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METHODS FOR EVALUATING THE COST OF OPTIONS IN A LEASING TRANSACTION

D.V. Kuznetsov (a)*
*Corresponding author

(a) Vladimir branch of the Financial University under the Government of the Russian Federation, 600037, Tikhonravova, 1, Vladimir, Russian Federation, E-mail dvkuznetsov@fa.ru

Abstract

The article explores the possibilities of using methods for assessing the value of options in a leasing transaction. Particular attention is paid to determining the value of the option to the right to acquire the leased asset at the end of the lease agreement. In order to assess the value of an option, factors were identified that affect the value of the option. The value of the option is affected by the current value of the leased asset, the strike price of the option, the time until the option expires, the volatility of the leased asset price, the short-term risk-free interest rate, expected income and expenses from the use of the leased asset during the term of the lease agreement. To assess the value of the option, a binomial model, a model based on creating the option equivalent, a risk-neutral method, put and call option parity equations, and the Black-Scholes model were used. The calculations allow us to conclude that the application of methods to assess the value of the option is reliable. The paper reveals the advantages and disadvantages of using various methods for assessing the value of an option in a leasing transaction. The application of options valuation methods allows the lessee to more reasonably approach the solution of the problem regarding the purchase of the leased asset under the purchase and sale agreement at the end of the lease agreement.

1. Introduction

An option in a leasing transaction is the ability of the leasing entity to perform a certain action that affects future cash flows and / or limits the risks of one of the parties to the transaction. An option in a leasing transaction is a derivative, since its price depends on the price of the leased asset. Options are fixed in contracts concluded between the subjects of leasing relations. Options for the parties to the leasing transaction may be provided for in the leasing agreement between the lessor and the lessee, in the sale and purchase agreement between the lessor and the seller of the leased asset.

2. Problem Statement

The use of options in leasing transactions allows you to coordinate the plans of leasing entities for the future. Having concluded an option agreement, the lessee secures the purchase of the leased asset in the future, and the lessor secures the sale of the leased asset back to the seller of property in case the lessee returns the leased asset. The study by Ajupov, Medvedeva, and Sarkin, (2016) found that hedging of risks arising in the implementation of leasing activity, it is today one of the main problems faced by lessors.

Option agreements make it possible to insure price risks, since in them leasing entities set the price of future settlements (settlement price). The exercise price is fixed in the contract and cannot be changed during the term of the option. Options allow predicting the future market conditions, since they reflect the expectations of leasing entities regarding the future price of the leased asset until the end of the contract. Option agreements relate to conditional transactions, giving one of the leasing entities the right to refuse to execute the transaction.

In leasing, various types of real options can be allocated. The article of Hsieh and Lin, (2016) employs model relevant parameters of pricing strategies for leasing non-public-use land based on real option analysis (ROA). The authors Chen, and Xu (2017) consider the on-line financial leasing problem with an interest rate where there are two lease options: financial lease and operating lease. The study by Rabbani, Keyhanian, Hasannia, Eskandari, and Jalali (2016) considers the end of lease contract, which contains several options: Return the leased product, return the used product and purchase other remanufactured product and buying the leased product.

For the main subjects of leasing, these are the lessee's options and the lessor's options. The lessee's options are as follows: for early termination of the leasing agreement; to extend the lease agreement; on the implementation of leasing payments by deliveries of products; to carry out maintenance and repair of the leased asset; to fulfill a leasing agreement in a predetermined period; on the right to acquire the leased asset. Lessor's options include: an option on the right to resell the leased asset to the seller of property and on changing the size of leasing payments.

3. Research Questions

The option agreement involves two persons. One person gains the right to choose to execute or not to execute a transaction. Another person grants the right of repudiation. The buyer and seller of the option in the leasing transaction may be the lessee, lessor, seller of the leased asset, as well as other subjects of

leasing relations. The buyer of the option pays the seller a fee called a premium (C). The bonus is usually paid at the time of conclusion of the option agreement. The option seller is obliged to fulfill his contractual obligations if the option buyer decides to exercise it.

The buyer of the option has the right to exercise the option. The exercise of an option means the purchase or sale of a leased asset at a price fixed in the option agreement. The price that is fixed in the option agreement is called the strike price (X). From the point of view of terms of exercise, options are divided into: American with execution at any time before the expiration of the contract; European with execution on the day the contract expires; Bermuda with execution at certain points in time during the term of the contract. Depending on the rights granted, the options call (option to purchase the leased asset) and put (option to sell the leased asset) are allocated. The most common type of options in leasing is the call option of the lessee to purchase the leased asset from the lessor at the end of the lease agreement.

4. Purpose of the Study

The aim of the study is the use of traditional options valuation methods for valuing options in a leasing transaction. To achieve this goal, it is necessary to identify factors that influence the formation of the value of the option in a leasing transaction.

We will identify the main factors that determine the value of options in a leasing transaction.

1. The current price of the leased asset (S).

The option price may change due to the terms of the transaction.

For a call option, an increase in the price of the leased asset increases the option price. In the case of the put option, there is an inverse relationship: as the price of the leased asset increases, its price decreases.

2. The exercise price of the option (X).

The exercise price of the option remains constant throughout its term, as it is fixed at the time of its conclusion.

