

The Delivery Industry Analysis

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Abstract: Four different delivery companies are discussed in this paper. The purpose is to see whether there is a vast difference in the distributions of the daily percentage returns among five different periods. Three fitted models have been applied for daily returns on each period: the Normal maximum-likelihood fitted model, the Normal robust-fitted model, and the Laplace maximum-likelihood fitted model. The analyses suggest no apparent difference between Chinese and American delivery companies. However, because the main business of Heartland Express is different from the other companies, its results are unlike the other three.

Keywords: The Normal Maximum-Likelihood Fitted Model; the Normal Robust-Fitted Model; the Laplace Maximum-Likelihood Fitted Model; Industry; Epidemic Effect

1. Introduction

The delivery industry business has been booming since 2013^[1]. In 2020, because of the outbreak of COVID-19, the express delivery industry faced increased volatility, accelerated competition, accelerated innovation, and accelerated evolution^[2].

This paper has chosen four stocks from the delivery industry: UPS, FDX, HTLD, and ZTO. The first three stocks are from US companies, and the last one is from Chinese companies.

ZTO Express is a famous Chinese delivery industry that has 94 transit centers, and its business covers almost 99%^[3] of countries.

United Parcel Service (UPS) is one of America's most famous industry companies.

Federal Express (FedEx) is the pioneer in overnight air delivery products, which perfectly fit the needs of the industry^[4].

Heartland Express Company was founded in 1978. It is a company that provides regional dry cargo vehicle services through its regional terminals and corporate headquarters.

2. Data

Table1: Basic information for stocks

	ZTO	HTLD	UPS	FDX
Length	1093	1093	1093	1093
Mean	20.8	19.9	114	199
Standard deviation	7.15	1.37	25.7	45.6
Variance	2.67	1.17	5.07	6.75

There are two long periods which include hundreds of daily data price points, and two short periods which focus on short-period changes. In the analyses below, when applying the Chi-square goodness-of-fit test to the returns data, I split the return range into 20 equal bins to ensure the validity of the Chi-square distribution.

2.1. Hypotheses

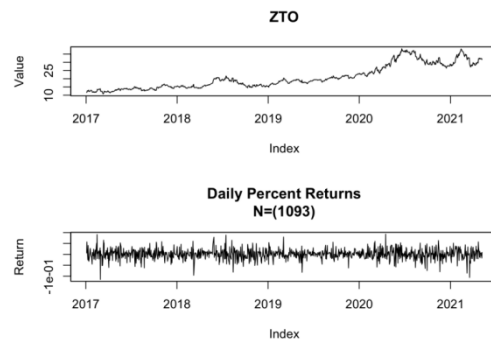


Figure 1: Hypothesis 1- The daily percent returns of ZTO will follow the Normal MLE-Fitted model

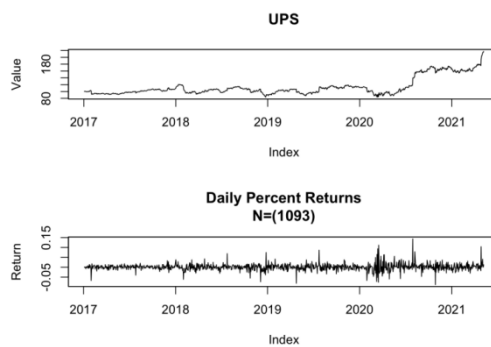


Figure 2: Hypothesis 2-The daily percent returns of UPS will follow the Normal MLE-Fitted model

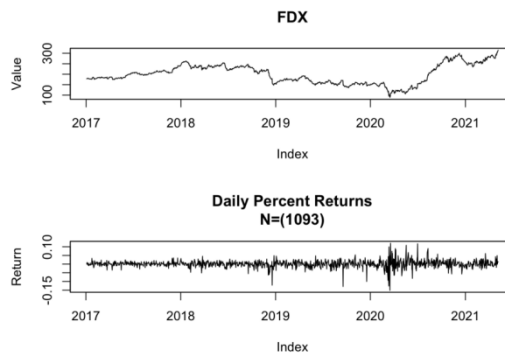


Figure 3: Hypothesis 3- The daily percent returns of FDX will follow the Laplace MLE-Fitted model

