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Does Selected Portfolio Investment Earn Abnormal Returns?

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Abstract

Finance literature suggests that average returns on common stocks are associated with firm characteristics such as size, book-to-market ratio, and growth. In this paper, I evaluate the performance of the selected portfolio when comparing with the benchmark portfolio (e.g., a market index), and document the anomalies earned by the selected portfolio. However, after matching the selected and benchmark portfolios by size and book-to-market ratio, the selected portfolio underperforms the benchmark portfolio. The results for testing anomalies are mixed, which is consistent with the previous literature that "apparent anomalies can be due to research methodology, most long-term return anomalies tend to disappear with reasonable changes in technique" (Fama 1998). The results are robust to the usage of Fama and MacBeth regression method and nonparametric signed-rank test, indicating that the results are not likely due to random chance.

Keywords: Investment, Selected portfolio, Size, Book-to-market ratio, Growth, Benchmark portfolio, Abnormal returns

JEL Classification Codes: G10, G11

1. Introduction

The goal in this research is to examine whether there is any abnormal return of the selected portfolio comparing with the preference (benchmark) portfolio, the market returns for firms listed on the New York, American, and NASDAQ exchanges with available data on the monthly returns files in the Center for Research in Security Prices (CRSP) form January 2000

through December 2004. I hypothesize that the selected portfolio outperform market, because securities for the firms belong to the banking and insurance industries weight heavily in this portfolio, these securities often have good performance in the past, and I suspect they still have good performance during the period I examined (Note 1). Consistent with my expectation, I find that the selected portfolio outperform market in the research period. But with direct benchmark matching on size and book-to-market ratio, the performance of selected portfolio under that of benchmark. This finding is similar to what documented by Fama (1998) when they investigate the abnormal returns in the event study for initial public offerings and seasoned equity offerings (Note 2).

In the sensitivity tests, I use Fama-MacBeth regression method to run regressions and find that there are statistically and economically significant abnormal returns in the selected portfolio compared with the market index. Nonparametric test is used to examine the abnormal returns compared with direct benchmark matching on size and book-to-market ratio. The result of nonparametric test confirms the finding obtained by using one-tailed t test that the selected portfolio underperforms the matched benchmark portfolio. This paper is related to the finance literature focusing on the capital asset pricing model and testing abnormal stock returns.

Capital asset pricing model (CAPM) was developed by Sharpe (1963 and 1964) and Treynor (1961), and further extended by Mossin (1966), Lintner (1965), and Black (1972). CAPM shows that the equilibrium rates of return on all risky assets are a function of their covariance with the market portfolio (Note 3) (well known as the market beta). CAPM cannot explain the relationship between a firm's average stock returns and its size (ME, stock price times number of shares), book-to-market value, earnings/price (E/P), cash flow/price (C/P), the past sales growth (e.g., Banz 1981, Basu 1983, Rosenberg, Reid, and Lanstein 1985). Therefore, these patterns are typically called anomalies.

The late literature tries to capture these anomalies. Bhandari (1988) showed that leverage helps explain the cross-sectional of average stock returns in tests that include size (market equity/value) and beta. Stattman (1980) and Rosenberg et al. (1985) uncovered that average returns on U.S. stocks are positively related to the ratio of a firm's book value of common equity, BE, to its market value, ME. Chen et al. (1991) provided more evidence for this notion in Japanese stocks. Fama and French (1992) showed that the market beta does not explain the expected stock returns sufficiently, and proposed size and the ratio of book to market equity can capture the cross sectional variation in average stock returns associated with market beta, size, leverage, book to market equity, and earnings to price ratios. Fama and French (1993) identifies three stock-market factors, an overall market factor and factors related to firm size (known as SMB) and book-to-market equity (known as HML). Fama and French (1995) discover that high BE/ME indicates persistent poor earnings and low BE/ME indicates strong earnings, and stock prices forecast the reversion of earnings growth observed after firms are ranked on size and BE/ME.

Fama and French (1996) further investigate the relation between anomalies and the three-factor model in Fama and French (1993), indicating that many of the CAPM

average-returns anomalies are related and they are captured by the three-factor model. Fama and French (1997) examine the accuracy of estimates of cost of equity for industries using the CAPM and the three-factor model of Fama and French (1993). They find that the standard errors of estimates are large, in another word, estimates of the cost of equity for industries are not precise. They argue that the large standard errors are due to uncertainty about true factor risk premiums and imperfect estimates of the loadings of industries on the risk factors. Fama (1998) documents that the anomalies are opportunity results that might due to the overreaction or underreaction to information. Fama (1998) also point out that apparent anomalies can be due to methodology, most long-term return anomalies tend to disappear with respect to the changes in research technique. The academic professionals apply the CAPM and three-factor model in Fama and French (1993) in detecting long-term (e.g., three years or five years) abnormal stock returns, and analyze the empirical power and the specification of test statistics in these tests (e.g., Barber and Lyon 1996 and 1997, Kothari and Warner 1997, Fama 1998, Lyon et al. 1999, Fama and French 2015) (Note 4).

