UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Mergers and Acquisitions in The Video Gaming Industry

An event study

Kandidatuppsats i Industriell och Finansiell ekonomi
Handelshögskolan vid Göteborgs universitet

Höstterminen 2020

Handledare: Shahryar Sorooshian

Författare :	**Födelseårtal:**
Viktor Glimne	**19910613**
Jesper Stålheim	**19880323**

Abstract

This research paper studies the effect of 102 M&A announcements during 2016-2020 in the video gaming sector. The purpose is to answer whether M&A events within the sector manages to create synergy gains for investors, or if it is just an act of management wanting to control larger firms, increasing the size of companies with little value added. The background of the paper is the recent rise in the debate around corporate leadership, consolidation, and its impact on game development and the new found reason to engage in M&A activity, namely acquiring key personnel. With the use of the event study method the acquiring companies cumulative abnormal return(CAR) in the event window was measured and compared to their expected return calculated through the estimation period. The results indicate that the CAR of 3.45% is significant. The results of the research is that value was created by the events during the time period, and that it might take more than one day for the news to be fully represented in the price of the stock. The paper also concludes that this result is mainly relevant for investors, and gives a recommendation for future researchers to consider using a shareholder perspective to get another angle of value creation and long term success for video game companies.

Acknowledgements

The writers would like to thank our supervisor, Shahryar Sorooshian for his guidance and feedback throughout the writing process. We would also like to thank our fellow students who participated in seminars alongside us and gave us a lot of valuable feedback that we hope is reflected in the finished work.

Table of contents

1 Introduction

Mergers and Acquisitions(M&A) is an area of corporate finance that was growing rapidly during the 80s and 90s, increasing from some hundreds of million dollars to just north of 4 trillion USD in 1999. Since the It-bubble in 2000 it has been moving in waves with the peak years 2007 and 2015 having just short of 50 000 deals with a total value of about 5 trillion USD(imaa, 2020). Bouwman, Fuller & Nain(2009) argue that M&A moves in accordance with the stock market, better times means higher valuation which means more deals.

The main idea behind a M&A is to create value beyond what the individual companies are worth. Through synergies the sum of the deal should be worth more than the individual companies combined. This can be achieved through economies of scale, economies of scope, tax-benefits, increased market power etc (Elliot, 2015). Although M&A have been thoroughly investigated throughout the years, the results from the combined research is inconclusive but with a majority of studies finding evidence that the added value is close to zero. However, more research is needed to help minimize the unknown in why some M&A are successful and others not and if it is sector or reason dependent. (Hitt et al., 2012)

The video gaming industry is a fast growing sector worth 152 billion USD in 2019, up nearly 10% since 2018 (Wijman, 2019). It can be divided into three sub categories, mobile, console and PC. Mobile games account for a bit less than half of the total market revenue, console just below one third and PC just below one quarter (Wijman, 2019). The sector has been positively affected by the covid pandemic during 2020 and with it the M&A activity has increased significantly from a period of decline during 2016-2019. For 2020 the total deals value close to 25 billion USD, up more than five-fold since the previous year and thumping the previous peak of 16 billion USD from 2016. (S&P global, 2020)

1.1 Background

Since the late 2000s the use of smartphones has exploded. During 2020 the number of smartphone users is expected to grow to 3.5 billion(O'Dea, 2020). With this massive increase in users the video gaming industry has grown. The reach of mobile games is immense and what was traditionally a sector for gamers is now a sector for a third of the world population who have at least one game installed on their smartphone(Wijman, 2020). With this in mind it is easy to see the opportunities for

developers as they don't need years of experience, tons of cash or computational power to develop a game. For a sector that has always had low entry barriers this means plenty of new startups. For the existing companies this means they have to be very innovative and agile to remain competitive. Mchawrab(2016) writes *"Operating in a high growing and dynamic markets characterized by a fast-paced innovation, and where barriers are not high, high tech companies use M&A as a vehicle either to acquire a dominant position or to enforce an existing one"* which fits very well to the video gaming industry as well.

As the video gaming industry develops and companies continue to grow, the market is seeing big profile names buying and merging into even bigger corporations, such as Microsoft acquiring the popular games studio Bethesda (BBC, 2020), EA growing ever larger with acquisitions such as popcap games and Respawn Entertainment (Takahashi, 2017) as well as Activision and Blizzard joining forces when Activision merged with Blizzards parent company Vivendi (Activision Blizzard, 2007).

As corporate structures grow larger however, the community of developers and customers have been starting to question the agility of these large structures, and whether it helps or actually hinders effective game development. One of these is founding member of the Blizzard team Mike Morhaime, who left Activision Blizzard in 2018, to start a new type of company that is described in an article on the gaming news website Venturebeat. Morhaime envisions it to be a company that is developer friendly and values product and player experience over short-term financial pressure. In the same article, Morhaime also states that the new company is not going for funding immediately, as he suggests that keeping control of the company's decision making is most important(Takahashi, 2020).

In an article on cnet.com, writer and entrepreneur Don Reisinger wrote about concerns with business decisions being made within the industry and in particular M&A activity, where he saw games themselves being less creative and more derivative (Reisinger, 2008). He attributed this to companies increasing in size and becoming more business savvy, focusing more on the titles that they know brings them revenue by reiterating rather than creating new innovative titles. He used genres such as first person shooters and sports games as examples. Reisinger once again correlates the consolidation of the gaming industry with an increase in derivative titles and a decreased focus on fun and innovation. A point that is also echoed in the Ernst & Young(2019) article that, much like what happened in the

movie industry 10 years ago, the big companies are narrowing their focus on creating fewer, high quality franchise titles.

From the other side, co-founder Matt “Matterhorn” Woomer of Blue Mammoth Games says in the company's blog (Woomer, 2018) that joining with the gaming giant Ubisoft gives them more resources and helps promote their games. This is an example of hopeful synergy gains when merging with another company which creates value in addition to the two involved parties existing value (Romano, 1992).

1.2 Problem Discussion

According to a survey by Ernst & Young from 2019, with 240 executives from video gaming companies ranging from 1m USD to 1b USD in revenue, two thirds think that M&A activity will increase in the next five years and that talent shortage is the main driver of this. So much so that in the coming five year period the main driver for M&A activity will be to secure intellectual property and talented developers.

Safwan Mchawrab writes in his viewpoint in Strategic Direction that *“Facebook’s real motive behind this acquisition was FriendFeed’s key managers and engineers"* (Mchawrab, 2016). Rather than acquiring a company to develop, the acquisition was made because of key managers and developers. Managers and developers who were a vital part in developing gmail and maps when they previously worked at google(Mchawrab, 2016). This is a very interesting example of M&A activities that are going on in the sector that is new and unstudied.

Further with all the M&A activity going on in the video gaming sector, that is forecasted to continue(Ernst & Young, 2019), one can question whether these companies are actually creating value for their shareholders and for the community of gamers or are using M&A as an alternative way of recruiting personnel when they can't hire them in a traditional way.

1.3 Research Questions

The main objective is to find out if value, measured through stock price, has been added or destroyed by answering the following questions.

- Is value added or destroyed through M&A in the video game industry?
- Are the management of companies in the gaming industry creating synergy effects?

This is important because, while previous research in M&A have reached several conclusions about the value of M&A, the current activities within the sector where companies see the quest for talented personnel as the main driver for M&A activity(Ernst & Young, 2019) is new and fairly unstudied. Hopefully, this paper could help interested parties better understand where value has been created in the industry and contribute some useful information to the debate.

There are surely more aspects to these questions, but by approaching it from a financial perspective, something can be said about the decision making of corporate leadership and perhaps the paper can offer some guidance or understanding of why decisions have been made and whether the mergers and acquisitions have created synergistic gains at a base level.

1.4 Academic contribution

Even though the research on M&A is extensive, the search for previous research found very little prior contributions on M&A in the video gaming sector. There is a gap in the literature regarding the video gaming industry and what value is created in the deals being made. That companies in both the software, high-tech and video gaming sectors use M&A as a way to secure key personnel is also something that is new and will probably grow in the future with more technical requirements and a more globalized workspace.

This paper aims to bridge this gap and shed some light on the value creation of M&A and if synergies happen. The conclusions could be adapted to other areas of research where, as in the video gaming industry, human knowledge is a key ingredient of a company's performance.

1.5 Delimitation

This thesis will only look at M&A in the video gaming sector in order to make sure that it is capturing the industry specific effects. The thesis will also be looking at publicly traded companies as this will allow us to get the best unbiased and readily available data. The time span for the research is from beginning of 2016 until the end of november of 2020 in order to obtain updated data that is relevant for the discussion today. Further is that the company that is the acquirer has to be listed and not only have a mother company that is listed.

