Is There an April Effect in Stock Returns?

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ABSTRACT

This paper examines the extent that retirement account inflows around the April 15th U.S. income tax filing deadline affect U.S. equity prices. Beginning in 1975, the U.S. Federal tax system allowed individuals to realize tax advantages by placing funds in specialized retirement accounts. Individuals can put money into these accounts until April 15th following the end of the tax year. Further, evidence suggests a disproportionate number of taxpayers file their returns near the April 15th deadline. This paper examines if money flowing into retirement accounts around the April 15th deadline produce a calendar-based stock-return pattern. This paper posits these market inflows result in higher average daily stock returns around April 15th. Results show large and significant April effects with event-window daily returns as much as eight times larger than daily returns for the rest of the year. Results hold for both U.S. and international stock indexes.

Keywords: Stock Returns, April Effect, Calendar Anomalies, IRA, Taxes

INTRODUCTION

Tax advantaged retirement accounts have enjoyed tremendous popularity in the U.S. Retirement assets account for about one third of all household financial assets (Investment Company Institute, 2020a). As of 2019, retirement accounts held an estimated $32.3 trillion. This amount includes an estimated $11 trillion in Individual Retirement Accounts (IRAs), $8.9 trillion in deferred compensation plans, $6.2 trillion in 401K plans and $2.7 in other deferred compensation plans. Some 81 million of 126.6 U.S. households (63 percent) held an IRA, employer sponsored retirement plan or both. Further, 36 percent held both an individual IRA and an employer sponsored IRA. Twenty-seven percent had an employee sponsored plan, but not an IRA (Investment Company Institute, 2020b).

U.S. Taxpayers may normally file their annual Federal income tax return anytime between January 1 and April 15. Those needing more time can file for an extension which allows additional time to complete the return. Taxpayers tend to file their tax returns early or late in the normal tax season. Data for 2019 shows that 18.46 percent of taxpayers filed their return in the last week of January or the first week of February. 21.67 percent of taxpayers filed their returns in the two weeks including, and prior to, the tax filing deadline of April 15th. (Internal Revenue Service, 2020a). Regardless of when taxpayers file their return, they may wait until April 15th, to fund their IRA. Some taxpayers file their returns early but wait to fund their IRA until later, perhaps doing so when they receive their refund.

The tax filing deadline generates financial effects throughout the economy. Taxpayers needing to pay taxes at the time of filing must remove money from other accounts to make these payments. The analysis here argues that, prior to making tax payments, the corresponding funds reside in low-risk accounts including money market funds. Taxpayers would not risk losing money needed to make mandatory tax payments. Tax refunds also play an important role in the economy. Many individuals overpay their taxes throughout the year, entitling them to a refund when filing their annual tax return. Tax return receipt produces a large inflow of funds for individuals. Some individuals consume the money or repay debt obligations. Others invest the money through IRAs, Simplified Employee Pensions (SEPs), other retirement accounts. Still others invest in standard investor accounts that do not enjoy tax advantages.

With large numbers of investors filing returns late in the tax season and others filing early but postponing funding their IRA until close to the April 15th deadline, the author expects a large flow of funds into retirement accounts immediately preceding April 15th. Further the author anticipates a post April 15th inflow of funds into the market due to investment delays. These delays occur between the time individuals place the money into investment accounts and ultimately invests the funds. No known data indicates the precise timing of money flows into retirement accounts or the time required for taxpayers to invest these funds in markets. However, stock markets should respond positively to the additional inflow of money. Thus, this paper examines if equity markets display abnormal positive daily returns around the April 15th tax filing deadline.

The remainder of the paper is organized as follows. The next section provides some history on retirement accounts in the United States. The paper continues with a review of the extant literature. The following section discusses data and methodology used in the examination. The discussion continues with a presentation of the results. The paper closes with concluding comments and suggestions for future research.

HISTORY OF TAX ADVANTAGED RETIRMENT ACCOUNTS

This section provides a discussion of the evolution of tax advantaged retirement accounts in the United States. This discussion is not exhaustive but rather focuses on specific elements of the tax system relevant for the research at hand. Table 1 (Appendix) shows the history of tax-advantaged retirement accounts.

The sixteenth amendment to the U.S. constitution allowed the federal government to levy taxes directly on individuals. The first year of an individual federal income tax was 1913. Table 2 (Appendix) shows the development timeline for tax deferred accounts. The Self-Employed Individuals Tax Retirement Act of 1962 launched the retirement account revolution by creating the Keogh plan for self-employed individuals. The Employee Retirement Income Security Act of 1974 (ERISA), created Individual Retirement Accounts (IRAs) which allow individuals to set aside pre-tax dollars for their retirement needs. Funds are taxed when withdrawn from the account. IRAs were originally envisioned for employees.

