MONTHLY EFFECTS IN AGGREGATE AND DISAGGEGATE STOCK RETURNS

by

Woo-Tag Choi
Bachelor of Business Administration, Finance, Simon Fraser University 2006

and

Yuan Kong
Bachelor of Arts, Economics, University of Western Ontario 2006

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Name: **Woo-Tag Choi and Yuan Kong**

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Supervisory Committee:

Dr. Robert Grauer.
Senior Supervisor
Endowed University Professor

Dr. George Blazenko
Second Reader
Associate Professor of Finance

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ABSTRACT

This paper examines the turn-of-the-month (TOM) and the first-half-of-the-month (FH) effects on aggregate and disaggregate stock returns in the United States. We employ an OLS regression model with a dummy variable to investigate significance of both monthly effects. We find that both monthly effects exist in the CRSP value-and equally-weighted market indexes and in value- and equally-weighted disaggregate portfolios sorted by industry, size, book-to-market equity, size and book-to-market equity. In addition, we observe that when the size of a firm increases, the monthly effects weaken in both aggregate and disaggregate stock returns. The relationship between the monthly effects and the book-to-market ratio is mixed depending on the size of a firm.

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1 INTRODUCTION

Even before Fama (1970) popularized the concept of an efficient capital market with his influential survey article, "Efficient Capital Markets", many academics and practitioners believed in general that the prices of securities were random and capital markets were sufficiently efficient in reflecting information about individual stocks and about the market as a whole. However, recent empirical research identified systematic patterns or anomalies in stock returns which indicates that the stock markets are at least partially inefficient. The existence of anomalies in stock returns is especially interesting for investors because investors should be able to earn superior returns if they can identify these anomalies. Among many anomalies documented in literature, seasonal anomalies are the most interesting and widely known class of anomalies.

Some of appealing seasonal anomalies that have received much attention recently are the weekend effect, the January effect, and the monthly effect. First, the evidence of the weekend effect was first documented by Fields (1931). In his paper, Fields tested the well-known hypothesis at the time that security prices on Saturday tended to decline owing to the selling pressures by investors over the uncertainties of a weekend. He compared the closing prices on Saturday with the arithmetic mean of the closing prices on the adjacent Friday and Monday of the Dow Jones index over the period 1915 to 1930. He found that about 52 percent of the time, the closing price of Saturday was at least $.10 higher than the mean of the closing prices on Friday and Monday.[1] About four decades later after Fields found the evidence of the Weekend effect, Cross (1973) found that the S&P 500 index rose 523 times out of 844 Fridays between 1953 and

[1] Fields (1931) examined the 717 weekends and found that the 372 cases in which the closing price of Saturday is at least $.10 higher than the mean of the closing prices on Friday and Monday and the 257 cases of the opposite result.

1970 in comparison with the only 333 advanced on Mondays out of the same sample period. He also observed that the mean percentage change on Friday was positive of 0.12 percent, whereas the mean percentage change on Monday was negative of -0.18 percent. French (1980) also analyzed daily returns of the S&P 500 index over the period 1953 to 1977 and found that the returns on Monday tended to be negative, while the returns on other days were positive. Since then, many more studies with longer sample period have been done by other scholars such as Keim and Stambaugh (1984) and Lakonishok and Smidt (1987). Their results also supported the existence of the weekend effect and confirmed that this anomaly is not just the result of "data mining".

Second, the January effect was first documented by Wachtel (1942). He examined seasonality in stock prices from 1927 to 1942 with the Dow Jones Industrial Average and observed frequent bullish tendencies from December to January. After about three decades later, Rozeff and Kinney (1976) again found the higher average monthly return in January compared with the average monthly returns in other months using monthly stock returns on the New York Stock Exchange for the period 1904 – 1974.[2] Keim (1983) and Reinganum (1983) also documented the higher rate of returns in January, while they found that the large portion of the higher January returns was attributed to small firms. Since then, the January effect has been identified with the small firm effect (Banz, 1981), especially after Lakonishok and Smidt (1986) documented that the average returns in January were not above the average returns of other months in the Dow Jones Industrial Average index.[3]

Third, the monthly effect is relatively new anomaly in stock prices compared to other anomalies introduced in this paper. Ariel (1987) analyzed the monthly pattern of stock index

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[2] Rozeff and Kinney (1976) used the equally-weighted arithmetic rates of return from 1926 to 1974.

[3] Lakonishok and Smidt (1986) used the monthly rates of return of the Dow Jones Industrial Average over the period 1897-1986. The Dow Jones Industrial Average consists of 30 of the largest and most widely held public companies in the United States

returns and found that there were positive average returns in the beginning and during the first half of months and zero average returns during the second half. Subsequently, a considerable amount of attention has been devoted to verify this monthly phenomenon. In the following section, we will look at various studies regarding the monthly effect and conduct our own research to examine the monthly effect further.

The paper proceeds as follows. In section II, as mentioned above, we will review previous studies about the monthly effect. Section III mentions the data and methodology. In section IV, we will introduce and discuss the results from this study. Finally, section V concludes the paper.

