The performance of delivery firms during the COVID-19 pandemic

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ABSTRACT,
This study investigated the stock performance of delivery firms during the COVID-19 pandemic, by the means of an event study, in which the event date that has been investigated is March 18, 2020, which is the announcement of a global pandemic by the WHO. The pandemic is an external shock that has an affect on the stock market, the US stock market has never had as many stock market jumps (increase or decrease of at least 2.5%) in a short period as now during the pandemic. Results of the study indicate that the event has caused the delivery industry to have a significant increase in stock returns and that the industry also has experienced these market jumps. The returns in the two different sectors (parcel delivery and food delivery) in the industry also differ. The parcel delivery sector's stock return only became higher after the event, whereas the food delivery sector's stock returns only declined after the event. Governmental lockdown measures caused the sectors to perform differently during the event and that larger companies benefited more from these measures.

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1. INTRODUCTION

At the end of 2019 a new virus was discovered in Wuhan, China, called COVID-19 virus. (Timeline: WHO's COVID-19 Response, 2019) Then unknown of what the global consequences of this virus would be. The COVID-19 virus soon began to spread all over the world, with every day gaining thousands of new infections. Leading to the point that in March 2020 it was declared as a global pandemic. (Timeline: WHO's COVID-19 Response, 2019) This global pandemic resulted in unexpected social and economic consequences. Each country began to implement their own measures in order to fight the virus and to reduce the number of infections and the number of deaths. These measures have caused certain industries to collapse and others to benefit. A measure used by the Dutch government to fight the virus was an 'intelligent lockdown'. (Ministerie van Algemene Zaken, 2020) The intelligent lockdown was initiated in March 2020, which resulted in closing of schools, bars, restaurants and putting a travel restriction to certain countries. Closing the catering industry led to unemployment, bankruptcy and financial risks of the catering industry stakeholders. Other industries on the other hand were really benefited by the measures. For instance, the parcel (food) delivery industry gained many new customers, because government restrictions caused physical stores to close, resulting in people starting to buy more online. The virus resulted in different buying behavior patterns of consumers and more need for 'online' solutions.

The COVID-19 virus has caused a global pandemic were no industry was prepared for. Different industries performed differently due to the unexpected government measures which had to be taken. All over the world the stock markets shifted unexpectedly due to all kinds of restrictions which were related to the virus. Baker et al. (2020) Many of these restrictions were implemented to reduce human contact and interactions. Online solutions and markets became more popular. Buying behaviors shifted towards more shopping online and avoiding human contact and avoiding the chance of being infected. People starting to buy more online meant that also more products had to be delivered to customers. Resulting in that delivery companies became very busy and gained many new customers. Where other industries were very limited and restricted due to the virus, the delivery industry could continue their operations and even became more popular. But how was this industry really affected by the pandemic all over the world? How an industries stock market is performing tells a lot about if the industry is performing well or if it is performing poorly. The research question of this paper is:

How did the delivery industry perform under the pandemic?

The thing this paper wants to analyze is how the pandemic has affected the delivery industry performance, by analyzing the stock market before and during the event of the pandemic.

2. LITERATURE REVIEW

Due to external events and emergencies the capital market is often affected. Different research has been conducted on the topic and it explains the effect of wars, crisis and diseases on stock market performance. The latest study who examines the effect of such an emergency is the one by He et al. (2020, p. 2207). The paper examines the stock performance during the COVID-19 pandemic and the effect across different sectors. Results are that different sectors are affected differently due to the pandemic , and that traditional markets are performing worse in China.

Research about other SARS pandemics and influenza are also have been conducted. In research from Chen et al. (2007, p. 210) the effects of the SARS virus on the Taiwanese hotel industry is examined. The results of the event study was that the SARS virus negatively impacted the stock performance of Taiwan hotel companies. McTier et al. (2013, p. 997) conducted research about the impact of influenza on the stock market , and the findings were that an increase in the flu rate would cause a decrease in trading activity and stock returns. The flu has effect on the crucial persons, such as dealers and market makers. It makes them unfit by altering overall investing behavior and lowering expectations about genuine economic activity. Also, they found out that an increase in flu was associated with lower volatility. According to study by Baker et al. (2020, p. 6) an outbreak or crisis affects the stock market volatility. The US stock market has never had as much stock market jumps (increase or decrease of at least 2.5%) in a short period as now during the pandemic.

