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The effect of Obamacare on the stocks of healthcare companies in the United States

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Abstract

This thesis examines whether there is an effect of the Patient Protection and Affordable Care Act (Obamacare) on the stocks of healthcare companies in the United States. To investigate this effect, the healthcare companies are split into 4 economic entities: health insurance companies, hospitals, brand-name pharmaceutical companies and generic pharmaceutical companies. Several major events related to Obamacare will be assigned to each economic entity. The data sample consists of 10-15 companies per economic entity. Using an event study, the cumulative average abnormal return (CAAR) is then calculated using the daily adjusted closing prices of the stocks of the healthcare companies to measure the impact of the act. A cross-sectional t-test will then be used to draw a conclusion regarding the calculated CAARs. This thesis concludes that there is overall a negative effect of Obamacare on the stocks of healthcare companies in the United States.

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1. Introduction

Barack Hussein Obama II (hereafter: Obama) is an American politician who served as the 44th president of the United States (US) of America from January 20, 2009 to January 2017, for two terms (Hulse, 2009). President Obama has ensured that the health care industry has undergone significant reform during his presidency. The reason for this reform is the signing of The Patient Protection and Affordable Care Act (PPACA) on March 23th, 2010, also known as the Affordable Care Act (ACA) of shortly: Obamacare (Sanger-Katz, Kliff & Bull, 2021). This act has several major aims such as achieving near-universal coverage and reforming the health insurance coverage (Rosenbaum, 2011). Understanding the effect of Obamacare on the stocks of healthcare companies in the United States is of crucial importance to both policy makers and researchers. This leads to the following main research question for this thesis: *"Is there an effect of the Patient Protection and Affordable Care Act (Obamacare) on the stocks of healthcare companies in the United States?".*

Ababneh & Tang (2013) investigated the effect of the US Supreme Court's decision to uphold Obamacare on the stocks of healthcare companies. In this study, they break the healthcare companies into four economic entities: hospitals, health insurance firms, brand-name pharmaceutical companies and generic pharmaceutical companies (Ababneh & Tang, 2013). Then they calculate the cumulative average abnormal return (CAAR) to determine whether there is an effect of the decision of the US Supreme Court on the stocks of healthcare companies (Ababneh & Tang, 2013). Within this thesis, the same research method as Ababneh & Tang (2013) will be used to investigate the above main research question. So, CAARs will be used to determine whether there is an effect of Obamacare on the stocks of healthcare companies and the same four economic entities will be used within this thesis.

To answer the above research question, the following sub-questions will be used:

1. Is there an effect of the Patient Protection and Affordable Care Act on the stocks of health insurance firms in the United States?
2. Is there an effect of the Patient Protection and Affordable Care Act on the stocks of hospitals in the United States?

3. Is there an effect of the Patient Protection and Affordable Care Act on the stocks of brand-name pharmaceutical companies in the United States?

4. Is there an effect of the Patient Protection and Affordable Care Act on the stocks of generic pharmaceutical companies in the United States?

Unlike the study by Ababneh & Tang (2013), which mainly focused on the Supreme Court's 2012 decision to uphold Obamacare, this thesis will also focus on other events regarding Obamacare. The PPACA will thus be split into several major events per economic entity. An example is the election of President Trump. So far only limited research has been done on the effect of Obamacare after President Obama's presidency. President Trump tried to repeal the Patient Protection and Affordable Care Act (Kim & Demirjian, 2020). So, it is interesting to investigate what effect this event has had on the stocks of healthcare companies. This makes this thesis scientifical relevant.

To measure the effects of an economic event on the value of firms, an event study can be used. An event study measures the impact of a specific event on the value of a firm by using financial market data (MacKinlay, 1997). Based on the research of Ababneh & Tang (2013), it is expected that there is a negative effect of Obamacare on the stocks of health insurance firms and generic pharmaceutical firms and a positive effect on the stocks of hospitals and brand-name pharmaceutical companies. The purpose of this thesis is therefore first to determine the effect of Obamacare on the stocks of health care companies. This thesis is important because the results of this thesis can be used by policymakers to evaluate the impact of Obamacare on firms operating in the healthcare sector and to make possible adjustments to the current American health care system. This also makes this thesis socially relevant.

This research is structured as follows. Section 2 will discuss the underlying theory, after which section 3 will discuss the data that is used. Section 4 will discuss the methodology of this thesis. Furthermore, section 5 will discuss the results and finally, section 6 will wrap up this thesis with a conclusion.

2. Underlying theory

2.1. The Patient Protection and Affordable Care Act

The healthcare system of the United States of America suffers from three major problems: many people do not have health insurance, healthcare costs are rising disproportionally, and the quality of care is substandard (Wilensky, 2012). Obamacare aims to solve these problems. The law will ensure that 30 million previously uninsured citizens will be insured (Wilensky, 2012). About half of these citizens will be insured through subsidized private insurance and the other half through Medicaid expansions (Wilensky, 2012). Medicaid is an outreach program that will ensure that low-income citizens receive health insurance (Currie & Duque, 2019). Those who choose to remain uninsured will face a tax penalty (Eastman & Eastman, 2013). Those who are already insured have the option to keep the same insurance, and it does not change how private insurance pays physicians and hospitals (Hall & Lord, 2014). Obamacare affects four economic entities, namely: health insurance firms, hospitals, brand-name pharmaceutical companies and generic pharmaceutical companies. The study of Ababneh & Tang (2013) and the literature review after section 2.2 show that Obamacare indeed affects these four economic entities.

2.2. Major events regarding the four economic entities

For each economic entity, three important events have been assigned in the context of Obamacare in this thesis. For all four economic entities, the first event was the signing of the law by President Obama on the 23rd of March 2010 (Sanger-Katz, Kliff & Bull, 2021). As a second important event, different events were chosen for health insurance companies, hospitals, and pharmaceutical companies, so that differences between the economic entities can be accounted for. The second major event for brand-name and generic pharmaceutical companies is the following. On the 1st of January 2011, Obamacare made sure that both brand-name and generic pharmaceutical companies must give seniors discounts on their medication to close the coverage gap, or 'donut hole' (Tehrani & Cunningham, 2016). This was part of the Medicare prescription drug coverage that was implemented in 2006 (Tehrani & Cunningham, 2016). Medicare is designed for low-income citizens (Meyers & Johnston, 2021). As a result of Obamacare, health insurance companies must grant annual insurance rebates from the 7th of December 2011 if the Medical Loss Ratio (MLR) is lower than a

certain percentage (Harrington, 2012). This date will represent the second major event for health insurance companies. The second major event for hospitals is the creation of The Hospital Value-Based Purchasing Program (VBP-program). The VBP program is one of several federal regulations mandated by Obamacare, created on the 1st of October 2012 (Lee et al., 2019). The program has been developed to improve the performance of hospitals in four domains: patient outcomes, clinical processes, patient experiences, and efficiency (Lee et al., 2019). The same third major event regarding Obamacare has been chosen for all four economic entities and that is the following. On June 26th of 2020, President Trump asked the US Supreme Court to repeal the Affordable Care Act (Kim & Demirjian, 2020).