Fama and French framework (the three-factor model) does not well explain the continuation of short-term returns reported by Jegadeesh and Titman (1993) and Asness (1994). Jegadeesh and Titman (1993) find that short-term returns tend to continue; stocks with higher returns in the previous twelve months tend to have higher future returns. Jegadeesh and Titman (2001) extend previous work (Jegadeesh and Titman 1993) by examining various reasons for the profitability of momentum strategies in Jegadeesh and Titman (1993). Jegadeesh and Titman (2001) find that momentum profits have continued in the 1990s'. Jegadeesh and Titman (2001) also investigate the predictions of behavioral models that suggest momentum profits are due to overreactions that are finally reversed. Their results support behavioral models.

Next section introduces the sample data and research method. Section 3 reports the results of tests and discussions of results. Section 4 describes sensitivity tests and their results. Section 5 draws the conclusion.

2. Sample Data and Research Method

To measure the long-run abnormal returns using the calendar-time portfolio method, a portfolio is constructed for every month, containing 213 firms. After eliminating the firms do not have data in COMPUSTAT and CRSP, the remaining sample includes 161 distinct firms, 8,262 firm year month observations, covered from fiscal year 2000 to 2004. CUSIP of a firm is used to match the available data in CRSP and COMPUSTAT. Then, I compute portfolio return as following:

$$R_{p,t} = \sum_{i=1}^{N} R_{i,t} \Big/ N \tag{1}$$

$R_{p,t}$ is the portfolio return at time t (year and month specific) and N is the number of stock at time t. By doing so, I estimate returns for an equal-weighted portfolio. Portfolio excess returns are calculated as the monthly return series less the risk-free rate.

2.1 CAPM and Modified Three-Factor Model

To test whether there is any abnormal return of the selected portfolio, I use regressions of the portfolio excess returns on the Capital Asset Pricing Model (CAPM) and a modified three-factor model in Fama and French (1993) including a momentum component. The Capital Asset Pricing Model is expressed in equation (2):

$$R_{p_t} - R_{ft} = \alpha_p + \beta_p(R_{m,t} - R_{f,t}) + e_{pt} \quad (2)$$

where, $R_{p,t}$ is the monthly calendar-time portfolio return at time *t*, $R_{m,t}$ is the monthly return on the CRSP value-weighted index at time *t*, $R_{f,t}$ is the risk-free rate at time *t*, α_p and β_p are the regression parameters, and e_{pt} is the error term. The intercept, α_p, measures the average monthly abnormal return and is assumed not be significantly different from zero if no abnormal returns.

The extended three-factor model in Fama and French (1993) is shown in equation (3):

$$R_{p_t} - R_{ft} = \alpha_p + \beta_p(R_{m,t} - R_{f,t}) + s_p SMB_t + h_p HML_t + m_p MonM_t + e_{pt} \quad (3)$$

Where, α_p, β_p, s_p, h_p and m_p are the regression parameters. $(R_{m,t} - R_{f,t})$ represents the excess return of the market at time t. SMB_t (small minus big) is the size factor at time t, and calculated as the difference between the returns on a portfolio of small stocks and a portfolio of big stocks. HML_t (high minus low) is the book-to-market factor and calculated as the difference between the returns on a portfolio of high-book-to-market-equity (BE/ME) stocks and a portfolio of low-BE/ME stocks. MonM_t is the stock momentum at time t, representing the difference between two high prior return portfolios and two low prior return portfolios (Note 5). The parameter of interest in this regression is the intercept, α_p. A positive intercept indicates that after controlling for market, size, and book-to-market factors (and momentum) in returns, the selected portfolio performed better than expected. This application of the CAPM and Fama-French three-factor model is conceptually equivalent to the tests based on the cumulative abnormal returns (Barber and Lyon 1997). Data used in the modified Fama and French model (R_{mt}, SMB, HML, and UMD) are obtained from Professor Ken French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/).

2.2 Size and BE/ME Effects

The Size and book-to-market ratio effects on abnormal returns were well documented in Fama and French (1992, 1995, and 1996). To further investigate the selected portfolio

performance, I use the equation (4) to examine the anomalies of the portfolio.

$$R_{p_t} - R_{ft} = r_{0p} + r_{1p}(R_{m,t} - R_{f,t}) + r_{2p}\,\text{Size}_t + r_{3p}(\text{BE/ME})_t + e_{pt} \quad (4)$$

Where, $r_{1p} - r_{3p}$ are the regression coefficients. r_{0p} is the intercept and e_{pt} is the error term. Following Fama and French (1996), Size_t is calculated as the logarithmic value of market equity (ME, stock price times shares outstanding). BE/ME ratio is the book-to-market equity. BE is the COMPUSTAT book value of stockholders' equity, plus balance sheet deferred taxes and investment tax credit (if available), minus the book value of preferred stock.