Studies on other emergencies than SARS pandemics and influenza have also been conducted. The research mainly focuses on financial crises, natural disaster, terrorist attacks and political behavior. Nikkinen et al. (2008, p. 40) researched the effect of '911' on the global stock prices, and the results were that the event caused an increase of volatility over a short time due to a change in investment behaviors of key individuals. Furthermore, the event caused the global stock prices to significantly drop, but that it was only for a short time period. Al-Rjoub (2009, p. 11) and AM Al-Rjoub and Azzam (2012, p. 195) studied different crises over the time period from 1st of January 1991 to July the second 2009. The results of the study was that overall crises would have a negative impact on stock returns in all sectors , and an increase of volatility.

COVID-19 has caused a lot of uncertainties in markets and unexpected changes. There are not many researches and papers yet that explain different performances of industries during the COVID-19 pandemic. Phan and Narayan (2020, p. 2148) examined the effect of the COVID-19 pandemic on the stock market performance and the response of countries. Liu et al. (2020, p. 4) examined the impact of COVID-19 on crude oil prices and stocks prices in the US. Ali et al. (2020, p. 100341) examines the reaction of financial markets globally concerning volatility and decline.

It is said that a pandemic will have effect on the stock market, but not why it effects the stock market. According to the behavioral finance theory, an emergency will have impact on investors' behavioral and psychological factors, which in return will have a significant impact on the stock prices. In research from Lee et al. (2002) it is seen that investor behavior has an impact on stock volatility. They showed that investor pessimism is correlated with an increase of volatility, while investor optimism is correlated with a reduction of volatility. Shifting to COVID-19, the pandemic has an impact on the economic environment and investors psychological factors, resulting in stock prices to change.

Why do stock markets react to external shocks? In research from Gheorghe et al. (2021) they concluded that global shocks caused foreign markets to react on each other and caused the 'spillover effect'. The spillover effect is a phenomenon in which unrelated events in a certain country have effect on the economy of another country. The spillover effect is a common term when it is talked about shocks on the stock market. In a latest research from Naeem et al. (2021) it is also explained that the COVID-19 pandemic was an external shock that caused the spillover effect to happen in different financial markets.

The pandemic caused, stores to close, people to start social distancing, and people to start to work from home. The parcel/food delivery industry would theoretically benefit from

this. People did start to buy more from online web shops, which have to be delivered to their homes by a delivery company. The industry would gain a lot of new customers and profit when their orders are increasing. Therefore, the following hypothesis was developed: The pandemic has led to a positive stock market performance of the delivery industry.

3. METHODS

3.1 Research model

For the testing of the hypothesis an event study will be done. The goal of an event study is to study the impact of an event. The event that will be researched is the announcement by WHO of that there was a pandemic. In order to find out how the stocks of the delivery firms were affected by the event, the daily stock returns have to be calculated. The stock returns of delivery firms will be calculated via the market model. Here you calculate the cumulative abnormal rate of return (CAR) of the firm's stock prices. Cumulative abnormal return is used to measure what the effects are of events on stock prices. The pandemic is an event that affected the stock prices and that is why the CAR method is the best way to calculate the returns of the stock market.

The first step in the market model is calculating the daily stock returns of the companies. The daily stock returns of the companies and of the markets will be calculated during the estimation window. MacKinlay (1997)

Calculate daily stock returns: (1)

$$Ri,t = \ln\left(\frac{(P1-P0)+D}{P0}\right)$$

Where, Ri,t is the return rate of stock i on trading day t, P0 is the end stock price, P1 is the end stock price on day P0 + 1, D is dividends received during that period.

The second step in the market model is the estimation of α and β. α and β are the regression coefficients of the daily return rate of the stock and the market return rate during the estimation window. They will be estimated for each company via a regression analysis. The intercept of the regression analysis is α and the slope of the regression analysis is β. MacKinlay (1997)

Estimate α and β: (2)

The third step in the market model is the calculation of the abnormal returns (AR) of the companies during the event window. MacKinlay (1997)

Calculate the abnormal returns: (3)

$$ARi,t = Ri,t - (\alpha + \beta RiMit)$$

Where, ARi,t is the abnormal return rate of stock i on trading day t. RiMi,t is the market return of the trading market, α and β are the regression coefficients of the stock i and the market return rate.

The last step in the market model is the calculation of the CAR. This is done by adding the individual AR's of a stock. MacKinlay (1997)

Calculate the cumulative abnormal rate of return: (4)

$$CARi(t1,t2) = \sum_{t2}^{t=t1} ARi,t$$

Where, CARi(t1,t2) is the cumulative abnormal return rate of stock i in the event window period (t1, t2).