2.3.   Obamacare and health insurance firms

An important consequence of Obamacare for health insurance firms is the so-called '80/20 rule'. In concrete terms, this means that health insurance firms must spend at least 80% of the money they receive from premiums on medical care or activities to improve health care quality (Leonard, Scholz & Alexander, 2012). The remaining 20% they can spend on overhead or marketing costs. This '80-20 rule' is also known as the Medical Loss Ratio, or MLR (Huguet et al., 2019). Obamacare ensures, among other things, that health insurers are no longer allowed to deny coverage to individuals with a pre-existing condition (Huguet et al., 2019). Obamacare also has the consequence that insurers are no longer able to charge higher rates to people who wait just as long until they need medical care (Wilensky, 2012). Also, health insurance companies are no longer allowed to drop individuals who become seriously ill, and they are no longer allowed to set a maximum lifetime dollar amount on insurance benefits (Ababneh & Tang, 2013).

The essence of the above data is that the business model of the health insurance companies has completely changed: the health insurance companies cannot longer avoid 'bad risks' (who can be very costly to treat) because of Obamacare. Moreover, these insurance companies are not able to charge higher rates. This generally negatively affects the shares of these companies. Also, the new law is expected to result in higher costs government, as well as many businesses, and individuals (Tanner, 2013). Those who invest in the health insurance companies can see this coming before President Obama signs the bill. These investors feel uncertain about the future and will react to the news by being reluctant to buy new shares of the health insurance companies or they will even start selling the shares. This

leads to the following hypothesis: "*H1a: The cumulative average abnormal return (CAAR) for health insurance companies regarding the signing of Obamacare by President Obama is negative.*"

Also, the following hypotheses regarding the Medical Loss Ratio can be made for health insurance companies. Because of Obamacare, health insurance companies must grant annual insurance rebates if the MLR is lower than a certain percentage (Mccue & Hall, 2014). The MLR is expected to produce moderate operating margins of the health insurance companies (Mccue & Hall, 2014) and the MLR will lead to higher expenditure per year (Cicala, Lieber & Marone, 2019). This leads to the following hypothesis: "*H1b: The cumulative average abnormal return (CAAR) for health insurance companies regarding the granting of annual insurance rebates is negative.*"

On June 26th, 2020, President Trump asked the US Supreme Court to repeal the ACA (Kim & Demirjian, 2020). This event can be seen as positive news for the same investors as those named in the first hypothesis. If the US Supreme Court would repeal the ACA, then health care companies can deny coverage again to individuals with a pre-existing condition and other 'bad risks'. This will minimize the amount of very expensive treatments. The investors will feel positive again about the future and will react to the news by buying more shares of the health insurance companies. It is also plausible that, by scrapping Obamacare, health insurance companies will incur less costs related to the MLR and therefore the profit margin will increase. This leads to the following hypothesis: "*H1c: The cumulative average abnormal return (CAAR) for health insurance companies regarding President Trump asking the US Supreme Court to repeal the ACA is positive.*"

2.4. Obamacare and hospitals

Because of Obamacare hospitals do not longer have the risk of treating uninsured citizens. As a result, there will no longer be a risk of default, because health insurance companies will guarantee the insured citizens (Neiman et al., 2021). Hospitals will benefit from this, and they will increase their profits. Also, because of The Hospital Value-Based purchasing program hospitals will become more efficient in their business operations, among other things (Lee et al., 2019). As a result, they will look for ways to cut costs and increase their profits and because of more efficiency, the readmission rate of hospitals will decrease (Neiman et al., 2021). Both the new law and the VBP program therefore have a positive

effect on the shares of hospitals. This leads to the following two hypotheses: "*H2a: The cumulative average abnormal return (CAAR) for hospitals regarding the signing of Obamacare by President Obama is positive.* And: "*H2b: The cumulative average abnormal return (CAAR) for hospitals regarding the creation of the VBP-program is positive.*"

On June 26 of 2020, President Trump asked the US Supreme Court to repeal the ACA (Kim & Demirjian, 2020). The above positive effects of Obamacare will no longer apply if the US Supreme Court grants President Trump's request. For example, hospitals will have to deal again with uninsured citizens and therefore the risk of default. This will lead to extra costs. The investors will feel negative about the future, and they will react to the news by selling shares of the hospitals. This leads to the following hypothesis: "*H2c: The cumulative average abnormal return (CAAR) for hospitals regarding President Trump asking the US Supreme Court to repeal the ACA is negative.*"

2.5. Obamacare and brand-name pharmaceutical companies

As it turns out, Obamacare has had a major impact on brand-name pharmaceutical companies. Because of the new law, there are millions of new citizens who will use hospitals (Roland, 2019). These hospitals will purchase more from brand-name pharmaceutical companies. Also, millions of new citizens will go to the doctor because of the new law and there will also be more use of the products of brand-name pharmaceutical companies (Roland, 2019). So, there will be more demand for the products of brand-name pharmaceutical companies. These companies do also have a patent and regulatory exclusivity, so there is minimum regulation and price control due to the signing of the law (Kesselheim, Sinha & Avorn, 2017). This leads to the following hypothesis: "*H3a: The cumulative average abnormal return (CAAR) for brand-name pharmaceutical companies regarding the signing of Obamacare by President Obama is positive.*"

Because of the closing of the coverage gap, or 'donut hole', brand-name pharmaceutical companies must give seniors discounts on their medication (Spatz, 2010). This affects pharmaceutical companies' profits in a negative way (Spatz, 2010). This leads to the following hypothesis: "*H3b: The cumulative average abnormal return (CAAR) for brand-name pharmaceutical companies regarding the closing of the coverage gap, or 'donut hole', is negative.*" With President Trump asking the US Supreme Court to remove the ACA on June 26, 2020, investors in brand-name pharmaceutical companies may feel uncertain about the

future. The scrapping of the ACA could mean that millions of citizens will no longer be insured and therefore a drop in demand for the products of brand-name pharmaceuticals could follow. The investors will react to the news by selling shares of these companies. This leads to the following hypothesis: "*H3c: The cumulative average abnormal return (CAAR) for brand-name pharmaceutical companies regarding President Trump asking the US Supreme Court to repeal the ACA is negative.*"

2.6. Obamacare and generic pharmaceutical companies

Generic pharmaceutical companies have a competitive disadvantage in contrast to brand-name pharmaceutical companies due to the signing of the Affordable Care Act (Shah, Badiyan & Keith, 2017). Because the latter companies have a market exclusivity for a branded drug for a period of 12 years (Shah, Badiyan & Keith, 2017). The US Supreme Court has also ruled that it is illegal to pay brand-name pharmaceutical companies to bring their products to market with a delay. This payment is also called 'pay for delay' (Rao & Hellander, 2014). Because this is punishable, generic pharmaceutical companies lose compensation if they delay the marketing of a competing drug (Rao & Hellander, 2014). Because of these circumstances in which generic pharmaceutical companies find themselves, the following hypothesis can be formulated: "*H4a: The cumulative average abnormal return (CAAR) for generic pharmaceutical companies regarding the signing of Obamacare by President Obama is negative.*"

Because of the closing of the coverage gap, or 'donut hole', also generic pharmaceutical companies must give seniors discounts on their medication. This affects pharmaceutical companies' profits in a negative way (Spatz, 2010). This leads to the following hypothesis: "*H4b: The cumulative average abnormal return (CAAR) for generic pharmaceutical companies regarding the closing of the coverage gap, or 'donut hole', is negative.*"

With President Trump asking the US Supreme Court to remove the ACA on June 26, 2020, investors in generic pharmaceutical companies can think positively about the future again. Removing the ACA would mean that the competitive disadvantage would be largely exaggerated. 'Pay for delay' might also be allowed again. The investors will react to the news by buying shares of these companies. This leads to the following hypothesis: "*H4c: The cumulative average abnormal return (CAAR) for generic pharmaceutical companies regarding President Trump asking the US Supreme Court to repeal the ACA is positive.*"

Table 1: major events and dates regarding Obamacare.