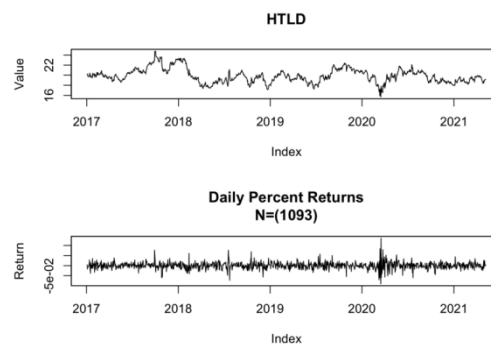


Figure 4: Hypothesis 4- The daily percent returns of HTLD will follow the Laplace MLE-Fitted model

2.2. Analysis

2.2.1 ZTO Express (Cayman) Inc.

The Laplace MLE model is the best one that suits the data well. And our idea has been confirmed as follows. The Laplace MLE Fit model is the best one that fits the whole period data.

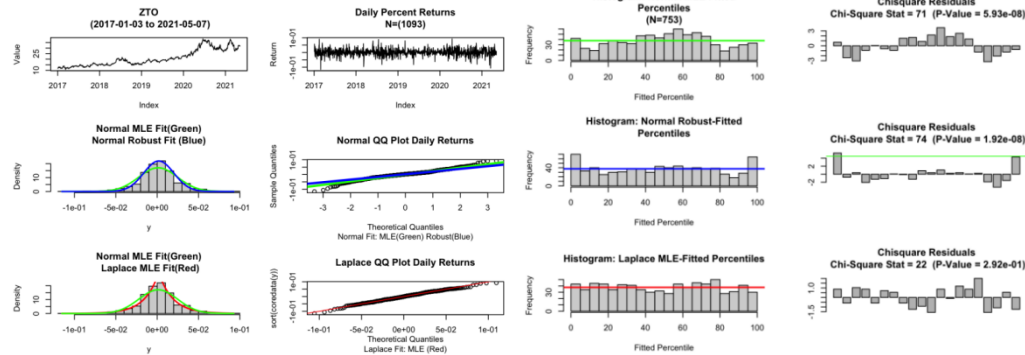


Figure 5: Period 1

Figure 6: Period 2

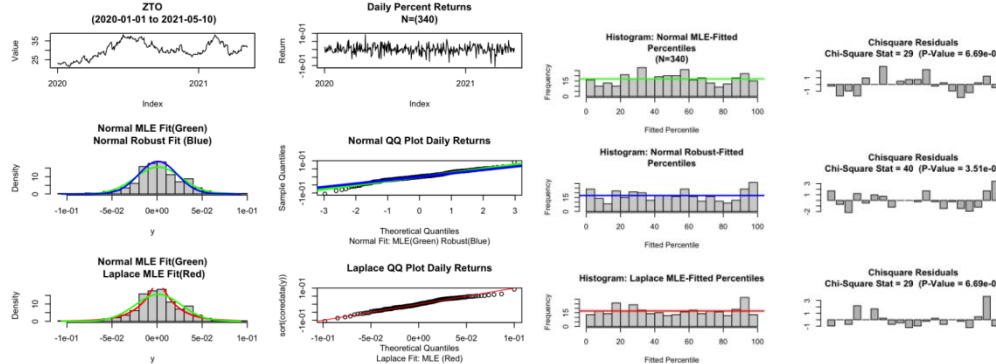


Figure 7: Period 3 the dot data fits both three-line well, and the red line fits the data best. Both the Normal MLE-Fitted model and the Laplace MLE-Fitted model fit period three

