Financial Report on the shares in SAGA PLC over the past five years 1st April 2015 - 1st April 2020

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Part 1

Abstract

This report will perform a statistical analysis of the shares for SAGA PLC, a travel and an insurance company for over-50's, based in south east England. The analysis covers the last 5-years (2015-2020), where it was found that three events heavily contributed to reducing the share price by 90% from 165 GBP (Great-British-pence) per share to 17 GBP [2]. With an average annual volatility of 46% and a drift of -43% over this period the shares are lively and have not done well. However, there could be hope for the future share price with a new Chief Executive Officer (CEO) Euan Sutherland in the post Covid-19 world [4].

Introduction

SAGA became public in 2014 on the London Stock Exchange [1], hence this 5-year period covers over 80% of its entire lifetime on the stock market, giving a great overview of the company's entire history. SAGA's main industries are insurance (pet, travel, life, medical, etc.), personal finance, personal healthcare and package holidays. In addition, SAGA also offer cruises around the world with two self-owned and -operated cruise ships. These services are exclusively for people over 50 years of age giving the company a unique edge over the competition, for now, as seen later in Fig.3, point B, this advantage could be over. For the last few years SAGA has had a yearly revenue of £1.1 Billion [4], with its closest competitors such as ORCHID, EPIC, and Jelf only each reaching half of that [3]. These positive and inherent considerations are worth bearing in mind when looking at the following analysis of the performance of the shares which show negative earnings.

The Daily Returns

The daily returns for the entire five years were retrieved [2] and analyzed. Creating histograms of the daily fluctuation, the shares were shown to be more volatile and followed the normal distribution much less when using quarterly or yearly data. In Fig. 1 a histogram created by daily data from the past 5-years is shown. Here the daily change in share price is seen to be close to a normal distribution, but not perfect.

The histogram in Fig.1 was made using 1264 daily returns from the five-year period, creating equally sized BINs at 0.5% of the daily return.

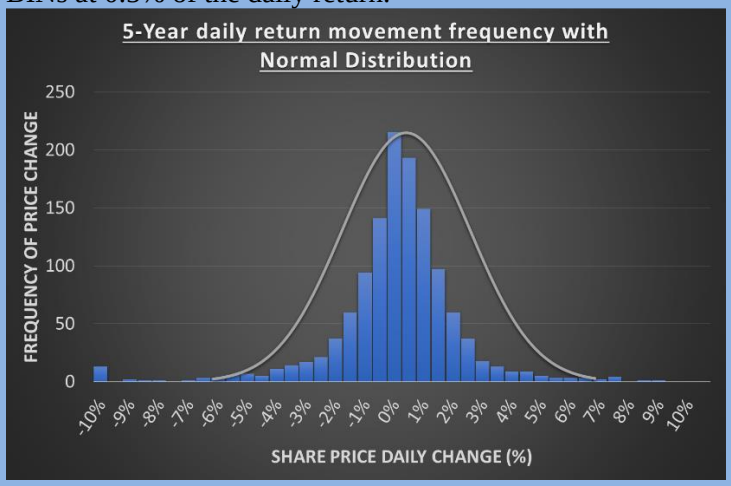

Figure 1. A histogram of the daily returns for the entire 5-year period (Blue bars). With the normal distribution (Grey bar) overlaid.

As seen above [Fig.1] the daily fluctuation rarely exceeded 5% showing a stable stock on a daily basis. This shows that the daily share price change is not highly volatile with a Std of just 3%. This was confirmed when the daily volatility was calculated to be 2.91%. The same style graphs were made with a sampling frequency of quarterly, and yearly showing much higher volatility at 74% and 34% respectively. A cause for this higher deviation could be due to the use of less data to calculate values, there was no pattern and no seasonal trends to be found.

This graph shows and even distribution between negative and positive changes, leading one to believe that the overall share price has remained relatively constant over the five years. This would be a correct assumption to make if this overall share prices trend

were not investigated. We can see [Fig.3] three main events causing the drops in the share price, without which the above assumption would stand true.

Despite no large fluctuations in these daily returns [Fig.1], the data does not follow a normal distribution perfectly. A quantile-quantile (QQ) plot [Fig.2] was created to see the level of this fit. The straight line shows a theoretical uniform normal distribution.

