

**THE 2016 U.S. ELECTION UPSET AND ITS IMPLICATIONS FOR**  
**U.S. CLEAN COMPANIES: AN EVENT STUDY**

Major Research Paper – M.Sc. Environmental Sustainability

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## **ABSTRACT**

This research investigates the stock market reactions of major publicly-traded environmentally-focused companies following the surprise outcome of the 2016 U.S. presidential election using event study methodology. Furthermore, three samples of clean companies are selected based on market valuation (small-capitalization, mid-capitalization, and large-capitalization) to test whether firm value plays a role in a security's reaction. This research then proceeds with testing whether environmentally-focused companies experienced statistically significant negative abnormal returns following the surprise outcome of the 2016 U.S. election. Results indicate that small-sized companies suffered negative abnormal returns on event day that quickly recovered post-event. Mid-sized companies also experienced negative abnormal returns on event day but drastically recovered to finish in strong positive territory. Large capitalization companies also had negative abnormal returns on event day, which persisted for at least ten post-event days. The resulting evidence, although statistically fragile, leads to the rejection of the stated hypothesis.

# **TABLE OF CONTENTS**

1. Introduction	1
2. Event of Interest: 2016 U.S. Election	2
3. Methodology: A Basic Event Study	5
3.1. Key Concept & Assumptions: Event Studies in Economics and Finance	5
3.2. Structure and Procedure	5
4. Model Design, Data & Statistical Testing	9
4.1. Election Results and Event Window	9
4.2. Company Selection	11
4.3. Data Sources	15
4.4. Normal Return Model	15
4.5. Estimation Window	16
4.6. Market Model Parameter Estimation	17
4.7. Statistical Testing Framework	18
5. Results	20
5.1. Statistical Significance	22
6. Discussion & Conclusion	25
7. References	28
8. Appendix A – Clean Company List	33

# **1. INTRODUCTION**

There are various instances in finance and economics where it can become quite useful to quantify the effects of a specific event on the valuation of publicly-traded securities. Unanticipated events can sometimes shock financial asset markets and deriving a value of this impact can yield interesting insights for industries or companies of interest. Although this task might appear intimidating at first, a measurement can be constructed relatively easily using event study methodology. In this research paper, an event study is carried out to analyse the implications of the stunning 2016 U.S. election outcome for clean companies that operate with the environment and its sustainability as priorities. The study looks at how these small-to-large-capitalization enterprises' shares reacted to the November 2016 surprise and whether those reactions were significant and sustained. The hypothesis being tested is that, considering the Republican candidate's pre-election position on climate change and the fact that the global consensus had projected a Democrat victory, clean companies were expected to suffer statistically significant negative returns relative to the broader market in the unlikely advent of a Donald Trump victory.

This research follows the general template of an event study as carried out in A. Craig MacKinlay's 1997 paper titled "*Event Studies in Economics and Finance*". The following research paper starts with a description of the event of interest and its significance in Section 2. The basic methodology and procedure of event studies used in the paper are then presented in Section 3. Next comes the event study's selected model and design in Section 4. Section 5 then proceeds with detailing the results of the study and to testing them for statistical significance. Following this comes a discussion of the results in Section 6 and concluding remarks in Section 7.

## **2. EVENT OF INTEREST: 2016 U.S. PRESIDENTIAL ELECTION**

The 2016 U.S. presidential election outcome sent shockwaves around the globe, ushering modern global politics into uncharted territory. The winner, Donald J. Trump, is a billionaire real-estate and brand manager with zero prior political experience. Not only was he seen by most as unfit to serve in this critical role, he managed to beat out a veteran career politician in Hillary Clinton who was far more qualified and who had the chance to be the first woman to hold office in United States history. What seemed a highly likely road to the presidency and a chance to reach a historical milestone for gender equality all came crashing down when the Republican candidate pulled off the surprising upset on the evening of November 8<sup>th</sup>, 2016.<sup>1 2 3 4 5</sup>

And quite the upset it was. Almost all the polls around the country seemed to indicate that the Democratic candidate was the favorite to win. Poll aggregators and election simulations also showed that Hillary Clinton should comfortably win enough states to obtain the 270 electoral college votes necessary to take the presidency. On the eve of the election, predictions of a Democrat victory reached as high as 98% at the Huffington Post, 84% at the New York Times, and 71% at FiveThirtyEight.<sup>6 7 8 9 10</sup>

Not only was the American population expressing their preference for Clinton, evidence suggests that the stock market also seemed to dislike the idea of a potential Trump presidency. Wolfers and Zitzewitz (2016) presented some evidence that destabilizing events leading up to the election produced asset reactions in line with a market expecting a Democrat win. These unanticipated events include the first debate won by Clinton on Sept. 26<sup>th</sup>, the release of Donald Trump's "Access Hollywood" tapes, and the re-opening and subsequent closing of the Clinton

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<sup>1</sup> CNN News. (2016). Who won the town hall debate?

<sup>2</sup> USA Today. (2016). USA Today's Editorial Board: Trump is "unfit for the presidency."

<sup>3</sup> Miller, J. (2016). Bob Gates: Donald Trump "unfit to be commander-in-chief."

<sup>4</sup> Columbus Dispatch. (2016). Editorial: For president | Trump unfit, Clinton is qualified.

<sup>5</sup> Grim, R., Terkel, A., & Date, S. V. (2016). Trump Made It Clear - Again - That He's Unfit For The Presidency.

<sup>6</sup> Grenier, E. (2016). Hillary Clinton has the lead for the final weekend, but will it hold through Tuesday?

<sup>7</sup> Zurcher, A. (2016). US election: Is Trump or Clinton going to win?

<sup>8</sup> Agiesta, J. (2016). Poll: Most see a Hillary Clinton victory and a fair count ahead.

<sup>9</sup> Jackson, N., & Hooper, A. (2016). Election 2016 Forecast - President & Senate.

<sup>10</sup> FiveThirtyEight. (2016). Who will win the presidency? - 2016 Election Forecast.

email investigation days before the election. The authors' predictive model shows that if Trump were to pull an upset victory, markets would suffer a large decline of near 10% in the short-term. Although this is only one study analysing the impact of smaller isolated events, it is in line with what the overwhelming popular consensus was at time; Clinton is going to win. Upon consideration of what most national polls were indicating, the incessant scandals surrounding the Republican candidate, the fact that the Democratic candidate was much more qualified for the job, and the apparent preference of financial markets, it is difficult to argue against the fact that the election results were highly surprising to most.<sup>11 12</sup>

Unexpected events of such importance are quite interesting to study using financial asset data as they can yield insights into how specific industrial sectors or asset classes are reacting at or surrounding the time of disclosure. For example, one would expect the election results to influence investors' earnings forecasts for companies or sectors championed by the winning candidate. Seeing how likely Clinton would win, it is reasonable to assume that issues she supported, including health-care, free trade, and environmental concerns, would have benefited from her presidency. Now, with the results of the election known, one can study the opposite side of the spectrum to find interesting insights.<sup>13 14</sup>

During the campaign, Donald Trump and Hillary Clinton were opposed on many issues ranging from immigration policy to trade agreements. Another issue of strong contention was that of climate change and the role of environmental sustainability in the United States' energy mix discussion. Companies that operate in these sectors are the main subjects of interest in this study. The Clinton platform campaigned for 50% of U.S. electricity generation to come from clean sources by 2026, for 500 million solar panels to be installed by 2020, and for reducing the country's oil consumption by one third. This point of view is diametrically different from the one pushed by the Trump campaign. The Republican is famously known to have stated that "climate change is a hoax created by China to undermine U.S. manufacturing competitiveness". Hence,

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<sup>11</sup> Wolfers, J., & Zitzewitz, E. (2016). What do financial markets think of the 2016 election?

<sup>12</sup> Zitzewitz, E. (2016). Column: The stock market doesn't like the idea of a Trump presidency.

<sup>13</sup> MacKinlay, A. C. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature*, 35(1), 13–39.

