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Evolution in the Seasonality in Equity Return: Revisiting the Day-Of-The-Week Effect in the US

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Abstract

One of the widely discussed issues in the financial literature is the daily seasonality in asset prices. In this study, we shed fresh lights and explore the evolution of weekday seasonality in the US capital market. For this sake, we utilize daily data for the period January 1990 to August 2022. We compare between cross-section portfolios including, for example, size-based profitability-based as well as risk-based portfolios. We find that Monday effect does not exist in both small and large cap firms. Yet, Fridays are associated with positive returns mainly for small size firms. Different subsamples and moving-sample window tests reveal mixed findings. Overall, our results indicate high degree of financial efficiency in information. Scholars and market participants may find our results useful.

Keywords: Monday effect • Friday effect • Seasonality • Market efficiency

JEL Classification: G12, G14, G41

Introduction

The purpose of this study is to examine the day-of-the-week effect on American data from the last thirty years. The day-of-the-week effect in the capital market is defined as a phenomenon where a certain trading day influences the continuous daily return of a stock or stock index on the trading day. With the help of this effect, historical information can be utilized to better predict the future and, in this way, reach a significant profit.

The data in this work consists of 8,229 daily observations from January 1990 to August 2022. For the study, we took data for two leading indices in the US:

- The first is the S&P500 index which expresses the weighted average of the stock returns of the 500 largest companies on the US stock exchange,
- And the second index is the Russell 2000 index (RUSSEL 2000) which expresses and reflects the price returns of the 2000 smallest stocks traded on the US stock exchange.

We downloaded the data for both indices from the Yahoo. Finance website (https://finance.yahoo.com/). The purpose of using two indices, as mentioned the S&P 500 index and the Russell 2000 index (RUSSEL 2000), is to reflect the weighted average returns of the large companies separately and the small ones separately, since in the literature we have often found a claim that the shares of the large companies behave differently from those of the small companies as claimed in Aharon DY and Mahmoud Q [1]. Therefore, we will use both indices in order to check if there is indeed a difference in the behavior of the shares according to the size of the companies.

The findings of the work regarding the S&P500 indicate that the Monday effect does exist. However, it is not statically significant and likewise for Fridays. The overall picture that emerges indicates that the effects of Monday and Friday are not noticeable. In other words, the hypothesis that Mondays are associated with negative returns is rejected. In addition, the hypothesis that Fridays are associated with positive returns is also rejected for large firms. However, while the returns on Monday, Thursday and Friday are not different from zero on average, we find that Tuesday and Wednesday are positive on average and are statistically significant.

Regarding the Russell 2000 index, we found that there is a tendency for prices to fall on Mondays. However, it is not statically significant. In other words, the hypothesis that Mondays are associated with negative returns is rejected for small stocks. On the other hand, it was accepted that the returns on Fridays are positive and statistically significant. That is, the hypothesis that Fridays are associated with positive returns is not rejected. Let's remind again that this finding was not documented for large company returns. In other words, the Friday effect does appear in small stocks, while it is absent in large stocks. Regardless of the non-significant findings on Monday and the significant findings on Friday, we find that Tuesday and Wednesday are positive on average and are statistically significant, similar to the findings for the S&P500.

Such an anomaly that we found at this work contradicts the theory of the efficient market. Therefore, it is not possible to state that the hypothesis is completely correct, certainly not in its strong form. There are also other anomalies in the market, phenomena that occur contrary to the theory of the efficient market and are difficult to explain.

The findings of empirical studies on calendar anomalies are still mixed. This is as a result of differences in data sets, data frequency, data periods and the methodology used. Other differences in the analysis arise from the choice of markets, financial assets and stock market countries. Therefore, despite the large number of articles devoted to calendar anomalies, one of the remaining questions concerns how markets evolve over time.

Many researchers believed that stock markets must evolve over time from an inefficient state to an efficient state. Also, calendar anomalies tend to be unstable over time. Other studies have suggested that stock markets are more efficient, eliminating the day-of-the-week effect.

However, there is no doubt that in the age of the information highway, information has become available to more and more market players, in a shorter time and at a lower cost than ever before. As a result, it is more difficult than before to find inefficiencies in the financial markets.

The following is the structure of the research in the following chapters:

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Chapter 2 reviews the literature, Chapter 3 will present the research method, Chapter 4 will describe the data, the findings will be presented in Chapter 5 and Chapter 6 will include a summary and conclusions.

Literature Review

Calendar anomalies have been the subject of research among academics since the 1930s. In fact, this line of inquiry rests on the efficient market hypothesis as postulated by Fama. That is, the markets fully reflect all available information, therefore anomalies in the calendar such as the effect of the day of the week, the effect of the beginning of the month, the effect of the beginning of the year and the effect of holidays should not exist. Furthermore, the efficient market hypothesis implies that traders do not need to be in a position to predict and 'beat' the market in order to market abnormal profits [2-3].