2 LITERATURE REVIEW

It was Ariel (1987) who first documented the interesting pattern in the monthly returns over the period 1963-1981. In his study, he divided each trading month into two parts. The first half of trading month (hereafter FH) consists of 10 trading days starting with the last day of the prior month (or trading days -1 to 9), the second half of trading month (hereafter LH) consists of 8 trading days prior to the last day of the month (or trading days -9 to -2), and the trading days between the FH and the LH are discarded. Then, he compared the cumulative returns for the FH with those for the LH using both the CRSP equally- and value-weighted indexes. He found that not only the cumulative return from the FH was significantly higher than one from the LH, but also the cumulative return for the LH was, in fact, negative. In the following year, Lakonishok and Smidt (1988) also reported the interesting anomaly in monthly retums for the Dow Jones Industrial Average over the period 1897-1986, which is now known as the Turn of the Month effect (hereafter TOM). They found that the large portion of the cumulative return for the FH discovered by Ariel (1987) was owing to the especially high average returns for trading days -1 to 3. As a matter of fact, the average daily return for trading days 5 to 9 was only -0.001 percent and the average price increase during four trading days -1 to 3 exceeded the average monthly price increase by 0.349 percent.[4]

After a considerable amount of studies were made using the rates of return in the US stock markets, the next logical question was whether these anomalies just occurred in the United States or they happened in other countries as well. Cadsby and Ratner (1992) argued that there

[4] Lakonishok and Smidt (1988) suggested that this TOM effect might be owing to the increasing buying activity of pension fund managers at the end of the month to circumvent a downward bias in expected rates of return. Ogden (1990) argued that seasonal anomalies such as the monthly effect and the January effect were due, partly, to a standardization in the payments system in the United States which resulted in a concentration of cash inflow at the turn of each calendar month and at the end of calendar year.

were two reasons for investigating the international evidence on the anomalies including the TOM effect. First, the seasonal anomalies have been discovered in many countries.[5] It is therefore of interest to find out whether such anomalies are a spillover from US markets or originate within each countries. Second, analyzing the data from other countries is the good way to avoid the possible "data mining" problem. Cadsby and Ratner (1992) studied the TOM and pre-holiday effects on the daily stock returns in 10 countries. They found the significant TOM effect described by Lakonishok and Smidt (1988) in US, Canada, UK, Australia, Switzerland and West Germany. However, they were not able to observe the TOM effect in Japan, Hong Kong, Italy or France. Boudreaux (1995) also found the TOM effect in Denmark, Norway and Germany. However, he found that the average return for the TOM was smaller than the average return for the rest of a month in Singapore and Malaysia. Nevertheless, in the case of the TOM effect, the previous studies were not able to directly examine whether this effect in other countries was independent from the TOM effect in US because the TOM effect happened at the same time across many countries. Kunkel, Compton, and Beyer (2003) argued that they were able to show that the TOM effects in other countries were not a spillover from the TOM effect in US. They studied daily closing prices on stock market indexes of 19 countries including 8 European countries (Austria, Belgium, Denmark, France, Germany, Netherlands, Switzerland, and UK), 2 North American countries (Canada and US), 2 Latin American countries (Brazil and Mexico) and South Africa over the period 1988-2000. They were able to observe the significant TOM effects in 16 countries except Brazil, Hong Kong, and Malaysia where they only found the weak TOM effects. The most intriguing result from their study was that over the period 1994-2000, 11 out of 19 countries consistently showed the TOM effect, while the TOM effects in Japan and US no

[5] Jaffe and Westerfield (1985a, 1985b, and 1989) found some evidence of seasonal anomalies in a number of foreign stock exchanges. For example, Jaffe and Westerfield (1985a) also documented the significant independent week-end effect in the US, UK, Japan, Canada, and Australia, yet unlike the US, the lowest mean returns for both the Japanese and Australian stock markets occurred on Tuesday. Jaffe and Westerfield (1985b) found the January effect in the Japanese market. In their 1989 paper, Jaffe and Westerfield were not able to find a US type monthly effect in other countries, except in Australia. However, in Japan, they observed the unique monthly anomaly.

longer existed. They thus concluded that the TOM effects in other countries were independent from the TOM effect in US.

As previously mentioned, the existence of anomalies in stock returns is particularly interesting for investors because investors should be able to earn superior returns if they can identify these anomalies. Hensel and Ziemba (1996) suggested the strategies that could exploit the TOM (which they defined as trading days -1 to 4) or the FH effect. Hensel and Ziemba argued that institutional investors could take advantage of the TOM and the FH effects by investing in the S&P 500 during the TOM or the FH period and in the money markets for the remainder of the month.[6] With this strategy, they showed that $1 investment invested in the S&P 500 during the TOM and in cash for the remainder of the month over the period 1928-1993 grew to $758.36 investment (which they defined as the TOM-plus-cash strategy). More surprisingly, $1 investment in the S&P 500 during the FH and in cash for the remainder of the month over the same period grew to $1,290.97 investment (which they defined as the FH-plus-cash strategy). They also computed the correlations between these strategies and buying-and-holding strategy in large-cap (S&P 500) or small-cap (bottom 20% of NYSE companies). They then argued that relatively low correlations between the TOM-plus-cash strategy and buying-and-holding strategy and between the FH-plus-cash strategy and buying-and-holding strategy would provide attractive diversification benefits to institutional investors. Kunkel and Compton (1998) also demonstrated that individual investors could take advantage of the TOM effect by implementing the switching strategy in a tax-deferred, no cost retirement plan.

[6] In their study, Hensel and Ziemba (1996) did not include transaction costs. They asserted that institutional investors could dramatically reduce the transaction costs using futures contracts.

3 DATA AND METHODOLOGY

3.1 Data

We use the daily CRSP equally- and value-weighted stock index returns for the period July 1, 1963 to December 30, 2006 to find out whether the monthly effects such as the TOM effect and the FH effect exist.[7] Furthermore, we utilize the daily returns for industry portfolios, size portfolios, book-market portfolios, and 25-portfolios over the same time period in order to investigate how the TOM and the FH effects vary among different ways of grouping stocks. The daily rates of return for these four portfolios are collected from the French's data library.[8]

The descriptions for the portfolios used for this study are as follows:

The industry portfolios consist of 10 industry portfolios including Consumer Non-durables (NoDur), Consumer Durables (Durbl), Manufacturing (Manuf), Oil, Gas, and Coal Extraction and Products (Enrgy), Business Equipment (HiTec), Telephone and Television Transmission (Telcm), Wholesale, Retail, and Laundries Services (Shops), Healthcare, Medical Equipment, and Drugs (Hlth), Utilities (Utils) and Others (Other).

