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Seasonality in Total Monthly Returns of Large and Small Stocks: Republican and Democratic Presidential Months

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Abstract

Seasonality in the monthly returns of large stocks and small stocks has been looked at from various perspectives by different researchers. This paper looks at the differences in the returns and standard deviations depending on Republican presidential versus Democratic presidential months, and existence of monthly seasonality during these presidential months. Contrary to popular belief, large as well as small stocks did better during Democratic presidents though the performance is not significantly higher. For large stocks, the significant negative September effect that we found for the entire data period is attributable to Republican presidential months. The January effect in small stocks is found in the returns of both Republican and Democratic presidential months.

Keywords: stock returns, seasonality, September effect, large stocks, small stocks

I. Introduction

Stocks have provided the highest returns in the long run among asset classes. This paper explores the performance of large and small stocks over the period 1926 to 2013 based on which party the president was from. We also explore seasonality in monthly returns under Republican and Democratic presidential periods.

II. Data Source and Methodology

Monthly returns data for large and small stocks are taken from "*Stocks, Bonds, Bills and Inflation Yearbook 2014".* Large stocks are represented by S&P 500 Composite Index with dividend reinvestment. It is S&P 500 stocks from 1957 to the present; from 1926 to 1956, it is S&P 90. Small company stocks are represented by fifth capitalization quintile of stocks on the NYSE for 1926 to 1o 1981; performance of the Dimensional Funds Association (DFA) Small Company Fund represents from 1982 to March 2001; performance of the DFA Micro Cap Fund represents from April 2001 to the present. The data is broken up into returns in the form of capital appreciation, and income returns.

III. Literature Survey on Seasonality in Stock Returns

Since exploration of comparative monthly seasonality in the two types of stocks is an important aspect of this study, we review previous work in this regard. Since the time stock exchanges were first established, traders and investors have exhaustively looked for patterns in stock prices that they could exploit to realize superior returns. As early as 1900, Bachelier characterized security prices as being efficient. Over thirty years later came the landmark work by Cowles (1933) in which he documented the inability of forty-five professional agencies to forecast stock prices. The conclusion was that stock prices are random – in general they do not exhibit patterns. This was followed by the researches of Working (1934), Cowles and Jones (1937), Kendall (1953), and Osborne (1959, 1962). They documented that stock and commodity prices behave like a random walk – as if they are independent random drawings. These empirical works were buttressed by the theoretical work of Samuelson (1965) and Mandelbrot (1966). Fama (1965) also contributed to this body of literature which came to be termed the 'random walk hypotheses. In 1970, Fama came up with the 'efficient markets hypothesis' (EMH). This hypothesis postulates that stock prices reflect all available information; they change in response to new information; since new information by definition

cannot be deduced from previous information, new information must be independent over time; if the arrival of new information is random, stock price changes are random – the changes cannot be anticipated; hence it is not possible to generate risk-adjusted abnormal returns from stocks.

The overall finding is that it is difficult to earn above-average profits by trading on publicly available information because it is already incorporated in securities prices.

However, some researchers have been able to identify profitable opportunities or anomalies. These go against the concept of efficient markets. As a result, some academics have deprecated the concept. The adherents of the new camp may possibly be increasing. Among the various anomalies discovered, the January effect is possibly the most well-known. It has been documented for financial markets across the globe. The first evidence of returns in January exceeding those of other months comes from Wachtel (1942). After thirty-three years, Officer (1975) presented further evidence followed by Rozeff and Kinney (1976).[1] These findings challenged the concept of efficient markets hypothesis that securities markets reflect all available information and hence it is not possible to garner positive risk-adjusted returns. Hamid and Habib (2018 a,b) present detailed literature survey on monthly seasonality in stock returns.

IV. Hypotheses

We study the seasonality in terms of monthly percentage changes from three approaches:

1. If the mean of monthly total returns is different from zero for the sample as well as for each month in the sample. We subject the mean percentage change for a given month *i* to the following hypothesis test: H_o: $\mu_i = 0$ vs. H_o: $\mu_i \neq 0$.
2. If the mean of the monthly total returns for a month is significantly different from the mean of the other 11 months stacked. We conduct the following hypothesis test for a given month *i*: H_o: $\mu_i = \mu_j$ vs. H_o: $\mu_i \neq \mu_j$, where j = {1, 2, …, i-1, i+1, ,,,, , 11, 12}. Since the variances for the periods i and j were unequal in many cases, we used the more conservative t-test assuming unequal variances.
3. If the variance of the monthly total returns for a given month is different from the variance of the other eleven months stacked. We conduct the following hypothesis test for a given month *i*: H_o: $\sigma_i^2 = \sigma_j^2$ vs. H_o: $\sigma_i^2 \neq \sigma_j^2$, where j = {1, 2, …, i-1, i+1, ,,,, , 11, 12}.

