# A VALUE-MOMENTUM TRADING STRATEGY USING SELECTIVE EQUITY SCREENING CRITERIA

by

Anderson Chu
BBA, Menlo College, Atherton, CA, U.S. 2006
and

Anh Tran
BBA, Simon Fraser University, Burnaby, 2009

PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF FINANCIAL RISK MANAGEMENT

In the Faculty of Business Administration



SIMON FRASER UNIVERSITY

Summer 2010

## Approval

| | |
|---|---|
| **Name:** | **Anderson Chu and Anh Tran** |
| **Degree:** | **Master of Financial Risk Management** |
| **Title of Project:** | **A Value-Momentum Trading Strategy Using Selective Equity Screening Criteria** |

**Supervisory Committee:**

_____

**Dr. Robert. R. Grauer**
Senior Supervisor
Endowed Professor, Finance

_____

**Dr. Alexander Vedrashko**
Second Reader
Assistant Professor, Finance

**Date Approved:** _____

## Abstract

Investors and money managers are constantly looking for a trading strategy that can help them outperform the market. These strategies usually are constructed from fundamental analysis that help money managers select the best value stocks for their portfolios. Hence, the task of finding common features of winning stocks is highly important. These common features are usually represented in terms of fundamental data. The purpose of this paper is to reexamine Yu (2009)'s four-factor trading strategy, which is based on Reinganum (1988)'s original four-factor strategy, on the S&P 500 stocks, and to develop a new profitable trading strategy based on updated value and momentum factors.

**Keywords:** Equity Screening, Portfolio Abnormal Return, Portfolio Management

## Dedication

We wish to dedicate this report to our family members for their endless support throughout our lives.

## Acknowledgements

We would like to sincerely thank our senior supervisor, Dr. Robert R. Grauer and our second reader, Dr. Alexander Vedrashko for their support, comment, patience and encouragement throughout the semester. Without them, we will never be able to achieve this accomplishment. We also would like to express special thanks to our friends and fellow classmates for providing us with assistance, opinion, and encouragement throughout the process of this paper.

Contents

Approval ..... i
Abstract ..... ii
Dedication ..... iii
Acknowledgements ..... iv
1. Introduction ..... 1
2. Literature Review ..... 2
3. Equity Screening Methodology ..... 3
   a. Return Related Filters ..... 3
   b. Risk Related Filters ..... 4
   c. Size Related Filters ..... 4
4. Data ..... 5
5. Performance Measure Methodology ..... 5
6. Results ..... 6
   Table 1 ..... 7
   Performance Measurement of Portfolios' Monthly Returns ..... 7
   Table 2 ..... 8
   Performance Measurement of Portfolios' Quarterly Returns ..... 8
   Table 3 ..... 9
   Results of Alphas for Both Portfolios' Monthly Return ..... 9
   Table 4 ..... 9
   Results of Alphas for Both Portfolios' Quarterly Return ..... 9
   Table 5 ..... 9
   Results of Matched-Pair t-test on Differences in Both Portfolios' Average Returns ..... 9
   6.1 The 1990 - 2009 Period ..... 10
   6.2 The 1990 - 1999 Period ..... 10
   6.3 The 2000 - 2009 Period ..... 11
7. Conclusion ..... 11
References ..... 13

# 1. Introduction

Money managers are striving to find a successful trading strategy that will help them outperform their rivals. They are constantly trying different strategies to obtain significant abnormal returns in their portfolios. This competition has made the mission of finding alpha difficult. This paper will first reexamine Yu's (2009) four-factor trading strategy developed from Reinganum's (1988) original four-factor strategy. Then we will develop our trading strategy created from a different set of factors with the hope that these portfolios will outperform the market. We evaluate the effectiveness of our strategy by back testing it using data from 1990 to the end of 2009 from the 500 stocks in the S&P 500 Index. We construct an equally weighted portfolio using five screening filters every quarter. Then, we evaluate the monthly and quarterly performance of these portfolios in the context of the Jensen's (1972) Capital Asset Pricing alpha, Fama and French's (1996) three-factor alpha and Carhart's (1997) four-factor alpha. In addition, we compare the returns of our portfolios to the return of Yu's (2009) equally weighted portfolios to determine which strategy is more profitable.