The size portfolios are made up with 10 portfolios depending on the size of company's capitalization (which is the market value of equity) from smallest deciles to largest deciles

[7] To avoid confusion, we distinguish the TOM effect from the FH effect in this paper. Unless otherwise stated, the monthly effects indicate both the TOM effect and the FH effect.
[8] For the detail description for the data, you can visit http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

The book-to-market portfolios consist of 10 portfolios based on the company's book-to-market ratio (which is the ratio of book value of equity divided by market value of equity) from lowest deciles to highest deciles

The 25 portfolios are sorted by both capitalization and book-to-market ratio in a 5X5 matrix with the capitalization factor in vertical axis and the book-to-market ratio in horizontal axis.

3.2 Methodology

In order to test the significance of the TOM and the FH effects, we employ the following simple OLS regression model:

$$R_{it} = \alpha + \beta D_{nt} + e_t, \qquad \text{(eq.1)}$$

where R_{it} is a dependent variable that is the daily market returns or the daily individual portfolio returns among four portfolios describe previously, and D_{nt} is a dummy variable used to capture the monthly effects. Two dummy variables used in the regression are defined in Table a.

Table 1 here

There is one considerable difference when using different dummy variables. If TOM is used as the dummy variable, all daily returns are used without modification. However, if FH is used as the dummy variable, we standardized the original data set into 18-trading days per month which is consistent with the data set used in the Ariel's 1987 paper. Therefore, all the regression results with FH as the dummy variable are computed with the modified data sets of 18 trading days, whereas the results with TOM as the dummy variable are computed with the unmodified data sets of total monthly trading days. The TOM is defined as trading days -1 to +4 which

indicates that the trading days of the TOM start from the last trading day in the prior month and end at the fourth trading day of the month. The FH is also defined as the same way as the TOM with trading days -1 to 9.

Before we introduce our results, it is important for readers to understand the meaning of each coefficient in the simple OLS model (eq.1) used in this paper. They could be interpreted as follows:

1. The estimate of the intercept (α): it represents the expected daily return for the market index or certain portfolios during the period without the monthly effects such as the TOM or the FH effect.

2. The estimate of the slope (β): it represents the expected monthly effect premium which is the difference between the TOM or the FH period and the rest of month period. If the slope is significant, we can determine that the given monthly effect has the significant impact on the daily return for the market index or certain portfolios during the TOM or the FH period.

From the estimated values of the intercept and slope, we compute the expected returns for the TOM and the FH period by summing up both estimated values of the intercept and the slope.

4 Results

4.1 The TOM and the FH Effects in the Value-weighted Data

The result in Table 2 indicates that the daily average return of the value-weighted stock index is significantly higher in the TOM and the FH period. Under the case of the TOM, the daily return for this period is 0.122% within the five days which is 0.102% higher than the remainder of month. Under the case of the FH, the daily return during this period is 0.071% which 0.065% higher than the second half of month. It is obvious from the result that the average daily return during the TOM period is higher than during the FH period. If we compute the cumulative return during each period, the cumulative return for the TOM period (trading days -1 to 4) is 0.612% and the cumulative return for the FH period (trading days -1 to 9) is only 0.711%.[9] This result implies that the TOM effect is much stronger than the FH effect. Moreover, the alpha in the FH regression is insignificant at 5% level with t-stat of 0.40. This indicates that the returns on the stock index during the second half of month is not statistically different from zero.

Table 2 here

Table 3 shows the monthly effects in ten industry portfolios. The result reveals that there are the significant monthly effects in each industry portfolio, except the utility industry portfolio. It is interesting to see that when TOM is used as the dummy variable, the slope parameter is always positive and statistically significant. However, when FH is used as the dummy variable, the slope parameter becomes statistically insignificant for the utility industry at 5% level with t-

[9] To compute the cumulative return during both the TOM and the FH period, we compound the average daily return over the each period.

stat of 1.93. This result may be explained by the impact of other time series factors such as the crude oil price. However, this explanation is not entirely satisfactory since the energy industry which also has high sensitivity over the changes in the prices of crude oil and natural gas still shows the significant monthly effects against both dummy variables. Therefore, based on this study, we cannot contribute this result to any reliable factors. We also examine the alpha in each industry regression and find that four out of ten portfolios have the insignificant alpha when TOM is used as the dummy variable. However, nine out of ten have the insignificant alpha when FH is used as the dummy variable. This difference is somewhat consistent with the result that we find in the stock index regression previously introduced. We conclude that the industry portfolios present different levels of the monthly effects although there is no convincing reason to explain this difference.

Table 3 here

After Fama and French (1992) introduced their three-factor model, the equity returns associated with the size and the book-to-market ratio received considerable attention. Here, we use SMB and HML portfolios used by Fama and French (1992) to investigate whether the monthly effects are also related to these factors. Table 4 shows that under both TOM and FH variables, all ten size portfolios have statistically significant beta estimates, which implies the existence of the strong monthly effects in these portfolios. In addition, the strength of the monthly effects weakens as the size increases. The smallest portfolio during the TOM and the FH period has the monthly effect premiums of 0.148% and 0.102% respectively, while the largest portfolio during these periods only has the premiums of 0.076% and 0.051% correspondingly. The premiums for the largest portfolio are almost the twice smaller than those for the smallest portfolio in both periods. This result implies that smaller firms tend to show the stronger monthly effects. Additionally, the result in Table 5 presents the similar information with the result from Table 4. In the case of HML portfolios (sorted by book-to-market ratios), the regression result

shows that every HML portfolio has the significant monthly effect premiums during both the TOM and the FH periods. Moreover, the strength of the monthly effects increases as the average book-to-market ratio for the portfolio increases. For example, the average daily return almost doubles from the portfolio with the lowest book-to-market ratio (0.064%) to one with the highest ratio (0.127%) in the TOM regression.