In addition to standard t-test which assumes normal distribution of the data, we also use Kruskal-Wallis non-parametric test which tests for differences among several population medians, and does not depend on normal distribution of data. We also use Mood's Median Test which performs a nonparametric analysis of a one-way layout. It is highly robust against outliers and errors in data. Further, we use Mann-Whitney test which performs a two-sample rank test for the difference between two population medians.

Many studies have used the dummy variable methodology to detect seasonality in market variables. Chien, Lee and Wang (2002) provide statistical analysis and empirical evidence that the methodology may provide misleading results. We avoid this methodology and use the

[1] Wachtel introduced the concept of January effect in 1942, but Rozeff and Kinney's article in the widely respected Journal of Financial Economics was the first evidence of January effect that attracted widespread attention.

methodology developed by Hamid and Dhakar (2008). Unless otherwise stated, significance is at 5% level.

V. Analysis of Results

We firstly present results of seasonality in large and small stocks by testing the three hypotheses above first for the full data set (1926 to 2013). Then we present results of seasonality during Republican and Democratic presidential months for the same period.

A. Large Stocks: 1926-2013

The 88 year period consists of 1,056 months. As shown in Table I below, the mean of monthly returns for the entire period is 0.95% and is significantly greater than zero.[1] The mean monthly return of July is the highest (1.79%), followed by December (1.71%), April (1.53%), November (1.40%), and January (1.37%). All of these returns are significantly greater than zero. But none of these returns are significantly greater than the mean returns of other eleven months stacked. This finding pretty closely follows the means of monthly changes found by Lakonishok and Smidt (1988) for the period 1896 to 1986. The mean return for September (-0.76%) is significantly lower than the mean return of the other eleven months stacked. However, December's mean return is significantly different from the other months for a p value of 0.052. So we have a negative September effect for large stocks. We find month effect in terms of variances of monthly returns for April (higher variance), and January, February, and December (lower variances).

Table I: Descriptive Statistics and Monthly Seasonality of Large Stocks: 1926-2013

	All	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Count	1056	88	88	88	88	88	88	88	88	88	88	88	88
Mean	0.95	1.37	0.37	0.72	1.53	0.51	0.98	1.79	1.29	-0.76	0.50	1.40	1.71
Median	1.31	1.66	0.77	1.18	1.32	1.37	0.32	1.44	1.61	0.01	0.95	1.88	1.82
Minimum	-29.73	-8.43	-17.72	-24.87	-19.97	-22.89	-16.25	-11.32	-14.46	-29.73	-21.52	-12.46	-14.00
Maximum	42.56	13.43	11.93	11.01	42.56	16.83	25.03	38.15	38.69	16.73	16.57	12.92	11.43
Std Dev	5.48	4.73	4.22	5.05	6.64	5.66	5.31	6.13	6.18	5.97	6.16	5.13	3.58
p-value (m=0)	0.00	0.01	0.41	0.19	0.03	0.40	0.09	0.01	0.05	0.23	0.45	0.01	0.00
p-value (t test)		0.39	0.20	0.65	0.39	0.45	0.96	0.18	0.59	0.01	0.47	0.40	0.05
p-value (F test)		0.03	0.00	0.14	0.01	0.35	0.35	0.07	0.06	0.12	0.06	0.20	0.00
Mean Return	Pos	Pos			Pos			Pos				Pos	Pos
Mo Effect (Mean)										Lower			
Mo Effect (Var)		Lower	Lower		Higher								Lower

Note: "Pos" implies the mean of monthly changes was significantly greater than zero; "Neg" implies the mean of monthly changes was significantly less than zero; "Higher" implies the mean or the variance of monthly changes for a month was significantly higher than those of the other months; "Lower" implies the mean or the variance of monthly changes for a month was significantly lower than those of the other months. Numbers are rounded in all tables to two decimal places.

