‘The Impact of New Tech Product Releases on Companies’ Stock Prices’

Bachelor Thesis

This past decade, developments within the tech industry followed one another in quick succession. This study, using an event-induced methodology concludes that the event window around a product release date has only very little effect on a company’s stock value. However, companies with higher revenues tend to yield negative returns while low revenue companies tend to show positive returns in a short period around the release date.

Kevin Schaminée
436325

1. Introduction

In 2016, Samsung's stock prices took a dive due to the Galaxy Note 7 fiasco. The company's main competitor Apple took optimum advantage of this and during this period its stock hit an all-time high ('Samsung share price dives after Galaxy Note 7 recall,' 2016). The tech market has been one of the most developing industries over the last decade and it is known to be relatively reactive to new information coming available to the market (Gawer, A., & Cusumano, M. A. 2002). Therefore, it could very well be the case that new tech products in the market have an influence on the market value of the releasing firm. Possible positive relationships could result in interesting investing strategies such as buying just before a firm releases its new product. Yet negative returns could lead to profits when shorting firms' stock prices around release dates.

Much research has been done into the evaluation of new products.[1] However, few papers show whether these innovations and releases of new products on the market have a direct impact on market value. [2] On top of that, most of these studies are from before the mobile phone era. Because of the extreme changes in technological knowhow, the results of these papers may no longer be accurate. This article attempts to fill the gap in literature as to a company's new product releases having an effect on its market value. This research focuses on the tech industry in particular. This industry will be divided into four categories: mobile phones, laptops, software and semiconductor. Consequently, these four markets will be compared in order to see whether one has more impact than another. This article will also address the question whether firm size makes a difference on the reactions of the stock price around release dates.

The main findings of this paper are that no significant effects were found that would apply to the whole tech industry in general. A possible reason for this could be that most information of the new product is incorporated in the stock price around the announcement event and not the actual release date. However, the results showed that there is a difference between low and high revenue firms: low revenue firms tend to show positive returns while high revenue firms tend to show negative returns. Because developments in this specific tech industry have mainly taken place in recent years and there have been no recent researches specifically into the effect of

[1] For example, Bass (1969), Moore and Lehmann (1982)
[2] For example, Chaney, P. K., & Devinney, T. M. (1992), Blundell, R., Griffith, R., & Van Reenen, J. (1999).

releases on firm value, the exact impact remains unclear. This research leans towards the conclusion that the new information becoming available on a release date is too limited to cause any significant effect on the stock price. However, an identical research with a very large sample size might show more significant results.

2. Literature Review

2.1 Development of the Tech Industry

It is safe to say that the tech industry has been one of the most booming industries over the past two decades. Take mobile phones for example. In 1992 the first SMS message was sent. Only thirteen years later a research by Park in 2005 resulted in the conclusion that there was an upcoming trend to great addiction to technology and to mobile phones in particular (Park, 2005.) In 2007, the first major iPhone was released. In that year Apple sold 1.39 million iPhones. However, 8 years later Apple managed to sell over 230 million mobile phones in just one year. This same company introduced the MacBook in 2006. This is a laptop designed to be taken anywhere, at any time. 10 years later Apple shipped 4.9 million units of those within just one quarter. However, the tech industry is much more than just the products you see at first sight. Software and semiconductor companies are examples of this. Where Windows 1997 made by Bill Gates' Microsoft, was initially a luxury product, Windows now is a must have for almost all people around the globe. In general, software companies like Microsoft, Oracle and SAP make our devices run smoothly. Software companies' semiconductor products are 'hidden away' in our devices. As a result, these companies are relatively unknown. Their revenue mostly comes from doing business with device manufacturers like Samsung and Apple. Qualcomm Incorporated, traded in NASDAQ, is one of those relatively unknown semiconductor companies. Just like other tech companies in other sectors their revenue went up by enormous amounts over the past 10 years.

2.2 The Impact of Innovation and Announcements on Market Value

Modern companies usually consider innovation a must. However, the question is whether innovations are acknowledged by the market. Consequently, does the market value of a firm change in line with its innovations? A previous study researched if innovation of British manufacturing companies had an impact on their market value. This study found that innovation had a positive effect on market value. The impact was larger when firms had larger market shares (Blundell, R., Griffith, R., & Van Reenen, J. 1999). Another study that came to the same conclusions was done by Hall, B. H., & Vopel, K. (1996). Previous research studies have shown that announcements do have an impact on market value. A research study done in 1991 showed the impact of new product introductions on the market. This impact was 0.75 percent over a 3-day period. This effect varied marginally from industry to industry (Chaney, P. K., Devinney, T. M., & Winer, R. S. 1991). Another similar research shows a 0.6 percent abnormal return of a 3-day event window starting one day before the announcement and ending 24 hours after the announcement. This research focused on the tech industry in particular (Chaney, P. K., & Devinney, T. M., 1992). Another research shows the connection between announcements and market value in different way. When announcements come with a delay, this will cost the company 5.25 percent of its market share on average (Hendricks, K. B., & Singhal, V. R., 1997).