Significant alphas are found in both strategies in almost all models used to evaluate monthly and quarterly returns of constructed portfolios over the entire period and two sub-periods. These findings lead us to believe that both Reinganum's revised strategy and our value investing mix momentum strategy are profitable.

The remainder of the paper is composed of six sections. Section 2 contains the literature review on the framework used in our study. The data and methodology of our trading strategy together with the analysis of our screening factors and those of Yu are mentioned in section 3, 4 and 5. Section 6 will summarize all results and findings. Section 7 is the conclusion of the paper.

## 2. Literature Review

As many studies, such as Chan and Lakinishok (2004), have suggested that value investing will, on average, outperform momentum investing in the long run. But, we are interested to know whether adding momentum factors to value investing strategy will create any value. Interesting findings of recent studies by Jegadeesh and Titman (1993) and Chan (1996) lead us to believe the implementation will add value to investors. These studies claim that investors can take advantage of the slowness in response to new information by investing with price and earnings momentum in the short term. Undoubtedly, transactions and other related costs should be considered in momentum strategies as they require more frequent turnover of portfolio's assets. A more recent study by Korajczyk and Sadka (2004) examines the effects of trading and the liquidity premium on momentum strategies and conclude that a liquidity-weighted strategy can still create profit opportunities for investors.

Now, the question is whether we can identify the common features of winning stocks. Reinganum (1988) studies 222 winning stocks traded on NYSE and AMEX that have at least doubled in price in any single year between 1970 and 1983. He then examines the performance of portfolios created using two strategies: a nine-variable model and a four-variable model. His four variables are: market-to-book ratio less than one; most recent quarterly earnings changes faster than of the previous one; most recent quarter's relative strength greater than the previous quarter; and less than 20 million outstanding shares. He finds that both strategies can generate significant cumulative excess returns.

Yu (2009) replicates Reinganum's four-variable strategy over extended periods from 1970 to 2006 and compares her new strategies with other common features of winning stocks to Reinganum's strategy. She finds that Reinganum's strategy applied in the post 1984 period

yields even higher returns than the pre 1984 period and her new strategy with variations of rules and filters can result in higher abnormal returns and alphas than portfolios constructed by Reinganum's strategy.

Another concern is the effect of market anomalies, such as the size effect. The idea that small stocks earn higher return than large stocks varies over different periods of time. Arnott (2005) finds that the size effect has far less effect than commonly perceived and that value factors are more powerful and consistent than thought.

## 3. Equity Screening Methodology

The filters can be grouped into three main categories: return, risk and size.

### a. Return Related Filters

***Year-over-Year Net Income Changes***

Yu considers year-over-year net income changes to represent the return performance in her model and can tell whether a firm is able to outperform its growth from last year's same quarter. The following formula demonstrates how the year-over-year net income changes are calculated:

$$\frac{Net\ Income_q - Net\ Income_{q-1}}{Net\ Income_{q-1}} - \frac{Net\ Income_{q-1} - Net\ Income_{q-2}}{Net\ Income_{q-2}}$$

***Return on Equity (ROE) and 6-month Return***

The past 6-month Return is included in both strategies; while, the ROE is only included in our strategy. Both filters best represent the return factor and the well-being condition of a company in both long term and relatively short term. Specifically, the ROE ratio represents the return effectiveness of a firm to the investor as its formula represents the magnitude of net income (return) received for every unit of equity. The 6-month total return including all

dividends payout helps indicate if a firm is able to sustain their returns within relatively short term.

**b. Risk Related Filters**

***Market Cap to Book Ratio***

Yu uses market cap to book ratio as the size and value measure in her model. This ratio is defined as book value to market value. This ratio compares the market value of the firm relative to its historical book value. The value of the ratio helps Yu determine whether the firm is overvalued or undervalued relative to book value.