2 Literature Review

This chapter introduces the theories that lie as a foundation for the thesis. The first 3 subchapters introduce previous M&A research, Efficient market hypothesis and Synergy gain theory. These chapters serve as the foundation for the chosen method and explain assumptions as well as theories behind the method. 2.4 and 2.5 present characteristics specific for the industry chosen for research and are mainly used in order to analyze the result and put it into context. Subchapter 2.6 introduces stakeholder theory, which is discussed in the analysis and conclusion sections as a possible other way to look at the issues presented in the introduction, and as a possible starting point for future research.

2.1 Mergers & Acquisitions

Even though the terms Mergers and Acquisitions are used interchangeably, there are some differences that are quite important. A merger is a consolidation between two, often of similar size, entities or companys. It's a friendly transaction where the board of directors in each company seek the shareholders approval before a decision is made. The deal is usually negotiated during a long time period as the different company structures and philosophies have to be taken into account. An acquisition is often hostile and the acquired company ceases to exist as it is absorbed into the acquiring company. As acquisitions have a somewhat negative tone to it often acquisition deals are referred to as a merger even though it's not. (Majaski, 2020)

There exists numerous reasons for engaging in M&A activities and how they are grouped together differs widely between authors. Piesse et al(2006) states eight different reasons for takeover: efficient theory, agency theory, free cash flow hypothesis, market power hypothesis, diversification hypothesis, information hypothesis, bankruptcy avoidance hypothesis and accounting and tax effects.
Whereas Geiger and Schiereck(2014) mentions three main reasons: efficiency theory, monopolistic collusion theory and agency theory. The main idea behind M&A is to create something that is worth more than what the individual companies would be. However, other reasons for M&A exist such as managerial hubris, which are very unlikely to create value (Elliot, 2015). The managerial hubris hypothesis involves agency theory where managers reap the benefit, through power and increased salary, on the detriment of the acquiring firms shareholders (Bindabel, 2020).

One key reference that has provided good background information is the article *Creating Value Through Mergers and Acquisitions* by Hitt et al from 2012. The article brings up previous research, how previous research has been conducted and some of the conclusions that have been reached before. One of the main findings in the article was that, while M&A has been a popular activity, it often creates limited to no value for the acquiring firms shareholders. They say that this is, among other things, attributed to too high premiums paid, the synergy imagined was not realized, integrating new parts was not effective and that the wrong targets were acquired. They also comment that the mixed results from the research is complex. When paying cash the deal has a higher chance of creating value than if stock is used as payment and prior M&A experience can be beneficial if management has learned from it. However care has to be taken that the prior M&A outcome is attributed to the right factors so not to draw the wrong conclusions(Hitt et al., 2012). Trichterborn et al(2016) also concluded that prior M&A experience had a positive impact on M&A performance. They further hypothesize, and show, that having a M&A function, a separate dedicated organizational unit, significantly increases M&A performance. The unit functions as a bundle for all M&A related information which in turn helps them to be proactive rather than reactive in M&A deals. It also works as a filter for acquisitions sorting out the irrelevant from more relevant proposals. Further it helps nursing deliberate learning mechanisms and provides the M&A process with experience and know-how.

Aloke Ghosh(2001) did a study in which he argues that a lot of the value creation found in previous M&A studies were biased. This since the firms engaging in M&A came from a period of above average profit and should therefore not be compared to the mean or median of the market but to that of matching firms. When accounting for this he did not find that merging firms were able to increase cash flow post merger. He did however find that if cash was used as payment post merger cash flows did increase.

2.2 Efficient market hypothesis

The efficient market hypothesis theory(EMH) was created by Eugene Fama back in the late 60s. The theory states that the price of a stock reflects all available information at that moment. It incorporates randomness as information becomes available randomly and as such stock price movements behave in the same way. It

means that it's impossible to beat the market consequently, risk adjusted, with the information that is available to the market since everyone has the same information and are expected to act on it immediately(Burton, 2003). According to Berk & DeMarzo(2017) securities with equal risk should have equal return, but that statement is incomplete without a definition on what equal risk is. And the fact that people, with different views and beliefs, have to judge this riskiness and may do so differently. This leads to the efficient market hypothesis is best viewed as a perfect approximation of a competitive market.

In his original paper Fama divided his empirical work into three information dependent categories where different information is already included in the stock price. The *strong form* assumes there is a limitation on the information available to the public - in other words, individuals or groups of people have exclusive information that is essential for the stock price but even this privileged information is included in the stock price. The *semi-strong-form* involves all publicly available information being already accounted for in the stock price and in the *weak-form "the information subset is just historical price or return sequences"*. (Fama, 1970, p 414)

There is a lot of criticism against the theory that if it was true there wouldn't have been any market bubbles. Burton(2003, p 59) addresses this in his article and concludes *"stock markets are far more efficient and far less predictable than some recent academic papers would have us believe. Moreover, the evidence is overwhelming that whatever anomalous behavior of stock prices may exist, it does not create a portfolio trading opportunity that enables investors to earn extraordinary risk adjusted returns."*

2.3 Synergy gain theory

According to Roberta Romano(1992), one of the main reasons behind a merger or acquisition of another company is the possibility of gaining value by utilizing synergies between the two companies. This may take the form of either real operating synergies or financial synergies. The former may further be broken down into different types. Economies of scale is the theory where the fixed costs of the company is divided up between a higher amount of output in a firm with larger capacity to produce. Economies of scope is when companies with complementary strengths and weaknesses are combined in order to create a stronger whole.

Another example of synergy gain that Romano brings up is that of managerial synergy. This assumes that the managerial ability of one company is considered to be especially good, and that this ability could be used to manage more assets more efficiently. It assumes that the managerial ability is generated by a team and that more assets can be bought and put under the management of the good managerial team, which develops firm-specific knowledge. In accordance with the theory of synergy gain in economies of scale, there seems to be more value generated between firms of different sizes. There also seems to be evidence for more value generated when economies of scope apply, says Romano.

The other type of synergies is the one of financial synergy where reduction in the cost of capital would constitute as the main financial synergy of merging companies. Romano lists three ways in which companies reduce their cost of capital through M&A. By lowering the risk of bankruptcy less needs to be paid to cover the risk, tax shields can be used more efficiently and if one company uses external funding for projects, it can use internal revenue from the added company to acquire funds instead, reducing the cost of borrowing from having to seek external investors that want a certain return.

2.4 Video gaming and related sectors

A master thesis conducted by Tatiana Abramova titled *Stock Price Reactions on M&A, Dividends and Game Releases. Evidence from Gaming Industry*(2013) looked at 55 M&A announcements in the video gaming sector during 2008-2013. Tatiana found that these events had a positive impact on the CAR of both the acquirer and the acquired companies' stock price and that buying a new subsidiary or a major stake of a company affected positively on a acquirers stock price in the event and post event window.

Being that the literature on M&A in the video gaming sector is so scarce the literature review was extended to include the software sector. Markus Schiefs(2013) thesis titled *Business models in the Software Industry* regards business model characteristics and how it impacts the firm and M&A performance. Overall the results reflect what can be seen in other sectors. The value added for the acquired firm is positive, and often quite substantial emphasizing that companies are willing to pay high premiums for innovation. The data for the acquiring company is however not

conclusive. However, Schief finds three characteristics for positive M&A performance for the acquiring firm. The market has a positive reaction to what Schief refers to as software companies focusing on application software, software companies that use M&A as an external source of innovation to keep their portfolio up to date and lastly M&A events from companies in the consumer software sector.

2.5 Market characteristics of gaming industry

In an article in the Journal of Interactive marketing André Marchand and Thorsten Hennig-Thurau write about the cyclical nature of the gaming market. According to their sources, gaming and software sales are cyclically connected to the hardware that they are played on. According to the writers this means that as a new console is released games are sold with it and sales rise as more people get the new console until it reaches its peak and starts to decline in wait for the next generation of consoles to arrive(Marchand & Hennig-Thurau, 2013).

Another point brought up in Marchand and Hennig-Thuraus' article is that the demand for mobile gaming has been taking more and more of the market share and that this might affect the nature of video gaming sales. Following up on this in a more recent article in Forbes, Matt Gardner writes that the gaming industry is expected to experience further large growth the next 3 years but that this is not due to games sales revenue related to the next generation of consoles, the Playstation 5 and Xbox Series X coming out. Instead the growth is expected to come from mobile and cloud gaming.(Gardner, 2020)

2.6 Stakeholder Theory

Stakeholder theory poses the thesis that managers and companies are not only responsible for creating the best returns for investors, but also need to look at the interests of customers, suppliers, employees and society at large to keep success in the long run. The theory came out of the need for managers to tackle a rapidly changing business environment and a need for a broader framework than just for the good of the stockholders'. It was designed to understand the needs of everyone who could affect, or was affected, by the success of the organization's objectives or goals. This is to be done by actively managing the relationships, interests and environment concerning and surrounding the business (Freeman & Mcvea, 2001).

It is meant to be a single framework for management that is more flexible than earlier ideas, designed to see the organization in relationship with the environment around it and focusing on achieving continued survival. This is done by aligning the interests of the different stakeholders without causing a conflict between them. These parts of stakeholder management are based on the enterprise strategy, which is the description of what the firm actually stands for. This stable core is needed for a successful enterprise according to Freeman and Mcvea(2001).

