

## Licensing Option Fee Valuation

By Paul Betten, Ph.D.\*

### Abstract

*This paper discusses several methods of calculating an option fee for a license. It is concluded that most option fees, with a technology now ready for the market, can be calculated simply as “interest” due on the net present value of the license. If substantial risk or time is involved before the product can come to market, like pharmaceuticals, the purpose of the option fee changes and it becomes a “place holder” for more potential income; but, the option fee can still be determined from a simple net present value calculation that includes both a discount rate factor and a technology risk factor.*

### Introduction

A question frequently asked is how to value an option fee due to a license delay. Consider the licensing situation where the terms and conditions have been negotiated and the license is ready to go. Negotiated fees include an upfront fee, annual running royalties, along with diligence payments determined from estimated sales figures in a business plan. Then, the Licensee gives you an unexpected call asking to delay license execution for six months because of an “unexpected” development (that has a reasonable explanation). The Licensee is still excited about the technology and still wants to license it, but needs to delay execution for a short time period. Other Licensee’s are interested should this deal fall through. The classic question is then, “What do you charge for this license option?” Thus, the question is how does one determine a value, if any, for delaying the license execution? Put another way, the option fee can be viewed as a penalty fee for delaying license execution. Often one has a “gut” feeling about what the right fee may be, but it is qualitative and can be biased by a variety of other factors, such as is the Licensee a big company (which can pay more) or small company (which can pay less), or if the Licensor is under upper management pressure to complete the deal with feedback advice like, “Don’t let this one get away.”

For clarification, the concept of an option is defined to be a “place holder or a delay in execution of a license for a pre-arranged and limited period of time” in which the Licensor will not license the technology to

another party. Sometimes the term “stand-still fee” is used. The literature is lacking on any publications discussing how to value licensing option fees. Belsky<sup>1</sup> first mentions option fees in 1966, but a general method is not proposed. Some<sup>2,3</sup> have suggested in a fleeting sentence that patents or other valuations be treated with the Black-Scholes equation. In brief, the Black-Scholes is a complex financial equation that is used in arbitrage to help calculate the value of a stock or commodity, which the holder has the right to buy or sell at some future time, at an agreed upon price. Kidder and Mody<sup>4</sup> have provided several reasons why use of the Black-Scholes equation is inappropriate for valuing patents. In addition, the Black-Scholes equation has parameters that do not translate easily into standard licensing terminology. The purpose of this paper is to suggest some simpler methods for determining option fees, to provide a consistent and repeatable logic behind that determination, and to remove some of the mystery and complexity surrounding option fees.

### The Value of an Option

The value of a license option fee is always tied to the value of the license. The easiest case to consider is fully developed technology with the licensing terms and conditions already negotiated. The lump-sum value of that license can be determined by a net present value (NPV) calculation using the negotiated terms. Now consider the hypothetical situation where the Licensee asks for an extension in executing the license, an option, for one day, one week, one month, or one year. For periods less than a month, practical experience indicates that no option fees should probably apply. What option fee, or penalty fee for not executing the license, should be charged for longer times? The author’s point of view is that the licensing terms, via the NPV calculation, is analogous to the Licensor having cash in-hand had the license been executed; however, the Licensee wants to delay paying that cash (i.e. the executed license) for a several months or longer. The option or penalty fee therefore can simply be viewed as the interest gained on the license had it

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1. S. Belsky, “Licensing as a Tool for Evaluation R&D,” *les Nouvelles*, Abstract, January 1, 1966.

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2. J. Wagner, “Valuation Fallacies: A Better Way,” *les Nouvelles* Vol. XXXVIII, No. 4, Dec. 2003, p. 201-205.