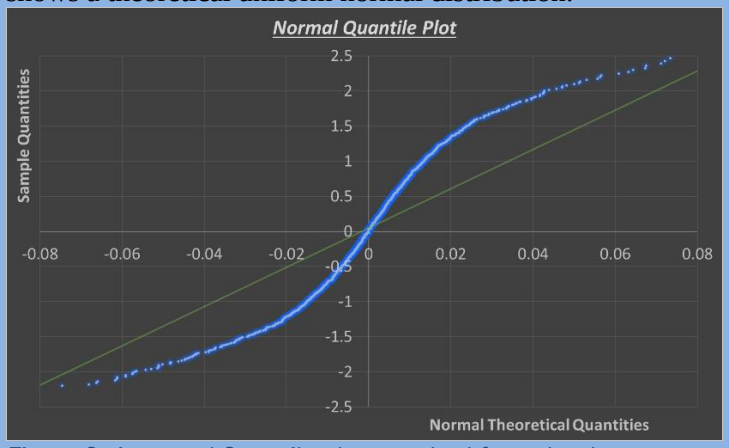

Figure 2. A normal Quantile plot, graphed from the data gathered for the normal distribution in Fig 1. Blue curve shows this sample data. The green line shows the normal distribution fit.

This QQ plot shows us that while close to a normal distribution with the tails and center of the data coming close, the middle sections of each side of the mean deviate, looking like bulges. These curves that are away from the uniform line show the data has spikes in identical values, having too many values at the data's extremes. Meaning the share data shows the same values turning up much more often than expected. Looking at this graph we can see these overloaded values peak around -3, and 3. This matches up to our analysis of Fig.1 with its daily volatility being 3%. This QQ plot therefore has helped us see the deviations from the normal distribution. As to why these specific values leap showing up that would just be speculation on the market.

Annual Drift

The annual drift was calculated using first a yearly worth of data and then just using quarterly data, the latter shows a much higher drift than anything from the yearly data. It could be safely assumed that this is due to the use of less data, so a rougher estimate with outliers having a heavier weighting. However the annual drift was also calculated using daily data showing a lower drift, hence ruling out this previous argument. It can therefore be concluded that the shares have a steeper drift then daily or annually.
The data for annual drift was formed into a tables below (Table 1 and 2) to enable the outliers to be seen clearly, and the contrast between daily, quarterly and yearly calculated drift.

Table 1. Showing daily and annual drift working from yearly data. Positive drifts in light green. Negative drifts in orange, highly negative drifts in red.

	2015	2016	2017	2018	2019
Daily Drift	0.06%	0.00%	-0.16%	-0.05%	-0.25%
Annual Drift	16%	1%	-39%	-13%	-61%

Table 2. Showing daily and annual drift working from quarterly data only. Positive drifts in light green. Negative drifts in orange, highly negative drifts in red.

Periods	2019 Quarters				1st quarter 2020	Entire five years
Drift (%)	1st	2nd	3rd	4th		
Daily Drift	0.11%	-1.66%	0.09%	0.34%	-1.78%	-0.17%
Annual Drift	28%	-414%	23%	86%	-445%	-43%

As seen above (Table 1 and 2) with an exception of two outliers, the quarterly drift matches the yearly.
The three key events shown in Fig. 3 are again visible here in the years 2017, 2019, and 2020. Although no yearly can be taken from 2020, the first drift in the first quarter can be found as is very high. Ignoring the three discussed outliers can see that daily drift (-0.17%) matches up closely with share price change in its data (2.9%) in Fig.1 with only small fluctuation, while annual drift averages at -43%.

Events impact on share price

An analysis of share price has shown the drift was hevily affected by three key events which had a profound negative impact on share price. These are shown in Fig. 3, highlghted as A, B and C. Here we can see the overall sare price over the 5-year period and the drift line.

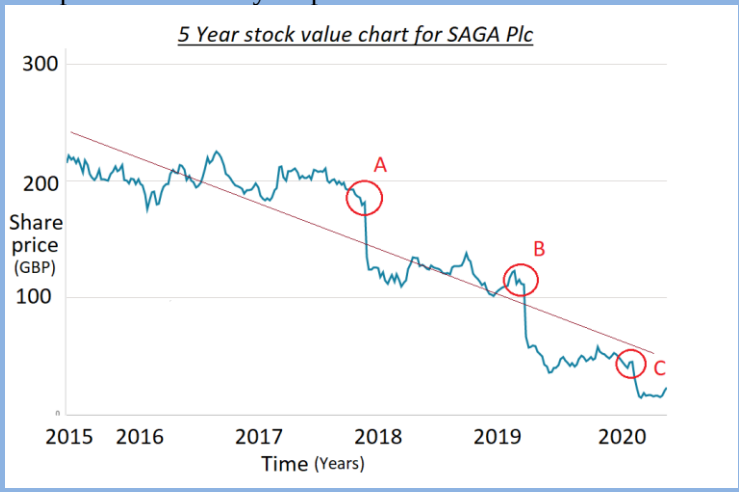

Figure 3. Overall share value over the 5-year period in blue. Red trend line showing average drift. Red circles showing major events A, B, and C.

