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Robert Feinschreiber

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CHAPTER A

Cost-Sharing Buy-Ins (New)

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[1] Becker, Brian, "Valuing In-Process R&D for Acquisitions: Economic Principles Applied to Accounting Concepts," *Transfer Pricing Report,* 9 (September 20, 2000): 323–326 and "Further Thoughts on Cost Sharing Buy-Ins: A Review of the Market Capitalization and Declining Royalty Methods," *Transfer Pricing Report,* 10 (July 11, 2001): 195–197.

A.1 INTRODUCTION

One of the more contentious transfer pricing issues is the valuation of intangibles when a business seeks to buy into a cost-sharing arrangement. There is no easy answer to determine the buy-in by the applicability of the market capitalization approach, the *declining royalty* method, or some other method. This article summarizes and critiques some of the main arguments on either side of this debate, while introducing other considerations.

The market capitalization methodology has a sound foundation, and should not produce bias results when applied correctly. The declining royalty approach can also lead to appropriate results, but there are two provisos:

1. The declining royalty approach is typically applied incorrectly, and
2. The declining royalty approach often requires significant adjustment and speculation.

A.2 IN-PROCESS AND FINALIZED RESEARCH AND DEVELOPMENT

The intangible that is subject to the buy-in is likely to be in-process research and development (R&D) or finalized R&D. In-process R&D proves difficult to value because it has no intrinsic value until it has been finalized into a process/technology that can generate revenue. In addition to the uncertainty as to the amount of revenue that can be generated from the technology, in-process R&D is complicated by the probability that the technology will never succeed. By contrast, *finalized* R&D by definition will generate some revenues, and its valuation can be based on the amount of revenue (and profit) that will accrue in the future. The economics and mathematics of this problem are analyzed before assessing the validity of valuation methods currently being applied by practitioners.

(a) Problem

For in-process R&D, valuation is particularly difficult at the time the in-process R&D is sold and/or transferred. The valuation is difficult to determine later in hindsight when the value of the resulting *finalized* R&D is known. The following example poses a typically difficult fact pattern:

Technology A began R&D in 1990. During the five-year period from 1990–95, Kira's Manufacturing Company (KMC) spent $10 million in R&D before it entered into a 50/50 cost-sharing agreement (CSA) with its Japanese subsidiary in 1995. From the joint effort of both parties, they expect to finalize the technology (assuming they are successful) in 2000, after incurring a total of $90 million in developing costs. By all accounts, technology A will be worth $668.9 million upon finalization in 2000. For buy-in purposes, Technology A must be valued as of 1995.

(b) Extremes of Current Practice

Current practice for estimating the value of in-process technology can range from one of two extreme assumptions/methodologies. Many companies buying in to the cost sharing arrangement would seek to reduce its cost. To minimize buy-in value, practitioners assume that each dollar of R&D expenditures, whether incurred before or after the CSA, has the same impact on creating the technology, regardless of when the expenditures occurred.

As with the above example, in many of these cases most R&D expenses occur in the late stages of development. These fact patterns lead to a large majority of the final technology value being assigned to later stage/post-CSA R&D. In this case, the 1995 in-process R&D would only have been worth $66.9 million ($668.9 million × 10/100) under such an approach, as only $10 million of the $100 million in R&D costs were incurred prior to 1995.

(i) Initial Development. Analogously, some practitioners treat the initial development as the only important development. These practitioners treat all other expenditures incurred through cost sharing as simply follow-up and relatively riskless. This methodology essentially treats the post-CSA R&D similar to operating expenses that should receive a modest mark-up.

Under this paradigm, almost all of the forecasted benefit/value of the technology is ascribed to the pre-CSA technology, after simply netting out the *costs* of the CSA R&D. This procedure would lead to a valuation of approximately $578.9 million to the 1995 in-process R&D ($668.9 million less $90 million). Typically, such post-CSA R&D costs would be modestly marked up to account for inflation and risk; however, we have avoided this step in this calculation for mathematical simplicity. Even with such a markup, however, the value implied for the in-process R&D in 1995 would be quite different from the $66.9 million computed above.