3. A. Arrow and N. Kossovsky, “Valuing Intellectual Property: the Art, the Science, and the Meaning of the Mean,” *les Nouvelles* Vol. XXXVI, No. 3, September 2001, p. 91-95.

been executed. This is schematically shown in Figure 1. For a short option period, say several months, the license value, for both the Licensor and Licensee, remains essentially constant as noted by Curve A. (Ignoring any time-to-market or other issues.) If interest,  $i$ , is charged on the value of the license, as noted in Curve B, the increase in the value of the license is the interest gained, or correspondingly the option fee. The option fee takes on a different meaning if the technology has risks, and more R&D is needed, such as in pharmaceuticals or nanotechnology. In these cases, the option fee is simply a “place holder” for the future, ultimate value of the technology while R&D continues. Curve C indicates the worst case where more R&D has not improved the situation and it appears not worthwhile to continue. Curve D represents an improved situation where more R&D has removed some obstacles, but more time and R&D is needed for a viable product. Curves A or B would represent the best outcomes, as R&D has overcome problems and the technology can move on to the next step of commercialization.

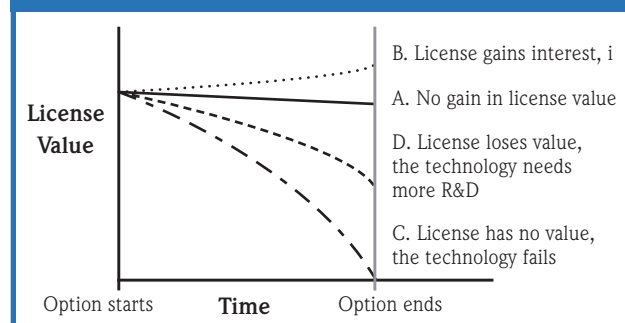
It is noted that a distinction is made between the interest rate,  $i$ , and the discount rate,  $k$ . The interest rate is viewed as the time-value of money with no or minimal risk involved, such as would occur in a savings account or with a bond; while the discount rate  $k$  can increase rapidly depending upon the perceived financial and/or R&D investment risk. Interest is therefore related to savings instruments, such as U.S. Treasury Notes, which are viewed as having no investment risk and traditionally have an interest rate of 5%-7%, although over the last several years rates have dropped into the 3%-4% range. Currently, many rates are at an all time low, and are represented by the lower number in the rate ranges discussed next. Municipal bonds usually have an interest rate of 4%-10%, while corporate bonds carry a higher interest rate of 5%-15%. It must be said that some corporate bonds do carry a higher risk, and as a result offer a higher interest rate because they carry a higher risk of default. It is proposed that a short term interest rate of 15% is probably appropriate for most option fees, but can go higher if the time extends beyond a year.

A discounted cash flow analysis typically employs a discount factor to account for various types of higher

risk activities (although it can be used for calculating the present value of bonds, too). A number of references<sup>5,6</sup> discuss the risk adjusted discount rate for various endeavors that containing commercial risks, such as an R&D risk, a product risk, or a financial risk. A “risk free” or “minimal risk” activity, such as expanding a product line, is in the 10%-20% discount rate range. Those with a low R&D risk have a discount rate of 15%-30% while activities with a moderate risk, such as putting an old product/technology into a new market carries a 25%-35% discount rate. A high risk activity, such as a new technology into a new market, increases the rate to 30%-50%. Some start-up companies or other endeavors carry a very high financial risk that corresponds to a discount rate of 50% or higher.

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**Figure 1. License Value During an Option Period**



## Interest Method for Option Fees

If the technology is ready for deployment, any option can be viewed as a delay on licensing income, and the option value can be viewed simply as the interest,  $i$ , gained on the net present value (NPV) of the license had it been executed. Thus,

$$\text{Option Fee} = i \times \text{NPV}_0 \quad (1)$$

$$\text{where, } \text{NPV}_0 = [U_0 + r_1/(1+i) + r_2/(1+i)^2 + r_3/(1+i)^3 + \dots + r_n/(1+i)^n] \quad (2)$$

where  $U_0$  is the upfront fee,

$r_n$  is the minimum payment due annually,

$i$  is the interest rate, and

$n$  is the term of the license in years.

