4-2018

Does the Stock Market Value Inclusion on a Sustainability Index? An Event Study Using the Dow Jones Sustainability North America Index

Lauren Hayward
College of the Holy Cross, ljhayw18@g.holycross.edu

Follow this and additional works at: https://crossworks.holycross.edu/econ_stu_scholarship

Part of the Economics Commons

Recommended Citation

Does the Stock Market Value Inclusion on a Sustainability Index?

An Event Study using the Dow Jones Sustainability North America Index

Lauren Hayward
Advisors: Prof. Victor Matheson and Prof. Karen Teitel
Economics Department Honors Thesis
College of the Holy Cross
April 2018

Abstract

The concept of socially responsible investing (SRI) has evolved into a mainstream strategy for investments. Investors who place value on sustainability use SRI strategies to make investment decisions. Companies send a signal to stakeholders, including investors, that they are sustainability leaders by being recognized as a member of a sustainability index. The purpose of this paper is to analyze the impact of the announcement that a company is added to, removed from, or remaining on the Dow Jones North America Sustainability Index (DJSI NA) on its stock price. An event study is used to measure the impact of the announcement by analyzing the abnormal stock returns over a 12-year period. The results indicate that a deletion of a company from the DJSI NA has a negative and statistically significant temporary impact on its stock price. Also, the addition of a company to the DJSI NA has a positive and statistically significant temporary impact on its stock price. However, excluding the inaugural year of the DJSI NA, only deletions from the index have a statistically significant impact on stock price.

Introduction

The concept of socially responsible investing (SRI) has become a mainstream strategy for investments. Assets managed using SRI strategies in the United States have grown over 125% from approximately $4 trillion at the start of 2014 to almost $9 trillion at the start of 2016 (U.S. SIF Foundation, 2016). Investors who place value on sustainability consider a company's environmental, social, and governance (ESG) performance when making investment decisions. For example, environmental criteria such as greenhouse gas emissions and energy consumption, social criteria such as employee working conditions and supply chain management, and governance criteria such as crisis and risk management are valued by investors who consider sustainability in their investment decisions.

Investors also recognize a positive relationship between ESG performance and a company's operational efficiency. For example, a recycling program to reduce waste at Cisco contributed over $100 million to the company's bottom line in 2008 (Nidumolu et al., 2009). In addition, Cheng, Ioannou, and Serafeimi (2014) finds that companies with a higher ESG rating obtain a lower cost of capital. Furthermore, investors see a positive relationship between ESG integration and the management of long-term financial risks (RobecoSAM, 2017b).

The growth of SRI has, in turn, led to the creation of multiple stock indices that track the sustainability performance of companies. Dorfleitner et al. (2015) explains that sustainability indices play an important role in the decision-making process of investors who care about social responsibility. Companies send a signal to stakeholders, including investors, that they are sustainability leaders by their inclusion on a sustainability index. Institutional investors increasingly rely on these indices to create their portfolios because these indices are viewed as "objective, professional benchmarks assessed by neutral parties" (Robinson et al., 2011, p. 495).

The sustainability indices include the KLD rating, the FTSE4Good Index, the Domini 400, and the Dow Jones Sustainability Index. According to Dorfleitner et al. (2015), excessive sustainability indices have been created because "neither a general consensus nor a set of rules exists on how to measure ESG" (p. 454).

Among the various indices, the Dow Jones Sustainability Index (DJSI) is recognized in the extant literature as the "leading sustainability index" by Lopez et al. (2007), Consolandi et al. (2009), Cheung (2011), Robinson et al. (2011), Oberndorfer et al. (2013), Cheung and Roca (2013), and Van Stekelenburg et al. (2015). The DJSI was the first global sustainability index, launched in 1999 by S&P Dow Jones Indices[1] and RobecoSAM. The DJSI family includes DJSI World, DJSI North America, DJSI Europe, DJSI Asia Pacific, DJSI Emerging Markets, DJSI Korea, DJSI Australia, and DJSI Chile (RobecoSAM, 2017a). S&P Dow Jones Indices and RobecoSAM introduced different indices to recognize the sustainability leaders in each geography (RobecoSAM, 2017a). According to Robinson et al. (2011), "the DJSI is recognized as a global standard and used by a number of SRI fund [managers] that do not conduct their own screening for social responsibility" (p. 498). Also, according to Van Stekelenburg et al. (2015), "the Dow Jones Sustainability Indices have become a reference point in sustainability investing" (p. 77). In addition, a survey of investors conducted by SustainAbility in 2013 recognized the DJSI as the most familiar sustainability rating to investors and one of the top two ratings in terms of credibility (Sadowski, 2013).

S&P Dow Jones Indices and RobecoSAM select companies on an annual basis to be included on the Dow Jones Sustainability Indices based on the results of a Corporate Sustainability Assessment (CSA). There are 60 industry-specific CSAs. The CSA is designed to

---

[1] S&P Dow Jones Indices is a joint venture of S&P Global, CME Group, and the Dow Jones & Company.

be "a fair representation of the corporate sustainability performance in a firm's peer group" (RobecoSAM, 2017b, p. 1). The CSA contains 80 to 120 questions related to environmental, social, and governance factors. A CSA completed by a company is verified by RobecoSAM for accuracy based on company supporting documentation, publicly available information, and external stakeholder reports. RobecoSAM also uses publicly available information to evaluate companies that do not complete the CSA, in order to ensure the DJSI covers a representative group of companies by region and industry (RobecoSAM, 2016a). S&P Dow Jones Indices and RobecoSAM select the companies to be named to the DJSI based on the results of the CSA. For example, the DJSI NA, which was introduced in 2005, represents the top 20% of CSA survey results among the 600 largest companies in the United States and Canada on the S&P Global Broad Market Index (S&P Dow Jones Indices, 2016). S&P Dow Jones Indices and RobecoSAM announce the results of the annual DJSI review each September. The announcement date is typically one week prior to the effective change date.

This paper investigates the impact of the announcement of the DJSI NA annual review results on a company's stock price. An event study methodology is used to determine the impact of the announcement that a company is included on or excluded from the DJSI NA by measuring the abnormal return of its stock. The estimates for abnormal return of the stock control for the daily return of the market and firm-specific fixed effects. Using data from 2005 to 2016, the results indicate that the removal of a company from the DJSI NA has a negative and statistically significant impact on its stock price for seven trading days following the effective change date. Using data from the same time period, the addition of a company to the DJSI NA has a positive and statistically significant impact on its stock price for two trading days following the announcement date. However, excluding 2005 when the DJSI NA was introduced, only a

deletion from the DJSI NA has a statistically significant impact on stock price. This suggests a change in investors' attitude toward inclusion on the DJSI NA may have occurred since 2005.

This paper contributes to literature by analyzing the impact of the announcement of the results of the DJSI NA annual review on a company's stock price. It also analyzes the impact of a company remaining on the index for consecutive years, in addition to being newly added or deleted from the index. Moreover, this paper includes a regression analysis to take into account company-specific and time-invariant factors in order to test the statistical significance of the addition to and deletion from the DJSI NA on a company's stock price.

Research Question and Hypotheses

How does a company's inclusion on or exclusion from the DJSI NA impact its stock price? The first hypothesis (H1) is that a company added to the DJSI NA experiences an increase in stock price following the announcement of its addition to the index. The second hypothesis (H2) is that a company removed from the DJSI NA experiences a decrease in stock price following the announcement of its removal from the index. The third hypothesis (H3) is that a company remaining on the DJSI NA for consecutive years does not experience a change in stock price following the announcement.

It is expected that institutional investors, who manage socially responsible funds, may reallocate their funds based on the change in DJSI NA designation. The inclusion on or exclusion from the DJSI NA may change the investors' view about the future profitability of the company and thus their demand for its stock. Alternatively, the investors who care about sustainability may increase their demand for a stock based on the addition of the DJSI NA designation and decrease their demand for a stock based on the deletion of the DJSI NA

designation. It is expected that the stock price of a company that remains on the index for consecutive years will not be impacted by the announcement since there is no change in DJSI NA designation.