<sup>14</sup> Ghosh, I. (2016). Trump vs. Clinton: Where they stand on the issues.

his disbelief of climate change science and the need for cleaner sources of energy shouldn't come as a shock. In line with his position on global warming, Trump also campaigned strongly on dismantling Obama's 2013 Climate Action Plan, withdrawing from the 2015 Paris Climate Agreement, and revitalizing the increasingly fading American coal industry.<sup>15 16 17 18 19</sup>

Having both candidates on such different standings regarding the environment before the election meant that environmentally-conscious companies were expected to be affected in one of two distinct ways. Simply put, clean companies were destined to thrive under Clinton or to suffer under Trump. This research tests this hypothesis using an event study methodology based on financial asset data in the days surrounding the election's outcome. Broadly, the study tests whether in the advent of a surprise Trump presidency, environmentally-focused companies' stock would suffer statistically significant negative returns relative to the broader market due to his adverse positions on the issue of climate change. Furthermore, the study looks at whether a studied company's market capitalization has an impact on the amplitude of their stock's reaction following the surprise election outcome. In brief, the hypothesis being tested using this statistical method is whether a Donald Trump win in the 2016 U.S. election resulted in statistically significant negative returns for clean companies.

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<sup>15</sup> Ghosh, I. (2016). Trump vs. Clinton: Where they stand on the issues.

<sup>16</sup> Baker, D. R. (2016). Clinton and Trump polar opposites on global warming and energy.

<sup>17</sup> Trefis Team. (2016). Clinton, Trump And The Future Of The U.S. Solar Industry.

<sup>18</sup> Geiling, N. (2016). In a tirade against renewables, Trump claims wind power "kills all the birds."

<sup>19</sup> CBS News. (2016). Where does Donald Trump stand?

### **3. METHODOLOGY: A BASIC EVENT STUDY**

#### **3.1. KEY CONCEPT & ASSUMPTIONS: EVENT STUDIES IN ECONOMICS AND FINANCE**

The following research utilizes the well-accepted concept of event studies to analyse the impact of a specific event on the market value of companies. This section describes the basics of this concept as well as the general structure of this statistical analysis technique. Used in economics, finance, law and various other disciplines, this analysis tool yields a measure of a specific event's economic impact on the market capitalization of a company using financial market data. By aggregating the values of these impacts for a targeted portfolio of securities, one can paint a quantitative picture of the fallout that a surprise event had on various aspects of the marketplace. This method derives its practicality from the assumption that, given the free flow of information and rationality of markets, the effect of unforeseen events is reflected immediately in the price of publicly traded securities. In other words, this statistical technique presumes that markets are efficient at incorporating all public information into security prices. Event studies of this kind were pioneered by Fama, Fisher, Jensen, and Roll in their seminal 1969 paper "The Adjustment of Stock Prices to New Information" and were later updated by Brown and Warner in their 1980 paper "Measuring Security Price Performance". In the context of this specific research paper, the employed event study methodology follows the template of Craig MacKinlay's 1997 paper "Event Studies in Economics and Finance" in which he analyses this statistical approach further and devises a standardized process for carrying it out.<sup>20 21 22 23</sup>

#### **3.2. STRUCTURE AND PROCEDURE**

Event studies can be designed and constructed in a variety of ways. Nonetheless, they follow a similar flow when it comes to execution. Ideally, event studies begin with a clear definition of the event or series of events being studied. This determination will dictate the design of the entire study. For example, the event study illustrated in MacKinlay's 1997 paper looked at

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<sup>20</sup> Event Study Tools. (2018). Event Study Assumptions.

<sup>21</sup> MacKinlay, A. C. (1997). Event Studies in Economics and Finance.

<sup>22</sup> Fama, Fisher, Jensen, & R. (1969). The Adjustment of Stock Prices to New Information.

<sup>23</sup> Brown, S. J., & Warner, J. B. (1980). Measuring security price performance.

the average stock market returns on the day of quarterly earnings announcements for the 30 companies listed in the Dow Jones Industrial Index for a five-year period spanning from 1989 to 1993. In this case, having four quarterly announcements per company per year yields 600 data points (30 firms with 20 data points each) on which to base the study's statistical analysis. In contrast, an event study could just as easily look at one single event and its effect on a single company. In an environmental economics setting, the notorious British Petroleum Gulf of Mexico oil spill in 2010 is one such event that has been analysed using event study methods. All in all, this wide range of possible study designs makes this technique highly flexible and adaptable to one's specific subject of inquiry.<sup>24 25</sup>

Once an event or a series of events is selected, the next step is to define the event window; the period surrounding the event in which stock returns are scrutinized. In the MacKinlay example of quarterly earnings disclosures, this announcement is made on a given day every quarter. To examine its impact on share prices, daily returns at and surrounding the day of the announcement are observed. Usually, the event window is set to cover an amount of days before and after event day to capture any other stock reactions or events that could have incidence on returns. For instance, information on the earnings announcement could leak days prior to event day, pre-emptively impacting the concerned company's stock. Furthermore, a stock's return could suffer a reversal in the days following the announcement once market participants reassess the impact of this new piece of information. Regardless, having a wider view of how a company's shares react around an event will help yield a better understanding of its overall response and will lead to higher quality insights.<sup>26</sup>

After determination of the event and the event window of the study, the next step is to define a selection criteria for choosing which companies will be subject to analysis. Left solely to the researcher's discretion, this selection process needs to be relevant to the event of study and keep in mind any biases that may be in play. Factors such as geographical location of a security's

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<sup>24</sup> MacKinlay, A. C. (1997). *Event Studies in Economics and Finance*.

<sup>25</sup> Boudreaux, D., Rao, S., Das, P., & Rumore, N. (2013). *How Much Did The Gulf Oil Spill Actually Cost British Petroleum Shareholders?*

<sup>26</sup> MacKinlay, A. C. (1997). *Event Studies in Economics and Finance*.

listing, firm size, industrial sector and/or financial performance metrics are considered at this point. Although more subjective, this step is critical as it selects the companies through which the event's hypothesised effect is expected to be reflected. If done incorrectly, the selected companies might not yield any discernable effect due to lack of relevance and render the researcher's conclusions defenceless.<sup>27</sup>

Next comes the most critical component of the event study; the measure of abnormal returns. Simply put, abnormal returns measure the proportion of a stock's returns that can only be attributed to the event in question. It is isolated by taking the real return of a stock during the event window and subtracting from it its normal return, the return that was expected for this security had the event never occurred.<sup>28</sup>

Real return:	Actual return observed during the event window (asset price data)
Normal return:	<i>A priori</i> expected return for the event window (model estimations)
Abnormal Return:	Measure of real return solely attributable to the event

Mathematically:

$$(1) \quad AR_{it} = R_{it} - E(R_{it} | X_t)$$

Where:

- $AR_{it}$  = Abnormal return for security "i" at time "t"
- $R_{it}$  = Real (observed) return for security "i" at time "t"
- $E(R_{it} | X_t)$  = Normal (expected) return for security "i" at time "t" given the conditioning information "X" of the chosen normal return model at time "t"

Various models exist to estimate the normal returns of a stock over the event window. The two most common are the *constant mean return model*, which implies that the mean real return of a stock stays constant through time, and the *market return model*, which assumes a stable linear relationship between the security's return and the market's return.<sup>29</sup>

<sup>27</sup> MacKinlay, A. C. (1997). *Event Studies in Economics and Finance*.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

Once a normal return model is chosen, an estimation window needs to be outlined. This time window is used to calculate the statistical parameters of each stock that are later used to estimate normal returns for each event window day. Usually, it lasts for a significantly long period of time, with MacKinlay's 1997 paper claiming that a basic event study using daily stock market returns with a 120-trading-days estimation window is sufficient. Regardless of the model chosen, the price data of a security in this period is used to estimate the normal returns of that security for the duration of the event window. In general, the estimation window will stop the day before the event window begins. Avoiding this overlap of both time periods prevents the event or the days surrounding it from influencing the normal return parameter estimates.<sup>30</sup>

With the previous elements completed, the normal return parameters can be estimated and the normal returns calculated. By subtracting them from the real returns observed, we obtain the abnormal returns for each security on each given day of the event window. The subsequent step is to lay down the design of the testing framework that will be used to derive insights from abnormal returns. This includes the formulation and definition of the null hypothesis and the choice of method for aggregating individual stocks' abnormal returns.<sup>31</sup>

Following testing design comes the presentation of empirical results. At this section, the findings of the study are presented and can contain tables, graphics, and diagnostics of what the data seems to be showing. Preferably, these results lead to insights enabling a better understanding of the roots and causes of the effect (or lack thereof) that stocks sustained at and around the event. Analysis can be pushed further in an effort to clarify some of the results or to speculate on their meaning before concluding the study.<sup>32</sup>

#### **SUMMARY PROCEDURE**

- |                                   |                                    |
|-----------------------------------|------------------------------------|
| 1 – Event definition              | 6 – Normal return calculation      |
| 2 – Event window                  | 7 – Abnormal return calculation    |
| 3 – Company selection criteria    | 8 – Statistical testing framework  |
| 4 – Normal return model selection | 9 – Empirical results presentation |
| 5 – Estimation window             | 10 – Discussion and conclusion     |

<sup>30</sup> MacKinlay, A. C. (1997). *Event Studies in Economics and Finance*.