4. D. Kidder and N. Mody, “Are Patents Really Options?,” *les Nouvelles*, Vol. XXXVIII, No. 4, Dec. 2003, p. 190-192.

5. R. Razgaitis, “Early-Stage Technology Valuation and Pricing,” John Wiley and Sons, Inc. New York, N.Y., 1999, p. 129-134.

6. Association of University Technology Managers, “Basic Licensing Course,” 1994.

For example, if an option for 6 months was requested, the option fee would be calculated based upon negotiated license terms. Let's say the negotiations provided for an upfront fee of \$100,000 with the minimum (running royalty) diligences being estimated for three years out as: Year 1 - \$0; Year 2 - \$10,000, and Year 3 - \$50,000, and the Licensor assumed interest rate,  $i$ , of 15% corresponding to a corporate bond rate. The option value would be:

$$\begin{aligned} \text{Option Fee} &= 0.15/2 \times [\$100,000 + \$0/ \\ &(1 + .015/2)^{1.5} + \$10,000/(1 + 0.15/2)^{2.5} + \$50,000/ \\ &(1 + 0.15/2)^{3.5} \\ &= \$7,500 + \$0 + \$626 + \$2,911 \end{aligned}$$

$$\text{Option Fee} = \$11,000$$

In this example, the inclusion of running royalties has increased the option value. If the running royalties were smaller for the estimated diligences because of a longer market startup period, the running royalty portion of the equation could be eliminated into a simpler equation. Thus, the option fee would be just the interest on the upfront fee.

$$\text{Option Fee} = \sim i U_0 \quad (3)$$

The interest approach is expected to work in instances where 1) the option period is generally a year or less, 2) the technology is ready to be deployed, and 3) the Licensee has a reasonable request for a licensing delay. Such delays can include reasons such as 1) raising capital for production and operation, 2) minor technology adjustments for the Licensee's application, 3) marketing surveys/issues that need completion, 4) receipt of a pending SBIR or other grant, 5) an upcoming board of directors meeting, or other concerns. Using this approach for an option longer than two years may be questionable because the initial assumption of the technology being readily deployable may no longer be true. Although one can "guesstimate" running royalties as far as twenty years into the future for a patent, usually the first five years of sales are guesses anyway. It would make practical sense to use either the Licensee's business plan sales figures or diligence payments to calculate the option value.

### Emerging Technologies with a Product Risk Factor

For situations where the option fee is simply a "place holder" for a future license because there is a significant risk that the technology may not work and the license is expected to be several years to a decade

away, product or financial risks must be considered. One obvious example is in pharmaceuticals, where the upfront fee can be in the millions, but the technology risk is high with only one in five pharmaceuticals (on average) making it through the FDA process. The FDA testing period takes about eight years on average. The easiest method to account for this technology risk would be to include it in an NPV calculation based just upon an estimated upfront fee taken at some date in the future. The license option fee is then:

$$\text{Option Fee} = \text{T-risk} \times \text{NPV}_{\text{FDA approval year}} \quad (4)$$

$$\text{Option Fee} = \text{T-risk} \times U_0 / (1+k)^n \quad (5)$$

where  $\text{T-risk}$  is the technology risk factor  
 $U_n$  is the upfront fee in the  $n^{\text{th}}$  year, and  
 $k$  is the discount rate

Betten<sup>7</sup> surveyed universities about their typical low and high option fees and upfront fees, and found that the upfront fees after FDA PLA/NDA approval, lows and highs, were \$500,000 and \$2,000,000 respectively, with the corresponding license option fees, lows and highs, being \$10,000/yr and \$50,000/yr, respectively. Thus, if one took either a \$500,000 or \$2 million upfront fee, eight years from now with a 20% chance of FDA approval and three possible discount rates of 15% (low risk), 30% (medium risk), and 50% (high risk), for increasing R&D and financial risk, the option fees would be calculated using Equation (5) and are shown in Table 1. As seen in Table 1, the medium risk discount rate of 30% gives a good correlation with the data from the survey. Thus, there is some leeway in selecting a representative  $k$  value and upfront fee for the option fee calculation. What is important to note is that there can be consistency and logic applied to finding an appropriate option fee in high risk situations, and that option fee determination can move beyond being an ad hoc process.