For a potential investor it is important to consider Fig 3. and the impacts of these events to determine whether

they should be of concern in future. These are disccued in detail below.

A. This drop was due to several events, mainly the collapse of Monarch Airlines which SAGA used for holiday packages [5]. The company was also investing money in expanding the business and changing it from insurance underwriting to insurance broking. While reportedly having trouble with competition, all having the combined effect of reducing the share price by 25% [5].

B. Simply put commoditization of the SAGA brand has begun "Customers are increasingly using price comparison websites" [6]. Meaning price is starting to mean more than brand name and worth, hence SAGA losing its unique edge over its competitors. Of course this would surely mean a slow decline then, and it had been exactly that. The tipping point was when SAGA released their annual statement showing a 5.4% loss in profits for this very reason. This coupled with BREXIT causing a "customer unwillingness" to commit to holidays and further investment led to the massive drop [6].

C. This drop at point C is due to a combination of two reasons, firstly the selling of the Bennett's motorcycle insurance for £26million. Though the CEO Sutherland claims the reason for its sale is "saga seeks to focus on our core branded business" [7]. It is easy to see the selling of such a worthy brand was a way to create more cash flow during the COVID-19 pandemic, the second and main reason for the fall in share prices.

The reason the pandemic has affected SAGA so much, is due to its travel sector, being effectively shut down. Their cruise ships such as the Spirit of Discovery have been docked and all sails suspended until further notice [8]. Just before all of this SAGA also lost £4 million on the Thomas Cook crash (September 2019) [8].

Annual Volatility and the future

However, it is not all doom and gloom, critics believe saga is making a comeback during the next quarter, with some predicting stocks soaring by 50% [9]. With over 70% of bookings being made for the post COVID-19 world [9]. So perhaps over the next quarter and years the share price will increase. Something that will help precipitate this is a highly volatile stock, since it needs a big change to get better.

As we can see in Fig. 4 the volatility was calculated for each year using daily variance/volatility. Thankfully for the current situation, the shares are currently highly volatile. Hence giving the share price the chance to redeem some of its value. Of course, it is important to realize unlike drift, volatility cannot be solely negative or positive, it is commonly mistaken that high volatility means high risk. This is not necessarily the case depending on how one invests in options and shares. Volatility is simply how much a share price has been changing, if this was low, then SAGA would never have any chance of recovering the losses over the last five years in any meaningful time. The high volatility gives the shares room to grow, or of course space to collapse.

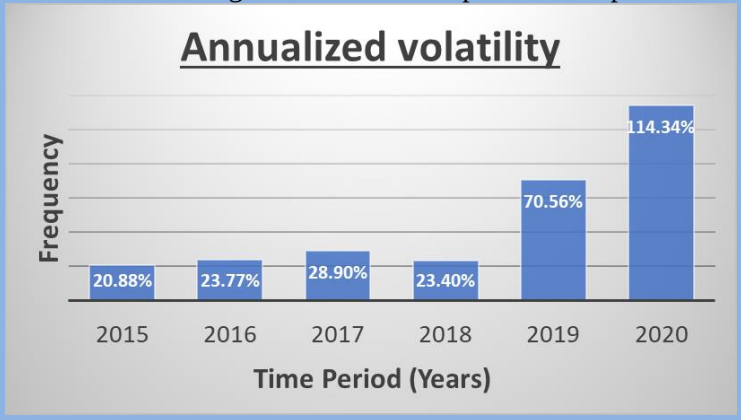

Figure 4. Bar graph showing annualized volatility. Data gained from daily returns. Each bar showing a years' worth of data, with the exception of the far-right bar (2020) showing only one quarters worth of data.

Investing £1-Million

Here we will assume we invested £1 million into SAGA PLC 5 years ago to give a picture and real feel as to what the shares have done over this period. Of course in hindsight this is a bad idea, but at the time of investment it would have been the right choice as seen in Fig.5 below the first three years had positive returns on the shares.

Table 3 shows our starting principal value, along with the lowest and highest points for the value of our investment.

Table 3. Showing start, high, low, and end value of hypothetical £1 million investment. Green box showing highest value, and red showing lowest value. All within the five year period.