Literature Review

Three studies are closely related to this research. Van Stekelenburg et al. (2015) tests whether companies that are added to the DJSI Europe experience a positive stock market reaction and whether companies that are removed from the DJSI Europe experience a negative stock market reaction. The data set includes 119 companies that are added to and 98 companies that are removed from the DJSI Europe between 2009 and 2013. Van Stekelenburg et al. (2015) finds that a company's addition to the DJSI Europe temporarily increases its stock price for one trading day after the announcement date, and a company's removal from the DJSI Europe temporarily decreases its stock price between five and ten trading days after the effective change date.

Similarly, Cheung (2011) finds that U.S. stocks experience a statistically significant increase in abnormal returns when companies are added to the DJSI World and a statistically significant decrease in abnormal returns when companies are removed from the DJSI World. The data set includes 80 inclusions and 97 exclusions from the DJSI World between 2002 and 2008. Cheung (2011) also concludes that the changes in abnormal returns are temporary. The addition to the DJSI World results in an increase in abnormal returns for one trading date (i.e., on the effective change date). The removal from the DJSI World results in a decrease in abnormal returns for six trading days surrounding the effective change date.

Like Van Stekelenburg et al. (2015) and Cheung (2011), a study by Robinson et al. (2011) demonstrates a similar stock market reaction when companies are included on the DJSI World. Robinson et al. (2011) analyzes the stock prices of 48 North American companies added to and 43 North American companies removed from the DJSI World between 2003 and 2007. The results indicate a statistically significant increase in abnormal returns for 60 trading days after a company is added to the DJSI World. However, the results indicate a statistically insignificant change in abnormal returns after a company is removed from the DJSI World.

In contrast to Van Stekelenburg et al. (2015), Cheung (2011), and Robinson et al. (2011), some research demonstrates that the inclusion on the DJSI World results in a *decrease* in stock price. According to Cheung and Roca (2013), stock prices decline when a company is either included on or excluded from the DJSI World. Cheung and Roca (2013) examines the DJSI World impact on stock prices in the Asia Pacific stock markets between 2002 and 2010. The study concludes that the addition of a company to the DJSI World results in a decrease in stock price. Cheung and Roca (2013) suggests that the negative price reaction to the inclusion on the DJSI World reflects the pessimistic view of sustainability in Asia Pacific. Likewise, according to Oberndorfer et al. (2013), the addition of a German company to the DJSI World results in a decrease in its stock price in the Frankfurt Stock Exchange between 1999 and 2002.

Finally, some economic literature indicates that the addition of a company to the DJSI does not impact its stock price. According to Oberndorfer et al. (2013), the addition of a German company to the DJSI STOXX between 2001 and 2002 has no impact on its stock price in the Frankfurt Stock Exchange. Oberndorfer et al. (2013) concludes that the DJSI STOXX is less recognized than the DJSI World because the DJSI STOXX had been recently launched at the start of the event study in 2001. Similarly, Consolandi et al. (2009) finds that the addition of a

company to the DJSI STOXX between 2001 and 2006 does not impact stock price. However, similar to Van Stekelenburg et al. (2015) and Cheung (2011), Consolandi et al. (2009) finds that stocks have statistically significant negative abnormal returns when companies are deleted from the DJSI STOXX. There is clearly no consensus in the extant literature on the size or the sign of the impact on stock price resulting from a change in DJSI status.

Data

Data for the companies on the DJSI NA between 2005 and 2016 are from the "Dow Jones Sustainability North America Composite Index" on the RobecoSAM website.[2] The data set includes the companies that are listed on the DJSI NA at least once from 2005 to 2016, as shown in Table 1 in Appendix A. The companies that are added to, deleted from, and remaining on the DJSI NA for each year are identified by comparing the index lists for consecutive years.

The historical stock prices are obtained from Yahoo Finance, the Center for Research in Security Prices (CRSP), and the Bloomberg Terminal. The closing stock price for each day the stock was publicly traded on a U.S. stock exchange from January 3, 2005 to December 30, 2016 is used in the study.[3] In addition, the S&P 500 Index is selected as the market portfolio.

A total of 281 companies are listed on the DJSI NA at least once from 2005 to 2016, but only 241 of these companies have all the necessary historical stock prices to be included in the data set. The remaining 40 companies are omitted because each is privately held and/or its stock is not publicly traded on a U.S. stock exchange. Data cleaning identified the companies that

---

[2] http://www.robecosam.com/en/sustainability-insights/about-sustainability/corporate-sustainability-assessment/send.jsp and
http://www.robecosam.com/images/DJSI2016_ComponentList_NorthAmerica.pdf (accessed on September 1, 2017).

[3] The actual closing price, not the adjusted closing price, is used in the study because the adjusted closing stock price is not available for all companies.

changed names during the 12-year time period, and all company names were standardized. The companies on the DJSI NA are researched using publicly available information, such as the press releases on company websites and the United States Securities and Exchange Commission (SEC) 8-K forms. A total of 24 companies on the DJSI NA had been acquired during the preceding year. These firms are omitted from the data set in the year that each is acquired because the stock prices are likely affected by the acquisition and/or the company is liquidated soon after the acquisition. For example, Cinergy Corporation was removed from the DJSI NA in September 2007, but it was acquired by Duke Energy in April 2006. In addition, three companies are omitted because each had experienced bankruptcy during the preceding year to a change in DJSI NA status. For example, Nortel Networks Corporation was removed from the DJSI NA in September 2009, but it had filed for bankruptcy in January 2009.

The data set contains 286 additions to the DJSI NA and 122 deletions from the DJSI NA from 2005 to 2016. The total number of additions and deletions is greater than the total number of companies (i.e., 241) because some companies, such as Allergan Inc., Xerox Corporation and Nisource Inc., are added to and/or deleted from the DJSI NA more than once between 2005 and 2016. Also, if a company is named to the DJSI NA for consecutive years, it is considered a "remain" for each year it stays on the index. The data set contains 1137 so-called remains.

Table 2 summarizes the results of the DJSI NA annual review for each year.[4] It also contains the announcement date (AD) and the effective change date (CD), which are available from the press releases on the RobecoSAM website.

---

[4] Quantities may differ from those reported in RobecoSAM press releases due to mergers, acquisitions, company name changes, etc.

Table 2: Summary of DJSI NA Annual Review Results in 2005-2016

Year	Number of Companies Added	Number of Companies Deleted	Number of Companies Remaining	Announcement Date (AD)	Effective Change Date (CD)
2005[5]	93	n/a	n/a	9/23/2005	9/23/2005
2006	17	10	78	9/6/2006	9/18/2006
2007	15	8	86	9/6/2007	9/24/2007
2008	16	8	86	9/4/2008	9/22/2008
2009	23	7	98	9/3/2009	9/21/2009
2010	17	17	101	9/9/2010	9/20/2010
2011	20	10	110	9/8/2011	9/19/2011
2012	17	15	112	9/13/2012	9/24/2012
2013	21	18	109	9/12/2013	9/23/2013
2014	19	9	119	9/11/2014	9/22/2014
2015	14	13	118	9/14/2015	9/21/2015
2016	14	7	120	9/12/2016	9/19/2016
TOTAL	286	122	1137		

Methodology and Model

An event study is used to evaluate H1, H2 and H3. The event study methodology is consistent with Consolandi et al. (2009), Cheung (2011), Robinson et al. (2011), Oberndorfer et al. (2013), Cheung and Roca (2013), and Van Stekelenburg et al. (2015). A. Craig MacKinlay (1997) describes the use of an event study to measure the impact of a specific event on the value of a firm using financial market data. According to MacKinlay, "the usefulness of such a study comes from the fact that, given rationality in the marketplace, the effects of an event will be

---

[5] Deletions and remains are not applicable because DJSI NA was introduced in 2005.

reflected immediately in security prices" (MacKinlay, 1997, p. 13). The benefit of an event

study is that an event's economic impact can be measured using security prices observed over a

relatively short time period (MacKinlay, 1997).