2.3 Comparison With Benchmark Returns

Previous studies (Barber and Lyon 1997, Fama 1998, Kothari and Warner 1997) suggest that different technique used in detecting long-term abnormal-return models might lead to different results. Barber and Lyon (1997) and Fama (1998) show that the abnormal returns disappear, compared with direct benchmark matching on size and book-to-market ratio. Therefore, I also define a benchmark by matching the selected portfolio to firms of similar size and book-to-market ratio.

One tailed t test is used to test the null hypothesis stated as the following equation (5)

H_0: The selected portfolio does not outperform market benchmark returns.

$$\text{DbenRet} = R_{p_t} - R_{ben,t} = 0 \quad (5)$$

The portfolio benchmark returns are obtained from French website (Note 6). Following Fama and French, I first sort the selected portfolio stock on size (market equity) by median and then category them into high/middle/low ratio of book equity to market equity. Subsequently, I compare the excess return of the selected portfolio with the return of benchmark portfolio (i.e., market returns at during the same period) matching the two portfolios with size and book-to-market ratio.

3. Results

3.1 Descriptive Statistic of Sample

Panel A of Table 1 shows the descriptive statistics for the selected portfolio firms. The risk-free rate denoted R_{ft} is the one-month Treasury bill rate (from Ibbotson Associates).

Panel B of table 1 provides the Fama and French (1997) 48 industry membership distribution of the selected portfolio. I notice that the highest weight industry is insurance in the selected portfolio (48.28% of total firms in the portfolio); next to highest weight is Banking, weighting 23.25% in the selected portfolio; real estate industry weights 11.67% in the portfolio; construction industry ranks forth, 3.63%, in the selected portfolio. These industries

are relative material and do not rapidly grow in current economic environment.

Table 1

Panel A. Descriptive statistics for the sample of selected portfolio

Variables	N	Maximum	Minimum	Std Dev	Mean	Median	Lower Quartile	Upper Quartile
ME	8262	228226.9	1.29E-05	18857.45	5621.17	538.3415	88.6269	2908.97
BE	8262	97074	-156.337	9527.1	3059.77	431.752	87.683	1682.56
BM	8262	7884165	-34.3252	521373	37431.27	0.754506	0.513204	1.162356
Size	8262	12.3381	-11.2591	2.602816	6.259264	6.288493	4.484435	7.975555
Ret	8262	1.465267	-0.6988	0.119536	0.014302	0.008044	-0.04138	0.061895
MktRET	8262	0.0818	-0.1076	0.049748	-0.00294	0.0074	-0.0387	0.0336
SMB	8262	0.2187	-0.1658	0.053412	0.008042	0.0058	-0.0224	0.0296
HML	8262	0.1371	-0.1266	0.047277	0.013149	0.0117	-0.0098	0.0374
MomM	8262	0.184	-0.2505	0.07463	0.004943	0.0151	-0.028	0.0529
R_f	8262	0.0056	0.0006	0.001654	0.002345	0.0014	0.001	0.004

ME: market equity, calculated as the price times shares of common stock outstanding.

BE: book equity, calculated as the COMPUSTAT book value of stockholders' equity, plus balance sheet deferred taxes and investment tax credit (if available), minus the book value of preferred stock.

BM: BE/ME ratio is the book-to-market equity.

Size: is calculated as the logarithmic value of market equity (ME).

Ret: excess return of portfolio, computed as $R_{p_t} - R_{ft}$, where, R_{p_t} is the portfolio return at time t, R_{ft} is the risk-free interest rate at time t.

MktRET: market excess return, computed as $R_{mt} - R_{ft}$, R_{mt} is the return on the value-weight

market portfolio at time t.

SMB: size factor, calculated as the difference between the returns on a portfolio of small stocks and a portfolio of big stocks.

HML: the book-to-market factor, calculated as the difference between the returns on a portfolio of high-book-to-market-equity (BE/ME) stocks and a portfolio of low-BE/ME stocks.

MomM: Momentum, obtained from French website. They use six value-weight portfolios formed on size and prior (2-12) returns to construct MomM. The portfolios, which are formed monthly, are the intersections of 2 portfolios formed on size (market equity, ME) and 3 portfolios formed on prior (2-12) return. The monthly size breakpoint is the median NYSE market equity. The monthly prior (2-12) return breakpoints are the 30^{th} and 70^{th} NYSE percentiles. MomM is the average return on the two high prior return portfolios minus the average return on the two low prior return portfolios,
R_f: risk free rate, measured as the one-month Treasury bill rate (from Ibbotson Associates).