Major event	Date
President Obama signed the law	23/03/2010
Pharmaceutical companies offer seniors discounts (donut hole)	01/01/2011
Insurance companies must grant annual insurance rebates (MLR)	07/12/2011
Creation of the VBP-program	01/10/2012
President Trump asked the US Supreme Court to repeal the ACA	26/06/2020

Table 2: expected CAAR per major event regarding Obamacare

Major event	Health insurance firms	Hospitals	Brand-name pharmaceutical companies	Generic pharmaceutical companies
President Obama signed the law	Negative	Positive	Positive	Negative
Pharmaceutical companies offer seniors discounts (donut hole)			Negative	Negative
Insurance companies must grant annual insurance rebates (MLR)	Negative			
Creation of the VBP-program		Positive		
President Trump asked the US Supreme Court to repeal the ACA	Positive	Negative	Negative	Positive

3. Data

3.1. Data source and sample size

This research aims to investigate the effect of Obamacare on the shares of healthcare companies. As described earlier in this thesis, the healthcare companies are divided into four categories: health insurance firms, hospitals, brand-name pharmaceutical companies and lastly generic pharmaceutical companies. Yahoo Finance is used to search for listed companies per category. The daily historical adjusted closing prices of the stocks are used. Due to mergers, limited trading history and many private healthcare companies, the same sample size has been chosen as of the sample size in the study of Ababneh & Tang (2013): between 10 and 15 healthcare companies. This thesis investigates 11 hospitals, 11 health insurance firms, 10 brand-name pharmaceutical firms and 10 generic pharmaceutical firms.

In order to generalize 'hospitals' so that enough companies are selected, it was decided in this thesis to also designate care institutions (such as retirement homes where the elderly receive medical care) as 'hospitals'. Furthermore, it was decided to only select companies that are in the United States of America. If a company is domiciled in this country, it is assumed in this thesis that this company is incorporated according to US legal standards and that this company is subject to US regulations. It is therefore assumed that a US company is subject to US regulations, such as Obamacare. Because there was a limited amount of financial data available for generic pharmaceutical companies, three companies located outside the United States were selected. It revolves around the following companies: Dr. Reddy's Laboratories Limited (RDY), Teva Pharmaceutical Industries Limited (TEVA) and Novartis AG (NVS). However, these companies are leaders in the US generic pharmaceutical companies' market (IMARC, 2022).

Per healthcare company, this thesis looked at 100 days of daily historical adjusted closings prices of the stocks before the major event and 5 days of daily historical adjusted closings prices of the stock after the major event. Within this time frame, the estimation window and the event window are important, which will be discussed in more detail in the next chapter.

4. Methodology

4.1. Event study

An event study has been chosen to investigate the effect of Obamacare on the stocks of healthcare companies. An event study measures the impact of a specific event on the value of a firm by using financial market data (MacKinlay, 1997). The standard event study leaves a limited number of choices to the analyst. This reduces subjective decisions and biases (Krivin et al., 2003). The first step is to determine an estimation window. According to Peterson (1989) and Armitage (1995) an estimation window of 300-100 days before a particular event is sufficient. Achsanta, Lepetit & Tarazi (2022) follow the existing literature and limit their estimation window to 20 days before the event to ensure the estimation window is unaffected by possible information leaks a few days before the event. That is why an estimation window of 100-20 days before the event (-100, -20) has been chosen within this research. The second step is the determination of the return on the stocks of the healthcare companies. Bisht (2022) conclude that using the adjusted closing price of the stocks of a company is more accurate because this price is used to account for the impact of dividends and splits, as the price of a stock drops by half when it is divided. A natural logarithm return was applied to evaluate the relative daily price changes (Costa et al., 2017):

$$Rit = ln\left(\frac{Pt}{Pt-1}\right) \qquad (1)$$

This formula (1) consists of the following components: Rit is the return on the stock of healthcare company i on time t; Pt the adjusted closing price of the stock of healthcare company i on time t; Pt-1 is the adjusted closing price of that stock a day before. Because the closing of the coverage gap ('donut hole') took place on a Saturday (01/01/2011), it was decided to set t=0 on the following Monday. This because the stock market is closed on Saturday and Sunday. The stock price on Monday will be affected by the event on Saturday and so the next Monday (03-01-2011) is an appropriate day for t=0. Third, the determination of the market return. The daily historical stock prices of the S&P500 are used to calculate the market return. For the same reason as when calculating the return on the stock of healthcare company i on time t, the adjusted closing price and the natural logarithm are used when calculating the market return:

$$Rmt = \ln\left(\frac{pt}{pt-1}\right) \qquad (2)$$

This formula (2) consists of the following components: Rmt is the market return at time t; Pt is the adjusted closing price of the S&P500 at time t; Pt-1 is the adjusted closing price of the S&P500 a day before. Fourth, the determination of the market model parameters (α and β). The estimation window is important here. As described earlier, an estimation window of (-100, -20) is used in this thesis. Alpha measures the value where the regression line crosses the y-axis: the intercept (Winter & Wieling (2016)). Beta is the slope of this line (Winter & Wieling (2016)). Alpha and beta of healthcare company i are determined using the following formulas in Excel:

$$\alpha i = intercept\left(\frac{Rit \ during \ the \ estimation \ window}{Rmt \ during \ the \ estimation \ window}\right) \qquad (3)$$

$$\beta i = slope\left(\frac{Rit \ during \ the \ estimation \ window}{Rmt \ during \ the \ estimation \ window}\right) \qquad (4)$$

The formulas (3) and (4) give the alpha and beta of healthcare company i and consists of the following components: 'Rit during the estimation window' is the return on the stock of healthcare company i 100-20 days before the major event; 'Rmt during the estimation window' is the market return 100-20 days before the major event; intercept and slope are the formulas used in Excel. Fifth, the determination of the normal return of the stocks of the healthcare companies: the market model. The above alpha, beta and market return are used for this:

$$E(Rit) = \alpha i + \beta iRmt + eit \qquad (5)$$

The formula (5) consists of the following components: E(Rit) is the normal return of the stocks of healthcare company i at time t; αi gives the alpha of healthcare company i; βi gives the beta of healthcare company i; Rmt is the market return at time t; eit is an error term of healthcare company i at time t. Sixth, the determination of the abnormal return of the stocks the healthcare companies. This can be determined by subtracting the return on the stocks of

healthcare company i at time t by the normal return of the stocks of healthcare company i at time t:

$$ARit = \ Rit - E(Rit) \qquad (6)$$

The formula (6) consists of the following components: ARit is the abnormal return of the stocks of healthcare company i at time t; Rit is the return on the stocks of healthcare company i at time t and E(Rit) is the normal return of the stocks of healthcare company i at time t. Seventh, the determination of the average abnormal return of the stocks of the healthcare companies. The average abnormal return can be determined by taking the average abnormal return of company 1, 2, ..., N using the following formula:

