sell	519.43
06/10/60	4.00	3.50	Buy	654.88
07/17/63	3.00	3.50	Sell	699.72
04/07/67	4.50	4.00	Buy	853.34
11/20/67	4.00	4.50	Sell	857.78
11/13/70	6.00	5.75	Buy	759.79
07/16/71	4.75	5.00	Sell	888.51
11/19/71	5.00	4.75	Buy	810.67
01/15/73	4.50	5.00	Sell	1025.59
12/09/74	8.00	7.75	Buy	579.94
08/31/77	5.25	5.75	Sell	858.89
05/30/80	13.00	12.00	Buy	850.85
09/26/80	10.00	11.00	Sell	940.10
11/02/81	14.00	13.00	Buy	866.82
04/09/84	8.50	9.00	Sell	1133.90
11/21/84	9.00	8.50	Buy	1220.30
09/11/87	5.50	6.00	Sell	2549.27
12/19/90	7.00	6.50	Buy	2626.73
05/17/94	3.00	3.50	Sell	3720.61

Over the 62-year period covered in this study, 109 discount rate changes (54 rate reductions and 55 rate increases) have been implemented by the Fed. Following the discount rate change trading rule, only 24 of the 109 changes have signalled either a buy or sell transaction. From Table 1, it follows that in-market periods constitute approximately 34 years of the 62-year period analyzed. Treasury bills are held for the balance of the period with realized returns ranging between zero and 14.7% over the 62-year period.

The market proxy used for testing the investors' trading strategy is the DJIA, given its availability on a *daily* basis dating back to 1933. The risk-free instrument held in out-market periods is the one year Treasury Bill, which is easily liquidated when a rate cut (market buy signal) occurs. Returns from the proposed trading activity are calculated 1) using the holding period capital appreciation and dividend yield on the DJIA for the in-market periods and 2) the T-Bill rate (appropriately adjusted for those occasions when the investor must sell the bills before maturity to reenter the market) for out-market periods. In addition to examining the entire 62-year period, we also analyze 12 five-year subperiods from 1935 to 1994.

The returns from the investors' trading strategy are compared to those of the buy and hold strategy, which consists of entering the market on April 7, 1933 and remaining fully invested through May 17, 1994. In addition to a direct comparison of aggregate returns, further analysis considers the differential risks associated with the two strategies. Recog-

nizing that investors who follow the proposed trading strategy hold risk-free securities for considerable periods of time during the 62-year study period, the risk of the investors' strategy is substantially lower than that of the buy and hold. Thus, the expected returns of the investors' trading strategy should reflect the reduction in risk and be adjusted accordingly.

The CAPM is employed to make these risk adjustments and is expressed as follows:

$$E(r_{pt}) = rft + {}_{p}(r_{mt} - r_{ft}), \tag{1}$$

where $E(r_{pt})$ = the average rate of return on a portfolio resulting from the particular strategy over the specified time period,
r_{ft} = the risk free rate over that same period,
r_{mt} = the market return over that same period,
β_p = the portfolio beta.

Implementation of the investors' strategy results in approximately 34 in-market years out of 62 total years (i.e., in the market 55% of the time). With an average risk free rate over the period of 3.87%, an average risk premium on the market of 8.23% (Ibbotson & Associates, 1995) and a market beta equal to 1.0, the CAPM required return for the investors' trading strategy is 8.40% (from equation 1). This required return is well below the expected return for the buy and hold strategy of 12.10% (from equation 1). Both strategies' actual or realized returns may be evaluated in terms of their CAPM excess returns where the excess returns from each strategy are calculated by netting out the CAPM required returns from the actual returns.

Further risk analyses and comparisons of the buy and hold returns and the investors' strategy returns utilize Treynor's Measure, which we calculate for both strategies. Treynor's Measure, T, represents the return premia per unit of risk and is defined as follows:

$$T = (r_{pt} - r_{ft})/\beta_p, \tag{2}$$

where r_{pt}, r_{ft} and β_p are defined above.

If the value of T for a given portfolio is greater than the value of T for the market in equilibrium, the portfolio lies above the security market line (i.e., is undervalued).

Finally, in addition to the above analysis, we employ a nonparametric analysis from Merton (1981) and Henriksson and Merton (1981) to test the investor's trading strategy proposed in this paper. According to the basic model, a forecaster predicts when stocks (Treasury Bills) will outperform Treasury Bills (stocks). The specific test examines a null hypothesis that discount rate changes do not provide information that leads to correctly forecasting stock market trends and is denoted as follows:

$$H_0 : p_1(t) + p_2(t) = 1, \tag{3}$$

where $p_1(t)$ = the conditional probability of predicting an up market when an up market occurs and,
$p_2(t)$ = the conditional probability of predicting a down market when a down market occurs.