3 Methodology

A fundamental requirement for M&A research is to decide and define what will be the determinants of success. In this research what this paper refers to as value created is measured through short term abnormal returns of stock price.

The aim of the thesis is to research whether there's an abnormal return in the stock price in the event of a M&A announcement in the video gaming sector. The abnormal return will be compared to the expected return at the significance level of 95%, which is in line with what most event studies use. The hypotheses will therefore be:

H_0: The M&A event has no impact on the distribution of the returns on acquiring firms. $\mu = 0$
H_a: The M&A event has an impact on the distribution of the returns on the acquiring firms. $\mu \neq 0$

Data was collected by the researchers from various sources but the data will not be produced so the data used will be secondary. Data collected will be observed, unchanged and unbiased by the authors and used to conduct a statistical analysis. This means the research will follow a quantitative descriptive approach.

3.1 Event studies

Event studies method is often acclaimed to either Ball and Brown(1968) or Fama et al(1969). It is a statistical method used to study the effect of unexpected events on the price of a security. It can be used to study the impact on stock prices for all events that could affect the stock price such as managerial behavior or M&A announcements from corporations. Three underlying assumptions are that (1) the market on which the stock is traded is effective and (2) the event is unexpected and (3) no confounding effects during the event window (McWilliams & Siegel, 1997). If information about the event has leaked out prior to the event that would already have been absorbed in the stock price. With these assumptions it is possible to calculate the abnormal return of the event that is studied and compare it to the expected normal return of the company or the market model return(Wang & Ngai, 2020). Abnormal return is defined as the actual return of a portfolio or stock minus the return of a market portfolio, such as an index(S&P500, Dow Jones), mean or CAPM portfolio(Tracy, 2020).

Event studies have become very common in financial research because accounting profits are not always a reliable and a good measure of a company's performance. Accounting data can be manipulated by management whereas stock prices are supposed to represent the discounted value of all future cash flows and take into account all available information. Also it is fairly easy to use because the data needed are public. (McWilliams & Siegel, 1997)

According to McWilliams and Siegle(1997) the biggest criticism of the methodology is too small sample size, too long of an event window and not looking for confounding effects. Further, as with all statistical analysis you always run the risk of type I and II errors(Braw & Heaton, 2015).

In an article in the Strategic Management Journal author Namgyoo K. Park(2004) discusses solutions to when you use Event studies in multiple country settings. He argues that using a country specific market model in a multi-country event study is likely to overestimate the value created from the event and therefore proposes the use of a world market portfolio in these settings.

3.2 Data collection

An event list was collected from S&P global marketplace database. Video game companies were listed within the Home Entertainment Software category together with some other types of companies such as streaming services. That generated a list of about 750 events per year, so to further narrow it down private equity deals were excluded and the paper only looked at acquisitions of whole companies. The paper didn’t put a geographical restriction on the search but chose to only look at the data from the last 5 years, 2016 until last november of 2020.

The original list of about 350 deals were checked through and all the deals where at least one part wasn't publicly traded were deleted. This unfortunately had to be done manually since there was no such function in the S&P database. Further only companies clearly linked to the video gaming industry were included. The idea was to look at both the acquirer and the acquired companies' returns during the event window. Unfortunately most of the video gaming companies that got acquired were not publicly traded. They were therefore excluded from the research. More companies were excluded from the list when stock data were collected as stock data did not exist as they might have been listed recently. A fair amount of deals got

excluded from the list as the acquiring company was wholly owned by another listed company. Another possible solution would have been to look at the abnormal returns of these mother companies, but as there were sometimes more than 10 deals per year from these mother-companies it was preferable to exclude them.

In the end the list of M&A events consisted of 102 events in the video gaming sector.

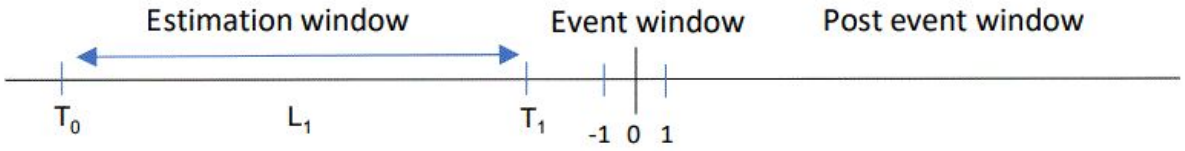
The stock and market portfolio data was collected with the historical data tool from investing.com.

3.3 Method

Online software 'Event study calculator', available at eventstudytool.com(Schimmer et al., 2014), was used to run the regression and calculate the AR, AAR and CAAR. It follows the framework outlined in section 3.3.2 below which is the same framework as outlined by MacKinley(1997).

3.3.1 Framework

The event window were the 3 days around the event(-1,1) as a short event window decreased the risk of confounding effects. The reasoning behind the chosen event window was that in some cases the news reaches news-sources the day before it was announced(McWilliams & Siegel, 1997) which gives some traders the opportunity to trade before the market. The arguments for extending the event window to one day after the event is that the M&A announcement could have been after the market closed on day zero, and as such, the event window would have missed the stock movements from the event. A second analysis were run with an extra day(-1,2) in the event window to see if the market needed more time to adapt. As per the efficient market hypothesis the stock prices should adapt straight away there wasn't a need to incorporate a longer event window as it would have only increased the risk of confounding effects. The estimation window for the parameters was a period of 110 days ending 7 days prior to the event(day 0). In some cases, where companies were involved in multiple events or other confounding effects, other time periods for the estimation window were used. The length of the estimation window is referred to as L_1, which equals $T_0 - T_1$. The market portfolio was the MSCI world index as there were events from all over the world.



(figure 1: Timeline of event window)

The estimated return *R* of stock *i* on time *t* is calculated as follow:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad eq\ (1)$$

$$E(\varepsilon_{it} = 0) \qquad var\ (\varepsilon_{it}) = \sigma_{\varepsilon}^{2}$$

where R_{mt} is the return of the market portfolio, α_i is the intercept term and the market independent stock return of firm i, β_i is the systematic risk of stock i and measures the sensitivity of firm i based on market return and ε_{it} is the error term expected to be zero. Further α and β are derived from the regression of R_{it} on R_{mt} during the estimation period. The estimated returns of R_{it} are approximated from the return of the market model with the parameters calculated from the regression during the estimation window. So as not to bias the parameters the estimation window is before, and not involving, the event window and other confounding effects.

Ordinary least squares(OLS) is a consistent method used to calculate the parameters(α and β) of the market model through making a regression between stock *i* and the market index.

$$\beta_i = \Big(\sum_{t=T0+1}^{T1} (R_{it} - \hat{u}_i)(R_{mt} - \hat{u}_{mt}) \Big) \Big/ \Big(\sum_{t=T0+1}^{T1} (R_{mt} - \hat{u}_{mt})^2 \Big) \qquad eq\ (2)$$

$$\alpha_i = \hat{u}_i - \beta_i \hat{u}_m \qquad eq\ (3)$$

$$\sigma_{\varepsilon i}^{2} = 1/(L_1 - 2) * \sum_{t=T0+1}^{T1} (R_{it} - \alpha_i - \beta_i R_{mt}) \qquad eq\ (4)$$

where

$$\hat{u}_i = 1/L_1 \sum_{t=T0+1}^{T1} R_{it}$$

$$\hat{u}_{mt} = 1/L_1 \sum_{t=T0+1}^{T1} R_{mt}$$

Where $\hat{u}_i$ = average return of R_{it}, $\hat{u}_{mt}$ = average return of the market portfolio, L_1 = the length of the estimation period(from T_0 to T_1 in the picture above). (MacKinley, 1997)

Abnormal return(AR) is then calculated as follows:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \qquad \textit{eq } (5)$$

$$\sigma^2(AR_{it}) = \sigma_{\varepsilon i}^2 + (1/L_1)((R_{mt} - \hat{u}_{mt})^2 / \sigma_m^2) \qquad \textit{eq (6)}$$

The variance of the abnormal return can be described as having two parts, one is the disturbance variance from eq (4) and the second is the sampling error in the parameters(*α & β)* that is found in all event window observations. As the length of the estimation window(L_1) increases the second term approaches zero. One usually chooses an estimation period sufficiently long to see past the second term.