However, many scholars have argued against the efficient market hypothesis on the grounds that it ignored transaction costs, information asymmetries, and irrationality. Investor behavior (mass panic, herd instinct and mass psychosis). As such, financial asset price data can have long memory (persistence), clustered volatility, and fat-tailed distributions.

There are three types of return anomalies in the literature. These are accounting anomalies, in the size of the firm and in the calendar. Accounting anomalies were originally identified by Basu S [4] who found that stocks with low price-earnings ratios or value stocks have higher risk-adjusted returns than stocks with high price-earnings ratios or high-growth stocks. Keim defined the firm size anomaly as a negative correlation between average returns and firm size, indicating that investors are more likely to obtain higher returns from investing in small firms than in larger firms. Anomalies in the calendar, therefore, contradict the efficient market hypothesis in that the fluctuation of returns depends on the season of the year or the day of the week.

Caporale G and Maria AP [5] focused on the day of the week effect, the beginning of the month effect, the beginning of the year effect, and the holiday effect. More importantly, the researchers presented an alternative methodological approach to existing in the literature (especially the methodology proposed by Urquhart A and Frank M [6] which ultimately indicates the absence of methodological bias in their article.

The results of the study of Plastun A, et al. [7] Showed that in terms of average analysis, between the 1920s and the late 1980s, Monday was the worst day of the week in terms of returns. The finding was confirmed by the significant ANOVA multiplier. The higher the ANOVA coefficient, the more unusual the difference. The ANOVA results clearly indicate the 'golden age' of the day of the week effect in the period 1900 to 2000. During this period there were statistically significant differences between repetitions on different days of the week. Most of these results are confirmed by the Kruskal-Wallis test.

At the same time Plastun A, et al. [7] claimed that it should be mentioned that throughout the analyzed period the effect of the day of the week existed not only on Mondays but also on other days. To show this, several t-tests were conducted for different days of the week. In the sub-periods 1900–1909, 1920–1929, 1950–1959 and 1960–1969, abnormal positive returns were discovered on Fridays. In addition, during the subperiod 1960-1969, abnormal positive returns were discovered on Wednesdays. This could partially explain the differences regarding the existence of the weekend effect in the literature. However, the results also show that the effect of the day of the week disappeared after 2000.

The professional literature and empirical studies in finance have documented the effect of the day of the week not only in stocks, but also in commodities, currencies, crypto currencies, government bonds and corporate bonds. The literature is divided as to the relationship that exists - if any - between the day of the week and the expected return of that day Many studies claim that the returns on Monday are significantly lower than those of other weekdays, and the returns on Friday are significantly positive or were the highest returns among the other days of the week.

Two main different explanations can be offered, which are also somewhat related to the above contradictory findings in the professional literature:

- The first is the variation in the type of economic news published throughout the week. In the work of Idilbi-Bayaa Y and Mahmoud Q [8] they documented that there is increased pessimism as reflected by the news published in the press at the beginning of the week. Specifically, they find that the Economic Policy Uncertainty. A measure developed through text analyzes of US newspapers, is lower on Fridays but significantly higher on Sundays and Mondays. At the same time, and as a complementary effect, there is literature relating the negative atmosphere on Monday to the timing of the company's news releases. These studies argue that companies tend to release good corporate news during trading hours and bad news on Friday after the market closes. On the other hand, other studies report higher volatility accompanied by lower trading volume in options after trading breaks on the weekend, holidays, and attribute this to asymmetric information that encourages option investors to postpone trading in options [9].
- The second explanation relies on the irrational factor of investors' mood. Previous works based on laboratory experiments and based on surveys and social media have determined that people's mood changes between weekdays, claiming that it improves on Fridays but drops sharply on Mondays [10]. This explanation is based on studies from psychology, decision making, social media, sleep research and even transportation and traffic jams to better understand the patterns mentioned above.

The psychology and decision-making literature have also established that mood significantly influences people's judgment and decision-making, and those psychological states influence their attitudes toward risk. Thus, emotional states can potentially influence investors' risk assessments and preferences, and ultimately, their investment decisions. Indeed, many studies have documented that investors' financial decisions change according to investor mood and that market volatility responds to investor sentiment.

Research done in the field has always based the question on the theory of the efficient market. The efficient market theory, or the efficient market hypothesis, holds that the prices of securities, such as shares traded on the stock exchange, embody within them all the available and obtainable information about the companies or the tradable assets. This means that there is no point in trying to choose securities that look cheap, because the market is fully priced and all the risks and opportunities inherent in each and every paper.

According to research by Singal V and Jitendra T [11] many comprehensive studies have documented different return seasonality in a wide variety of markets. The results of these studies indicate the existence of weekend, January, and early-year effects. However, similar investigations in futures markets are few and focus on a small number of property types.