B. Small Stocks: 1926-2013

Table II shows the mean of monthly returns for the entire period is 1.31% and is significantly greater than zero. The mean monthly return of January is the highest (5.84%), followed by July (1.90%), February (1.53%), and December (1.44%). All of these returns are significantly greater than zero. The mean return of January is significantly higher ($p = 0.00$) than the mean of the other eleven months stacked. The mean return for October (-0.68%) is significantly lower ($p = 0.02$) than the mean return of the other eleven months stacked. The mean return of September is lower than the mean of the other eleven months stacked at a p value of 0.07. So we have a positive January effect and a negative October effect for small stocks. However, this finding is based on smallest capitalization stocks in the NYSE which are comparatively

larger than the small stocks that other researchers considered. We also find May and August exhibiting significantly higher variances compared to that of other eleven months stacked, and lower variances for February, November, and December. These findings for both large and small stocks go against the concept of efficiency of the markets and possibly present profitable investment opportunities.

Table II: Descriptive Statistics and Monthly Seasonality of Small Stocks: 1926-2013

	All	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Count	1056	88	88	88	88	88	88	88	88	88	88	88	88
Mean	1.31	5.84	1.53	0.55	1.36	0.68	0.95	1.90	1.30	-0.42	-0.68	1.29	1.44
Median	1.49	4.82	1.38	1.47	1.68	0.60	0.47	1.33	1.26	0.30	0.49	2.24	1.70
Minimum	-36.74	-8.48	-13.11	-36.00	-22.20	-36.74	-21.68	-22.59	-20.10	-32.46	-29.19	-19.62	-21.95
Maximum	73.46	38.91	25.66	14.45	50.38	63.39	34.98	35.23	73.46	51.45	21.36	14.12	12.41
Std Dev	8.30	8.39	6.44	7.43	9.32	9.93	7.65	7.99	9.76	9.17	8.26	7.03	5.76
p-value (m=0)	0.00	0.00	0.03	0.49	0.17	0.52	0.25	0.03	0.21	0.67	0.44	0.09	0.02
p-value (t test)		0.00	0.75	0.32	0.95	0.53	0.65	0.48	0.99	0.07	0.02	0.98	0.84
p-value (F test)		0.39	0.00	0.08	0.07	0.01	0.15	0.32	0.02	0.09	0.51	0.02	0.00
Mean Return	Pos	Pos	Pos					Pos					Pos
Mo Effect (Mean)		Higher									Lower		
Mo Effect (Var)			Lower			Higher			Higher			Lower	Lower

Note: See note under Table V; numbers are rounded to two decimal places.

C. Republican vs. Democratic Presidential Months

i. Large Stocks

Policies of Republican presidents have been generally perceived to be more beneficial to businesses. There were eight Republican presidents during the period 1926-2013, and seven Democratic presidents. The 518 months which had Republican presidents had a mean monthly return of 0.62% versus 1.27% for 538 Democratic presidential months (Tables 2A and 2B). The difference between the two means is significant for a p value of 0.056 in 2-tailed test assuming unequal variances. During Republican and Democratic presidential months, the standard deviations were 5.78% and 5.16% respectively. The difference between the two standard deviations is significant for a p value of 0.01 **(F Statistic = 1.27).** The Democratic presidential months experienced a higher median (1.58%) compared to the Republican months (0.93%) which is significantly different under three nonparametric tests. Under Mann-Whitney test, the W-Statistic = 263571.5; p value = 0.04; under Mood's Median test, the Chi-square = 5.78; p value = 0.02; under Kruskal Wallis test, the H-Statistic = 4.23; p value = 0.04.