Table 4 and 5 here

We have investigated hitherto how the size factor and the distressing factor (or the book-to-market ratio factor) are related to the monthly effects separately. Now, we will look at these two factors together by utilizing the 25 portfolios data. Table 6 shows the results from two regressions based on two dummy variables of TOM and FH. Several interesting findings from the regressions are as follows:

1. There is no portfolio has the insignificant slope parameter which indicates that all portfolios have the significant monthly effects when SMB and HML factors are combined.

2. Holding the book-to-market ratio factor constant, portfolios with smaller market values always have the greater monthly effect premiums.

3. Holding the size factor constant, we observed two different patterns. For portfolios with the smaller size, the higher book-to-market ratio leads to the smaller monthly effect premiums. However, for portfolios with the bigger size, the higher book-to-market ratio leads to the greater monthly effect premiums. The portfolios with the medium size show the ambiguous result without a clear trend.

We make a conclusion that the strength of the monthly effects has the unconditionally negative correlation with the size and the strength of the monthly effects has the conditionally positive correlation with the book-to-market ratio with the condition on the size.

Table 6 here

4.2 The TOM and the FH Effects in the Equally-weighted Data

In previous section, we discussed the monthly effects using the value-weighted data. In this part, we will analyze the results from the regressions using the equal-weighted data. The results are reported from Table 7 through Table 11. There are some similarities and differences between results obtained by utilizing the equally-weighted data and the value-weighted data.

Tables 7 to 11 here

The similarities are described as follows:

1. The significance of the monthly effect premiums is consistent under two different data sets for the stock index regression, the SMB portfolios regression, the HML portfolios regression and the 25 portfolios regression.

2. The monthly effect premium is greater during the TOM period compared to one during the FH period under both data sets.

3. In the SMB portfolios regression (see Table 4 and Table 9), the impact of the size factor on the monthly effect premiums is the same under both value- and equally-weighted data. For example, the smaller firms tend to show the stronger monthly effects.

4. The 25 portfolios show the same trend under both data sets. The relationship between the monthly effect premiums and the book-to-market ratio varies, whereas such relationship is steady between the size factor and the monthly effect premiums.

The differences are as follows:

1. All industry portfolios show the significant monthly effect premiums under the equally-weighted data that is different from the result under the value-weighted data which shows the insignificant monthly effect premium during the FH period for the utility industry portfolio.

In the HML portfolios regression (see Table 5 and Table 10), the impact of the distressing factor on the monthly effects varies. For instance, there is no clear trend in the monthly effect premiums as the book-to-market ratio increases under the equally-weighted data. Instead, the alpha shows an increasing trend along with the book-to-market ratio. Therefore, when we combine the estimated alpha and beta, the overall returns during the TOM and the FH increase in the equally-weighted data as well. This is somewhat consistent with the result under the value-weighted data. As previously mentioned, we can contribute this difference to the natural of data sets. The results in the 25 portfolios show that there are two opposite relationships between the book-to-market ratio and the monthly effect premium based on the size of a firm. For example, under the equally-weighted data, two opposite trends offset each other when the HML portfolios are constructed owing to the fact that small firms and big firms are weighted equally in this data set. However, because big firms have more weights in the value-weighted data, big firms will dominate small firms. Therefore, the HML portfolios under the value-weighted data will show an increasing trend along with the book-to-market ratio.

5 DISCUSSION AND CONCLUSION

We have observed a considerable amount of research on the monthly effects since Ariel (1987) documented one of these anomalies. As mentioned in this paper, these phenomena are particular interesting for investors owing to the potential gains with employing these phenomena in their investment strategies. For example, we have shown that both institutional investors (Hensel and Ziemba, 1996) and individual investors (Kunkel and Compton, 1998) could take advantage of the monthly effects using the "switching strategy" by investing in the S&P stock index during the monthly effect periods and in money markets for the remainder of the month.

The purpose of this paper is to find out whether the monthly effects still exist in the US markets and to investigate that the strength of the monthly effects differ with certain characteristics of the company such as the size, the book-to-market, and the industry profile. In general, we find several interest results on the monthly effects. First, when we investigate the CRSP value- and equally-weighted stock indexes, we observe that the significant the TOM and the FH effects still exist over the period 1963-2006. Second, all industry portfolios show the positive and the significant monthly effects except the utility industry portfolio which has the insignificant monthly effect premium during the FH when industry portfolios are value-weighted. Third, the size factor has the very strong and clear relationship with the TOM and the FH effects. Particularly, smaller firms show stronger both monthly effects. Finally, the distress (or HML) factor shows the mixed relationship with the monthly effects. The monthly effects are positively correlated with the book-to-market ratio for bigger firms. For smaller firms, this relationship is negative. Therefore, the aggregate relationship depends on how the stock is weighted in indexes. There is the positive correlation between the book-to-market ratio and the monthly effect

premiums under the value-weighted stock index, while this correlation is insignificant under the equal-weighted stock index.

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APPENDICES

Table 1 Definitions of Dummy Variables Relating to the Monthly Effects

Name	Trading days of each month
Turn of the month (TOM)	-1 to +4
First half the month (FH)	-1 to +9

Table 2 The Regression Result of Market Index Returns (value-weighted)

$$R_{MKT} = \alpha + \beta D_{TOM} + \varepsilon \quad \text{or} \quad R_{MKT} = \alpha + \beta D_{FH} + \varepsilon$$

R_{MKT} is value-weighted index returns from July 1st, 1963 to December 30th, 2006. Alpha is the average daily return during the period other than the TOM or during the period other than the FH, depending on the dummy variable. Beta is the difference in the average daily return between the TOM and the rest of month or between the FH and the second half of month depending on the dummy variable. The return of the TOM or the return of the FH is the sum of the estimated coefficients $\hat{\alpha}$ and $\hat{\beta}$ in each regression equation, representing the average daily return in the TOM or the FH.