**Table 1. Pharmaceutical Option Fee Calculations with Different Discount Rates**

| Option Fee (\$1,000s) | Survey from Ref. 7 | Equation (5) with different discount rates, $k$ |          |          |
|-----------------------|--------------------|-------------------------------------------------|----------|----------|
|                       |                    | $k=0.15$                                        | $k=0.30$ | $k=0.50$ |
| \$10-\$50             | \$33-\$131         | \$12-\$49                                       | \$4-\$16 |          |

7. P. Betten, "Pharmaceutical Up-Front Licensing Fees," *les Nouvelles*, Vol. XXXVIII, No. 4, Dec. 2003, p. 201-205.

This previous example was given, not so much to provide an option fee for pharmaceuticals, but to indicate that this approach works and can be used for other emerging technologies where there is little or no experience. For one familiar with pharmaceuticals, they probably have enough experience to determine the option fee based on the potential market value of that drug, and the FDA process is well defined. There are a number of emerging technologies that possess a high risk and need more time for practical applications, in which a Licensor may apply the above formula in valuing an option. These can include today's darlings, such as nano-technology and nano-materials, micro-electro-mechanical systems (MEMS), quantum dots, a cure for cancer or HIV/AIDS, fusion nuclear reactors, hydrogen storage catalysts, hydrogen-economy infrastructure technologies, high temperature superconductivity, among others. One could also potentially use Equation (5), knowing the option fee, to calculate a future upfront fee; however, any calculated upfront fee should be compared with market conditions, at some future date, to determine the appropriate valuation.

## The Last Year of Income Method

During informal discussions, some have suggested that the option fee should be calculated based upon making up the licensing income lost from the last year of the patent. That is, an option delay of one year will result in the Licensor losing one year of patent coverage if no option were granted. Thus, the Licensor should be entitled to that additional year of royalties if the patent had not expired.

From Equation (6), the  $n^{\text{th}}$  year of royalties lost using an NPV calculation is

$$\text{Option Fee} = \text{NPV}_{\text{nth year}} = \text{royalties}/(1+k)^n \quad (6)$$

For example, consider a patent issued five years ago, and 15 years remain on the patent. A Licensee would like a one year option from today. The 15th year of royalties is assumed to be \$50,000 and the discount rate,  $k$ , is taken to be 15%. The value of the option fee using the last year of income method would be,

$$\begin{aligned} \text{Option Fee} &= \$50,000/(1+0.15)^{15} \\ &= \$50,000/8.13 \\ &= \$6,140 \end{aligned}$$

This approach contains a thread of truth; however, there are a number of problems with this approach that shortchanges the Licensor because too many as-

sumptions are made about sales significantly distant in the future. These poor assumptions are: 1) Sales figures even five years into the future are hard to estimate, let alone 15 years into the future, and 2) The rule-of-thumb is that only one in ten products are a commercial success, with the others failing. It is not clear if the product will have any sales in 15 years or will even still be in production. A better approach is to use the Interest Method described by Equation (1) and collect the current value of the technology now, not the value of the technology years in the future. It is important to remember that the Licensee is interested in the technology primarily for what it can do for him today, not years in the future.