2.3 Hypotheses

In general, falling behind in knowhow compared to your competitors can have disastrous consequences. A recent example of this is Nokia, the market leading phone company until the release of the smartphone (Alcacer, J., Khanna, T., & Snively, C. 2014). Moreover, the public is known to be attracted by new product releases. Whether this concerns a big update compared to a previous generation does not always matter. Are those the main reasons firms keep innovating or is there a direct link between new product releases and firm value? Previous studies have shown a slight abnormal return around announcement dates. However, these studies are

aged and the tech market as well as the stock market have changed a lot since then. This leads to the first hypothesis.

Hypothesis 1. New tech releases have an impact on firm value.

The second hypothesis relates to release announcement impact compared to firm size. A study showed that firms with lower sales appear to get higher returns around release announcements Blundell, R., Griffith, R., f& Van Reenen, J. (1999). This could be explained in a few different ways. A smaller company may possibly focus on a few primary products, so that a new release of this product can consequently have a bigger impact on the firm overall. Another explanation could be that smaller firms are relatively unknown. Release announcements events from market-leading firms like Samsung and Apple are usually announced a couple of weeks in advance. As a result of this, traders can already anticipate the outcome of the event before it has taken place. For smaller firms this would be harder to accomplish.

Hypothesis 2. Firms with higher revenues are impacted less around release announcement dates.

It is quite common that data varies between different industries. Usually this is adjusted with an industry beta. However, in this paper we will look at different sectors within one industry. Possibly, some sectors show bigger abnormal returns than others. A possible reason for this is sensibility to new market information. An example of this is the Samsung Galaxy Note 7. After it was released on the market it appeared it could explode randomly at any given time. This had consequences for Samsung's stock prices. However, not long after, its stock prices had fully recovered. The explanation: phones are simply no longer that important to Samsung's stock prices. This could also be so for Apple. This leads to hypothesis 3.

Hypothesis 3. Mobile phone companies show less impact around release announcements dates than laptop, software and semiconductor companies.

3. Research Methodology

3.1 Event-Study Methodology

3.1.1 General Event-Study Methodology

The efficient market hypothesis states that the stock prices reflect all available market information at that moment of time.[3] Therefore, a change in stock price reflects information that has become available. This public information changes the expected future cash flow of the firm. So, you can conclude that by investigating the stock prices around product releases, one is testing the change in market forecast for a firm's future cash flow income. In this particular paper a product release is seen as information that becomes public for everyone, which may affect expected future cash flow of firms.

3.1.2 Description of Event-Study Methodology

When trying to determine the impact of a certain firm specific event the cumulative abnormal returns (CAR) have to be calculated. However, before doing this you will first have to have the constant mean return model. The constant mean return model is given by:

$$R_{i,t} = E[R_{i;t} | X_t] + \xi_{i,t} \quad (1)$$

where $E[R_{i;t} | X_t] = \mu_i$ holds. We expect that $E[\xi_{i,t}] = 0$ and $Var[\xi_{i,t}] = \sigma_{\xi,i}^2$ when no new information has become available between period t – 1 and period t.[4] There are multiple ways to calculate the firm's expected stock price. However, the market model is the one used most in practice:

$$E[R_{i;t} | X_t] = \alpha_i + \beta_i R_{m,t} \quad (2)$$

In this model $R_{m,t}$ shows the return on the market portfolio and the model's linear specification follows from an index. An example could be Standard and Poor's 500 (S&P500). When expected

[3] See, e.g. Basu, S. (1977)

[4] Brown, S. J., & Warner, J. B. (1985) find that simple return models often result in similar results to more sophisticated models.

returns are calculated cumulative abnormal returns have to be estimated. This can be done using the following formula:

$$CAR^{i}_{t,;t+K} = \Sigma_{k}\ AR_{i,,t+k} \quad (3)$$

This paper will consider an event window of E – 3 to E + 3. The event will have a positive economic value with CAR > 0 and a negative economic value with CAR < 0.