Subsequent legislation increased the availability of IRAs to other individuals. In 1978, IRAs were expanded to small businesses through creation of the Simplified Employee Pension (SEP) and 401K. The Taxpayer Relief Act of 1997 created a new type of retirement account called the Roth IRA. Roth IRAs allows individuals to place taxed monies into a retirement account. Money withdrawn from the account is not taxed upon withdrawal in retirement. Tax code changes in 2001 reduced the popularity of Keogh plans, with Simplified Employee Pension (SEP) plans largely taking their place. Further legislative innovations created additional tax-advantaged accounts including 457 and 403B accounts.

Dollar limits on tax-advantaged retirement account contributions periodically increase. Table 2 shows contribution limitations into various retirement accounts. In 1974, the maximum contribution equaled $1,500 per year. As of 2019 individuals under 50 years of age can contribute up to $6,000 to an IRA.

Those 50 years of age and older may contribute up to $7,000. Non-working spouses may contribute up to $6,000. In 2019, individuals can contribute as much as $19,000 to a SEP, 401k, 403b and 457 annually. For those 50 years of age or older, the limit is $25,000. Individuals can sometimes contribute to more than one of these accounts. For each of these accounts, taxpayers may make contributions until the tax filing deadline which is generally April 15th of the following year. Individuals withdrawing funds from these accounts before they reach 59.5 years old face a withdrawal penalty. In 2020, individuals failing to begin removing a defined portion of the money from these accounts before they are 72.5 also face a penalty.

LITERATURE REVIEW

No known research examines stock returns around the April 15th tax filing deadline. Thus, we relate this paper to literature on other stock market calendar-based anomalies. Rozeff and Kinney (1976) wrote the seminal article on the January effect. They found that over a 70-year period, average stock market returns in January equaled 3.48 percent compared to a 0.42 percent monthly average return for the remainder of the year. In subsequent years extensive examinations confirmed the effect and offered various explanations for its existence.

Explanations for the January effect include window dressing as proposed by Lakonishok, Shleifer, Thaler and Vishny (1991). Window dressing involves institutional investors selling losing stocks and buying winning stocks to improve the appearance of their portfolio around

reporting periods thereby enhancing perceived performance. Tax loss selling provides an alternate explanation whereby investors sell losing investments late in the year and wait until January to reinvest the funds.

Some authors find evidence suggesting the January effect occurs primarily among small firms (Reinganum, 1983 and Roll, 1983). Haug and Hirschey (2006) examine small cap stocks for a January effect focusing on the 1986 Tax Reform Act which reduced motivations for institutional investors to make tax motivated trades around the end of the calendar year. They find the January effect persists after passage of the Tax Reform Act of 1986. More recent literature documents a declining or eliminated January effect. Patel (2016) examined 1997-2014 data and found the January effect no longer exists.

Bauman and Jacobson (2002) examined the sell-in-May-and-go-away (SIMGA) effect. They found higher returns in the November through April half year in 35 of 37 markets examined. Significant differences occurred in 20 markets. Other authors subsequently examined this phenomenon including Andrade, Chhaochharai and Fuerst (2013), who utilized a longer dataset. Results showed the SIGMA effect continued to exist with stock returns averaging about 10 percent higher in the November-April period than the May-October period. They argued the SIMGA effect stems from seasonal variation in aggregate risk aversion.

Cross (1973) identified the day-of-the-week effect. His evidence showed lower returns on Monday than on Friday. Other studies confirmed the weekend effect including Gibbons and Hess (1981); and Keim and Stambaugh (1984). More recent evidence shows a reduced, but still existent, day of the week effect Zilca (2017). A common explanation for this phenomenon posits that firms wait until after the market closes on Friday to make negative announcements. The Friday flow of negative information results in negative price responses on Monday. However, managers hope that market participants digest the information over the weekend thereby reducing price declines.

Many authors document the existence of a holiday effect. Merrill (1976) found disproportionate increases in the Dow Jones Industrial Average on the trading day preceding a holiday. Ariel (1990) found the average preholiday return is nine to 14 times larger than returns on non-preholiday trading days. Kim and Park (1994) show the holiday effect persists in international markets independent from the U.S. market effect. More recently, Kudravatsev (2019) finds the holiday effect continues to permeate markets.

Another calendar-based anomaly suggests that positive abnormal returns exist around the turn of the month. Arial (1987) examined U.S. markets on the last day of the month through the first three days of the following month. Results show positive returns around the turn of the month with close to zero returns for the remainder of the month. Lakonishok and Smidt (1988) confirmed these findings using ninety years of data. Other authors demonstrate the turn-of-the-month effect also occurs outside the U.S. Arendas and Kotlebova (2019) detected a significant turn-of-the-month effect in seven of eleven European countries examined. Recent evidence indicates this anomaly continues to exist and affects both stock returns and return volatility (Sharma and Narayan, 2014).