***Asset to Equity and P/E***

The next two ratios enable us to categorize companies in term of their riskiness level. The Asset to Equity ratio indicates how much leverage a company is taking on. Being value investors, we want companies with acceptable level of leverage but not too high comparing to its peers average. As a result, this ratio will screen out companies that are not fit in our investing strategy. For the price to earnings ratio, we decide to include this in our model as we prefer lower P/E companies that are cheaper on average for every unit of earnings. High P/E companies tend to have higher growth in the future, so they are more likely to have high debt and leverage compared to lower P/E companies. Thus, low to medium P/E companies are preferred in our investing strategy.

**c. Size Related Filters**

***Market Cap***

The last factor that both strategies consider is the size of the firm. Unlike most value investors who would prefer firms with large market cap, Yu and we prefer firms with small to medium market cap relative to the index average market cap. As mentioned in the literature

review, small cap companies tend to outperform large cap companies in the long term. As a result, this filter is used in both strategies.

We exclude stocks with missing values from the screening process. Next, we define our cutting point for each filter. These cutting points are set in a way that will best represent our mixed investing style. This means we will pick the top $50^{th}$ percentile for filters, such as ROE, 6-month Return, YOY Quarterly Net Income Changes and bottom $50^{th}$ percentile for filters such as Market Cap, Asset to Equity, P/E and Market Cap to Book Ratio.

## 4. Data

The data are obtained from CompuStat and CRSP data through Wharton Research Data Services (WRDS) website. The data period is quarterly from 1990 to the end of 2009. The monthly and quarterly market return between 1990 and 2009 together with the SMB (Small Minus Big) and HML (High Minus Low) factors are attained from Kenneth R. French's website; whereas, the 3-month treasury bills are downloaded from the Federal Reserve Bank of St. Louis' website.

## 5. Performance Measure Methodology

After the screening process, portfolios for every quarter are formed. We compute the monthly and quarterly total returns assuming that portfolios are equally weighted. Monthly returns of constructed portfolios are attained from CRSP data and quarterly returns are computed from the monthly data. Since both strategies are based on past quarterly data and these data may not be available immediately to the public, we will issue a buy signal two months after each quarter end. Thus, the portfolios' monthly and quarterly returns will be calculated accordingly. After determining monthly and quarterly returns over the entire period 1990 to end of 2009, we take the average value of the constructed portfolios' returns over the desired periods.

Jensen's alpha, Fama-French's three-factor alpha and Carhart's four-factor alpha are used to evaluate the performance of portfolios constructed by Yu's strategy and our strategy.

$$r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \varepsilon_{pt}$$

$$r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \lambda_p SMB_t + \theta_p HML_t + \varepsilon_{pt}$$

$$r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \lambda_p SMB_t + \theta_p HML_t + \eta_p MOM_t + \varepsilon_{pt}$$

where:

$r_{pt}$ = return of a portfolio created by a strategy

$r_{mt}$ = return of a value-weighted portfolio of NASDAQ/NYSE/AMEX market proxy

$r_{ft}$ = return of Treasury bill rate (monthly and 3-month)

$r_{mt} - r_{ft}$ = excess return of the market proxy over the Treasury bill rate

$SMB_t$ = average return on three small portfolios minus average return on three big portfolios

$HML_t$ = average return on the two value portfolios minus the average return on the two growth portfolios

$MOM_t$ = average return on the two high prior return portfolios minus the average return on the two low prior return portfolios

In addition, we regress the differences in both portfolios' monthly and quarterly return in the above frameworks. This additional test will show whether the differences between two portfolios' alphas are statistically significant at 5% level.