In an event study, the impact of the event (e.g., the announcement of the results of the

DJSI NA annual review) is measured by the abnormal return of the stock. The market model is

used to predict the return of a stock using the return of the market portfolio. The market model is

$$R_{it} = \alpha_{iy} + \beta_{iy}R_{mt} + \varepsilon_{it}$$

where R_{it} is the expected return of stock i on trading day t, and R_{mt} is the return of the S&P 500

Index on trading day t. α_{iy} and β_{iy} are the stock-specific parameters for stock i in year y, and ε_{it}

is the error term of stock i on trading day t.

The market model parameters α_{iy} and β_{iy} are estimated for the stocks of the 241

companies for each year (i.e., 2005 to 2016). An ordinary least squares regression uses the stock

returns and S&P 500 Index returns during the estimation window, which is 165 to 16 trading

days prior to the announcement date of the DJSI NA annual review results. The estimation

window does not overlap the event window to prevent the announcement from influencing the

market model parameter estimates.

The expected return of the stock is

$$E(R_{it}) = \alpha_{iy} + \beta_{iy}R_{mt}$$

where $E(R_{it})$ is the estimated expected return of stock i on trading day t. The parameters α_{iy}

and β_{iy} are estimated for each stock i in year y.

The abnormal return is calculated as the difference between the realized return and the

estimated expected return of the stock as shown below:

$$AR_{it} = R_{it} - E(R_{it})$$

where AR_{it} is the abnormal return of stock i on trading day t.

The cumulative abnormal return (CAR) is

$$CAR_{t1,t2} = \sum_{t=t_1}^{t_2} AR_{it}$$

where $CAR_{t1,t2}$ is the cumulative abnormal return from trading day t_1 to trading day t_2.

Similar to Van Stekelenburg et al. (2015), the event window is selected as the time period between 15 trading days prior to the announcement date and 60 trading days after the announcement date (written as AD-15 to AD+60 trading days). Analyzing the abnormal returns prior to the announcement date determines if the market acquires information about the DJSI NA annual review results prior to the announcement. Similar to Van Stekelenburg et al. (2015), Cheung (2011), and Robinson et al. (2011), the event window is divided into sub-windows to analyze the CAR for different time periods surrounding the announcement date (AD) and the effective change date (CD).

A one-sample t-test is used to test if the CAR for the companies added to, removed from, and remaining on the DJSI NA are statistically distinguishable from zero. Also, a two-sample t-test compares the CARs for (1) companies added to and removed from the DJSI NA, (2) companies added to and remaining on the DJSI NA, and (3) companies removed from and remaining on the DJSI NA.

In addition, a regression analysis estimates the marginal effects of DJSI NA additions and deletions on the cumulative abnormal returns. The regression includes fixed effects in order to control for company-specific and time-invariant impacts on its stock price, such as industry. The regression equation is

$$CAR_{i,t1,t2} = \beta_0 + \beta_1 ADD_{it} + \beta_2 DELETE_{it} + \sum_i f_i + \varepsilon_{it}$$

where $CAR_{i,t1,t2}$ is the cumulative abnormal return for stock i from trading day t_1 to trading day t_2. ADD_{it} is a dummy variable for stock i that equals one for companies added to the DJSI NA, and zero otherwise. $DELETE_{it}$ is a dummy variable for stock i that equals one for companies deleted from the DJSI NA, and zero otherwise. $\sum_i f_i$ is the fixed effects of company i, and ε_{it} is the error term of stock i on trading day t. β_1 is the marginal effect on CAR if a company is added to the DJSI NA. β_2 is the marginal effect on CAR if a company is removed from the DJSI NA.

An indicator variable for the days from the announcement date is assigned to each trading day. The indicator variable 0 denotes the announcement date (AD). The indicator variable +1 denotes the trading day following the AD, +2 denotes the second trading day following the AD, etc. Likewise, the indicator variable -1 denotes the trading day prior to the AD, -2 denotes the second trading day prior to the AD, etc. Similarly, an indicator variable for the days from the effective change date (CD) is assigned to each trading day.

The assumption for the event study is that the timing of the announcement of the results of the DJSI NA annual review is exogenous and cannot be influenced by the company. Another assumption is that the market is efficient and rational. The market model assumes the normality of data and a linear relationship between the return of the market portfolio and the expected stock return.

Results

Market Model Regression Analysis

The parameters α_{iy} and β_{iy} for the market model are estimated for each stock for each year using an ordinary least squares regression. The data for the regression include the stock

returns and S&P 500 Index market returns during the estimation window (i.e., between AD-165 and AD-16 trading days) for each company and each year.

A summary of the market model regression results is shown in Table 3 below. The results estimate that the mean β_{iy} is 0.994. The marginal effect of the S&P 500 Index market return on the stock return is positive and is estimated to be approximately one. The p-values for the coefficient β_{iy} indicate that the S&P 500 Index market return is a good estimator for the expected stock return. The coefficient β_{iy} is statistically significant in 1542 out of the 1560 regressions based on a 10% significance level. The remaining 18 companies are Canadian companies traded on both the Toronto Stock Exchange and the NYSE and/or gold production companies whose stock prices likely do not trend with the S&P 500 Index. The mean R-squared value is 0.358, and the maximum value is 0.816.

Table 3: Market Model Regression Summary[6]

	Mean	N	Max	Min
α_{iy}	0.000111	1560	0.00828	-0.00477
α_{iy} Std. Error	0.00113	1560	0.00624	0.000388
α_{iy} t-statistic	0.0946	1560	3.17	-2.981
α_{iy} p-value	0.496	1560	0.998	0.00152
β_{iy}	0.994	1560	3.113	-0.962
β_{iy} Std. Error	0.12	1560	0.616	0.0392
β_{iy} t-statistic	9.408	1560	25.623	-3.06
β_{iy} p-value	0.0045	1560	0.844	0
R-squared value	0.358	1560	0.816	0.00262

Cumulative Abnormal Return (CAR) Analysis

The results of the one-sample t-tests are shown in Tables B1 to B3 in Appendix B. Consistent with the event studies performed by Van Stekelenburg et al. (2015), Cheung (2011),

---

[6] The specific results of the market model regressions are available upon request.

and Robinson et al. (2011), the one-sample *t*-tests identify if the CAR is statistically

distinguishable from zero in any of the event sub-windows. If the CAR is statistically different

than zero in an event sub-window, the announcement has an impact on abnormal returns during

this window.

The one-sample *t*-test of the CAR during the event window prior to the announcement

(i.e., AD-15 to AD-1 trading days) indicates that the CAR is not statistically distinguishable from

zero. This suggests that the market does not acquire information about the DJSI NA annual

review results before the announcement date.

The one-sample *t*-test indicates the CAR of the DJSI NA additions is positive and

statistically different from zero between (1) the two trading days prior to and following the

announcement, (2) the announcement date and the following two trading days, and (3) the

announcement date and the following five trading days. This suggests that an addition to the

index temporarily increases the CAR up to five trading days following the announcement date.

The one-sample *t*-test indicates the CAR of the DJSI NA deletions is negative and

statistically different from zero for seven out of the 11 event sub-windows analyzed. The longest

windows are between (1) the announcement date and the following fifteen trading days and (2)

the effective change date and the following seven trading days. This suggests that a deletion

from the index temporarily decreases the CAR for 15 trading days following the announcement

date and for seven trading days following the effective change date. These two windows are

similar because the announcement date is typically one week prior to the effective change date.