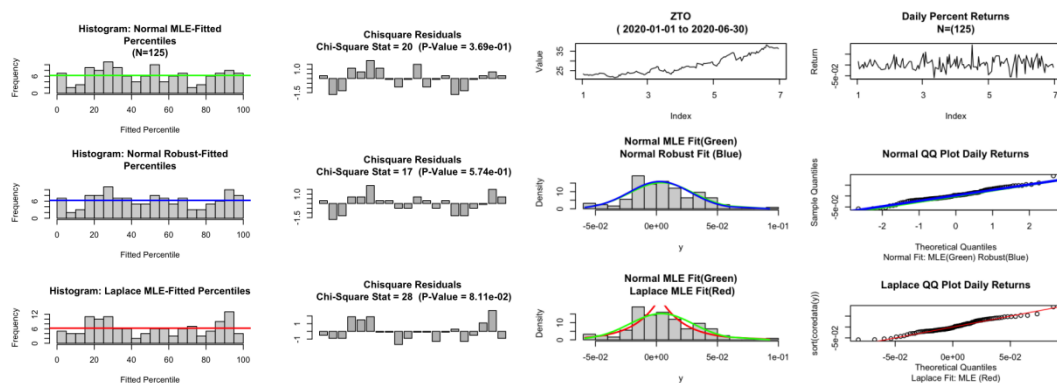


Figure 8: Period 4 in the picture on the left side of the second line for the data, we can see both blue lines, which means Normal Robust Fit, and green line, which means Normal MLE Fit fits the data well. The dot data fits both three-line well. The Normal Robust-Fitted model is the best one that fits period four

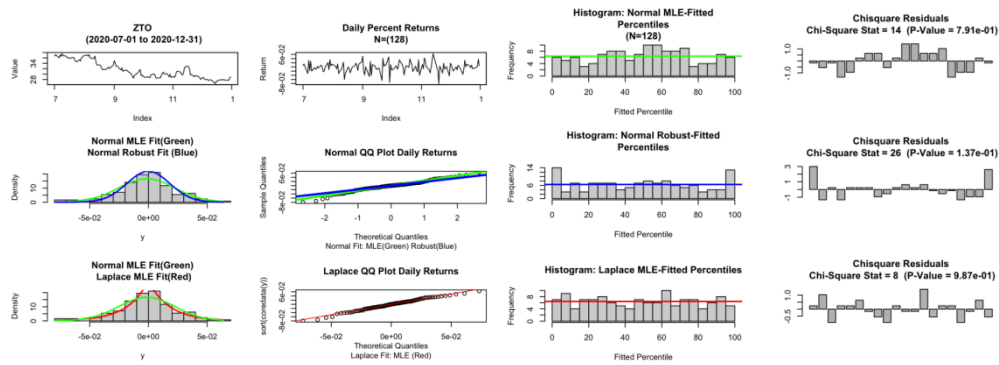


Figure 9: Period 5 Both the Normal MLE-Fitted and Laplace MLE-Fitted model fit period five

Thus, the Laplace MLE-Fitted model fits all five periods.

2.2.2 United Parcel Service, Inc.

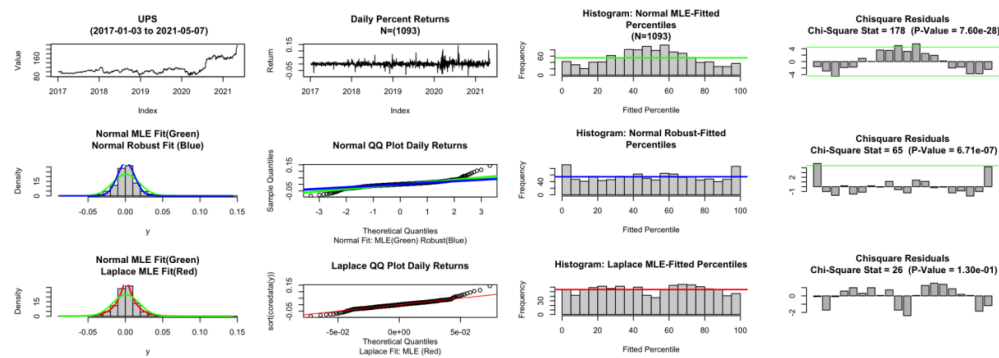


Figure 10: Period 1 the Laplace MLE Fit model is the best one that fits the whole period data