	TOM	FH
$\hat{\alpha}$	0.02	0.005
t($\hat{\alpha}$)	2.07	0.40
$\hat{\beta}$	0.102	0.065
t($\hat{\beta}$)	5.15	3.62
Return of TOM/FH	0.122	0.071

Table 3 The Regression Result of Ten Industry Portfolios

$$R_{IND} = \alpha + \beta D_{TOM} + \varepsilon \text{ or } R_{IND} = \alpha + \beta D_{FH} + \varepsilon$$

R_{IND} is value-weighted industry portfolio return from July 1st, 1963 to December 30th, 2006. Alpha is the average daily return during the period other than the TOM or during the period other than the FH, depending on the dummy variable. Beta is the difference in the average daily return between the TOM and the rest of month or between the FH and the second half of month depending on the dummy variable. The return of the TOM or the return of the FH is the sum of the estimated coefficients $\hat{\alpha}$ and $\hat{\beta}$ in each regression equation, representing the average daily return in the TOM or the FH.

Panel 1: Turn of Month (TOM)

TOM	NoDur	Durbl	Manuf	Enrgy	HiTec	Telcm	Shops	Hlth	Utils	Other
$\hat{\alpha}$	0.035	0.015	0.024	0.028	0.027	0.019	0.024	0.037	0.023	0.020
t($\hat{\alpha}$)	3.90	1.17	2.32	2.25	1.71	1.71	2.12	3.22	2.98	1.91
$\hat{\beta}$	0.069	0.107	0.095	0.111	0.086	0.096	0.105	0.061	0.070	0.119
t($\hat{\beta}$)	3.71	4.15	4.54	4.35	2.71	4.21	4.61	2.59	4.34	5.65
Return of TOM	0.104	0.122	0.119	0.138	0.113	0.115	0.128	0.099	0.094	0.138

Panel 2: First Half of Month (FH)

FH	NoDur	Durbl	Manuf	Enrgy	HiTec	Telcm	Shops	Hlth	Utils	Other
$\hat{\alpha}$	0.024	0.001	0.003	0.021	0.010	0.005	-0.003	0.022	0.024	0.001
t($\hat{\alpha}$)	1.92	0.08	0.18	1.20	0.44	0.30	-0.20	1.37	2.17	0.04
$\hat{\beta}$	0.047	0.069	0.070	0.058	0.064	0.064	0.092	0.046	0.029	0.078
t($\hat{\beta}$)	2.78	2.93	3.69	2.51	2.20	3.08	4.44	2.11	1.93	4.08
Return of FH	0.071	0.070	0.072	0.079	0.074	0.069	0.089	0.068	0.053	0.079

Table 4 The Regression Result of SMB (Small-Minus-Big) Portfolios

$$R_{SML} = \alpha + \beta D_{TOM} + \varepsilon \text{ or } R_{SML} = \alpha + \beta D_{FH} + \varepsilon$$

R_{SML} is value-weighted size portfolio return from July 1st, 1963 to December 30th, 2006. Alpha is the average daily return during the period other than the TOM or during the period other than the FH, depending on the dummy variable. Beta is the difference in the average daily return between the TOM and the rest of month or between the FH and the second half of month depending on the dummy variable. The return of the TOM or the return of the FH is the sum of the estimated coefficients $\hat{\alpha}$ and $\hat{\beta}$ in each regression equation, representing the average daily return in the TOM or the FH.

Panel 1: Turn of Month (TOM)

TOM	Small									Large
$\hat{\alpha}$	0.016	0.015	0.018	0.019	0.021	0.019	0.022	0.020	0.021	0.024
t($\hat{\alpha}$)	2.00	1.54	1.83	1.95	2.15	1.98	2.27	2.05	2.23	2.32
$\hat{\beta}$	0.148	0.146	0.146	0.133	0.132	0.124	0.123	0.124	0.107	0.076
t($\hat{\beta}$)	8.90	7.46	7.31	6.61	6.53	6.38	6.32	6.21	5.47	3.54
Return of TOM	0.164	0.161	0.164	0.152	0.153	0.143	0.145	0.144	0.129	0.100

Panel 2: First Half of Month (FH)

FH	Small									Large
$\hat{\alpha}$	-0.002	-0.001	0.002	0.003	0.007	0.003	0.004	0.006	0.008	0.009
t($\hat{\alpha}$)	-0.16	-0.07	0.17	0.19	0.47	0.20	0.33	0.43	0.63	0.64
$\hat{\beta}$	0.102	0.096	0.092	0.088	0.086	0.080	0.082	0.078	0.066	0.051
t($\hat{\beta}$)	6.66	5.27	4.98	4.74	4.63	4.50	4.56	4.29	3.71	2.65
Return of FH	0.100	0.095	0.095	0.091	0.093	0.083	0.086	0.084	0.074	0.061

Table 5 The Regression Result of HML (High-Minus-Low) Portfolios

$$R_{HML} = \alpha + \beta D_{TOM} + \varepsilon \quad \text{or} \quad R_{HML} = \alpha + \beta D_{FH} + \varepsilon$$

R_{HML} is value-weighted return of portfolio sorted by book-to-market ratio, from July 1st, 1963 to December 30th, 2006. Alpha is the average daily return during the period other than the TOM or during the period other than the FH, depending on the dummy variable. Beta is the difference in the average daily return between the TOM and the rest of month or between the FH and the second half of month depending on the dummy variable. The return of the TOM or the return of the FH is the sum of the estimated coefficients $\hat{\alpha}$ and $\hat{\beta}$ in each regression equation, representing the average daily return in the TOM or the FH.