A variation on this method is to use the maximum yearly royalty income for the product, assuming that maximum sales will occur in 4-8 years into the future, instead of the final year of the patent, and discount it back to today using a net present value calculation as noted in Equation (6). This approach yields a larger license option fee because the royalties are at a maximum and discounting is not as far in the future as the "last year" calculation. This variation still falls short because it rests on assumptions still too far off into the future to be accurately predicted. On a practical side, this variation may result in a bigger option fee, allowing the Licensor a bigger number to propose initially in negotiations.

## The Administrative Approach

The administrative approach represents more of a practical way of thinking than as a pricing algorithm. The logic behind this method is that there is an administrative cost associated with any license, such as patenting, lost marketing time, office administrative costs, lost royalties, etc. This approach aims at recovering those costs, or as much of the costs as possible. It is legitimized by saying that it is "our policy," and the fee cannot be changed. The Licensor simply states, "Our policy states that the option fee is... to recover patent, administrative, delayed royalty, and other licensing costs."

My licensing experience, and discussions with other licensing offices, indicates that the administrative license option fee is determined somewhat more arbitrarily by picking a number, ad hoc, such as \$5,000, \$10,000, or \$25,000, rather than actually calculating what the total administrative cost is for a particular technology. Some variations have inserted some logic in their valuation. For example, one variation relates the option fee to the number of patents, and then bases the option fee on recovering part of the patent costs. Thus, one can request to recoup, say, \$5,000 per patent, and if there are three patents, then the

option fee extrapolates to \$15,000. One can argue that this looks more like a patent cost recovery fee; however, the Administrative Approach reply would be that, “This is our policy on option fees for multiple patents.” This method may also result in “larger” up-front fees for big companies, and “smaller” up-front fees for startups or small companies. Another variation of this method is to provide a minimum floor or fee for technologies whose long-term usefulness is unclear or to provide a minimum option fee. That is, “Our policy states that the minimum option licensing fee is \$10,000” (or whatever is sanctioned by the policy).

The advantage of this approach is that it is simple and easy to use. The disadvantage is that it may not accurately represent the value of the technology, and may be over-predicting or under-predicting the option fee. However, if the technology is an emerging technology or a market-entry technology whose economic value is uncertain, and if there is only one interested Licensee and one does not have the time and resources to invest in a detailed market survey, this method may provide a quick value. The final determination, of course, lies with the policy being administered by the licensing executive.

## Conclusions

This paper has presented several methods of calculating option fees for a license with some being more analytical than others. Part of the confusion in determining such fees is how the option is perceived. The author concludes that if a technology is now ready for the market, the Licensor can simply calculate the option fee as interest compounded on the net present value of the license, as noted in Equation (1). This is akin to calculating the interest due on money in a bank

account. The interest rate,  $i$ , should be higher than that of a treasury bill due to a higher risk of commercializing a product and probably in the 10%-20% range.

If substantial risk is involved in the product coming to market, like pharmaceuticals, the option fee function changes and becomes a “place holder” for significantly more income in the future. The license option fee is still determined from a net present value calculation discounted for years in the future, and includes a technology risk factor as noted in Equation (4) or (5). Here, the Licensor has to do some research to determine the technology risk factors for that particular product, as well as an appropriate discount rate. For pharmaceuticals, an initial calculation indicated that a medium risk discount rate of 30% seemed appropriate. For technology risk factors, data on FDA approval for pharmaceuticals is well documented, and only one in five drugs makes it through the formal process. For other technologies, such as nano-technology, these technology risk factors may not be as well documented, so the Licensor may have to talk with researchers or colleagues to better quantify the risk. The advantages of the discount rate calculation approach is that it is simple, consistent, logical, and easy to use. Further, it minimizes arbitrariness between licensing staff that can result in large fluctuations in option fee suggestions.

The “Last Year of Income” and Administrative methods represent alternative suggestions on determining option fees, and may be appropriate under certain circumstances. If the Licensor has a number of licenses with modest net present valuations, it may be a good idea to consider a policy where a flat fee of, say, \$10,000, is an easy and consistent manner to handle option fees. ■