The abnormal returns are then accumulated for the days during the event window(τ) for the cumulative abnormal return(CAR) for all the specified firms. This means that each event gets one CAR, which is the total return of firm *i* during the event window:

$$CAR = \sum_{\tau 2}^{\tau 1} AR_{it} \qquad \textit{eq } (7)$$

$$\sigma_i^2(\tau_1,\tau_2) = (\tau_2 - \tau_1 + 1)\sigma_{\varepsilon i}^2 \qquad \textit{eq (8)}$$

The average of this CAR, cumulative average abnormal return(CAAR), is then calculated where N is the number of firms in the sample. CAAR is therefore the average return for all the events in the sample:

$$CAAR = \frac{1}{N} \sum_{i=1}^{N} CAR_{it} \qquad \textit{eq } (9)$$

$$\sigma^2_{CAAR} = \frac{1}{N^2} \sum_{i=1}^{N} \sigma_i^2 \qquad \textit{eq(10)}$$

The formulas above are valid for both the acquired and acquiring firm and can be used to conduct statistical tests to test a hypothesis and see if the returns are statistically different from the value you are testing against(MacKinley, 1997).

3.3.2 Statistical tests

Statistical tests are used, as a basis, in deciding whether to accept or reject the null hypothesis and therefore accept the alternative hypothesis in hypothesis testing. There are a couple of different tests where parametric tests assume that the data follows a probability distribution whereas non-parametric tests don't assume that the data follow any type of probability distribution.

According to McWilliams and Siegel(1997) the parametric test statistics used in event studies are prone to be affected by outliers. Therefore they recommended that with the parametric test conducting a non-parametric test to control for this. Further

they write that identifying and measuring the effect of outliers is valuable in small sample event studies. It is argued that since stock prices aren't normally distributed the power of non-parametric tests is far greater than that of parametric tests. However problems in implementing such tests have caused researchers to rely on parametric tests(Kolari & Pynnonen, 2011).
The underlying difference between non-parametric tests and the tests based on parameters is that these tests do not rely on the sample following a certain distribution and require less assumptions, giving a more robust result. More specifically, parametric tests make assumptions about the population parameters such as the mean, and that the population is normally distributed. As the non-parametric tests make no such assumptions, they can be used freely when the population is not normally distributed, as well as when it is. (Campbell, 2016)

According to Joachkim Klement's article *The distribution of stock market returns*, the distribution of stock returns are in general not normally distributed. This would indicate that non-parametric tests would be ideal for event studies and stock market analysis in general, but according to other research done on daily return data by Berry et al(1990), in their paper *Using Daily Stock Returns in Event Studies and the Choice of Parametric versus Nonparametric Test Statistics,* it would seem that because of its defined distribution and the normality of residuals of daily data, parametric tests are to be preferred over nonparametric ones.

The preference of parametric tests is also echoed in Campbells article. For the reasons of wanting to say something about the population which is done easiest using parameters and, also relevant, that the parametric tests have arguably more statistical power, causing them to better detect significant differences when they are actually there (Campbell, 2016). MacKinley(1997) writes that non-parametric tests are not used on their own but rather as a verification of the results from the parametric tests.
Because of these reasons, the report focuses on results from the t-test and the conclusions in this report will mainly be based on these. A non-parametric test results are included as well since as mentioned above, there are arguments for using them even though they have a secondary role merely for comparison in this report.

A t-test is very common and follows different distributions of probability depending on the degrees of freedom you employ. The degrees of freedom is your sample size

minus one. When the degrees of freedom increases it approaches a classical normal distribution.

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} \qquad \textit{eq(11)}$$

where s

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} \qquad \text{eq(12)}$$

where x is the sample mean, μ is the mean from H_0 that you are testing if the x value differs from, s is the sample standard deviation and n is the number of events.

Wilcoxon signed-rank test will be used as a non-parametric counterpart to the t-test performed. Because it does not only take the sign but also the size of the abnormal return and rank it into account compared to a simple sign test which would be the easiest non-parametric test to implement. The procedure follows:

1. Calculate the absolute difference between the CAR and the hypothesis
2. Remove all the differences that equal zero and adjust N accordingly
3. Rank all the events from 1 to N in an ascending order
4. Give all the events either a positive or negative sign depending on whether CAR is positive or negative
5. If there is a tie they receive the average of the ranks they span
6. Calculate W_+. It's the ranked sum of the positive numbers.

Because Z is approximately normally distributed, N(0,1) when H_0 is true:

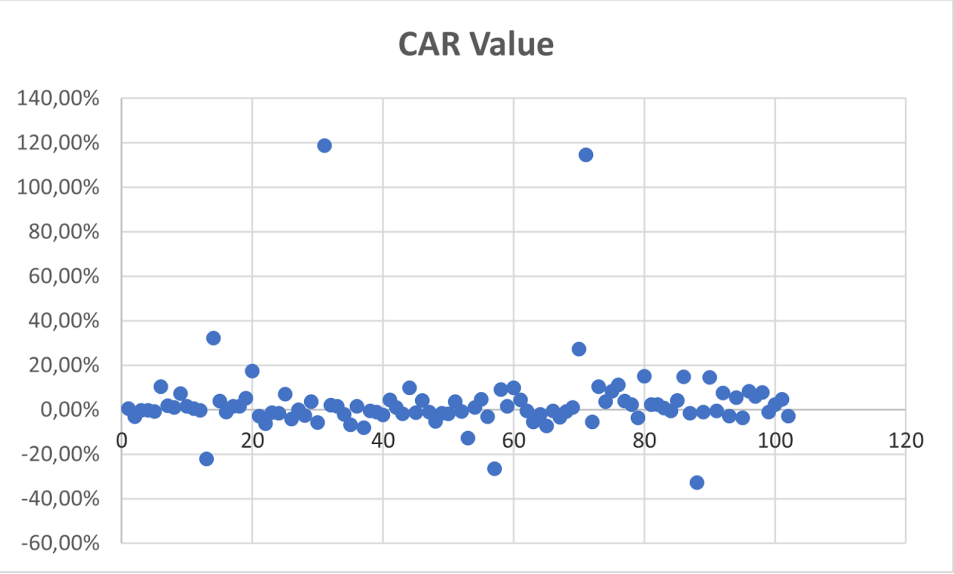
$$Z = \frac{W - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}} \qquad \text{eq(13)}$$

(Lind et al., 2015)

4 Results

The data presented in this section is derived from the results returned from the online software eventstudytools.com used to run the regression. The data came in five different excel files from where the graphs and figures were made. In the tables the reader will find presented confidence intervals, p-values, standard deviations and added a note on whether it was statistically significant according to the alpha used. A student t-test and wilcoxon signed-rank-test was performed to check whether the CAR and CAAR were statistically different from zero, as per hypothesis H_0.

As can be seen in the list of the events in the appendix, there are quite a lot of companies that have been involved in multiple deals during the 5 years chosen to look at.



(figure 2: CAR value for every event in event window(-1,1))

Figure 1 shows the CAR for the 102 different events(on the x-axis) for the main event window(-1,1). The data, and figure 1 above, showed that the spread of the CAR between the events was big. Some outliers can be spotted with returns exceeding 100%. Three events were in itself significant with an absolute t-test score of more than 4,3(2 degrees of freedom as N=3 in the main event window).

AAR was divided during the three days in the event window as follows: the day before(-1) AAR was 0.17%, day of the event(0) 0.48% and the day following the event(+1) 2.80%. The average alpha was very close to zero and average beta came in at 0.69. The CAR spread was big ranging from -32% to 118%.

(Table 1: Parametric test scores)

PARAMETRIC TEST								
event window	CAAR	pos:neg	N	t-test score	p-value	confidence interval 95%	significant	std dev
(-1, 1)	3,45%	54;48	102	1,925	.057	3.45 ± 3.55	No	18,10%
(-1, 2)	3,08%	59;43	102	2,157	.033	3.08 ± 2.83	Yes	14,42%

Figure 3 shows the CAAR, t-test scores, p-value, confidence interval and standard deviation for the two event windows used. Only the longer event window was statistically significant at the predetermined level of 5% even though the short window came in close. Standard deviation and the p-value decreased in the longer event window and as such narrowed the confidence interval. In the longer event window the number of positive observations increased by 5 compared to the main event window.

As McWilliams & Siegel(1997) mentions in their research the data is often driven by outliers and a test to check how they affect the data is good practice in small samples. To check whether the data was driven and affected by outliers a second analysis was conducted where they were excluded. Mainy the 3 events that were statistically significant on their own, and a forth which had a CAR of more than 100%. This caused the AAR during the three event days to be much more even; 0.1%, 0.52% and 0.64% respectively. The mean of beta increased from the regression where to 0.82 whereas alpha remained close to zero.

(Table 2: parametric test scores excluding outliers)

PARAMETRIC TEST EXCLUDING OUTLIERS								
event window	CAAR	pos:neg	N	t-test score	p-value	confidence interval 95%	significant	std dev
(-1, 1)	1,25%	51;47	98	1,568	.120	1.25 ± 1.58	No	7,89%
(-1, 2)	1,77%	56;42	98	1,988	.049	1.77 ± 1.766	Yes	8,81%

Figure 4 shows that the main differences by excluding the outliers is that the spread of the results gets a lot narrower as the standard deviation is more than halved. The results from the main window remained insignificant where the CAAR was drastically decreased to 1.25% and the p-value was .12. The longer event window was statistically significant.

