

Valuate2000 and ValBio2000

1. Copyright and support issues

Valuate2000 and ValBio2000 are Excel spreadsheet templates for establishing a reasonable royalty rate and license issue fee in licensing arrangements. The template was originally developed by Martha Luehrmann in 1993 for the University of California. The current version, Valuate2000, was last modified February, 2000 by Martha Luehrmann. Valuate2000 and ValBio2000 may be used and duplicated by anyone as long as (1) this entire paragraph is appended to any copy of this documentation and (2) the similar paragraph found at the bottom of the accompanying Valuate2000 worksheet templates is appended to all copies of the worksheet templates. These templates are provided "as is" and neither Martha Luehrmann nor The Regents of the University of California are responsible for any errors, omissions, or any consequences thereof. Neither The Regents of the University of California nor Martha Luehrmann give any warranty of merchantability or of fitness for a particular purpose, and neither The Regents nor Martha Luehrmann have any obligation to provide any support for this product. You may distribute only unmodified copies of this template to others. If there are modifications you would like to distribute to others or if you have suggestions for improvements, please contact Martha Luehrmann, 1466 Grizzly Peak Blvd., Berkeley, CA 94708-2202, telephone 510-548-7239, fax 510-845-0322, email MarthaL@california.com.

2. How do you get the Valuate2000 or ValBio2000 worksheet templates?

Go to the AUTM home page on the world wide web at:

<http://www.autm.net/>

Click on the tab labeled Members near the top of the page. When you are on the Members page, Valuate2000 will be on the right side frame. Click on the Valuate2000 link to download the manual and the version of Valuate2000 that you want. It is free.

3. How do you install and run it?

You will need a copy of Microsoft Excel 97, 98, 2000, 2001, or later. You may be able to read Valuate2000 or ValBio2000 with other spreadsheet programs, such as AppleWorks, depending on their ability to import Excel files.

You should always keep one copy of the files locked on your hard drive so you can retrieve the original files. You will make other working copies of the files as you need them, giving them file names of your choosing and modifying them to suit your own situation.

Double-click the Valuate2000 or ValBio2000 file icon to start your Excel program and open the template. Immediately give the **File/Save As...** as command to save the file with a name of your choosing. That way you won't accidentally write on top of your original Valuate2000 file.

4. Valuation Basics

If you want to go straight on to the instructions on running the program and don't feel you need a refresher on valuation basics, skip to section 5, the description of the

worksheets. If you want more than this quick refresher, please read the other chapters in the *AUTM Manual* that deal with valuation and evaluation of inventions, especially Teri Willey's *Royalties, Valuations, Financial Considerations* (Part VII Chapter 3), Richard Razgaitis' *Pricing the Intellectual Property Rights to Early-Stage Technologies: A Primer of Basic Tools* (Part VII Chapter 4), Ashley Stevens' *Finding Comparable Licensing Terms* (Part VII Chapter 5), and Lita Nelsen's *Evaluation of Inventions* (Part V Chapter 4).

4.1. Value is price agreed upon by a willing buyer and a willing seller

Basically, a reasonable value is any price on which a buyer and seller can agree. Of course the buyer wants the lowest cost possible and the seller wants to get the highest price possible. The negotiations between the two parties will hopefully settle on a price that is acceptable to both. A seller should go into a negotiation knowing in advance the minimum price s/he would accept and why. Otherwise, s/he will be vulnerable and might accept a package that brings in less than is economically viable. A buyer should go into a negotiation knowing in advance the maximum price s/he would accept and why. Otherwise s/he will be vulnerable to such a high price that the project is economically doomed. If the seller's minimum is above the buyer's maximum, it is doubtful that a deal can take place.

Below are some factors that will affect the valuation of a technology. Some are shamelessly cribbed from a 1994 Stanford University Invention Evaluation Worksheet.

4.2. Factors that affect valuation

Below are some of the factors that affect the valuation of an invention:

- The potential market.
- How well the technology fits with the licensee in terms of technology, markets served, manufacturing capabilities, and distribution channels.
- Do the proposed products open up new markets for the licensee? Or do they eat into current markets of the licensee?
- How far along is the development of the technology: already scaled-up and tested working units, working prototype, proof of concept, analytical work?
- The benefits of the technology vs. the current technology within the intended markets. Are alternative technologies progressing? Is there a lot of related patent activity?
- The strength and enforceability of the patent protection. Are infringers going to be easy to spot and prosecute?
- The margins that the industry and the technology can command.
- The cost savings for manufacture and distribution vs. current technologies.
- Who will derive value, end customers, VARs, your licensee, sublicensees?
- Are there follow on opportunities? Multiple fields of use?

Unfortunately, going in to a negotiation on a new unproven technology, perhaps addressing a new market, we need some more specific guidance as to what might be a reasonable starting point for a price.

4.3. Rules of thumb - Going Market Rates

Generally, going market rates are poor choices for valuing an invention. They are only justified if your invention is closely similar to other inventions with a common royalty rate AND if your invention and those other inventions are common enough to classify as a commodity. A good example where going market rates *are* reasonable to use is in the case of a research reagent, especially one for which you have no special application where it is important and outshines all other reagents.

4.4. Rules of thumb - Recouping costs plus

If you are thinking about basing your asking price on recouping expenses you've already incurred — such as the costs of the research leading to your invention — forget it. No buyer owes you your past expenses, and they have no bearing on the value of your invention. For example, let's say you spent \$200,000 in research and \$30,000 in patent costs (not to mention your own time) and the *very best* price you're going to get from a potential licensee is \$50,000. Do it. At least you will only be \$180,000 down, not \$230,000 down.