<sup>31</sup> Ibid.

<sup>32</sup> Ibid.

## **4. MODEL DESIGN, DATA & STATISTICAL TESTING**

Now that the concept of event studies and its methodology are known, model design can proceed in relation to the inquiry of interest; the unexpected outcome of the 2016 U.S. election.

### **4.1. ELECTION RESULTS AND EVENT WINDOW**

The event of interest being the 2016 U.S. election results, the periods of time to be used in this event study need to be carefully considered. Unlike a dividend declaration or a positive earnings report published during trading hours, the results of the election were made official by the Associated Press around 2:30 am Eastern Time (ET) during the night between Tuesday November 8<sup>th</sup> and Wednesday November 9<sup>th</sup>. With U.S. stock market trading hours starting at 9:30 am ET, equities only felt the consequences of these results during the trading day of November 9<sup>th</sup>. This date is therefore retained as event day for this study. Also, considering daily stock prices serve as the raw data input to this research, daily stock returns are used to calculate normal returns.<sup>33</sup>

November 9<sup>th</sup> being selected as the event day, the question of choosing an event window is now addressed. This matter needs contemplation because of the varying ways in which other factors can influence stock movements before or after the target event has taken place. Indeed, events that move markets can do so pre-emptively and in various degrees of shock amplitude. For instance, the British Petroleum Oil Spill of 2010 caught everyone by absolute surprise. No one had any inclination that it was about to occur, as can be attested by the fact that 11 workers died in the explosion that caused one of the worst oil spills ever and that the operator under contract, Transocean, said it had no warning of what was about to come. Had there been any indication that this environmental disaster was imminent, it is safe to assume that actions would certainly have been taken by British Petroleum to remedy this potentially explosive situation. In contrast, other types of events, such as quarterly earnings disclosures, can be anticipated to some degree in that market players try to forecast company earnings in the hope of profiting from them.<sup>34 35</sup>

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<sup>33</sup> Berenson, T. (2016). Donald Trump Wins the 2016 Election.

<sup>34</sup> BBC News. (2010). Timeline: BP oil spill.

<sup>35</sup> Griffin, D., Black, N., & Devine, C. (2015). 5 years after the Gulf oil spill: What we do (and don't) know.

As Efficient Markets Theory dictates, investors value the price of a stock by forecasting the net present value of a company's future cash flows. According to EMT, markets are efficient at incorporating new information almost immediately into securities prices. If major changes occur in that company's environment, such as a surprising presidential election outcome, future cash flow forecasts are bound to change after this new information becomes public. In the hypothetical scenario where an investor forecasts that a company will disclose better-than-expected earnings, it is expected that she will buy a position in that company's stock prior to the earnings report in the hope that on the day of disclosure, the stock performs positively. Similarly, if she anticipates negative earnings' news on that day, it is expected that she will sell the stock short prior to disclosure in the hope of rebuying it later at a cheaper price and simultaneously securing a profit. Although earnings disclosures are anticipated to some degree (their date of disclosure and the overall market's general expectations are usually known before they're published) they still have the potential to shock markets in very significant ways if the publicized numbers are contrary to the overall market's expectations. These scenarios, in addition to other factors such as insider information leaks or market manipulation, can affect the price of a security in the days surrounding a surprise event. Due to this feature of financial asset markets, it is important to analyse the abnormal returns that occur in pre-event and post-event days, in addition to the immediate reaction to the event itself.<sup>36 37 38 39 40</sup>

In the specific case of this present research, the event of interest is much more analogous to the earnings disclosure scenario than the BP Oil Spill of 2010, while still containing a strong element of surprise. For starters, no one was surprised by the election itself since all knew the time had come to elect a new president and the election date was known by all. The surprise came in the direction of the results themselves, which most expected to be in favor of a Hillary Clinton presidency. Second, although highly expected, no one had pegged a 100% chance that the Democrat would win. As previously mentioned, Trump had as high as close to 30% chances

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<sup>36</sup> Ong, H. (2017). How do quarterly earnings reports affect stock prices?

<sup>37</sup> Blau, B. M., & Pinegar, J. M. (2013). Are short sellers incrementally informed prior to earnings announcements?

<sup>38</sup> Christophe, S. E., Ferri, M. G., & Angel, J. J. (2004). Short-Selling Prior to Earnings Announcements.

<sup>39</sup> MacKinlay, A. C. (1997). Event Studies in Economics and Finance.

<sup>40</sup> Investopedia. (n.d.). Short Selling.

of winning the White House according to some members of the media. Although relatively small, some around the world still believed that Trump had a chance to come out on top.<sup>41 42</sup>

For this event study, it is critical to see the event of interest under this light. Yes, the victory of Donald Trump came as a shock to most, but it wasn't entirely unexpected. The study's design needs to keep this in mind when analysing stock movements surrounding November 9<sup>th</sup>. Examining abnormal returns during those non-event days could yield insights into why a security reacted the way it did. In general, event studies analyse abnormal returns for each day included in the event window. Their length usually ranges from 3-day windows (-1 day, event day, +1 day) to 41-day windows (-20 days, event day, +20 days). This study opts for a 21-day event window (-10 days, event day, +10 days) which covers the trading days from October 26<sup>th</sup> to November 23<sup>rd</sup>, 2016.<sup>43</sup>

## **4.2. COMPANY SELECTION**

The companies retained for this study were screened using three selection metrics. First, a measure of U.S. exposure was devised. To analyse the impact of a Donald Trump U.S. election victory, it is essential to observe this impact in securities that are expected to be decidedly impacted by this outcome, i.e. companies who are greatly exposed to the United States. Second, companies considered to have environmentally-friendly purposes or environmentally-sustainable operations were selected. Finally, a measure of companies' market value was used to screen out companies that are very small or extremely large. In aggregate, the objective of this selection is to isolate U.S. exposed companies covering a substantial range of valuations that are considered clean. For the purposes of this research, this portfolio of securities will be referred to as "clean companies" or "clean stocks" moving forward.

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<sup>41</sup> Zurcher, A. (2016). US election: Is Trump or Clinton going to win?

<sup>42</sup> FiveThirtyEight. (2016). Who will win the presidency? - 2016 Election Forecast.

<sup>43</sup> MacKinlay, A. C. (1997). Event Studies in Economics and Finance.

## 1. United States Exposure

To assess a company's level of exposure to the United States, U.S. stock listings was first employed. Companies listed in the U.S. typically have significant operations and interests in the country, its economy, and its geo-political landscape. For this reason, only stocks listed on the New York Stock Exchange (NYSE) and the NASDAQ were analysed. Pushing this even further, only companies that are also headquartered in the U.S. were kept in play. This was done to get rid of non-U.S. companies that list shares in the country but that have most of their operations outside of it. These companies, although exposed somewhat to the United States, may be less impacted by a surprise election result because of other operations around the world, their ability to repatriate profits to their home country, and the reality that they aren't subject to the same tax systems.<sup>44 45 46</sup>

## 2. Clean Stocks

Selecting companies based on their environmental stewardship is tougher than it seems on the surface. Although singling out notoriously environmentally-destructive sectors like the oil industry is simpler, there isn't any one industry classification that singles out clean companies in the United States. In contrast, the Toronto Stock Exchange lists "clean technologies" as an industry sector, but there isn't any comparable distinction made on the NYSE or the NASDAQ.

### U.S. INDUSTRY CLASSIFICATIONS (NYSE & NASDAQ)

- |                         |                     |                    |
|-------------------------|---------------------|--------------------|
| - Basic Industries      | - Consumer Services | - Miscellaneous    |
| - Capital Goods         | - Energy            | - Public Utilities |
| - Consumer Durables     | - Finance           | - Technology       |
| - Consumer Non-Durables | - Healthcare        | - Transportation   |

When talking about clean companies, they are present in almost all the industries mentioned above. Tesla is a good example of this. The company predominantly makes electric vehicles, which classifies it as a capital goods company on the NASDAQ. On the other hand, the

<sup>44</sup> Cogman, D., & Poon, M. (2012). Choosing where to list your company.

<sup>45</sup> Beattie, A. (n.d.). Alibaba IPO: Why List In the U.S.?