In addition, the cross-sectional average AR (AAR) is calculated. MacKinlay (1997)

Calculate the average abnormal rate of return: (5)

$$AARi = \frac{\sum_{i=1}^{N} ARi,t}{N}$$

Where, N is the number of companies in the sample.

3.2 Event window & Sample Selection

At the 11th of March 2020 the WHO announced that the COVID-19 virus was a global pandemic and this will be the event date. The estimation window provides the information needed to calculate the returns during the event window. The estimation of α and β will be based on the data during the estimation window. They will be estimated for each company in excel via a regression method of the market return and the stock return. The estimation window will be 100 trading days before the event window. If the estimation window will be too long, then the forecast might change. If the estimation window is too short, then it might be biased. The event window will be every 5 trading around the event date. In research from He et al. (2020) a similar research was done about stock market performance of industries, with the same event window. Figure 1 shows the event window.

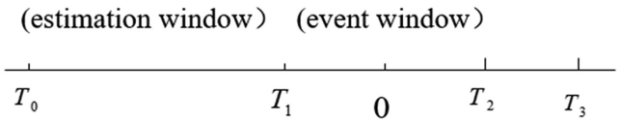

Figure 1. T0-T1 is the estimation window. T1-T2 is the event window. 0 is the event date.

The date of the announcement of the global pandemic is noted as day '0' and the days before are numbered with the sign '−' thus giving coding of type day '−1' and so on until day '−30'. As for the days after the announcement, they are denoted day '+1' until day '+30'

The study sample consists of 15 stock market listed food and parcel delivery firms from all over the world. The company's stock returns and the market returns are retrieved from Yahoo Finance. Table 1 gives an overview of the sample.

Table 1. Research Sample

Company	Country	Market Index
PostNL	Netherlands	AEX Index
UPS	USA	S&P 500 Index
Deutsche Post AG (DHL)	Germany	DAX Index
FedEx	USA	S&P 500 Index
XPO	USA	S&P 500 Index
Poste Italiane SpA	Italy	FTSE MIB Index
Blue Dart Express	India	Nifty 50 Index
Royal Mail	United Kingdom	FTSE 100 Index
Osterreichische Post AG	Austria	ATX Index
TFI International Inc.	Canada	S&P/TSX Composite Index
Singapore Post Ltd.	Singapore	FTSE Straits Times Index
Expeditors	USA	S&P 500 Index

International		
Justeat Takeway	Netherlands	AEX Index
Hellofresh	Germany	DAX Index
Delivery Hero	Germany	DAX Index
DX Group	United Kingdom	FTSE 100 Index

4. RESULTS

This part presents the empirical results of the research. Table 2 shows the AAR of the sample and the two sectors (Parcel Delivery and Food Delivery) during the 60 days event window period, where day '0' is the day of the announcement of the global pandemic. Table 3 provides the results of the CAR of the sample and the two sectors (Parcel Delivery and Food Delivery) during different event windows. Table 4 provides the results of the CAR of the companies with different market share percentages, during different event windows. The table has 3 sectors, which are low-, medium-, and high market share percentage companies.

From the collected data I saw that the pandemic caused all the market indexes to drop significantly. The S&P 500 index, which consists out of the 500 largest companies in the US, dropped from $3279.59 to 2912.43, a decrease of 11.2% in only 60 days. The same happened to the stock market indexes of all the other countries during the days 60 period. The stock market indexes are normally well known for their yearly increase of a couple of percent a year.

Table 2. Average Abnormal Returns (AARs) of the total sample 30 days before and 30 days after the announcement of the global pandemic (March 18, 2020)