In contrast, the one-sample *t*-test indicates the CAR of the stocks of the companies

remaining on the DJSI NA is not statistically distinguishable from zero. This suggests the

announcement that a company remains on the index for consecutive years does not impact its stock price.

The results of the two-sample *t*-tests are shown in Tables B4 to B6 in Appendix B. The two-sample *t*-test results support the findings of the one-sample *t*-tests. For example, the CAR of the stocks of companies newly added to the DJSI NA is greater than the CAR of the stocks of companies remaining on the index during the analyzed event windows. The results of the two-sample t-tests further support that the announcement of a company remaining on the DJSI NA for consecutive years does not have a statistically significant impact on stock price.

In addition, the results of the regression analysis are shown in Table 4 below. The marginal effect of the addition to the DJSI NA on CAR is positive and statistically significant between (1) the one trading day before and one trading day after the announcement date and (2) the announcement date and the following two trading days. The regression results indicate that the addition of a company to the index increases the CAR by approximately 0.005 and 0.004 respectively in these two windows. For example, the predicted impact on a $10 stock would be an increase in CAR by approximately $0.04 during the two trading days following the announcement of the company's addition to the index.

The marginal effect of the removal from the DJSI NA on CAR is negative in the analyzed event windows. The marginal effect of the removal from the index is statistically significant between (1) the effective change date and the following five trading days and (2) the effective change date and the following seven trading days. The regression results indicate that the removal of company from the index decreases the CAR by approximately 0.008 in these two windows. For example, the predicted impact on a $10 stock would be a decrease in CAR by approximately $0.08 during five to seven trading days following the effective change date.

Table 4: Regression Results for Cumulative Abnormal Returns (2005-2016)

Event Sub-Window (trading days)	Variable	Coefficient	Std. Error	t-statistic
AD-15 to AD-1	ADD	-0.000884	0.00376	-0.24
	DELETE	-0.00768	0.00559	-1.37
	Constant	0.00138	0.00159	0.87
AD-1 to AD+1	ADD	0.00478***	0.00168	2.85
	DELETE	-0.00219	0.00250	-0.88
	Constant	-0.00101	0.000712	-1.42
AD-2 to AD+2	ADD	0.00401	0.00251	1.60
	DELETE	-0.00544	0.00373	-1.46
	Constant	-0.00104	0.00106	-0.98
AD-5 to AD+5	ADD	0.00230	0.00360	0.64
	DELETE	-0.00778	0.00535	-1.45
	Constant	0.000626	0.00152	0.41
AD to AD+2	ADD	0.00373**	0.00171	2.18
	DELETE	-0.00218	0.00254	-0.86
	Constant	-0.00111	0.000724	-1.51
AD to AD+5	ADD	0.00318	0.00259	1.23
	DELETE	-0.00378	0.00385	-0.98
	Constant	-0.000431	0.00110	-0.39
AD to AD+15	ADD	-0.00231	0.00447	-0.52
	DELETE	-0.0103	0.00665	-1.55
	Constant	-0.00250	0.00189	-1.32
AD+10 to AD+15	ADD	-0.00305	0.00275	-1.11
	DELETE	-0.00428	0.00408	-1.05
	Constant	0.000230	0.00116	0.20
CD to CD+5	ADD	-0.000423	0.00261	-0.16
	DELETE	-0.00796**	0.00388	-2.05
	Constant	-0.000892	0.0111	-0.81
CD to CD+7	ADD	0.000805	0.00307	0.26
	DELETE	-0.00816*	0.00457	-1.79
	Constant	-0.00160	0.00130	-1.23
CD to CD+10	ADD	-0.00376	0.00388	-0.97
	DELETE	-0.00716	0.00576	-1.24
	Constant	-0.00173	0.00164	-1.05

Note: ***, ** and * represent statistical significance at one percent, five percent and ten percent levels, respectively.

2005 Sensitivity Analysis

The circumstances in 2005, the first year of the DJSI NA, are arguably different than any year since. For example, approximately one-third of the additions to the DJSI NA in the data set occur in 2005 and may skew the results. In addition, the popularity of the DJSI NA may have declined as additional sustainability indices have been introduced. In fact, the one-sample t-test indicates the CARs of the stocks of companies added the DJSI NA are not statistically distinguishable from zero if the 2005 data are omitted, as shown in Table C1 in Appendix C.

The regression results excluding the 2005 data are shown in Table C2 in Appendix C. If the 2005 data are omitted, the regression analysis also indicates that the addition to the DJSI NA no longer has a statistically significant impact on the CAR. In contrast, a deletion from the index has substantially the same regression results if the 2005 data are included or excluded.

Average Cumulative Abnormal Returns by Year

Representative graphs of the average cumulative abnormal return (CAAR) by year are shown in Appendix D. The graphs indicate that there is no apparent upward or downward trend for CAAR from 2005 to 2016. Although the year 2008 appears to be an outlier on Figure D1, the cause is likely related to the volatility of stock prices in September 2008 during the financial crisis.

Effect of Winsorizing the Stock Prices

The results of winsorizing the closing stock prices are shown in Appendix E. The closing stock prices are winsorized at the 99% and 1% level to mitigate the effect of outliers. Winsorizing the stock prices does not substantially affect the results of the one-sample t-tests, two-sample t-tests, and regression analyses.

Comparison to Other Studies

Similar to Van Stekelenburg et al. (2015) and Cheung (2011), this study finds that the deletion of a company from a DJSI index has a negative and statistically significant temporary impact on stock price. Also, the addition of a company to the DJSI NA has a positive and statistically significant temporary increase on stock price using data from 2005 to 2016. However, unlike Van Stekelenburg et al. (2015), Cheung (2011), and Robinson et al. (2011), this study finds that only the deletion from the index has a statistically significant impact if the 2005 data are excluded. The differences may be due to the different Dow Jones Sustainability Indices and/or time frames.

Conclusion

Based on the regression results, the announcement that company is added to DJSI NA has a statistically significant increase in stock price for two trading days after the announcement date. In addition, the announcement that a company is removed from the DJSI NA has a statistically significant decrease in stock price for seven trading days after the effective change date. However, omitting the data from the inaugural year 2005, the announcement that a company is added to the DJSI NA does not have a statistically significant impact on stock price.

The results suggest that there was a change in investor sentiment when company was initially added to DJSI NA in 2005. The addition of the DJSI NA designation may have increased the demand for the stock and thus increased the stock price. However, over time, the prominence of the DJSI NA has perhaps declined. Using data from 2006 to 2016, the results indicate that the stock market does not react to the announcement that a company is included on the DJSI NA, but it does react to the announcement that a company is removed from the index.

The results suggest that commitment to sustainability has become an expectation of doing

business. It appears the stock market no longer rewards a company for being included on the

DJSI NA, but it may penalize a company if it is removed from the index.

References

Cheng, B., Ioannu, I., & Serafeimi, G. (2014). Corporate social responsibility and access to finance. *Strategic Management Journal, 35*, 1-23.

Cheung, A. W. K. (2011). Do stock investors value corporate sustainability? Evidence from an event study. *Journal of Business Ethics, 99*, 145-165.

Cheung, A. W. K., & Roca, E. (2013). The effect on price, liquidity and risk when stocks are added to and deleted from a sustainability index: Evidence from the Asia Pacific context. *Journal of Asian Economics, 24*(1), 51-65.

Consolandi, C., Jaiswal-Dale, A., Poggiani, E., & Vercelli, A. (2009). Global standards and ethical stock indexes: The case of the Dow Jones Sustainability Stoxx Index. *Journal of Business Ethics, 87*(1), 185-197.

Dorfleitner, G., Halbritter G., & Nguyen, M. (2015). Measuring the level and risk of corporate responsibility: An empirical comparison of different ESG rating approaches. *Journal of Asset Management, 16*(7), 450-466.

