Using Financial Models to Get Royalty Rates

BY STEPHEN A. DEGNAN*

Parameters for evaluating technology and decision-making process for setting royalty rates are examined

Patrick Sullivan in his 1994 les Nouvelles article concluded that the craft of technology licensing and royalty-rate-setting is not yet sufficiently understood and therefore a set of rigid decision rules or precise codification has not yet been created. This article attempts to create a theoretically sound financial model with regular decision rules that can be used by licensing executives when deciding whether to license technology.

Intellectual property derived from innovation is the most important asset owned by most corporations. It has been estimated that over 40% of the world’s economic growth since World War II has occurred directly as a result of advances in technology (Wyss 1981 and Mansfield 1975). With this amazing contribution to mankind, one would expect that this subject would have been extensively studied to understand its subtleties. Surprisingly, it has and it has not.

The credit for focusing the world’s attention on the nature and significance of intellectual property and innovation to the world economy certainly belongs to Joseph Schumpeter, an Austrian economist. Schumpeter in Capitalism, Socialism and Democracy (1942) set forth in most impressive terms the preeminent importance of innovation for the development of economic life. To a large extent, innovations are the motor of economic development, of growth and change including technological change. As such they are an essential function of an industrial enterprise (Taeschler 1992).

Before the 1980s innovation was primarily conducted and consumed by individual business enterprises. It was unusual for U.S. businesses to license in or out core-technologies from nonaffiliated entities. At the time most businesses innovated internally and subscribed to the “Only-Invented-Here” (OIH) philosophy. The reasons for this philosophy included the lack of effective intellectual property protection and the fear of antitrust prosecutions by the U.S. government.

Prior to 1982, the infringers of patents were so often successful in the U.S. federal court system that patent owners truly had to think twice before asserting their rights, even when they legitimately believed that their rights were valid (Wepner 1985). The legal impediments to technology transfer licensing started to change with the creation by the Congress of the United States in 1982 of the U.S. Federal Circuit Court of Appeals (Federal Circuit). After years of controversy, a single court was vested with subject matter jurisdiction over all appeals from the U.S. Patent and Trademark Office (PTO) in connection with pending patent applications, and most significantly, was also given jurisdiction over all appeals in patent infringement cases (Wepner 1985). Almost immediately this new court began finding in favor of patent holders and against infringers. The result since has been a favorable climate for innovation and licensing within the United States.

Another condition inhibiting licensing was that before the Reagan Administration took office in 1980, most licenses were scrupulously reviewed by lawyers for potential antitrust implications. The attorneys with their abundant caution, nixed many potential technology transfer licenses (Horton 1997). This changed when Reagan instructed his Justice Department to cease this type of antitrust inquiries.

The final legal impediment was the lack of intellectual property protection outside of the United States. Prior to the 1994 signing of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), which covered the worldwide protection of intellectual property rights, little meaningful enforcement of intellectual property rights existed in a significant portion of the world.

The changes in the legal environment in both the United States and in the industrialized world gave owners of intellectual property the legally enforceable right to license technology to some while excluding others. These policy, treaty, and legal changes coupled with certain technological and economic changes have had a significant impact on the importance of licensing to business enterprises in the 1990s.

The non-legal changes that have also tended to stimulate and encourage licensing during the past decade are the globalization of the world’s economy, the rising cost and complexity of technological development, and the compression of product life cycles. These collective forces have forced businesses to look beyond internal development as a source of innovation (Sandri 1995).

Today, the competitive business environment for all technology-based enterprises requires that some or all of a business’ core technological know-how be externally acquired. Therefore, licensing has become a basic component of the business’ fundamental strategy. This has meant that businesses must learn to cope with a broad...
range of complex and interacting economic, legal, and technology issues surrounding transfer and licensing of technology.

**Georgia-Pacific Factors and Other Articles**

There are at least 10 different articles and studies that have postulated the factors (evaluation parameters) utilized when two or more parties are negotiating terms and rates of an intellectual property license. These studies have proposed that as few as three factors (Matsunaga 1983) and as many as 100 factors (Arnold 1989) influence technology transfer negotiations. One of the most utilized compilations of factors affecting negotiated royalties is a 1970 opinion by Judge Charles H. Tenney in the Georgia-Pacific vs. U.S. Plywood matter. In arriving at his opinion the Judge found that 15 factors should be considered. These 15 factors were tested in the author’s 1995 survey described below, and all relevant factors were considered important to the survey respondents.