<sup>46</sup> NYSE. (2018). 10 Reasons Companies List on the NYSE.

company also designs battery technology that can greatly improve the way we conserve energy in our homes. Furthermore, the company designs, produces and installs solar panels, in addition to the solar electricity it sells. Evidently, companies that strive to improve every aspect of our energy consumption can have significant impacts in many industry sectors, whether it be transportation, energy, technology or capital goods.<sup>47 48</sup>

To circumvent this issue, and to help parse through the more than 6000 companies listed on the two major U.S. exchanges, a definition of what is considered a “clean company” had to be developed. The utilized approach starts with a long list of very specific business lines and activities that are beneficial to the environment or that have significant implications for sustainability. Examples include renewable energy production, renewable energy distribution, renewable energy technologies, energy efficiency, waste management, water quality, and many others. After envisioning the full range of possible clean businesses out there, a set of broader categories was formulated to group companies with similar environmentally-focused purposes. This resulted in a list of six categories used to screen whether a candidate stock is considered clean in the context of this study.<sup>49</sup>

#### **CLEAN COMPANY DEFINITIONS FOR THIS EVENT STUDY**

- |  |                            |
|--|----------------------------|
| - Renewable Energy Generation, Distribution  | - Electric Transportation  |
| - Renewable Energy Technology, Manufacturing | - Environmental Management |
| - Energy Intelligence, Storage, Conversion   | - Advanced Materials       |

### **3. Company Value**

The final screening concerned the size of companies. Firms were ranked by market capitalization and categorized using the standard market cap annotations (small-cap, mid-cap, large-cap, etc.). As previously mentioned, the idea here is to remove companies that are extremely big (mega-cap stocks) or much too small (micro-cap and nano-cap stocks). Bigger companies hire thousands of workers and are usually much more insulated from unanticipated

<sup>47</sup> TMX Money. (2018). Research Sectors - Clean Technology.

<sup>48</sup> NASDAQ. (2018). Company List (NASDAQ, NYSE, & AMEX).

<sup>49</sup> Ibid.

risks or externalities. They are often industry leaders which sometimes forces governments to make drastic actions to guarantee that these companies remain in good financial health and competitive in the marketplace to help keep or create ever more jobs. This can be attested by the automotive industry bailouts of 2007 or the banking sector bailouts of 2008 during the housing crisis. In contrast, very small companies are usually highly dependent on a few key factors such as their industry’s performance and business cycle, regulatory environments, or research and developments requirements. They are also more likely to default in economic downturns and often trade at penny-stock levels which is much riskier than at bigger valuations. Due to these reasons and many others, very small companies’ shares are much more volatile than bigger ones when unanticipated events rock markets. In the context of this event study, neither valuations are desired and are therefore removed. The volatile reactions of micro-cap and nano-cap stocks could skew the perceived impact seen in the entire event study, while mega-cap corporations could dilute it due to their solid status as leaders in their respective fields and economies. After screening for this, the remaining 74 clean companies, listed in Appendix A, are used to carry out the event study.<sup>50 51 52 53 54</sup>

**MARKET CAPITALIZATION ANNOTATIONS AND THEIR CORRESPONDING DOLLAR VALUE**

Mega-Cap:	Over \$200 Billion	Rejected
Large-Cap:	\$10 Billion to \$200 Billion	Selected (14)
Mid-Cap:	\$2 Billion to \$10 Billion	Selected (27)
Small-Cap:	\$300 Million to \$2 Billion	Selected (33)
Micro-Cap:	\$50 Million to \$300 Million	Rejected
Nano-Cap:	Under \$50 Million	Rejected

<sup>50</sup> Amadeo, K. (2018). Market Cap and Why Is It Important.

<sup>51</sup> DTS Systems Inc. (2017). Understanding market capitalization.

<sup>52</sup> Investopedia. (2017). Market Capitalization Defined.

<sup>53</sup> Amadeo, K. (2018). Auto Industry Bailout (GM, Chrysler, Ford).

<sup>54</sup> Berkeley University of California. (2011). 2008 Emergency Economic Stabilization Act.

### 4.3. DATA SOURCES

The financial assets of interest used in this event study are the common shares of the 74 selected companies and the S&P 1500 Composite Index. To calculate daily real returns, and subsequently daily normal returns, closing prices are used as the raw data inputs to the model. All closing price quotes and market capitalization values used were obtained from the NASDAQ and S&P Dow Jones Indices websites.<sup>55 56</sup>

### 4.4. NORMAL RETURN MODEL

As a key piece of event studies, the choice of a relevant normal return model needs to be made. In the present case, the *Market Model* is employed to carry out normal return calculations. This statistical model paints a linear relationship between a security's return and the return of the market, i.e. its relation to a market index or benchmark. Assuming the joint normality of asset returns, it can approximate their linear specification with a market proxy. Considering that the clean stocks in this study range from small-cap to large-cap valuations, a measure of the broad U.S. stock market was desired. The S&P 1500 Composite Index is therefore used as the market proxy, as it covers approximately 90% of the total U.S. stock market capitalization by combining the S&P 500, the S&P Mid-Cap 400, and the S&P Small-Cap 600.<sup>57 58</sup>

The market model for any security "i" at time "t" is as follows:

$$(2) \quad NR_{it} = \alpha_{it} + \beta_i R_{mt} + \varepsilon_{it}$$

$$(3) \quad E(\varepsilon_{it}) = 0$$

$$(4) \quad \text{var}(\varepsilon_{it}) = \sigma_{\varepsilon_i}^2$$

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<sup>55</sup> NASDAQ. (2018). U.S. Stock Quotes, Charts, and Research.

<sup>56</sup> S&P Dow Jones. (2018). S&P Composite 1500.

<sup>57</sup> MacKinlay, A. C. (1997). Event Studies in Economics and Finance.

<sup>58</sup> S&P Dow Jones. (2018). S&P Composite 1500.

Where:

- $NR_{it}$  = Normal return of security “ $i$ ” for period “ $t$ ”
- $R_{mt}$  = Real return of market index (S&P 1500) for period “ $t$ ”
- $\alpha_i$  = Intercept model parameter of security “ $i$ ” relative to market index
- $\beta_i$  = Slope parameter of security “ $i$ ” relative to market index
- $\varepsilon_{it}$  = Zero mean disturbance term (with expected value of 0)
- $\sigma_{\varepsilon_i}$  = Standard error model parameter of security “ $i$ ” relative to market index

#### 4.5. ESTIMATION WINDOW

In this section, the framework for estimating normal returns is discussed. First, daily returns are annexed in event time with the notation “ $t$ ”. Setting event day at  $t = 0$ , we can delimit the length of the estimation window from  $t = T_0 + 1$  to  $t = T_1$ , and the length of the event window from  $t = T_1 + 1$  to  $t = T_2$ . For simplification, let notations  $L_1 = T_1 - T_0$  and  $L_2 = T_2 - T_1$  be the respective lengths of the estimation window and the event window, as depicted in Figure 1a.<sup>59</sup>

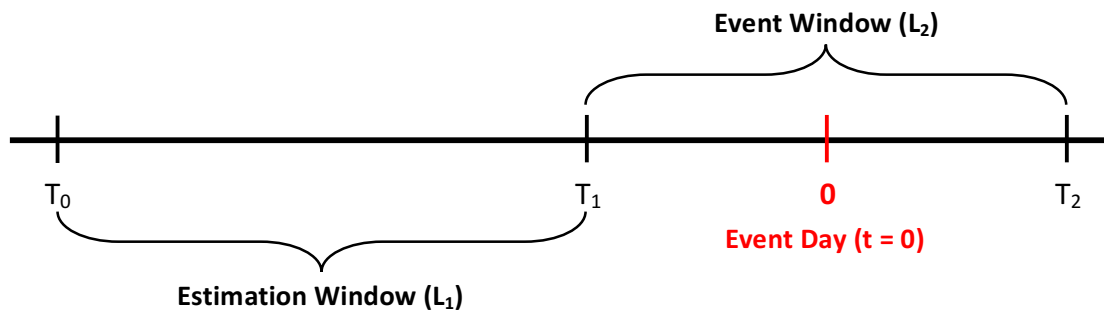


Figure 1a. Event study timeline with basic notation.

In terms of estimation windows, the choice of length is left to the researcher’s discretion. An example study included in MacKinlay’s 1997 paper uses a 250-days window to estimate linear regression parameters. For the present research, a 200-trading-days estimation window was employed, with daily stock returns going back to January 12<sup>th</sup>, 2016. As for the length of the event window, it is 21 trading days long with 10 pre-event days and 10 post-event days. In line with the previous notation, this yields  $L_1 = 200$  days and  $L_2 = 21$  days. The complete study timeline employed in this research is illustrated in Figure 1b.<sup>60</sup>

<sup>59</sup> MacKinlay, A. C. (1997). Event Studies in Economics and Finance.