(c) Successful and Unsuccessful R&D

As is often the case, the truth is somewhere between two extremes. That is, post-CSA/late stage R&D is less speculative than pre-CSA/early stage R&D, but it is too speculative to simply be considered as an expense requiring a simple inflation/cost of capital markup. In essence, the probability of a technology's commercial success increases as the technology becomes more developed.

Thus, ex-postsuccessful late stage R&D is more valuable than an operating expense, but less valuable than ex-postsuccessful early stage R&D in dividing out the value of technology. One author hints at a part of this point by concluding that the treatment of future R&D as costs in a net present value type of analysis will overstate the relative value of early stage technology.[2] While this suggests that late stage R&D expenditures should not be considered expenses, it does not attempt to compare the relative values of R&D expenditures incurred at different points in the development cycle. Recent research confirms the relatively large contribution of early stage R&D.

The contribution of basic research (work aimed at developing new science and technology) to corporate productivity and growth is substantially larger than the contribution of other types of R&D, such as product development and process R&D (where the latter is aimed at enhancing the efficiency of production processes). The estimated contribution differential of approximately three to one in favor of basic research is particularly intriguing.[3]

(i) Comparing Basic Research and Advanced Research. The above discussion does not characterize early stage R&D as any more value adding than later stage R&D. However, success probabilities dictate that successful early stage R&D is more valuable than successful later stage R&D. That is, since the return to unsuccessful R&D is zero, the return to successful R&D must compensate the investor for the expenses incurred in the successful technology as well as the unsuccessful technology.[4] As such, the investor's expected return must be consistent with other investment opportunities in the market, for example, a *required rate of return.* With lower probabilities of success seen for early stage R&D, the apparent return to successful early stage R&D is relatively high.

(ii) Success Possibilities. The concepts of successful versus unsuccessful R&D and success probabilities translate well into economics, but they are more difficult to apply to accounting definitions of costs. All of the expenses involved in the commercialization of a technology must either be classified—from an accounting perspective—as R&D or operating expenses, but these expenses clearly do not fall neatly into two prespecified groups based on risk. Rather, the expenses span a continuum from purely speculative development for a product with almost no chance of commercial success to late stage developmental expenses for products that have been assured of commercial success, such as final filing fees and so forth.

Economics and finance, however, do not require the classification of costs into two categories. Instead, these disciplines ascribe higher returns to investments with higher risks to account for the probability of failure. This process provides a natural methodology to value R&D along the probability continuum. Probability

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[2] John Wills, "Valuing Technology: Buy-In Payments for Acquisitions," *Global Transfer Pricing* (February–March 1999), pp. 28–34.

[3] Baruch Lev, *Intangibles: Management, Measurement, and Reporting* (The Brookings Institution, Washington, DC, 2001), pp. 55–56.

[4] Comments of Boyan Jovanovic in Baruch Lev, *Intangibles: Management, Measurement, and Reporting* (The Brookings Institution, Washington, DC, 2001), pp. 55–56. Edwin Mansfield and Samuel Wagner, *The Production and Application of New Industrial Technology* (Norton, 1977), p. 23.

theory—most closely associated with Bayes' Rule—helps quantify this point in the KMC example. These disciplines essentially quantify a payment mechanism whereby companies—on average (i.e., expected value)—cover their costs plus a market-based profit for not only successful R&D, but also unsuccessful R&D.

While this structure provides a market-based profit rate, the required rate of return on average, it necessarily implies that firms with successful technology earn above market returns and those with unsuccessful technology earn below market returns. Only in companies that develop a large number of products can the returns begin to approximate the market return over the long run. Here, there is a large enough sample size to average out the *good* projects with the *bad* products.

A.3 KIRA'S MANUFACTURING COMPANY EXAMPLE

The theory described above can be quantified in the KMC example. Technology A's development is characterized by 10 stages, each of which takes one year to transpire. At each stage, there is a known probability of success. Products only derive value when they have succeeded through all 10 stages.