TABLE III: Descriptive Statistics and Monthly Seasonality: LS: Republican Months: 1926-2013

	All	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Count	518	43	43	42	42	42	42	42	42	42	42	42	43
Mean	0.62	1.28	0.59	0.88	0.41	0.24	0.52	1.60	1.92	-2.09	0.28	1.48	1.53
Median	0.93	0.73	1.11	1.05	0.89	0.78	0.09	0.97	1.60	-0.48	0.87	2.32	1.81
Minimum	-29.73	-8.43	-17.72	-11.58	-19.97	-21.96	-16.25	-7.80	-9.03	-29.73	-21.52	-12.46	-14.00
Maximum	38.69	13.43	11.93	11.01	8.24	9.75	14.21	38.15	38.69	8.51	16.57	12.92	11.43
Std Dev	5.78	5.14	4.84	4.02	5.11	5.36	4.90	7.28	7.56	6.40	6.97	5.35	4.35
p-value (m=0)	0.01	0.11	0.43	0.16	0.61	0.77	0.50	0.16	0.11	0.04	0.80	0.08	0.03
p-value (t test)		0.39	0.96	0.68	0.78	0.64	0.89	0.36	0.24	0.01	0.74	0.29	0.22
p-value (F test)		0.16	0.06	0.00	0.14	0.26	0.08	0.02	0.01	0.17	0.05	0.26	0.01
Mean Return	Pos									Neg			Pos
Mo Effect (Mean)										Lower			
Mo Effect (Var)				Lower				Higher	Higher				Lower

Note: See note under Table V; numbers are rounded to two decimal places.

TABLE IV: Descriptive Statistics and Monthly Seasonality: LS: Democratic Months: 1926-2013

	All	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Count	538	44	44	45	45	45	45	45	45	45	45	45	45
Mean	1.27	1.62	0.25	0.59	2.50	0.75	1.61	2.02	0.69	0.65	1.09	1.51	1.88
Median	1.58	2.17	0.57	1.65	1.47	1.63	1.78	1.96	1.64	0.31	0.96	1.33	1.85
Minimum	-24.87	-6.74	-10.65	-24.87	-8.09	-22.89	-8.03	-11.32	-14.46	-14.03	-9.81	-9.61	-4.59
Maximum	42.56	10.69	7.21	9.78	42.56	16.83	25.03	11.05	12.06	16.73	10.93	11.27	6.68
Std Dev	5.16	4.26	3.56	5.93	7.77	6.03	5.54	4.97	4.65	5.19	4.76	4.87	2.69
p-value (m=0)	0.00	0.02	0.64	0.51	0.04	0.41	0.06	0.01	0.33	0.40	0.13	0.04	0.00
p-value (t test)		0.57	0.06	0.42	0.26	0.55	0.66	0.29	0.39	0.41	0.80	0.73	0.15
p-value (F test)		0.05	0.00	0.10	0.00	0.08	0.27	0.38	0.18	0.50	0.24	0.31	0.00
Mean Return	Pos	Pos			Pos			Pos				Pos	Pos
Mo Effect (Mean)													
Mo Effect (Var)		Lower	Lower		Higher								Lower

Note: See note under Table V; numbers are rounded to two decimal places.

ii. Small Stocks

The 518 months which had Republican presidents had a mean monthly return of 0.56% versus 2.02% for 538 Democratic presidential months (Tables 3A and 3B). The difference between the two means is significant for a p value of 0.00 in 2-tailed test assuming unequal variances. During Republican and Democratic presidential months, the standard deviations were 7.67% and 9.09% respectively. The difference between the two standard deviations is significant for a p value of 0.00. The Democratic presidential months experienced a higher median (1.95%) compared to the Republican months (0.86%); the difference between the two medians is significantly different using three nonparametric tests. Under Mann-Whitney test, the W-Statistic = 256512.5; p value = 0.00; under Mood's Median test, the Chi-square = 11.88; p value = 0.00; under Kruskal Wallis test, the H-Statistic = 12.12; p value = 0.00.

TABLE V: Descriptive Statistics and Monthly Seasonality: SS: Republican Months: 1926-2013

	All	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Count	518	43	43	42	42	42	42	42	42	42	42	42	43
Mean	0.56	5.67	1.60	0.93	-0.54	-0.23	-0.03	0.74	1.67	-2.28	-1.21	0.93	0.54
Median	0.86	5.43	0.94	1.07	1.23	0.45	0.65	0.52	-0.65	-0.41	0.76	2.24	1.50
Minimum	-32.46	-7.64	-12.78	-13.11	-22.20	-13.79	-21.68	-14.48	-12.96	-32.46	-29.19	-19.62	-21.95
Maximum	73.46	27.67	25.66	10.07	9.28	11.62	18.19	35.23	73.46	10.86	13.05	11.47	11.80
Std Dev	7.67	7.82	6.53	4.95	6.91	6.10	6.09	7.57	12.31	7.46	8.56	6.78	6.17
Sample Var	0.59	0.61	0.43	0.25	0.48	0.37	0.37	0.57	1.51	0.56	0.73	0.46	0.38
p-value (m=0)	0.10	0.00	0.12	0.23	0.62	0.80	0.98	0.53	0.38	0.054	0.37	0.38	0.57
p-value (t test)		0.00	0.29	0.63	0.29	0.40	0.53	0.87	0.53	0.01	0.17	0.72	0.90
p-value (F test)		0.38	0.08	0.00	0.19	0.03	0.03	0.47	0.00	0.44	0.17	0.15	0.03
Mean Return		Pos											
Mo Effect (Mean)		Higher								Lower			
Mo Effect (Var)				Lower		Lower	Lower		Higher				Lower