(Table 3: Wilcoxon signed-rank test)

NON-PARAMETRIC TEST						
Event window	CAAR	pos:neg	N	W+ test score	p-value	significant
(-1, 1)	3,45%	54;48	102	2,0296	.042	Yes
(-1, 2)	3,08%	59;43	102	2,2383	.025	Yes

Figure 5 shows the results from the non-parametric test, a wilcoxon signed-rank test, conducted. When H_0 is true the W_+ value calculated is approximately normally distributed, hence a p-value could be calculated. The p-values are significant at the pre-specified 5% level. A longer event window had a big effect on the test scores as the p-values decreased significantly.

(Table 4: Wilcoxon signed-rank test excluding outliers)

NON-PARAMETRIC TEST EXCLUDING OUTLIERS						
Event window	CAAR	pos:neg	N	W+ test score	p-value	significant
(-1, 1)	1,25%	51;47	98	1,7960	.072	No
(-1, 2)	1,77%	56;42	98	2,0145	.044	Yes

With the big number of positive to negative CAR values the longer event window remained significant when excluding the outliers whereas in the shorter event window it did not.

5 Analysis

This paper's research purpose was to examine whether or not there was any value added through the M&A event for the shareholders. The research hypothesis read:

H_0: The M&A event has no impact on the distribution of the returns on acquiring firms. $\mu = 0$

The analysis, and the conclusion that follows, will mainly be focusing on the data from all the events. There will however be a discussion about what affects the outliers had on different parametrics as they are prone to skew the results(McWilliams & Siegel, 1997).

5.1 Main event window

The results show that, even though the CAAR of 3.45% was quite high, it was not significant according to the t-test with a p-value of .057 across the main event window. This was mainly due to the very high volatility of more than 18% that had a very big effect on the t-score. The AAR hints that most of the CAAR comes at or post event day indicating that in most cases there haven't been much of an information leakage before the announcement day. At a first glimpse the results, with all the companies included, indicate that the market didn't react fully on the day of the announcement but rather the day after as the AAR on the day following the announcement was 2.8%. This could be explained by the announcement being after the markets closed day zero, or that there was a strong form of the efficient market hypothesis (Fama, 1970) and all information wasn't available to the public on day zero but rather the day after the event. It is however more likely that it was driven by some companies M&A announcement being after the markets closed on day zero, something that gets more clear when looking at the data excluding the outliers as McWilliams & Siegel(1997) suggests.

When looking at the data excluding outliers the CAAR decreased to 1.25% and the AAR during the three days were much more evenly spread with the biggest part still on the day after the announcement. Even though the volatility was more than halved the results remained insignificant due to the low CAAR with a p-value of .120 which is the lowest p-value recorded in the research. As expected the confidence intervals excluding the outliers became much narrower compared to the case with all the events as the volatility was drastically decreased. This was again caused by the outliers driving both the CAAR and the volatility.

The betas of the group of companies were following the MSCI index fairly well, especially when looking at the betas excluding the outliers with a beta of 0.82. Again, it seems the outliers did indeed create quite a lot of noise in the data as the beta with them were much lower at 0.688. This goes against what Marchand & Hennig-Thurau(2013) writes about video games companies not being cyclical around the general economy or market trends but rather follow another cycality around when consoles are released. Since much has changed in the video gaming industry since their paper in 2013 it's very likely that the cycality around console release dates has more or less disappeared with most of the revenue nowadays coming from mobile(Gardner, 2020) and that the video games sector follows the general market much better. Some cycality will probably remain since consoles and the associated sales are still released every now and then and they still account for about one third of the market.

The non-parametric wilcoxon signed rank test was, unlike the t-test conducted, significant with all the events with a p-value of .0424 but remained insignificant in the case excluding the outliers with a p-value of .0723. This value is however a lot closer to the significance level of .05 compared to the t-test. With these results in mind it would be easy to accept the H_0 hypothesis, that the M&A events did not create any value for the shareholders. However as an observant reader will see in the case of the longer event window, things did change more than anticipated making it harder to decide whether to accept or dismiss the hypothesis.

5.2 Long event window

Increasing the event window with one day post event had a bigger impact than expected. In both the case with the outliers and in the case without them the p-values from the results were lower and the results were significant. The data however suggests different reasons for this. In the case with the outliers the decrease in the p-value can, arguably, be driven by the reduction of the standard deviation, whereas in the case without outliers it is driven by a higher CAAR. Comparing the numbers with or without the outliers it seems the CAAR is converging. It can be interpreted as there was an overreaction in the stock prices of, mainly, the outliers during the main event window which was followed by a correction, or possibly some shareholders selling for profit. The rise in CAAR excluding the outliers is however harder to explain but a fairly improbable reason could be a strong-form market according to the efficient market hypothesis(Fama,

1970) where a group of traders get the information before it's available to everyone. This does not seem very likely these days as information is shared across the internet in milliseconds and as such the stock prices should adjust accordingly. But some kind of insider trading is not ruled out. Another, perhaps more probable, reason is that the market is having a hard time valuing the companies involved in the M&A events in the video gaming sector. Compared to the main event window there was a big rise in the number of positive to negative observations with adding one more day to the event window. This implies that the market is still trying to decide what the stocks are worth after the main event window. The theory states that the stock prices should adapt more or less straight away as per the efficient market hypothesis. But this big movement one day after when the market, at the latest, should have adapted to the new information tells us that either video game companies are especially hard to value or that there is some sort of strong form of the efficient market hypothesis where some investors have more information available to them than the rest of the traders.

The non-parametric wilcoxon signed-rank test conducted was significant in both the case with or without the outliers with p-values of .0252 and .0439 respectively. As there's quite a bit of question marks over if the stock returns is following a normal/t-distribution or not(Klement, n.d.) these tests verifying the findings from the t-test is a good validation according to McWilliams & Siegel(1997). Even though one can't be 100% certain that value was created, and will be in the future, the data for the group strongly suggests the market sees M&A activity in the video gaming sector as something positive. Though the results didn't fully agree in the shorter event window, the results were all significant in the longer event window. This leads us to believe there is evidence of some value creation from the M&A events and as such the H_0 hypothesis can be dismissed(with some scepticism..).

5.3 Market performance

The average yearly return of the MSCI for the 5 year period starting, from first of december 2015, was roughly 11.33%, which is higher than the all time (2004 to 2020) average yearly return of roughly 8.46%. According to (Ghosh, 2001) this could mean that part of the value creation or abnormal returns is due to the period involved being more profitable than the average. While during this study this was not done due to time constraints and doubts as to if this actually affects the study, future

research could definitely create an industry average of the companies doing good during the period to compare to in order to find abnormal returns compared to other gaming companies.

Considering an average return of the market of 11.33% yearly during the whole period included in the study, an increase for investors of 1.25% or even 3.45% is a significant gain and cannot be trivialized if one can consider the stock price to be the sum of discounted future cash flows (Brealey et al., 2011), meaning that costs have already been accounted for. Given the efficient market hypothesis the market as a whole must also believe that this is a long term gain. Checking whether it is correct or not is a whole other question for future researchers.

5.4 Discussion

Even though the tests conducted didn't show a unified front regarding the significance of the results obtained most of them point to there being some value created from the events. All of the four CAARs were positive and 5 of 8 were significant at the 5% significance level and only one not being significant at a 10% level. What follows is a discussion of what the authors believe to be the main reasons for this possible value creation.

Some of the CAR can be attributed to the companies prior M&A experience. Like Hitt et al and Trichterborn et al have shown, prior experience is key to success in the M&A area. And as can be seen in the appendix, a lot of the companies in the research are there multiple times during the 5 year period chosen for the research. For example swedish company Embracer has 55 different studios under them and they continued to expand their business through M&A multiple times during the 5 years the paper looked at. So it would be a fair assumption that they have a, to use Trichterborns vocabulary, M&A function unit in their company that has done a good job in filtering out the good from bad cases and collected prior knowledge and experiences. They can therefore act in a proactive rather than reactive way during their M&A deals to create more synergies in the merged company which creates value for the shareholders and developers. Even though Embracer says they don't need M&A to grow in the future, they have raised 1,647 million SEK for further acquisitions. Founder Lars Wingefors writes in the annual report of 2020 that the company was funded and is run by entrepreneurs and that he’s a firm believer in empowering talented people to make their own decisions. The synergies Embracer

creates through the acquisitions is through assets, resources, marketing and distributional power. The companies acquired however remain independent. (Embracer Group, 2020)
This is economies of scale from the synergy gain theory, where the companies share assets and resources. There's also what Romano(1992) refers to as managerial synergies where a company with good management buys other companies and manages them more efficiently. In Embracers case mostly through marketing and distributional help.