<sup>60</sup> Ibid.

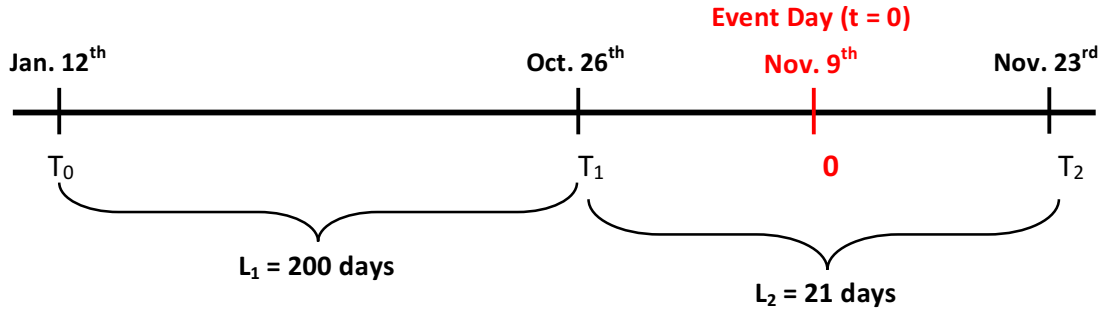


Figure 1b. Event study timeline employed in this research.

#### 4.6. MARKET MODEL PARAMETER ESTIMATION

Ordinary least squares (OLS) regression is used to estimate the market model parameters that describe the linear relationship between clean stocks and the S&P 1500 index. In line with the procedure depicted in MacKinlay's 1997 paper, this estimation procedure is accepted as being consistent and efficient. This method estimates an intercept ( $\alpha$ ) and a slope ( $\beta$ ) parameter for each clean stock from which normal returns are approximated.<sup>61</sup>

Security "i" model parameters, estimated using OLS regression during estimation window L<sub>1</sub>, are:

$$(5) \quad \hat{\beta}_i = \frac{\sum_{t=T_0+1}^{T_1} (R_{it} - \hat{\mu}_i) (R_{mt} - \hat{\mu}_m)}{\sum_{t=T_0+1}^{T_1} (R_{mt} - \hat{\mu}_m)^2}$$

$$(6) \quad \hat{\alpha}_i = \hat{\mu}_i - \hat{\beta}_i \hat{\mu}_m$$

$$(7) \quad \hat{\sigma}_{\varepsilon_i}^2 = \frac{1}{L_1 - 2} \sum_{t=T_0+1}^{T_1} (R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt})^2$$

- Where:
- $\hat{\beta}_i$  = Slope (beta) model parameter estimated using OLS regression for security "i" during estimation window L<sub>1</sub>
  - $\hat{\alpha}_i$  = Intercept (alpha) model parameter estimated using OLS regression for security "i" during estimation window L<sub>1</sub>
  - $\hat{\mu}_i$  = Mean daily real return of security "i" during estimation window L<sub>1</sub>

<sup>61</sup> MacKinlay, A. C. (1997). Event Studies in Economics and Finance.

- $\hat{\mu}_m$  = Mean daily real return of market index (S&P 1500) during  $L_1$
- $\hat{\sigma}_{\varepsilon_i}$  = Standard error model parameter estimated using OLS regression for security “ $i$ ” during estimation window  $L_1$

Using the estimated model parameters from above, the event study can proceed with calculating the normal returns for each clean stock for any given day of the event window ( $L_2$ ). By subtracting these values from the real returns observed for each day in  $L_2$ , daily abnormal returns can be isolated and analysed. This is the resulting data that is scrutinized to gain insights relating to the event study’s stated hypothesis.<sup>62</sup>

#### 4.7. STATISTICAL TESTING FRAMEWORK

Before abnormal returns’ statistical relevance can be assessed, their aggregation needs to take place to allow for analysis of clean stocks by market capitalization groupings. The three resulting samples contain 33 small-cap clean stocks, 27 mid-cap stocks and 14 large-cap stocks respectively for a total of 74 companies. Once abnormal returns are obtained for each day of the event window, they are aggregated to obtain the cumulative abnormal returns (CAR) of each security, the key metric that displays how each reacted throughout the 21-day period, not just on event day. For simplification, cumulative abnormal returns follow the notation  $CAR(\tau_1, \tau_2)$  for the period  $\tau_1$  to  $\tau_2$  where  $T_1 < \tau_1 \leq \tau_2 \leq T_2$ . For the purposes of this research, CAR is always observed for the full length of the event window, i.e. 21 days.<sup>63</sup>

Let the cumulative abnormal return (CAR) of security “ $i$ ” for period  $L_2$  ( $\tau_2 - \tau_1 = 21$  days) be:

$$(8) \quad CAR_i(\tau_1, \tau_2) = \sum_{t=\tau_1}^{\tau_2} AR_{it}$$

Asymptotically (as  $L_1$  grows), the daily variance estimator of  $CAR_i$  is computed through:

$$(9) \quad \sigma_i^2(\tau_1, \tau_2) = (\tau_2 - \tau_1 + 1) \cdot \sigma_{\varepsilon_i}^2$$

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<sup>62</sup> MacKinlay, A. C. (1997). *Event Studies in Economics and Finance*.

<sup>63</sup> *Ibid.*

As stated in MacKinlay's 1997 paper, this estimator of the daily variance of CAR for security "i" can be used when based on reasonable values of  $L_1$ , i.e. the estimation window's length. In this event study,  $L_1$  lasts 200 trading days, which is quite sufficient. Now armed with each security's cumulative abnormal return and daily variance estimators, we can proceed to aggregating them by market capitalization groupings. This is the final step that yields an average CAR and an average daily variance estimator for all three groups of clean stock valuations.<sup>64</sup>

Define the average cumulative abnormal return of "N" securities for period  $L_2$  (21 days) as:

$$(10) \quad \overline{\text{CAR}}(\tau_1, \tau_2) = \frac{1}{N} \cdot \sum_{i=1}^N \text{CAR}_i(\tau_1, \tau_2)$$

And let the daily variance estimator of the average CAR of "N" securities for period  $L_2$  be:

$$(11) \quad \text{var}(\overline{\text{CAR}}(\tau_1, \tau_2)) = \frac{1}{N^2} \cdot \sum_{i=1}^N \sigma_i^2(\tau_1, \tau_2)$$

Having calculated the average CAR and the average daily variance estimator of each of sample of securities, the null hypothesis can be tested. To do this, the standard T-test is used with a significance threshold of +/- 1.96 standard errors from the mean (95% confidence).<sup>65</sup>

Let the t-statistic used to assess statistical significance for a sample of "N" securities be:

$$(12) \quad \theta_1 = \frac{\overline{\text{CAR}}(\tau_1, \tau_2)}{\text{var}(\overline{\text{CAR}}(\tau_1, \tau_2))^{(1/2)}} \sim N(0,1)$$

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<sup>64</sup> MacKinlay, A. C. (1997). Event Studies in Economics and Finance.

<sup>65</sup> Ibid.

## 5. RESULTS

With the study's design fully mapped out, computation of its results can take place. In this research's case, results indicate a stock reaction that is somewhat in line with the stated hypothesis for small-cap companies, strongly against the hypothesis for mid-cap companies, and moderately in line with the hypothesis for large-cap stocks.