In sum, the extant literature shows that calendar-based patterns in stock returns exist and persist for extended periods of time. This paper continues the effort to identify calendar-based stock return patterns by searching for an April effect.

DATA AND METHODOLOGY

Data were obtained from Stooq.com. Stooq.com provides historical daily index and volume levels for selected stock indexes. Data collection includes five U.S. indexes and four international indexes. While the expected April effect relies on the U.S. tax system and U.S. taxpayers, some of this money may flow to foreign assets. Thus, the April effect could manifest itself both in the U.S and in international markets.

Table 3 (Appendix) shows summary data on the indexes examined. Data collection included daily index levels for the Dow Jones Industrial Average (DJIA), Standard and Poor's 500 (SPX), Dow Jones Transportation (DJT), Dow Jones Utilities (DJU), National Association of Securities Dealers Automated Quotation Composite (NASDAQ), Deutscher Aktienindex (DAX), NIKKEI 225 (NKX), Hang Seng Index (HSI), and Cotation Assistée en Continue (CAC 40). These indexes were selected because of the relatively long time-series of data available through Stooq.com.

The international indexes required additional adjustments. Three international indexes involved non-trading holidays on April 15. If the international index did not include trading on April 15th, the approach involved setting the following trading day to equal tax-day. Specifically, adjustments happened for the HSI, DAX and CAC indexes for the years 1979, 1990, 1995, 2001, 2006 and 2017. The HSI index required further adjustments in 1973 and 1974. Finally, all CAC index data for 1974 were eliminated because of missing data observations.

Data coverage differs by index with seven of nine indexes covering the entire examination period from 1965-2019. Data for the HSI and CAC indexes were not available for the entire examination period. HSI and CAC data were first available on January 2, 1970, and January 2, 1969, respectively. The analysis on these two series were completed utilizing the abbreviated datasets.

The analysis continued by categorizing the data for examination by time-period relating to the evolution of retirement accounts. The first period extends from 1965 through 2019. This begins with the first introduction of tax-advantaged accounts and continues through current day. While Keogh accounts were available for the 1964 tax year, the first expected tax-day market response occurs in April of 1965. The second examination period focuses on the establishment of IRAs. IRAs first became available in 1975. The first expected market response occurs in April of 1976. The period 1976-2019 captures this IRA effect. The third examination period focuses on the increase in popularity of IRAs associated with the ERTA of 1981. Indeed, annual IRA contributions increased from $4.8 billion in 1981 to 28.3 billion in 1982. The first expected response to this change occurs in 1983. Thus, the third data period extends from 1983-2019. Several important changes in tax-deductible retirement accounts occurred after 1983, but there existed steady and substantial flow of funds into tax-advantaged retirements accounts after 1981. An argument can be made for utilizing the year of adoption as the starting date, 1964, 1975 and 1982 rather than the starting points selected. Robustness checks indicate the starting date choice does not materially affect the results.

The Tax-day variable equals the due date for income tax returns, usually April 15th. If April 15th falls on a weekend or a holiday, the Tax-day variable equals the following trading day. The variable Tax-day Relative indicates how much a given trading date differs from Tax-day. Tax-day receives a Tax-day Relative value of 0. If Tax-day equals April 15th, then April 14th Tax-day Relative equals -1 and April 13th Tax-day Relative equals -2. Similarly, April 16th Tax-Day Relative equals +1 and April 17th equals +2. Tax-day has changed throughout history,

however the tax filing deadline occurred on April 15th between 1955 and 2019 which encompasses the time period of this study. In 2020, the tax filing deadline occurred on July 15th due to the coronavirus pandemic. Similarly, in 2021, the filing deadline was extended to May 17. Because of these tax filing changes and corresponding retirement account changes, 2020 and 2021 data were not included in this study.

The variable Window identifies the expected response window which includes 16 days around Tax-day. The Window variable equals one when observations fall within the 10 trading days before Tax-day, Tax-day, or the five days after Tax-day. The Window variable equals zero for observations falling outside the expected response window.

Next, the procedure involves calculating daily returns on each index. Consider an index with level L_t on day t, and level L_{t-1} on the previous day. Then the daily return, DR_t, equals the natural log of these price relatives. In percentage terms Equation 1 shows the calculations:

$$DR_t = LN\left(\frac{L_t}{L_{t-1}}\right) X\ 100 \quad (1)$$

RESULTS

The data examination begins by assessing differences in means, standard deviations and return distributions for observations in the event window (EW) compared to those outside-event-window (OW). To provide a better image of the results the tables include Means Ratios. Consider an index with a daily return mean during the event window, MEW, and a mean for observations outside the event window, MOW. Then the Means Ratio equals:

$$MR = \frac{MEW}{MOW} \quad (2)$$

A Means Ratio of one indicates the EW mean equals the OW mean and implies an April effect does not exist. A Means Ratio greater than one indicates an EW mean greater than the OW mean. A Means Ratio greater than one implies positive abnormal returns and the existence of the predicted April effect. A Means Ratio less than one indicates an EW mean less than the OW mean and indicates a reverse April effect. Similarly, we calculate a Standard Deviation Ratio. Consider an index with event-window standard deviation, SDEW, and outside-event-window standard deviation of, SDOW. Then the Standard Deviation Ratio equals:

$$SDR = \frac{SDEW}{SDOW} \quad (3)$$

Table 4 (Appendix) provides results for the 1965-2019 period corresponding to establishment of Keogh plans. The first column shows the mean daily return for the EW, OW, and the full sample (FS). Figures in parentheses indicate the number of observations used in the calculations.