In line with the results obtained by Tatiana Abramova(2013) the results indicate that video gaming M&A events are associated with significantly positive CAR for the acquiring company. Marcus Schiefs(2013) results also indicate that software companies in the consumer sector engaged in M&A activities tend to do well. His theory about software companies using M&A as an external source of innovation could also explain why there is so much activity from some of the bigger companies in the video gaming sector. As previously stated some of the companies were involved in multiple deals during the period looked at. There are some fairly big companies in the group that might not have the same agility and ability to remain up to date on their own and therefore use M&A as a way of staying relevant and through it to tap into new markets. It also goes hand in hand with the Ernst & Young survey from 2019 where the respondents answer that the biggest driver the coming 5 years for M&A activity will be to secure talented developers and personnel as there seems to be a shortage of good manpower available. This last point is something that is worth stressing as it comes up more and more in the research of the area and is likely a strategy that will continue to grow in the future with more and more human knowledge savvy jobs. While neither Piesse et al(2006) or Geiger and Schiereck(2014) list this as a reason to engage in M&A the survey from Ernst & Young(2019) and the data from both Schief (2013) and Mchawrab(2016) suggest it may in fact be one of the main reasons video gaming, high-tech and software companies engage in M&A. While this paper's aim is not regarding the theory of reasons for engaging in M&A the authors propose adding securing key personnel as a reason to engage in M&A in future papers regarding M&A.

The bigger players in the sector are either companies that have been around for a while and gotten big from PC and Console or high tech companies that are now using M&A as a way to tap into the mobile market. By acquiring companies from the mobile sector they tap into the market with the most revenues and gamers. Through

this they can increase their clientele as well as revenue. For the big high tech companies buying up smaller video gaming studios it can further be explained by the quest to secure key personnel.

The results from this research goes against some prior research into M&A that show that no value has been added(Hitt et al., 2012). But overall the literature review indicates that CAR in both the software and video gaming sector have been positive for the acquiring firm. So it would seem that M&A as an activity to secure new key personnel is something that, at least, the shareholders view as positive.

The result of the study does indicate that the market expectations of future performance following the events are actually positive and most likely in line with or close to the intentions of management. Investors therefore must believe that synergistic effects have or will be achieved. This does not say anything about the effectiveness of large corporate structures in game development in itself, but it does tell us that the aggregated analysis of the market does not believe it to be enough of an issue in general to undo the positive effects of the synergies added from combining the two entities into one.

5.5 Future research

This paper has a clear focus on investor interests and profitability. A perspective that is relevant for future research is the Stakeholder perspective. While this paper can say that value has been created for investors, it cannot say the same for other stakeholders in the company such as developers, consumers/gamers or others. The focus of the event study method and thereby the paper is on investor value, but for future researchers the stakeholder theory could be used to further look at how developers view their role in a growing corporate structure, as hints of such conflicts can be seen in the problem discussion.

Another perspective that could be interesting to look at could be that of the customers or Gamers who play the products. One could argue that as long as games sell and investors get their money, the customers are happy enough to not stop buying the games. But according to stakeholder theory, this perspective is not enough, but the interests of customers should also be considered in order to build long term success for the company. From a stakeholder perspective, it is important

for the companies to have developed their own enterprise strategy and values in order to achieve long term success, along with handling the interests of both employees and customers.

This could also be useful for investors and management, given that, according to the Stakeholder theory, successfully ensuring the interests of stakeholders is needed to succeed in the long term. This could be a more qualitative study with answers from parties such as developers, customers and other employees about how they view consolidation and how to best include their interests when making future plans in order to achieve long term sustainable success.

6 Conclusion

The main conclusion of the paper is that value was created as a result of Mergers and Acquisitions during the studied period. By the use of the event study method, the paper used the market's expectations as a proxy for this in the form of present abnormal returns. The conclusion was asserted by the overall results of, statistically significant, parametric and non-parametric tests due to arguments made for both. It was also concluded that it could take the market more than one trading day post event to properly absorb the information of the event and the price of the stock to adjust.

While the result can say that the market expects that value will be created in addition to the previous combined value of the two companies merging, it cannot be said for sure what kind of extra value has been added. According to the literature review it is commonly attributed to synergy gains such as economies of scale or scope, financial synergies or synergies created by acquiring key personnel. A final synergy found to be likely is large corporations buying smaller creative studios or companies as a way to stay innovative.

While the market expectations of future gains are positive, this might not actually be the case when the future unfolds. One perspective that would argue for this is the stakeholder perspective, where the company has to act in the interest of all stakeholders such as customers and employees in addition to investors in order to actually achieve long term success and survival. Given the extensive material found, some of it included in the problem statement, there are issues to be brought up around this and it is deemed to be a recommended perspective for future research in order to explore the process of consolidation of the video game industry from other perspectives.

Bibliography

Abramova, T. (2013, Dec 3). *Stock Price Reactions on M&A, Dividends and Game Releases. Evidence from Gaming Industry*. -. https://lutpub.lut.fi/bitstream/handle/10024/94019/Tatiana_Abramova_Master_Thesis.pdf?sequence=2&isAllowed=y

Activision Blizzard. (2007, Dec 2). *Vivendi and activision create Activision Blizzard World's Largest, Most Profitable Pure-Play Video Game Publisher*. Activision Blizzard. https://investor.activision.com/news-releases/news-release-details/vivendi-and-activision-create-activision-blizzard-worlds-largest

Ball, R., & Brown, P. (1968). An Empirical Evaluation of Accounting Income Numbers. *Journal of Accounting Research*, *6*(2), 159-178. https://www.jstor.org/stable/2490232?seq=1

BBC. (2020, Sep 21). *Microsoft buys Fallout creator Bethesda for $7.5bn*. BBC. https://www.bbc.com/news/54233235

Berk, J., & DeMarzo, P. (2017). *Corporate Finance*. Pearson Education. 978-1-292-16016-0

Berry, M. A., Gallinger, G. W., & Henderson, Jr, G. V. (1990). *Using Daily Stock Returns in Event Studies and the Choice of Parametric versus Nonparametric Test Statistics* (1st ed., Vol. 29). Creighton University. https://www-jstor-org.ezproxy.ub.gu.se/stable/40472983?seq=1#metadata_info_tab_contents

Bindabel, W. (2020). M&A Open Innovation, and Its Obstacle: A Case Study on GCC Region. *J. Open Innov. Technol. Mark. Complex*, *6*(4), 138-155. https://www.mdpi.com/2199-8531/6/4/138/htm

Bouwman, C. H.S., Fuller, K., & Nain, A. S. (2009). Market Valuation and Acquisition Quality: Empirical Evidence. *The Review of Financial Studies*, *22*(2). https://www.jstor.org/stable/30226002

Braw, A., & Heaton, J. B. (2015). Event Studies in Securities Litigation: Low Power, Confounding Effects, and Bias. *Washington University Law Review*, *93*(2), 583-614. https://openscholarship.wustl.edu/law_lawreview/vol93/iss2/15/

Brealey, R. A., Myers, S. C., & Allen, F. (2011). *Principles of Corporate Finance* (10th ed.). Douglas Reiner. 978-0-07-353073-4

Burton, M. G. (2003). The Efficient Market Hypothesis and Its Critics. *Journal of Economic Perspectives*, *17*(1), 59-82. https://pubs.aeaweb.org/doi/pdfplus/10.1257%2F089533003321164958

Campbell, M. (2016). *Parametric and Non-parametric tests for comparing two or more groups*. Health Knowledge. https://www.healthknowledge.org.uk/public-health-textbook/research-methods/1b-statistical-methods/parametric-nonparametric-tests

Elliot, S. H. (2015). *Manager's Guide to Financial Analysis - Powerful Tools for Analyzing the Numbers and Making the Best Decisions for Your Business (6th Edition)*. AMACOM – Book Division of American Management Association. https://app-knovel-com.ezproxy.ub.gu.se/web/toc.v/cid:kpMGFAPTA5/viewerType:to