Day	AAR Total sample (N=16)	AAR Parcel delivery firms (N=13)	AAR Food delivery firms (N=3)
-30	0.002	0.002	0.003
-29	-0.009	-0.007	-0.020
-28	0.005	0.004	0.008
-27	0.003	0.000	0.015
-26	0.000	-0.003	0.013
-25	-0.003	-0.003	-0.001
-24	-0.001	0.002	-0.018
-23	0.003	0.003	0.000
-22	0.001	0.003	-0.010
-21	0.003	0.004	0.003
-20	-0.005	-0.002	-0.019
-19	0.006	0.009	-0.007
-18	-0.003	0.000	-0.017
-17	-0.009	-0.005	-0.029
-16	0.002	-0.006	0.034
-15	-0.009	-0.005	-0.024
-14	0.005	0.000	0.026
-13	0.000	-0.001	0.002
-12	-0.015	-0.021	0.010
-11	0.008	0.004	0.026
-10	0.004	-0.004	0.039
-9	-0.010	-0.007	-0.023
-8	0.006	0.009	-0.007
-7	0.006	0.008	0.001
-6	-0.012	-0.002	-0.056
-5	0.006	0.002	0.027
-4	0.014	0.018	-0.004
-3	-0.004	-0.013	0.035
-2	0.019	0.015	0.033
-1	0.001	-0.022	0.100
0	0.021	0.026	0.001
1	-0.013	-0.013	-0.011
2	0.028	0.028	0.030
3	-0.002	0.017	-0.082
4	-0.016	-0.024	0.018
5	-0.005	-0.003	-0.012
6	-0.004	-0.003	-0.009
7	0.000	-0.002	0.012
8	0.000	-0.002	0.008
9	-0.007	-0.011	0.011
10	0.007	0.010	-0.003
11	-0.003	0.001	-0.019
12	-0.017	-0.013	-0.035
13	-0.016	-0.008	-0.053
14	0.007	0.007	0.010
15	0.009	0.019	-0.031
16	0.007	-0.004	0.056
17	0.012	0.001	0.060
18	0.002	-0.006	0.035
19	0.003	0.007	-0.017
20	-0.004	0.000	-0.022
21	0.015	0.010	0.038
22	0.005	0.006	-0.001
23	0.001	0.005	-0.015
24	0.003	-0.001	0.020
25	0.012	0.016	-0.003
26	0.012	0.015	-0.001
27	-0.003	0.003	-0.026
28	0.006	0.009	-0.008
29	0.002	-0.006	0.035
30	-0.001	-0.007	0.023

Figure 2. Average Abnormal Returns (AARs) of the total sample 30 days before and 30 days after the announcement of the global pandemic (March 18, 2020)

In Table 2 are reported the AARs from the event study for all companies in the sample as well as the two sectors (Parcel Delivery and Food Delivery). The results show that in the 30 days prior of the event the AARs are shifting from positive to negative, with some high returns on days -11, -7, -4 and -2, and big negative returns on days -29, -17, -15, -12 and -6. On the day of the event, the stock returns are positive in both industries, with a big peak for the food delivery industry a couple days prior of the event. In the 30 days after the event, the returns are also shifting between high positive and high negative returns.

Table 3. Cumulative Abnormal Returns (CARs) of different event windows (before event, across event and after event)

Event window	CAR Total sample (N=16)	CAR Parcel delivery firms (N=13)	CAR Food delivery firms (N=3)
(-30, 0)	0.545	0.123	0.422
(-25, 0)	0.540	0.174	0.366
(-20, 0)	0.491	0.073	0.445
(-15, 0)	0.653	0.094	0.559
(-10, 0)	0.829	0.390	0.439
(-5, 0)	0.917	0.339	0.578
(0, 0)	0.344	0.340	0.004
(0, +5)	0.234	0.400	-0.166
(0, +10)	0.187	0.295	-0.108
(0, +15)	-0.127	0.363	-0.490
(0, +20)	0.178	0.331	-0.152
(0, +25)	0.754	0.788	-0.034
(0, +30)	0.998	0.965	0.004
(-30, +30)	1.200	0.748	0.452

In Table 3 are reported the CARs of the companies in different event windows around the event date. The results show that there is a significant increase in stock return during the 60 days event period. This significant increase supports the hypothesis that the event caused an increase in stock market performance for the delivery industry. Furthermore, it can be seen that the parcel delivery sector is having high returns in every window and that the food delivery sector performed better before the event date than after. It is clear that all companies have significantly been affected by the pandemic.

Table 4. Cumulative Abnormal Returns (CARs) of the companies based on market share percentage

Event window	CAR Low market share (<10%) (N=3)	CAR Medium Market Share (10-25%) (N=5)	CAR High Market Share (>25%) (N=8)
(-30, 0)	0.175	-0.145	0.516
(-20, 0)	0.116	-0.088	0.463
(-10, 0)	0.172	0.036	0.620
(0, 0)	0.131	0.016	0.196
(0, +10)	0.295	0.057	-0.078
(0, +20)	0.227	0.180	-0.228
(0, +30)	0.303	0.561	0.134
(-30, +30)	0.347	0.400	0.453

In Table 4 are reported the CARs of the companies based on the individual market share percentage they have. The results show that all 3 samples experienced a high CAR during the event window. Furthermore, the high market share sample has a higher CAR than those with a lower market share. The low market share sample on the other hand, experienced only positive CARs, whereas the other two samples had negative CARs in two event windows.