**THEORETICAL FRAMEWORK AND DISCUSSION**

In 1995 this author and Corwin Horton prepared and conducted a 37-question paper-and-pencil survey that was mailed to over 2,100 members of the Licensing Executives Society (USA & Canada). This survey covered various financial, managerial and economic topics. The results, compiled from the 428 respondents, were published in the *les Nouvelles* in June 1997. The survey gave insight into who was involved in the technology transfer process, what royalty rates businesses were paying and receiving for technology licensed, and what methods the respondents were using to analyze technology licensing opportunities. While the survey gave useful insights, it did not answer two important questions. How do parties to a licensing negotiation evaluate whether to consummate a technology transfer license, and secondly, if the parties agree to consummate a license, how do they arrive at the amount of royalties to be exchanged.

Based on a literature search and discussion with other licensing executives, the author concluded that most licensing executives consider their analysis of potential licenses to be very subjective (seat-of-the-pants)-based. Being a student of finance and accounting, this approach to licensing (the subjective, intuitive approach) seems to this writer to be illogical and economically dangerous.

**EVALUATION PARAMETERS**

After reading of over 150 articles and books on the subject, conferences with a number of licensing executives, scheduling out the Georgia-Pacific factors, and reviewing the nine other studies (Arnold; Matsunaga; McGavok, Haas & Patin; Parr and Smith; Mignan; Rahn; Sandri; Scaligone; and Sullivan), it became clear that at least

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**FACTORS IMPACTING TECHNOLOGY TRANSFER LICENSES**

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<th>Nature of the Invention</th>
<th>Characteristics of the Licensor</th>
<th>Characteristics of the Licensee</th>
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<td><strong>Nature of the Invention</strong></td>
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<td>Nature and quality of the protection offered.</td>
<td>Entity size and industry.</td>
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<td>Utility over old modes.</td>
<td>Type of organization (government, etc.).</td>
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<tr>
<td>Nature of problems solved.</td>
<td>Licensing policy and strategy.</td>
<td>Licensing policy and strategy.</td>
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<td>Advantages over prior art.</td>
<td>Obtain a cross-license or alliance.</td>
<td>Defensive.</td>
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<td>Stage of development.</td>
<td>Make their technology a standard.</td>
<td>Increase technical proficiency.</td>
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<tr>
<td>Time and costs required to complete.</td>
<td>Expansion into foreign markets.</td>
<td>Profit maximization.</td>
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<tr>
<td>Need for other enabling technologies.</td>
<td>Entity’s perceived technical proficiency.</td>
<td>Entity’s perceived ability to succeed.</td>
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<tr>
<td>Creates a competitive advantage.</td>
<td>Support, know-how and training offered.</td>
<td>Need for ongoing support and R&amp;D.</td>
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<tr>
<td>Decreases overall costs.</td>
<td>Commitment to ongoing support and R&amp;D</td>
<td>Cost paid to acquire the technology.</td>
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<tr>
<td>Ability to exclude or limit others.</td>
<td>Grant back of improvements.</td>
<td>Grant back of improvements.</td>
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**Economic Factors**

| Anticipated commercial success. | Comparable industry royalty rate. |
| Market/Sales potential. | Average running royalties. |
| Licensee’s anticipated profits. | Profit sharing percentages. |
| Conveyed sales and profits. | |
| Commercial relationship of the parties. | |
| Licensor’s lost profits. | |
| Licensor’s profits and maintenance costs. | |
| Licensee’s risk adjusted NPV and ROI. | |
| Time and costs required to commercialize. | |
| Probability and degree of success. | |
| Payment terms (upfront or running). | |
| Guarantees, minimum, etc. | |

**Perceived Industry Standards**

<table>
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<td><strong>Negotiating Skills of the Parties</strong></td>
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50 evaluation parameters are relevant. These 50 evaluation parameters fall generally into seven broad categories, as follows:

1. **Nature of the Invention** — The nature and quality of the protection offered. Its utility over old modes. Its state of development. The need for enabling technologies. The nature of the commercial embodiment. The ability to exclude others.

**Characteristics of the Licensor** — The size and industry of the licensor. The presence of a senior product champion. The licensor’s perceived technical proficiency. The support, know-how and training offered. Commitment to on-going support and R&D. The cost paid to acquire the technology. The grant-back of improvements.

3. **Characteristics of the Licensee** — The size and industry of the licensee. The presence of a senior product champion. The licensee’s perceived ability to succeed. The need for ongoing support. The capital and other resources required. The licensee’s ability to substitute or design around the technology.

4. **Nature of the License Offered** — The type, scope, duration and protection offered.

5. **Economic Factors** — The current and future economic and political environment. The anticipated commercial success. The market potential. The licensee’s anticipated incremental profits. The commercial relationship of the parties. The licensor’s anticipated creation and maintenance costs and lost profits. Payment terms including guarantees and minimums.