Panel 1: Turn of Month (TOM)

TOM	Low									High
$\hat{\alpha}$	0.023	0.024	0.020	0.014	0.021	0.024	0.027	0.032	0.033	0.032
t($\hat{\alpha}$)	1.97	2.27	1.99	1.44	2.23	2.64	3.02	3.72	3.52	3.22
$\hat{\beta}$	0.064	0.084	0.106	0.133	0.106	0.112	0.115	0.097	0.106	0.127
t($\hat{\beta}$)	2.63	3.84	5.18	6.66	5.53	6.03	6.25	5.45	5.54	6.14
Return of TOM	0.087	0.108	0.126	0.148	0.127	0.136	0.142	0.130	0.139	0.159

Panel 2: First Half of Month (FH)

FH	Low									High
$\hat{\alpha}$	0.006	0.009	0.006	-0.003	0.011	0.011	0.015	0.021	0.016	0.016
t($\hat{\alpha}$)	0.37	0.61	0.43	-0.22	0.82	0.84	1.23	1.77	1.20	1.13
$\hat{\beta}$	0.048	0.057	0.066	0.086	0.063	0.068	0.071	0.057	0.072	0.088
t($\hat{\beta}$)	2.16	2.90	3.53	4.72	3.59	4.01	4.27	3.54	4.14	4.65
Return of FH	0.054	0.066	0.072	0.083	0.073	0.079	0.086	0.079	0.088	0.104

Table 6 The Regression Result of 25 Portfolios

$$R_{25} = \alpha + \beta D_{TOM} + \varepsilon \quad \text{or} \quad R_{25} = \alpha + \beta D_{FH} + \varepsilon$$

R_{25} is value-weighted return of portfolio sorted by both capitalization and book-to-market ratio, from July 1st, 1963 to December 30th, 2006. Alpha is the average daily return during the period other than the TOM or during the period other than the FH, depending on the dummy variable. Beta is the difference in the average daily return between the TOM and the rest of month or between the FH and the second half of month depending on the dummy variable. The return of the TOM or the return of the FH is the sum of the estimated coefficients $\hat{\alpha}$ and $\hat{\beta}$ in each regression equation, representing the average daily return in the TOM or the FH.

Panel 1: Turn of Month (TOM)

Size	Book/Market Ratio				
$\hat{\alpha}$	Low	2	3	4	High
Small	-0.018	0.014	0.023	0.033	0.037
2	-0.001	0.015	0.031	0.032	0.032
3	0.008	0.022	0.022	0.032	0.034
4	0.018	0.013	0.025	0.028	0.032
Big	0.029	0.018	0.022	0.027	0.026
t($\hat{\alpha}$)					
Small	-1.48	1.36	2.67	4.25	4.72
2	-0.07	1.48	3.45	3.82	3.37
3	0.62	2.31	2.62	3.75	3.51
4	1.53	1.40	2.81	3.26	3.21
Big	2.51	1.79	2.25	2.84	2.39
$\hat{\beta}$					
Small	0.172	0.162	0.140	0.135	0.141
2	0.150	0.140	0.127	0.130	0.145
3	0.124	0.128	0.131	0.118	0.138
4	0.109	0.128	0.123	0.134	0.125
Big	0.054	0.111	0.099	0.095	0.104
t($\hat{\beta}$)					
Small	7.01	7.90	8.02	8.43	8.86
2	5.76	6.79	6.89	7.49	7.42
3	4.84	6.47	7.54	6.85	6.98
4	4.42	6.61	6.80	7.52	6.12
Big	2.31	5.27	4.87	4.85	4.72
Return of TOM					
Small	0.154	0.175	0.162	0.169	0.178
2	0.149	0.154	0.158	0.162	0.177
3	0.131	0.150	0.154	0.150	0.172
4	0.127	0.142	0.148	0.163	0.157
Big	0.083	0.130	0.121	0.122	0.129

Panel 2: First Half of Month (FH)

Size	Book/Market Ratio				
$\hat{\alpha}$	Low	2	3	4	High
Small	-0.022	0.009	0.020	0.029	0.032
2	-0.008	0.009	0.025	0.026	0.025
3	-0.002	0.016	0.016	0.025	0.027
4	0.010	0.007	0.015	0.021	0.025
Big	0.019	0.008	0.014	0.019	0.017
t($\hat{\alpha}$)					
Small	-1.64	0.81	2.17	3.29	3.71
2	-0.57	0.84	2.54	2.83	2.36
3	-0.14	1.55	1.70	2.71	2.54
4	0.74	0.68	1.60	2.22	2.32
Big	1.47	0.70	1.32	1.86	1.48
$\hat{\beta}$					
Small	0.176	0.166	0.142	0.140	0.146
2	0.157	0.145	0.133	0.136	0.152
3	0.133	0.133	0.138	0.124	0.145
4	0.117	0.135	0.133	0.142	0.132
Big	0.065	0.122	0.107	0.103	0.112
t($\hat{\beta}$)					
Small	6.99	7.91	7.94	8.52	8.91
2	5.88	6.89	7.05	7.67	7.59
3	5.09	6.63	7.75	7.09	7.21
4	4.68	6.84	7.24	7.77	6.35
Big	2.31	5.27	4.87	4.85	4.72
Return of FH					
Small	0.154	0.175	0.162	0.169	0.178
2	0.149	0.154	0.158	0.162	0.177
3	0.131	0.150	0.154	0.150	0.172
4	0.127	0.142	0.148	0.163	0.157
Big	0.083	0.130	0.121	0.122	0.129

Table 7 The Regression Result of Market Index Returns (equally-weighted)

$$R_{MKT} = \alpha + \beta D_{TOM} + \varepsilon \text{ or } R_{MKT} = \alpha + \beta D_{FH} + \varepsilon$$

R_{MKT} is equally-weighted index return from July 1st, 1963 to December 30th, 2006. Alpha is the average daily return during the period other than the TOM or during the period other than the FH, depending on the dummy variable. Beta is the difference in the average daily return between the TOM and the rest of month or between the FH and the second half of month depending on the dummy variable. The return of the TOM or the return of the FH is the sum of the estimated coefficients $\hat{\alpha}$ and $\hat{\beta}$ in each regression equation, representing the average daily return in the TOM or the FH.