After calculation of the CAR, a simple t-test can determine whether the CARs vary significantly from zero. This t-test can be used to test all three hypotheses. For the first hypothesis the sample size will be distributed between years. The second hypothesis splits the sample size in two. One group will be known as the 'high' revenue group and consequently the other one will be the 'low' revenue group. For the last hypothesis the sample size will be split into four groups: Mobile phone, Laptop, Semiconductor and Software. However, to be able to reliably use t-tests 4 assumptions need to hold. The first one is normal distribution of the sample (Appendix A). This assumption holds due to the fact that the sample size has over 100 observations, which leads to normal distribution. The second refers to whether the sample has unequal or equal variances. This is especially important for hypotheses 2 and 3, as the data will be split into groups resulting in a two-sample t-test rather than a one-sample t-test which is the case for hypothesis 1. For hypotheses 2 and 3 a two-sample t-test with unequal variances will be used. Assumption 3 refers to outliers (Appendix A). When some events show extreme returns compared to others, those can be marked as outliers. It might then be better to remove them from the sample as they can have a large impact on the outcome of the tests. The last assumption requires independent samples. As the data is randomly and manually gathered, it is safe to say this assumption is not violated.

3.1.3 Limitations of Event-Study Methodology

There are multiple limitations to event-study methodology. Firstly, stock prices fluctuate naturally and therefore for an event must trigger in such a significant way that abnormal returns will be seen above the natural fluctuation of stock prices. Secondly, most events do not have a

specific event date. There is a tendency that stock prices show abnormal returns before public announcements. Insider trading and leakage can be considered reasons for this. Thirdly, many events do not show a clear view of an impact on a firm. For example, a company could introduce a new product. Consequently, this will trigger investors to either be positive or negative towards the new introduction. Because these groups even out, no clear changes in stock prices will be seen. However, trading volume might still be heavily impacted around these events. Unfortunately, event-study methodology does not show any data about this.

3.2 The Data

3.2.1 Sample Selection

The process of data collection was done in two phases. The tech industry is a very broad industry and therefore it was impossible to pick a sample from each sector. For this reason, the tech industry was split up into four main groups: mobile phone, software, semiconductor and laptop. Each group will contain three companies (two for laptop) which all publicly trade on large stock and index markets like New York Stock Exchange and NASDAQ. To be able to perform an event-study product releases were searched manually. No specific database has been used for this. The product releases took place from January 1st 2010 until December 31st 2017 (2007-2017 for software). Finally, the stock prices of these companies over the same period had to be acquired. Database DataStream was used for this.

3.2.2 Industry Groups

This section contains a brief explanation of why specific companies were chosen. Among the four groups 10 companies will be examined with a total of 143 events.

The mobile industry contains the following companies: Apple and Samsung. These two companies have had the highest market share on the mobile phone market for the past years. One may have heard about the upcoming popularity of Xiaomi and OPPO in the Asian phone

market, yet these companies are not traded publicly and are therefore not ideal for this research. The mobile phone segment contains a total of 36 product releases.

Software companies are another big player in the tech industry. Microsoft, Oracle and SAP will be examined. Microsoft and Oracle are the two biggest software companies in the world. SAP is number four on that list behind IBM. However, only 29% of IBM's revenue comes from software whereas for SAP this is almost 83%. Consequently, a software release from IBM will probably not have as much of an impact on its stock price. The impact for SAP will probably more significant. Due to a lack of releases the timeframe of the software group was extended by three years to January 1st 2007. In this time period 34 software release are studied.

The third group that under consideration is known as the semiconductor group. This group contains product releases that are not always publicly visible, such as chips and processors. This group contains the following three firms: Intel, Qualcomm and NVIDIA. Because semiconductor companies release a lot of new products a selection was made of their major releases. This yields 49 product releases.

The last group is the group of companies that produces laptops. Many companies produce laptops yet this group only contains two companies. HP, Lenovo, Dell and Acer all have about the same market share in this industry and because they all produce dozens of laptops each year two of these companies should be sufficient to show whether these product releases have an impact on their stock prices. 24 events will be studied among HP and Lenovo.