In the aforementioned article, the researchers focused on one such seasonality, that is, the weekend effect, which is defined as Friday's return minus the following Monday's return, in the futures markets. Specifically, they empirically examined the existence of the weekend effect in futures markets and present possible reasons for its existence.

The researchers proposed two competing hypotheses as potential explanations for the existence of a weekend effect in futures markets:

Their first hypothesis presents a risk-based explanation that relies on two different concepts of variance, namely bad and good changes in asset returns. The researchers decomposed realized variance into good and bad realized variances and apply them as a measure of upside and downside risk, respectively. The realized semi-variance on the higher side is risk for short positions, and the semi-variance on the higher downside is risk for

long positions. Therefore, they expected the weekend effect to be higher when the relative risk of short positions is higher than that of long positions because of an asymmetric risk premium associated with short positions.

The second hypothesis is motivated by the psychology literature on investor sentiment/mood. An important finding in this literature is that the mood of investors varies depending on the day of the week. In particular, investor mood worsens on Mondays and improves on Fridays. This change in investor mood has an impact on decision making when information is uncertain. Similar effects are documented in stock markets where a change in investor sentiment affects stock returns. Given the impact of investor sentiment on stock returns, the researchers expected to see an impact of aggregate investor sentiment on the weekend effect in the futures markets as well.

Caporale GM and Alex P [5] analyzed the impact of the day of the week on the cryptocurrency market focusing on BitCoin, LiteCoin, Ripple and Dash. Using both parametric and non-parametric methods, the researchers found evidence of an anomaly (abnormal positive returns on Mondays) only in the case of Bitcoin. Moreover, using a trading simulation approach, the researchers showed that a trading strategy based on this anomaly is profitable for the entire sample (2013–2017): it produces a net profit with a probability of 60% and these results are significantly different from random ones. However, in the case of a few years, the opposite conclusions are reached. Overall, there is no conclusive evidence that the cryptocurrency market is inefficient.

Data

Our data consists of 8229 daily observations that cover the period January 02, 1990, to August 30, 2022. We downloaded the data about both the Russel 2000 as well as S&P 500 indices from Yahoo. Finance (https://finance.yahoo.com).

The S&P500 index expresses the weighted average of the returns of the 500 largest stocks on the US stock exchange, and the Russell 2000 index (RUSSEL 2000) captures and reflects the price returns of the 2000 smallest stocks traded on the US stock exchange.

In line with prior works, we use daily data in order to describe the distribution of the returns across weekdays (e.g., French, 1980). Figure 1 plots the evolution of the level price for both indices (Figure 1).

In this study, we chose to focus on the American market for the following reasons:

- The data is available and can be accessed for free from anywhere in the world
- The data is reliable, up-to-date and faithfully reflects the prices and returns of the indices
- Many researchers use the database we used for research. This makes it possible to compare our findings with similar findings in the literature
- The economy is liquid and large enough to investigate the conduct of returns and reach relevant conclusions
- This research was done on the American market in light of its importance, size and seniority.

More in-depth analysis shows the following. There are 1553 Mondays, 1688 Tuesdays, 1686 Wednesdays, 1658 Thursdays and 1645 Fridays. We also use data about the S&P 500 Index. Figure 2 describes theses initial findings (Figure 2).

The purpose of using S&P 500 is to reflect the weighted average returns of the biggest companies in the US. Indeed, earlier studies have reported that the weekday seasonality is relatively absent in large cap firms. This index is constructed using the largest 500 companies listed and traded in the US exchanges. This index is followed by retail and institutional investors

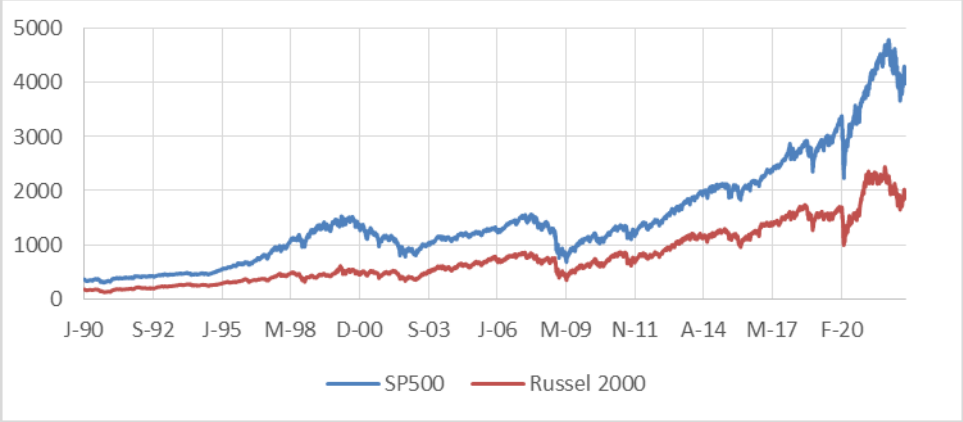


Figure 1. Development of the index price throughout the sample period.