Henriksson and Merton use the hypergeometric distribution (equation 4) to calculate the probability that a given outcome from a sample comes from a population that satisfies the null hypothesis (no forecasting ability).

$$Pn_1 = x(\backslash N, N_2, n) = \frac{\binom{N_1}{n_1}\binom{N_2}{n-n_1}}{\binom{N}{n}} \tag{4}$$

where N_1 = the number of observations where Treasury Bill returns are greater than market returns,

N_2 = the number of observations where market returns are greater than Treasury Bill returns,

N = total number of observations ($N_1 + N_2$),

n_1 = number of successful predictions given Treasury Bill returns greater than market returns,

n_2 = number of unsuccessful predictions given market returns greater than Treasury Bill returns,

n = number of forecasts predicting Treasury Bill returns greater than market returns.

Under the Henriksson and Merton framework, the conditional probability of a forecast does not depend on the magnitude of subsequent realized returns. This gives the Henriksson and Merton analysis a significant advantage in that it does not require the specification of a particular equilibrium model of returns as do the CAPM and the Treynor analyses presented above.

For the strategy proposed in this paper, the null hypothesis is that changes in the discount rate do not forecast the direction of the stock market. Rejection of the null hypothesis would be evidence of a successful strategy. The hypergeometric distribution equation is used to calculate the probability of obtaining at least the observed number of correct down-market period forecasts under the null hypothesis (no forecasting ability) given the total number of observations, the total number of up-market period observations and the number of forecasted down-market periods.

III. RESULTS

Table 2 provides descriptive information on the investors' trading strategy including the average one-year Treasury Bill rate, the number of years, as well as the percentage of time in the market, and an approximate beta for the overall study period and the 12 subperiods. The beta measurement for the investors' portfolio simply reflects the percentage of the particular investment horizon in the market and represents a close approximation for the regression beta estimates. These beta measurements illustrate that the investors' strategy is less risky than the buy and hold strategy with investors in the market only 55 % of the time.

Table 3 reports the annual returns, CAPM required returns, excess returns and the Treynor Measures for the buy and hold strategy and the investors' trading strategy over the entire period and the 12 subperiods. From a long term perspective (1933 to 1994), the average annual return from the trading strategy is approximately the same as the buy and hold strategy (11.72% for the trading strategy and 12.10% for the buy and hold). Analyses of several subperiods reveal that in seven out of the 12 subperiod cases the investors' strategy returns are equal to or exceed the buy and hold returns. After considering risk through use of the Treynor measures, the trading strategy outperforms the buy and hold strategy in all subperiods except one (the early 1960s). Using the Wilcoxon sign rank test (one-tail) we can reject the null hypothesis that the two sample populations have identical probability distributions in favor of the alternative hypothesis that the distribution of Treynor measures for the trading strategy is shifted to the right of that for the buy and hold population at the 99.5% significance level. These findings of the strategy's superiority are consistent with the studies of Pearce and Roley (1985) and Jensen and Johnson (1995) who report a long-term stock price response from certain types of economic news.

Consistent with *a priori* expectations, the excess return for the buy and hold strategy for the entire study period is zero. Alternatively, Table 3 reveals that the excess returns for the buy and hold strategy are negative in all but five of the subperiods examined. The divergence of the excess returns from zero in the subperiod analyses of the buy and hold strategy arises from the use of an average market risk premium of 8.23%. This average risk premium is based on historical information from 1933 through 1994. Alternatively, the risk-adjusted excess return for the trading strategy is positive for the overall period (3.32%) and negative in only three of the 12 subperiods (the early 1940s and the 1960s). Based on the Wilcoxon sign rank test, we can again reject the null hypothesis that the population median

TABLE 2

Descriptive Information On The Investors' Trading Strategy

This table contains the average risk-free rate, the number of years in the market, the percentage of time and an approximate beta for each time period.

Time Period	*Average Risk-Free Rate*	*Number of Years in the Market*	*Percentage of the Period in the Market*	*Approximate Beta*
Entire Period				
1933-1994	3.87%	34.09	55%	0.55
Five Year Subperiods:				
1935-1939	0.14	5.00	100%	1.00
1940-1944	0.20	5.00	100%	1.00
1945-1949	0.62	3.04	61%	0.61
1950-1954	1.42	0.66	13%	0.13
1955-1959	2.34	1.08	23%	0.23
1960-1964	2.82	3.04	61%	0.61
1965-1969	4.94	0.63	13%	0.13
1970-1974	5.92	1.92	38%	0.38
1975-1979	6.72	2.67	53%	0.53
1980-1984	11.00	2.92	58%	0.58
1985-1989	6.82	2.71	54%	0.54
1990-1994*	4.99	3.50	79%	0.79

Note: *This period is 4.38 years: based on a buy signal December 19, 1990 and a sell signal May 17, 1994 which ends the study period.

