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EVALUATING AN INVESTMENT FUND WITH DOWNSIDE RISK PROTECTION: A CASE STUDY[1]

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ABSTRACT

In this paper, we report a case study on evaluating an investment fund with downside risk protection by which investors can gain higher returns from investing on a mutual fund and protect themselves from losing their principle investment. Such downside risk protection is preferred in many cases, e.g. in managing government pension, trust funds, and donation funds of academic institutions. Supposedly one such organization, ABC Ltd, plans to invest its excess funds to maximize capital gains and yet requires assurance of the principal invested capital (even in bearish market conditions) after a 5-year period. ABC is interested in investing in CP Notes marketed by XYZ as it may meet ABC's investment objective. We develop a simulation model to evaluate the appropriate charge for such an option to protect any downside risks.

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INTRODUCTION

Downside risk protection funds have always been a popular choice among fund managers managing liquidity, which requires stable performance throughout the period of investment. The main objective of obtaining these liquidates is the fact that these will be a good source of revenue offering high cash flows in one lump sum. The main reason for its attractiveness is that they provide an almost equal stability return, to safeguard the interest of the investors or beneficiaries that cannot afford the risk of losing their principal amount.

For a financial institution to offer low or minimal risk funds is not an easy task especially in the volatile situation of our current global financial market. This is especially so if the bonds offered are of a volatile nature such as the former "dot-com" companies which created the technological economy boom bubble. If such a situation arises with an institution offering downside risk protection funds, it would be highly costly, even unprofitable for such an institution to absorb any "losses". This ultimately boils down to the selection criteria of the company for bonds or stocks to be selected.

As in our case, RQ Company does not record the greatest returns but with a long historical lineage that presents itself as a good candidate for the study of simulation outcomes. Using the historical stock indices of RQ company, we derive the main finding of our study, which is the calculation of the amount of fees to charge for downside risk protection. However, if the risk is very minimal for a particular company, the liquid fund will be directly channelled to purchase the stock or bond, rather then going through a protection fund. Therefore, risk factor is to be taken into consideration for calculating the fees to remain attractive to investors.

THE CASE OF CP NOTES AND LG FUND

CP Notes are 5-year bonds for LG fund, which at maturity, offer a 100% guarantee of the principal amount of investment, even if the price of LG fund falls below the initial sale price. LG fund combines a carefully selected group of hedge fund advisors to create a portfolio that is diversified across asset classes, investment styles and markets. The objective of CP Notes is to provide maximum exposure to a diversified portfolio of hedge funds consistent with the return of principal at maturity.

As CP Notes are guaranteed the 100% principal amount invested at maturity, the main purpose of this analysis is to

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find an equitable amount for XYZ to charge the investor ABC Ltd for the benefit of this risk-free investment product. By tracing the long-term historical returns of a randomly chosen stock (RQ Company), we are able to simulate the future possible returns of CP Notes. The differential profit (DP) from the average profits of an investor of CP notes (P2) and the average profits of a LG fund investor (P1) will indicate an estimated reasonable fee to charge ABC Ltd.

In order to use simulation to evaluate a reasonable fee, we consider the following scenarios (Let the current market price of the LG fund/CP Notes bond be Xt and the initial investment price be $100):

Scenario 1: Investor 1 buys directly into LG fund. If the price of LG fund rises above the initial investment price to Xt after 5 years, Investor 1 makes a profit of Xt-$100 but if the price of LG fund falls below the initial investment price to Xt after 5 years, Investor 1 will incur a loss of 100-Xt.

Scenario 2: Investor 2 buys CP Notes. If the price of LG fund rises above the initial investment price of $100 to Xt after 5 years, Investor 2 makes a profit of Xt-100. However, if the price of LG fund falls below the initial investment price after 5 years, Investor 2 will not incur any loss as the invested capital is protected.

In a bull market, both Investor 1 and 2 will make a profit of $(Xt-100). On the other hand, in a bear market, Investor 2's capital is preserved but Investor 1 would have incurred a loss. The difference in profit made between investor 1 and 2 is illustrated in Table 1 below.

TABLE 1

Investor	Return
Without Option (no guarantee) i.e. equivalent to buying LG fund direct	Xt
With Option (with guarantee) i.e. buying of LG fund through CP notes	Max (100, Xt)

Note: Xt = price of share at end of 5 year maturity period

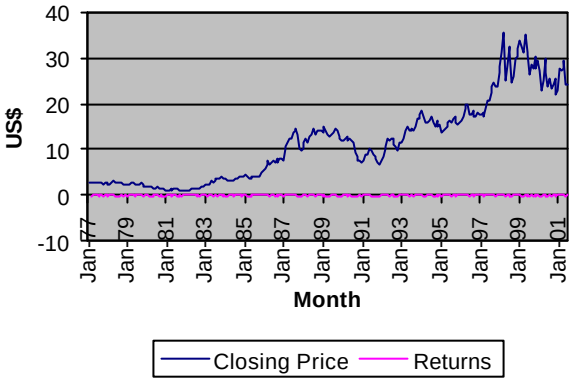
P1 = Profit without option (no guarantee) = Xt-100
P2 = Profit with option (guaranteed capital return)
= (Xt-100) if Xt> 100 or 0 if Xt< 100 = Max (Xt-100)
DP = Differential Profit
= Max (100, Xt) – Xt
= Max (100 – Xt, 0)

SIMULATION

The simulation will be done based on the 2 scenarios as mentioned above. One investor engages the security of the protection fund while the other invests without engaging the protection fund. The one directly buying the stocks will have a direct gain or loss from the outcome of the stocks' performance. The one engaging the protection fund will have the same gain with the bullish performance of the stocks but will be able to retain all its initial capital (exclusive of fees) invested in the case of a bearish performance. The only difference in the initial investment capital is the extra charge the protection fund requires.