The results show remarkably larger daily returns in the event window. For the Dow Jones Industrial Average (DJIA), MEW equals 0.1140 compared to a MOW of 0.0192. The Means Ratio shows that the event window average daily return equals 5.9375 times the mean for the remainder of the year! The t-test and Wilcoxon tests confirm significance of the difference at the one percent level. The SPX and DJT index produce similar results. Results for the DJU and

NASDAQ index indicate no significant difference, despite the event-window mean equaling 3.4907 and 2.3717 times the outside-event-window mean respectively.

The DAX, HSI and CAC indexes each reveal an event-window mean significantly higher than the outside-event-window mean. Indeed, the CAC event window mean equals 8.1782 times the MOW. Despite a 2.0099 means difference results for the NIKKEI index the test does not reach the critical level for significance. The somewhat larger differences in international indexes relative to domestic indexes may reflect U.S. investors purchasing international stocks with retirement account funds.

The question arises if the higher returns noted here coincide with higher risk? Table 4, Columns 5 and 6 (Appendix) show the standard deviations and Standard Deviation Ratio. Standard deviation results reveal an unexpected pattern. For the DJIA, the event-window standard deviation equals 0.9433 and the out-of-event-window standard deviation equals 1.0235 producing a Standard Deviation Ratio of 0.9216. This result indicates the EW standard deviation is 8.02 percent lower than the OW standard deviation. The difference, as evidenced by the F-test, produces significance at the one percent level. Significantly lower EW standard deviation occurs for three of five U.S. indexes. The DJT index shows no significant standard deviation differences and the NASDAQ displays a significantly higher standard deviation in the EW period.

The international index examination produces mixed standard deviation results. The DAX and CAC indexes show significantly lower standard deviation in the event window. The NIKKEI and HSI indexes reveal no significant standard deviation differences. Overall, the results show that higher returns earned during the event window do not come at the expense of higher risk. Rather, the higher returns are associated with lower or similar risk patterns.

The Kolmogrov-Smirnov test examines the overall distribution of returns. The examination produces mixed results. Five indexes reveal significantly different distributions. However, four indexes do not indicate significantly different distributions.

Table 5 and Table 6 show results for the 1976-2019 and 1983-2019 periods respectively. The results follow a similar pattern with the event window producing higher returns on lower risk. However, the April effect declined in magnitude in the 1983-2019 period. The 1965-2019 and 1976-2019 results show significantly different mean effects in seven of the nine indexes examined. However, the 1983-2019 period produced significant differences for five indexes. Moreover, the level of significance is somewhat reduced in the later period. For example, the Means Ratio for the DJIA declined from 5.9375 to 3.4805 from the 1965-2019 period to the 1983-2019 period. While the reduced significance is notable, a lower number of observations in the 1983-2019 data period may explain at least some of the result.

To further confirm the means differences noted in Tables 4-6 (Appendix), we conduct Ordinary Least Squares (OLS) regression analysis. The dependent variable equals the daily return, $DRET_t$. The independent variable, Window, equals 1 for event-window observations and 0 otherwise. The variable ε equals a random error term. Equation 4 shows the estimated equation:

$$DRET_t = \alpha + \beta_1 (Window) + \varepsilon \quad (4)$$

Table 7 (Appendix) shows results of the regression analysis. Panels A, B and C show results for the 1965-2019, 1976-2019 and 1983-2019 periods respectively. Panel A shows significant results for five indexes, indicating the EW returns significantly exceed the OW

returns. Careful readers will notice the 1965-2019 and 1976-2019 both produced 5 significant indexes. However there remain some differences. The SPX index was significant in the early period, and insignificant in the later period. The HSI index was not significant in the early period but was significant in the later period. In the 1983-2019, four indexes produced significant results with neither the SPX or HSI showing significance. Not surprisingly, the regressions produce low R2 statistics. The April effect constitutes a relatively small component when considering all factors that come into play to determine stock returns. In general, the results here confirm the means analysis results. Overall, results show clear differences between returns and risk in the EW and OW periods, providing clear evidence of an April effect in stock returns.