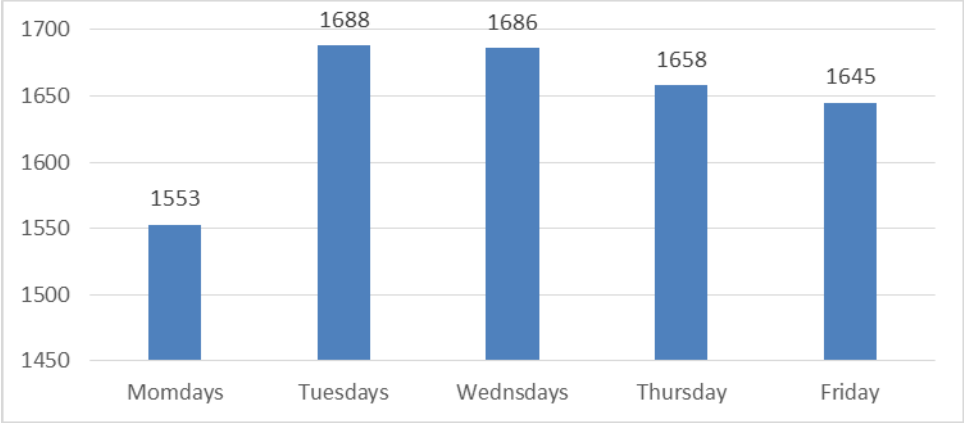


Figure 2. The number of times for each day of the week in the examined period.

in the US as well as worldwide as US market portfolio. In parallel, we use of the Russel 2000 index in order to capture the behavior of the prices of small cap companies [12].

The research method

As mentioned in the introductory chapter, the purpose of the work is to check whether the distribution of stock prices is the same or different over the days of the week. According to the Efficient Market Hypothesis, there is no connection between the day of the week and the amount of return. At the same time, the review of the literature showed that there is empirical evidence that the distribution of securities prices (stocks, crypto bonds, etc.) is not the same Days of the week.

Based on the tests done in the literature, below is a concise description of our hypotheses.

- The big stocks return on Mondays are negative
- The small stocks return on Mondays are negative
- The big stocks return on Fridays are positive
- The small stocks return on Fridays are positive
- The small stocks are more sensitive in Mondays and Fridays

To confirm or reject these hypotheses, we used two methodologies proposed in the articles we reviewed. The first is a simple statistical test of averages. At the same time, we used another method and that is running multivariable linear regressions.

As mentioned earlier, we analyze two series from the capital market. The first series is the return series of the S&P 500 index to describe the behavior of the weighted average returns of the 500 largest companies on the New York Stock Exchange. The second series is the return series of the RUSSEL 2000 index which shows the returns of the 2000 index of small companies in the USA. We note that these companies or some of them are not included in the S&P 500 index. Since the research question deals with the distribution of returns according to the days of the week, we use daily return data.

The average return for all trading days is calculated using the formula:

$$\overline{R} = \frac{1}{N}\sum_{i=1}^{N} Rt \quad (1)$$

The average returns of any trading day i (let's say i=2, i.e. Monday) is calculated according to:

$$\overline{R_i} = \frac{1}{N}\sum_{i=1}^{N} R_{it} \quad (2)$$

For a broader picture and using a regression framework, we run the following model that relates the return of the S&P 500 index to the fee variables of the US trading days:

$$= \beta_2 mon_t + \beta_3 tue_t + \beta_4 wed_t + \beta_5 thu_t + \beta_6 fri_t + ut \quad (3)$$

when the:

β_2 is the estimate for the return on Monday, will receive the value 1 if today is Monday and 0 otherwise.

β_3 is the estimate for the return on Tuesday, will receive the value 1 if today is Tuesday and 0 otherwise.

β_4 is the estimator for the return on Wednesday, will receive the value 1 if today is Wednesday and 0 otherwise.

β_5 is the estimate for the return on Thursday, will receive the value 1 if the day is Thursday and 0 otherwise.

β_6 is the estimate for the return on Friday, will receive the value 1 if the day is Friday and 0 otherwise.

The meaning of a coefficient is the addition of the return of the stock on the specific day described according to the corresponding beta, that is β_2 is the excess return of the stock on Mondays and β_3 is the excess return of the stock on Tuesdays and so on.

$R_t^{S\&P500}$ Symbolizes the index return of the 500 largest companies on the New York Stock Exchange. This size is calculated from the closing rates of the daily index (Pt) and it is using $R_t = 100 * (\frac{P_t}{P_{t-1}} - 1)$

Similarly, we run the following regression model in order to check the behavior of returns over the days of the week:

$$R_t^{RSL2000} = \beta_2 mon_t + \beta_3 tue_t + \beta_4 wed_t + \beta_5 thu_t + \beta_6 fri_t + ut \quad (4)$$

$R_t^{RSL2000}$ Symbolizes the yield of the index of the 2000-smallest stocks and is calculated in a similar way to the calculation of the yield of the index of the 500 smallest companies.