$$AARt = \ \frac{1}{N}\sum_{i=1}^{N} ARit \qquad (7)$$

This formula (7) consists of the following components: AARt is the average abnormal return of all N healthcare companies at time t; N is the total number of healthcare companies and ARit is the abnormal return of the stocks of healthcare company i at time t. Eighth, the determination of the cumulative average abnormal return (CAAR) of the stocks of the healthcare companies and the determination of the event window. The cumulative average abnormal return can be found by taking the sum of the average abnormal returns during the event window. Naape & Masoga (2020) argue that a short event window removes the limitations of a long event window. Furthermore, a short event window provides relevant and reliable results about the CAAR. Naape & Masoga (2020) are using an event window of 5 days before the event and 5 days after the event: (-5,5). This window will also be used in this event study. To check whether other event windows show a different result, 6 smaller event windows are added to this thesis: (-3,3), (-1,1), (-3,0), (-1,0), (0,1) and (0,3). If for instance the CAARs differ per event window, this thesis will adopt the CAAR of the shortest event window because this CAAR will be more reliable according to the literature. The following formula gives the calculation of the CAAR:

$$CAAR = \ \sum_{t1}^{t2} AARt \quad (8)$$

This formula (8) consists of the following components: CAAR is the cumulative average abnormal return; t2 is the end of the ending day of the event window; t1 is the beginning day of the event window and AARt is the average abnormal return of all N healthcare companies at time t. Ninth, using the appropriate t-test to draw a conclusion regarding the sign of the CAAR and its significance. The cross-sectional t-test can be used to test the cumulative average abnormal return (Graves, Callahan & Ramanan (2000)). This t-test does not require any correction for serial correlation and is thus computationally simpler to use (Graves, Callahan & Ramanan (2000)). This test will be used in this event study and can be performed using the following formulas:

$$tCAAR = \sqrt{N} \frac{CAAR}{sCAAR} \qquad (9)$$

$$sCAAR = \sqrt{\frac{1}{N-1} \Sigma \left((CAR_i - CAAR) \right)^2} \qquad (10)$$

$$CAR_i = \Sigma_{t1}^{t2} ARit \qquad (11)$$

This formula (9) consists of the following components: tCAAR is the t-statistic for the calculated CAAR; N is the total number of healthcare companies; CAAR is the cumulative average abnormal return and sCAAR is the standard deviation of the CAAR. The formula (10) consists of the following components: sCAAR is the standard deviation of the CAAR; N is the total number of healthcare companies; CARi is the cumulative abnormal return of healthcare company i (see the description of formula (11) which follows next); CAAR is the cumulative abnormal return. The formula (11) consists of the following components: ARit is the abnormal return of the stocks of healthcare company i at time t; t2 is the end of the ending day of the event window and t1 is the beginning day of the event window.

Appendix A gives a summary of the methodology of this event study.

5. Results

5.1. Health insurance firms

According to table 3 below the event windows (-5,5), (-3,3) and (-3,0) for the first major event show a positive statistically insignificant CAAR. This is not what is predicted according to the hypothesis H1a. However, as this positive CAAR is statistically insignificant, this thesis is cautious about its interpretation. The CAARs of the event windows (-1,1), (-1,0), (0,1) and (0,3) are negative as predicted. However statistically insignificant, this thesis cautiously contends that, the signing of the law by President Obama has had a negative impact on the stocks of health insurance firms regarding these four event windows.

The CAARs of the event windows (-5,5), (-3,0), (0,3) and (0,1) for the second major event (MLR) are negative and statistically insignificant. This is as predicted according to the hypothesis H1b. Although not significant, this thesis cautiously contends that, the insurance rebates (MLR) have had a negative impact on the stocks of health insurance firms. The event windows (-3,3) and (-1,1) show negative statistically significant CAARs as predicted. Regarding these windows the second major event has surely had a negative impact on the stocks of health insurance firms. The event window (-1,0) shows a positive statistically insignificant CAAR. This is not what is predicted but this thesis is cautious about its interpretation because it is statistically insignificant.

According to table 3 below the CAAR of the event window (-5,5) for the third major event is negative and statistically significant. This is not what this thesis predicted according to the hypothesis H1c. It seems that regarding this event window the third major event has surely had a negative impact on the stocks of health insurance companies. The CAAR of the event windows (-3,3) and (0,3) are negative statistically insignificant. However, this is not what this thesis predicted and therefore this thesis is cautious about its interpretation because it is statistically insignificant. The event windows (-1,1) and (-1,0) show a positive statistically significant CAAR. This is what is predicted, so regarding this window the third major event has surely had a positive effect on the stocks of health insurance firms. The event windows (-3,0) and (0,1) show a positive statistically insignificant CAAR. Although insignificant, because of the predicted positive CAAR, this thesis cautiously contends that the third major event has had a positive effect on the stocks of health insurance firms regarding these windows.

Table 3: CAAR and t-statistic of health insurance firms.

Major event	Event window	CAAR%	T-statistic
President Obama signed the law	(-5, 5)	3,109	1,226
	(-3, 3)	1,689	0,878
	(-1, 1)	-0,011	-0,007
	(-3, 0)	1,842	0,880
	(-1, 0)	-0,293	-0,225
	(0, 1)	-0,522	-0,716
	(0, 3)	-0,957	-0,720
Insurance companies must grant annual insurance rebates (MLR)	(-5, 5)	-1,623	-1,327
	(-3, 3)	-1,678	-2,183*
	(-1, 1)	-0,783	-1,678***
	(-3, 0)	-0,606	-0,862
	(-1, 0)	0,258	0,666
	(0, 1)	-0,569	-1,360
	(0, 3)	-0,600	-0,993
President Trump asked the US Supreme Court to repeal the ACA	(-5, 5)	-2,061	-3,880**
	(-3, 3)	-0,515	-0,988
	(-1, 1)	1,127	1,949***
	(-3, 0)	0,466	0,674
	(-1, 0)	0,859	1,656***
	(0, 1)	0,509	1,157
	(0, 3)	-0,739	-1,245

Note: *Significant at 0,05 level ** 0,01 level *** 0,1 level.

5.2. Hospitals

According to table 4 below the CAARs of every event window are positive and statistically insignificant for the first major event for hospitals. This is as predicted according to the hypothesis H2a. Although not significant, this thesis cautiously contends that, because of the positive CAARs, the signing of Obamacare by President Obama has had a positive impact on the stocks of hospitals.

The CAAR for the second major event for hospitals is negative and statistically insignificant for the event windows (-5,5) and (0,3). This is not what is predicted according to the hypothesis H2b. This thesis is cautious about the interpretation of this result as the CAAR is not statistically significant. The CAARs of the event windows (-3,3) and (-1,1) are also statistically insignificant, but these CAARs are positive as predicted. This thesis cautiously contends that, because of the positive CAARs, that the creation of the VBP-program has had a positive impact on the stocks of hospitals regarding these event windows. The event windows (-3,0), (-1,0) and (0,1) show a positive statistically significant CAAR regarding the creation of the VBP-program. These event windows support the hypothesis H2b, and they confirm the predicted positive CAARs. This thesis surely contends regarding these windows that the creation of the VBP-program has had a positive impact on the stocks of hospitals.

The CAAR of the third major event for hospitals is negative and statistically insignificant for the event windows (-5,5) and (-3,0). A negative CAAR is predicted according to the hypothesis H2c. However, this CAAR is statistically insignificant, this thesis cautiously contends that this third event has had a negative impact on the stocks of hospitals regarding these event windows. The CAARs of the event windows (-3,3), (-1,1) and (0,1) are positive instead of the predicted negative CAAR and these windows show a statistically insignificant effect. Therefore, this thesis is cautious about its interpretation. The (-1,0) event window shows a positive statistically insignificant CAAR of almost zero. Although insignificant, this thesis cautiously contends that regarding this event window the third major event has had no effect on the stocks of hospitals. The event window (0,3) shows a positive statically significant effect regarding the third event. This is against the predicted negative CAAR of hypothesis H2c. Regarding this event window the third major event that President Trump asked the US Supreme Court to repeal Obamacare has surely had a positive effect on the stocks of hospitals.