Table 1 Number of announcements and revenue for each company

Group	Company	N	Revenue*
Mobile phone	Apple	14	229.2
	Samsung	22	223.4
Software	Microsoft	11	90.0
	Oracle	5	37.7
	SAP	18	23.5
Semiconductor	NVidia	20	9.7
	Qualcomm	13	22.3
	Intel	16	62.8

Laptop	Lenovo	10	43.3
	HP	14	52.1
Total	10	143	794

NOTE – This table represents all companies and events analysed within the period 2007-2018.
** Total revenue in billions*

4. Empirical Results

4.1 Aggregate Results

4.1.1 New Tech Releases Have an Impact on Firm Value

Table 2 shows the results of cumulative average abnormal returns for 3 event windows by year. However, due to a lack of observations, years 2007-2010 and 2017-2018 are grouped together. The overall results show there is very little correlation between release dates and stock prices. The average daily excess return for event window (-1, +1) is -.01 percent which is not significant. The 7-day window (-3, +3) shows a negative effect of -.03. The widest window (-5, +5) is the only window to show a positive effect of .01 between release dates and stock prices. [5] In table 2 very few events show a significant effect. Possibly, the new information becoming available on a release date is too restrictive to have a significant impact on stock prices. Since most information about the product becomes available around the announcement date, the release date effect could be seen as a correction of possible under- or overvaluation of the product. Remarkably, events across 2014 show 3 out of 5 significant effects. This may be due to the stock market reacting to a disappointing year as to new product introductions within the tech industry. Investors expected the announced new products to be better. Consequently, the stock prices declined marginally to compensate for the overvaluation of the products that took place around

[5] The null hypothesis being tested is H0 : CARi = 0. Consequently, the alternative will be Ha : CARi ≠ 0.

1)

$$S_{CAR}^2 = L_2 \, S_{AR_i}^2$$

2)

$$t_{CAR} = \frac{CAR_i}{S_{CAR}}$$

the announcement date of the new product. The results in table 2 can be interpreted as a rejection of hypothesis 1, which posed that new tech releases had an impact on firm value. However, results in table 2 do not provide a conclusion as to hypotheses 2 and 3. It is still possible that firms with lower revenues show a more significant effect than firms with larger revenues (hypothesis 2) and that mobile phone companies' stock prices are impacted less on release dates whereas one or more of the other three groups are impacted more (hypothesis 3).

Table 2 **Average daily excess returns (in %) by year for different event windows (2007-2018)**

		Event Window		
Year	*N*	*(-1, +1)*	*(-3, +3)*	*(-5, +5)*
2007-2010	*14*	*.20*	*.17*	*.14****
2011	*10*	*-.02*	*-.30*	*-.18*
2012	*13*	*0.00*	*-.05*	*-.10*
2013	*29*	*-.18*	*-.06*	*.04*
2014	*25*	*-.31**	*-.19***	*-.11****
2015	*18*	*.27*	*-.01*	*.08*
2016	*17*	*.03*	*.04*	*.05*
2017-2018	*17*	*.21*	*.16**	*.11*
2007-2018	*143*	*-.01*	*-.03*	*.01*

NOTE – Table shows the release date effect on the firm value. 143 events in total over 10 companies were analyzed within a time period of 12 years. All results are rounded on 2 digits.

* $p < 0.1$

** $p < 0.05$

*** $p < 0.01$

4.1.2 Firms with Higher Revenues are Impacted Less around Release Announcement Dates

To test hypothesis 2 the sample has been split in 2 groups based on revenue. The first group contains the companies with more than 50 billion USD in revenues and the other group contains the other companies. Consequently, a two-sample t-test with unequal variances has yielded the results shown below in table 3 (see assumption 1 and 3 for a two-sample t-test in Appendix A).

Table 3 Difference in returns around releases (in %) between high and low revenue groups

		Event window		
Group	N	(-1, +1)	(-3, +3)	(-5, +5)
>50 billion†	77	-.12*	-.09*	.01
<50 billion††	66	.12*	.03*	.01
Difference		.24*	.12*	.00
t-statistic		-1.37	-1.39	0.04

NOTE – Table shows different reactions as to release date effects for low revenue firms relative to large revenue firms. T-statistic of difference. All are rounded on 2 digits.
† This group contains: Apple, Samsung, Microsoft, Intel and HP.
† This group contains: Oracle, SAP, NVidia, Qualcomm and Lenovo.
** P<0.2*

On the basis of this table we can draw a few conclusions. Firstly, the group with high revenues has negative effects in the 3- and 7-day time window. Contrariwise, the group with lower revenues shows positive returns in the same time windows. However, the CAR in these circumstances only significantly differs from zero in a 20% significance interval. Nevertheless, we can conclude that smaller firms are more likely to have positive returns after a product release and big firms are more likely to have negative returns after a product release. The restriction as to this conclusion being that it only holds for 20% significance and in the two shortest event windows tested. Product announcements from high revenue firms are much more likely to get attention than low revenue firms. Therefore, a possible explanation for this result could be that products of high revenue firms are more likely to be overvalued around the announcement dates due to excessive amount of attention they get relative to the products of lower revenue firms. Secondly, the time window of 11 days shows a very low t-statistic, leading to a very high p-value. From this we can conclude that product releases only have an effect in the very short run and that their restricted impact in shorter windows dwindles quite rapidly. Hypothesis 2 can

therefore be rejected on a 20% significance level, since high revenue companies tend to show negative returns and low revenue companies tend to show positive returns in the short run.