As seen in Table A.1, the probability of commercial success seems extremely remote at the early stages and a near certainty at the later stages. That is, Stage 1 development can only be successful if Stage 1 R&D is successful enough to proceed to Stage 2, 50 percent probability *ex ante,* and Stages 2–9 R&D are each successful enough to proceed to the next stage, 2.4 percent probability *ex ante.*

Thus, a technology that successfully navigates the first five stages of development will become commercially successful approximately one-third of the time (32 percent), while a product that has only navigated stages 1 through 3 (i.e., beginning stage 4) will only succeed commercially 1 in 10 times.

Table A.1

PROBABILITY OF COMMERCIAL SUCCESS

Stage or Year	Probability of Success in Stage	Probability of Commercial Success	Dollars Spent in Stage ($M)	Return Required per Successful Technology
1	50%	1.2%	1	21,683%
2	50%	2.4%	1	9,802%
3	50%	4.8%	2	4,401%
4	50%	9.5%	3	1,946%
5	60%	19.1%	3	830%
6	70%	31.8%	5	407%
7	70%	45.4%	10	223%
8	80%	64.8%	20	105%
9	90%	81.0%	25	49%
10	90%	90.0%	30	22%

(a) Markup on Costs

It is understood in this hypothetical industry that investors require a return that is consistent with a 10 percent annual markup on costs. When all costs go to the production/marketing of a *commercial* product, the internal product-level accounting is fairly straightforward. That is, one must merely mark up the costs of producing/marketing that product by an annualized rate of 10 percent. However, the problem turns much more complicated when a portion of investment goes to technology that never becomes commercially feasible. In that case, investors will not be satisfied with only a 10 percent annualized markup on successful commercial products.

This concept translates well to the example above, as it takes different levels of returns on the commercial products to compensate investors for all of their investments. As seen above, only approximately 1 cent of each dollar invested in Stage 1 can ever be recovered by a commercially successful product 10 years later, while 65 cents of each dollar invested in Stage 8 will be recovered commercially 3 years later.

(b) Consequences of a Ten Percent Return

To receive an expected market annualized return of 10 percent on all of Stage 8 investments, investors would require a *105 percent return* on the successful products to compensate for the *−100 percent return* on the unsuccessful products. That is, for each dollar invested in a successful technology in Stage 8 development, an investor would need to earn $2.05 in profit, that is, the net present value as of the date of initial commercialization of all profits when the product became commercialized three years later:

$$64.8\%(X) + 35.2\%(0) = (1.1)^3\% = 133.1\%$$

$$X = \frac{133.1\%}{64.8\%}$$

$$X = \$2.05 \quad \text{a return of 105 percent}$$

This demonstrates that investors who were lucky enough to invest in a successful product at Stage 8 will receive a return of 105 percent three years later. However, those investors in the noncommercially successful products will lose their entire investment.

(c) Extreme Results for Initial Development

This calculation becomes much more extreme—over a 21,000 percent required return—when applied to the required return on successful Stage 1 development costs. This calculation is extreme because of the low probability of success and the 10-year wait until the product is commercialized. Expenditures in Stage 1 have only a 1.2 percent chance of commercial success, and such success would occur 10 years after these R&D costs have been incurred.

Table A.2

SUMMARY OF RESULTS

Stage	Dollars Spent in Stage ($M) for Successful Technology	Return Required per Successful Technology (%)	Gross Return Required per Successful Technology ($M)
1	1	21,683%	217.8
2	1	9,802%	99.0
3	2	4,401%	90.0
4	3	1,946%	61.4
5	3	830%	27.9
6	5	407%	25.4
7	10	223%	32.3
8	20	105%	41.1
9	25	49%	37.3
10	30	22%	36.7
Total	100	283%	668.9

$$1.2\%(X) + 98.8\%(0) = (1.1)^{10}\% = 259.4\%$$

$$X = \frac{259.4\%}{1.2\%}$$

$$X = \$217.83 \quad \text{a return of 21,683 percent}$$

While this return seems particularly high, it is important to remember that only approximately 1 out of 100 investors will earn this return 10 years later, while the other 99 will lose their entire investment. See Table A.2.