## 6. Results

The results are displayed in the following tables

## Table 1

### Performance Measurement of Portfolios' Monthly Returns

| Monthly Returns | 1990-2009 | | 1990-1999 | | 2000-2009 | |
|---|---|---|---|---|---|---|
| | Yu's Portfolios | Our Portfolios | Yu's Portfolios | Our Portfolios | Yu's Portfolios | Our Portfolios |
| **Panel A: Average Returns** | | | | | | |
| | 0.84 | 0.88 | 0.66 | 0.73 | 1.02 | 1.05 |
| **Panel B: Jensen's alpha** $r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \varepsilon_{pt}$ | | | | | | |
| **α** | 0.40 | 0.40 | -0.30 | -0.20 | 1.10 | 1.10 |
| *t-stat* | 1.89 | 1.98 | -1.22 | -0.60 | 3.90 | 3.90 |
| $\mathbf{r_{mt} - r_{ft}}$ | 0.94 | 0.92 | 1.02 | 0.97 | 0.90 | 0.90 |
| *t-stat* | 21.35 | 19.12 | 14.91 | 11.84 | 16.02 | 15.76 |
| **Adj. $R^2$** | 0.66 | 0.61 | 0.65 | 0.54 | 0.68 | 0.68 |
| **Panel C: FF's alpha** $r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \lambda_p SMB_t + \theta_p HML_t + \varepsilon_{pt}$ | | | | | | |
| **α** | 0.10 | 0.20 | -0.60 | -0.40 | 0.50 | 0.70 |
| *t-stat* | 0.47 | 1.04 | -2.69 | -1.45 | 2.38 | 2.76 |
| $\mathbf{r_{mt} - r_{ft}}$ | 1.05 | 1.02 | 1.27 | 1.19 | 0.93 | 0.92 |
| *t-stat* | 28.30 | 22.26 | 19.98 | 14.26 | 21.07 | 17.10 |
| $\mathbf{SMB_t}$ | 0.13 | 0.03 | 0.11 | -0.02 | 0.20 | 0.11 |
| *t-stat* | 2.63 | 0.47 | 1.62 | -0.18 | 2.76 | 1.24 |
| $\mathbf{HML_t}$ | 0.60 | 0.47 | 0.68 | 0.57 | 0.60 | 0.44 |
| *t-stat* | 11.76 | 7.41 | 7.45 | 4.74 | 10.11 | 6.14 |
| **Adj. $R^2$** | 0.78 | 0.68 | 0.77 | 0.63 | 0.84 | 0.75 |
| **Panel D: Carhart's alpha** $r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \lambda_p SMB_t + \theta_p HML_t + \eta_p MOM_t + \varepsilon_{pt}$ | | | | | | |
| **α** | 0.10 | 0.20 | -0.40 | 0.00 | 0.50 | 0.70 |
| *t-stat* | 0.52 | 1.11 | -1.74 | 0.16 | 2.37 | 2.72 |
| $\mathbf{r_{mt} - r_{ft}}$ | 1.04 | 1.01 | 1.25 | 1.14 | 0.93 | 0.99 |
| *t-stat* | 26.43 | 20.72 | 19.73 | 14.94 | 18.57 | 16.41 |
| $\mathbf{SMB_t}$ | 0.13 | 0.03 | 0.11 | 0.00 | 0.20 | 0.10 |
| *t-stat* | 2.64 | 0.50 | 1.69 | 0.01 | 2.73 | 1.19 |
| $\mathbf{HML_t}$ | 0.60 | 0.46 | 0.59 | 0.32 | 0.60 | 0.43 |
| *t-stat* | 11.39 | 7.11 | 6.03 | 2.73 | 10.06 | 6.09 |
| $\mathbf{MOM_t}$ | -0.01 | -0.02 | -0.15 | -0.40 | 0.00 | 0.09 |
| *t-stat* | -0.35 | -0.50 | -2.30 | -5.16 | 0.13 | 2.25 |
| **Adj. $R^2$** | 0.78 | 0.68 | 0.78 | 0.71 | 0.83 | 0.76 |