On the other hand, it makes sense to set your minimum to *at least* recoup your *future* expenses. For example, if you are going to have ongoing patent expenses, including foreign patent maintenance payments, make sure that the licensee will be paying for them.

Also, don't commit to interference or patent litigation guarantees unless the licensee is going to pay the costs involved. You certainly don't want to bring a \$500,000⁺ infringement suit or a \$150,000⁺ interference suit on an invention where you have a license issue fee of \$20,000, piddling royalties, and piddling upside even if you win the suits.

Finally, just the oversight and ongoing tracking of licenses has a cost, as does all the time and angst used in license negotiations. The estimate at one place I worked was that the game just wasn't worth the expense unless the license brought in at least \$20,000 over its estimated future costs. This sets a floor. If the invention isn't worth at least that much, give it back to the inventors to patent and market.

4.5. Rules of thumb - 25% Rule

In Valuate2000 and ValBio2000 we make use of what has been termed the 25% rule — that the “goodies” flowing from an invention should be split as follows:

inventor	25%
developer	25%
manufacturer	25%
distributor	25%

Universities rarely provide the licensee with anything other than a bare invention and patent. The invention usually requires substantial development work before it can be manufactured and distributed. So, according to the above rule of thumb, a university usually can claim only 25% of the net income flowing from the invention. In some cases, frequently in software products, the university does a substantial part of the work of development, and therefore has grounds to claim a higher percentage of the net income flowing from the invention.

4.6. Net Present Value (NPV)

When you are looking at the flow of cash that is projected to come from an invention in the future, you have to remember that the net profits you see for future years are worth much less today. You'd much rather have the cash now than the future. Even if there were absolutely no risk, you could put the same amount of money into a safe bank and get interest from it. If you add risk, the chance that the future money might not even exist at all, your preference for getting the cash now would be even greater. You would even accept less cash today than if you have to wait a number of years for an uncertain future amount.

In Valuate2000 and ValBio2000 you take this into account by looking at the Net Present Value (NPV) of the stream of future cash. You discount the future cash by the combination of the cost of money (the low-risk bank rate) and a rate that takes account of the riskiness of the project. If the NPV is positive, that means that project is earning a higher rate of return than the discount rate used in the calculation; so from the licensee's viewpoint, it is probably a good investment.

In Valuate2000 and ValBio2000, we use the 25% rule and the NPV of the projections of the potential licensee to estimate a reasonable royalty rate and license issue fee.

5. The Worksheets for Valuate2000

There are six linked worksheets in the Valuate2000 workbook. Each main paragraph below describes a worksheet. The worksheets already contain sample data that help clarify how things work. You'll replace the data with your own.

5.1. Business Estimates Worksheet (Valuate2000)

In the purple squares you will enter projected figures you get from the potential licensee. First enter the date for the end of the first year of the project. (Valuate2000 assumes you get the license issue fee at the beginning of that year, but that all costs for that year are incurred throughout the year.) Then enter the estimates for:

- projected sales (in dollars)
- cost of goods (COG, the variable cost to produce each widget that will be sold)
- sales, general, and administrative costs (SG&A — nearly all the remaining costs attributable to producing and selling the widget, but not including costs and overhead attributable to other projects, research and development, interest on loans or taxes, or extraordinary items)
- research and development costs (R&D, but only that R&D that is directly attributable to the widget project.)

Notice that you do not put in anything here for royalty or license issue fee. We'll take care of that in the next linked worksheet.

5.1.1. Getting Detailed Business Plans

The above figures may look daunting, but the fact is that your potential licensee has already made such projections and can give you the figures. If your potential licensee is a startup, they've had to make the projections in their business plans in order to attract venture capital and bank loans. If your potential licensee is an ongoing company, the project manager or champion has had to make such projections to justify the capital investment to her/his management. Any well-run

company would require far more detailed projections before embarking on a project. If they don't, they will probably not be in business long and are therefore not good licensees.

If you have a business plan from the licensee that includes detailed projections, great. If not, request one. If a licensee tells you they don't have one, don't believe it. If you cannot obtain projections from the licensee, you can still put in your guesses on sales, and use some company averages (taken from the licensee's annual reports, or from the reports of comparable companies) for the expenses. Check the annual report and see what percentage of sales revenues is the licensee's normal cost of goods. Do the same for the selling, general and administrative expenses and R&D costs. Obviously the overall figures may not track the true figures for your particular project, but it will probably be adequate.

In either case, if your potential licensee does not like the valuation you come up with, you can show her/him that you used their own figures and ask for corrections if there is something amiss. By doing this you will have moved the negotiations off the contentious area of my royalty vs. your royalty to the less emotional underlying business assumptions.

5.1.2. Upside and downside estimates

If you can, get figures for **upside** (sales go better than we expected, costs are not quite as bad as expected, we get to market a little faster) and **downside** (we're late to market, competition comes in, our sales are a little slower than expected, costs are a little higher than expected). When I was CFO of a company, we would make upside and downside projections based on an 80% rule: (a) What would be the sales, COG, SG&A, R&D assuming an optimistic scenario but you're certain that 80% of the time it would not get better, and (b) what would be the sales, COG, SG&A, R&D assuming a pessimistic scenario, but you're certain that 80% of the time it would not be any worse.

If you do get these figures, run separate Valuate2000 workbooks with the expected, optimistic, and pessimistic figures to see how they affect the company's (and your) bottom line.