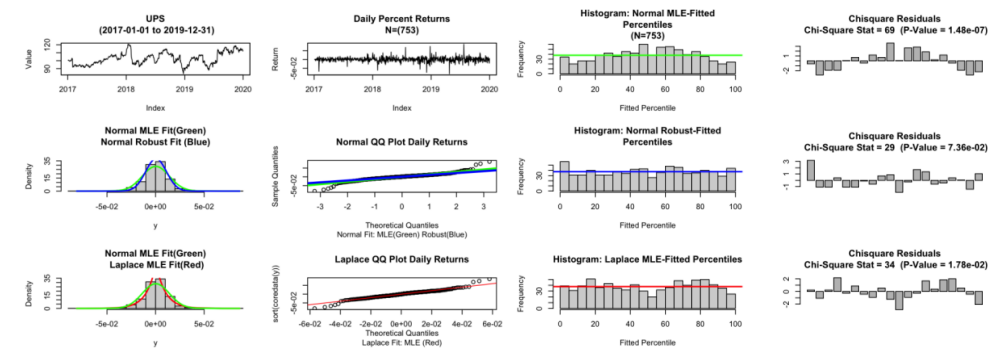


Figure 11: Period 2 The Laplace MLE Fit model is the best one that fits the data. The Normal Robust-Fitted model is the best one that fits period two

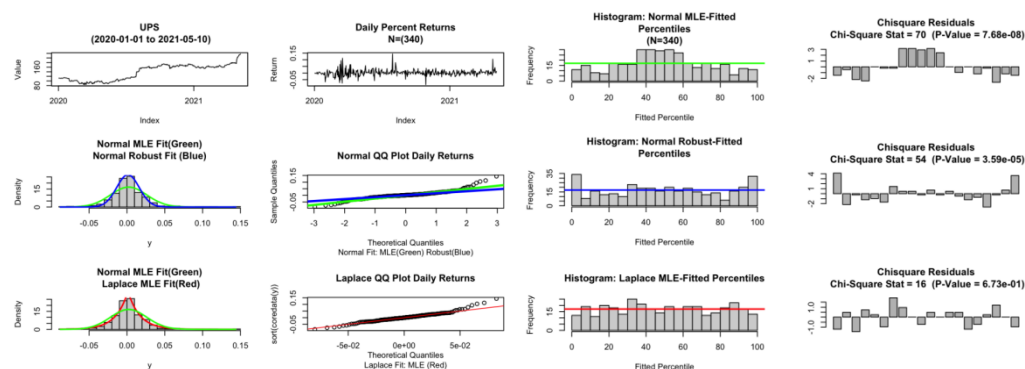


Figure 12: Period 3 The dot data fits both three-line well, and it saw the red line fits the data best
The Laplace MLE-Fitted model fits better in the third period.

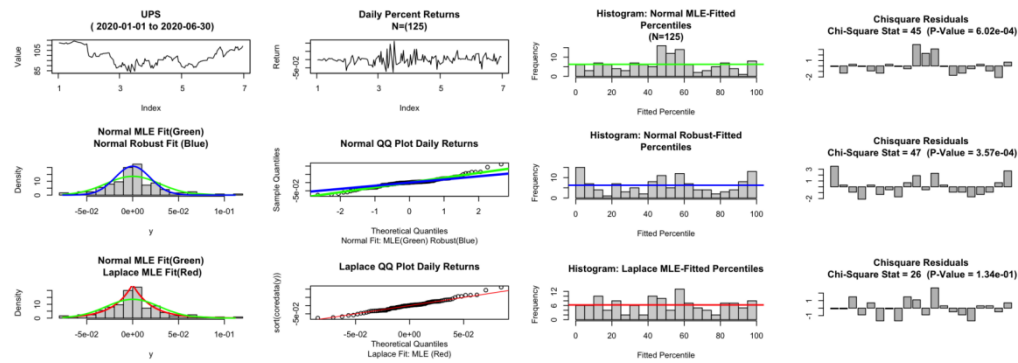


Figure 13: Period 4 The Laplace MLE-Fitted model is the best-fitting model related to the data than the Normal Robust-Fitted model and the Normal MLE-Fitted model