6. **Perceived Industry Standards** — Comparable industry royalty rates including average running royalties and profit sharing percentages for like technologies and protection.

7. **Negotiating Skills of the Parties** — The more skilled and prepared a licensing team is in interpersonal relationships and the mechanics of licensing the more likely they will be successful.

For a more comprehensive list of evaluation parameters and their grouping see Table 1. Based on these evaluation factors the author prepared a model to mirror the typical decision-making process in technology transfer licensing.

**THE FINANCIAL MODEL**

Obviously, the decision to license is a multi-step process involving numerous individuals and the passage of time (six months on average). The process frequently entails the potential licensor making the decision to license its technology, the parties meeting and agreeing to consider licensing options, the gathering and exchanging of information, the licensee’s determination of whether to continue to negotiate, and the final negotiation on mode and amount of royalties. A number of published articles have focused on the economic benefits of licensing and the most advantageous ways for licensor and licensee to meet and reach agreement. The remainder of this article will focus on the last three steps.

The financial model posits that the last three processes truly involve at least 10 discrete actions or steps by the parties, as follows:

1. **Step 1: Gather Pro Forma Data** — The licensee, and to a certain extent the licensor, needs to obtain or prepare certain pro forma schedules based on present and future anticipated results. These schedules will show the net direct and indirect revenues from new and convoyed sales — the direct costs associated with that revenue production (including the anticipated royalty to be paid), the appropriately apportioned general and administrative expenses, the capital needed for new facilities, equipment and working capital, and the disruption or opportunity costs caused from allocation of scarce resources to this project.

2. **Step 2. Calculate the Licensee’s Pro Forma “Risk Adjusted Discount Rate”** — Long before the development of modern financial theories linking risk and returns, chief financial officers adjusted for the time value of money and the risk inherent in certain proposed transactions. Financial executives realized that, all other things being equal, a risky long-term project was less desirable than a safer short-term one. Therefore, they developed the Discounted Cash Flow (DCF) technique.

3. **Step 3: Calculate the Net Present Value (NPV)**.

4. **Step 4: Calculate the Rate of Return on Investment (ROI)**.

The discount rate used for ordinary run-of-the-mill projects is the company’s “cost of capital” plus a fudge factor. This is frequently called the “hurdle rate,” and it is used to discount future cash flows back to today. The result of the summing of discounted current and future cash flows is called the Net Present Value (NPV). If the NPV of a project is found to be positive, then all other things being equal, the company should invest in the project, because the undertaking adds value to the company. And companies work by creating value (McPherson 1995).

**Radar Factor**

For risky projects various techniques have been created and used to evaluate projects. For example, some have suggested reducing the estimated cash flows for uncertainty. Today, sophisticated financial executives adjust the hurdle rate up based on the amount of “systematic risk” in the project. The result is called the “risk-adjusted discount rate” (RADR) or radar for short.

Similarly, licensing executives factor in risk in their licensing arrangements. The licensee evaluates the whole licensing opportunity in its totality and then decides whether to take a license. Currently, licensing executives are subjectively performing this calculation based on years of experience and the concommitment wisdom gained. A more systematic way and a tool for licensing executives would be the use of their radar.

The determination of the RADR requires that the company first determine its weighted average cost of capital. Various academic techniques are available for obtaining this information.

One frequently used method is the Capital Asset Pricing Model (CAPM). When this rate is determined, the licensing executive needs to adjust the rate higher or lower for presence of certain evaluation parameters regarding the proposed license. The evaluation parameters that tend to increase the rate are:

- When the nature of the protection is weak.

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> When the quality of the protection is in question.
> When the ability to limit others from the market is not assured.
> When the technology is not fully developed.
> When the licensee requires ongoing support and R&D to be successful.
> When the duration of the protection is shorter than usual.
> When the licensee has little or no experience in the relevant market.

The evaluation parameters that tend to decrease the rate are:
< When the licensor has a reputation for superior technical proficiency.
< When the licensor has committed to provide senior product champions.
< When the licensor has committed to substantial ongoing support and R&D.

After considering the factors enumerated above and any other adjustment factors the licensee’s technology, production, marketing, and legal departments consider relevant, the licensee needs to select the appropriate risk-adjusted discount rate. The range of risk-adjusted discount rates is from a low of 20% to a high of 80%, as follows:

Speculative Projects 50-80%

High-risk Projects 40-50%
Prototype has proven capabilities. Nature of protection adequate.

Moderate-Risk Projects 30-40%
Technology fully developed. Excellent chance of commercial success. Intellectual property solid.

Low-Risk Projects 20-30%
Product and technology already successful. It fits into existing product or service line.

Before proposing risky license-in opportunities to their top management and owners, the licensing executive should prepare a Risk and Uncertainty Profile for their company. Public companies rarely take excessive risk with large amounts of their stakeholders’ capital.