Table 4: CAAR and t-statistic of hospitals.

Major event	Event window	CAAR%	T-statistic
President Obama signed the law	(-5, 5)	8,680	0,877
	(-3, 3)	7,926	0,997

	(-1, 1)	10,260	1,166
	(-3, 0)	7,040	1,160
	(-1, 0)	7,500	1,350
	(0, 1)	4,870	0,788
	(0, 3)	3,000	0,589
Creation of the VBP-program	(-5, 5)	-0,284	-0,153
	(-3, 3)	1,003	1,417
	(-1, 1)	0,650	1,479
	(-3, 0)	2,914	2,826**
	(-1, 0)	0,895	1,661***
	(0, 1)	0,810	2,176*
	(0, 3)	-0,856	-0,713
President Trump asked the US Supreme Court to repeal the ACA	(-5, 5)	-1,647	-1,001
	(-3, 3)	1,522	0,080
	(-1, 1)	1,723	1,458
	(-3, 0)	-0,842	-0,626
	(-1, 0)	0,003	0,004
	(0, 1)	1,586	1,416
	(0, 3)	2,231	1,739***

Note: *Significant at 0,05 level ** 0,01 level *** 0,1 level.

5.3. Brand-name pharmaceutical firms

Table 5 below shows regarding the first major event a negative statistically insignificant CAAR for the event windows (-5,5) and (0,1). However, a positive CAAR has been predicted according to the hypothesis H3a. Because this CAAR is insignificant, this thesis is cautious about interpreting this result. The event windows (-3,3) and (0,3) show a negative statistically significant CAAR. The hypothesis H3a must be rejected regarding these windows. Moreover, regarding these windows the first major event has had a negative effect on the stocks of brand-name pharmaceutical companies. This thesis is cautious about the interpretation of the smaller event window (-1,1) as it shows an insignificant CAAR of almost zero. The event windows (-3,0) and (-1,0) show insignificant positive CAARs. This thesis

cautiously contends that the first major event regarding these windows has had a positive effect on the shares of brand-name pharmaceutical companies.

Regarding the second major event table 5 below shows positive statistically significant CAARs for the event windows (-1,1), (0,1) and (0,3). Regarding these event windows the second major event has surely had a positive effect on the stocks of brand-name pharmaceutical firms. The other windows show positive statistically insignificant CAARs. Regarding these windows this thesis cautiously contends that the second major event has had a positive effect on the stocks of brand-name pharmaceutical firms. This is not as predicted according to the hypothesis H3b.

Regarding the third major event the table below shows positive statistically significant CAARs for the event windows (-3,3) and (0,3). This is not as predicted according to the hypothesis H3c, this hypothesis needs to be rejected regarding these event windows. Moreover, regarding these windows the third major event has surely had a positive effect on the stocks of brand-name pharmaceutical firms. The other event windows also show positive CAARs but remain statistically insignificant. Because these CAARs are insignificant and not negative as predicted, this thesis is cautious about interpreting these results.

Table 5: CAAR and t-statistic of brand-name pharmaceutical firms.

Major event	Event window	CAAR%	T-statistic
President Obama signed the law	(-5, 5)	-1,435	-1,020
	(-3, 3)	-1,479	-1,721***
	(-1, 1)	-0,001	-0,002
	(-3, 0)	0,402	0,636
	(-1, 0)	0,128	0,200
	(0, 1)	-0,027	-0,058
	(0, 3)	-1,779	-2,724**
Pharmaceutical firms offer seniors discounts (donut hole)	(-5, 5)	1,880	1,109
	(-3, 3)	1,443	1,459
	(-1, 1)	1,383	1,799***
	(-3, 0)	0,581	0,647
	(-1, 0)	0,602	1,329

	(0, 1)	1,357	2,031*
	(0, 3)	1,438	2,143*
President Trump asked the US Supreme Court to repeal the ACA	(-5, 5)	1,635	0,810
	(-3, 3)	3,422	1,666***
	(-1, 1)	2,466	1,094
	(-3, 0)	2,815	1,245
	(-1, 0)	2,268	1,237
	(0, 1)	1,591	0,991
	(0, 3)	2,000	1,738***

Note: *Significant at 0,05 level ** 0,01 level *** 0,1 level.

5.4. Generic pharmaceutical firms

According to table 6 below the event windows (-5,5), (-3,3), (0,1) and (0,3) of the first major event for generic pharmaceuticals show negative statistically insignificant CAARs. A negative CAAR is predicted according to the hypothesis H4a. However, this CAAR is statistically insignificant, this thesis cautiously contends that this first event regarding these windows has had a negative impact on the stocks of generic pharmaceutical firms. However, the event windows (-1,1), (-3,0) and (-1,0) show positive statistically insignificant CAARs. Because this thesis predicted a negative CAAR and because of the insignificant results, this thesis is cautious about its interpretation.

The event windows (-3,3) and (0,3) of the second major event for generic pharmaceuticals show positive statistically significant CAARs. This is not as predicted according to the hypothesis H4b. This hypothesis must be rejected regarding these windows. Moreover, regarding these windows the second major event has surely had a positive effect on the stocks of generic pharmaceutical firms. Only the CAAR of the event window (-1,0) is negative as predicted, but this result is statistically insignificant. Regarding this window this thesis cautiously contends that the second major event has had a negative effect on the stocks of generic pharmaceutical firms. The CAARs of all other windows for the second major event are positive and statistically insignificant. Because a negative CAAR is predicted and because those CAARs are insignificant, this thesis is cautious about its interpretation.

The event windows (-1,1) and (0,1) of the third major event for generic pharmaceuticals show a positive statistically insignificant CAAR. This is predicted according to the hypothesis

H4c. Regarding these windows this thesis cautiously contents that the third major event has had a positive effect on the stocks of generic pharmaceutical firms. However, all other event windows show negative statistically insignificant CAARs. Because a positive CAAR is predicted and because those CAARs are insignificant, this thesis is again cautious about its interpretation. Lastly, appendix B gives a summary of the results of the CAARs for the four categories of healthcare companies.

Table 6: CAAR and t-statistic of generic pharmaceutical firms.

Major event	Event window	CAAR%	T-statistic
President Obama signed the law	(-5, 5)	-1,730	-0,754
	(-3, 3)	-0,019	-0,015
	(-1, 1)	0,593	0,667
	(-3, 0)	1,329	1,483
	(-1, 0)	0,484	0,270
	(0, 1)	-0,824	-0,559
	(0, 3)	-2,281	-1,059
Pharmaceutical firms offer seniors discounts (donut hole)	(-5, 5)	3,881	1,079
	(-3, 3)	5,001	1,735***
	(-1, 1)	2,090	0,857
	(-3, 0)	0,419	0,580
	(-1, 0)	-0,650	-1,357
	(0, 1)	2,651	1,146
	(0, 3)	4,493	1,753***
President Trump asked the US Supreme Court to repeal the ACA	(-5, 5)	-0,355	-0,150
	(-3, 3)	-1,759	-0,901
	(-1, 1)	0,120	0,100
	(-3, 0)	-2,687	-0,904
	(-1, 0)	-2,268	-0,889
	(0, 1)	0,736	0,431
	(0, 3)	-0,724	-0,582

Note: *Significant at 0,05 level ** 0,01 level *** 0,1 level.