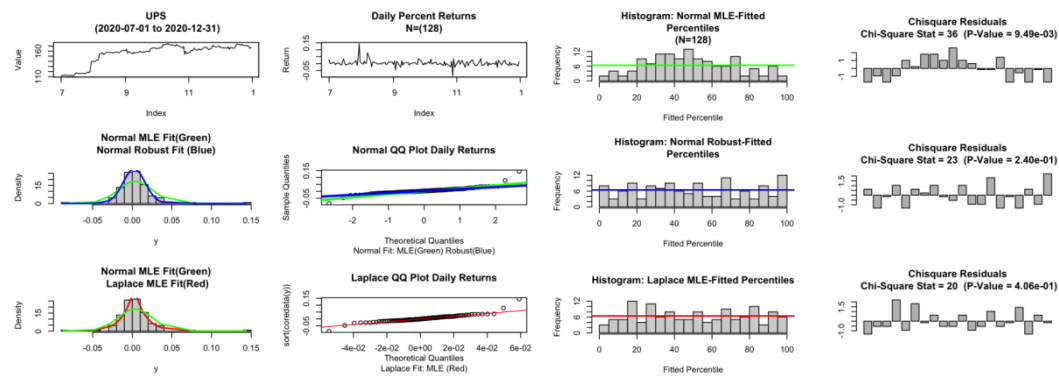


Figure 14: Period 5 The dot data fits both three-line well. The Laplace MLE-Fitted model is the best one that fits period five

The P-values for the Laplace MLE-Fitted model are all higher than 0.01. Therefore, we choose the Laplace MLE-Fitted model as a result.

2.2.3 FedEx Corporation

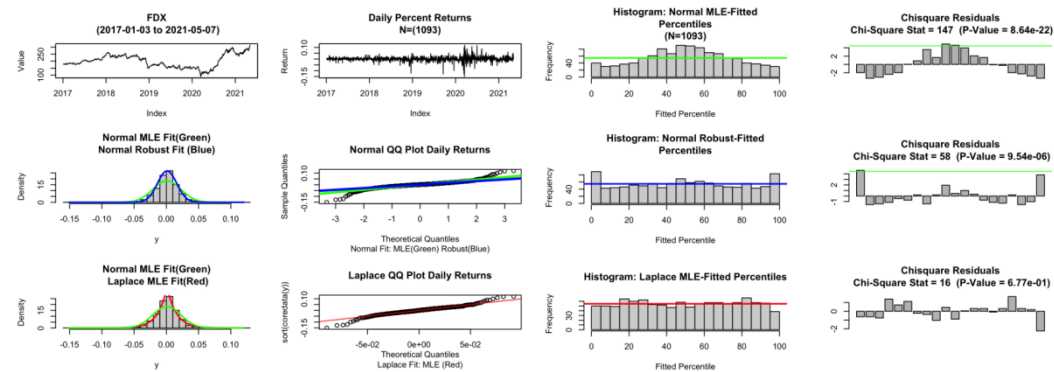


Figure 15: Period 1 The Laplace MLE Fit and Normal Robust fit the data well. The Laplace MLE Fit model is the best one that fits the whole period data

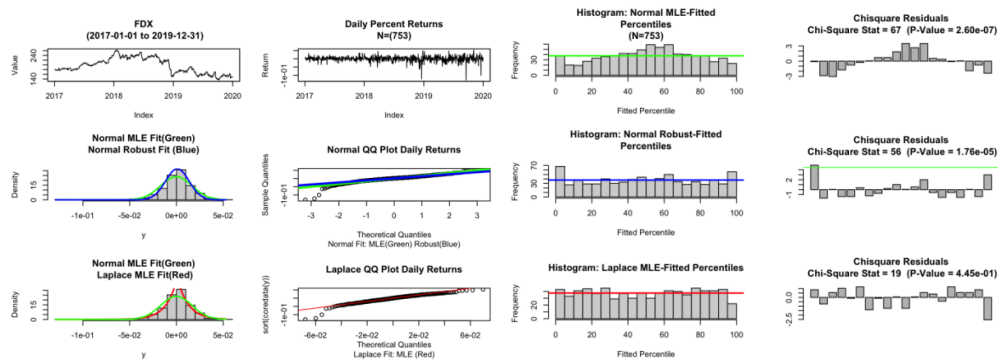


Figure 16: Period 2 the Laplace MLE Fit model is the best one that fits period two