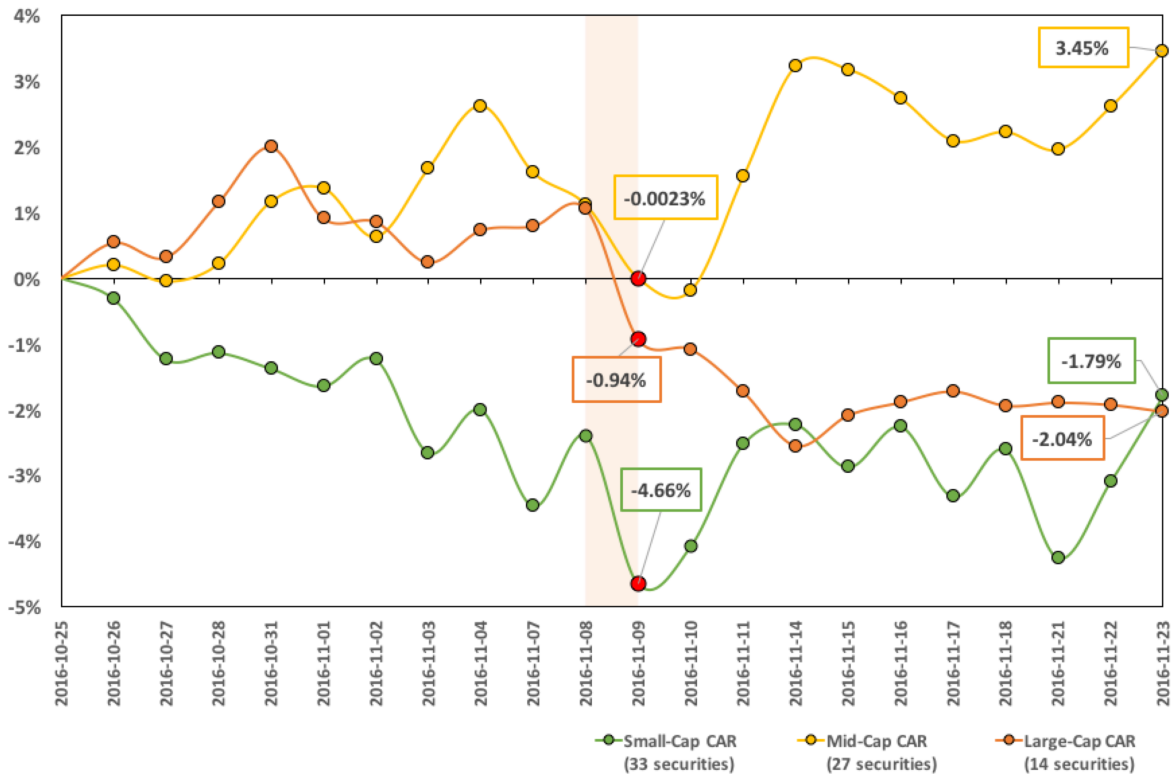


Figure 2. Plot of cumulative abnormal returns (CAR) for all three clean stock samples.

In aggregate, the study's final results don't support the hypothesis that clean companies we're destined to suffer statistically significant negative returns following the surprise outcome of the 2016 U.S. election. Although Figure 2 clearly exhibits how all three valuation samples did suffer negative average abnormal returns on event day, small-cap and mid-cap stocks either rebounded or trended higher towards the end of the event window, hinting at a probable recovery from post-event lows. In the contrasting case of large-cap stocks, this drawdown is sustained throughout the second half of the event window, finishing with the lowest cumulative abnormal return of all three samples. All three samples' results are listed in Table 1.

Table 1. Results		SMALL-CAP		MID-CAP		LARGE-CAP	
Date	Event Time (t)	AR	CAR	AR	CAR	AR	CAR
2016-10-26	-10	-0.32%	-0.32%	0.20%	0.20%	0.53%	0.53%
2016-10-27	-9	-0.92%	-1.24%	-0.25%	-0.05%	-0.22%	0.31%
2016-10-28	-8	0.10%	-1.14%	0.27%	0.21%	0.83%	1.15%
2016-10-31	-7	-0.24%	-1.38%	0.94%	1.16%	0.84%	1.99%
2016-11-01	-6	-0.27%	-1.65%	0.21%	1.36%	-1.09%	0.91%
2016-11-02	-5	0.40%	-1.25%	-0.74%	0.63%	-0.05%	0.85%
2016-11-03	-4	-1.41%	-2.66%	1.03%	1.66%	-0.62%	0.24%
2016-11-04	-3	0.65%	-2.01%	0.95%	2.61%	0.49%	0.73%
2016-11-07	-2	-1.46%	-3.47%	-1.01%	1.60%	0.06%	0.79%
2016-11-08	-1	1.07%	-2.40%	-0.49%	1.11%	0.26%	1.05%
<b>2016-11-09</b>	<b>0</b>	<b>-2.26%</b>	<b>-4.66%</b>	<b>-1.11%</b>	<b>-0.0023%</b>	<b>-1.99%</b>	<b>-0.94%</b>
2016-11-10	1	0.58%	-4.08%	-0.18%	-0.19%	-0.15%	-1.09%
2016-11-11	2	1.54%	-2.53%	1.73%	1.54%	-0.65%	-1.73%
2016-11-14	3	0.30%	-2.24%	1.68%	3.22%	-0.82%	-2.56%
2016-11-15	4	-0.64%	-2.88%	-0.05%	3.16%	0.47%	-2.09%
2016-11-16	5	0.62%	-2.26%	-0.44%	2.72%	0.20%	-1.89%
2016-11-17	6	-1.07%	-3.33%	-0.64%	2.08%	0.17%	-1.73%
2016-11-18	7	0.71%	-2.62%	0.13%	2.22%	-0.22%	-1.94%
2016-11-21	8	-1.65%	-4.26%	-0.27%	1.95%	0.05%	-1.90%
2016-11-22	9	1.16%	-3.10%	0.65%	2.60%	-0.03%	-1.93%
<b>2016-11-23</b>	<b>10</b>	<b>1.30%</b>	<b>-1.79%</b>	<b>0.85%</b>	<b>3.45%</b>	<b>-0.10%</b>	<b>-2.04%</b>

**Table 1.** Abnormal returns for an event study of clean companies during the 2016 U.S. election. The total sample contains 74 small-to-large-cap companies both listed and headquartered in the U.S.

At event day ( $t = 0$ ), the 33 small-cap stocks suffered an **average abnormal return of -2.26%** which brought the small-cap cumulative abnormal return to its lowest of the entire event window at -4.66%. This result implies that small-caps trended lower in the days prior to the election. Following the election, they rebounded drastically for three days (from  $t = 1$  to  $t = 3$ ) which completely erased the losses suffered on event day. With that in mind, the sample of 33 smaller clean companies did finish the event window with a negative CAR of -1.79%, although at that point, the immediate losses following the election had already been recouped.

Mid-cap stocks had a much different reaction than smaller industry counterparts. Before event day, mid-caps had accumulated a positive CAR that reached a high of +2.61% by the eighth day of the event window ( $t = -3$ ). The sample of 27 companies then sustained negative returns for the following four days, with an **average abnormal return of -1.11% on event day ( $t = 0$ )**. At this point, the initial positive CAR that was accumulated until then was completely erased to yield a cumulative abnormal return of -0.0023% for event day ( $t = 0$ ). At essentially zero, this value of CAR on event day indicates that mid-cap stocks have had no real discernible abnormal returns,

relative to the broader market, in the ten pre-event days leading up to the election. After election day, mid-caps benefited from a strong 2-day rally (from  $t = 2$  to  $t = 3$ ) that brought cumulative abnormal returns in sustained positive territory for the remainder of the event window. By the end of it ( $t = 10$ ), mid-cap CAR was measured at +3.45%, indicating that these companies had reacted very positively to the election results over the full span of the event window.

As for the sample of large-cap companies, the observed reaction seems to be the one most in-line with the stated hypothesis out of all three valuation groups. The sample of 14 clean stocks started out by accumulating a small positive CAR that peaked at +1.99% by the fourth day of the event window ( $t = -7$ ) and that gyrated slightly around the +1% CAR range until event day. **On that day ( $t = 0$ ), the large-cap abnormal return was of -1.99% on average**, which brought down the sample's cumulative abnormal return to -0.94%. After this strong negative event day reaction, large-caps continued their downward trend for three days (from  $t = 1$  to  $t = 3$ ) and settled in the -2% CAR territory for the remainder of the event window. They finished with a final CAR ( $t = 10$ ) of -2.04%. This result is in line with the posited hypothesis and theory. Expecting a Clinton win, market participants seem to have pushed this group of stocks upwards in expectations of a favorable president for their respective industries. Upon realizing that Trump would win, i.e. only at the very moment that election results were known, large-cap stocks suffered a strong negative reaction that was sustained for the remainder of the event window.

### 5.1. STATISTICAL SIGNIFICANCE

To test whether the above results are statistically significant, the standard T-test (as previously described) is employed using each sample's cumulative abnormal return and each sample's average daily variance estimators. T-testing results are listed in Table 2.

Table 2. Statistical Testing		SMALL-CAP		MID-CAP		LARGE-CAP	
		AR	CAR	AR	CAR	AR	CAR
Daily Sample Standard Error:		2.35%		1.64%		1.69%	
T-Statistics at Event Time:	$t = 0$	-0.96	-1.98	-0.68	0.00	-1.18	-0.55
	$t = 1$	0.25	-1.73	-0.11	-0.11	-0.09	-0.64
	$t = 5$	0.26	-0.96	-0.27	1.66	0.12	-1.12
	$t = 10$	0.55	-0.76	0.52	2.10	-0.06	-1.20

Table 2. Sample T-statistics derived from abnormal returns and daily standard error estimates.