5.1.3. Problems with long-lead-time inventions

The more distant your product is from market introduction, the less reliable will be the projections you get from the licensee's business plan. For very long lead-time products such as pharmaceuticals or super-early inventions, use ValBio2000 instead of Valuate2000. Instead of insisting on detailed business plans, it bases its NPV figures on market size and penetration, estimated dates of passing milestones, and on the probability of passing those milestones.

5.2. License Terms Worksheet (Valuate2000) - First Cut

In the second worksheet, put in your first estimate of a reasonable license issue fee, maintenance fee, minimum royalty, and royalty rate. Don't worry if you just pull them out of a hat. Valuate2000 will help you narrow them down to something reasonable.

5.3. NPV Rates Worksheet (Valuate2000)

Move on to the third worksheet, where you will enter discount rates for risk and for the cost of capital.

5.3.1. Risk and Return

The riskier the project, the higher will be the return on the project demanded by your licensee.

(Incidentally, don't be overly swayed by the argument that your licensee is carrying all the risk on the project. Your organization has already risked a small fortune in the research. Besides, even though you are asking for an upfront license issue fee, which does transfer some of the future risk to the licensee, you are still risking your future royalty return if the project fails.)

Enter your estimate as to the discount rate to use to account for the relative riskiness of the project from year to year. When I first started licensing, we would use somewhere between 25-30% total discount rate (including both the risk rate and the cost of capital rate) for each year of the project. You can do that here, or you can put in a different rate for certain years that are more or less risky than other years of the project. For most university technologies a reasonable discount rate would be about 25-30% per year if you use an average discount rate over the life of the project and your potential licensee is an ongoing company. Or it might start out to be VERY high (like 50-75%) in the first couple of years and then drop down dramatically once sales start. If your potential licensee is a startup based on your technology, the average discount rate would be MUCH higher.

5.3.2. Cost of Capital

Put in a discount rate due to the cost of money. A good estimate is the current prime rate.

5.4. Valuate2000 Worksheet

This fourth worksheet is the one that shows income projections based on the data in the first three worksheets.

5.4.1. Projections

First of all, take all the projections shown on this worksheet with a grain of salt. Remember the computer saying "Garbage in - Garbage out" (GiGo). All the figures you entered were *guesses*. Plus, the farther out in time those guesses are, the worse they are. If you have optimistic and pessimistic figures as well, you can get a pretty good idea of the range of probable outcomes, but don't assume you have TRUTH, especially if you only have one set of projections.

Discount factor: Rows 5–8 of the worksheet contain calculations of the discount factor to be used for that year of the project. Income for that year will be multiplied by the discount factor to see what its "worth" is at time zero: when the license is signed.

Profit and loss for the licensee: Rows 10–23 of the worksheet contain profit and loss projections for the licensee for the products based on the technology that you will be licensing.

Income to the licensor: Rows 26–29 contain income projections for you, the licensor. They do not include your prior R&D and administrative expenses. Nor do they include future patent, legal, and administrative expenses.

Second cut at royalty estimate: Look at the figures in row 33. This shows the implied royalty rate if you were to get 25% of the net pre-tax income for that

year. Look along row 33 until you come to some steady sales years (usually about 3–4 years after introduction). You can see what royalty rate would be implied by the 25% rule.

Notice that we don't have to use the NPV discounted amounts to estimate the royalty. This is because the licensee will be getting the profit and you will be getting the royalty based on those sales in virtually the same period of time. The risk is equally shared.

Use the implied royalty rates in row 33 to give you a better idea of what royalty rate you should enter in the License Terms worksheet, and go ahead and make the change.

Second cut at LIF estimate: A rule of thumb for a license issue fee is one year's worth of royalty at steady-state sales, discounted to today. Row 31 shows the 25% of the net goodies that is presumably due the licensor for each year. Row 32 shows the same amount, but discounted by the discount factor for that year. Look along row 32 until you come to some steady state sales years. You can see what LIF would be implied by the 25% rule and the rule of thumb that the LIF is one year's worth of royalty at steady-state sales discounted to today.

Use the implied license issue fees in row 32 to give you a better idea of what LIF you should enter in the License Terms worksheet, and go ahead and make the change.

Net income for the licensee: Row 20 shows year by year the net pretax income to the licensee. This is income after expenses, including royalty payments. In the sample data the licensee shows a profit *for that year* in year 8. Row 21 shows the cumulative net pretax income. That shows how many years it is before the licensee breaks even on the project in terms of cash flow. In the sample data the licensee shows a positive cash flow for the project in year 10. Rows 22 and 23 show the same figures (net income and cumulative net income) discounted with the discount factors in row 8 to get the NPV of the net income and cumulative net income. In the sample data the licensee doesn't have a positive cumulative net present value until year 11 of the project. These key points are in green on your worksheet. They will vary for your data. This is good, since few companies would enter into the project as shown. Most companies will require net positive cash flow within just a few years to minimize their risk.

Income for the licensor: Row 26 shows the pretax income to the licensor. Row 27 shows the cumulative pretax income. Rows 28 and 29 show the same figures (income and cumulative income) discounted with the discount factors in row 8.

5.4.2. Summary Statistics

Look at the summary statistics in the box at A35...B45. It shows some key figures for the licensee and licensor looking out toward the 16th year (you may want to change that to look at a period closer in time, but if you do, make sure you take into account the residual value of the future profits when computing the return to the licensee and licensor, and the licensor's return on investment, ROI).