4.1.3 Mobile Phone Companies Show Less Impact around Release Announcements Dates than Laptop, Software and Semiconductor Companies

Hypothesis 3 compares phone companies with semiconductor, software and laptop manufacturing companies. Each group is separately tested, with mobile phones companies using a two-sample t-test. Table 4 below shows the results from the two-sample t-tests.

Table 4 Difference in return (in %) between mobile phone companies and other groups

		Event window		
Group	N	(-1, +1)	(-3, +3)	(-5, +5)
Mobile phone	36	-.04	-.08	.10
Software	34	.06	-.01	-.02
t-statistic		-0.45	-.70	1.57
Semiconductor	49	.12	.11*	.02
t-statistic		-.77	-1.79	1.08
Laptop	24	-.32	-.28	-.09
t-statistic		.69	1.13	1.50

NOTE – T-statistics show difference between mobile phone companies and another group. For example, software t-statistic represents difference between Mobile phone CAR relative to Software CAR around release date. All results are rounded on 2 digits.
** P<0.1*

The stock returns of mobile phone companies tend to have small negative effects in the short run and this shifts back to positive returns in a longer time frame. However, this is not significant at all, and therefore we cannot draw a conclusion from this. The other 3 groups also do not show any significant differences from the mobile phone group. The only significant result is the one between semiconductor and mobile phones in a 7-day time window, where semiconductor companies tend to show significantly more positive returns than mobile phone companies. However, since this is the only significant relationship between all observations, it is

acceptable to reject hypothesis 3. Mobile phone companies do not show less impact around releases dates than the other groups.

4.2 Summary of Results

The empirical results are inadequate to support our hypotheses. Firstly, the rejection of hypothesis 1, as we can see that firm and stock prices do not have a major significant effect on firm value. This is the case for all event windows. Apparent results around this hypothesis were the significant abnormal returns in 2014 compared to the rest of the years studied. This cannot be fully explained from the data available. However, a possible explanation for this could be disappointing product releases of tech companies. Secondly, there is only mixed support from empirical results for hypothesis 2. For 3- and 7-day time windows there is a minor significant effect between high and low revenue firms. For these time windows, high revenue firms are more likely to show negative returns than small revenue firms. Yet this result is completely absent in an 11-day time window, which suggests that the effect is not major. Hypothesis 3 is not supported by empirical results at all. No major significant relationships between mobile phone companies' returns and other industry sector returns were visible. The only significant relationship was the one between semiconductor and mobile phone companies. Since this was only the case in a 7-day time window, it does not provide enough evidence to support hypothesis 3.

5. Conclusion and Discussion

This article presents some results on the impact of new releases on the introducing firms' market values. This article found there were no major effects around these release dates. Furthermore, it was found that low revenue firms tend to show more positive returns than high revenue firms, even if this result was only significant at 20%. Finally, no significant effect was

found when the sample size was split up into company product specific characteristics. A possible explanation for the absence of significant effects could be the lack of new information becoming available around a release date. Before a release takes place, the upcoming product release is usually announced publicly by the company during an event. Around this announcement event the stock market already incorporates the new information that is available about this product. Therefore, the only new information that becomes available on a release date is whether the new product announced by the company actually lives up to customers' expectations. If this is not the case, the stock prices will likely drop due to incorporated overvaluation in the current stock price. Consequently, when a product turns out better than expected, this will lead to an increase in the stock price due to undervaluation. However, announcement events usually show a representable view of the reality and therefore the over- and undervaluation effects around the release dates will be very minor, as van be verified from the results. Other shortcomings could be the actual data available. Certainly, a bigger sample size would lead to more significant effects in general. More conclusions could be drawn than just the few that were drawn now. Another complication this could entail, is the different release dates across countries as sometimes companies decide to release a product earlier in some locations than in others. This would result in less impactful effects as well, due to the already minor new information available around releases being spread across different dates. Other than that, the tech industry is represented by 4 groups in this research. A wider variety of tech manufacturing companies would also benefit the conclusions that could be drawn from this research. Even though no enormous significant effects were found in this research, that doesn't necessarily mean that release date effects do not exist at all. It could very well be the case that possible follow-up studies with a very big and broad sample size, representing the tech industry, could establish a significant effect between release dates and firm value.