Concentrating only on event day ( $t = 0$ ), the sample of 33 small-cap stocks suffered an average abnormal return of -2.26%. Given the standard error of daily average abnormal returns for this sample is 2.35%, the value of the test statistic (T-statistic or  $\theta_1$ ) is of -0.96 standard errors from the mean, and the hypothesis that a surprise Trump victory would cause significantly negative stock reactions can't be supported here. Although these results do indicate a negative abnormal effect for event day, this effect wasn't strong enough to conclude with 95% confidence (+/- 1.96 standard errors from the mean) that it was solely caused by the election result itself and not by chance. As for the average cumulative abnormal return, things change a bit. Since CAR captures the sum of all the abnormal returns up to a certain day inside the event window, it can be used to assess whether the cumulative return over a period of days is statistically significant. In the case of small-cap stocks, and only looking at the CAR up to event day ( $t = 0$ ) of -4.66%, using a standard error of 2.35% we obtain a T-statistic of -1.98 standard errors from the mean. This result barely crosses the 95% confidence threshold to conclude that the election's outcome did have a statistically significant negative impact on small-cap stocks when accounting for the 11-day period of time ending on event day. As we carry this test with CAR past event day, the T-statistic immediately recedes under the 95% confidence threshold, since small-cap stocks rebounded quickly in the post-event days. When testing for the full 21-day CAR ( $t = 10$ ) value of -1.79%, small-caps have T-statistic of -0.76 standard errors from the mean. This result implies that, over the span of the full event window, the surprise election outcome had no statistically significant impact on small-cap stocks. Although it did have a somewhat strong negative effect on event day itself, this effect wasn't statistically strong and it barely kept hold due to the ensuing rally that this sample experienced.

The story is quite different for the sample of 27 mid-cap companies. On event day ( $t = 0$ ), they sustained an average abnormal return of -1.11%. With a standard error of daily average abnormal returns of 1.64%, this yields a T-statistic of -0.68 standard errors from the mean. Similar to small-cap stocks, this sample did suffer negative returns relative to the market on event day, but they were far from being even close to statistically significant. On this basis, the stated hypothesis can't be supported for this sample of mid-cap securities. This conclusion is amplified when looking at values of cumulative abnormal returns. As stated previously, mid-cap stocks had

a positive CAR in the days running up to the election. These securities did suffer some negative abnormal returns around the election, but quickly recovered to finish with a CAR of +3.45% at the end of the event window. By testing for the statistical significance of this result over the entire 21-day length of the event window ( $t = 10$ ), the T-statistic obtained is 2.10 standard errors from the mean. This result is not only statistically significant (more than 1.96 standard errors), the described effect is in the opposite direction than the one postulated by the null hypothesis. Not only did mid-cap stocks experience a statistically significant effect over the event window period, this effect was very positive instead of negative. Upon consideration of these results, the null hypothesis is strongly rejected for this sample of mid-cap securities.

Finally, as expressed earlier on, large-cap companies constitute the sample that reacted most similarly to the stated hypothesis and to event study theory. In terms of statistical significance though, the results simply weren't strong enough. Only looking at event day ( $t = 0$ ), this sample's average abnormal return is of -1.99%. Given the standard error of daily average abnormal returns for this group is of 1.69%, the resulting T-statistic is of -1.18 standard errors from the mean. Although this result is the strongest of all three clean stock samples in terms of average abnormal return on event day, it is still far from the statistical significance threshold of 1.96 standard errors. In this light, the stated hypothesis that a Trump victory would entail significant negative stock reactions can't be supported for this sample. The size of the effect, relative to the broader market, simply isn't large enough to confidently discount the possibility that it could have occurred by chance. In terms of cumulative abnormal returns, the results are along the same theme. Using the CAR at event day ( $t = 0$ ) of -0.94%, the resulting T-statistic is of only -0.55 standard errors from the mean. By the end of the event window ( $t = 10$ ), the value of CAR reaches -1.21 standard deviations from the mean. Although these progressively negative T-statistics seem to indicate that, as the event window grows through time, the impact of the election outcome becomes more and more significant, their value remains much lower than the 1.96 threshold needed. Again, due to the reasons stated above, the null hypothesis can't be supported for large-cap securities.

## **6. DISCUSSION & CONCLUSION**

Overall, this study indicates that the negative implications directly attributable to the 2016 U.S. election surprise were negligible for clean companies in terms of short-term stock performance. The hypothesis that these companies' shares would suffer statistically significant negative abnormal returns following a surprise Trump victory is not supported in any strong fashion by the evidence uncovered in this research. Even though all three clean company samples did experience some negative abnormal returns on event day, these stock reactions weren't strong enough to confidently discard the possibility that they were the result of pure chance. Nevertheless, some insights were retained from this exercise.

For starters, the more volatile nature of small-cap stocks was quite apparent in the graphical representation of small-cap CAR and by the fact that this sample of clean companies has a higher standard error than the two bigger valuation groupings (2.35% for small-caps versus 1.64% and 1.69% for mid-caps and large-caps respectively). This alleviates the weight given to these results in the overall study considering the negative reaction witnessed on event day for these stocks was most likely amplified due to this higher volatility. In line with this, the way in which this sample recovered and whipsawed positively and negatively in post-event days shows how it needs to be taken more lightly than the two bigger valuation samples.<sup>66</sup>

In terms of the mid-caps sample, the results are much more intriguing and significant. This group of clean companies reacted contrarily from what was initially hypothesised, and did so in a statistically significant manner. The market sentiment regarding this range of company valuations seems to be that they are much more solid in the light of a potentially detrimental presidency to their industry. This reaction could stem from the fact that, being much more mature companies relative to their smaller counterparts, they boast a stronger financial situation, geographically more diverse operations, and are simply more insulated from negative externalities. Other potential explanations are that, although not a supporter of the fight against climate change, Donald Trump is a supporter of American businesses and the creation of jobs.

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<sup>66</sup> Amadeo, K. (2018). Market Cap and Why Is It Important.

Considering this, and even though the short-term implications could be negative, market participants might consider that in the long run, a Donald Trump presidency will equate to a much more pro-business environment for U.S. businesses, including clean companies. Supporting events since the election seem to be in accordance with this line of thinking. Since becoming President, Donald Trump has enacted a sweeping tax code overall in the country. Whether this tax system reform will benefit clean companies moving forward or not, in the days leading to and surrounding the election, the prospect alone of such a reform could have enticed investors to view a Trump presidency as a positive for all businesses, regardless of their industry. Having many market players share this opinion could justify why these larger companies didn't react strongly to the downside once the election results became public knowledge.<sup>67 68 69 70 71</sup>

If the above logic holds, we would expect to see large-cap stocks react even more favorably than did middle valuations, which was not the case here. One reason for why large-cap companies didn't experience better-than-mid-cap returns could be that they are much more globalised. In the wake of isolationism crossing over from the U.K.'s Brexit surprise and it being embodied by Trump during his campaign, investors might have perceived a potential Trump presidency as a similarly negative situation, if not worse, considering the U.S. is the world's economic leader. Isolating the U.S. from the rest of the modern globalised economy would certainly entail negative implications for American businesses dependant on preserving healthy trade relations with other countries. Also, major market participants such as institutional investors usually hold much larger positions in large-corporations relative to smaller ones. Considering a Trump presidency would bring a heavy load of uncertainty for the foreseeable future, these investors might have decided to adopt a wait-and-see approach in the wake of the election outcome even though they did suffer some negative returns on event day.<sup>72 73 74 75</sup>

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<sup>67</sup> Amadeo, K. (2018). Mid-Cap Stocks and Funds with Their Effect on the Economy.

<sup>68</sup> Ghosh, I. (2016). Trump vs. Clinton: Where they stand on the issues

<sup>69</sup> CBS News. (2016). Where does Donald Trump stand?

<sup>70</sup> BBC News. (2018). Trump tax reform gives Buffett \$29bn boost.

<sup>71</sup> The Globe and Mail. (2017). Globe editorial: Trump's tax reform is a creature from the swamp.

<sup>72</sup> Amadeo, K. (2018). Large Cap Stocks and Funds with Their Effect on the Economy.

<sup>73</sup> Kaletsky, A. (2016). Trump's rise and Brexit vote are more an outcome of culture than economics.