6. Conclusion

This thesis investigated whether there is an effect of the Patient Protection and Affordable Care Act (Obamacare) on the stocks of healthcare companies in the United States. The first sub-question is whether there is an effect of Obamacare on the stocks of health insurance firms in the United States. First, this thesis cautiously contends that the signing of the law by President Obama has had a negative effect on the stocks of health insurance firms. Caution is needed because all cumulative average abnormal returns (CAARs) are insignificant. However, the returns are negative for the shortest and thus most reliable event windows. That is because the business model of these firms has completely changed because of Obamacare. The hypothesis H1a must be accepted. There is also a negative effect on the stocks of health insurance firms regarding the second event that insurance companies must grant annual insurance rebates (MLR). That is because the shortest event windows (-3,3) and (-1,1) show statistically significant negative CAARs. The reason of these negative returns is that the MLR produces moderate operating margins and leads to higher expenditure per year for health insurance firms. The hypothesis H1b must be accepted. Lastly, this thesis finds that the event that President Trump asked the US Supreme Court to repeal Obamacare has had a positive effect on the stocks of health insurance firms. That is because the shortest event windows (-1,1) and (-1,0) show statistically significant positive CAARs. If Obamacare gets repealed, health insurance firms can again deny coverage to 'bad risks' and this will minimize the amount of very expensive treatments. The stocks of these companies will thus be positive affected. The hypothesis H1c must be accepted. Based on the three important events mentioned above, this thesis concludes that Obamacare has overall had a negative effect on the shares of health insurance firms.

The second sub-question is whether there is an effect of Obamacare on the stocks of hospitals in the United States. This thesis cautiously contends that the signing of the law by President Obama has had a positive effect on the stocks of hospitals. Cautious is needed again because all CAARs are insignificant. However, the return of all event windows is positive. Because of Obamacare hospitals do not longer have the risk of treating uninsured citizens. As a result, there will no longer be a risk of default, because health insurance companies will guarantee the insured citizens. Hospitals will benefit from this, and they will

increase their profits. The hypothesis H2a must be accepted. This thesis finds that the creation of the VBP-program has also had a positive effect on the stocks of hospitals. That is because the shorter and thus more reliable event windows (-3,0) and (-1,0) show statistically significant positive CAARs. Because of the program, hospitals will become more efficient in their business operations and as a result they will look for ways to cut costs and increase their profits. The hypothesis H2b must be accepted. Lastly, this thesis finds that the event that President Trump asked the US Supreme Court to repeal Obamacare has had an unclear effect on the stocks of hospitals. The only statistically significant CAAR is that of the event window (0,3) which is positive. This CAAR should be negative as predicted because if Obamacare gets repealed there is a risk again that hospitals will deal again with uninsured citizens if the Obamacare will be repealed. This will lead to lower profits. However, when the shorter event window (0,1) is used this CAAR becomes statistically insignificant. Therefore, this thesis concludes that the longer event window (0,3) includes other effects than the third major event and is thus biased. The hypothesis H2c must be rejected. This thesis finds that Obamacare has had a positive effect on the stocks of hospitals based on the first two events.

The third sub-question if whether there is an effect of Obamacare on the stocks of brand-name pharmaceutical companies in the United States. This thesis concludes that the signing of the law by President Obama has had an unclear effect on the stocks of brand-name pharmaceutical firms. The results show statistically significant negative CAARs of the event windows (-3,3) and (0,3). However, this thesis finds that these returns should be positive. President Obama's signing of the law resulted in a larger customer base, and at that time there was no mention of mandatory discounts for seniors. This should lead to more turnover and profit and thus to a positive effect on the shares of brand-name pharmaceutical companies. The effect according to the results remains thus unclear. The hypothesis H3a must be rejected. Furthermore, this thesis concludes that the second event that pharmaceutical firms offer seniors discounts has had an unclear effect on the stocks of brand-name pharmaceutical firms. Although statistically significant positive CAARs of the event windows (-1,1), (0,1) and (0,3) this thesis finds that these returns should be negative. The mandatory senior discount should lead to a reduction in profits and so there should be a negative effect on the shares of brand-name pharmaceutical companies. The effect according to the results again remains unclear. The hypothesis H3b must be rejected. This

thesis concludes that the third event that President Trump asked the US Supreme Court to repeal Obamacare has had a positive effect on the stocks of brand-name pharmaceutical firms. That is because of the statistically significant positive CAAR of the event window (-3,3) and (0,3). This is against what this thesis predicted according to hypothesis h3c. This hypothesis thus must be rejected. Investors of the pharmaceutical companies were positive about the future when they heard that there was a possibility that Obamacare would be repealed, and they started to buy the companies' shares again. This would namely mean an increase in profit: these companies no longer had to give a compulsory discount to seniors. This thesis assumes that the effect of abolishing the compulsory discount is greater than the effect that citizens become uninsured because of the abolition of Obamacare: citizens will always need medicines. Based on the third major event for brand-name pharmaceutical companies this thesis concluded that Obamacare has overall had a negative effect on the stocks of these firms.

The fourth sub-question is whether there is an effect of Obamacare on the stocks of generic pharmaceutical companies in the United States. This thesis cautiously contends that the signing of the law by President Obama has had a negative effect on the stocks of generic pharmaceutical firms. Cautious is needed again because all CAARs are insignificant. Although statistically insignificant, the event windows (-5,5) and (-3,3) show negative CAARs. As stated, this thesis looks at the shortest event windows because the shorter the window the more reliable. The event window (-1,1) shows a statistically insignificant positive CAAR. However, this event window can be split in a pre-event and a post-event window: (-1,0) and (0,1) respectively. The post-event window (0,1) shows a statistically insignificant negative CAAR. So, because the event window (-1,1) also consists of a negative return when this window is split and because of the negative returns of the windows (-5,5) and (-3,3) this thesis cautiously contends that the signing of the law has had a negative effect on the stocks of generic pharmaceutical firms. That is because these firms had gained a competitive disadvantage due to Obamacare and because 'pay for delay' became punishable because of the signing of the law. The hypothesis H4a must be accepted. Moreover, this thesis concludes that the second event that pharmaceutical firms offer seniors discounts has had an unclear effect on the stocks of generic pharmaceutical firms. That is because the event windows (-3,3) and (0,3) show a statistically significant positive CAAR. This thesis finds that

these returns should be negative. The mandatory senior discount should lead to a reduction in profits and so there should be a negative effect on the shares of brand-name pharmaceutical companies. Only the event window (-1,0) supports this finding, although statistically insignificant. The effect of this second event thus remains unclear. The hypothesis H4b must be rejected. This thesis cautiously contends that the third event that President Trump asked the US Supreme Court to repeal Obamacare has had an unclear effect on the stocks of generic pharmaceutical firms. Cautious is needed again because all CAARs are insignificant. Although the shortest and thus the most reliable event window (-1,1) shows a statistically insignificant positive CAAR, the longer and thus less reliable event windows (-5,5) and (-3,3) show statistically insignificant negative CAARs. Also, the event window (-1,1) consists of a pre-event window (-1,0) and this window also shows a statistically insignificant negative CAAR. This paper finds that these returns should be positive. Repealing Obamacare would mean that the competitive disadvantage would be largely exaggerated. 'Pay for delay' might also be allowed again. So, the effect according to the results remains unclear. The hypothesis H4c must be rejected. This thesis concludes that based on the signing of the law by President Obama that Obamacare has overall had a negative effect on the stocks of generic pharmaceutical firms.