Panel B. Fama and French (1997) industry membership distribution for the sample of selected portfolio

			Cumulative	Cumulative
FamaFrench Industry	Frequency	Percent	Frequency	Percent
Enrgy	60	0.73	60	0.73
Cnstr	300	3.63	360	4.36
Hshld	60	0.73	420	5.08
BldMt	60	0.73	480	5.81
Misc	96	1.16	576	6.97
Trans	60	0.73	636	7.7
Telcm	120	1.45	756	9.15
Util	60	0.73	816	9.88
Rtail	144	1.74	960	11.62
Banks	1921	23.25	2881	34.87
Fin	249	3.01	3130	37.88

Insur	3989	48.28	7119	86.17
RlEst	964	11.67	8083	97.83
BusSv	119	1.44	8202	99.27
PerSv	60	0.73	8262	100

3.2 Correlations

Table 2 provides the Pearson above Spearman below correlation among independent and dependent variables used in regressions. Excess returns (denoted as ret) is positively associated with market returns and HML factor, and negatively associated with risk free rate. When risk free rate increase, investors decrease the demand for the securities, then the returns of securities downward, therefore, the negative sign is consistent with expectation. The correlation sign between excess returns and BM is negative. That means low BE/ME ratio, the higher returns of securities. This result is consistent with the market expectation that securities with low BE/ME ratio are those grow rapidly, market prices them highly, therefore, the excess returns of them are higher too. The correlation sign between excess returns and momentum is negative. This is different from findings in Jegadeesh and Titman (1993 and 2001). This might due to the investigated time interval in this study is different from Jegadeesh and Titman (1993 and 2001), and the portfolio I used is different from them too. The selected portfolio is relative small and not presenting the market. And also, this result is consistent with the expectation that the market recognizes the mispricing of stock and adjusts the securities prices timely, and the securities prices converge to their true value. Therefore, the correlation between excess returns and momentum is negative.

Table 2. Pearson above Spearman below correlation table for the sample data

	ME	BE	BM	Size	ret	MktRET	SMB	HML	MomM	Rf
ME	1.0000	0.8811	-0.0214	0.4701	-0.0138	0.0055	-0.0035	0.0034	-0.0056	-0.0219
		<.0001	0.0517	<.0001	0.2106	0.6169	0.7539	0.7555	0.6140	0.0470
BE	0.9588	1.0000	-0.0224	0.4724	-0.0174	0.0181	0.0018	-0.0123	-0.0075	-0.0608
	<.0001		0.0422	<.0001	0.1147	0.0999	0.8709	0.2626	0.4965	<.0001
BM	-0.4641	-0.2271	1.0000	-0.4833	-0.0093	0.0070	0.0008	-0.0103	-0.0006	-0.0479
	<.0001	<.0001		<.0001	0.3961	0.5235	0.9429	0.3491	0.9604	<.0001
Size	1.0000	0.9588	-0.4641	1.0000	0.0192	0.0288	0.0002	-0.0092	-0.0118	-0.0860
	<.0001	<.0001	<.0001		0.0804	0.0088	0.9824	0.4047	0.2821	<.0001

ret	0.0447	0.0204	-0.0825	0.0447	1.0000	0.1872	-0.0230	0.0526	-0.1044	-0.0256
	<.0001	0.0638	<.0001	<.0001		<.0001	0.0367	<.0001	<.0001	0.0201
Mkt	0.0337	0.0292	-0.0251	0.0337	0.2206	1.0000	0.2434	-0.5150	-0.3683	-0.2231
RET	0.0022	0.0079	0.0228	0.0022	<.0001		<.0001	<.0001	<.0001	<.0001
SMB	0.0146	0.0114	-0.0134	0.0146	0.0540	0.3470	1.0000	-0.6341	0.2817	-0.0972
	0.1855	0.3020	0.2223	0.1855	<.0001	<.0001		<.0001	<.0001	<.0001
HML	-0.0289	-0.0342	-0.0068	-0.0289	0.0479	-0.5052	-0.4759	1.0000	0.0231	0.2483
	0.0086	0.0019	0.5381	0.0086	<.0001	<.0001	<.0001		0.0360	<.0001
MomM	-0.0176	-0.0186	0.0010	-0.0176	-0.1080	-0.3797	0.1635	0.1768	1.0000	-0.0107
	0.1095	0.0905	0.9286	0.1095	<.0001	<.0001	<.0001	<.0001		0.3307
RF	-0.1245	-0.1130	0.0855	-0.1245	-0.0621	-0.2276	-0.1645	0.2871	0.0715	1.0000
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	

Please refer to the measurement of variables in this Table in Table 1.

3.3 OLS Regression Results

Table 3 shows results of regression equations (2), and equation (3).