You (the licensor) have already entered a royalty rate designed to give you 25% of the net income on a year by year basis. But the summary statistics show that you are getting more than your fair share of 25% of the NPV net income. Why is this? Well, you are getting about 25% of the net income each year PLUS you are getting a

license issue fee, and you get that LIF right up front, so it is not discounted the way the future income to the company and royalty to the licensor is.

5.4.3. A Third Cut at Royalty Rate and License Issue Fee

Remember that we said the licensor is (generally) entitled to about 25% of the net present value of the net income flowing from the invention. Now that you've put in the income and expense figures and a second cut at the royalty rate and LIF, use the Excel **Goal Seek...** command to find out what royalty rate and license issue fee would give you 25% of that NPV net income. Click on cell B42. That cell has a formula that calculates the percentage of NPV income that will go to the licensor given the royalty rate and figures you have put into the worksheet.

Here's one way to make the percentage come out 25%. Go to the **Tools** menu (in earlier versions of Excel you will find Goal Seek in the Formula menu) and select **Goal Seek...** A Goal Seek dialog box will appear, and Excel will put the selected cell address \$B\$42 in the **Set cell:** text box. Click the **To value:** text box, and type .25 because that is your goal. Next, click the **By changing cell:** text box, and then click on cell C6 of the License Terms worksheet to select the royalty rate (because that's what needs to be changed in order to reach the goal). Click OK. The dialog box will give you the continuing status of the computations. Click OK when it's done. In the summary statistics box you can see the royalty rate and license issue fee that will give the licensor 25% of the NPV income. Elsewhere on the worksheet, you can see the detailed projections that lead to this result.

Adjust the main variables: Feel free to adjust the royalty rate and LIF in the License Terms worksheet. If you change the royalty rate and/or LIF elsewhere in the Valuate2000 worksheet you will be destroying a formula, and the internal consistency of the worksheet can no longer be guaranteed; so try adjusting the royalty rate and LIF just in the License Terms worksheet.

In particular, in my experience the LIF is rarely as large as the rule of thumb (one year's worth of steady state royalties discounted to today) calls for. In particular, if you are licensing to a cash poor small company, they will be willing to accept a higher royalty rate if that means lowering their LIF.

You may even want to change the license issue fee in the worksheet so it comes in installments, rather than all at once. To do so you will have to change those cells in the main Valuate2000 worksheet. That's OK as long as you remember that you've made the change so the formulas can no longer be relied on, because you still have the pristine worksheet in your saved original file.

If you split the LIF up into milestone payments you should ask for a bit more, to take care of the discounted value of the future payments, and you should consider carefully how you want to write the license. If the license is terminated before all the milestones are paid, must the licensee pay them anyway? If it is a license issue fee, yes, since the fee is incurred upon the issuance of the license. If it is a milestone payment and the license is terminated before the milestone occurs, the fee is probably not incurred and owing.

5.5. Sensitivity Worksheet

Now turn to the Sensitivity worksheet. (No, this is not the *pc* = *politically correct* sensitivity, but the *pc* = *personal computer* sensitivity.) Each of the tables show what

happens to the various measures of profitability to the licensee and the licensor change when you change the royalty rate, the license issue fee, and the discount rate a bit.

To find the value at which the NPV to the licensee is zero (the last row in each of the sensitivity tables) select the cell that gives the Cumulative NPV to Company for that row, then pull down the **Tools** menu and select **Goal Seek....** The text box labeled **Set cell:** should show the cell address of the NPV to the licensee that you will be setting to zero. Click the text box labeled **To value:** and type 0; click the text box labeled **By changing cell:** and type the cell address of the B column cell for that row. The computer will try various values for that cell until it finds one that yields 0 for the cumulative NPV to the licensee.

For example, to find the royalty rate that will make the licensee's cumulative NPV in year 16 equal zero, select cell H12. Select **Goal Seek....** The **Set cell:** box should be H12. Click in the **To value:** box and type 0. Click in the **By changing cell:** box and type B12. B12 will be changed until the computer finds a royalty rate that causes the cumulative NPV of the licensee to go to zero.

It has always surprised me that licensees and licensors rarely negotiate over fractions of a percentage of royalty. As you can see from the sensitivity tables, adding a fraction to a royalty rate doesn't really make much of a dent in the ROI to the licensee and doesn't cut its cumulative NPV by much. But it can mean a nice tidy sum to the licensor.. You can use these sensitivity tables as a negotiation tool to show the licensee that increasing the royalty by $x\%$ has only $y\%$ effect on their internal rate of return for the project. Similarly, you can demonstrate the effect of varying the LIF, and you can assure the licensee a bit regarding the risk of the project by showing how you can vary the discount rates a bit and still have a positive NPV for the licensee.

Adjust the main variables again: Go back to the License Terms worksheet and NPV Rates worksheet and enter in your figures for the key variables of royalty rate, license issue fee, and discount rate. See what happens to the bottom line for the licensor and for the licensee. Check the sensitivity tables and see how much the outcome would change with a small change in each variable. (You may have to use **Tools/Goal Seek...** again to find the values that make the NPV to the licensee go to zero.) As described in paragraph 5.4.3, you can also use **Tools/Goal Seek...** to see what royalty rate would give you exactly 25% of the total NPV return. Using the results from the tables as your guide, select a combination of royalty rate, license issue fee, and discount rate that gives a percentage to the licensor that you are comfortable with.

5.6. Company Cash Flow Worksheet

The Company Cash Flow worksheet contains a cash-flow calculation for the licensee. It is not necessary for you to use the cash-flow calculation section in order to arrive a reasonable royalty rates and license issue fees. While this is not directly helpful in setting royalty rates and fees, it can be helpful in negotiations to show how your offer does not bankrupt the project by choking off its cash. However, to be really useful it needs additional information from the licensee which they may or may not want to share with you.