<sup>74</sup> Zurcher, A. (2016). US election: Hillary Clinton and Donald Trump compared to world leaders.

<sup>75</sup> Investopedia. (n.d.). Institutional Investor.

Although the 2016 U.S. election has come and went, its unprecedented nature allows us to derive interesting insights in hindsight about what happened surrounding this event. This research attempted to do just that by employing an event study approach to analyse stock market returns of clean companies. Results indicate that, although small-to-large-capitalization clean stocks all suffered negative returns on November 9<sup>th</sup> 2016, none of those drawdowns were strong enough to completely discount the possibility that they occurred by chance, i.e. they weren't statistically noteworthy. In addition, when looking at cumulative stock returns during the entire 21-day event window surrounding election results disclosure, small-cap securities quickly rebounded from post-event lows to finish slightly in negative territory, mid-cap securities briskly experienced strong positive returns to finish in strong positive territory, and large-cap stocks suffered sustained negative returns in weak negative territory. All in all, statistical significance for most of these results was quite weak, pointing to the fact that the stated hypothesis isn't supported here. The evidence seems to indicate that, although clean companies did suffer negative returns upon learning the election's outcome as expected, these drawdowns either quickly recovered or only finished in weak negative territory. This all points to clean companies having reacted quite well following the Republican upset, contrary to expectations.

As the 2016 U.S. election is now part of the past, the world witnessed that the first year and a half of the Trump presidency entailed strong positive stock market returns across the board of industries. Although clean company investors might have been spooked on November 9<sup>th</sup> of that year, the general market sentiment since then seems to have shifted to optimism in the light of Trump's pro-American-business agenda. Now that this initial sentiment seems to be fading in the wake of his recent offensive trade rhetoric directed at major global trade players, corrections and volatility are returning to markets. One can only wait-and-see what will ensue in the wake of this global economic uncertainty. <sup>76 77</sup>

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<sup>76</sup> Grant, M. (2018). A Trade War Will Leave Markets With Few Winners.

<sup>77</sup> Mayeda, A. (2018). Trump's "Art of the Deal" Tactics Face Ultimate Test With China.

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## 8. APPENDIX A – CLEAN COMPANY LIST

Appendix A. List of the clean companies selected for this study.				
Company Name	Security Ticker	Exchange	Clean Index/ETF Membership	Market Valuation
Ameresco Inc	AMRC	NYSE	PBW	Small-Cap
AZZ Inc	AZZ	NYSE	QGRD	Small-Cap
General Cable Corporation	BGC	NYSE	GWE	Small-Cap
Ballard Power Systems Inc. (US)	BLDP	NASDAQ	CELS	Small-Cap
Badger Meter, Inc.	BMI	NYSE	QGRD	Small-Cap
8Point3 Energy Partners, LP	CAFD	NASDAQ	CELS	Small-Cap
Calgon Carbon Corp	CCC	NYSE	EVX	Small-Cap
Canadian Solar	CSIQ	NASDAQ	CELS	Small-Cap
Casella Waste Systems Inc	CWST	NASDAQ	EVX	Small-Cap
Daqo New Energy Corp ADR	DQ	NYSE	PBW	Small-Cap
Us Ecology Inc	ECOL	NASDAQ	EVX	Small-Cap
ESCO Technologies Inc.	ESE	NYSE	QGRD	Small-Cap
Green Plains, Inc.	GPRE	NASDAQ	CELS	Small-Cap
Hannon Armstrong Sustainable Infrastructure	HASI	NYSE	CELS	Small-Cap
Heritage-Crystal Clean Inc	HCCI	NASDAQ	EVX	Small-Cap
JA Solar Holdings	JASO	NASDAQ	CELS	Small-Cap
JinkoSolar	JKS	NYSE	CELS	Small-Cap
Kadant Inc	KAI	NYSE	PZD	Small-Cap
Lindsay Corp	LNN	NYSE	PZD	Small-Cap
Pattern Energy Group, Inc.	PEGI	NASDAQ	CELS	Small-Cap
Plug Power, Inc.	PLUG	NASDAQ	CELS	Small-Cap
Power Integrations	POWI	NASDAQ	CELS	Small-Cap
Raven Industries Inc	RAVN	NASDAQ	PZD	Small-Cap
Renewable Energy Group	REGI	NASDAQ	CELS	Small-Cap
Sunrun, Inc.	RUN	NASDAQ	CELS	Small-Cap
Schnitzer Steel Industries Inc	SCHN	NASDAQ	EVX	Small-Cap
SolarEdge Technologies, Inc.	SEDG	NASDAQ	CELS	Small-Cap
SunPower Corporation	SPWR	NASDAQ	CELS	Small-Cap
TerraForm Power, Inc	TERP	NASDAQ	CELS	Small-Cap
Gentherm Inc	THRM	NASDAQ	PBW	Small-Cap
TPI Composites, Inc.	TPIC	NASDAQ	CELS	Small-Cap
Veeco Instruments	VECO	NASDAQ	CELS	Small-Cap
Vivint Solar, Inc.	VSLR	NYSE	CELS	Small-Cap
Advanced Energy	AEIS	NASDAQ	CELS	Mid-Cap
AVX Corporation	AVX	NYSE	CELS	Mid-Cap
Atlantica Yield	AY	NASDAQ	CELS	Mid-Cap
Acuity Brands, Inc.	AYI	NYSE	CELS	Mid-Cap
Clean Harbors Inc	CLH	NYSE	EVX	Mid-Cap
Cree, Inc.	CREE	NASDAQ	CELS	Mid-Cap
Covanta Holding Corp	CVA	NYSE	EVX	Mid-Cap
Darling Ingredients Inc	DAR	NYSE	EVX	Mid-Cap
EnerSys	ENS	NYSE	CELS	Mid-Cap
First Solar, Inc.	FSLR	NASDAQ	CELS	Mid-Cap
Hexcel Corporation	HXL	NYSE	CELS	Mid-Cap
Integrated Device Technology, Inc.	IDTI	NASDAQ	CELS	Mid-Cap
Itron, Inc.	ITRI	NASDAQ	CELS	Mid-Cap
Alliant Energy Corporation	LNT	NYSE	GWE	Mid-Cap
Microsemi Corp	MSCC	NASDAQ	CELS	Mid-Cap
MasTec, Inc.	MTZ	NYSE	QGRD	Mid-Cap
NextEra Energy Partners, LP	NEP	NYSE	CELS	Mid-Cap
NRG Energy Inc	NRG	NYSE	CELS	Mid-Cap

## 8. APPENDIX A – CLEAN COMPANY LIST (CONTINUED)

Appendix A. List of the clean companies selected for this study.				
Company Name	Security Ticker	Exchange	Clean Index/ETF Membership	Market Valuation
NRG Yield	NYLD	NYSE	CELS	Mid-Cap
Universal Display	OLED	NASDAQ	CELS	Mid-Cap
ON Semiconductor	ON	NASDAQ	CELS	Mid-Cap
Ormat Technologies, Inc.	ORA	NYSE	CELS	Mid-Cap
Stericycle Inc	SRCL	NASDAQ	EVX	Mid-Cap
Sensata Technologies Holding NV	ST	NYSE	PZD	Mid-Cap
Tenneco Inc	TEN	NYSE	EVX	Mid-Cap
Tetra Tech Inc	TTEK	NASDAQ	EVX	Mid-Cap
Woodward Inc	WWD	NASDAQ	GWE	Mid-Cap
Autodesk Inc	ADSK	NASDAQ	PZD	Large-Cap
Albemarle Corp	ALB	NYSE	PBW	Large-Cap
ANSYS Inc	ANSS	NASDAQ	PZD	Large-Cap
Air Products & Chemicals Inc	APD	NYSE	PBW	Large-Cap
BorgWarner Inc	BWA	NYSE	PZD	Large-Cap
Duke Energy Corp	DUK	NYSE	GWE	Large-Cap
Eaton Corporation, PLC	ETN	NYSE	QGRD	Large-Cap
Fortis Inc	FTS	NYSE	QGRD	Large-Cap
Johnson Controls International plc	JCI	NYSE	QGRD	Large-Cap
NextEra Energy Inc	NEE	NYSE	CELS	Large-Cap
Republic Services Inc	RSG	NYSE	EVX	Large-Cap
Tesla, Inc.	TSLA	NASDAQ	CELS	Large-Cap
Waste Connections Inc	WCN	NYSE	EVX	Large-Cap
Waste Management Inc	WM	NYSE	EVX	Large-Cap