Similar to the definitions of the coefficients when we used the S&P 500 index, the coefficients above:

β_2 is the estimate for the return on Monday, will receive the value 1 if today is Monday and 0 otherwise.

β_3 is the estimate for the return on Tuesday, will receive the value 1 if today is Tuesday and 0 otherwise.

β_4 is the estimator for the return on Wednesday, will receive the value 1 if today is Wednesday and 0 otherwise.

β_5 is the estimate for the return on Thursday, will receive the value 1 if the day is Thursday and 0 otherwise.

β_6 is the estimate for the return on Friday, will receive the value 1 if the day is Friday and 0 otherwise.

Also in the case of the Russell 2000 index, the meaning of a coefficient is the addition of the return of the stock on the specific day described according to the corresponding beta that is β_2 is the excess return of the stock on Mondays and β_3 is the excess return of the stock on Tuesdays and so on.

According to the hypotheses in this work, it is possible to formulate the following: H_0

$$H_o : \beta_2 < 0;$$

$$H_1 : \beta_2 \geq 0.$$

In addition, regarding the distribution of returns on Fridays:

$$H_1 : \beta_6 > 0;$$

$$H_1 : \beta_2 \leq 0$$

In conclusion, rejecting the null hypothesis for β_2 means that the Monday effect does not exist. At the same time, the rejection of the hypothesis regarding β_6 indicates a tendency for negative returns on Fridays. In the next chapter, chapter 5, we will describe our findings regarding the hypotheses.

Empirical findings

Table 1 presents a general statistical description of the return behavior of the index of the largest companies traded on the American stock exchange - the S&P 500 index. The first row of the Table shows the average return of the index over the various days of the week.

As known, the American stock exchange is open from Monday to Friday and trading is conducted between the hours of 9:30 and 16:00. Because of national holidays and other holidays in the USA, we see that the number of trading days is different throughout the week. For example, our sample includes 1553 Mondays compared to 1687 Tuesdays.

An interesting thing that emerges from the data of the standard deviation of the returns is that the standard deviation of Mondays is the highest with 1.27% and the standard deviation of the return on Fridays is the lowest with

a value equal to 1.066. This finding indicates the tendency to see Mondays as nervous or volatile trading days. Evidence of this is that the maximum fluctuation up (maximum) or down was recorded precisely on Mondays as you can see from the maximum and minimum values.

The average return for Mondays is 0.031%. This finding contradicts our hypothesis that Mondays are identified days with a negative average return. At the same time, the average return on Fridays stands at 0.016% (0.00016) and is indeed positive but is too small to be rejected because it is equal to/ is not different from zero (Table 1).

Table 2 presents a general statistical description of the return behavior of the small companies' index - the RUSSEL 2000 index. The first row of the Table shows the average return of the index over the various days of the week. As we have seen for the large companies, also for the small companies the standard deviation of the returns on Mondays is the highest with 1.497% and the standard deviation of the returns on Fridays is the lowest with a value equal to 1.237%. The findings show that even in small companies, Mondays are considered nervous or volatile trading days. The maximum and minimum values recorded on Mondays also testify to this. The maximum value recorded is 9.265% and the minimum value recorded is -14.27%.

The Table shows that the average returns of small companies on Mondays is -0.045%-. This finding is consistent with our hypothesis that Mondays are identified days with a negative average return. This finding is significantly different from the average we received for Mondays in large companies. At the same time, the average return on Fridays stands at 0.068% and is positive and is almost 4 times that of its counterpart in large companies (Table 2).

Table 3 reports the estimation results of Equation (1) with respect to the S&P 500 index. As previously noted, the equation links the return of the index to the weekday dummies. That is,

$$H_1 : \beta_2 \leq 0 \quad (1)$$

According to Table 3, the β_2 coefficient is positive. However, it is not statically significant as evident by the t-statistic and the p-value. In addition, β_6 is also positive on Fridays, yet it is not statistically significant. The overall picture that arises from the Table indicates that Monday and Friday effects are not evident. In other words, the hypothesis that Mondays are associated with negative returns has been rejected. In addition, the hypothesis that Fridays are associated with positive returns is rejected as well (Table 3).

Nevertheless, while the returns on Mondays, Thursdays and Fridays are not different from zero in average, we find that Tuesdays and Wednesdays are positive in average, and they are statistically significant. According to the Table, β_3 and β_4 that capture the average return on Tuesday and Wednesday are 0.0653% and 0.0482%, respectively. This means that Tuesdays and Wednesdays account for 16.44% and 12.14% in annual terms. To conclude, the results of the coefficients appear in Figure 3 and they range between 0.016% to 0.0652%.