In conclusion, this thesis finds that Obamacare has had a negative effect on the stocks of health insurance firms, brand-name pharmaceutical companies and generic pharmaceutical companies and only a positive effect on the stocks of hospitals. Overall, this thesis concludes that there is a negative effect of the Patient Protection and Affordable Care Act (Obamacare) on the stocks of healthcare companies in the US because only the stocks of hospitals are positively influenced. These findings are largely consistent with those of Ababneh & Tang (2013). The only difference is that Ababneh & Tang (2013) concluded that Obamacare has had a positive effect on the shares of brand-name pharmaceutical firms. This thesis concludes a negative effect of Obamacare on the stocks of brand-name pharmaceutical firms based on the third event. This event was the event that President Trump asked the US Supreme Court to repeal Obamacare. Ababneh & Tang (2013) did not look at Presidents after President Obama. This thesis has done so and therefore does not correspond with the results of Ababneh & Tang (2013) in that respect. This thesis concludes that the results of the former researchers thus must be rejected regarding brand-name pharmaceutical firms.

7. References

- Ababneh, M., & Tang, A. (2013). Market Reaction to Health Care Law: An Event Study. *International Journal of Accounting and Financial Reporting*, *3*(1), 108. https://doi.org/10.5296/ijafr.v3i1.3356

- Achsanta, A. F., Lepetit, L., & Tarazi, A. (2022). Government ownership of banks: Implications for minority shareholders. *Economic Modelling*, *112*, 105842. https://doi.org/10.1016/j.econmod.2022.105842

- Affleck-Graves, J., Callahan, C. M., & Ramanan, R. (2000). Detecting Abnormal Bid-Ask Spread: A Comparison of Event Study Methods. *Review of Quantitative Finance and Accounting*, *14*(1), 45–65. https://doi.org/10.1023/a:1008328107489

- Armitage, S. (1995). EVENT STUDY METHODS AND EVIDENCE ON THEIR PERFORMANCE. *Journal of Economic Surveys*, *9*(1), 25–52. https://doi.org/10.1111/j.1467-6419.1995.tb00109.x

- Bisht, A., Chahar, A., Kabthiyal, A., & Goel, A. (2022). Stock Prediction using Gaussian Process Regression. *2022 6th International Conference on Computing Methodologies and Communication (ICCMC)*. https://doi.org/10.1109/iccmc53470.2022.9754114

- Bonakdar Tehrani, A., & Cunningham, P. J. (2017). Closing the Medicare Doughnut Hole. *Medical Care*, *55*(1), 43–49. https://doi.org/10.1097/mlr.0000000000000613

- Cicala, S., Lieber, E. M. J., & Marone, V. (2019). Regulating Markups in US Health Insurance. *American Economic Journal: Applied Economics*, *11*(4), 71–104. https://doi.org/10.1257/app.20180011

- Costa, D., Garaffa, R., Branco, D. C., Danko, A., & Fiuza, A. (2017). Price volatility across the Atlantic: The US and the European natural gas markets. *2017 14th International Conference on the European Energy Market (EEM)*. https://doi.org/10.1109/eem.2017.7981849

- Currie, J., & Duque, V. (2019). Medicaid: What Does It Do, and Can We Do It Better? *The ANNALS of the American Academy of Political and Social Science*, *686*(1), 148–179. https://doi.org/10.1177/0002716219874772

- Eastman, A. D., & Eastman, K. L. (2013). Personal Federal Tax Issues And The Affordable Care Act: Can Tax Penalties And Subsidized Premiums Provide Sufficient Incentives For

Health Insurance Purchases. *Journal of Business & Economics Research (JBER)*, *11*(7), 315. https://doi.org/10.19030/jber.v11i7.7950

- Hall, M. A., & Lord, R. (2014). Obamacare: what the Affordable Care Act means for patients and physicians. *BMJ*, *349*(oct22 7), g5376. https://doi.org/10.1136/bmj.g5376

- Harrington, S. E. (2012). Medical Loss Ratio Regulation Under the Affordable Care Act. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2180965

- Huguet, N., Angier, H., Hoopes, M. J., Marino, M., Heintzman, J., Schmidt, T., & DeVoe, J. E. (2019). Prevalence of Pre-existing Conditions Among Community Health Center Patients Before and After the Affordable Care Act. *The Journal of the American Board of Family Medicine*, *32*(6), 883–889. https://doi.org/10.3122/jabfm.2019.06.190087

- Hulse, C. (2009, 21 januari). *Obama Is Sworn In as the 44th President*. The New York Times. Geraadpleegd op 29 juni 2022, van https://www.nytimes.com/2009/01/21/us/politics/20web-inaug2.html

- IMARC Group. (2022, 8 juni). *US Generic Drug Market Size 2022, Growth, Companies Share, Demand and Forecast*. Digital Journal. Geraadpleegd op 9 juni 2022, van https://www.digitaljournal.com/pr/us-generic-drug-market-size-2022-growth-companies-share-demand-and-forecast

- Kesselheim, A. S., Sinha, M. S., & Avorn, J. (2017). Determinants of Market Exclusivity for Prescription Drugs in the United States. *JAMA Internal Medicine*, *177*(11), 1658. https://doi.org/10.1001/jamainternmed.2017.4329

- Kim, S. M., & Demirjian, K. (2020, 27 juni). *Trump administration's move to end Obamacare amid pandemic reignites political fight*. Washington Post. Geraadpleegd op 29 juni 2022, van https://www.washingtonpost.com/politics/trump-administrations-move-to-end-obamacare-amid-pandemic-reignites-political-fight/2020/06/26/9c1ddb98-b7bf-11ea-9b0f-c797548c1154_story.html

- Krivin, D., Patton, R., Rose, E., & Tabak, D. (2003). Determination of the Appropriate Event Window Length in Individual Stock Event Studies. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.466161

- Leonard, E. W., Scholz, S., & Alexander, R. M. (2012). Employers United: An Empirical Analysis of Corporate Political Speech in the Wake of the Affordable Care Act. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2138828

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

- McCue, M. J., & Hall, M. (2014). Health Insurers' Financial Performance and Quality Improvement Expenditures in the Affordable Care Act's Second Year. *Medical Care Research and Review*, *72*(1), 113–122. https://doi.org/10.1177/1077558714563172

- Meyers, D. J., & Johnston, K. J. (2021). The Growing Importance of Medicare Advantage in Health Policy and Health Services Research. *JAMA Health Forum*, *2*(3), e210235. https://doi.org/10.1001/jamahealthforum.2021.0235

- Naape, B., & Masoga, M. (2020). An Address of the Global Financial Crises with Unconventional Monetary Policies. *Journal of Economics and Behavioral Studies*, *11*(6(J)), 23–31. https://doi.org/10.22610/jebs.v11i6(j).2936

- Neiman, P. U., Tsai, T. C., Bergmark, R. W., Ibrahim, A., Nathan, H., & Scott, J. W. (2021). The Affordable Care Act at 10 Years: Evaluating the Evidence and Navigating an Uncertain Future. *Journal of Surgical Research*, *263*, 102–109. https://doi.org/10.1016/j.jss.2020.12.056