*(Note: alphas' values and average returns are multiplied by 100)*

**Table 2**

**Performance Measurement of Portfolios' Quarterly Returns**

| Quarterly Returns | 1990-2009 | | 1990-1999 | | 2000-2009 | |
|---|---|---|---|---|---|---|
| | Yu's Portfolios | Our Portfolios | Yu's Portfolios | Our Portfolios | Yu's Portfolios | Our Portfolios |
| **Panel A: Average Returns** | | | | | | |
| | 2.58 | 2.65 | 1.60 | 1.93 | 3.55 | 3.35 |
| **Panel B: Jensen's alpha** $r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \varepsilon_{pt}$ | | | | | | |
| **α** | 1.10 | 1.20 | -0.80 | -0.90 | 3.60 | 3.40 |
| *t-stat* | 1.54 | 1.71 | -0.78 | -0.66 | 3.68 | 4.00 |
| $\mathbf{r_{mt} - r_{ft}}$ | 0.98 | 0.92 | 0.95 | 1.10 | 1.02 | 0.86 |
| *t-stat* | 12.30 | 11.19 | 6.40 | 6.06 | 10.63 | 10.34 |
| **Adj. $R^2$** | 0.66 | 0.61 | 0.51 | 0.48 | 0.74 | 0.73 |
| **Panel C: FF's alpha** $r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \lambda_p SMB_t + \theta_p HML_t + \varepsilon_{pt}$ | | | | | | |
| **α** | 0.00 | 0.70 | -1.60 | -1.80 | 1.60 | 2.40 |
| *t-stat* | 0.11 | 1.04 | -2.30 | -1.79 | 2.88 | 3.30 |
| $\mathbf{r_{mt} - r_{ft}}$ | 1.02 | 1.00 | 1.15 | 1.38 | 1.02 | 0.90 |
| *t-stat* | 20.12 | 13.49 | 11.55 | 9.17 | 18.57 | 12.88 |
| $\mathbf{SMB_t}$ | 0.17 | -0.08 | 0.08 | -0.23 | 0.09 | -0.12 |
| *t-stat* | 2.51 | -0.83 | 0.88 | -1.61 | 0.96 | -1.04 |
| $\mathbf{HML_t}$ | 0.76 | 0.47 | 0.79 | 0.54 | 0.72 | 0.42 |
| *t-stat* | 11.60 | 4.93 | 6.83 | 3.10 | 9.64 | 4.45 |
| **Adj. $R^2$** | 0.88 | 0.72 | 0.81 | 0.69 | 0.93 | 0.84 |
| **Panel D: Carhart's alpha** $r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \lambda_p SMB_t + \theta_p HML_t + \eta_p MOM_t + \varepsilon_{pt}$ | | | | | | |
| **α** | 0.50 | 1.10 | -1.00 | -0.10 | 1.70 | 2.40 |
| *t-stat* | 1.08 | 1.65 | -1.25 | -0.06 | 3.07 | 3.26 |
| $\mathbf{r_{mt} - r_{ft}}$ | 0.94 | 0.91 | 1.10 | 1.21 | 0.94 | 0.90 |
| *t-stat* | 17.35 | 11.25 | 10.32 | 8.25 | 14.82 | 10.41 |
| $\mathbf{SMB_t}$ | 0.22 | -0.03 | 0.13 | -0.08 | 0.16 | -0.12 |
| *t-stat* | 3.37 | -0.25 | 1.29 | -0.60 | 1.73 | -0.94 |
| $\mathbf{HML_t}$ | 0.70 | 0.41 | 0.73 | 0.36 | 0.68 | 0.42 |
| *t-stat* | 10.57 | 4.10 | 5.97 | 2.13 | 9.31 | 4.24 |
| $\mathbf{MOM_t}$ | -0.14 | -0.14 | -0.12 | -0.36 | -0.12 | -0.00 |
| *t-stat* | -3.01 | -2.02 | -1.31 | -2.96 | -2.24 | -0.05 |
| **Adj. $R^2$** | 0.89 | 0.74 | 0.82 | 0.75 | 0.94 | 0.83 |

*(Note: alphas' values and average returns are multiplied by 100)*

**Table 3**

**Results of Alphas for Both Portfolios' Monthly Return**

| | 1990-2009 | 1990-1999 | 2000-2009 |
|---|---|---|---|
| **Panel A: Jensen's alpha** $r_{pt} - r_{yt} = \alpha_d + \beta_d(r_{mt} - r_{ft}) + \varepsilon_{dt}$ | | | |
| **α** | 0.05 | 0.11 | 0.03 |
| *t-stat* | 0.31 | 0.43 | 0.11 |
| **Panel B: FF's alpha** $r_{pt} - r_{yt} = \alpha_d + \beta_d(r_{mt} - r_{ft}) + \lambda_d SMB_t + \theta_d HML_t + \varepsilon_{dt}$ | | | |
| **α** | 0.13 | 0.13 | 0.19 |
| *t-stat* | 0.73 | 0.51 | 0.71 |
| **Panel C: Carhart's alpha** $r_{pt} - r_{yt} = \alpha_d + \beta_d(r_{mt} - r_{ft}) + \lambda_d SMB_t + \theta_d HML_t + \eta_d MOM_t + \varepsilon_{dt}$ | | | |
| **α** | 0.14 | 0.46 | 0.19 |
| *t-stat* | 0.76 | 1.76 | 0.71 |