(d) Summary of Results

We summarize similar calculations for each stage above and find that in this industry early stage development requires astronomical returns on successful products to provide investors with a 10 percent expected annualized return on all investments.

Thus, successful product requires both $100 million in development costs and $668.9 of gross returns to keep investors satisfied. Table A.2 also provides a methodology to value in-process technology in the far right column. More than half of the value is derived in the first three stages, and through Stage 5 the value is $496.1 million. Such a mark-up compensates for both the risk of commercial nonviability and the 10 percent annual return required by investors.

A.4 SUMMARY OF ECONOMIC THEORY

In-process technology valuations must consider the relative success probabilities of early and late stage development. The goal is that such calculations implicitly provide a return to investors for both successful and unsuccessful development.

That is, returns to investors must compensate for the varying levels of risk at different stages. We presented an example above with known probabilities of success and expenditures at 10 different stages of development. This example allowed us to estimate required returns for successful products at each stage of development and to value in-process technology.

Our example provides useful insight into thinking about returns to, and valuations of, in-process technology, but real-world R&D does not offer known probabilities and explicit stages of development. Further, the timing of each stage of development and the level of commercial success are in doubt. Nonetheless, the theories described above do bear out in many typical business situations.

(a) Pharmaceutical Situations

The initial development of pharmaceutical compounds includes the "scrapping" of nearly all of the compounds. Any expected return at this level of development must compensate not only for successful, but also failed, development efforts. Thus, the *return* to successful R&D at this stage typically appears to be extremely high.

When pharmaceutical companies compare their returns and costs on successful products, the returns and costs are clearly understating the cost basis since the returns and costs should also include the many products that never became commercially viable. The pharmaceutical industry, in particular, has generated some research into this area, where probabilities of success, timing, and costs are estimated for each of the phases of Federal Drug Administration (FDA) testing.[5]

(b) New Companies and Investments

New companies and investments, high tech or otherwise, typically look to equity investors to start operations. For those successful firms, new companies and investments often look to equity markets again a year or two later to infuse the company/investment with more capital. The initial equity investors correctly perceive their investments to be more speculative and require a higher return than the second set of investors. Indeed, some of these investments are perceived as more of a "lottery" than anything else, hoping that the company will eventually go public.

However, the second set of investors still face a somewhat speculative investment that may be difficult to put into an expense reimbursement type of paradigm. For example, many Internet/technology companies are purchased for their technology after their early stages of development. The prices paid for such companies often bear no relation to the historical R&D expenses incurred. That is, the value of such R&D is often 10, 20, or even 50 times the historical R&D, as seen below:

- A popular textbook states, ". . . the cost approach is generally not a good measure of IPRD [in-process R&D] value."[6]

[5]Dimasi et al., "The Cost of Innovation in the Pharmaceutical Industry," *Journal of Health Economics* (1991), pp. 107–142.

[6]Lawrence Gooch, "In-Process R&D," Chapter 9, p. 176, in *The Handbook of Advanced Business Valuation,* McGraw-Hill, 2000.

- American Airlines spent $40 million of initial R&D on its SABRE reservation system, but sold it for $3.3 billion.[7]
- A Securities and Exchange Commission (SEC) study of 48 venture capital investments, which eventually went public (i.e., became successful after the fact), showed an average rate of return of 716 percent.[8]

What is not explicitly captured in such prices is the fact that for every successful development company, there are numerous others that failed and recovered none of their R&D expenses.

The problem summarized above presents another instance when accounting rules and economic theory are not consistent. Accounting rules draw a *black-and-white* line between R&D and operating expenses. The rules of such distinctions vary by industry, but it is very clear that—for valuation purposes—such costs cannot simply be either classified as only R&D or as operating expenses.

A.5 ANALYSIS OF TWO COMMON APPROACHES

Much of the literature and applications regarding cost-sharing buy-ins has focused on the market capitalization method and the declining royalty method. Due principally to misapplication, the two methodologies often result in valuations that differ by orders of magnitude.