When I regress the excess returns of the portfolio on the market risk premium alone (CAPM), the Jensen alpha is 0.01447, which is positive and statistically economically significant. Regressing the portfolio return series on the modified three-factor model in Fama and French (1993), the Fama-French alphas are positive, slightly smaller, and statistically significant in both cases. I discussed in previous section that the mean intercept term is used to test the null hypothesis that the mean monthly abnormal returns of the selected portfolio is equal to zero (Barber and Lyon 1997). Thus, the results in table 3 indicate that there are abnormal returns of the portfolio compared with the preference portfolio. In the regressions of three-factor model and modified three-factor model in Fama and French (1993), coefficients associated with size factor (SMB) and BE/ME factor (HML) are both positive and statistically significant. This implies that the smaller size stocks have higher returns than those of big size, and value stocks in this portfolio were favored by market during the research period. The selected portfolio contains with heavy weight of firms in insurance and banking industries that are not fast growth industries. Therefore, the positive signs of HML are consistent with the characteristics of the selected portfolio.

The coefficient of momentum (denoted as MomM) is negative but not significant at

conventional level. According to Jegadeesh and Titman (1993 and 2001), this coefficient should be positive. However, as I discuss in section 1, it is an open question what cause the continuation of short-term returns documented in Jegadeesh and Titman (1993 and 2001). Therefore, it is not surprised that the result is not significant. The adjusted R squares are continuously increased when I add more independent variables into the regression equations. This shows that the size factor (SMB) and book-to-market factor (HML) and momentum (MomM) can explain the anomalies that CAPM does not explain. This result is consistent with previous literature (Fama and French 1992, 1993, 1995, and 1996).

Table 3. Regression results based on CAPM, modified Fama French three-factor model

$$R_{p_t} - R_{ft} = \alpha_p + \beta_p(R_{m,t} - R_{f,t}) + e_{pt} \quad (2)$$

$$R_{p_t} - R_{ft} = \alpha_p + \beta_p(R_{m,t} - R_{f,t}) + s_p SMB_t + h_p HML_t + m_p MonM_t + e_{pt} \quad (3)$$

	Model 1			Model 2			Model 3		
Name	Estimate	T value	P value	Estimate	T value	P value	Estimate	T value	P value
Intercept	0.01447	12.83895	0.00000	0.00625	5.02371	0.00000	0.00616	4.94502	0.00000
MktRET	0.42646	18.85766	0.00000	0.69034	26.53572	0.00000	0.67282	23.68969	0.00000
SMB				0.12612	4.69528	0.00000	0.14241	4.93206	0.00000
HML				0.60656	17.66460	0.00000	0.60971	17.72626	0.00000
MomM							-0.02680	-1.53695	0.12434
F value	355.61127			247.77273			186.45076		
Prob F	0.00000			0.00000			0.00000		
Inc_R^2				0.04109			0.04124		

F value: F statistics for regression.

Prob F: P value of F statistics.

Inc_R^2: magnitude of increased adjusted R square of the regression.

Dependent variable is portfolio excess returns, measured by the monthly calendar-time portfolio return less the risk-free rate the at time t ($R_{p_t} - R_{ft}$). MktRET: $(R_{m,t} - R_{f,t})$ represents the excess return of the market at time t. SMB_t (small minus big) is the size

factor at time t, and calculated as the difference between the returns on a portfolio of small stocks and a portfolio of big stocks. HML_t (high minus low) is the book-to-market factor, and calculated as the difference between the returns on a portfolio of high-book-to-market-equity (BE/ME) stocks and a portfolio of low-BE/ME stocks. MonM$_t$ is the stock momentum at time t, representing the difference between two high prior return portfolios and two low prior return portfolios. The parameter of interest in this regression is the intercept, α_p. This application of the CAPM and Fama-French three-factor model is conceptually equivalent to the tests based on the cumulative abnormal returns (Barber and Lyon 1997). A positive intercept indicates that after controlling for market, size, and book-to-market factors (and momentum) in returns, the selected portfolio performed better than expected. Referring to French website for details on the construction of these factors.

Table 4 provides regression results for the equation (4). The first model is the based model, CAPM, regressing the excess returns of the portfolio on the market risk premium alone (CAPM), the Jensen alpha is 0.01447, as the same as that in the table 3, which is positive and statistically and economically significant. Regressing the excess returns of portfolio on the size and book-to-market ratio (BM), the intercept is still positive and statistically and economically significant. The results in table 4 suggest that there are abnormal returns in the selected portfolio during the research period. The coefficients on size and BM factors are negative and statistically significant. This is consistent with the result in correlation table that size has a negative correlation with excess returns. The result implies that smaller firms tend to have higher excess returns than those of big firms. The negative sign with BM shows the favor to growth stock. This is consistent with the correlation between excess returns with BM ratio in the correlation table. The low BE/ME ratio, the higher excess returns. The low BE/ME ratio implies that the security grows rapidly, market prices growth stocks (with low BE/ME ratio) at high price, and therefore, there is positive association between the excess returns and BM ratio. Thus, my results are consistent with the market expectation. The adjusted R square is increased with adding size and book-to-market ratio into CAPM equation. This shows that the size and book-to-market can explain the anomalies that CAPM does not explain. This result is consistent with previous studies (Fama and French 1992, 1993, 1995, and 1996).