*(Note: alphas' values are multiplied by 100)*

**Table 4**

**Results of Alphas for Both Portfolios' Quarterly Return**

| | 1990-2009 | 1990-1999 | 2000-2009 |
|---|---|---|---|
| **Panel A: Jensen's alpha** $r_{pt} - r_{yt} = \alpha_d + \beta_d(r_{mt} - r_{ft}) + \varepsilon_{dt}$ | | | |
| **α** | 0.15 | -0.03 | -0.25 |
| *t-stat* | 0.28 | -0.03 | -0.36 |
| **Panel B: FF's alpha** $r_{pt} - r_{yt} = \alpha_d + \beta_d(r_{mt} - r_{ft}) + \lambda_d SMB_t + \theta_d HML_t + \varepsilon_{dt}$ | | | |
| **α** | 0.61 | -0.26 | 0.62 |
| *t-stat* | 1.20 | -0.32 | 0.93 |
| **Panel C: Carhart's alpha** $r_{pt} - r_{yt} = \alpha_d + \beta_d(r_{mt} - r_{ft}) + \lambda_d SMB_t + \theta_d HML_t + \eta_d MOM_t + \varepsilon_{dt}$ | | | |
| **α** | 0.61 | 0.93 | 0.57 |
| *t-stat* | 1.13 | 1.01 | 0.89 |

*(Note: alphas' values are multiplied by 100)*

**Table 5**

**Results of Matched-Pair t-test on Differences in Both Portfolios' Average Returns**

| | 1990-2009 | 1990-1999 | 2000-2009 |
|---|---|---|---|
| *Monthly Return's t-stat* | 0.25 | 0.26 | 0.10 |
| *Quarterly Return's t-stat* | 0.12 | 0.41 | -0.27 |

### 6.1 The 1990 - 2009 Period

Over the entire period, the average monthly and quarterly return of portfolios constructed using our strategy are 0.88% and 2.65% respectively, which are higher than the average returns of 0.84% and 2.58% from portfolios constructed using Yu's strategy as shown in **Table 1 and Table 2**. However, the differences in both portfolios' average returns are not statistically significant as shown in **Table 5**. Our portfolios' cumulative return for the entire period is $12.08 for every dollar invested at the beginning of the period comparing to $10.99 from Yu's portfolios. Neither strategy can create monthly and quarterly portfolios with significant abnormal return in Fama-French's three-factor alpha and Carhart's four-factor alpha. In Jensen's alpha, only monthly portfolios constructed using our strategy have positive and significant abnormal return.

### 6.2 The 1990 - 1999 Period

The average return of monthly and quarterly portfolios constructed using our strategy are 0.73% and 1.93% respectively, which are higher than the average return of 0.66% and 1.6% from portfolios constructed using Yu's strategy (**Table 1 and 2**). But, the differences in both portfolios' average returns are not statistically significant (**Table 5**). Also, one should earn $3.22 at the end of 1999 for every dollar invested at the beginning of 1990 in our portfolios; while, Yu's portfolios will earn $3.03. Neither Yu's nor our portfolios can create any positive and significant abnormal return in this period. The only portfolios with significant and negative abnormal return are Yu's monthly and quarterly portfolios measured in Fama-French's three-factor alpha.