CONCLUDING COMMENTS

This paper examines daily stock returns around the United States income tax filing deadline. Tax-day has special implications in the United States because individuals may place funds in tax-advantaged retirement plans for the previous year until the April 15th tax-filing deadline. This creates the potential for large inflows into equity markets around the tax-filing deadline. This paper examines daily index abnormal returns around tax-day. The examination includes five U.S. indexes and four international indexes. The event window equals the ten trading days prior to the tax-filing deadline, the tax filing deadline, and the five trading days following the deadline. Results indicate a large tax-day effect in stock returns. The average event-window daily return reaches levels of more than eight times the average daily return for the remainder of the year. Moreover, evidence shows these higher returns associate with lower return volatility. International indexes produced larger responses than U.S. stock indexes suggesting that money invested into retirement accounts flows disproportionately into international investments.

Investors might take advantage of these findings by increasing their equity holdings around tax-day to capture these higher returns. Passive investors may open their IRAs and invest the proceeds at least two weeks prior to April 15th to capture the abnormal returns. Institutional investors might increase equity holdings around the tax window.

The work here faces several limitations. First, this paper examines a single event window of sixteen days including 10 trading days before tax-day, the tax-day and five trading days after tax-day. Future analysis might examine different window lengths. The author posits that abnormal April returns result from an IRA effect. However, other effects, such as a tax return effect could drive the results. Further research might definitively attribute the April effect to a tax effect or some other effect that occurs in April. Results show large April effects in international indexes. These results suggest the possibility that investors allocate retirement account contributions to international investments. Further research may examine specific destinations for retirement account deposits. This paper exclusively examines the U.S. income tax filing deadline. Similar tax-day effects might exist in other countries and thereby offer a rich avenue for future research. Finally, the analysis here utilized indexes generally composed of large firms. Other researchers note small firm effects in calendar-based stock market anomalies. Future research might examine indexes focused on smaller firms. Similarly, this paper examines only broad indexes representing the entire U.S. market. An examination of industry specific indexes provides an opportunity for future research.

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Table 1: Tax Advantaged Retirement Account Evolution

Year	Effective for Tax Year	Relevant Law	Development
1962	1963	Self-Employed Individuals Tax Retirement Act	Created Keogh accounts. Maximum contribution equaled $2,500 of which 1/2 was tax deductible.
1974	1975	Employee Retirement Income Security Act of 1974 (ERISA)	Created Individual Retirement Accounts. Maximum contribution equaled $1,500. Allowed only for individuals not covered by an employer's pension
1978	1980	Revenue Act of 1978	Created 401(k) and Simplified Employee Pensions (SEPs).
1981	1982	Economic Recovery Tax Act (ERTA)	Opened IRAs to all wage earners under 70.5 years of age. Allowed for Spousal IRAs.
1986	1987	Tax Reform Act of 1986 (TRA)	Reduced IRA deductibility. IRA deduction phased out for high- income individuals with an employer-sponsored retirement plan.
1996	1997	Small Business Jobs Protection Act	Created the SIMPLE IRA.
1997	1998	Taxpayer Relief Act of 1997	Created Roth IRAs. Phase out limits for high-income taxpayers increased. Allowed non-deductible contributions to IRAs.
2001	2002	Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA)	Allowed for catch up contributions for those Age 50 and above. Created the Saver's Tax Credit involving a non-refundable tax credit of up to $1,000 equaling between 10% and 50% of retirement account contribution for lower income taxpayers..
2006	2007	Pension Protection Act of 2006 (PPA)	Roth conversion income limitations removed. Made it easier for firms to automatically enroll employees into 401(k) plans.
2019	2020	Further Consolidated Appropriations Act (FCAA)	Eliminates 70.5 year limitation on making contributions to IRAs. Delays required minimum distributions to age 72.5.

Sources: IRS Form 1040 and Instructions, Investment Company Fact Book (2020a), Plaehn, T. (2020), Elkins (2017) Holden, Ireland, Leonard-Chambers and Bogdan (2005).

Table 2: History of IRA contribution Limits

Panel A: IRA Limitations			
Period	Taxpayer	Catch-Up	Non-Working Spouse
1974-1976	$1,500		
1976-1981	$1,500		$250
1982-1997	$2,000		$250
1998-2001	$2,000		$2,000
2002-2004	$3,000	$500	$3,000
2005	$4,000	$500	$4,000
2006-2007	$4,000	$1,000	$4,000
2008-2012	$5,000	$1,000	$5,000
2013-2018	$5,500	$1,000	$5,500
2019-	$6,000	$1,000	$6,000
Panel B: 401(k), 403(b) and 457 Contribution Limitations			
1978-1981	45,475		
1982-1985	30,000		
1986-1987	$7,000		
1988	$7,313		
1989	$7,627		
1990	$7,979		
1991	$8,475		
1992	$8,728		
1993	$8,994		
1994-1995	$9,240		
1996-1997	$9,500		
1998-1999	$10,000		
2000	$10,500		
2001	$10,500		
2002	$11,000	$1,000	
2003	$12,000	$2,000	
2004	$13,000	$3,000	
2005	$14,000	$4,000	
2006	$15,000	$5,000	
2007	$15,500	$5,000	
2008	$15,500	$5,000	
2009-2011	$16,500	$5,500	
2012	$17,000	$5,500	
2013	$17,500	$5,500	
2014	$17,500	$5,500	
2015-2016	$18,000	$6,000	
2017	$18,000	$6,000	
2018	$18,500	$6,000	
2019	$19,000	$6,000	
Panel C: SIMPLE Contribution Limitations			
1997-2000	6,000		
2001	6,500		
2002	7,000		
2003	8,000		
2004	$9,000		
2005	$10,000		
2006	$10,000		
2007-2008	$10,500		
2009-2012	$11,500		
2013-2014	$12,000		
2015-2018	$12,500		
2019	$13,000		