Most licensees reject projects out-of-hand when the capital investment is material and the RADR exceeds 40%. Only businesses with diversified R&D portfolios (e.g., large pharmaceutical companies) and early-stage entrepreneurial start-ups play in the highest percent of capital and RADR ranges, no matter how large the NPV is.

Lastly, it is a given that carefully written licensing agreements can minimize certain risks and poorly written agreements can create unnecessary risks. One should always involve an experienced attorney at some point in the licensing process.

Step 3. Calculate licensee’s NPV using the risk adjusted discount rate — After the cash flow has been calculated in Step 1 and the risk-adjusted discount rate has been calculated in Step 2, the project’s net present value and internal rate of return (IRR) are determined. The IRR is the rate of return that makes the NPV equal to zero. The IRR is also known as the rate implicit in the cash flow.

Step 4: If the NPV calculated in Step 3 is negative, the signing of a license very likely is not in the licensee’s best interest.

Step 5. If the NPV is positive, determine the licensee’s maximum royalty rate — The licensee is willing to pay a royalty to the licensor, only if the licensee’s anticipated rate of return exceeds the licensee’s normal rate of return. For example, if the licensee normally receives a 10% return on capital invested, and in Step 3 the licensee determines that it will receive a 12% return before paying a royalty, the maximum royalty the licensee can afford to pay is 2%. This 2% is known as the “Excess Profit” percentage. The author recommends readers interested in this topic to review Daniel Burns, September 1995, les Nouuelles article “DCF Analyses in Determining Royalty.”

Step 6: Search for noninfringing alternatives by the licensee to a license — Frequently, taking a license is not the only alternative a licensee has. The licensee occasionally determines that it can legally design around the technology and not infringe. Another alternative to taking this license is to take a license with another entity, assuming that the technology is a non-infringing alternative. When the potential licensee determines that either alternative is possible and cheaper; then the maximum royalty the licensee should pay is the lower of the cost to design around the technology or the cost for an alternative license.

Step 7: Determine licensor’s costs and benefits — At the same time the licensee is determining its revenues, costs and alternatives the licensor should be calculating its costs to create, maintain, and monitor the license agreed to by the parties. The costs include the cost of technical assistance to be provided by licensor to licensee and the licensor’s lost incremental profits from lost sales resulting from the license.

Step 8: Determine licensor’s minimum royalty — After the licensor’s costs and lost profits are determined the licensor should determine what is the minimum royalty that will cover the present and future lost profits and costs. Frequently, this calculation is simply the annual costs divided by the licensor’s anticipated net revenues. But occasionally, it is more complicated.

Step 9: Determine of the “Range of Negotiation” — If the licensor’s minimum acceptable royalty rate exceeds the prospective licensee’s maximum royalty rate then a nonlitigation license is unlikely. If as is usual the licensor’s minimum royalty is less than the licensee’s maximum royalty a license is possible. The starting point for licensing negotiations, assuming it falls within the range of negotiation, is the customary royalty rate for like technologies and protection within the licensee’s industry. In the absence of agreement on the industry standard, the midpoint of the range of negotiation can be utilized.

Step 10: Adjust the running royalty within the “Range of Negotiation” for the following factors — The industry standard royalty or the midpoint of the range of negotiation is an arbitrary starting point. This rate is adjusted higher or lower for presence of certain evaluation parameters. The evaluation parameters that tend to decrease the rate are:
< When the licensee has other acceptable noninfringing alternatives.
< When the licensee’s risk ad-
Lump-Sum Payments

Frequently, the licensor does not wish to have any of the risk and therefore requests that it receive a lump-sum, up-front payment. All things being equal, the discount rate that the licensee should use to determine the lump sum should be the RADR.

CONCLUDING COMMENTS

The transfer of patented innovations through licensing is recognized to be a complex interrelationship of technology innovation, legal and public policy, finance and economics, and entrepreneurial management. The subject of technology transfer and its significance, both for developed and developing countries, cannot be overstated.

Licensing contributes to a considerable extent to the process of innovation and economic growth. It contributes to innovation because technologies that are fully exploited yield greater economic returns to inventors, which in turn encourages additional investment in research and development, which results in more innovation. On the licensee's side, licensing of technology generally enables the licensor to get into the business more quickly and economically and with greater assurance of success, compared to independent development (McLain 1976).

Clearly, the creation of a financial model of the outcome of licensing negotiations and the resultant agreed upon royalty rate permit intellectual property to be more effectively and efficiently distributed. It is hoped, the results of this work will be helpful to future researchers in determining the appropriate financial model and decision rules.

REFERENCES