Lopez, M. V., Garcia, A., & Rodriguez, L. (2007). Sustainable development and corporate performance: A study based on the Dow Jones Sustainability Index. *Journal of Business Ethics, 75*(3), 285–300.

MacKinlay, A. C. (1997). Event studies in economics and finance. *Journal of Economic Literature, 35*(1), 13-39.

Nidumolu, R., Prahalad C.K., & Rangaswami, M.R. (2009). Why sustainability is now the key driver of innovation. *Harvard Business Review, 87*(9), 1-18.

Oberndorfer, U., Schmidt P., Wagner M., & Ziegler A. (2013). Does the stock market value the inclusion in a sustainability index? An event study analysis for German firms. *Journal of Environmental Economics and Management, 66*(3), 497-509.

RobecoSAM. (2015). Dow Jones Sustainability North America Composite Index. *RobecoSAM*. Retrieved from http://www.robecosam.com/en/sustainability-insights/about-sustainability/corporate-sustainability-assessment/send.jsp

RobecoSAM. (2016a). CSA guide: RobecoSAM's Corporate Sustainability Assessment methodology. *RobecoSAM*. Retrieved from http://www.sustainability-indices.com/images/corporate-sustainability-assessment-methodology-guidebook.pdf

RobecoSAM. (2016b). Dow Jones Sustainability North America Index 2016 Component List. *RobecoSAM*. Retrieved from http://www.robecosam.com/images/DJSI2016_ComponentList_NorthAmerica.pdf

RobecoSAM. (2017a). DJSI family. *RobecoSAM*. Retrieved from http://www.sustainability-indices.com/

RobecoSAM. (2017b). The Corporate Sustainability Assessment at a glance. *RobecoSAM*. Retrieved from http://www.robecosam.com/en/sustainability-insights/about-sustainability/corporate-sustainability-assessment/index.jsp

Robinson, M., Kleffner A., & Bertels S. (2011). Signaling sustainability leadership: Empirical evidence of the value of DJSI membership. *Journal of Business Ethics, 101*(3), 493-505.

Sadowski, M. (2013). Polling the experts: The 2013 ratings survey. *Sustainability.com.* Retrieved from http://10458-presscdn-0-33.pagely.netdna-cdn.com/wp-content/uploads/2016/07/ratings_research_globe_scan_sustain_ability_survey_2013.pdf

SAM and Dow Jones Indexes. (2009, September 3). SAM, Dow Jones Indexes and STOXX Ltd. announce results of Dow Jones Sustainability Indexes review [Press Release]. Retrieved from http://www.sustainability-indices.com/images/press-release-review-2009.pdf

SAM and Dow Jones Indexes. (2010, September 9). SAM and Dow Jones Indexes announce results of the Dow Jones Sustainability Indexes review [Press Release]. Retrieved from http://www.sustainability-indices.com/images/press-release-review-2010.pdf

SAM and Dow Jones Indexes. (2011, September 8). SAM and Dow Jones Indexes announce 2011 results of the Dow Jones Sustainability Indexes annual review [Press Release]. Retrieved from http://www.sustainability-indices.com/images/110908-djsi-review-2011.pdf

Sam Group. (2006, September 6). Sam Group announces results of Dow Jones Sustainability Indexes review [Press Release]. Retrieved from http://www.sustainability-indices.com/images/press-release-review-2006.pdf

Sam Group. (2007, September 6). Sam Group announces results of Dow Jones Sustainability Indexes review [Press Release]. Retrieved from http://www.sustainability-indices.com/images/press-release-review-2007.pdf

Sam Group. (2008, September 4). Sam Group announces results of Dow Jones Sustainability Indexes review [Press Release]. Retrieved from http://www.sustainability-indices.com/images/press-release-review-2008.pdf

S&P Dow Jones Indices. (2016). DJSI North America Index fact sheet. Retrieved from http://djindexes.com/mdsidx/downloads/fact_info/Dow_Jones_Sustainability_North_America_Index_Fact_Sheet.pdf

S&P Dow Jones Indices and RobecoSAM. (2012, September 1). Results announced for 2012 Dow Jones Sustainability Indexes review [Press Release]. Retrieved from http://www.sustainability-indices.com/images/120913-djsi-review-2012-e-vdef.pdf

S&P Dow Jones Indices and RobecoSAM. (2013, September 12). Results announced for 2013 Dow Jones Sustainability Indices review [Press Release]. Retrieved from http://www.sustainability-indices.com/images/130912-djsi-review-2013-en-vdef.pdf

S&P Dow Jones Indices and RobecoSAM. (2014, September 11). Results announced for 2014 Dow Jones Sustainability Indices review [Press Release]. Retrieved from http://www.sustainability-indices.com/images/140911-djsi-review-2014-en-vdef.pdf

S&P Dow Jones Indices and RobecoSAM. (2015, September 14). Results announced for 2015 Dow Jones Sustainability Indices review [Press Release]. Retrieved from http://www.sustainability-indices.com/images/150910-djsi-review-2015-en-vdef.pdf

S&P Dow Jones Indices and RobecoSAM. (2016, September 12). Results announced for 2016 Dow Jones Sustainability Indices review [Press Release]. Retrieved from http://www.sustainability-indices.com/images/160908-djsi-review-2016-en-vdef.pdf

U.S. SIF Foundation. (2016). Report on U.S. sustainable, responsible and impact investing trends. *USSIF Foundation*. Retrieved from http://www.ussif.org/files/SIF_Trends_16_Executive_Summary(1).pdf

Van Stekelenburg, A., Georgakopoulos, G., Sotiropoulou, V., Vasileiou K. Z., & Vlachos, I. (2015). The relation between sustainability performance and stock market returns: An empirical analysis of the Dow Jones Sustainability Index Europe." *International Journal of Economics and Finance, 7*(7), 74-88.

Appendix A
Table 1: Companies Added to or Removed from DJSI NA (2005-2016)

3M Co.	Boeing Co.	eBay Inc.
Abbott Laboratories	Bristol-Myers Squibb Co.	Ecolab Inc.
AbbVie Inc.	Brookfield Asset Management	El Paso Corp.
Adobe Systems Inc.	CA Inc.	Electronic Data Systems Corp.
Advanced Micro Devices Inc.	Cameco Corp.	EMC Corp.
AES Corp.	Campbell Soup Co.	Enbridge Inc.
Aetna Inc.	Canadian Imperial Bank	EnCana Corp.
Aflac Inc.	Canadian National Railway Co.	Entergy Corp.
Agilent Technologies Inc.	Cardinal Health Inc.	Equity Office Properties Trust
Agnico-Eagle Mines Ltd.	Caterpillar Inc.	Exelon Corp.
Air Products & Chemicals Inc.	CBRE Group Inc.	Exxon Mobil Corp.
Akamai Technologies Inc.	Cenovus Energy Inc.	FedEx Corp.
Alcan Inc.	CGI Group Inc.	Fluor Corp.
Alcoa Inc.	Chevron Corp.	FMC Technologies Inc.
Allergan Inc.	Chubb Ltd.	Ford Motor Co.
Allergan plc	Cisco Systems Inc.	Freeport-McMoRan Copper & Gold
Allstate Corp.	CIT Group Inc.	Gannett Co. Inc.
Altria Group Inc.	Citigroup Inc.	Gap Inc.
American International Group Inc.	CME Group Inc.	Genentech Inc.
American Power Conversion Corp.	Coach Inc.	General Electric
American Water Works Co. Inc.	Coca-Cola Co.	General Mills Inc.
AmerisourceBergen Corp.	Colgate-Palmolive Co.	General Motors Co.
Amgen Inc.	Comcast Corp.	Genzyme Corp.
Applied Materials Inc.	ConAgra Brands Inc.	Georgia-Pacific Corp.
AT&T Inc.	ConocoPhillips	Gildan Activewear Inc.
Autodesk Inc.	Consolidated Edison Inc.	Goldcorp Inc.
Avon Products Inc.	Constellation Energy Group Inc.	Goldman Sachs Group Inc.
Ball Corp.	Cooper Industries Ltd.	Guidant Corp.
Bank of America Corp.	CSX Corporation	H&R Block Inc.
Bank of Montreal	Cummins Inc.	Halliburton Co.
Bank of New York Mellon Corp.	CVS Health Corp.	Hanesbrands Inc.
Bank of Nova Scotia	Dell Technologies Inc.	Hartford Financial Services Group
Barrick Gold Corp.	Delphi Automotive PLC	Hasbro Inc.
Baxalta Inc.	Delta Air Lines Inc.	HCP Inc.
Baxter International Inc.	DIRECTV	Health Net Inc.
BCE Inc.	Dow Chemical Co.	Hershey Co.
Bear Stearns Cos.	Duke Energy Corp.	Hess Corp.
Becton Dickinson & Co.	Dun & Bradstreet Corp.	Hewlett-Packard Co.
Best Buy Co. Inc.	E.I. DuPont de Nemours & Co.	Humana Inc.
Biogen Inc.	Eastman Kodak Co.	Inco Ltd.