6. The Worksheets for ValBio2000

There are 5 linked worksheets in the ValBio2000 workbook.

6.1. Assumptions Worksheet (ValBio2000)

You will be entering figures in the purple squares. Some you will get from the potential licensee, and others you will be developing yourself.

6.1.1. First stab at royalty rate and license issue fee

First put in your initial estimate of the cost of capital (a decent estimate is the current prime rate), a royalty rate, a minimum royalty, and a license issue fee. You may want to check the discussion in sections 5.1, 5.2, and 5.3. Don't worry if you just pull the estimates out of a hat. ValBio2000 will help you narrow them down to something reasonable.

6.1.2. Milestone dates

Next, enter the projected dates for completing FDA milestones (or other self-designated milestones if you are not using ValBio2000 for a pharmaceutical. Enter in the date marked "today" as the day you project to sign the agreement and start the project (or accept the given date).

6.1.3. R&D cost estimates for each milestone period

Enter the various R&D estimates for the project for each of the major milestone periods, and an estimate for the ongoing R&D expense as a percentage of sales for the period after sales begin. Do not include any royalty or license issue or maintenance fees.

6.1.4. Probabilities of success for each milestone period

On the right, estimate the probabilities of passing each of the major milestone periods successfully.

6.1.5. SG&A

Enter in the Sales, General, and Administrative (SG&A) costs for the periods before the initial ramp-up for sales as a percent of the R&D costs. Enter in the SG&A costs for the six month period just before sales begin as a percent of expected full penetration sales. These expenses will be high because the company will have to ramp up for the rollout of the product. Enter in the SG&A costs for the periods after sales start as a percent of sales.

6.1.6. Price and COG

Now estimate the cost of goods (COG, the variable cost to produce each widget or dose that will be sold) and the price the company will be charging for the product.

6.1.7. Market penetration

Estimate the total yearly market for the product in the markets the company will be entering, and estimate the company's probable penetration of the market given three scenarios:

- 1) The product turns out to be not as effective as the competition
- 2) The product turns out to be just about as effective as the competition

3) The product turns out to be more effective than the competition

Estimate the probabilities for each of the scenarios.

6.1.8. Ramp-up of sales

The company's sales won't reach the full penetration of the market right off the bat. Enter in the number of years it will take for the sales to ramp up to the expected market penetration. For each of those years, enter in the percentage of full penetration that the company expects to achieve. For instance, if the company thinks it will finally achieve 80% of the total market, and thinks that it might take three years of sales to achieve that 80% of the market, it might think that the first year of sales would bring in 25% of that 80%, the second year might bring in 70% of that 80%, and the third year they would achieve the full 100% of the 80% penetration. If this is a bit confusing, use the example figures in the ValBio2000 workbook.

All this data entry has taken a lot of effort, but from here on in, ValBio2000 does the work and fills in the expected incomes and expenses for the projected years of development and sales.

6.2. Getting the figures (ValBio2000)

You can be certain that your potential licensee has already made shrewd guesses on all the above figures and projections, so be sure to enlist their help in making the estimates. If your potential licensee is a startup, they've had to make the projections in their business plans in order to attract venture capital and bank loans. If your potential licensee is an ongoing company, the project manager or champion has had to make such projections to justify the capital investment to her/his management. Any well-run company would require far more detailed projections before embarking on a project. If they don't, they will probably not be in business long and are therefore not good licensees. If a licensee tells you they don't have such figures, don't believe it. It tells you something about their trustworthiness as possible partners.

If you cannot obtain projections from the licensee, you can still put in your guesses and use some company averages (taken from the licensee's annual reports, or from the reports of comparable companies) for some of the figures. Check the annual report and see what percentage of sales revenues is the licensee's normal cost of goods. Do the same for the selling, general and administrative expenses and R&D costs. Obviously the overall figures may not track the true figures for your particular project, but it may be adequate.

In either case, if your potential licensee does not like the valuation you come up with, you can show her/him that you used their own figures and ask for corrections if there is something amiss. By doing this you will have moved the negotiations off the contentious area of my royalty vs. your royalty to the less emotional underlying business assumptions.

6.3. Risk and Return (ValBio2000)

The riskier the project, the higher will be the return on the project demanded by your licensee. In general, the further out in time the licensee's sales begin, the higher the risk. ValBio2000 takes this into account when you specify the probability of success though the milestone periods.

(Incidentally, don't be overly swayed by the argument that your licensee is carrying all the risk on the project. Your organization has already risked a small fortune in the research. Besides, even though you are asking for an upfront license issue fee, which does transfer some of the future risk to the licensee, you are still risking your future royalty return if the project fails.)

ValBio2000 will use your probabilities of success through phases 1, 2, 3, and approval to determine the part of the discount rate that is dictated by the riskiness of the project.

6.4. ValBioMain Worksheet

The ValBioMain worksheet shows income projections based on your assumptions.

6.4.1. Projections

First of all, take all the projections shown on this worksheet with a grain of salt. Remember the computer saying "Garbage in - Garbage out" (GiGo). All the figures you entered were guesses. Plus, the farther out in time those guesses are, the worse they are. Don't assume you have TRUTH.

Discount factor: Rows 6–9 of the worksheet contain calculations of the discount factor to be used for that year of the project. Income for that year will be multiplied by the discount factor to see what its "worth" is at time zero: when the license is signed.

Profit and loss for the licensee: Rows 10–25 of the worksheet contain profit and loss projections for the licensee for the products based on the technology that you will be licensing.

