Predicting Intermediate Returns of the S&P500; The Risk Factor

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Abstract: I analyze annual returns of the S&P 500 from 1993 – 1998. Future returns of the market are predicted using current dividend yield levels, past risk free returns and a standard deviation variable over the preceding five years. Evidence from the article suggests that future returns can be predicted when combing dividend yields with recent volatility in the market. This article suggests that recent market levels and investment momentum may pose a threat to a major correction in the future.

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I. Introduction

The S&P 500 continues to grow at astounding rates. Market Investors have enjoyed a bull market since 1981, which began to rage in the mid 1990's. The Dividend Yield and Price to Earnings ratios are at, or near all time lows and highs respectively. In addition, tax laws and congressional acts in the mid 80's have created a huge momentum of investor inflows into equity funds. Recent technology has made it easier and cheaper for Lehman investors to launch trades at will with little thought. When will this magic carpet ride end?

In the last two decades, the new generation has seen two significant downturns (1987 and 1997). However, the downturn in 1997 recovered painlessly within one month. Allen Greenspan, during recent addresses, has termed this market behavior as irrational exuberance. Furthermore, the Federal Reserve has begun to raise interest rates in order to offset the threat of inflation that this accumulation of wealth, combined with other factors, presents.

Many theories have been proposed regarding the prediction of future market returns. The random walk suggests the only predictor of future market prices is the current price of the market. That is, future returns are random and cannot be predicted. The more traditional approach suggests that the best predictor of future returns is historical returns of the market.

Reichenstein and Rich (1994) conclude that market returns are somewhat predictable based on the dividend yield. This study was based on an earlier theory suggested by Fama and French (1988), which found that Dividend Yields follow a mean reversion process over time.

Two recent theories (1999) have attributed market growth to large investment inflows and lower risk premiums. Mosebach and Najand base market highs on a structural change caused by an increase in demand for equity funds over the previous 15 years. A recent Forbes Magazine article predicts higher returns in the future for the aggregate investor views equities be risk free.

Excluding the Random Walk, the aforementioned theories provide compelling evidence that the market is somewhat predictable. However, with the exception of Forbes, the risk that investors are willing to bare is not sufficiently addressed. Furthermore, the Forbes article does not compel me to believe that the aggregate investor has lowered the perceived risk of the market to rock bottom levels. The major difference in the following study and the above research is the recent variation of the market is considered.

The following study hypothesizes that investors determine their portfolio allocations based on the perceived risk of the market.

II. Theoretical Discussion

Past research by Reichenstein and Rich (1994), as well as Fama and French (1988), conclude that dividend yields offer some insight into which way stock market returns will move over two-year time horizons. Low dividend yields suggest that the market is overpriced while a high dividend yield suggests that the market is under-priced.

Fama and French found that dividend yields travel through a mean reverting process. Low yields will revert in an upward fashion to equilibrium where high yields will tend to drift downward. Price is constantly adjusting based on the current status of dividend yields. Thus, there is an inverse relationship between future returns and dividend yields. However, as the true equilibrium of price is unknown, the true equilibrium of dividend yields is also unknown.

The true contrast of recent decades is that firms have lowered their dividend ratios due to financial theory. With this in mind, the price to earnings ratio (P/E, inverted to earnings to price for this model) should be a better predictor. However, as Reichenstein and Rich found, the dividend yield is more significant than earnings to price. The priori of this finding may be that P/E is a direct result of dividends, as can be seen in the Dividend Discount Model (DDM) in Equation 1. This model focuses on dividend yield.

The recent Forbes Magazine article suggests that the market is no riskier than bonds. This would be in direct conflict with the Market Risk Premium (MRP) in the Capital Asset Pricing Model (CAPM, equation1).

Equation 1

$$k_i = rf + B_i\,(R-rf)$$

k = expected return of asset i
rf = risk free rate of return
B = beta of the risky asset I
(beta is defined as the systematic risk of the asset to the S&P 500)
R = historical market return of the S&P 500
(R-rf); defined as the market risk premium

The Forbes article would suggest that the market risk premium is decreasing or gradually disappearing. If true, future returns are expected to soar even higher as the

DDM would show in Equation 2. However, once the market returns adjust to the new risk premium, following returns would be projected to be significantly lower than historical averages.