(a) Market Capitalization Method

The market capitalization method is theoretically applied in this manner: Add the company's market capitalization (the product of the market price times number of outstanding shares) to the company's liabilities to arrive at its *enterprise* value. Subtract the values of all tangible and nontransferred intangible assets from the enterprise value to compute the worldwide value of the transferred intangible. It is particularly important to make reasonable estimates of these assets or the remaining value of the transferred intangibles may be inappropriate. For example, it is generally not appropriate to value the nontransferred intangibles as a *cost of capital* markup on development costs unless the markup accounted for the risks incurred at each stage of development. This process—which I have seen applied before—tends to overvalue the transferred intangible.

Multiply the worldwide value for the transferred intangible by the portion of the world in which the product is used, based on relative benefit being purchased to determine the appropriate buy-in value. The benefit can be defined in a number of ways, including sales, operating profit, or incremental sales. The portion applied in the buy-in is typically the initial portion applied to the sharing of future development expenditures.

[7] Case study prepared in 1998 by Professor Bruce Weber, Baruch College, City University of New York.

[8] U.S. Securities and Exchange Commission, *Institutional Investors Study Report*, H. Doc. 92-64, Pt. 1, 8, pp. 2477–2497.

(b) Declining Royalty Approach

The declining royalty approach requires the subsidiary to incur ongoing cost-sharing payments after the buy-in payment, but its buy-in payment structure takes on a different form of payment than that seen under the market capitalization approach. Instead of having the subsidiary pay a lump-sum fee, this approach requires the subsidiary to make annual royalty payments throughout the useful life of the intangible being transferred. The declining royalty method would theoretically determine the royalty payment during any specific year of the transferred intangible's useful life in three steps:

1. Define the royalty rate being paid before the CSA as the *baseline* royalty rate for the use of such intangibles. The pre-CSA royalty must be arm's length to use it as a baseline. If it is not, or there is no such royalty payment (e.g., the transferred intangibles have not yet led to commercial sales), an arm's length rate must be determined to set this baseline.
2. Determine the portion of the transferred intangible's (expected) *value* in the year in question that was developed before the CSA.
3. Multiply the pre-CSA value portion by the baseline royalty rate to calculate the royalty rate for the year in question.

This exercise is repeated for each year that comprises the intangible's useful life.

A.6 DISAGREEMENT AS TO METHOD

Economists continue to disagree about the appropriateness of these two methods. The critiques leveled on the market capitalization method have generally been unfounded. Relatively little specific criticism has been leveled on the declining royalty method, but it has typically been on point.

(a) Market Capitalization

Most of the criticism in this area has been directed toward the theory of the market capitalization. A 2001 article by economists and an attorney from Ernst & Young[9] criticizes the use of the market capitalization method on a number of grounds. Among other points, they argue that it is too difficult to separate out the values of the various types of intangibles owned by the parent, and the market capitalization of the firm includes current and expected future intangibles, while the buy-in should only include current intangibles.

Baker & McKenzie attorneys and an economist[10] also criticize the market capitalization method, although not quite as severely. Their article points out that a

[9] Christopher Faiferlick, Robert Ackerman, John Wills, and Timothy Reichert, "Market Capitalization: Not a Reliable Transfer Pricing Method," *Transfer Pricing Report,* 9 (February 21, 2001): 753–757.

[10] Marc Levey, Victor Miesel, and William Garofalo, "Buy-In, Buy-Out Requirements Present Unusual Difficulties for Cost-Sharing Agreements," Prepared for Baker & McKenzie's 16th Annual Asia Pacific Tax Conference in Singapore, November 2000.

company's market value can show wide swings over short periods of time for reasons independent of the value of transferred intangibles. Further, they mention that the market capitalization may overstate firm value during periods when the market is in a "bubble." An Arthur D. Little, Inc. economist voiced additional criticism by implying that the market capitalization essentially requires the subsidiary to pay twice for future intangibles.[11]

(b) Declining Royalty Method

The declining royalty method has also faced some detractors. The criticisms are not focused on its theoretical rationale, but rather on its typical application whereby pre-CSA *value* is computed based simply on pre- and post-CSA development costs. That is, the declining royalty method does not typically account for different levels of risk at different stages of development. Common arguments are that the declining royalty method does not allow for the possibility that the intangibles may become more valuable after the CSA, and the declining royalty method typically phases out the royalty too quickly.

