The case of cephalon essay sample

Based on the contract, the strike of the call options is $21. 5, and capped at $39. 5. Thus this is a combination of a call option at $21. 5 and a put option at $39. 5 two options, and the value is the difference between the two.

Based on the Balck-scholes call formula,

among which, □

1□The price of call option with the strike price of $21. 5: S=$20; K=$21. 5; r= 5. 5%; T-t= 0. 5yrs; σ= 75%

2□The price of put option with the strike price of $39. 5:

S=$20; K=$39. 5; r= 5. 5%; T-t= 0. 5yrs; σ= 75%

The price of the capped calls should be $3. 83-$0. 75=$3. 08, and the value of the options $3. 08*2500000=$7. 7 million By using the Black-Scholes formula, there are several important features being ignored for this proposed option contract. First, this option contract has an Asian feature that the Black-Scholes model is not built to handle. In the contract, the options' payoff at maturity is determined by the spread between the exercise price and the stock's average price over the 20 days prior to exercise, with three readings taken a day. This averaging feature would tend to reduce the value of the options. Second, these options are being bought by a firm on its own stock, so in effect they are negative warrants due to the negative dilution effect. This anti-dilution would tend to increase the value of the position acquired by Cephalon. Third, and most importantly, Cephalon faces an uncertainty which will affect the stock price at a very large level. Because one day after the option contract is signed, the FDA advisory panel recommendation will be issued.

The stock price may jump largely, effectively increasing the volatility of the stock and increases the option value. It also means that the true distribution of returns is bimodal. Fourth, from January 1996 to May 1997, the skewness of Cephalon’s daily log stock returns is -1. 13 (0. 26), while the kurtosis is 15. 54 (0. 13). These values are significantly different from those expected for a normal distribution. Ignoring the fact that the implied volatility surface for Cephalon’s options is not flat would lead to biased and inconsistent parameter estimates for the underlying valuation model, throwing into some question the robustness of the conclusions we draw as to whether the options are a cost-effective financing vehicle for Cephalon. Therefore, a model accounting for non-normality in log returns is in order. For the first three non-standard features, we can make adjustments within a Black-Scholes framework. For the non-normality of log returns, we can model the stock process using a variant of the GJR-GARCH process, which includes the volatility within the model.

Due to the non-Markov nature of the GARCH process, the expected return of the stock enters into the risk-neutral process and the option prices, unlike with the Black-Scholes/Merton pricing formula. It also includes a jump term on the stock price to reflect the large impact that FDA committee’s recommendation will have on the stock price. By using this model, the value of the options is estimated at $3. 48 each, which is $8. 7 million in total. The Asian feature of the option subtracts about three cents from each option, and the dilution effect adds 13 cents. Thus, the deadweight cost of the risk management program using the warrants is 9. 8-8. 7=$1. 1 million. Compared with costs of raising equity, it would bear costs of $9 million to

raise $45 million. It means that the break-even probability is about 12%. If the management believed that the approval of Myotrophin had a 12% probability or higher, the option-based financing yields lower expected deadweight costs than issuing equity.