Equation 2

$$P_j = D_1 / (k-g)$$

P_j = price of stock j
D_1 = dividend in period 1
k = required rate of return of stock j obtained from CAPM
g = constant growth rate of dividends

As required return decreases, Price rises. Furthermore, a rise in growth will also cause Price to rise. A decrease in required return combined with a rise in growth increases price substantially. The question is then raised, what effect of market risk does the aggregate investor take into account when allocating his portfolio.

Mosebach and Najand have attributed inflated market returns in the last decade to massive inflows to equity funds. Tax laws and congressional creations such as the 401(k) have created massive monthly inflows for equity fund managers to invest since 1985. These increasing inflows have attributed to the higher returns of recent. Furthermore strong equity markets encourage more investment. They conclude that structural changes in mutual fund investing are driving the market to its current levels. This would imply structural changes in the market are due to investors' perceptions.

Actually, the original basis of this research was to observe this phenomenon. However, when beginning, the article was published. This supported the original hypothesis, so there was no reason to "reinvent the wheel." Perusal of the aforementioned literatures identified some relations. Increasing flows to equity funds, as found by Mosebach and Najand, suggests investors perceive less risk in the market than previous generations. This is inline with Forbes's implication of a lower MRP. However, at some point, as suggested by Fama, French, Reichenstein and Rich, the market will realize the yields that the investor is willing to bear.

The basis of modern finance is risk reward. That is expected returns are based on the perceived risk of the investor. Higher the risk generates a higher expected return. The following study attempts to identify the perceived market risk to the aggregate investor and then use this measurement as future predictor of nominal returns.

III. Data and Methodology

The year ending (1923-1928) index levels, dividend yields, and price to earnings ratios of the S&P 500 were taken from the Global Financial Database. The risk free rates of return were obtained by using government bonds on 10 – 20 year bonds.

The data was then used as the basis in developing variables goaled to determine the arithmetic average of annual nominal returns for horizons of one to five years. These annualized averages were then used as dependent variables to be predicted. The model to determine the significance of the variables was a simple Ordinary Least Squares (OLS) estimator.

As the CAPM would suggest, future returns are in direct relation to the risk free rate of return. Therefore several variations of annual risk free rates of return were taken into consideration. At first the risk free rate at time (t) was used to generate the model. However, after several experimental runs, the mean risk free rate of the previous five years proved the most significant. They were used as one of the dependent variables. The risk free coefficient is expected to be positive.

As previous studies suggest, the current dividend yield serves as a significant estimator of future returns. With this in mind, dividend yields were used as an independent variable in the model. The coefficient of dividend yields is expected to be positive since returns are expected to be higher if the current yield is high.

The last of the three predictors was the most difficult to achieve. The goal was to develop some mathematical concept to symbolize the amount of market risk investors perceive at current times. Traditionally, the historical standard deviation of the market has been used to address this factor. However, when timing the market investors are concerned with what the market has done in recent years as opposed to the life of the market. In order meet this objective the standard deviation of the previous five years of the market was used. Risk reward financial theory suggests that risk and return are positively correlated. Thus, the coefficient is expected to be positive.

The descriptive statistics of the independent variables are as follow in Table 1.

Table 1
Independent Variables Descriptive Statistics

	RFLESS5	DIVYIELD	STDLESS5
Mean	5.015879	4.421061	18.97081
Median	3.752000	4.130000	16.45450
Maximum	11.87800	9.080000	39.63420
Minimum	2.308000	2.710000	8.346800
Std. Dev.	2.850251	1.390377	7.752264
Skewness	0.982286	1.187155	0.976081
Kurtosis	2.673171	4.271822	3.023543
Jarque-Bera	10.90749	19.95091	10.48159
Probability	0.004280	0.000047	0.005296
Observations	66	66	66

The proposed model for research resembled;

$$R_{t+n}MEAN = B_0 + B_1(RFLESS5) - B_2(DIVYIELD) + B_3(STDLESS5)$$

R_tMEAN = the mean returns of the S&P500 over t+n years
B_0 = predicted y intercept
RFLESS5 = mean risk free rate of return at t-5
DIVYIELD = dividend yield at t
STDLESS5 = standard deviation of t-5 years of S&P 500 returns

IV. Empirical Model

Based on the variables mentioned above, an OLS model was formed to predict S&P 500 mean returns for future time horizons. The model is significant at the 90% confidence level for both four and five years. Both models are as follows:

Table 2
OLS Regression of Future Annual Returns

R5MEAN = -4.94 + 1.02(RFLESS5) + 3.24(DIVYIELD) - 0.30 (STDLESS5)