Table 1 - continued

Ingersoll-Rand PLC	New York Times Co.	Sprint Corp.
Intel Corp.	Newmont Mining Corp.	Stanley Black & Decker Inc.
IBM Corp.	Nexen Inc.	Staples Inc.
International Game Technology	NextEra Energy Inc.	Starbucks Corp.
Intuit Inc.	Nike Inc.	State Street Corp.
Iron Mountain Inc.	NiSource Inc.	Sun Life Financial Inc.
J.C. Penney Co. Inc.	Nortel Networks Corp.	Suncor Energy Inc.
Johnson & Johnson	Northern Trust Corp.	Symantec Corp.
Johnson Controls Inc.	Northrop Grumman Corp.	Talisman Energy Inc.
Jones Lang LaSalle Inc.	Nvidia Corp.	Target Corp.
JP Morgan Chase & Co.	NYSE Euronext	TE Connectivity Ltd.
Kimberly-Clark Corp.	Occidental Petroleum Corp.	TELUS Corp.
Kimco Realty Corp.	Office Depot Inc.	Teradata Corp.
Kinross Gold Corp.	PepsiCo Inc.	Texas Instruments Inc.
Kohl's Corp.	Pfizer Inc.	Thomson Reuters Corporation
Kroger Co.	PG&E Corp.	Tiffany & Co.
Las Vegas Sands Corp.	Phillips 66	Tim Hortons Inc.
Liberty Global PLC	Pinnacle West Capital Corp.	Time Warner Inc.
Life Technologies Corp.	Plum Creek Timber Co. Inc.	Toronto-Dominion Bank
Lincoln National Corp.	Potash Corp. of Saskatchewan	TransAlta Corp.
Lockheed Martin	Praxair Inc.	TransCanada Corp.
Lowe's Cos.	Procter & Gamble Co.	Travelers Cos. Inc.
Macy's Inc.	ProLogis Inc.	United Parcel Service Inc.
ManpowerGroup Inc.	Public Service Enterprise Group	United Rentals Inc.
Manulife Financial Corp.	Pulte Group Inc.	United Technologies Corp.
Masco Corp.	PVH Corp.	UnitedHealth Group Inc.
Mastercard Inc.	Quest Diagnostics Inc.	Unum Group
McDonald's Corp.	Rackspace Hosting Inc.	Verizon Communications Inc.
McKesson Corp.	Republic Services Inc.	Virgin Media Inc.
Medtronic PLC	Reynolds American Inc.	Voya Financial Inc.
Merck & Co. Inc.	Rockwell Automation Inc.	Walt Disney Co.
MetLife Inc.	Rockwell Collins Inc.	Waste Management Inc.
Microsoft Corp.	Royal Bank of Canada	Welltower Inc.
Millipore Corp.	Safeway Inc.	Weyerhaeuser Co.
Molson Coors Brewing Co.	Sara Lee Corp.	Whirlpool Corp.
Mondelez International Inc.	Schlumberger Ltd.	Whole Foods Market Inc.
Morgan Stanley	Sempra Energy	Wyndham Worldwide Corp.
Motorola Mobility Holdings Inc.	Sigma-Aldrich Corp.	Xcel Energy Inc.
Motorola Solutions Inc.	Smith International Inc.	Xerox Corp.
Nalco Holding Co.	Spectra Energy Corp.	Xylem Inc.
Nasdaq Inc.		

Appendix B

Table B1: One-sample *t*-test for Companies Added to DJSI NA (2005-2016)

Event Sub-Window (trading days)	Mean	Std. Dev.	*N*	*t*-statistic
AD-15 to AD-1	0.00210	0.0505	286	0.705
AD-1 to AD+1	0.00372***	0.0248	286	2.544
AD-2 to AD+2	0.00310*	0.0334	286	1.566
AD-5 to AD+5	0.00326	0.0480	286	1.150
AD to AD+2	0.00220*	0.0232	286	1.607
AD to AD+5	0.00262*	0.0336	286	1.319
AD to AD+15	-0.00570	0.0605	286	-1.594
AD+10 to AD+15	-0.00387	0.0352	286	-1.862
CD to CD+5	-0.00175	0.0345	286	-0.859
CD to CD+7	-0.00103	0.0439	286	-0.396
CD to CD+10	-0.00570	0.0577	286	-1.671

Notes:
(1)   *** and * represent statistical significance at one percent and ten percent levels, respectively.
(2)   One-sided *t*-test with H_a: mean>0

Table B2: One-sample *t*-test for Companies Removed from DJSI NA (2005-2016)

Event Sub-Window (trading days)	Mean	Std. Dev.	*N*	*t*-statistic
AD-15 to AD-1	-0.00397	0.0473	122	-0.927
AD-1 to AD+1	-0.00374**	0.0207	122	-1.997
AD-2 to AD+2	-0.00621**	0.0359	122	-1.909
AD-5 to AD+5	-0.00566	0.0488	122	-1.280
AD to AD+2	-0.00397**	0.0238	122	-1.845
AD to AD+5	-0.00346	0.0332	122	-1.152
AD to AD+15	-0.0112**	0.0674	122	-1.842
AD+10 to AD+15	-0.00455*	0.0364	122	-1.380
CD to CD+5	-0.00696*	0.0494	122	-1.556
CD to CD+7	-0.00698*	0.0520	122	-1.483
CD to CD+10	-0.00654	0.0611	122	-1.181

Notes:
(1)   ** and * represent statistical significance at five percent and ten percent levels, respectively.
(2)   One-sided *t*-test with H_a: mean<0

Table B3: One-sample *t*-test for Companies Remaining on DJSI NA (2005-2016)

Event Sub-Window (trading days)	Mean	Std. Dev.	N	*t*-statistic
AD-15 to AD-1	0.000732	0.0541	1137	0.456
AD-1 to AD+1	-0.000945	0.0236	1137	-1.350
AD-2 to AD+2	-0.00110	0.0343	1137	-1.082
AD-5 to AD+5	0.000380	0.0487	1137	0.264
AD to AD+2	-0.000928	0.0229	1137	-1.363
AD to AD+5	-0.000480	0.0355	1137	-0.456
AD to AD+15	-0.00244	0.0608	1137	-1.354
AD+10 to AD+15	0.000550	0.0379	1137	0.489
CD to CD+5	-0.000986	0.0372	1137	-0.894
CD to CD+7	-0.00183	0.0432	1137	-1.431
CD to CD+10	-0.00193	0.0528	1137	-1.233

Note: Two-sided *t*-test

Table B4: Two-Sample *t*-test - Difference between Additions and Deletions from DJSI NA (2005-2016)