Note: See note under Table V; numbers are rounded to two decimal places.

Table VII presents output of tests for difference in the means and medians of monthly returns between large and small stocks during Republican presidential months and during Democratic presidential months. We do not detect difference between large and small stocks during Republican months either based on one parametric test and three non-parametric tests (p values are 0.86 and above). We see difference between the means as well as medians of large and small stocks at 4% to 9% level. We see highly significant differences in the variances of monthly returns of large stocks and small stocks in both Republican months as well as Democratic months.

TABLE VI: Descriptive Statistics and Monthly Seasonality: SS: Democratic Months: 1926-2013

	All	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Count	538	44	44	45	45	45	45	45	45	45	45	45	45
Mean	2.02	6.30	1.57	0.20	3.12	1.46	2.09	2.92	0.91	1.48	0.25	1.95	2.30
Median	1.95	4.52	1.77	1.75	2.71	0.44	0.46	2.31	2.73	2.13	0.30	2.45	1.89
Minimum	-36.74	-8.48	-13.11	-36.00	-17.95	-36.74	-11.83	-22.59	-20.10	-25.39	-24.27	-14.53	-16.94
Maximum	63.39	38.91	23.58	14.45	50.38	63.39	34.98	25.35	15.46	51.45	21.36	14.12	12.41
Std Dev	9.09	8.84	6.47	9.28	10.98	12.59	8.75	8.38	6.85	10.31	7.51	7.06	5.26
Sample Var	0.83	0.78	0.42	0.86	1.21	1.59	0.76	0.70	0.47	1.06	0.56	0.50	0.28
p-value (m=0)	0.00	0.00	0.11	0.89	0.06	0.44	0.12	0.02	0.38	0.34	0.82	0.07	0.01
p-value (t test)		0.00	0.63	0.17	0.48	0.74	0.97	0.47	0.27	0.70	0.11	0.93	0.75
p-value (F test)		0.47	0.00	0.32	0.02	0.00	0.50	0.34	0.01	0.08	0.08	0.03	0.00
Mean Return	Pos	Pos						Pos					Pos
Mo Effect (Mean)		Higher											
Mo Effect (Var)			Lower		Higher	Higher			Lower			Lower	Lower

Table VII: Comparison of Large and Small Stocks: Republican and Democratic Presidencies

Period	Large Stocks (%)		Small Stocks (%)		Parametric Test: p-value		Non-parametric Test: p-value		
	Mean	Median	Mean	Median	t-test	F-test	KW	MM	MW
Republican	0.62	0.93	0.56	0.86	0.88	0.00	0.88	0.95	0.88
Democratic	1.27	1.58	2.04	2.06	0.08	0.00	0.04	0.09	0.04

Note: 1. Except for means and medians, the numbers in the cells show p values of the relevant tests
2. KW = Kruskal-Wallis test of difference in medians; MM = Mood Median test of difference in medians; MW = Mann-Whitney test of difference in medians of two samples

VI. Summary and Conclusion

For both, large and small stocks, we explored and found monthly seasonality for the entire data period: 1926-2013. We found a negative September effect in the monthly returns of large stocks for the entire data period. For the small stocks, we found a January effect for the entire period. We look at the performance of large stocks and small stocks during Republican presidential months and Democratic presidential months. Contrary to popular belief, large as well as small stocks did better during Democratic presidents though the performance is not significantly higher. The significant negative September effect that we found for the entire data period is attributable to Republican presidential months. The January effect in small stocks is found in the returns of both Republican and Democratic presidential months.

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