Table 4 reports the estimation results of Equation (2). This equation links the return on the Russel index to the weekday dummies. That is,

$$R_t^{Russel} = \beta_2 mon_t + \beta_3 tue_t + \beta_4 wed_t + \beta_5 thu_t + \beta_6 fri_t + vt \quad (2)$$

According to Table 4, the β_2 coefficient is negatively signed. Yet, it is not statically significant given the t-statistic value which is equal to -1.284. This finding indicates that Mondays tend to be associated with negative returns. However, this tendency is statistically weak. In other words, the hypothesis that Mondays are associated with negative returns has been rejected.

On the other hand, returns on Fridays, as captured by β_6, are positive and statistically significant as evident by the relatively low P-value. Meaning, the hypothesis that Fridays are associated with positive returns is not rejected. This finding opposes that for large cap equity returns. In other words, Friday effect does present in small cap equities, while it is absent in large cap ones (Table 4).

Regardless the insignificant findings on Monday and the significant findings on Friday, we find that Tuesdays and Wednesdays are positive in average and they are statistically significant. Like the findings regarding S&P 500, the resulting values of β_3 and β_4 - which capture the average return on Tuesday and Wednesday - are 0.061% and 0.057%, respectively. In other words, Tuesdays and Wednesdays account for 15.46% (0.061×252) and 14.35% (0.057%×252) in annual terms (Figure 4).

In order to strengthen the findings we received, we performed a robustness test of the findings by dividing the sample into three sub-samples: the first sub-sample was from 1990 to 2000, the second sub-sample included the years 2001-2010 and the third sub-sample was from 2011 to August in 2022.

It can be learned from Table 5 that regarding the S&P 500 index in the first sub-sample, Monday's measure was actually positive and not small (equal to 0.1213) and statistically significant, in complete contrast to our hypothesis, and all other measures were not significant (Table 5).

Table 6, On the other hand, shows that in the second sub-sample there was no statistically significant index. In other words, both coefficients β_2 and β_6 was not statistically significant, and that means there is no evidence for day-of-the-week effect in that period (Table 6).

The regression results on the S&P 500 index in the third sub-sample

Table 1. Descriptive statistics of the S&P 500 index.

	Mon	Tue	Wed	Thu	Fri
Average	0.031	0.065	0.048	0.017	0.016
Stdev.	1.270	1.163	1.087	1.150	1.066
Max.	11.580	10.789	5.733	6.921	9.287
Min.	-11.98	-5.74	-9.03	-9.51	-5.83
N.	1553	1687	1686	1658	1645

Notes: The table reports the descriptive statistics of the return on the S&P 500 index. Stdev. is the standard deviation, Max. is the biggest achieved return, Min is the smallest return and N is the number of observations.

Table 2. Descriptive statistics of the Russel index.

	Mon	Tue	Wed	Thu	Fri
Average	-0.045	0.061	0.057	0.045	0.068
Stdev.	1.497	1.351	1.352	1.394	1.237
Max.	9.265	9.391	5.936	8.487	7.765
Min.	-14.27	-7.03	-10.42	-11.18	-7.26
N.	1553	1687	1686	1658	1645

Notes: The table reports the descriptive statistics of the return on the S&P 500 index. Stdev. is the standard deviation, Max. is the biggest achieved return, Min is the smallest return and N is the number of observations.

Table 3. Estimation results of equation (1) for S&P 500.

	β_2	β_3	β_4	β_5	β_6
Coefficients	0.0314	0.0653	0.0482	0.0169	0.0162
St. Error	0.0291	0.0279	0.0280	0.0282	0.0283
t Stat	1.0764	2.3352	1.7248	0.6011	0.5737
P-value	0.2818	0.0196	0.0846	0.5478	0.5662

Notes: The table reports the estimation results of Equation 1 with respect to the returns on S&P 500 Index.

Table 4. Estimation results of model 2.

	β_2	β_3	β_4	β_5	β_6
Coefficients	-0.045	0.061	0.057	0.045	0.068
St. Error	0.035	0.033	0.033	0.034	0.034
t Stat	-1.284	1.843	1.711	1.336	2.012
P-value	0.199	0.065	0.087	0.182	0.044

Notes: The table reports the estimation results of Equation 1 with respect to the returns on the Russel 2000 Index.