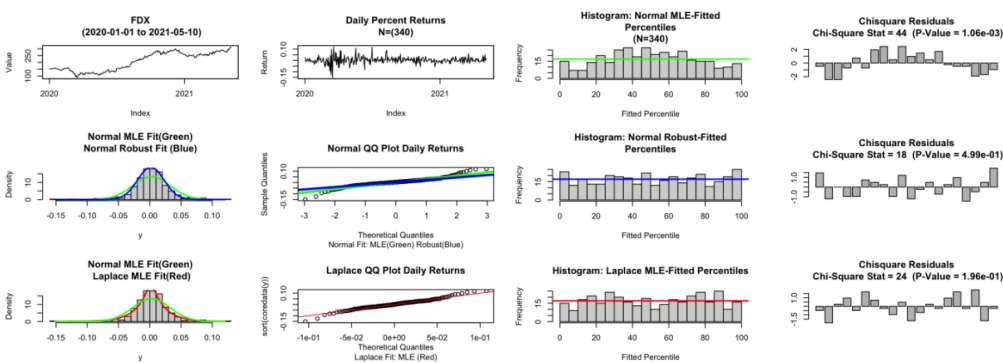


Figure 17: Period 3 both the Normal MLE-Fitted model and the Laplace MLE-Fitted model fit period three, and the Laplace MLE-Fitted model works better

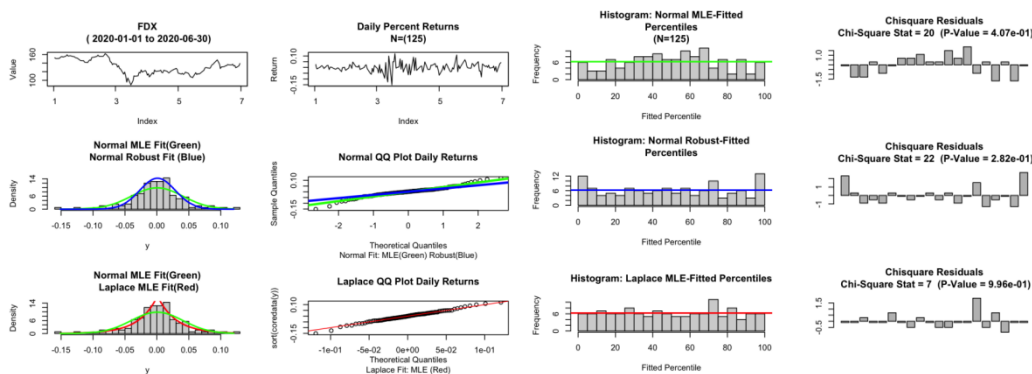


Figure 18: Period 4 the Laplace MLE Fit model is the best one that fits period four

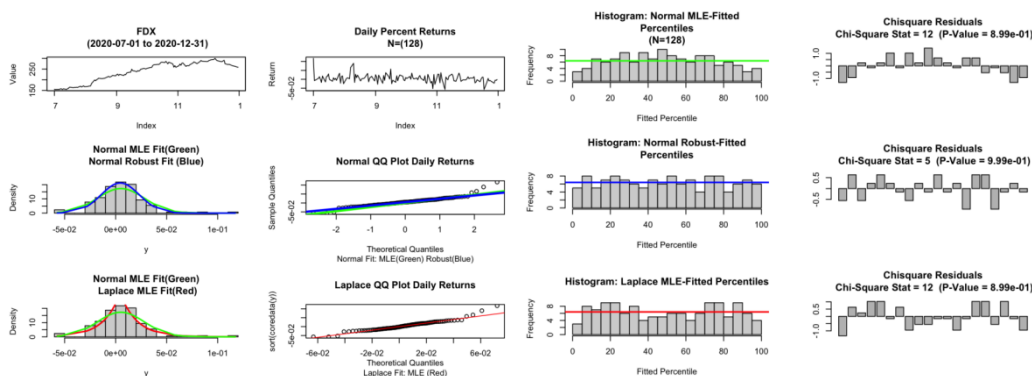


Figure 19: Period 5 Normal MLE-Fitted model, Normal Robust-Fitted model, and Laplace MLE-Fitted model fit period five

The Laplace MLE-Fitted model is the best model that fits FDX stock price.