An earlier article of mine criticized the typical *application* of this method in that it implies too large of a share of value to post-CSA development expenditures.[12] My paper, which observed that earlier stage development expenses are generally riskier and require a higher rate of return than later stage development expenses due to lower success probabilities, is mirrored in a standard valuation textbook[13]:

The actual rate of return selected should consider how far along the development is and the perceived confidence of success or failure. If the product is embryonic, the rate of return might be as high as 50 percent after tax. If the IPRD [in-process R&D] is just an improvement on an existing, well-established product line, then rates of return should probably be pegged at the firm's cost of capital plus a premium depending on the perceived additional risk.

(c) Other Declining Royalty Issues

Other potential problems with the declining royalty approach include high levels of speculation/estimation and inappropriate fact patterns. It is a difficult and speculative estimation at the time of the buy-in to estimate the portion of the intangibles' value that will be created in future years. One can have projections of development expenses, or actual expenditures, when the valuation is conducted after the fact. These projections cannot translate to value without incorporating hard-to-estimate probabilities of commercial success at each stage of development. Another difficult estimation is the useful lives of certain intangibles, including goodwill and core technology. This estimation becomes especially complicated

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[11] Comments of Irving Plotkin, *Transfer Pricing Report,* 9 (July 26, 2000): 196.

[12] Brian Becker, "Valuing In-Process R&D for Acquisitions: Economic Principles Applied to Accounting Concepts," *Transfer Pricing Report,* 9 (September 30, 2000): 323–326.

[13] See Lawrence Gooch, "In-Process R&D," Chapter 9, pp. 188–89, in *The Handbook of Advanced Business Valuation,* McGraw-Hill, 2000.

when numerous intangibles are being transferred and relative values must be determined to estimate weighted average useful lives.

The declining royalty method becomes complicated when the finished and in-process intangibles are very different. For example, a subsidiary may have paid 8 percent royalties on an over-the-counter pharmaceutical before the buy-in, but the principal value in the buy-in was for a patent for a not yet commercialized/potential blockbuster pharmaceutical (i.e., an eventual royalty of 25 percent). In that event, it would be difficult or impossible to apply this method without significant adjustment. That is, a royalty declining from a base of 8 percent as payment for an intangible that will potentially have value consistent with a 25 percent royalty is inappropriate.

A.7 CONSIDERING THE STANDARD CRITICISMS OF THE MARKET CAPITALIZATION APPROACH

The market capitalization method has endured the bulk of the criticism in this field on three theoretical grounds. Three primary criticisms have been put forth, but are unfounded or overstated:

1. Value of nontransferred intangibles
2. Price fluctuation
3. Inclusion of future intangibles

While any method is subject to application error, the market capitalization method is theoretically sound. By contrast, there have been some valid criticisms raised regarding the *application* of the market capitalization method. For example, the nontransferred intangibles can be undervalued (thereby, overvaluing the transferred intangibles) by valuing them as a modest markup on their development expenses.

(a) Value of Nontransferred Intangibles

The first criticism focuses on the difficulty in determining the values of the nontransferred intangibles. However, even an imprecise calculation can serve as an order of magnitude test of reasonableness. For example, the market capitalization can be used to test the implications of the results of another method. That is, if a declining royalty method calculated that the transferred intangibles are worth 2 percent of the company's total enterprise value, it is reasonable to examine whether the tangible assets and the nontransferred intangibles could realistically be worth the remaining 98 percent. Further, for many companies, the application is fairly straightforward, as all of their valuable intangibles are being transferred.

(b) Price Fluctuation

The criticism that a company's market value fluctuates too much and/or is not indicative of its value has no foundation. A company's value varies because the expectations of its future profits are updated all of the time, as changes in the economy/industry/company are processed into the minds of buyers and sellers in the market. This is one of the principle foundations on which modern finance theory rests—the theory of efficient markets.