Income to the licensor: Rows 28–31 contain income projections for you, the licensor. They do not include your prior R&D and administrative expenses. Nor do they include future patent, legal, and administrative expenses.

Another look at royalty estimate: Look at the figures in row 35. They show the implied royalty rate if you were to get 25% of the net pre-tax income for that year. Look along row 33 until you come to some steady sales years (usually about 3–4 years after introduction). You can see what royalty rate would be implied by the 25% rule.

Notice that we use the straight profits, not the NPV discounted amounts, to calculate this estimation of a reasonable royalty rate. This is because the licensee will be getting the profit and you will be getting the royalty based on those sales in virtually the same period of time. The risk is equally shared.

Use the implied royalty rates in row 33 to give you a better idea of what royalty rate you should enter in the Assumptions worksheet, and go ahead and make the change.

Another look at LIF estimate: A rule of thumb for a license issue fee is one year's worth of royalty at steady-state sales, discounted to today. Row 33 shows the 25% of the net goodies that is presumably due the licensor for each year. Row 34 shows the same amount, but discounted by the discount factor for that year. Look along row 34 until you come to some steady state sales years. You can see what LIF would be implied by the 25% rule and the rule of thumb that the LIF is one year's worth of royalty at steady-state sales discounted to today.

Use the implied license issue fees in row 34 to give you a better idea of what LIF you should enter in the Assumptions worksheet, and go ahead and make the change.

Net income for the licensee: Row 22 shows year by year the net pretax income to the licensee. This is income after expenses, including royalty payments. In the sample data the licensee shows a simple profit in year 9. Row 23 shows the cumulative net pretax income. That shows how many years it is before the licensee breaks even on the project in terms of cash flow. In the sample data the licensee shows a positive cash flow for the project in year 10. Rows 24 and 25 show the same figures (net income and cumulative net income) discounted with the discount factors in row 9 to get the NPV of the net income and cumulative net income. In the sample data the licensee doesn't have a positive cumulative net present value until year 11 of the project. These key points are in green on the worksheet. They will vary for your data. Most licensees will require net positive cash flow within just a few years of product introduction for a bio invention.

Incidentally, ValBio2000 does not take into account possible pre-product introduction sales. In many bio inventions some "sales" take place before complete FDA approval as companies seek to recoup some of their clinical costs from patients or from sales of diagnostic kits or reagents. You can take these into account either under the sales and expenses rows of ValBio2000, or by inserting new rows in rows 14 and 15 for such income and expenses. Make sure you change the formula in the net pre tax row to reflect properly the new incomes and expenses in rows 14 and 15.

Net income for the licensor: Row 28 shows the pretax income to the licensor. Row 29 shows the cumulative pretax income. Rows 30 and 31 show the same figures (income and cumulative income) discounted with the discount factors in row 9.

6.4.2. Summary Statistics

Look at the summary statistics in the box at A37...C44. It shows some key figures for the licensee and licensor looking out toward the 16th year (you may want to change that to look at a period closer in time, but if you do, make sure you take into account the residual value of the future profits when computing the return to the licensee and licensor, and the licensor's return on investment, ROI).

You (the licensor) have already entered a royalty rate designed to give you 25% of the net income on a year by year basis. But the summary statistics show that you are getting more than your fair share of 25% of the NPV net income. Why is this? Well, you are getting about 25% of the net income each year PLUS you are getting a license issue fee, and you get that LIF right up front, so it is not discounted the way the future income to the company and royalty to the licensor is.

6.4.3. Another Cut at Royalty Rate and License Issue Fee

Remember that we said the licensor is (generally) entitled to about 25% of the net present value of the net income flowing from the invention. Now that you've put in the income and expense figures and a second cut at the royalty rate and LIF, use the Excel **Goal Seek...** command to find out what royalty rate and license issue fee would give you 25% of that NPV net income. Click on cell C40 That cell has a formula that calculates the percentage of NPV income that will go to the licensor given the royalty rate and figures you have put into the worksheet.

Here's one way to make the percentage come out 25%. Go to the **Tools** menu (in earlier versions of Excel you will find Goal Seek in the Formula menu) and select **Goal Seek...** A Goal Seek dialog box will appear, and Excel will put the address \$C\$40 in the **Set cell:** text box. Click the **To value:** text box, and type .25 because that is your goal. Next, click the **By changing cell:** text box, and then click on cell B5 of the Assumptions worksheet to select the royalty rate (because that's what needs to be changed in order to reach the goal). Click OK. The dialog box will give you the continuing status of the computations. Click OK when it's done. In the summary statistics box you can see the royalty rate and license issue fee that will give the licensor 25% of the NPV income. Elsewhere on the worksheet, you can see the detailed projections that lead to this result.

6.4.4. Adjust the main variables:

Feel free to adjust the royalty rate and LIF in the Assumptions worksheet. If you change the royalty rate and/or LIF elsewhere in the Valuate2000 worksheet you will be destroying a formula, and the internal consistency of the worksheet can no longer be guaranteed, so try adjusting the royalty rate and LIF just in the Assumptions worksheet.

In particular, in my experience the LIF is rarely as large as the rule of thumb (one year's worth of steady state royalties discounted to today) calls for. In particular, if you are licensing to a cash poor small company, they will be willing to accept a higher royalty rate if that means lowering their LIF.