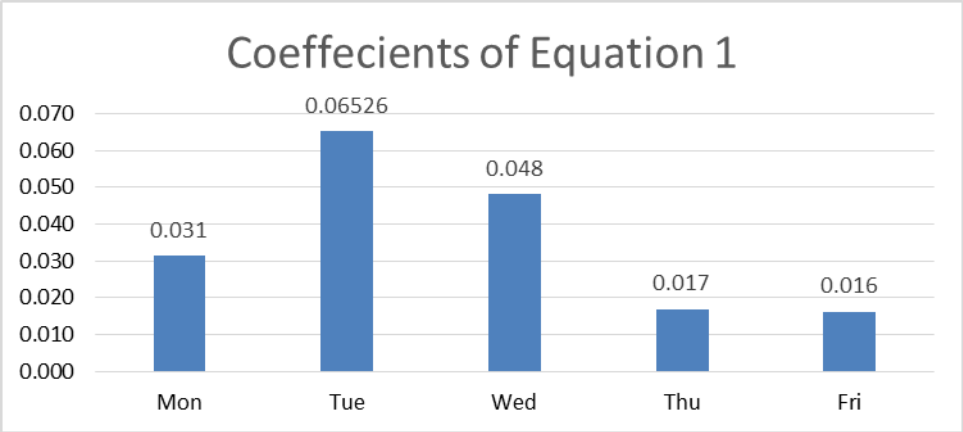
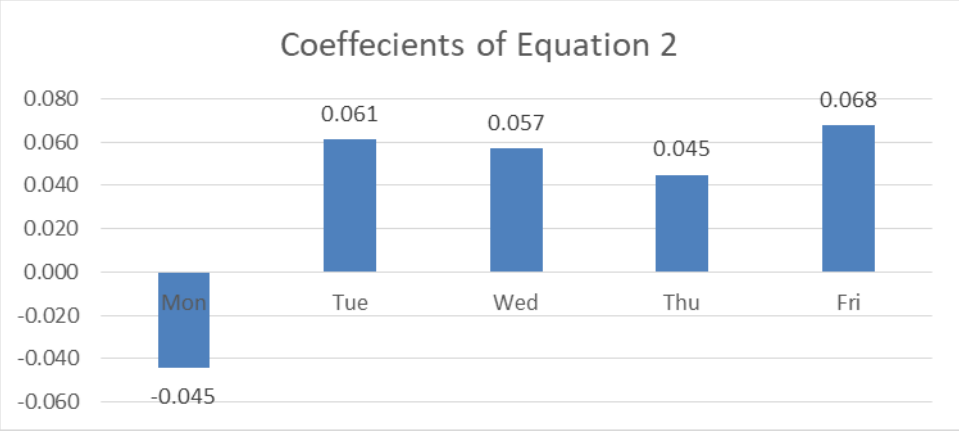


Figure 3. The coefficients resulted in equation (1).



(Source: yahoo.finance)

Figure 4. The coefficients of equation (2) for russel 2000.

Table 5. Estimation results of subsample (1) for S&P 500.

	Coefficients	Standard Error	t Stat	P-value
β_2	0.12130414	0.04110589	2.95101584	0.00319384
β_3	0.06360769	0.03963472	1.6048477	0.10864116
β_4	0.03980718	0.03966959	1.00346829	0.31572249
β_5	-0.007168	0.03998766	-0.1792553	0.85775036
β_6	0.04248037	0.04016771	1.05757515	0.29034127

Notes: The table reports the estimation results of subsample 1 with respect to the returns on S&P 500 Index for the period 2/1/1990 – 29/12/2000.

Table 6. Estimation results of subsample (2) for S&P 500.

	Coefficients	Standard Error	t Stat	P-value
β_2	-0.0070782	0.06324711	-0.1119137	0.9109008
β_3	0.0194586	0.0606773	0.32068997	0.74847205
β_4	0.04984257	0.06055982	0.82303038	0.4105689
β_5	0.02492812	0.06121454	0.40722543	0.68387715
β_6	-0.0518775	0.06139682	-0.8449539	0.39821712

Notes: The table reports the estimation results of subsample 2 with respect to the returns on S&P 500 Index for the period 2/1/2001 – 31/12/2010

(Table 7) show that the Monday coefficient was negative but not statistically significant, compared to the Friday coefficient which was positive and equal to 0.04977 but not statistically significant, and this indicates the existence of positive returns identified with Fridays of the week in the sample but not a similar relationship can be established in population (Table 7).

Table 7. Estimation Results of subsample (3) for S&P 500.

	Coefficients	*Standard Error*	*t Stat*	*P-value*
β_2	-0.0220472	0.04715238	-0.4675737	0.64012427
β_3	0.10592624	0.04503252	2.35221644	0.01872774
β_4	0.0547526	0.04510739	1.21382761	0.22491139
β_5	0.03286396	0.04541064	0.72370623	0.46930388
β_6	0.04977503	0.0456033	1.09147867	0.27515206

Notes: The table reports the estimation results of subsample 3 with respect to the returns on S&P 500 Index for the period 1/1/2011 – 30/8/2012

Table 8. Estimation Results of subsample (1) for Russel 2000.