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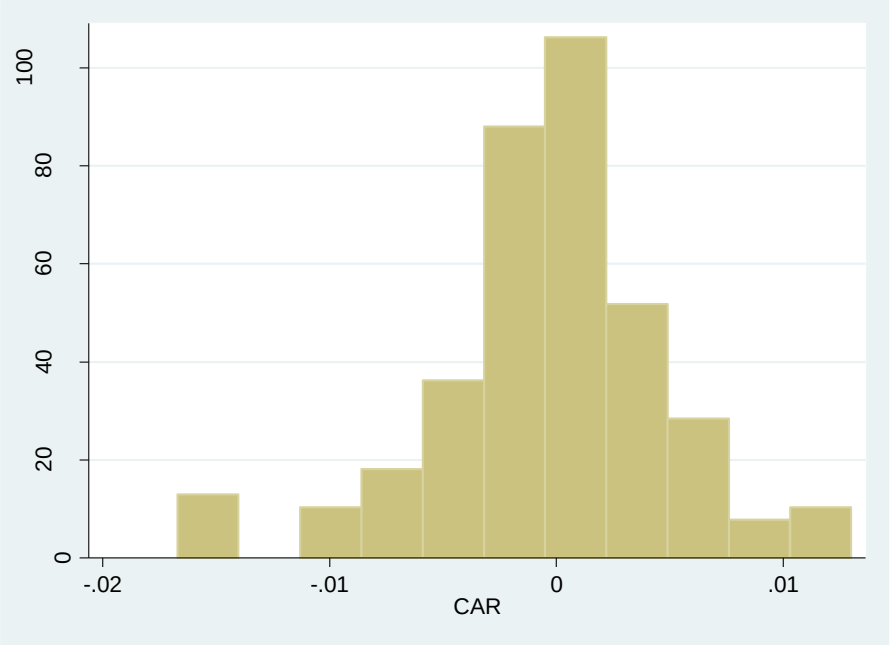
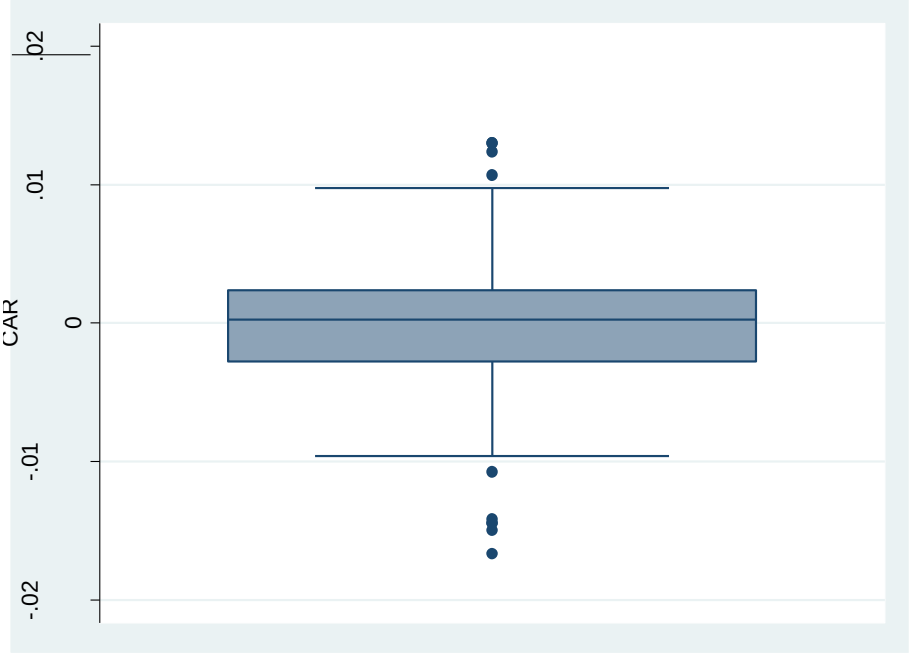
Appendix A

Assumption 1: Normal distribution.



Assumption 3: No outliers



These outliers should not be a problem as it is the nature of stock returns to fluctuate a lot.