### 6.3 The 2000 - 2009 Period

In this sub-period, the monthly portfolios constructed using Yu's strategy have lower average return than those constructed using our strategy (1.02% compared to 1.05%). However, the average quarterly return of Yu's portfolios (3.55%) is greater than our strategy's average return of 3.35%. The differences in both portfolios' average returns do not have any statistical significance as displayed in **Table 5.** Our portfolios can produce $3.75 at the end of 2009 for every dollar invested at the start of 2000 comparing to $3.63 produced by Yu's portfolios in the same period. All portfolios perform very well in second half period. In fact, they all have highly significant and positive abnormal return as shown in both tables 1 and 2. Also, the alphas for Yu's and our portfolios are not statistically different at 5% level (**Table 3 &4**). Both monthly and quarterly portfolios constructed using Yu's strategy have higher abnormal return than those constructed using our strategy in Jensen's alpha. When measured in Fama-French's three-factor alpha and Carhart's four-factor alpha, our monthly and quarterly portfolios yield greater abnormal return relative to Yu's monthly and quarterly portfolios.

## 7. Conclusion

Our strategy is better than Yu's over the entire period. The average monthly and quarterly returns of portfolios constructed using our strategy are greater than those of Yu's although the differences are not statistically significant. In addition, only our portfolio has a positive statistically significant Jensen's alpha of 0.4% with monthly returns.

Over the first sub-period, our strategy is arguably better than Yu's for the following reasons. The average monthly and quarterly returns of our portfolios are higher than those of Yu's portfolios although the differences are not statistically significant. At the 5% significance level, Yu's portfolios generate negative and significant alpha on both monthly and quarterly

return basis according to Fama-French. Our portfolios also experience negative alphas on both monthly and quarterly basis in all models, but the losses are smaller than those of Yu's and our alphas are not statistically significant.

Over the second sub-period, our strategy shows improvement over Yu's. Our portfolio's average monthly return is greater than those of Yu's, but the average quarterly return of Yu is slightly higher than our portfolio's. But, the differences in both portfolios' average returns are not statistically significant. Both strategies are profitable over the second sub-period as both portfolios are capable of creating consistently high positive Jensen, Fama-French and Carhart alphas. In fact, the alphas of our portfolios on monthly and quarterly return basis in Fama-French and Carhart are much greater than those of Yu's. Both Yu's and our portfolios produce similar significant and positive Jensen's alpha.

In addition, the adjusted $R^2$ for Yu's portfolios are higher than ours in all regressions. This leads us to believe that our value-momentum strategy contains other unknown factors responsible for abnormal returns in our portfolios.

Overall, we find that only our strategy can construct monthly portfolios with significant alpha over the entire period and both strategies are capable of creating high and very significant alpha over the second sub-period.

Hence, equity screening models are important and useful tools for money managers in their quest for alpha.

## References


Arnott, R.D. (2005), "Disentangling size and value", *Financial Analyst Journal*, Vol. 61 No. 5 pp. 12-15.

Bodie Z., Kane A., Marcus A., Perrakis S., Ryan P. (2005). *Investments,* Toronto: McGraw-Hill Ryerson.

Carhart, M.M., (1997). "On persistence in mutual fund performance", *Journal of Finance*, Vol. 52, pp. 57-92.

Chan, L.K.C and Lakonishok, J. (2004),"Value and growth investing: review and update", *Financial Analyst Journal,* Vol.60 No.1, pp. 71-86.

Chan, L.K.C, Jegadeesh, N. and Lakonishok, J. (1996), "Momentum strategies", *Journal of Finance,* Vol.51 No.5, pp.1681-731.

Fama, E.F., French, K.R. (1996), "Multifactor explanations of asset pricing anomalies", *Journal of Finance,* Vol. 51, pp. 55-84.

Jegadeesh, N. and Titman, S. (1993). "Returns to buying winners and selling losers: implications for stock market efficiency", *Journal of Finance,* Vol.48 No.1, pp.65-91.

Jensen, M.C., 1972, "Capital Market: Theory and evidence", *Bell Journal of Economics and Management Science,* Vol.3, pp. 357-398.

Korajczyk, R.A and Sadka, R. (2004), "Are momentum profits robust to trading costs?", *Journal of Finance,* Vol.59 No.3, pp.1039-82.

Reinganum, M.R. (1988), "The anatomy of a stock market strategies", Journal *of Finance,* Vol.44 No.1, pp. 16-28.

Yu, S. (2009), "Reinganum's trading strategies revisited", *Managerial Finance,* Vol. 35 No. 4, pp.357-384.