5. DISCUSSION

How did the delivery industry perform under the pandemic? That is the research question that this research is trying to answer. The results indicate that the industry performed really well. The data provides us the following information. The parcel delivery sector and the food delivery sector both benefited from the event, with both an increase in stock returns. The parcel delivery sector performed significantly better than the food delivery sector. On the other hand, not all companies got a positive stock return during the event. The companies that mainly had the highest stock return were the companies that were the market leaders in their countries. UPS is the biggest parcel service in the US and got a CAR of 20.67%. This is also the case for PostNL and Royal Mail, who respectively had a CAR of 14.90% and 21.49%. Table 4 also indicates that companies with a larger market share performed better during the event than companies with a lower market share. The food delivery sector has a significant difference in returns prior to and post-event. This decrease in returns is probably due to the initiation of the lockdowns and the closing of restaurants. For the parcel delivery sector, it works the other way around. Due to the lockdowns, their stock returns increased significantly post-event. The closing of stores gave them many new customers because they had to buy their goods online.

In line with the hypothesis, the results showed that the pandemic has led to a better stock market performance of the industry. The event study shows that the stock returns of the industry have significantly increased. I cannot assume that the pandemic is only responsible for this increase, but I am certain

that it is the biggest cause. The pandemic is an external shock that has an effect on the stock market. Such an eternal shock does also have an effect on the delivery industry. Due to the pandemic, there has been a big increase in the volatility of stocks. This volatility can also be seen in the results where there are stock returns jumping from high to low in just one day.

The data also supports that due to the pandemic and its lockdowns, people started to buy more online. Looking at the biggest parcel services, with the largest market shares (PostNL, Royal Mail, DHL, UPS, Osterreichische Post AG and Poste Italiane SpA) and biggest food delivery service (Justeat Takeway) they all had an increase in stock returns. If people start to buy more online, they would probably order via a company which they are familiar with, resulting in that the stock returns of these companies would increase.

Based on previous studies by Al-Awadhi et al. (2020) and H. Liu et al. (2020), it is concluded that the pandemic has led to a general increase in stock volatility and a general decrease in stock returns. This research confirms that the pandemic causes an increase in stock volatility, since the results show that returns are changing from high to low often. This research does not back up that the pandemic has caused a general decrease in stock returns. The stock performance of the delivery industry during the pandemic was better than before, which caused the delivery industry to be one of few to benefit from the pandemic.

The research of course has its limitations. Firstly, a t-test or a regression could have been done for the validation of the sample. This would have made the data more reliable since it is a part of hypothesis testing. Secondly, the research has been done with a small sample that represent the entire industry. This can affect the results since the sample is small, outliers can have a big impact on the results. Furthermore, there were different lockdown dates in different countries, which have all different effects on the companies and their performance. Nevertheless, the results give a valid overview of how the delivery industry performed during the pandemic because the sample gives a good overview of the industry.

6. CONCLUSION

The focus of this study was to investigate the effects of the announcement of the global COVID-19 pandemic on the delivery industry. This study uses an event approach in which March 18, 2020, the announcement of a global pandemic from WHO, was the event date. The findings reveal that on the day of the event the stock returns in the industry were high. In previous research from He et al. (2020) it was shown that the pandemic has led to a change in stock performance in many industries. From this study, we can conclude that the event has also affected the delivery industry. The stock returns of the industry have more than doubled during the analysis period. This is mostly due to the stock returns of the ‘big’ companies. The research showed that the biggest companies only gained more returns during the event, in comparison to the relatively smaller companies. Furthermore, the parcel delivery sector performed better than the food delivery sector event. The reason for this being is probably because of the closing of restaurants due to the lockdowns, as the turnovers are positive before the event and negative after the event.

For further research, I would recommend collecting data from non-stock listed delivery companies. As the supply of these companies is very large, you can probably get a better image of how the pandemic has affected them, and if they also had such good turnovers as the big companies. Then you can get a better view of how the pandemic has affected the entire industry, instead of just the large companies. Furthermore, for further research the industry could be compared to other industries during the pandemic, to see how well they performed in comparison. Also, the factors of what makes a delivery company successful could be researched, to see what delivery companies could have done differently during the pandemic to become more successful.

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