c//root_slug:viewerType%3Atoc/url_slug:root_slug%3Amanagers-guide-financial?kpromoter=federation
Embracer Group. (2020, May 20). *FAQ*. Embracer Group. https://embracer.com/om-oss/qa/?lang=sv
Embracer Group. (2020, Dec 15). *Embracer group annual report 2019/2020*. Embracer Group annual report. https://embracer.com/wp-content/uploads/2020/08/1298981.pdf
Ernst & Young. (2019, Nov 14). *How is your business powering up for the next video gaming challenge?* Ernst & Young Global. https://www.ey.com/en_gl/tmt/how-is-your-business-powering-up-for-the-next-video-gaming-challenge
Fama, E. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, *25*(2), 383-417. https://www.jstor.org/stable/2325486
Fama, E. F., Fisher, L., Jensen, M. C., & Roll, R. (1969). THE ADJUSTMENT OF STOCK PRICES TO NEW INFORMATION. *International Economic Review*, *10*(1), 1-21. https://www.jstor.org/stable/2525569
Freeman, R. E., & Mcvea, J. F. (2001). A Stakeholder Approach to Strategic Management. *SSRN Electronic Journal*, *January 2001*(1). 10.2139/ssrn.263511
Gardner, M. (2020, Sep 19). *Report: Gaming Industry Value To Rise 30%–With Thanks To Microtransactions*. Forbes. https://www.forbes.com/sites/mattgardner1/2020/09/19/gaming-industry-value-200-billion-fortnite-microtransactions/?sh=6f94af452bb4
Geiger, F., & Schiereck, D. (2014). The influence of industry concentration on merger motives—empirical evidence from machinery industry mergers. *Journal of Economics & Finance*, *38*(1), 27-52. http://web.b.ebscohost.com.ezproxy.ub.gu.se/ehost/detail/detail?vid=0&sid=896153a1-6cf0-4546-b0e9-be3c5e8f5215%40pdc-v-sessmgr02&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#db=buh&AN=93751059
Ghosh, A. (2001). Does operating performance really improve following corporate acquisitions? *Journal of corporate finance*, *7*(2), 151-178. https://www-sciencedirect-com.ezproxy.ub.gu.se/science/article/pii/S0929119901000189
Hitt, M. A., King, D. R., Krishnan, H. A., & Makri, M. (2012). Creating Value Through Mergers and Acquisitions. *Oxford scholarship online*, *sep*(12), 1-61. 10.1093/acprof:oso/9780199601462.003.0004
imaa. (2020, Oct 31). *imaa worldwide statistics*. The Institute for Mergers, Acquisitions and Alliances. https://imaa-institute.org/mergers-and-acquisitions-statistics/
Klement, J. (n.d.). Klement on Investing. Retrieved 12 20, 2020, from https://klementoninvesting.substack.com/p/the-distribution-of-stock-market
Kolari, J. W., & Pynnonen, S. (2011). Nonparametric rank tests for event studies. *Journal of Empirical Finance*, *18*(5), 953-971. https://doi.org/10.1016/j.jempfin.2011.08.003
Lind, D. A., Marchal, W. G., & Wathen, S. A. (2015). *Statistical Techniques in Business & Economics* (16th ed.). McGraw-Hill. ISBN: 978-1-259-09564-1
MacKinley, C. A. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature*, *35*(1). https://www.jstor.org/stable/2729691
Majaski, C. (2020, Sep 30). *What are the Differences Between Mergers and Acquisitions?* Investorpedia. https://www.investopedia.com/ask/answers/021815/what-difference-between-merger-and-acquisition.asp

Marchand, A., & Hennig-Thurau, T. (2013). Value Creation in the Video Game Industry: Industry Economics, ConsumerBenefits, and Research Opportunities. *Journal of interactive marketing*, *27*(1), 141-157. https://www.researchgate.net/publication/255995598_Value_Creation_in_the_Video_Game_Industry_Industry_Economics_Consumer_Benefits_and_Research_Opportunities

Mchawrab, S. (2016). M&A in the high tech industry: value and valuation. *Strategic Direction*, *32*(6), 12-14. https://www.emerald.com/insight/content/doi/10.1108/SD-03-2016-0036/full/html

McWilliams, A., & Siegel, D. (1997). Event Studies in Management Research: Theoretical and Empirical Issues. *The Academy of Management Journal*, *40*(3), 626-657. https://www.jstor.org/stable/257056

O'Dea, S. (2020, Aug 20). *Number of smartphone users from 2016 to 2021*. statista.com. https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/

Park, N. K. (2004). A Guide to Using Event Study Methods in Multi-Country Settings. *Strategic Management Journal*, *25*(7), 655-668. https://www.jstor.org/stable/20142151

Piesse, J., Lee, C.-F., Kuo, H.-C., & Lin, L. (2006). *Merger and acquisition: Definitions, motives, and market responses.* Springer, Boston. https://doi-org.ezproxy.ub.gu.se/10.1007/978-0-387-26336-6

Reisinger, D. (2008, Feb 28). *Are developer mergers good for the video game industry*. Cnet. https://www.cnet.com/news/are-developer-mergers-good-for-the-video-game-industry

Romano, R. (1992). A Guide to Takeovers: Theory, Evidence, and Regulation. *The Yale Journal on Regulation*, *9*(1), 125-129. https://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?article=2991&context=fss_papers

Schief, M. (2013). *Business Models in the Software Industry*. Springer Gabler. 10.1007/978-3-658-04352-0

Schief, M., Buxmann, P. D. P., & Schiereck, P. D. D. (2013). Mergers and Acquisitions in the Software Industry. *Business & Information Systems Engineering*, *6*(1). 10.1007/s12599-013-0293-1

Schimmer, M., Levchenko, A., & Müller, S. (2014, Jan 1). *EventStudyTools (Research Apps), St.Gallen*. eventstudytools.com. http://www.eventstudytools.com/

S&P global. (2020, Dec 7). *Transaction statistics*. S&P global marketplace. https://platform.marketintelligence.spglobal.com/web/client?auth=inherit#markets/isMAGraph

Takahashi, D. (2017, Dec 20). *Electronic Arts' biggest acquisitions: the good, the so-so, and the duds*. Venturebeat. https://venturebeat.com/2017/12/20/electronic-arts-biggest-acquisitions-the-good-the-so-so-and-the-duds/

Takahashi, D. (2020, Sep 23). *Blizzard cofounder Mike Morhaime launches new gaming endeavor Dreamhaven*. Venturebeat. https://venturebeat.com/2020/09/23/blizzard-cofounder-mike-morhaime-launches-new-gaming-endeavor-dreamhaven/

Tracy, P. (2020, Aug 12). *What is Abnormal Return?* Investinganswears. https://investinganswers.com/dictionary/a/abnormal-return

Trichterborn, A., Knyphausen-Aufseb, D. Z., & Schweizer, L. (2016). How to improve acquisition performance: The role of a dedicated M&A function, M&A learning process, and M&A capability. *Strategic Management Journal*, *37*(4), 763-773. https://doi-org.ezproxy.ub.gu.se/10.1002/smj.2364

Wang, Q., & Ngai, E. W.T. (2020). Event study methodology in business research: a bibliometric analysis. *Industrial Management & Data Systems*, *120*(10), 1863-1900. https://doi.org/10.1108/IMDS-12-2019-0671

Wijman, T. (2019, Jun 18). *The Global Games Market Will Generate $152.1 Billion in 2019 as the U.S. Overtakes China as the Biggest Market*. Newzoo.com. https://newzoo.com/insights/articles/the-global-games-market-will-generate-152-1-billion-in-2019-as-the-u-s-overtakes-china-as-the-biggest-market/

Wijman, T. (2020, May 8). *The World's 2.7 Billion Gamers Will Spend $159.3 Billion on Games in 2020; The Market Will Surpass $200 Billion by 2023*. Newzoo.com. https://newzoo.com/insights/articles/newzoo-games-market-numbers-revenues-and-audience-2020-2023/

Woomer, M. M. (2018, May 18). *BLUE MAMMOTH GAMES JOINS UBISOFT!* Brawlhalla.com. https://www.brawlhalla.com/news/ubisoft/

Appendix

List of events, with event date, alpha and beta, CAR and t-test score for event window(-1,1). Yellow marked is the excluded outliers.