(c) Inclusion of Future Intangibles

It is difficult to see the logic in the final criticism: the current market value of a company includes *future* intangibles. Thus, the critics argue, a market capitalization approach leads to double payment for the same future intangible, buy-in, and cost sharing payments. The current market value of a company, however, does *not* include the value of future intangibles. It simply includes the discounted value of the work-in-process intangibles based on commercial success probabilities and the time value of money.

In the future, that expectation of commercial success may turn out to be either too high or too low, and the market value will adjust as seen in the table below. This example is simplified to assume no other changes in the company or market during the development period of June 1, 2001, through May 30, 2003.

Date	Probability of Commercial Success (i.e., $100 million profit)	Market Capitalization
June 1, 2001	50%	$300 million
June 1, 2002	0%	$250 million
June 1, 2003	100%	$350 million

This simplified example above shows how the market can adjust to the successful or unsuccessful development of an intangible. At June 1, 2001, the market assigns $50 million of value to this work-in-process intangible due to its 50 percent chance of generating $100 million in profits. If the development concludes without creating any commercial sales, the value of the company drops by $50 million. Similarly, if the development generates a profit of $100 million with certainty, the market adjusts upward by an additional $50 million.

A.8 OTHER APPROACHES

Two more recent approaches to the valuation of buy-in payments include the *foregone profits* approach and the *acquisition study* approach. The *foregone profits* method considers the intangible transfer from the perspective of its owner, typically the parent. That is, the owner or any hypothetical seller in the marketplace would only enter into these cost-sharing and buy-in transactions if it were not being made worse off. That is, at arm's length, an intangible owner would negotiate payments from the transferee of such intangibles (e.g., cost-sharing plus buy-in payments) that were consistent with the returns based on ongoing royalties that the owner could expect to earn in the absence of the agreement. In such a comparison, the absolute payments expected by the owner need not be equivalent in both scenarios due to some shifting of risk, but there should be some consistency between the two figures.

One way to incorporate the only arm's length value typically available regarding a company and its intangible property—its market capitalization—is to consider acquisition studies and other publicly available metrics that determine the ratio of intangible value to market value for similar companies. In this context, the market values must be *geographically* adjusted, as described above. Companies' own purchase price allocation studies define the portion of the acquisition price made up of intangibles and in-process intangibles. Some of these targets may be similar to the company itself, otherwise there are numerous public filings of other potential benchmarks, some of which are seen below:

- American Airlines had a market capitalization of approximately $6.5 billion in October 1996. It then spun off a new company for its SABRE reservation system. SABRE's market capitalization was immediately $3.3 billion, or approximately half of the value of American Airlines.[14]
- In a thorough empirical study of 375 acquisitions, Deng & Lev (1998) found that 72 percent of the acquisition price was made up of in-process R&D for the median acquisition.[15]
- In-process intangibles (R&D) contributed 57 percent to IBM's $3.3 billion purchase of Lotus Development Corporation in 1995. A full 100 percent of the acquisition price was attributed to all intangibles.[16]

Not only are such estimates of intangible value publicly available across different industries, they are also perceived by investors to be credible indicators of value.[17]

A.9 SUMMARY

Cost-sharing buy-in valuation remains one of the primary topics of disagreement in the transfer pricing area. The commonly applied methods have theoretical backing, but are often misapplied, leading to dramatically differing results. With a full accounting for economic and financial theory, such methods can be applied properly and consistently, which should lead to more agreement between taxpayers and the Internal Revenue Service. In addition, the application of certain new methods—including foregone profits and the acquisition study approaches—may provide economists with further arm's length benchmarks from which to make their valuation determinations.

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[14] Case study prepared in 1998 by Professor Bruce Weber, Baruch College, City University of New York.

[15] Zhen Deng, and Baruch Lev, "'Flash then Flush': The Valuation of Acquired R&D—in-Process," Working Paper, New York University, Stern School of Business, 1998, p. 11.

[16] IBM, 1995 *Form 10-K*.

[17] Zhen Deng, and Baruch Lev, "'Flash then Flush': The Valuation of Acquired R&D—in-Process," Working Paper, New York University, Stern School of Business, 1998, p. 24.