CHAPTER 10
Chapter 10: Applications of Black Scholes Model, With Revision

10.1 Case I: Brand Core Media

Venture has been set up by Umesh Bhimani, MBA in Marketing and one more partner, from technical field. Partner with Management degree, is looking into management aspects and the other partner is looking into technical aspects. Venture is into making of advertisements, printing of brochures, pamphlets etc. Venture has been set up in February 2011 and it has an average turnover of Rs. 6,00,000 per annum.

Venture has been set up, assuming 10% share in Ahmedabad market, with market size being approximated as Rs. 5 crores.

Black Scholes Model:

Following five variables are considered in calculating value of call premium

- Current underlying price i.e. Rs. 50,00,000 (10% of Rs. 5 crores)
- Options strike price i.e. Rs. 3,00,000 (based on thinking of the management partner)
- Time until expiration, expressed as a percent of a year: 2 years
- Implied volatility i.e. risk expressed as standard deviation of 30%
- Risk-free interest rates i.e. treasury bill rate at time of starting of venture in February 2011, rate approximated as 8.00%

Using Template available in MS Excel format, value of call premium has been calculated as 4701985.4012, put premium has been calculated as 0.00.

Revised value of Call Option, to account for the change in K:

where $C = S N(d1) - cc * K e^{-rt} N(d2)$ and $cc = \text{change coefficient, from 0 to 1}$

Based on the thinking of the both the management partners, change coefficient has been taken as 0.5 and value of call premium is revised and calculated as 4850992.7
Call Premium value being very high in lacs, suggests that premium of purchasing the venture is very high, which shows higher value assigned to the venture. After applying the change coefficient, attempt has been made to refine the value. Value is decreasing by 50%, is justified by the fact that business of advertising is quite risky as certain names have already become famous to offer such services and printing services, also faces competition from well known names, who are already in the market from some years and made their name by their services.

Put premium is zero, which signifies that business is not worth to sell, but to buy as call premium is very high. This is 100 % in line with the current practices, as the management partners are not interested in selling, but in continuing with the business.

10.2 Case II: Maharashtra Freight Lines

Venture has been set up in July 2011 by Harjyot Singh and his father. As the name suggests, business is logistics based. It involves movement of goods from Gujarat to Maharashtra.

Business is characterized by lot of risk in terms of price and service levels. Due to competition between big number of unorganized players in this sector, risk levels in terms of attracting customers and making them permanent is very high.

Venture management person himself, has taken responsibility of calling customers and their references, every 3-4 days, to avoid the risk of losing them to rivals. Management people took 6 months to study the conditions and also, additionally, one month field visit was organized to understand the market conditions in Maharashtra, commodities, which are in demand there, season-wise requirement of commodities etc.

Black Scholes Model:

Following five variables are considered in calculating value of call premium

- Current underlying price i.e. Rs. 20,00,000 (Total initial investment in starting the venture)
• Options strike price i.e. Rs. 30,00,000 (to account for the risks already taken in making people, customers due to affordable pricing and reliable service)
• Time until expiration, expressed as a percent of a year: 7 months
• Implied volatility i.e. risk expressed as standard deviation of 90%
• Risk-free interest rates i.e. treasury bill rate at time of starting of venture in February 2011, rate approximated as 8.00%

Using Template available in MS Excel format, value of call premium has been calculated as 6743.7170, put premium is higher than call premium at 992784.2957

Revised value of Call Option, to account for the change in K:
where, \( C = S N(d1) - cc \times K e^{-rt} N(d2) \) and \( cc \) = change coefficient, from 0 to 1

Change coefficient has been taken as 0.8, higher value has been assigned to account for the risk and value of call premium is revised and calculated as 21917.18.

As put premium is higher, business can be taken as an option to sell it, which is shown by higher amount of risk present in the form of price and service delivery. Management has adopted the strategy of calling regular customers and inquiring about the transportation requirements to get the revenue and take care of the risk involved in logistics business.

10.3 Case III: Optimist Academy

Venture has been set up in 2010 by Animesh Banker. He identified that there was need of coaching classes in and around Maninagar. He started his first branch there, focusing on coaching batches for Bank P.O. exams and crash batches, along with regular batches for MBA and MCA entrance exams. In the first year, sales income was Rs. 2.45 lacks.
Annual growth in sales has been seen as 10% for the venture. Recently third branch has been opened in Vastrapur.

Coaching classes have a lot of competition, but area-wise, wherever, reputed classes are not available, there is an opportunity for a new venture. Risk percentage by the owner was taken as 30-35 %.

Owner saw that working capital investment, as a percentage of sales, was around 40% of net sales, which means that substantial cash savings need to be made available for supporting daily expenses like remuneration paid to tutors, stationery expenses, printing of material etc. Magnitude of these costs would depend on the number of batches and students in each batch, which would vary, based on the strategies adopted by the competitors within same areas and from other areas.

**Black Scholes Model:**
Following five variables are considered in calculating value of call premium
- Current underlying price i.e. Rs. 10,000 (Total initial investment in starting the venture)
- Options strike price i.e. Rs. 3,00,000 (taken from the average income earned during three years)
- Time until expiration, expressed as a percent of a year: 6 months
- Implied volatility i.e. risk expressed as standard deviation of 35%
- Risk-free interest rates i.e. treasury bill rate at time of starting of venture in 2010, rate approximated as 7.50%

Using Template available in MS Excel format, value of call premium has been calculated as zero, put premium is higher than call premium at 278958.3253

**Revised value of Call Option, to account for the change in K:**
where, \( C = S N(d1) - cc \cdot K e^{-rt} N(d2) \) and \( cc = \) change coefficient, from 0 to 1

Change coefficient has been taken as 0.45, Call premium is further becoming negative.
Put premium is available, which indicates that the venture can be up for sale as compared to somebody purchasing and keeping it. Investment cost incurred is quite low, as the area chosen for the business was not having fierce competition and the exercise price is a premium value, based on average of sales in three years. Hence, it is better to exercise option to sell for this venture.