Table 4. Regression results of equation (4)

$$R_{p_t} - R_{ft} = r_{0p} + r_{1p}(R_{m,t} - R_{f,t}) + r_{2p}\,\text{Size}_t + r_{3p}(\text{BE/ME})_t + e_{pt} \quad (4)$$

	Model 1			Model 4		
Name	Estimate	T value	P value	Estimate	T value	P value

Intercept	0.01447	12.83895	0.00000	0.03782	7.98945	0.00000
MktRET	0.42646	18.85766	0.00000	0.42221	18.74058	0.00000
Size				-0.00129	-2.32840	0.01992
BM				-0.01647	-8.57181	0.00000
F value	355.61127			145.24770		
Prob F	0.00000			0.00000		
Inc_R^2				0.00862		

F value: F statistics for regression.

Prob F: P value of F statistics.

Adj_R^2: adjusted R square of the regression.

Inc_R^2: magnitude of increased adjusted R square of the regression.

Dependent variable is portfolio excess returns, measured by the monthly calendar-time portfolio return less the risk-free rate the at time t (R_{p_t} - R_{ft}). MktRET: $(R_{m,t} - R_{f,t})$ represents the excess return of the market at time t. Size_t is calculated as the logarithmic value of market equity (ME, stock price times shares outstanding). BM: BE/ME ratio is the book-to-market equity. BE is the COMPUSTAT book value of stockholders' equity, plus balance sheet deferred taxes and investment tax credit (if available), minus the book value of preferred stock.

Table 5 shows the result of comparison the selected portfolio performance with the Fama and French portfolio benchmark by matching the selected portfolio to firms of similar size and book-to-market ratio. The null hypothesis is that the selected portfolio does not outperforms the market benchmark (DBenRet =0). I perform one-tailed t test to examine my null hypothesis. The result of t test rejects null hypothesis at <0.0001 level. The mean value of difference between the return of selected portfolio and benchmark direct matching with firms with similar size and BM ratio is -0.124 and statistically significant at <0.0001 level. This indicates that the selected portfolio underperformed market benchmark range from 2000 to 2004, with the direct matching to preference portfolio with similar size and book-to-market ratio. The result is different from the previous results shown in the Table 3 and Table 4. However, it might due to using the different testing technique (Fama 1998), or using the different preference portfolio (Barber and Lyon 1997). The result shown in Table 5 is obtained by different technique and compared with different preference portfolio from Table

3 and Table 4. Therefore, this result adds more evidence to previous studies that the estimates of long-term abnormal returns can be sensitive to small changes in the method of selecting portfolio firms.

Table 5

T test for comparison of benchmark returns

Variable	N	Mean	Std Dev	Std Error	DF	T Value	P> | T |
DbenRet	8262	-0.124	0.292	0.0032	8261	-38.52	<.0001

DbenRet = R_{p_t} - $R_{ben,t}$; H_0: DbenRet > 0.

R_{p_t}: portfolio return at time t. $R_{ben,t}$: Fama an French portfolio benchmark returns obtained from French website, which are rebalanced quarterly using two independent sorts, on size (market equity, ME) and book-to-market (the ratio of book equity to market equity, BE/ME). The size breakpoint (which determines the buy range for the Small and Big portfolios) is the median NYSE market equity. The BE/ME breakpoints (which determine the buy range for the Growth, Neutral, and Value portfolios) are the 30th and 70th NYSE percentiles. Following Fama and French, I first sort the selected portfolio stock on size (market equity) by median and then category them into high/middle/low ratio of book equity to market equity. Then compare the excess return of the selected portfolio with this direct benchmark matching on size and book-to-market ratio.

4. Sensitivity Tests

Ziobrowski et al. (2006) use Fama and MacBeth (1973) regression method to detect abnormal return of the U.S. Senate Common Stock Portfolio and obtain significant results. Therefore, to check the accuracy of the results of regressions on three-factors, I compare the mean value of beta obtained from regression equations with the mean value of beta provided by COMPUSTAT not tabulated and find they are quite closed. I also perform Fama and MacBeth (1973) regression method, running those five regressions equations by year month, then average those 60 months regression results out. I find that the intercepts (alpha) of regressions are positive and economically and statistically significant with the values range from 0.011 to 0.02. This further confirms that, during the research period, there were abnormal returns in the selected portfolio compared with the preference portfolio containing all firms listed in NYSE, AMEX, and NASDAQ markets.