All things being equal, the lower the strike price, the higher the call option price. For put options, the higher the strike price, the higher the option price.

3. Time to option expiration date (T).

After the option expires, its value drops to zero.

Other things being equal, the longer the time until the expiration date, the higher the option price. If less time is left before the option expires, then there is less time for a possible increase in the price of the leased asset (for the buyer of the call option) or for a drop in the price of the leased asset (for the buyer of the put option).

4. The volatility of the price of the leased asset over the life of the option (σ).

Other things being equal, the higher the variability of the price of the leased asset, the more the buyer of the option will agree to pay for the option and the more the seller of the option will demand for it. This is because the higher the variability of the price of the leased asset, the greater the likelihood that before the expiration date of the option the leased asset price will move in the direction necessary for the option buyer.

5. Short-term risk-free interest rate (r).

The purchase of property subject to leasing requires the investment of a certain amount of money. The purchase of an option saves the call option buyer the amount equal to the difference between the price of the leased item and the option price that he can invest at a risk-free interest rate. Therefore, the higher the short-term risk-free interest rate, the more attractive is the purchase of the call option compared to the direct purchase of leased property. As a result, the higher the short-term risk-free interest rate, the higher the call option price.

6. The effect of the expected income and expenses from the use of the leased asset during the term of the option.

Revenues from the use of the leased asset reduce the price of the call option because they make the use of the leased asset more attractive than the acquisition of the option. For a put option, the proceeds from the use of the leased asset increase the price of the option.

5.   Research Methods

The study by Yoshida, Seko, and Sumita (2016) analyzes the rent term premium for leases that can be cancelled by the lessee. They model the lessor's trade-off between leasing costs and the cost of cancellation options based on the recognition that many leases are cancellable by lessees, and lease markets involve significant transaction costs. The study by Zheng, Xia, and Wu, (2014) found that the traditional net present value method ignores the value of managers using flexible investment strategy. The paper Milanesi, (2016) studies different simples and complex real options contained in the leasing contracts, below a methodology that combines the equivalent loan method (ELM) and real options.

The valuation of options in leasing transactions was carried out using the binomial model, the option equivalent option model, the risk-neutral method, and the Black-Scholes model.

Consider the features of assessing the value of the option to purchase the leased asset.

The option to purchase the leased asset during the lease term is granted to the lessee. For the right to purchase a leased asset at a redemption price, the lessee makes lease payments throughout the entire lease term. The redemption price of the leased asset may be included in lease payments or be fixed in the lease agreement at the time of its conclusion.

To assess the value of the option to purchase the leased asset, one can use the R. Merton single-period binomial model. The price of the option at the end of the lease agreement depends on the price of the leased asset and is determined by the following formulas:

$$C_u = max(\ 0,\quad S_u - X);\ C_d = max(\ 0,\quad S_d - X).$$

where Su is the price of the leased asset in the event of a price increase; Sd –price of the leased asset in case of price reduction; Cu - call option price in case of leased asset price increase; Cd - call option price in case of reduction of the leased asset price; X - the exercise price of the option.

The option will be exercised by the lessee in case the price of the leased asset increases to Su, since in this case the option for the lessee will be of interest, otherwise the option is not exercised. To determine the option price using the option equivalent model, it is necessary to consider two strategies for acquiring the leased asset.

1 The strategy involves the purchase of a leased asset by exercise of an option at exercise price X.

2 The strategy involves the purchase of property subject to leasing with a loan.

Thus, the equivalent of an option is created from a combination of investments in the subject of leasing and obtaining a loan. The net cost of acquiring the option equivalent should equal the value of the option.

To finance part of the transaction for the acquisition of property into property, the lessee attracts a loan at a risk-free interest rate. The amount of this loan together with the accrued interest in a year should be equal to the price of the leased asset Sd.

Another method for determining the value of an option is the risk neutral approach, which is based on the assumption that leasing entities are indifferent to risk. If investors are indifferent to risk, then the expected return on investment in the leased asset should be equal to the risk-free interest rate. Based on this assumption, the probability of an increase in the price of leased asset is determined. Then the expected and current value of the option is determined.

In the Black – Scholes model, the variability of the value of the leased asset is measured by the standard deviation. The calculation of this indicator is based on an analysis of the dynamics of the value of the leased asset for the period preceding the valuation of the option.

6.   Findings

The results of evaluating the value of an option in a leasing transaction by various methods are consistent with each other. The use of the binomial model for assessing the value of an option in a leasing transaction is based on the assumption of two possible values of the value of the leased asset in the future. The advantage of using the binomial model is to illustrate the essence of the real options method for assessing the value of options in a leasing transaction. In fact, the value of the leased asset at the time the option is exercised can take on various values that are predicted with varying degrees of certainty. The binomial model is a special case of the Black-Scholes model.

7.   Conclusion

The application of methods for assessing the value of options in leasing allows a more reasonable approach to solving the lessee's problem regarding the purchase of the leased asset under a sale agreement upon the expiration of the lease agreement. Comparing the purchase price of the leased asset on an option and on the market, the lessee may decide to conclude a purchase and sale agreement with the lessor, and refuse to conclude it. For the lessor, the cost of the lessee's option to acquire the leased asset is a measure of investment risk assessment and should be taken into account when determining leasing payments.

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