Event Sub-Window (trading days)	Difference Mean	Difference Standard Error	*t*-statistic
AD-15 to AD-1	0.00608	0.00522	1.164
AD-1 to AD+1	0.00746***	0.00238	3.141
AD-2 to AD+2	0.00930***	0.00360	2.445
AD-5 to AD+5	0.00892**	0.00525	1.698
AD to AD+2	0.00617***	0.00255	2.420
AD to AD+5	0.00609**	0.00360	1.689
AD to AD+15	0.00554	0.00707	0.783
AD+10 to AD+15	0.000681	0.00390	0.174
CD to CD+5	0.00520	0.00491	1.059
CD to CD+7	0.00595	0.00537	1.108
CD to CD+10	0.000839	0.00650	0.129

Notes:
(1)   Two-sample *t*-test with unequal variances
(2)   *** and ** represent statistical significance at one percent and five percent levels, respectively.
(3)   One-sided *t*-test with H_a: diff>0

Table B5: Two-Sample *t*-test - Difference between Additions and Remains on DJSI NA
(2005-2016)

Event Sub-Window (trading days)	Difference Mean	Difference Standard Error	*t*-statistic
AD-15 to AD-1	0.00137	0.00339	0.405
AD-1 to AD+1	0.00467***	0.00162	2.877
AD-2 to AD+2	0.00420**	0.00222	1.888
AD-5 to AD+5	0.00288	0.00318	0.906
AD to AD+2	0.00313**	0.00153	2.045
AD to AD+5	0.00310*	0.00225	1.380
AD to AD+15	-0.00326	0.00400	-0.813
AD+10 to AD+15	-0.00442	0.00236	-1.871
CD to CD+5	-0.000767	0.00232	-0.0367
CD to CD+7	0.000807	0.00289	0.279
CD to CD+10	-0.00377	0.00375	-1.0043

Notes:
(1)   Two-sample *t*-test with unequal variances
(2)   ***, ** and * represent statistical significance at one percent, five percent and ten percent levels, respectively.
(3)   Two-tailed *t*-test

Table B6: Two-Sample *t*-test - Difference between Remains and Deletions from DJSI NA
(2005-2016)

Event Sub-Window (trading days)	Difference Mean	Difference Standard Error	*t*-statistic
AD-15 to AD-1	0.00471	0.00458	1.028
AD-1 to AD+1	0.00279*	0.00200	1.397
AD-2 to AD+2	0.00511*	0.00341	1.499
AD-5 to AD+5	0.00604*	0.00465	1.298
AD to AD+2	0.00304*	0.00226	1.348
AD to AD+5	0.00298	0.00319	0.937
AD to AD+15	000880*	0.00636	1.383
AD+10 to AD+15	0.00510*	0.00349	1.464
CD to CD+5	0.00597*	0.00460	1.297
CD to CD+7	0.00514	0.00488	1.0549
CD to CD+10	0.00460	0.00575	0.8010

Notes:
(1)   Two-sample *t*-test with unequal variances
(2)   * represents statistical significance at the ten percent level.
(3)   Two-tailed *t*-test

Appendix C

Table C1: One-Sample *t*-test for Companies Added to DJSI NA
(2006-2016)

Event Sub-Window (trading days)	Mean	Std. Dev.	*N*	*t*-statistic
AD-15 to AD-1	0.00244	0.0532	193	0.637
AD-1 to AD+1	0.00197	0.0268	193	1.0223
AD-2 to AD+2	0.00157	0.0371	193	0.587
AD-5 to AD+5	0.00312	0.0521	193	0.831
AD to AD+2	0.00127	0.0256	193	0.691
AD to AD+5	0.00222	0.0370	193	0.833
AD to AD+15	-0.00251	0.0614	193	-0.568
AD+10 to AD+15	-0.00253	0.00271	193	-0.934
CD to CD+5	-0.00427	0.0379	193	-1.564
CD to CD+7	-0.00348	0.0482	193	-1.0041
CD to CD+10	-0.00616	0.0639	193	-1.339

Note: One-sided *t*-test with H_a: mean>0

Table C2: Regression Results for Cumulative Abnormal Returns (2006-2016)

Event Sub-Window (trading days)	Variable	Coefficient	Std. Error	*t*-statistic
AD-15 to AD-1	ADD	0.00395	0.00553	0.71
	DELETE	-0.0110	0.00684	-1.62
	Constant	-0.00278	0.00191	-1.46
AD-1 to AD+1	ADD	0.00257	0.00210	1.23
	DELETE	-0.00268	0.00259	-1.04
	Constant	-0.000907	0.000724	-1.25
AD-2 to AD+2	ADD	0.00209	0.00315	0.66
	DELETE	-0.00661	0.00389	-1.40
	Constant	-0.000897	0.00109	-0.82
AD-5 to AD+5	ADD	0.00335	0.00448	0.75
	DELETE	-0.00891	0.00554	-1.61
	Constant	0.000542	0.00155	0.35
AD to AD+2	ADD	0.00262	0.00215	1.22
	DELETE	-0.00280	0.00265	-1.06
	Constant	-0.00100	0.000741	-1.35
AD to AD+5	ADD	0.00345	0.00324	1.06
	DELETE	-0.00443	0.00400	-1.11
	Constant	-0.000489	0.00112	-0.41
AD to AD+15	ADD	0.00395	0.00553	0.71
	DELETE	-0.0111	0.00683	-1.62
	Constant	-0.00278	0.00191	-1.46
AD+10 to AD+15	ADD	-0.000428	0.00342	-0.13
	DELETE	-0.00462	0.00422	-1.09
	Constant	0.000157	0.00118	0.13
CD to CD+5	ADD	-0.00123	0.00327	-0.38
	DELETE	-0.00892**	0.00404	-2.21
	Constant	-0.00101	0.00113	-0.89
CD to CD+7	ADD	-0.0000201	0.00385	-0.01
	DELETE	-0.00932**	0.00475	-1.96
	Constant	-0.00170	0.00133	-1.28
CD to CD+10	ADD	-0.00216	0.00485	-0.45
	DELETE	-0.00831	0.00600	-1.39
	Constant	-0.00189	0.00168	-1.13

Note: ** represents statistical significance at the five percent level.