Stages	Date	Value of Shares	Value of Investment
Start	01/04/2015	146	£ 1,000,000
High	08/09/2016	190	£ 1,300,116
Low	16/03/2020	14	£ 97,531
End	31/03/2020	17	£ 115,998

So, our £1million would now be worth £115,998, which is a -88% Return On Investment (ROI). A drastic decline, however looking at Fig.3 we can see if not for the three major drops (A.-50p B.-75p C.-30p) the share price would be sitting at roughly the same value where it started at 150GBP: current value (16p) + drops =171GBP. With Fig.1 showing this; that on average the ROI would likely be not far from the principal value. Thus, SAGA could be a good company to invest in, as these three events are abnormalities, and the share prices may rise again. Then again these three events could be the exact opposite and be a sign of the changing times,

with airlines going bankrupt, travel shut down indefinitely and price comparison websites [8][6].

Fig. 5 shows how the £1M GBP investment would have behaved over the five-year period in two scenarios. Investing it all in SAGA, or alternatively investing it in a savings bank account.

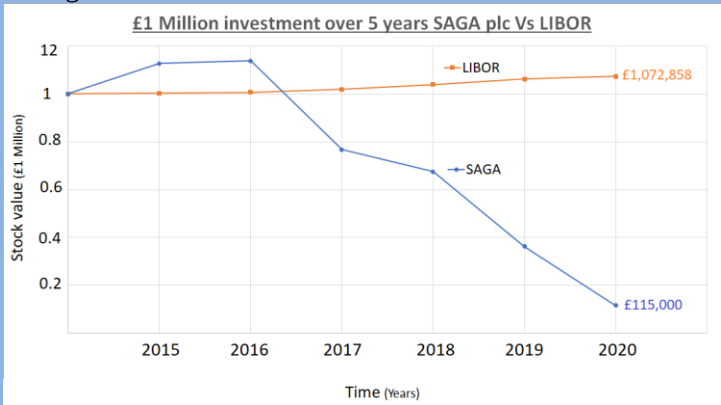

Figure 5. Graph showing the value of a £1 million investment over a five year period. Orange is the LIBOR investment. Blue is the SAGA investment. Both with end values of investments at end of five years.

This was done using the LIBOR data base for historical interest rates [10] and for the SAGA investment; the daily share prices [2]. This data was then input into the following equation (Eq.1) to find future value of share price (F) using the compound interest (r) over time (t) and the principal value (P).

$$\text{Eq.1} \qquad F = P(1+r)^t$$

As it can be seen, the investment in SAGA would have been the right choice in the first three years, until 2017 when the shares took a massive dip, again representing point A in Fig.3. As shown before the investment in saga would yield an ROI of -88% as for the investment in banks would have created an ROI of 7% with a profit of £72,000. A much lower risk investment with a much higher yield. For future investment it would be suggested to take all money out of SAGA and put into a bank savings account. However, with the recent and current high volatility of the SAGA share price, there is a possibility for making some of your investment back, perhaps by betting against saga and buying put options. By doing this, it minimizes further high risk of loss of investment, and enables you to gain profit from the continuation in decline of the share price.

Conclusion

In conclusion, it can be seen from the annual drift in tables 1 and 2 and in Fig.3 that if the pattern continues then the share price will continue to fall drastically. Though despite this negative drift, SAGA still has its brand name and trust from its existing customers. Along with its high level of assets and low debt to equity ratio [4]. The company still earns an underlying profit of £100 million a year, and if the new CEO develops the new business strategy correctly the company can change its negative share direction [4]. The new high volatility seen in Fig.4 shows how the share price does have the potential to move, however volatility and implied volatility are two different things and this could be a stabilizing period for SAGA. However given this high volatility and the poor fit to a normal distribution it is hard to accurately estimate what will happen next with the share price.

Part 2

The daily returns from SAGA's share data [2] was analyzed assuming a lognormal distribution instead of a normal distribution. This was done using Eq.2 and the Std, the results are all summarized in the Table 4. The volatility does not change a great deal whereas annual drift highlighted in red has a massive difference.

$$\text{Eq.2} \quad Volatility = {}^{Std}/_{(Time\ Interval)^{0.5}}$$

Table 4. Showing annual drift and annual volatility gained from the five years worth of data. One set following a lognormal distribution, the other following a normal distribution. Red boxes indicating large variances in the two sets of data.