	Coefficients	Standard Error	t Stat	P-value
β_2	-0.0619309	0.04084375	-1.5162893	0.12956016
β_3	-0.0079859	0.03938196	-0.2027801	0.83932175
β_4	0.08674793	0.03941661	2.20079631	0.02783257
β_5	0.06560321	0.03973265	1.65111594	0.0988281
β_6	0.12324848	0.03991154	3.08804087	0.00203474

Notes: The table reports the estimation results of subsample 1 with respect to the returns on Ruseel 2000 Index for the period 2/1/1990 – 29/12/2000.

And as a summary of the above findings regarding the effect of Mondays and Fridays on the stock returns in the S&P 500 index, i.e., the large companies, it can be stated that the above effect does not exist.

From the Table 8 that summarize the regression results on the small companies - the RUSSEL 2000 index - it can be learned that in the first sub-sample, Monday's index was indeed third and equal to -0.0619) but it is not

Table 9. Estimation Results of subsample (2) for Russel 2000.

	Coefficients	Standard Error	t Stat	P-value
β_2	-0.0458805	0.07622207	-0.6019317	0.54727397
β_3	0.06836209	0.07312507	0.93486524	0.34994768
β_4	0.09566073	0.07298349	1.31071741	0.19007317
β_5	0.03686863	0.07377252	0.49976094	0.61728722
β_6	0.00273747	0.0739922	0.0369968	0.9704905

Notes: The table reports the estimation results of subsample 2 with respect to the returns on Ruseel 2000 Index for the period 2/1/2001 – 31/12/2010.

Table 10. Estimation results of subsample (3) for Russel 2000.

	Coefficients	Standard Error	t Stat	P-value
β_2	-0.0266756	0.06103694	-0.4370399	0.66211465
β_3	0.12080009	0.05829287	2.07229602	0.03832511
β_4	-0.0044371	0.05838979	-0.0759918	0.93943082
β_5	0.03211445	0.05878233	0.54632833	0.58488187
β_6	0.07132656	0.05903172	1.20827512	0.22703897

Notes: The table reports the estimation results of subsample 3 with respect to the returns on Ruseel 2000 Index for the period 1/1/2011 – 30/8/2022.

statistically significant. Also, the average for Friday was positive and equal to 0.1232 and statistically significant, a finding that is consistent with our hypothesis. All other values (for the rest of the week) were not significant (Table 8).

In the second sub-sample (Table 9) there was no statistically significant index, i.e., there was no evidence that there are positive returns on Fridays and negative returns on Mondays, i.e., in the second sub-sample all our hypotheses were refuted (Table 9).

The regression results on the RUSSEL 2000 index in the third sub-sample\ (Table 10), show that Monday's coefficient was negative but not statistically significant (equal to -0.02667), and Friday's coefficient was positive and equal to 0.07132 but not statistically significant, and this indicates the absence of identified positive returns with Fridays a week (Table 10).

As a summary of the above findings regarding the effect of Mondays and Fridays on the stock returns in the RUSSEL 2000 index, i.e., the small companies, it can be stated that the above effect does not exist. If we add the results of the entire sub-sample to both the large and small companies, it cannot be determined that the day-of-the-week effect exists, that is, we found no evidence that the returns on Mondays tend to be negative and the returns on Fridays tend to be positive.

Conclusion

In this study, we examined a well-known calendrical anomaly that was documented in studies in the field of financing and the capital market. The phenomenon was named the "day-of-the-week" effect or the "weekend effect". According to previous studies we reviewed, the effect showed that there is a tendency for negative returns on Mondays and positive returns on Fridays.

In this research, we tested the validity of the phenomenon on current American data. For this purpose, we collected daily data from January 1990 to the end of August 2022. The data includes data from the index of the 500 largest companies on the New York Stock Exchange (S&P 500) and data from the index of the 2000 smallest companies on the stock exchange (RUSSEL 2000).

The findings show that the day of the week effect, i.e., the Monday and Friday effect, does not exist in large companies. That is, on Fridays we did not find evidence of positive returns as hypothesized. The same goes for Mondays. That is, on Mondays the returns did not show a tendency towards the negative territory. On the other hand, we found evidence that the Friday effect exists in small companies. That is, the RUSSELL 2000 index showed positive returns on average, and this is in line with the hypothesis. Two in small companies tend to be negative, but this tendency is not statistically significant.

Despite the above, we have received a clear tendency that Tuesdays and Wednesdays are identified with a positive and clear return. That is, the returns tend to be positive these days. This phenomenon exists in both large and small companies.

A possible explanation for this - unexpected - finding is that if Fridays and Mondays are trading days without a clear direction in the returns, and in the aggregate the American capital market has risen for 30 years, then it is expected to see an increase in returns in the middle of the week.

Our findings are important and have useful implications for market efficiency, and help to reconcile mixed findings in previous studies, including findings that show there is no appearance of the weekday effect in those years.

Future research may extend our study and focus on other investment tools such as derivatives, options, cryptographic assets and others, so we can learn more about the phenomenon day-of-the-week effect.

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