2.2.4 Heartland Express, Inc.

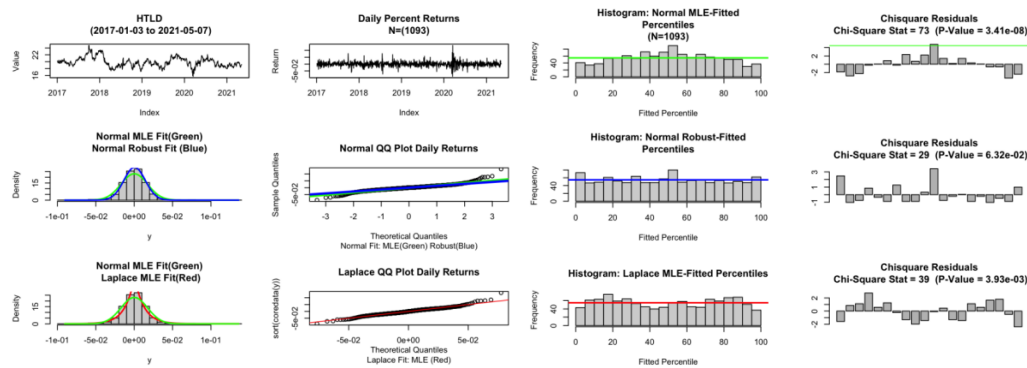


Figure 20: Period 1 the dot data fit three lines well. The Normal Robust-Fitted model is the best one that fits the whole period data

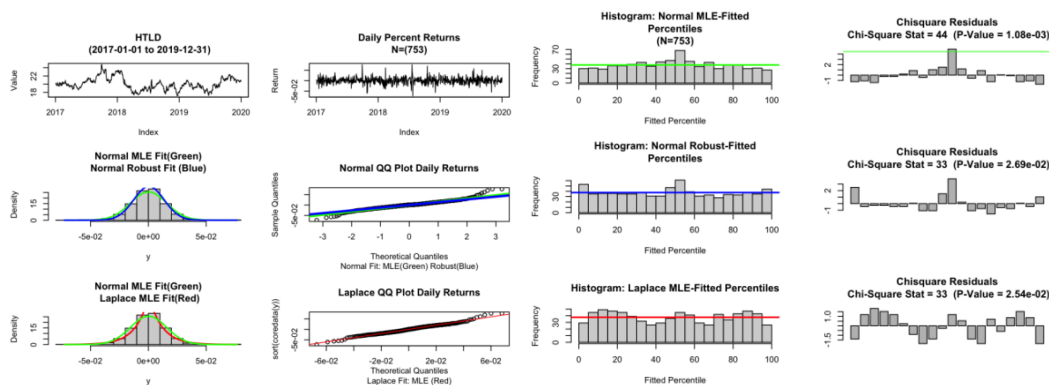


Figure 21: Period 2 The Normal Robust-Fitted model is the best one that fits period two

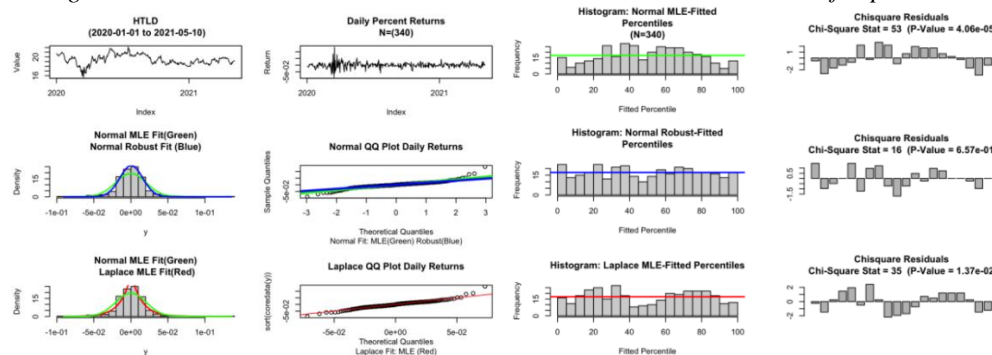


Figure 22: Period 3 the Normal Robust-Fitted model is the best one that fits period three