You may even want to change the license issue fee in the worksheet so it comes in installments, rather than all at once. This is particularly appropriate when you are licensing a bio invention or other invention that will take a long time to get to market and that has well defined milestones. To do so you will have to change those cells in the main Valuate2000 worksheet. That's OK as long as you remember that you've made the change and the LIF will no longer change based upon your Assumptions worksheet, because you still have the pristine worksheet in your saved original file.

If you split the LIF up into milestone payments you should ask for a bit more, to take care of the discounted value of the future payments, and you should consider carefully how you want to write the license. If the license is terminated before all the milestones are paid, must the licensee pay them anyway? If it is a license issue fee, yes, since the fee is incurred upon the issuance of the license. If it is a milestone payment and the license is terminated before the milestone occurs, you may decide that the fee is probably not incurred and owing.

6.5. Decision Analysis Worksheet

Turn to the Decision Analysis worksheet. Decision analysis is a technique where you look at a decision (such as whether or not to license a technology), a decision that has different possible outcomes, from the standpoint of the "expected" value of the outcome. You weigh each of the possible outcomes by the probability of that outcome and then sum them all to get the expected value. The higher the expected outcome, the better off you will probably be in making the decision. There are those who argue that if the expected outcome is even slightly above zero, you should make the decision, although I maintain that doesn't take into account all the pain and angst of assuming risk.

In the block of cells from B3 to E6, the probabilities of success that were given in the Assumptions worksheet have been translated into risks per year of each of the milestone periods, and are used in the ValBioMain worksheet.

In the block of cells from B9 to G15 the computer has calculated the expected value to both the licensee and the licensor of the different possible outcomes. Column C holds the probability of loss (or gain) at each of the milestones. Column D holds the joint probability of that outcome. For example, to lose at phase 2, you would have to have won at phase 1 (a probability of 50%) and to have lost at phase 2 (a probability of 40%). The joint probability of those events is $50\% * 40\%$, or 20%. To lose at phase 3, you would have to have won at phase 1 (a probability of 50%), won at phase 2 (a probability of 60%), and to have lost at phase 3 (a probability of 30%). The joint probability of those events is $50\% * 60\% * 30\%$, or 9%. Similarly, to win FDA approval, you would have to have won at phase 1 (a probability of 50%), won at phase 2 (a probability of 60%), won at phase 3 (a probability of 70%), and to win final FDA approval (a probability of 70%). The joint probability of those events is $50\% * 60\% * 70\% * 70\%$, or 21%.

Now look at columns E and F. These are the projected NPV cumulative net incomes for the licensee and licensor at the end of each of those milestones. In our example, if the project dies at the end of phase 1, the licensee loses \$4M. The licensor gets the license issue fee of \$2.5M and not anything else. If the project dies at the end of phase 2, the licensee is out \$9M and the licensor still makes about \$2.5M from the license fees. If the project dies at the end of phase 3, the licensee is out a whopping \$19M and the licensor still makes about \$2.5M from the license fees. But if the project wins FDA approval, the licensee is stands to gain \$71M and the licensor stands to gain about \$9M.

In row 15, each of those possible outcomes is weighed by its joint probability to get the expected value for both the licensee and licensor of the project as a whole. In our example, the average expectation of the licensee is \$9M, as is the average expectation of the licensor. (Incidentally, in this example the expectations of licensee and licensor are roughly the same, but this is not usually the case.) Since both the licensee and licensor have a positive expected value of the project, it is reasonable each of the players would like the project to proceed, even though it has close to an 80% chance of being a loss for the licensee.

Note that you can use this decision analysis at each of the junctures at the end of the milestones. The joint probabilities will have changed since some of the outcome will be known, and you may have a better-honed idea of the probabilities of the remaining events, but the model is the same.

You can see that sometimes, even though the royalty rate and license issue fee are designed to capture 25% of the expected flow of net income from an invention, if you look at the joint probabilities of success at particular milestones, and weigh the outcomes by those probabilities, the licensor may be capturing a far greater percent of the expected flow. In such a case you may want to adjust your royalty rate and license issue fee.

The chart shows the possible outcomes: losing at phase 1, losing at phase 2, losing at phase 3, and winning FDA approval graphically, along with the expected value.

6.6. Sensitivity Worksheet

Now turn to the Sensitivity worksheet. (No, this is not the *pc = politically correct* sensitivity, but the *pc = personal computer* sensitivity.) Each of the tables show what

happens to the various measures of profitability to the licensee and the licensor change when you change the royalty rate, the license issue fee, and the discount rate a bit.

To find the value at which the NPV to the licensee is zero (the last row in each of the sensitivity tables) select the cell that gives the Cumulative NPV to Company for that row, then pull down the Tools menu and select Goal Seek.... The text box labeled Set cell: should show the cell address of the NPV to the licensee that you will be setting to zero. Click the text box labeled To value: and type 0; click the text box labeled By changing cell: and type the cell address of the B column cell for that row. The computer will try various values for that cell until it finds one that yields 0 for the cumulative NPV to the licensee. For example, to find the royalty rate that will make the licensee's cumulative NPV in year 16 equal zero, select cell H15. Select **Goal Seek....** The **Set cell:** box should be H15. Click in the **To value:** box and type 0. Click in the **By changing cell:** box and type B15. B15 will be changed until the computer finds a royalty rate that causes the cumulative NPV of the licensee to go to zero.

It has always surprised me that licensees and licensors rarely negotiate over fractions of a percentage of royalty. As you can see from the sensitivity tables, adding a fraction to a royalty rate doesn't really make much of a dent in the ROI to the licensee and doesn't cut its cumulative NPV by much. But it can mean a nice tidy sum to the licensor.. You can use these sensitivity tables as a negotiations tool to show the licensee that increasing the royalty by $x\%$ has only $y\%$ effect on their internal rate of return for the project. Similarly, you can demonstrate the effect of varying the LIF, and you can assure the licensee a bit regarding the risk of the project by showing how you can vary the discount rates a bit and still have a positive NPV for the licensee.