10.4 Case IV: Adani Wilmar Limited (AWL)

Adani Wilmar Limited (AWL), a Rs. 12,000 crore company, is a joint venture between two global corporations: The Adani Group of India - the leaders in international trading & private infrastructure and The Wilmar International Limited of Singapore - agri-business group and leading merchandiser and processor of edible oils. Company was established in the year 1998. Jointly, the Adani Group and Wilmar Group, have set up India's first port based refinery, at Mundra, Gujarat.

Today, the Mundra refinery, is one of India's largest and most sophisticated oil refineries. FORTUNE, King's, RAAG, Bullet, Fryola and JUBILEE are the brands, under which AWL sells its range of edible oil, vanaspati and bakery shortening. The company has production infrastructure across the country with a crushing capacity of over 5750 TPD (Tonnes per Day) and Refining capacity of over 9000 TPD. AWL is one of the very few national players in the Industry to have this massive production infrastructure, with all its plants so strategically located to take advantage of the Import Parity and Domestic crop season. The company also has packing operations at Kadi [Gujarat], Latur [Maharashtra], Jaipur [Rajasthan], Dharwad [Karnataka], Dewas [Madhya Pradesh], Nagpur [Maharashtra] and Cochin [Kerala]. With 85 Stock points, 5000 distributors, 600 Super Stockists catering to 1 million outlets, AWL's products reach to 20 million households across India. Since its launch in 2000, Fortune oil has taken 20 months to become India's No.1 edible oil brand. Due to success in India, AWL introduced branded Edible oil to Middle-East and is now
exporting its products to more than 19 countries in the Middle-East, South East Asia & East Africa.

**Black Scholes Model:**
Following five variables are considered in calculating value of call premium
- Current underlying price i.e. Rs. 50,00,00,000 (Total initial investment in starting the venture)
- Options strike price i.e. Rs. 60,00,00,000
- Time until expiration, expressed as a percent of a year: 2 years
- Implied volatility i.e. risk expressed as standard deviation of 20%
- Risk-free interest rates i.e. treasury bill rate at time of starting of venture in 2010, rate approximated as 5.00%

Using Template available in MS Excel format, value of call premium has been calculated as 39641064.4324, put premium is higher than call premium at 406068068.9956

**Revised value of Call Option, to account for the change in K:**
where, \( C = S \cdot N(d1) - cc \cdot K \cdot e^{-rt} \cdot N(d2) \) and \( cc = \) change coefficient, from 0 to 1
Change coefficient has been taken as 0.25 and revised value of call premium is 175108470.7

Change coefficient is lesser, which suggests that company would not have a bigger change in the call premium or put premium. Put premium is larger than call premium, which signifies that company’s option to sale would be profitable than option to buy. Company has set up massive infrastructure for refining oil with impressive capacity and has been able to sell oil under different brand names with different processing requirements. Hence, put premium is higher, which means that sale value is higher. Revised call premium is higher, indicating that company can thrive on the manpower talent and foresight of top management to keep continuing in the market.
10.5 Case V: The HRism

Venture has been established on 1st April 2009. It provides customized HR recruitments and solutions, with pan-India focus on IT/ITES companies. It has an effective and qualified team of professionals for better recruitment. It consistently focuses on reducing HR time and efforts into the recruitment process.

It’s mission is to offer Integrated, Best Quality & Competent Services to their Clients, on cost effective and time efficient basis, for complete Human Resource Management. Also, it wants to be a most reliable Business Partner in their Sphere of Work through values, honesty & professionalism.

**Service Quality & Promise:**
- More than 30% Selection ratio, helping in reducing the HR Time & Efforts.
- Optimum Satisfaction for each Selected Candidate.
- To work in close coordination with each & every client, for their executive search & consulting requirements.
- To provide value added services apart from the normal requirements for each assignments.
- To execute each and every assignment with utmost Trust & Integrity.
- To adhere to follow & maintain the Strict norms of the client & their code of ethics.
- To act as an Internal HR of the Company rather than considered as Placement Agency.
- To serve each Candidate & Client with utmost respect, honesty & professionalism.
- To provide the guarantee of each & every selected candidate, as per the Service Agreement.
Black Scholes Model:

Following five variables are considered in calculating value of call premium

- Current underlying price i.e. Rs. 1,50,000 (Total initial investment in starting the venture)
- Options strike price i.e. Rs. 3,50,000
- Time until expiration, expressed as a percent of a year: 2 years
- Implied volatility i.e. risk expressed as standard deviation of 50%
- Risk-free interest rates i.e. treasury bill rate at time of starting of venture in April 2009, rate approximated as 4.50%

Using Template available in MS Excel format, value of call premium has been calculated as 10806.1504, put premium is higher than call premium at 180682.0652

Revised value of Call Option, to account for the change in K:

where, $C = S \ N(d_1) - cc \ K \ e^{-rt} \ N(d_2)$ and $cc = \text{change coefficient, from 0 to 1}$

Change coefficient has been taken as 0.50 and revised value of call premium is 23144.71

Venture has entered in job market, which is having lots of competition, from many conventional agents, as well as, internet based job portals like naukri.com, monsterindia.com etc. Still, it is doing well by strong focus on particular market i.e. IT/ITES companies. It is targeting cities like Mumbai, Bangalore etc. one by one for getting companies for their recruitment program. Hence, If it is kept as an option to sell, it would fetch more money and that is the reason, of put premium being higher than call premium. But revised call premium is higher than put premium, which accounts for the risks faced during business expansion.