Distributions	Lognormal	Normal
Daily volatility	3.13%	2.91%
Annualized volatility	50%	46%
Daily Drift	0.21%	-0.17%
Annual Drift	54%	-43%

Using this new assumption, the daily returns were graphed with the same method as in Fig.1. Showing a similar pattern, following the distribution, but not perfectly.

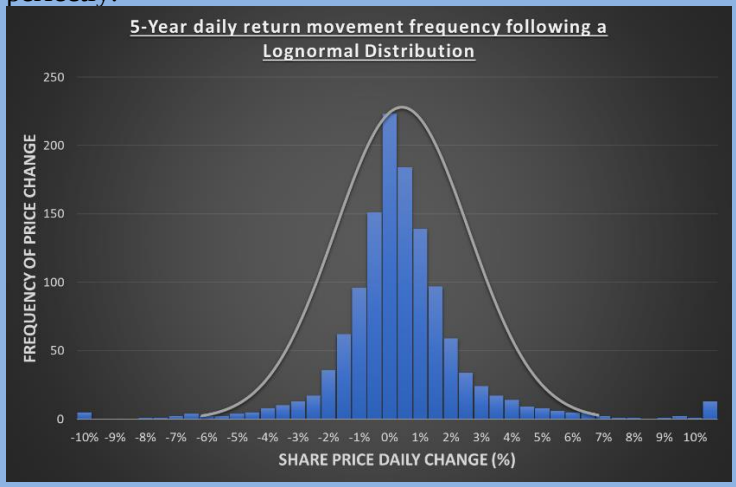

Figure 6. The same graph as in Fig.1 except this time the data following a lognormal distribution.

The share data was then analyzed to find its appropriate options prices. This was done by creating two 2-step binomial trees, one for call options, and one for put

options. The annual volatility calculated earlier (46%) from the five years worth of data was used along with the annual interest rate from LIBOR (1.18%) to give us the discounting factor [10]. The time period for these options was decided to be a 2 month expiry date with 1 month intervals.

The starting date for these hypothetical options was the last day of the five year data set (31/03/2020), at which point the share value was worth 17GBP.

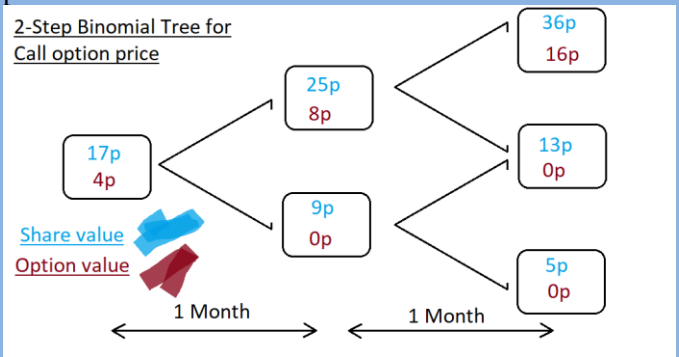

*Figure 7. A Binomial tree of a **call** option with a beginning share value of 17GBP, and its potential changing share price (In blue) over time. Showing a cost of the options (In red).*

To achieve this a strike price was needed for both the call and put options, 20p was chosen for the call option being slightly higher than the principal value as with most call options. The put option strike price was put at 10p.

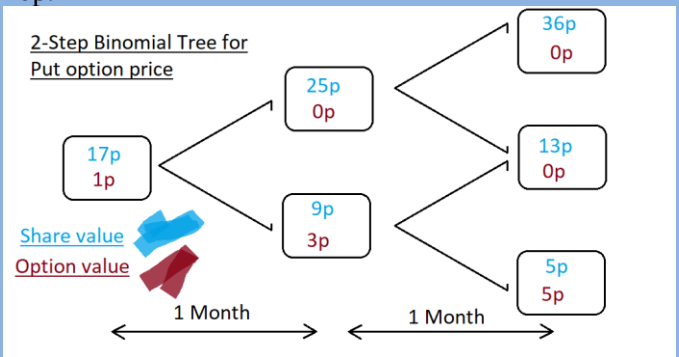

*Figure 8. Figure 7. A Binomial tree of a **put** option with a beginning share value of 17GBP, and its potential changing share price (In blue) over time. Showing a cost of the options (In red).*

As seen above in Fig.7 and 8 the far-right options values on date of expiry were calculated (in red), this was done using the following equations:

Eq.3 $$Call\ Payoff = MAX(S_T - E, 0)$$

Eq.4 $$Put\ Payoff = MAX(E - S_T, 0)$$

E is the strike price and S_T is the share price at time(T). The equation shows us to take the "max" value, hence if the result is a negative number then zero is taken as the answer. Once this was done the following more complicated equation was needed to find the option value for the remaining nodes, and eventually find the option price at the start date.