This table shows maximum employee contribution to tax-advantaged retirement accounts. Sources: IRS Publication 560, IRS Publication 590-a, PK (2020a), PK (2020b) and Wikipedia (2020) en.wikipedia.org/wiki/SIMPLE_IRA.

Table 3: Indexes Examined

Index	Acronym	Country
Dow Jones Industrial Average	DJIA	USA
Standard and Poor's 500	SPX	USA
Dow Jones Transportation	DJT	USA
Dow Jones Utilities	DJU	USA
NASDAQ Composite	NASDAQ	USA
DAX	DAX	Germany
Nikkei 225	NIKKEI	Japan
Hang Seng Index	HSI	Hong Kong
CAC 40	CAC	France

This table shows summary data on the indexes examined. The analysis includes five U.S. indexes and four international indexes.

Table 4: Mean and Variance Tests for 1965-2019 Period

Index	Means	Means Ratio	t-test	Wilcoxon	Standard Deviation	Std. Dev. Ratio	F-Value	KS Statistic
DJIA		5.9375	-2.87***	2.7770***		0.9216	1.18***	1.603**
Event Window	0.1140 (880)				0.9433			
Outside Event	0.0192 (12,964)				1.0235			
Full Sample	0.0252 (13,844)				1.0189			
SPX		4.100	-2.04**	1.9388**		0.9328	1.15***	1.138
Event Window	0.0902 (880)				0.9573			
Outside Window	0.0220 (12,963)				1.0263			
Full Sample	0.02634 (13,843)				1.0222			
DJT		5.8182	-2.46***	2.4880***		0.9713	1.06	1.536**
Event Window	0.1280 (880)				1.2336			
Outside Window	0.0220 (12,963)				1.2700			
Full Sample	0.02870 (13,843)				1.2678			
DJU		3.4907	-0.96	0.2629		0.8581	1.36***	0.9721
Event Window	0.0377 (880)				0.8000			
Outside Window	0.0108 (12,963)				0.9323			
Full Sample	0.0125 (13,483)				0.9244			
NASDAQ		2.3717	-0.90	1.3084*		1.2828	1.65***	1.234*
Event Window	0.0804 (880)				1.5016			
Outside Window	0.0339 (12,964)				1.1706			
Full Sample	0.0368 (13,844)				1.1943			
DAX		5.5269	-2.23**	1.8134**		0.8702	1.32***	1.460**
Event Window	0.1028 (880)				1.0736			
Outside Window	0.0186 (12,950)				1.2338			
Full Sample	0.0239 (13,830)				1.2244			
NIKKEI		2.0099	-0.46	0.2330		1.0076	1.02	0.7195
Event Window	0.0408 (880)				1.2713			
Outside Window	0.0203 (12,826)				1.2617			
Full Sample	0.0216 (13,706)				1.2623			
HIS		2.4857	-0.86	1.5463*		0.9987	1.000	0.9951
Event Window	0.0957 (800)				1.8169			
Outside Window	0.0385 (11,527)				1.8192			
Full Sample	0.04219 (12,326)				1.8190			
CAC		8.1782	-3.00***	2.9865***		0.9976	1.32***	1.749***
Event Window	0.1423 (800)				1.1267			
Outside Window	0.0174 (11,787)				1.2940			
Full Sample	0.0254 (12,587)				1.2843			

This table shows mean daily returns for each index. The analysis includes daily index data from 1965-2019. Daily returns equal: $DRET_t = \ln\left(\frac{L_t}{L_{t-1}}\right) X100$, where L_t and L_{t-1} equal the index level on day t and day t-1 respectively. The window equals the 10 trading days prior to the tax filing deadline, the tax filing deadline and the 5 trading days following the tax filing deadline. The Event Window Mean, Outside Event Window Mean and Full Sample Mean equal the average daily return during the window period, outside the window period and for the full sample respectively. Figures in parentheses show the number of observations. The column labeled Means Ratio equals the Event Window mean divided by the Outside Event Window mean. The column labeled t-test reports the one-tailed t-test for difference in means. The column labeled Wilcoxon reports the one-tailed Z statistic. The F-value indicates the F-Statistic for a test of differences in variance. KS indicates the Kolmogrov-Smirnov test for equal distributions. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.