	TOM	FH
$\hat{\alpha}$	0.048	0.029
t($\hat{\alpha}$)	6.05	2.60
$\hat{\beta}$	0.149	0.100
t($\hat{\beta}$)	9.19	6.68
Return of TOM/FH	0.196	0.129

Table 8 The Regression Result of Ten Industry Portfolios

$$R_{IND} = \alpha + \beta D_{TOM} + \varepsilon \text{ or } R_{IND} = \alpha + \beta D_{FH} + \varepsilon$$

R_{IND} is equally-weighted industry portfolio return from July 1st, 1963 to December 30th, 2006. Alpha is the average daily return during the period other than the TOM or during the period other than the FH, depending on the dummy variable. Beta is the difference in the average daily return between the TOM and the rest of month or between the FH and the second half of month depending on the dummy variable. The return of the TOM or the return of the FH is the sum of the estimated coefficients $\hat{\alpha}$ and $\hat{\beta}$ in each regression equation, representing the average daily return in the TOM or the FH.

Panel 1: Turn of Month (TOM)

TOM	NoDur	Durbl	Manuf	Enrgy	HiTec	Telcm	Shops	Hlth	Utils	Other
$\hat{\alpha}$	0.046	0.034	0.047	0.066	0.058	0.042	0.048	0.056	0.033	0.057
$t(\hat{\alpha})$	6.35	3.66	5.65	5.69	4.60	3.66	5.82	5.26	5.38	7.71
$\hat{\beta}$	0.126	0.158	0.144	0.158	0.183	0.165	0.148	0.165	0.083	0.131
$t(\hat{\beta})$	8.45	8.30	8.52	6.65	7.13	6.96	8.81	7.54	6.70	8.62
Return of TOM	0.172	0.192	0.190	0.224	0.240	0.208	0.196	0.221	0.116	0.188

Panel 2: First Half of Month (FH)

FH	NoDur	Durbl	Manuf	Enrgy	HiTec	Telcm	Shops	Hlth	Utils	Other
$\hat{\alpha}$	0.031	0.011	0.025	0.051	0.031	0.017	0.028	0.038	0.030	0.040
$t(\hat{\alpha})$	3.03	0.83	2.17	3.07	1.75	1.03	2.45	2.52	3.54	3.84
$\hat{\beta}$	0.084	0.113	0.100	0.095	0.133	0.119	0.101	0.111	0.040	0.089
$t(\hat{\beta})$	6.08	6.44	6.41	4.29	5.58	5.40	6.46	5.49	3.49	6.25
Return of FH	0.115	0.124	0.125	0.145	0.164	0.136	0.129	0.150	0.070	0.129

Table 9 The Regression Result of SMB (Small-Minus-Big) Portfolios

$$R_{SML} = \alpha + \beta D_{TOM} + \varepsilon \text{ or } R_{SML} = \alpha + \beta D_{FH} + \varepsilon$$

R_{SML} is equally-weighted size portfolio return from July 1st, 1963 to December 30th, 2006. Alpha is the average daily return during the period other than the TOM or during the period other than the FH, depending on the dummy variable. Beta is the difference in the average daily return between the TOM and the rest of month or between the FH and the second half of month depending on the dummy variable. The return of the TOM or the return of the FH is the sum of the estimated coefficients $\hat{\alpha}$ and $\hat{\beta}$ in each regression equation, representing the average daily return in the TOM or the FH.

Panel 1: Turn of Month (TOM)

TOM	Small									Large
$\hat{\alpha}$	0.076	0.023	0.023	0.021	0.022	0.021	0.023	0.020	0.023	0.023
t($\hat{\alpha}$)	10.33	2.44	2.37	2.11	2.20	2.14	2.40	2.03	2.35	2.22
$\hat{\beta}$	0.148	0.155	0.150	0.141	0.138	0.128	0.128	0.130	0.111	0.089
t($\hat{\beta}$)	9.88	7.96	7.47	6.90	6.70	6.41	6.43	6.38	5.50	4.16
Return of TOM	0.224	0.178	0.174	0.162	0.160	0.149	0.152	0.150	0.134	0.113

Panel 2: First Half of Month (FH)

FH	Small									Large
$\hat{\alpha}$	0.056	0.003	0.005	0.003	0.004	0.002	0.004	0.003	0.009	0.006
t($\hat{\alpha}$)	5.33	0.24	0.39	0.18	0.28	0.17	0.26	0.22	0.66	0.39
$\hat{\beta}$	0.105	0.105	0.097	0.095	0.094	0.086	0.087	0.086	0.069	0.063
t($\hat{\beta}$)	7.53	5.79	5.17	5.00	4.91	4.68	4.76	4.60	3.75	3.23
Return of FH	0.161	0.108	0.102	0.097	0.097	0.089	0.091	0.089	0.078	0.069

Table 10 The Regression Result of HML (High-Minus-Low) Portfolios

$$R_{HML} = \alpha + \beta D_{TOM} + \varepsilon \quad \text{or} \quad R_{HML} = \alpha + \beta D_{FH} + \varepsilon$$

R_{HML} is equally-weighted return of portfolio sorted by book-to-market ratio, from July 1st, 1963 to December 30th, 2006. Alpha is the average daily return during the period other than the TOM or during the period other than the FH, depending on the dummy variable. Beta is the difference in the average daily return between the TOM and the rest of month or between the FH and the second half of month depending on the dummy variable. The return of the TOM or the return of the FH is the sum of the estimated coefficients $\hat{\alpha}$ and $\hat{\beta}$ in each regression equation, representing the average daily return in the TOM or the FH.