LS // Dependent Variable is R5MEAN
Date: 12/05/99 Time: 16:43
Sample: 1928 1993
Included observations: 66

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.943232	4.819309	-1.025714	0.3090
RFLESS5	1.015931	0.369414	2.750112	0.0078
DIVYIELD	3.241595	0.733877	4.417081	0.0000
STDLESS5	-0.300407	0.136918	-2.194070	0.0320

R-squared	0.312098
Adjusted R-squared	0.278812
F-statistic	9.376355
Prob(F-statistic)	0.000034
Durbin-Watson stat	0.607694

R4MEAN = -5.98 + 0.89(RFLESS5) + 3.30(DIVYIELD) - 0.26(STDLESS5)

LS // Dependent Variable is R4MEAN
Date: 12/05/99 Time: 16:51
Sample: 1928 1993
Included observations: 66

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.982511	5.494371	-1.088844	0.2804
RFLESS5	0.888338	0.421160	2.109266	0.0390
DIVYIELD	3.298789	0.836675	3.942737	0.0002
STDLESS5	-0.261668	0.156097	-1.676319	0.0987

R-squared	0.241387
Adjusted R-squared	0.204680
F-statistic	6.576041
Prob(F-statistic)	0.000624
Durbin-Watson stat	0.845737

As previously stated, both linear models are statistically significant at the 90% confidence level. The F-statistics support the validity of the model and all variables are statistically different than zero.

For both models the one problem is the low Durbin Watson (DW) statistic. A low DW suggests the existence of autocorrelation. This can be expected since both STDLESS5 and RFLESS5 represent lagged variables. The only way to correct for this error is with the DW h-test of the DW m-test. Work by Inder (1984) has proven the DW h-test to be unwise and suggests the DW-m test. This method was not possible with the technology available. For this reason, the DW statistic is ignored.

V. Results

Overall, the model does a fair job of predicting S&P 500 returns over four and five year horizons. The adjusted r-square of .24 and .27, respectively suggest that markets are somewhat predictable. Disappointingly however, attempts at predicting shorter time horizons were unsuccessful. This may point out one flaw in the model. As time horizons grow longer, the mean returns will grow closer to total historical market returns. Thus, longer time horizons will be more significant. For this reason, the R4MEAN model will only be discussed in the following.

Due to the fact that returns are directly related to the risk free rate (as the MRP suggests), the positive coefficient with RFLESS5 comes as no surprise. The model suggests that a 1% increase in the risk free average will produce a 0.89% increase in the expected annual mean for the next four years (all else held constant).

As Reichenstein and Rich found, dividend yields are significant estimators of future market returns. As dividend yields increase 1%, expected annual mean will increase by 3.30% all else held constant. This holds true with Fama and French. Higher dividend yields will lead to higher market returns in the future. Lower yields will lead to lower returns.

The basis of this model was to judge the investors’ perception of market risk. The STDLESS5 variable was used. An 1% increase in a five year standard deviation of 5 year returns will lead to a -0.26 % decrease. Thus, market volatility leads to lower expected returns.

VI. Conclusion

Two conclusions are apparent in this paper. One, the random walk theory is dead. Recent research, including this study, is evidence that future returns are somewhat predictable. The primary reason for this research was to determine if recent risk levels would help predict the intermediate returns of the S&P 500 index. Two, the statistically significant STDLESS5 variable suggests that market volatility does help somewhat predict where the market is headed intermediate time horizons.

Based on the evidence of previous studies and the discussed model, the author believes that when recent volatility has been significant investors are more likely to seek “less risky” assets. This argument is strengthened especially true when combined with low dividend yields.

Furthermore, Mosebach and Najand’s structural change theory, and theories of a decreasing MRP are frightening. Recent markets have been bid up due the fact that the risk is considered to be less and there are massive inflows into equity funds. Actually the model supports this theory with a 1993 STDLESS 5 of 14% well below the mean of 18% and the median of 16%. These low deviations would lead to higher returns. However, the dividend yield and price to earnings ratios are at historical lows and highs. What will happen when distrust creeps in and volatility begins to rise? Once investors realize there is risk in the market, Mosebach theory of massive inflows will soon turn to a theory of massive outflows. Markets cannot continue to enjoy these levels of growth. I do not mean to play Chicken Little. If you feel I am look at the Japanese market in 1989.

VII. References

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