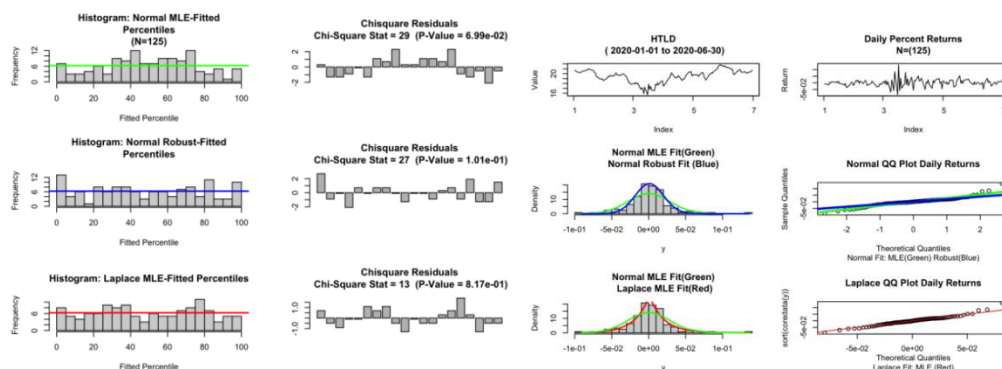


Figure 23: Period 4 the Laplace MLE Fit model is the best one that fits period three

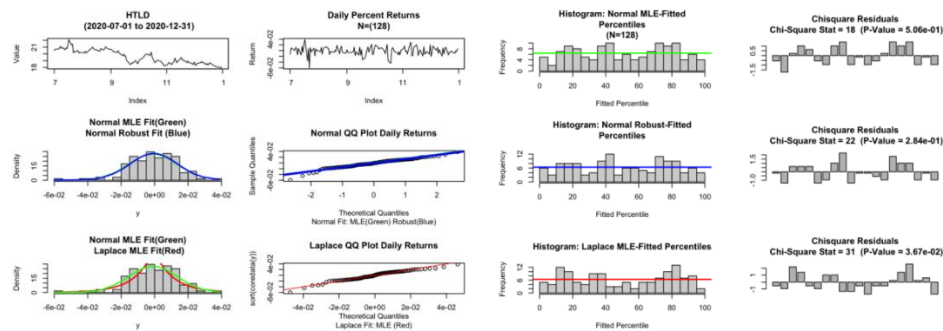


Figure 24: Period 5 the dot data fits both three lines well. Normal MLE-Fitted model is better than the Normal Robust-Fitted model

The Normal Robust-Fitted model fits all the periods and the Laplace MLE-Fitted model fits periods two, four, and five. The Normal MLE-Fitted model fits the fourth and fifth periods. Therefore, we regard the Normal Robust-Fitted model as the best model which fits the HTLD.

3. Conclusion

After the analysis, we summarize that the Laplace MLE-Fitted model fits the stock prices of ZTO, UPS, and FDX. Our hypotheses 1 and 2 are rejected. The stock prices of ZTO and UPS didn't follow the Normal MLE-Fitted model; it might be because of the significant volatility after 2020 and the quick rise of the cost. We are pleased to see that the stock price of FDX follows our hypothesis 3. The Normal Robust-Fitted model fits the HTLD best, confirming our original hypothesis in section three.

All in all, I predict that the stock price of the HTLD will stay stable in the latter year in 2021 because the COVID-19 still causes some trouble in the business, and there wouldn't be too much profit rise in a short period. The stock price of ZTO, UPS, and FDX will rise in the latter year in 2021 because many overseas students are going back to school this year, and there will be much demand in the future.

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References

- [1] Wang Yan "Comparative study and experience reference of the development of Chinese and American express industry" *Journal of Beijing Vocational College of Finance and Trade*, May 2020, pp30-31.
- [2] Sun Mingqi "Research on the coordinated development of e-commerce and express delivery industry" *Cooperative economic and technology*, No5x 2021, pp57.
- [3] ZTO Express (Cayman) *Business*, pp 137-139 Available: <https://www1.hkexnews.hk/listedco/listconews/sehk/2020/0929/9455981/sehk20091101108.pdf>.
- [4] Luo Yong and Luo Xiaotao "How FedEx influence our delivery industry," *Authoritative Forum*, pp130.