Table 5: Mean and Variance Tests for 1976-2019 Period

Index	Means	Means Ratio	t-test	Wilcoxon	Standard Deviation	Standard Dev. Ratio	F-Value	KS Statistic
DJIA		4.2137	-2.17**	2.142**		0.9365	1.14***	1.358*
Event Window	0.1104(704)				0.9908			
Outside Window	0.0262(10,393)				1.0580			
Full Sample	0.0316(11,097)				1.0540			
SPX		3.1661	-1.54*	1.350*		0.9489	1.11*	0.870
Event Window	0.0896 (704)				1.0165			
Outside Window	0.0283 (10,392)				1.0713			
Full Sample	0.0322 (11,096)				1.0680			
DJT		4.5493	-2.10**	2.104**		0.9914	1.02	1.429**
Event Window	0.1383 (704)				1.3217			
Outside Window	0.0304 (10,392)				1.3331			
Full Sample	0.0372 (11,096)				1.3326			
DJU		3.8820	-1.50*	0.9375		0.8759	1.30***	0.923
Event Window	0.0691 (704)				0.8673			
Outside Window	0.0178 (10,392)				0.9902			
Full Sample	0.0211 (11,096)				0.9829			
NASDAQ		1.9208	-0.67	0.694		1.1607	1.35***	0.808
Event Window	0.0776 (704)				1.4478			
Outside Window	0.0404 (10,394)				1.2474			
Full Sample	0.0427 (11,098)				1.2611			
DAX		6.7729	-2.67***	2.366**		0.8819	1.29***	1.324*
Event Window	0.1402 (704)				1.1399			
Outside Window	0.0207 (10379)				1.2926			
Full Sample	0.0283 (11,083)				1.2838			
NIKKEI		6.2672	-1.19	1.329*		1.0017	1.00	1.175
Event Window	0.0727 (704)				1.3229			
Outside Window	0.0116 (10,086)				1.3206			
Full Sample	0.0156 (10,790)				1.3208			
HIS		4.400	-1.87**	1.679**		0.89136	1.24***	1.248*
Event Window	0.1452 (704)				1.5300			
Outside Window	0.0330 (10154)				1.7042			
Full Sample	0.0403 (10,858)				1.6936			
CAC		7.2513	-2.75***	2.80***		1.2106	1.26***	1.766***
Event Window	0.1443 (704)				1.2918			
Outside Window	0.0199 (10,384)				1.1523			
Full Sample	0.0278 (11,088)				1.2837			

This table shows mean daily returns for each index. The analysis includes daily index data from 1976-2019. Daily returns equal: $DRET_t = \ln\left(\frac{L_t}{L_{t-1}}\right) X\ 100$, where L_t and L_{t-1} equal the index level on day t and day t-1 respectively. The window includes the 10 trading days prior to the tax-filing deadline, the tax filing deadline and the 5 trading days following the tax filing deadline. The Event Window Mean, Outside Event Window Mean and Full Sample Mean equals the average daily return during the window period, outside the window period and the full sample respectively. Figures in parentheses show the number of observations. The column labeled Means Ratio equals the Event Window mean divided by the Outside Event Mean. The column labeled t-test reports the one-tailed t-test for difference in means. The column labeled Wilcoxon reports the one-tailed Z statistic. The F-value indicates the F-Statistic for a test of differences in variance. KS indicates the Kolmogrov-Smirnov test for equal distributions. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.