ID	Firm	Event Date	Alpha	Beta	CAR	t-score
1	Vivendi SA	2016-02-18	-0.0015	0.8351	0.54%	0.2092
2	GameStop Corp.	2016-03-21	-0.0027	1.1098	-3.11%	-0.6725
3	COLOPL, Inc.	2016-03-30	0.0011	0.6531	-0.25%	-0.0439
4	Playtech plc	2016-05-24	0.0001	0.718	-0.11%	-0.0504
5	Playtech plc	2016-05-31	0.0001	0.6988	-0.69%	-0.3137
6	Everysport Media Group AB	2016-05-31	0.0092	-0.9408	10.37%	0.507
7	Digital Domain Holdings Limited	2016-06-09	0.0014	1.8602	1.93%	0.1185
8	Stillfront Group AB (publ)	2016-06-21	-0.0003	0.1321	1.16%	0.183
9	Zynga Inc.	2016-07-01	-0.0005	1.3633	7.25%	1.3999
10	Keywords Studios plc	2016-07-28	0.002	0.3808	1.72%	0.531
11	Google Inc	2016-08-05	-0.0002	0.7257	0.48%	0.2828
12	Ubisoft Entertainment SA	2016-09-27	0.002	1.2488	-0.30%	-0.0809
13	Asiasoft Corporation Public Company Limited	2016-10-11	-0.0005	0.0966	-22.07%	-9.7268
14	Gaming Corps AB (publ)	2016-10-17	-0.0061	0.634	32.39%	2.4477
15	Stillfront Group AB (publ)	2016-12-16	0.0015	1.6856	3.95%	0.9915
16	Starbreeze AB (publ)	2016-12-16	-0.0003	0.4977	-0.89%	-0.2379
17	Ubisoft Entertainment SA	2017-01-18	-0.0021	0.6406	1.54%	0.5261
18	Zhejiang Jinke Entertainment Culture Co., Ltd.	2017-02-06	0.0056	0.8732	1.49%	0.2053
19	Ubisoft Entertainment SA	2017-02-28	-0.0019	0.5101	5.22%	1.6931
20	PlayWay S.A.	2017-03-01	-0.0007	-0.0124	17.48%	5.097
21	CHIeru Co.,Ltd.	2017-03-13	0.0016	0.4492	-2.78%	-0.4434
22	Hugo Games A/S	2017-03-31	-0.0034	0.9168	-6.27%	-1.3407
23	Scientific Games Corporation	2017-04-07	0.0037	1.9595	-1.22%	-0.3117
24	Scholastic Corporation	2017-04-12	0.0002	0.8618	-1.60%	-0.6894
25	CHIeru Co.,Ltd	2017-04-14	0.0019	0.4021	7.14%	1.0763
26	Aeria Inc.	2017-04-28	0.0135	-0.7443	-4.23%	-0.3305
27	Google Inc.	2017-05-09	0.0005	1.0764	0.07%	0.0539
28	National CineMedia, Inc.	2017-05-17	-0.0054	-0.0804	-2.44%	-0.423
29	Paradox Interactive AB (publ)	2017-06-30	0.0019	0.986	3.69%	1.1272
30	Stillfront Group AB (publ)	2017-07-18	-0.0002	0.9953	-5.65%	-1.3048
31	Freeze Tag, Inc.	2017-07-31	-0.0155	-12.3921	118.91%	1.9317
32	Glu Mobile Inc.	2017-08-01	0.0006	2.6083	2.14%	0.4413
33	Macro Games S.A.	2017-09-21	-0.0054	-1.4019	1.47%	0.0707
34	Keywords Studios plc	2017-10-19	0.0042	1.6052	-1.97%	-0.3622
35	PlayWay S.A	2017-10-20	0.0003	2.0955	-6.68%	-1.8542
36	Electronic Arts Inc.	2017-11-09	-0.0005	1.6107	1.50%	0.7597
37	Liquid Media Group Ltd	2018-01-09	-0.0025	6.2114	-7.96%	-0.4369
38	GameStop Corp	2018-01-19	-0.0017	1.0769	-0.56%	-0.1525
39	Playway SA	2018-02-14	0.0018	0.2889	-1.07%	-0.2358
40	Scientific Games Corporation	2018-02-26	0.0005	2.0389	-2.37%	-0.6485

41	Projekt Red SA	2018-03-20	-0.001	0.6308	4.36%	0.9795
42	Playtech PLC	2018-03-26	-0.0023	0.4794	1.03%	0.2124
43	DLE Inc	2018-04-03	-0.0006	0.8652	-1.71%	-0.275
44	RealNetworks Inc	2018-04-16	-0.0048	0.5213	10.04%	1.7099
45	RealNetworks Inc	2018-04-30	-0.0044	0.6162	-1.25%	-0.2148
46	BigBen Interactive	2018-05-14	0.0003	0.8288	4.17%	0.7868
47	Tencent Holdings Limited	2018-05-21	0.0003	0.9078	-0.93%	-0.2619
48	Paradox Interactive AB	2018-06-05	0.0068	0.7511	-5.13%	-0.8535
49	Toadman Interactive	2018-06-28	0.0046	1.8822	-1.48%	-0.1585
50	Giant Network Group Co Ltd	2018-06-30	-0.004	-0.0592	-1.80%	-0.5499
51	Keywords Studios plc	2018-07-20	0.0011	1.1139	3.67%	0.9293
52	Finsoft Financial Investment Holdings Limited	2018-08-09	0.0007	-0.3787	-0.70%	-0.0877
53	5th planet games	2018-09-10	-0.0092	-0.1876	-12.63%	-1.5416
54	Stillfront Group AB (publ)	2018-09-21	0.0004	0.0672	1.08%	0.1999
55	BigBen Interactive	2018-09-24	-0.0022	0.7565	4.75%	1.172
56	BigBen Interactive	2018-10-02	-0.0022	0.7635	-3.14%	-0.7747
57	ShareRoot Limited	2018-11-13	-0.0018	1.0374	-26.60%	-1.1951
58	Embracer Group	2018-11-14	-0.0013	1.2117	9.19%	1.8815
59	TAL Education Group	2018-11-30	-0.0019	1.971	1.53%	0.2769
60	Stillfront Group AB (publ)	2018-12-11	-0.0011	0.8257	9.92%	1.7898
61	Zynga Inc	2018-12-20	-0.0005	1.1022	4.50%	1.0692
62	Hangzhou Electronic Soul Network Technology Co., Ltd.	2019-01-31	-0.0009	0.7287	-0.49%	-0.1072
63	Sportech PLC	2019-02-01	-0.0061	-0.12	-5.29%	-1.1106
64	Com2uS Corporation	2019-02-18	-0.0024	0.3985	-1.96%	-0.3581
65	Rentracks CO.,LTD.	2019-03-08	-0.0022	0.8576	-7.25%	-1.0111
66	QubicGames S.A.	2019-03-18	0.0002	0.2981	-0.40%	-0.0492
67	Tencent Holdings Limited	2019-05-21	0.0012	1.3454	-3.46%	-1.1286
68	Microsoft Corporation	2019-06-09	0.0005	1.6398	-0.76%	-0.4668
69	PlayWay S.A	2019-06-14	0.0011	1.5895	1.00%	0.2723
70	Toadman Interactive AB (publ)	2019-06-18	-0.0031	0.7663	27.43%	3.5193
71	Spiffbet AB	2019-07-30	-0.009	1.7379	114.75%	6.5336
72	Broccoli Co., Ltd.	2019-08-30	-0.003	0.5976	-5.39%	-1.313
73	Mynet Inc.	2019-10-24	-0.0054	0.3193	10.39%	1.8233
74	Zordix AB (publ)	2019-11-06	0.0028	0.4742	3.61%	0.4406
75	Toadman Interactive AB (publ)	2019-11-26	0.0035	1.2226	8.42%	0.9703
76	Codemasters Group Holdings plc	2019-11-28	-0.0011	0.1007	11.33%	3.9645
77	Facebook, Inc.	2019-12-18	-0.0003	1.5852	3.90%	2.2517
78	Embracer Group AB (publ)	2019-12-20	-0.0016	0.6489	2.31%	0.509
79	BoomBit S.A.	2020-01-20	-0.0045	1.4725	-3.62%	-0.3029
80	Stillfront Group AB (publ)	2020-01-21	0.0032	1.2388	15.08%	3.1545
81	Ubisoft Entertainment SA	2020-01-31	-0.0026	1.2608	2.39%	0.5187
82	Zordix AB (publ)	2020-03-02	0.0067	0.7401	2.50%	0.331
83	Stillfront Group AB (publ)	2020-04-23	0.0055	0.6941	0.81%	0.1652
84	Bublar Group AB (publ)	2020-04-29	-0.0018	0.7545	-0.59%	-0.1113
85	Sumo Group Plc	2020-05-15	0.0019	0.4544	4.23%	0.7204

86	Zynga Inc	2020-06-01	0.0032	0.7273	14.92%	3.3914
87	Rovio Entertainment Oyj	2020-06-03	0.0027	0.2695	-1.51%	-0.2542
88	Three Gates AB (publ)	2020-06-09	0.0029	0.7764	-32.76%	-1.401
89	SciPlay Corporation	2020-06-22	0.0013	0.6584	-1.00%	-0.1401
90	Focus Home Interactive Société anonyme	2020-06-25	0.0012	0.59	14.56%	3.0238
91	Keywords Studios plc	2020-06-26	0.0021	0.551	-0.53%	-0.0933
92	Paradox Interactive AB (publ)	2020-07-01	0.0025	0.5788	7.61%	1.3355
93	Three Gates AB (publ)	2020-07-15	0.0054	0.792	-2.85%	-0.124
94	Paradox Interactive AB (publ)	2020-07-17	0.0031	0.581	5.55%	0.9799
95	PlayWay S.A	2020-07-31	0.0033	0.8897	-3.56%	-0.4458
96	Embracer Group AB (publ)	2020-08-13	0.0035	0.4637	8.48%	1.5158
97	Enad Global 7 AB (publ)	2020-08-27	-0.0007	0.7078	5.93%	0.6959
98	MAG Interactive AB (publ)	2020-08-28	0.0038	0.2145	7.71%	1.1592
99	PlayWay S.A	2020-09-03	0.0056	0.9011	-0.89%	-0.11
100	Nacon S.A.	2020-10-19	0.0019	0.2533	2.39%	0.5632
101	Com2uS Corporation	2020-10-27	-0.0011	0.5727	4.83%	1.014
102	Stillfront Group AB (publ)	2020-10-28	0.0046	-0.1177	-2.93%	-0.5639
			Alpha	**Beta**	**CAAR**	
		AVG	7.0E-05	0.6881	3.45%	