Adjust the main variables again: Go back to the License Terms worksheet and NPV Rates worksheet and enter in your figures for the key variables of royalty rate, license issue fee, and discount rate. See what happens to the bottom line for the licensor and for the licensee. Check the sensitivity tables and see how much the outcome would change with a small change in each variable. (You may have to use **Tools/Goal Seek...** again to find the values that make the NPV to the licensee go to zero.) As described in paragraph 6.4.3, you can also use **Tools/Goal Seek...** to see what royalty rate would give you exactly 25% of the total NPV return. Using the results from the tables as your guide, select a combination of royalty rate, license issue fee, and discount rate that gives a percentage to the licensor that you are comfortable with.

6.7. Company Cash Flow Worksheet

The Company Cash Flow worksheet contains a cash flow calculation for the licensee. It is not necessary for you to use the cash flow calculation section in order to arrive a reasonable royalty rates and license issue fees. While this is not directly helpful in setting royalty rates and fees, it can be helpful in negotiations to show how your offer does not bankrupt the project by choking off its cash. However, to be really useful it needs additional information from the licensee which they may or may not want to share with you.

7. CAVEATS

- If you are dealing with a medical or biotech product, you may not even be selling product until 10 years into the project. In that case, please use ValBio2000 instead of Valuate2000.

- If your inputs are poor, your results will be poor. Furthermore, you've seen how varying an assumption just a bit can radically change the results. So don't rely on these figures completely. Just because a computer printed the result doesn't make it any better or worse a prediction than you'd get from a palm reader. But it can be a good guide for finding a reasonable structure for the deal, and it can provide you with useful ammunition for bargaining.
- Be careful when you type in values to replace formulas. When you override a calculated formula by typing in a value you lose the formula that established the relation of that cell with the other cells in the worksheet. So, if you later update some other value in a different cell, the cell where you lost the formula will not recompute properly.
- The worksheet only goes to 16 years in the future. There can be a lot of residual value left in the invention. For a biomed patent, you may not even get on the market for 10 years. Since this worksheet truncates at 16 years, you are probably understating the value of the technology.
- Also, the license issue fee is currently calculated from year 10 net income, (discounted to year zero). If this is unreasonable, feel free to change it to another year, or to override it entirely, if you wish.
- You may want to add more years. If so, be careful. There are many instances in the worksheet where cells reference the 16th year. You will want to change those references.

7.1. Strategies

Even though you cannot rely entirely on the worksheets, they give you some strong negotiation tools. You have seen what the internal rate of return is for the licensee, using the licensee's own figures. You have seen how varying the royalty rate by as much as 10% only changes the NPV to the licensee by (perhaps) only 5%. You can try out different scenarios and know how to give on one variable and gain on another. Even where you give in, like in structuring milestone license issue fee payments, you can show how you have lost effective income because of the discounted future payments, and perhaps win a concession on another issue.

You can even, using the worksheets, test the assumptions made by the licensee in their business plan. For example, someone in our office was using the worksheets and came across an anomaly. Even with a pitifully low royalty rate and a low license issue fee a company we were negotiating with showed large cumulative losses for many years. The problem was in the high R&D projected for years 0 and 1. We rechecked the worksheets using zero royalty rate and zero license issue fee. The company still came out very badly until many years into the future. It didn't make sense. No rational company would enter such a project. We checked further with the company and found out that fully half of the large 1st year R&D was in fact the repayment of a note, based on several other projects, from a venture capitalist. It was improperly loaded on our project. When we removed that high up front cost, all the figures fell into place.

7.2. Improvements You can Make

graphs: You can graph figures to see if they make reasonable sense. Do sales climb reasonably? Do they follow the traditional S-curve? Do you see learning curve advantages and economies of scale entering in on the cost side?

percentages: You can also add columns to check the relationships between the figures. What is the cost of goods (C of G) divided by the revenue? What is Selling and General and Administrative cost (Sell & G&A) and R&D divided by the revenue.

Are all those costs a reasonable percent of the revenue? Do the percent figures reasonably match the corresponding figures for the company as a whole (which you can find in their annual report)? R&D should be high for your project at the beginning, but should tail down as sales start. Conversely, SG&A should be small until just before sales start. C of G should go down as sales volume goes up.

trends: If you're pretty good with spreadsheets, check out the trend line of the sales revenue and the various costs.

time to product: Again, if you're pretty good with spreadsheets, try varying the date at which the licensee actually starts selling product. You may have to make some adjustments in the formulas. You will probably be surprised at the strong influence this has on the outcome.

optimistic/pessimistic check: You can also vary the licensee's projections. What if they are overestimating the sales by 10%. Cost of goods would also go down about 10%, but Selling, General, and Administrative costs would probably only fall a bit, since they're harder to curtail. Try out the new pessimistic estimates and see what is your, and the licensee's downside risk. Check what happens if you have a run away best seller.

8. Summary

You've used the worksheets to get a rough idea of a reasonable royalty rate and license issue fee, and you now have a pretty good idea how changing some of the assumptions will change the income picture for you and your potential licensee. As you continue to negotiate the terms, run the worksheets again with the new figures to see what you and the licensee may be gaining or losing. Remember that you don't want to extract the last drop of blood from the potential licensee. This is a partnership — if the licensee fails, you fail also.