Panel 1: Turn of Month (TOM)

TOM	Low									High
$\hat{\alpha}$	0.015	0.028	0.034	0.040	0.045	0.051	0.056	0.062	0.073	0.095
$t(\hat{\alpha})$	1.27	2.88	3.73	4.72	5.67	6.78	7.83	8.73	10.39	13.22
$\hat{\beta}$	0.149	0.151	0.147	0.149	0.137	0.133	0.135	0.130	0.128	0.148
$t(\hat{\beta})$	6.32	7.51	7.94	8.53	8.35	8.67	9.17	8.97	8.86	10.02
Return of TOM	0.163	0.179	0.181	0.189	0.183	0.184	0.191	0.191	0.201	0.243

Panel 2: First Half of Month (FH)

FH	Low									High
$\hat{\alpha}$	-0.008	0.008	0.017	0.022	0.028	0.036	0.040	0.042	0.053	0.068
$t(\hat{\alpha})$	-0.48	0.61	1.30	1.79	2.44	3.40	3.95	4.22	5.32	6.68
$\hat{\beta}$	0.105	0.103	0.097	0.099	0.093	0.087	0.090	0.092	0.093	0.115
$t(\hat{\beta})$	4.78	5.52	5.63	6.11	6.15	6.11	6.60	6.90	6.96	8.40
Return of FH	0.097	0.111	0.113	0.121	0.121	0.123	0.130	0.134	0.146	0.184

Table 11 The Regression Result of 25 Portfolios

$$R_{25} = \alpha + \beta D_{TOM} + \varepsilon \quad \text{or} \quad R_{25} = \alpha + \beta D_{FH} + \varepsilon$$

R_{25} is equally-weighted return of portfolio sorted by both capitalization and book-to-market ratio, from July 1st, 1963 to December 30th, 2006. Alpha is the average daily return during the period other than the TOM or during the period other than the FH, depending on the dummy variable. Beta is the difference in the average daily return between the TOM and the rest of month or between the FH and the second half of month depending on the dummy variable. The return of the TOM or the return of the FH is the sum of the estimated coefficients $\hat{\alpha}$ and $\hat{\beta}$ in each regression equation, representing the average daily return in the TOM or the FH.

Panel 1: Turn of Month (TOM)

Size	Book/Market Ratio				
$\hat{\alpha}$	Low	2	3	4	High
Small	0.030	0.057	0.066	0.075	0.098
2	0.004	0.021	0.038	0.037	0.038
3	0.011	0.026	0.026	0.035	0.037
4	0.020	0.018	0.028	0.031	0.034
Big	0.026	0.022	0.024	0.029	0.029
t($\hat{\alpha}$)					
Small	2.79	6.23	8.32	10.39	14.36
2	0.28	2.08	4.19	4.34	3.97
3	0.83	2.65	3.00	4.08	3.85
4	1.61	1.87	3.10	3.46	3.36
Big	2.23	2.27	2.48	3.22	2.83
$\hat{\beta}$					
Small	0.183	0.169	0.145	0.142	0.139
2	0.159	0.147	0.133	0.132	0.146
3	0.131	0.128	0.134	0.125	0.145
4	0.117	0.127	0.126	0.138	0.132
Big	0.078	0.110	0.114	0.104	0.112
t($\hat{\beta}$)					
Small	8.34	9.11	8.91	9.68	9.93
2	6.04	7.08	7.25	7.59	7.47
3	5.02	6.41	7.54	7.18	7.33
4	4.70	6.53	6.92	7.63	6.36
Big	3.22	5.44	5.76	5.57	5.37
Return of TOM					
Small	0.213	0.226	0.211	0.217	0.237
2	0.162	0.168	0.171	0.168	0.184
3	0.141	0.154	0.160	0.160	0.182
4	0.136	0.145	0.153	0.169	0.166
Big	0.104	0.132	0.138	0.133	0.141

Panel 2: First Half of Month (FH)

Size	Book/Market Ratio				
$\hat{\alpha}$	Low	2	3	4	High
Small	0.025	0.051	0.063	0.069	0.093
2	-0.005	0.015	0.031	0.030	0.029
3	0.001	0.019	0.019	0.027	0.030
4	0.010	0.010	0.018	0.023	0.027
Big	0.016	0.013	0.015	0.020	0.020
t($\hat{\alpha}$)					
Small	2.10	5.08	7.13	8.67	12.24
2	-0.38	1.32	3.09	3.25	2.71
3	0.06	1.77	1.99	2.93	2.82
4	0.75	0.98	1.88	2.31	2.42
Big	1.23	1.17	1.46	2.01	1.82
$\hat{\beta}$					
Small	0.188	0.174	0.148	0.148	0.144
2	0.168	0.153	0.140	0.138	0.155
3	0.141	0.135	0.141	0.132	0.152
4	0.126	0.135	0.135	0.146	0.139
Big	0.088	0.120	0.123	0.113	0.121
t($\hat{\beta}$)					
Small	8.29	9.09	8.81	9.77	9.97
2	6.19	7.19	7.45	7.78	7.72
3	5.24	6.61	7.77	7.46	7.57
4	4.96	6.83	7.36	7.91	6.57
Big	3.61	5.92	6.20	6.09	5.74
Return of FH					
Small	0.213	0.226	0.211	0.217	0.237
2	0.162	0.168	0.171	0.168	0.184
3	0.141	0.154	0.160	0.160	0.182
4	0.136	0.145	0.153	0.169	0.166
Big	0.104	0.132	0.138	0.133	0.141