Table 6: Mean and Variance Tests for 1983-2019 Period

Index	Means	Means Ratio	t-test	Wilcoxon	Standard Deviation	Standard Dev. Ratio	F-Value	KS Statistic
DJIA		3.4805	-1.77**	1.742*		0.9278	1.16**	1.258*
Event Window	0.1072 (592)				1.0095			
Outside Window	0.0308 (8736)				1.0881			
Full Sample	0.0357 (9327)				1.0834			
SPX			-1.27	1.244			1.12*	0.912
Event Window	0.0871 (592)	2.8841			1.0480	0.9453		
Outside Window	0.0302 (8736)				1.1086			
Full Sample	0.0338 (9327)				1.1048			
DJT		4.6157	-1.74**	1.698**		0.9935	1.01	1.088
Event Window	0.1297 (592)				1.3750			
Outside Window	0.0281 (8736)				1.3840			
Full Sample	0.03456 (9327)				1.3836			
DJU		3.1809	-1.05	0.520		0.8674	1.33***	0.802
Event Window	0.0598 (592)				0.9071			
Outside Window	0.0188 (8736)				1.0458			
Full Sample	0.0213 (9327)				1.0375			
NASDAQ		1.4047	-0.24	0.079		1.1752	1.38***	0.438
Event Window	0.0538 (592)				1.5539			
Outside Window	0.0383 (8738)				1.3222			
Full Sample	0.03925 (9329)				1.3380			
DAX			-2.29**	1.991**		1.1351	1.29***	1.239*
Event Window	0.1454 (592)	5.5285			1.3755			
Outside Window	0.0263 (8739)				1.2118			
Full Sample	0.0339 (9331)				1.3660			
NIKKEI		8.375	-0.98	0.9974		1.0041	1.01	0.809
Event Window	0.0670 (592)				1.4103			
Outside Window	0.0080 (8547)				1.4045			
Full Sample	0.0118 (9138)				1.4049			
HIS		4.5833	-1.75**	1.505*		0.8840	1.28***	1.0321
Event Window	0.1485 (592)				1.4619			
Outside Window	0.0324 (8546)				1.6538			
Full Sample	0.03946 (9137)				1.6421			
CAC		6.393	-2.47***	2.839***		0.8839	1.28***	1.835***
Event Window	0.1464 (592)				1.1668			
Outside Window	0.0229 (8768)				1.3200			
Full Sample	0.0307 (9359)				1.3110			

This table shows mean daily returns for each index. The analysis includes daily index data from 1983-2019. Daily returns equal: $DRET_t = \ln\left(\frac{L_t}{L_{t-1}}\right) X\ 100$, where L_t and L_{t-1} equal the index level on day t and day t-1 respectively. The window equals the 10 trading days prior to the tax-filing deadline, the tax filing deadline and the 5 trading days following the tax filing deadline. The Event Window Mean, Outside Event Window Mean and Full Sample Mean equals the average daily return during the window period, outside the window period and for the full sample respectively. Figures in parentheses show the number of observations. The column labeled Means Ratio equals the Event Window mean divided by the Outside Event Mean. The column labeled t-test reports the one-tailed t-test for difference in means. The column labeled Wilcoxon reports the one-tailed Z statistic. The F-value indicates the F-Statistic for a test of differences in variance. KS indicates the Kolmogrov-Smirnov test for equal distributions. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.

Table 7: Regression Analysis on Daily Returns: Window -10 to + 5 Days from Tax filing Deadline

Panel A: 1965-2019 Time Period				
Index	Intercept	Coefficient	T-Statistic	R2
DJIA	0.0192	0.0948	2.67***	0.0005
SPX	0.0220	0.0682	1.92*	0.0003
DJT	0.0220	0.1061	2.40**	0.0004
DJU	0.0108	0.0269	0.84	0.0001
NASDAQ	0.0339	0.0465	1.12	0.0001
DAX	0.0190	0.0842	1.97**	0.0003
NIKKEI	0.0203	0.0205	0.47	0.0000
HIS	0.0385	0.0572	0.86	0.0001
CAC	0.0174	0.1249	2.66***	0.0006
Panel B: 1976-2019 Time Period				
Index	Intercept	Coefficient	T-Statistic	R2
DJIA	0.0262	0.0842	2.05**	0.0004
SPX	0.0283	0.0613	1.47	0.0002
DJT	0.0304	0.1080	2.08**	0.0004
DJU	0.0178	0.0513	1.34	0.0002
NASDAQ	0.0404	0.0372	0.76	0.0001
DAX	0.0207	0.1195	2.39**	0.0005
NIKKEI	0.0116	0.0612	1.19	0.0001
HIS	0.0303	0.1122	1.70*	0.0003
CAC	0.0199	0.1244	2.49**	0.0006
Panel C: 1983-2019 Time Period				
Index	Intercept	Coefficient	T-Statistic	R2
DJIA	0.0308	0.0764	1.66*	0.0003
SPX	0.0302	0.0569	1.21	0.0002
DJT	0.0208	0.1016	1.73*	0.0003
DJU	0.0188	0.0410	0.93	0.0001
NASDAQ	0.0383	0.0156	0.27	0.0000
DAX	0.0263	0.1191	2.05**	0.0005
NIKKEI	0.0080	0.0590	0.99	0.0001
HIS	0.0324	0.1095	1.57	0.0003
CAC	0.0229	0.1236	2.22**	0.0005

This table shows regression results. Panel A examines daily index data from 1964 through 2019. Panel B examines daily index data from 1976 through 2019. Panel C examines daily index data from 1983-2019. The estimated regression equals: $DRET_t = \alpha + \beta_1(Window)$, where Window is a dummy variable equaling 1 for the event window and 0 otherwise. The Window equals the 10 trading days before the tax filing deadline the tax filing deadline day and the 5 trading days following the tax filing deadline. Daily returns are calculated as $DRET_t = ln\left(\frac{L_t}{L_{t-1}}\right) X\ 100$, where L_t and L_{t-1} equal the index level on day t and day t-1 respectively.