Because the return data in the selected portfolio is highly skewed, and the normality test rejects the null hypothesis that the return data is normally distributed, I perform the Wilcoxon signed-rank test to test the null hypothesis that the median abnormal return is equal to zero (this method was used to test abnormal performance of a portfolio in Barber and Lyon 1996), when I match the selected portfolio to the Fama and French benchmark portfolio of similar

size and book-to-market ratio. The signed-rank test rejects the null hypothesis at <.001 level, and shows that majority median of deference between portfolio and benchmark is negative. This suggests that anomalies disappear when I use different benchmark with direct matching firms of similar size and book-to-market ratio, and the selected portfolio even underperform benchmark. To further examine the effects of different benchmark on abnormal return tests, I divide the selected portfolio into two sub-portfolios measured by size (follow Fama and French), if the market equity of a firm less than the median of NYSE market equity, then it belongs to small size sub-portfolio, otherwise, will be in the big size sub-portfolio. Then, I use one-tailed t test and Wilcoxon signed-rank test to examine whether there is any abnormal return appearing. The results of both parametric and nonparametric tests show that there are positive abnormal returns in small size sub-portfolio, but no such anomalies the big size sub-portfolio underperform its benchmark. This is consistent with the regression results showed in table 4 that smaller size firms tend to have higher returns than do big firms.

I also construct the value-weighted portfolio to examine whether there is abnormal return in the selected portfolio. The results for the value-weighted portfolio are similar to the equal-weighted portfolio not tabulated here.

5. Conclusion

I examine whether there is abnormal return in the selected portfolio during the period of time from January 2000 to December 2004, including years when the stock markets performed very poorly from 2000 to 2002. I find positive abnormal returns by investing in the selected portfolio. The CAMP regression analysis indicates that there is statistically and economically significant abnormal return in the selected portfolio. The result is also confirmed by the modified Fama and French three-factor model. I do not find there is momentum strategy in the portfolio management in the modified three-factor model in Fama and French (1993). However, with direct benchmark matching on size and book-to-market ratio, the abnormal returns disappear and the selected portfolio even underperform benchmark. This finding is similar to the findings of Barber and Lyon (1997) and documented by Fama (1998) in which they investigate the abnormal returns in the event study for initial public offerings and seasoned equity offerings. In the sensitivity tests, they employ Fama-MacBeth regression method to run regressions and find that there are statistically and economically significant abnormal returns in the selected portfolio compared with the market. Nonparametric signed-test is used to examine the abnormal returns compared with direct benchmark matching on size and book-to-market ratio. The result of nonparametric test confirms the finding obtained by using one-tailed t test that the selected portfolio underperforms benchmark.

In sum, the findings in this study are consistent with previous works and add evidence to the literature related to detecting long-run abnormal returns by choosing different benchmarks and different models. The mixed results in detecting long-term abnormal returns of a portfolio might due to the different technique used in research imply that caution is needed when interpret the anomalies appeared in a portfolio.

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Notes

Note 1. The securities with high returns in the past tend to have good performance continuously. This was documented by Jegadeesh and Titman (1993, and 2001).

Note 2. Refers to Fama (1998), in which there is detailed discussion why the test results were different when chose different benchmark in the comparison.

Note 3. Refers to chapter 6 of the textbook, Financial Theory and Corporate Policy (2005), by Copeland, Weston and Shastri.

Note 4. This paper focuses on commenting certain strategies of portfolio selection and the tests on abnormal returns of selected portfolio. There are other strategies of portfolio construction. For example, researchers selected portfolio based on certain accounting characteristics of the firm such as research and development investment (e.g., Penman and Zhu 2014) and accounting fundamental (e.g., Penman and Reggiani 2018, Penman et al. 2018, Penman and Zhang 2018). This type of research is beyond the scope of this paper.

Note 5. Here refers to French website. They use six value-weight portfolios formed on size and prior (2-12) returns to construct MomM. The portfolios, which are formed monthly, are the intersections of 2 portfolios formed on size (market equity, ME) and 3 portfolios formed on prior (2-12) return. The monthly size breakpoint is the median NYSE market equity. The monthly prior (2-12) return breakpoints are the 30th and 70th NYSE percentiles. MomM is the average return on the two high prior return portfolios minus the average return on the two low prior return portfolios.

Stocks: The six portfolios used to construct MomM each month include NYSE, AMEX, and NASDAQ stocks with prior return data. To be included in a portfolio for month t (formed at the end of the month t-1), a stock must have a price for the end of month t-13 and a good return for t-2.