- Peterson, P. P. (1989). Event Studies: A Review of Issues and Methodology. *Quarterly Journal of Business and Economics*, *28*(3), 36–66. http://www.jstor.org/stable/40472954

- Rao, B., & Hellander, I. (2014). The Widening U.S. Health Care Crisis Three Years after the Passage of 'Obamacare'. *International Journal of Health Services*, *44*(2), 215–232. https://doi.org/10.2190/hs.44.2.b

- Roland, J. (2019, 17 augustus). *The Pros and Cons of Obamacare*. Healthline. Geraadpleegd op 29 juni 2022, van https://www.healthline.com/health/consumer-healthcare-guide/pros-and-cons-obamacare#pros

- Rosenbaum, S. (2011). The Patient Protection and Affordable Care Act: Implications for Public Health Policy and Practice. *Public Health Reports*, *126*(1), 130–135. https://doi.org/10.1177/003335491112600118

- Sanger-Katz, M., Kliff, S., & Bui, Q. (2021, 17 juni). *Obamacare, in Its First Big Test as Safety Net, Is Holding Up So Far*. The New York Times. Geraadpleegd op 29 juni 2022, van https://www.nytimes.com/2020/12/29/upshot/obamacare-recession-big-test.html

- Shah, C., Badiyan, S. N., & Keith, K. (2017). An Oncologist's Perspective on the Affordable Care Act. *American Journal of Clinical Oncology*, *40*(1), 91–93. https://doi.org/10.1097/coc.0000000000000350

- Spatz, I. D. (2010). Health Reform Accelerates Changes In The Pharmaceutical Industry. *Health Affairs*, *29*(7), 1331–1336. https://doi.org/10.1377/hlthaff.2010.0432

- Tanner, M. (2013). The Patient Protection and Affordable Care Act: A Dissenting Opinion. *Journal of Family and Economic Issues*, *34*(1), 3–15. https://doi.org/10.1007/s10834-013-9350-7

- Wilensky, G. R. (2012). The Shortfalls of "Obamacare". *New England Journal of Medicine*, *367*(16), 1479–1481. https://doi.org/10.1056/nejmp1210763

- Winter, B., & Wieling, M. (2016). How to analyze linguistic change using mixed models, Growth Curve Analysis and Generalized Additive Modeling. *Journal of Language Evolution*, *1*(1), 7–18. https://doi.org/10.1093/jole/lzv003

8. Appendices

8.1. Appendix A

Summary of the methodology of this event study

Components of the event study	Formula
1. Estimation window	(-100, -20)
2. Stock return	$Rit = \ln\left(\dfrac{Pt}{Pt-1}\right)$
3. Market return	$Rmt = \ln\left(\dfrac{pt}{pt-1}\right)$
4. Market model parameters	$\alpha i = intercept\left(\dfrac{Rit\ during\ the\ estimation\ window}{Rmt\ during\ the\ estimation\ window}\right)$ $\beta i = slope\left(\dfrac{Rit\ during\ the\ estimation\ window}{Rmt\ during\ the\ estimation\ window}\right)$
5. Normal return of the stocks (market model)	$E(Rit) = \alpha i + \beta iRmt + eit$
6. Abnormal return of the stocks	$ARit = Rit - E(Rit)$
7. Average abnormal return of the stocks	$AARt = \dfrac{1}{N}\sum_{i=1}^{N} ARit$
8. Cumulative average abnormal return	$CAAR = \sum_{t1}^{t2} AARt$
9. Event window	(-5,5), (-3,3), (-1,1), (-3,0), (-1,0), (0,1) and (0,3)
10. T-test	Cross-sectional t test: T-statistic: $tCAAR = \sqrt{N}\dfrac{CAAR}{sCAAR}$ Standard deviation: $sCAAR = \sqrt{\dfrac{1}{N-1}\sum\left((CAR_i - CAAR)\right)^2}$ $CAR_i = \sum_{t1}^{t2} ARit$

8.2.   Appendix B

CAAR hypothesis and result per major activity regarding Obamacare

Major event	Event window	Health insurance firms	Hospitals	Brand-name pharmaceutical companies	Generic pharmaceutical companies
President Obama signed the law	All windows	*Hypothesis:* **negative**	*Hypothesis:* **positive**	*Hypothesis:* **positive**	*Hypothesis:* **negative**
	(-5, 5)	*Result:* **positive**	*Result:* **positive**	*Result:* **negative**	*Result:* **negative**
	(-3, 3)	*Result:* **positive**	*Result:* **positive**	*Result:* **negative*****	*Result:* **negative**
	(-1, 1)	*Result:* **negative**	*Result:* **positive**	*Result:* **negative**	*Result:* **positive**
	(-3, 0)	*Result:* **positive**	*Result:* **positive**	*Result:* **positive**	*Result:* **positive**
	(-1, 0)	*Result:* **negative**	*Result:* **positive**	*Result:* **positive**	*Result:* **positive**
	(0, 1)	*Result:* **negative**	*Result:* **positive**	*Result:* **negative**	*Result:* **negative**
	(0, 3)	*Result:* **negative**	*Result:* **positive**	*Result:* **negative****	*Result:* **negative**
Pharmaceutical companies offer seniors discounts (donut hole)	All windows			*Hypothesis:* **negative**	*Hypothesis:* **negative**
	(-5, 5)			*Result:* **positive**	*Result:* **positive**
	(-3, 3)			*Result:* **positive**	*Result:* **positive*****
	(-1, 1)			*Result:* **positive*****	*Result:* **positive**
	(-3, 0)			*Result:* **Positive**	*Result:* **positive**

	(-1, 0)			*Result:* **positive**	*Result:* **positive**
	(0, 1)			*Result:* **positive***	*Result:* **positive**
	(0, 3)			*Result:* **positive***	*Result:* **positive***
Insurance companies must grant annual insurance rebates (MLR)	All windows	*Hypothesis:* **negative**			
	(-5, 5)	*Result:* **negative**			
	(-3, 3)	*Result:* **negative***			
	(-1, 1)	*Result:* **negative****			
	(-3, 0)	*Result:* **negative**			
	(-1, 0)	*Result:* **positive**			
	(0, 1)	*Result:* **negative**			
	(0, 3)	*Result:* **negative**			
Creation of the VBP-program	All windows		*Hypothesis:* **positive**		
	(-5, 5)		*Result:* **negative**		
	(-3, 3)		*Result:* **positive**		
	(-1, 1)		*Result:* **positive**		

		Hypothesis: positive	Hypothesis: negative	Hypothesis: negative	Hypothesis: positive
	(-3, 0)	Result: positive**			
	(-1, 0)	Result: positive***			
	(0, 1)	Result: positive*			
	(0, 3)	Result: negative			
President Trump asked the US Supreme Court to repeal the ACA	All windows	Hypothesis: positive	Hypothesis: negative	Hypothesis: negative	Hypothesis: positive
	(-5, 5)	Result: negative**	Result: negative	Result: positive	Result: negative
	(-3, 3)	Result: negative	Result: positive	Result: positive***	Result: negative
	(-1, 1)	Result: positive***	Result: positive	Result: positive	Result: positive
	(-3, 0)	Result: positive	Result: negative	Result: positive	Result: negative
	(-1, 0)	Result: positive***	Result: positive	Result: positive	Result: negative
	(0, 1)	Result: positive	Result: positive	Result: positive	Result: positive
	(0, 3)	Result: negative	Result: positive***	Result: positive***	Result: negative

*Note: *Significant at 0,05 level ** 0,01 level *** 0,1 level.*