In this case, we took the returns of the stock of RQ Company over 20 years to conduct our simulation. Figure 1 shows the historical trend of RQ Company's stock prices over the past 24 years. The raw data is the company's monthly closing price (Data is taken from the monthly closing stock price of RQ Company from January 1977 to June 2001). These numbers are used to generate the individual returns. These returns are used as the base units for the probability distribution. From the returns, the mean and the standard deviation is calculated. Sets of random numbers are generated according to the normal distribution curve. The number of random numbers generated will be very much dependent on the projection years required.

FIGURE 1: GRAPH OF RQ CLOSING PRICES AND MONTHLY RETURNS (US$)



The generated random numbers are used to represent the simulated rise and fall of the stock price. As the random number is based on the trend of the stock prices from the historical data, it acts as the continuation of the data collected and follows the trend, which the data has set. The first random number will be the rise or fall percentage of the initial buying price (which is $100 in this case) and the subsequent number will be the rise and fall of the price ahead the first random number. We have taken a set of 60 random numbers generated monthly, thus, the set of random numbers will represent the rise and fall for each monthly price in a period of 5 years. The outcome will be the predicted price of the stock at the end of the 5 years. We will further calculate the profit or loss with respect to the base price of $100. Any difference in profits between with and without the option will be calculated and any loss incurred by the investor with the option will be reset to zero. This will be considered as 1 set of simulation.

This simulation is repeated 1000 times to obtain a more significant average result of the stock returns after 5 years. The profits from stock value appreciation are the same both investors, whether taking or not taking up the option but all losses incurred for investors taking up the downside protection option are reset to zero. The profit or loss for each 5-year simulation is summed up and averaged out throughout the 1000 simulations to derive the final

expected average profit for the next 5 years and the final expected average profits or losses if no protection option is taken.

FINDINGS

Outcome of the simulations show an average of expected profit with protection option to be $102.09 and without option $94.52. The profit with option will always be higher as all losses are absorbed and only net profit is considered. Thus, XYZ can charge ABC a sum of $7.57, which is the differential profit, as the guarantee fee for taking up its downside protected CP notes.

APPLICATIONS AND LIMITATIONS

As we have used RQ Company's monthly closing stock figures as an example, we have numerous data for calculations. If applying to a real situation for any listed stocks or bonds, a daily data collection for the stock or bond price can be used for greater accuracy, especially if the protection fund is only of short term. The recommended period for the data tracking should be as long as the time horizon of the particular fund. That is to say, a 2 years protection bond will have to have at least 2 years of data collected daily/monthly in order to predict more closely to the trend of its performance. Another point to note is that the data collected should be as close as the fund' s issuing date to avoid any outdated data affecting the future trend. Simulation of fund performance should be consistent with the period of the reported performance figures whether daily, monthly or yearly. An example will be the 60 random numbers generated in our simulation, which represented the 60 months for the 5-year period.

The normal distribution is used here for the generation of the random number based on the mean and standard deviation of the data collected. This assumption of normal distribution might fall short in typical volatile market conditions. A more accurate model can be developed by taking the skew factor into consideration when taking the mean as the base number. In this way, we can even more closely predict the trend of the stock prices.

The main limitation, which we face in this simulation, is the computations involve. We have employed MS Excel for the computational purpose of our studies and therefore it is inadequate to implement it on such complexity. The other limitation will be the final number of sets of random values. We have used 1000 sets, which is quite a conservative number. This should be increased to a number as large as possibly manageable. This would depend on the software of the simulation program written in, the memory of the program storage and the computational power of the processor. A real business environment will be able to produce quite an accurate figure for the stock return value.

The last consideration we would like to highlight is that no matter how complex the simulation is, the simulation program can never predict disastrous downturn in the stock market brought about by natural or man made. The most we can do is to input an "external disaster" factor into the simulation program but being an averaging program, the figures affected will never shown to be significant.

Due to the nature of the stock involved, that is with downside risk protection, we cannot offer a protection for a stock which has a down turning trend. In terms of calculation, any negative mean return cannot be offered this option. Thus, we will have to alter the equation if we were to offer a protection for a stock that is more likely to make a loss.

The simulation is also a trial and run approach that may produce different solutions in repeated runs. However, the profit generated is consistently in that price range therefore, it can be employed to view possible stock trends or approximate prices.

CONCLUSION

This simulation demonstrates the basic risk management technique, which is employed for the prediction of stock market prices based on past trends. As described in the applications and limitations section, normal distribution probability generation may not capture sudden bullish or bearish market situations and therefore it can only be viewed as an estimated guide for deciding a suitable fee.

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