Eq.5 $$F = e^{-rT}(pf_u + (1-p)f_d$$

Where p is:

Eq.6 $$p = \frac{e^{-rT} - d}{u - d}$$

The option price for the call option was found to be 4p, which given the shares high volatility is a good price. Enabling the investor to potentially buy shares worth 36p for just 4p in just two months. Which is a large gain over such a short space of time. Also given the steady negative drift of these stocks along with its high volatility investing in such call options as this would be much less risky and a more sound way to invest your money. If instead shares were bought and the price dropped, the investor could loose everything, where as an option has a limited loss, as we're about to find out below.

It can be clearly seen that in the call option scenario the investor will gain a positive return when the share does well and only the cost of the option if it does not. The reverse is true for the put option. This relationship can be seen even more clearly in the following graphs Fig.9 and 10.

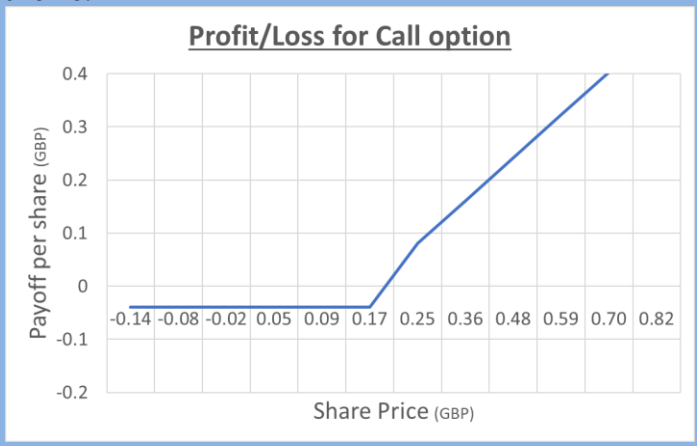

Figure 9. Graph representing the potential losses and gains in a call option during the share price changing.

In this call option scenario, we can see (Fig.9) that the profit, positive returns are endless as the share price increase. And yet as it decreases the investor will only loose a maximum of the cost of the option. This is exactly true and opposite for the put option as seen below in Fig.10. This put option allows an investor to make money from a falling stock price, which in the case of SAGA, is a promising prospect.

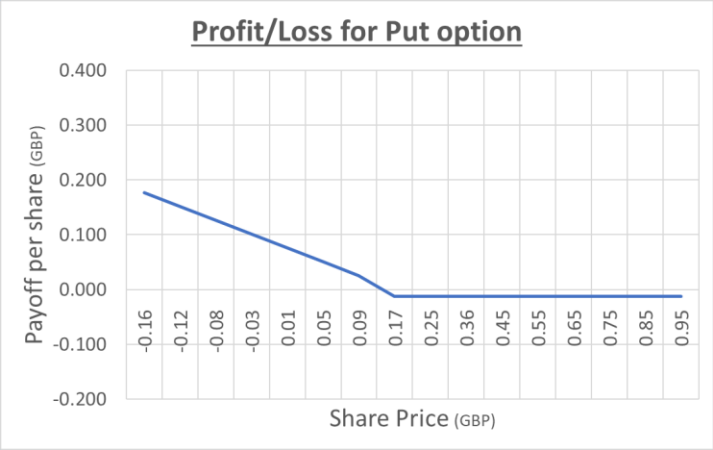

Figure 10. Graph representing the potential losses and gains in a put option during the share price changing.

In both above graphs it can be seen that the losses stop at a certain value, this value isn't zero as one would expect. It is the value of the option price, as an investor has to purchase them before the outcome is seen. In this way investors can reduce risk, in some cases to zero, when managing a portfolio with both put and call options working with shares connected to each other. For the SAGA shares it can be seen there is potentially a lot of money to be gained in a shot space of time due to the highly volatile share price.

Conclusion

The option prices found were very reasonable, for a high possibility of positive rewards, with the risks being relatively low compared to owning shares in the company. In part one it was seen SAGA shares have had several downfalls in the recent years and with the current climate, COVID-19, online compare sites, etc. it is hard to know which way the share price will go. This makes it the safer choice to invest in options within the SAGA shares rather than buying shares. The graphs and binomial trees clearly represented that, and of course a two-month time period is relatively short for stocks. So, it would be interesting to investigate further into longer options for the company.

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