Note 6. The Fama/French benchmark portfolios are rebalanced quarterly using two independent sorts, on size (market equity, ME) and book-to-market (the ratio of book equity to market equity, BE/ME). The size breakpoint (which determines the buy range for the Small and Big portfolios) is the median NYSE market equity. The BE/ME breakpoints (which determine the buy range for the Growth, Neutral, and Value portfolios) are the 30th and 70th NYSE percentiles.

Appendix

Appendix A. Fama and French (1997) Industry Classifications

Fama and French (1997) use four-digit SIC codes to assign firms to 48 industries (short name, long name, and SIC codes) as following:

Agric	Agriculture	0100-0799,2048-2048
Food	Food Products	2000-2046,2050-2063,2070-2079,
Soda	Candy and Soda	2090-2095,2098-2099
Beer	Alcoholic Beverages	2064-2068,2086-2087,2096-2097
Smoke	Tobacco Products	2080-2085
Toys	Recreational Products	2100-2199 0900-0999,3650-3652,3732-3732, 3930-3949
Fun	Entertainment	7800-7841,7900-7999
Books	Printing and Publishing	2700-2749,2770-2799
Hshld	Consumer Goods	2047-2047,2391-2392,2510-2519,2590-2599,2840-2844,3160-3199, 3229-3231, 3260-3260, 3262-3263, 3269-3269,3630-3639,3750-3751, 3800-3800,3860-3879, 3910-3919, 3960-3961,3991-3991,3995-3995
Clths	Apparel	2300-2390,3020-3021,3100-3111, 3130-3159,3965-3965
Hlth	Healthcare	8000-8099
MedEq	Medical Equipment	3693-3693,3840-3851
Drugs	Pharmaceutical Products	2830-2836
Chems	Chemicals	2800-2829,2850-2899
Rubbr	Rubber and Plastic Products	3000-3000,3050-3099
Txtls	Textiles	2200-2295, 2297-2299, 2393-2395, 2397-2399
BldMt	Construction	0800-0899,2400-2439,2450-2459,2490-2499,2950-2952,32

	Materials	00-3219, 3240-3259,3261-3261,3264-3264,3270-3299,3420-3442,3446-3452, 3490-3499,3996-3996
Cnstr	Construction	1500-1549,1600-1699,1700-1799
Steel	Steel Works, Etc.	3300-3369,3390-3399
FabPr	Fabricated Products	3400-3400,3443-3444,3460-3479
Mach	Machinery	3510-3536,3540-3569,3580-3599
ElcEq	Electrical Equipment	3600-3621,3623-3629,3640-3646, 3648-3649,3660-3660,3691-3692, 3699-3699
Misc	Miscellaneous	3900-3900,3990-3990,3999-3999, 9900-9999
Autos	Automobiles and Trucks	2296-2296,2396-2396~3010-3011, 3537-3537,3647-3647,3694-3694, 3700-3716, 3790-3792,3799-3799
Aero	Aircraft	3720-3729
Ships	Shipbuilding, Railroad Eq	3730-3731,3740-3743
Guns	Defense	3480-3489,3760-3769,3795-3795
Gold	Precious Metals	1040-1049
Mines	Nonmetallic Mining	1000-1039,1060-1099,1400-1499
Coal	Coal	1200-1299
Enrgy	Petroleum and Natural Gas	1310-1389,2900-2911,2990-2999
Util	Utilities	4900-4999
Telcm	Telecommunications	4800-4899
PerSv	Personal Services	7020-7021,7030-7039,7200-7212, 7215-7299,7395-7395,7500-7500, 7520-7549, 7600-7699,8100-8199, 8200-8299,8300-8399,8400-8499, 8600-8699,8800-8899

BusSv	Business Services	2750-2759,3993-3993,7300-7372, 7374-7394,7397-7397,7399-7399, 7510-7519, 8700-8748, 8900-8999
Comps	Computers	3570-3579,3680-3689,3695-3695, 7373-7373
Chips	Electronic Equipment	3622-3622,3661-3679,3810-3810, 3812-3812
LabEq	Measuring and Control Equip	3811-3811,3820-3830
Paper	Business Supplies	2520-2549,2600-2639,2670-2699, 2760-2761,3950-3955
Boxes	Shipping Containers	2440-2449,2640-2659,3210-3221, 3410-3412
Trans	Transportation	4000-4099, 4100-4199, 4200-4299, 4400-4499,4500-4599,4600-4699, 4700-4799
Whlsl	Wholesale	5000-5099,5100-5199
Rtail	Retail	5200-5299,5300-5399,5400-5499, 5500-5599,5600-5699,5700-5736, 5900-5999
Meals	Restaurants, Hotel, Motel	5800-5813,5890-5890,7000-7019, 7040-7049,7213-7213
Banks	Banking	6000-6099,6100-6199
Insur	Insurance	6300-6399,6400-6411
RlEst	Real Estate	6500-6553
Fin	Trading	6200-6299,6700-6799