Appendix D

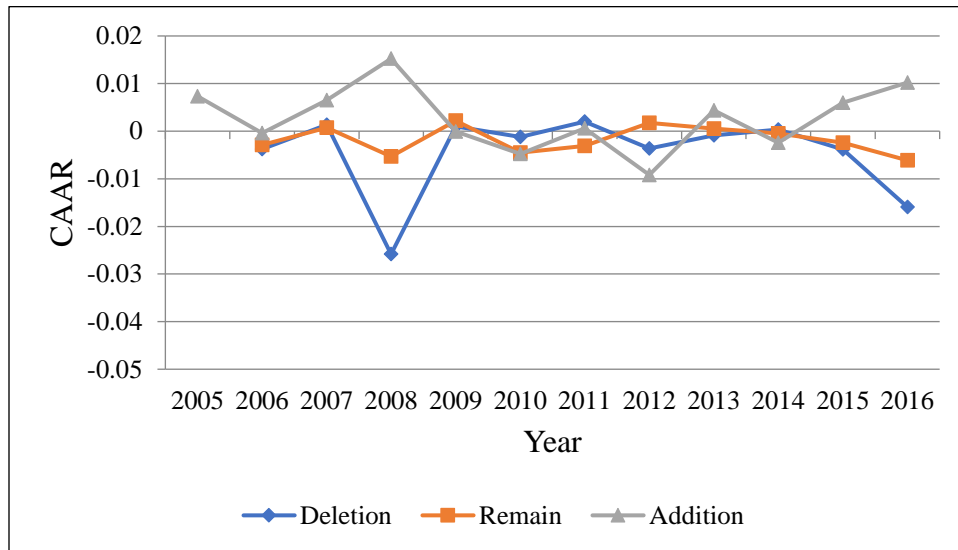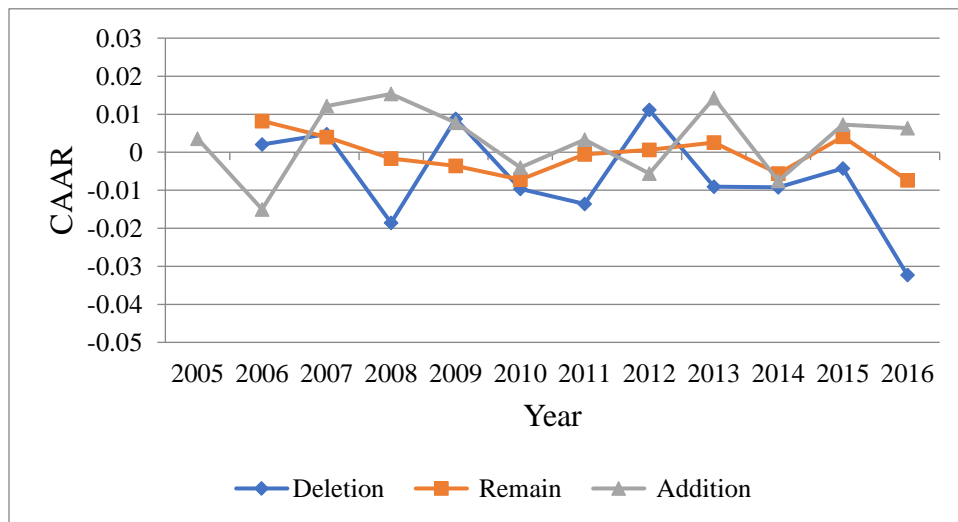Figure D1: CAAR by Year (Event Window AD-1 to AD+1 Trading Days)

Figure D2: CAAR by Year (Event Window AD-5 to AD+5 Trading Days)

Appendix E

Table E1: One-Sample *t*-test for Companies Added to DJSI NA
using Winsorized Stock Prices (2005-2016)

Event Sub-Window (trading days)	Mean	Std. Dev.	*N*	*t*-statistic
AD-15 to AD-1	0.00199	0.0503	286	0.670
AD-1 to AD+1	0.00368***	0.0246	286	2.531
AD-2 to AD+2	0.00283*	0.0331	286	1.446
AD-5 to AD+5	0.00335	0.0477	286	1.186
AD to AD+2	0.00212*	0.0232	286	1.552
AD to AD+5	0.00276*	0.0336	286	1.387
CD to CD+5	-0.00184	0.0345	286	-0.902

Notes:
(1)   *** and * represent statistical significance at one percent and ten percent levels, respectively.
(2)   One-sided *t*-test with H$_a$: mean>0

Table E2: One-Sample *t*-test for Companies Removed from DJSI NA
using Winsorized Stock Prices (2005-2016)

Event Sub-Window (trading days)	Mean	Std. Dev.	*N*	*t*-statistic
AD-15 to AD-1	-0.00390	0.0474	122	-0.909
AD-1 to AD+1	-0.00374**	0.0207	122	-2.002
AD-2 to AD+2	-0.00614**	0.0358	122	-1.8971
AD-5 to AD+5	-0.00559	0.0487	122	-1.269
AD to AD+2	-0.00387**	0.0238	122	-1.798
AD to AD+5	-0.00327	0.0332	122	-1.0877
CD to CD+5	-0.00644*	0.0504	122	-1.413

Notes:
(1)   ** and * represent statistical significance at five percent and ten percent levels, respectively.
(2)   One-sided *t*-test with H$_a$: mean<0

Table E3: One-Sample *t*-test for Companies Remaining on DJSI NA
using Winsorized Stock Prices (2005-2016)

Event Sub-Window (trading days)	Mean	Std. Dev.	N	*t*-statistic
AD-15 to AD-1	0.000590	0.0539	1137	0.370
AD-1 to AD+1	-0.00104	0.0236	1137	-1.487
AD-2 to AD+2	-0.00117	0.0342	1137	-1.155
AD-5 to AD+5	0.000315	0.0485	1137	0.219
AD to AD+2	-0.000909	0.0228	1137	-1.134
AD to AD+5	-0.000285	0.0353	1137	-0.272
CD to CD+5	-0.00103	0.0368	1137	-0.942

Note: Two-sided *t*-test

Table E4: Regression Results for Cumulative Abnormal Returns
using Winsorized Stock Prices (2005-2016)

Event Sub-Window (trading days)	Variable	Coefficient	Std. Error	*t*-statistic
AD-1 to AD+1	ADD	0.00484***	0.00168	2.89
	DELETE	-0.00226	0.00249	-0.91
	constant	-0.00110	0.000710	-0.123
AD-2 to AD+2	ADD	0.00388	0.00250	1.55
	DELETE	-0.00527	0.00372	-1.42
	constant	-0.00113	0.00106	-1.06
AD-5 to AD+5	ADD	0.00246	0.00359	0.68
	DELETE	-0.00785	0.00534	-1.47
	constant	0.000575	0.00152	0.38
AD to AD+2	ADD	0.00359**	0.00170	2.11
	DELETE	-0.00219	0.00252	-0.87
	constant	-0.00107	0.000720	-1.49
AD to AD+5	ADD	0.00306	0.00258	1.19
	DELETE	-0.00405	0.00384	-1.05
	constant	-0.000205	0.00109	-0.19
CD to CD+5	ADD	-0.000660	0.00260	-0.25
	DELETE	-0.00774**	0.00387	-2.00
	constant	-0.00874	0.00110	-0.79

Notes:
(1)   *** and ** represent statistical significance at one percent and five percent levels, respectively.
(2)   Regression results for additional event sub-windows available upon request.

Table E5: One-sample *t*-test for Companies Added to DJSI NA
using Winsorized Stock Prices (2006-2016)

Event Sub-Window (trading days)	Mean	Std. Dev.	N	*t*-statistic
AD-15 to AD-1	0.00233	0.0530	193	0.610
AD-1 to AD+1	0.00201	0.0267	193	1.0512
AD-2 to AD+2	0.00129	0.0367	193	0.489
AD-5 to AD+5	0.00337	0.0521	193	0.899
AD to AD+2	0.00116	0.0256	193	0.629
AD to AD+5	0.00252	0.0370	193	0.945
CD to CD+5	-0.00430	0.0381	193	-1.569

Note: One-sided *t*-test with H$_a$: mean>0

Table E6: Regression Results for Cumulative Abnormal Returns
using Winsorized Stock Prices (2006-2016)

Event Sub-Window (trading days)	Variable	Coefficient	Std. Error	*t*-statistic
AD-1 to AD+1	ADD	0.00274	0.00209	1.31
	DELETE	-0.00278	0.00258	-1.08
	constant	-0.000990	0.000722	-1.37
AD-2 to AD+2	ADD	0.00200	0.00314	0.63
	DELETE	-0.00644	0.00388	-1.36
	constant	-0.000988	0.00109	-0.91
AD-5 to AD+5	ADD	0.00367	0.00448	0.82
	DELETE	-0.00897	0.00553	-1.62
	constant	0.00491	0.00155	0.32
AD to AD+2	ADD	0.00242	0.00213	1.14
	DELETE	-0.00281	0.00264	-1.07
	constant	0.000969	0.00737	1.32
AD to AD+5	ADD	0.00350	0.00323	1.08
	DELETE	-0.00467	0.00399	-1.17
	constant	-0.000236	0.00111	-0.21
CD to CD+5	ADD	-0.00150	0.00326	-0.46
	DELETE	-0.00869**	0.00403	-2.16
	constant	-0.000988	0.0113	-0.88

Notes:
(1)   ** represents statistical significance at the five percent level.
(2)   Regression results for additional event sub-windows available upon request.