TABLE 3

Risk-Free Rates, Returns and Treynor Measures This table contains actual, CAPM required and excess returns and the Treynor measures for the buy and hold and the investors' trading strategies for each time period (all return figures are average annualized returns).

	BUY AND HOLD STRATEGY				*DISCOUNT RATE CHANGE STRATEGY*			
Time Period	*Actual Return*	*Required Return(CAPM)*	*Excess Return*	*Treynor Measure*	*Actual Return*	*Required Return(CAPM)*	*Excess Return*	*Treynor Measure*
Entire Period								
1933-1994	12.10%	12.10%	0.00%	8.23	11.72%	8.40%	3.32%	14.27
Five Year Subperiods:								
1935-1939	12.18	8.37	3.81	12.04	12.18	8.37	3.81	12.04
1940-1944	5.60	8.52	-2.92	5.40	5.60	8.52	-2.92	5.40
1945-1949	11.02	8.85	2.17	10.40	7.77	5.62	2.51	11.72
1950-1954	21.61	9.65	11.96	20.19	8.40	2.49	5.91	53.69
1955-1959	16.03	10.57	5.46	13.69	9.07	4.23	4.84	29.26
1960-1964	9.75	11.05	-1.30	6.93	4.79	7.84	-3.05	3.23
1965-1969	2.74	13.17	-10.43	-2.20	4.77	6.01	-1.24	-1.31
1970-1974	0.10	14.15	-14.05	-5.82	13.92	9.05	4.87	21.05
1975-1979	13.53	14.95	-1.42	6.81	14.50	11.08	3.42	14.68
1980-1984	14.11	19.23	-5.12	3.11	16.88	15.77	1.11	10.14
1985-1989	22.67	15.05	7.62	15.85	22.13	11.26	10.87	29.35
1990-1994*	11.26	13.22	-1.96	6.27	13.01	11.49	1.52	10.15

Note: *for 1994 the sell signal is on May 17, thus the return is adjusted to reflect the partial year (.38 years).

of excess returns for the trading strategy is equal to zero in favor of the alternative hypothesis that the population median of excess returns is shifted to the right (i.e., greater than zero) at the 97.5% confidence level. Alternatively, the null hypothesis of a population median equal to zero cannot be rejected for the buy and hold strategy at any meaningful significance level.

Implementation of the trading strategy triggered 24 trades (23 intervals for market trend forecasts). Over the entire period analyzed there were 12 up-market and 11 down-market periods forecasted. Actual occurrences consisted of 17 up-market periods and 6 down-market periods. Thus, based on the conditional probabilities and the hypergeometric distribution equation, we calculate the probability of predicting 6 of 6 down-market trends if the null hypothesis is true as follows:

$$p_1(t) + p_2(t) = 12/17 + 6/6 = 1.7059$$

$$P(n_1) = 6|(23, 17, 6) = \frac{\binom{6}{6}\binom{17}{11-6}}{\binom{23}{11}} = .0046$$

Based on these calculations we can reject the null hypothesis of no forecasting ability ($p_1(t) + p_2(t) = 1$) at a confidence level of 99.5%.

The overall results suggest that investors may not only profit, but also reduce risk exposure by following the proposed strategy. The recommendation, of course, is subject to the caveat that the historical market responses to discount rate changes continue in essentially the same direction and magnitude in the future and that investors consistently follow the strategy. Additionally, the full benefits of the proposed strategy are realized when trading costs, consisting of taxes, commissions and other fees, are zero (i.e., retirement accounts that trade costlessly and on a tax deferred basis). Even when trading costs are considered they do not significantly reduce the returns or alter the basic comparisons reported in Table 3. For example, if round trip transaction costs of one percent were applicable, the returns from the DR strategy would be reduced by approximately 0.39% per year on average. This reflects the fact that trading associated with the proposed strategy is relatively infrequent (only 24 trades over 62 years).

IV. SUMMARY AND CONCLUSIONS

This paper examines a trading strategy for individual investors based on Fed announcements of discount rate changes. The strategy keeps the investor in the market (out of the market) during periods of declining (rising) interest rates. During periods of rising interest rates, the investor holds Treasury Bills. This strategy is evaluated relative to a buy and hold (the market) strategy.

Consistent with previous studies indicating a long-term relationship between stock prices and economic news, the results of this study suggest that it may be possible for individual investors to capitalize on discount rate changes. In particular, the results indicate

that the investors' trading strategy produces higher risk adjusted returns than a buy and hold strategy. These findings are especially interesting in that many individuals invest in mutual funds, and yet most fund managers do not, on average, beat the market. The strategy advocated in this study should be attractive to individual investors since it eliminates the need for professional management, security analysis and/or selection, but still provides investors with above market returns and below market risk.

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