Abstract: Using Regression for Explanation and Prediction of Exchange Traded Fund (ETF) Returns

When trying to determine how to predict the stock market, researchers have found many different ways of accomplishing the task. Some use statistics, compare and contrast models and experiments. Over the course of my own research, I have found many models that can be beneficial.

One author from the Journal of Banking and Finance found it useful to use the UK's financials to estimate the stock market vs. volatility. There research included their results which stated that they found evidence for a negative relationship but only when volatility expectations were represented by standard deviations. Standard deviations are important to know because they help finding a variation close to the average (mean). Another author who used standard deviations to predict the stock market was C. W. Zhuanxin Ding, author of A long memory property of stock market returns and a new model. He studied the "long memory" property of the stock market. He states that the study of "long memory" is enough to say that it is the strongest when the standard deviation is close to 1. He used the heteroskedasticity equation to estimate their results from the data. These results were helpful when deciding how to predict the stock market because it made for finding standard deviations important.

E.M. Racine, author of Entropy and predictability of stock markets returns, studied the use of the entropy to measure the stock market. For example: They use a model assuming that $100 is invested in stocks or bonds with either low or high cost of transactions. Low transactions cost is .5% on trading stocks and .1% on trading bonds, while high cost transactions is 1.0% on trading stocks and .1% on trading bonds. After comparing linear to nonlinear returns the author concluded that a use of low and high transaction cost were beneficial. Another way to use a linear model is by predicting quarterly stock market excess returns. Y. Hiemstra, author of Linear Regression vs. Backpropagation Networks to Predict Quarterly Stock Market Excess Return, said that he found that quartely stock markets returns are somewhat predictable. The ending results confirm that other studies that a fundamental model using a limited number of imputs has predictive power.

Another way to predict the stock market is using the S&P 500 index. D.E. Wohar, author is Structural Breaks and Predictive Regression Models of Aggreate US stock Returns, uses S&P 500 and CRSP equal-weighted real stock returns based on 8 financial variables to predict regression models. The authors used Andrews SUPF statistics and the BAI subsample procedure in conjunction with the Hansen heterskedastic fixed-regressor bootstrap to test for structure stability. They also used recent methodologies of Elliot and Muller and Bai and Perron. In conclusion, they found strong evidence of structural breaks in 5/8 bivariate predictive regression models of S &P500 returns and some evidence of structural breaks in the other 3 models. John Y Campell, author is Predicting Excess Stock Returns Out of Sample: Can Anything Beat the Historical Average, also used the S & P index. Campell began by conducting an out-of-sample

forecasting exercise inspired by Goyal and Welch with modifications that reveal the effectiveness of theoretically motivated restrictions. They used monthly data and predicted simple monthly or annual stock returns on the S & P 500 Index.

M. T. Correa author os Gaussian Process Regression Models for Predicting Stock Trends used 2 experiements using the Gaussian process. He kept track of important stock information such as: price and whether the price was increasing or decreasing by useing a + 1 labeling to produce a simple metric trend. (1 when increasing and -1 when decreasing). Next, he looked to see if the value of the stocks were close to the trading day so they could predict the price of the stock for the following days. To help his experiement he used 100 iteration optimization of the marginal liklehood with rach different kernel. M. H. Pesaran, author of Market Efficiency and Stock Market Predictability, stated he found by using the return regression equation was statistically significant.Evidence of stock market predictability can be done by using intrest rates, dividend yields and a variety of macroeconomic variables exhibiting clear business cycle variations.

Overall, these authors have been successful in their research. Whether the use of standard deviations, linear and nonlinear, S&P 500 index or the return regression were used, all authors came up with results from their experiments. The use of their research has helped me complete my own experiement in finding the best possible way to predict the stock market.

1. Compares and contrast the stock market vs. volatility. The authors use the UK financial times to estimate. Result: evidence for a negative relationship but only when volatility expectations are represented by standard deviations.

   Taylor, S.-H. P. (1992). Stock returns and volatility: An empirical study of the UK stock market. *Journal of Banking and Finance* , 37-59.

2. The authors use new metric entropy to measure the stock market returns. They compare linear to nonlinear returns. They use a model assuming that $100 is invested in stocks or bonds with either low or high cost of transactions. Low transactions cost is .5% on trading stocks and .1% on trading bonds, while high cost transactions is 1.0% on trading stocks and .1% on trading bonds.

   Racine, E. M. (2002). Entropy and predictability of stock market returns. *Journal of Econometrics* , 291-312.

3. Compares a linear model to predict quarterly stock market excess return to several backpropagation networks. The authors say that they found that quartely stock markets returns are somewhat predictable. The ending results confirm that other studies that a fundamental model using a limited number of imputs has predictive power.

   Hiemstra, Y. (1996). *Linear Regression vs. Backpropagation Networks to Predict Quarterly Stock Market Excess Return.* Netherlands: Kluwer Academic Publishers.

4. Studies "long memory" property of the stock market. The power transformation of the absolute return has a high auto correction for long lags. The authors study "long memory" enough to say that it is the strongest when d is close to 1. They use the heteroskedasticity equation to estimate their results from the data.

Zhuanxin Ding, C. W. (1993). A long memory property of stock market returns and a new model. *Journal of Empirical Finance* , 83-106.

5. This paper states that you can predict stock markets based on seasons. The authors use 3 approaches to prove their study: Janurary effect, Sell-in May effect, and Years-ending-in-five effect. explanantions of each study are highlighted in the print out.

Works Cited

Marquering, W. (2002). *Seasonal Predictability of Stock Market Returns.* Erasmus University Rotterdam.

6. This study predicts regression models using S&P 500 and CRSP equal-weighted real stock returns based on 8 financial variables that display predictive ability in the literature. The authors used Andrews SUPF statistics and the BAI subsample procedure in conjunction with the Hansen heterskedastic fixed-regressor bootstrap to test for structure stability. They also used recent methodologies of Elliot and Muller and Bai and Perron. In conclusion, they found strong evidence of structural breaks in 5/8 bivariate predictive regression models of S &P500 returns and some evidence of structural breaks in the other 3 models.

Wohar, D. E. (2006). *Structural Breaks and Predictive Regression Models of Aggregate US Stock Returns.* Wester Economic Association.

7. This paper states that using the return regression equation should be statistically significant.Evidence of stock market predictability can be done by using intrest rates, dividend yields and a variety of macroeconomic variables exhibiting clear business cycle variations.

Pesaran, M. H. *Market Efficiency and Stock Market Predictability.* Lent Term.

8. The authors used 2 experiements using the Gaussian process. They kept track of important stock information such as: price and whether the price was increasing or decreasing. They used a + 1 labeling to produce a simple metric trend. (1 when increasing and -1 when decreasing). Second they looked to see if the value of the stocks were close to the trading day so they could predict the price of the stock for the following days. They also used 100 iteration optimization of the marginal liklehood with rach different kernel.

Correa, M. T. (2007). *Gaussian Process Regression Models for Predicting Stock Trends.*

9. The authors conduct an out-of-sample forecasting exercise inspired by Goyal and Welch with modifications that reveal the effectiveness of theoretically motivated restrictions. They used monthly data and predicted simple monthly or annual stock returns on the S & P 500 Index.

John Y. Campell, S. B. (2007). *Predicting Excess Stock Returns Out of Sample: Can Anything Beat the Historical Average?* Oxford University Press.