

Introduction to technology valuation

Chris Moody, 28th January 2011

Valuation

- “... .it is the sign of an educated mind *not* to expect more certainty from a subject than it can possibly provide ...”
- ***Aristotle...***”

Valuation is a combination of exact science and inexact assumptions

“Price is what you pay

Value is what you get”

Warren Buffett

Actual value is determined by the execution of a transaction and realization of cash

Value will be different for the buyer and the seller but the price will be the same

The transaction occurs on signing an agreement

The realization of cash may occur now and in the future

Six Methods of Technology Valuation and Pricing

Industry Standards (Benchmarking)	Evaluate comparable agreements with published financials
Rating and Ranking	Select a series of rating criteria and allocate a scoring and weighting system
Rules of Thumb	Generalisations from previous practice eg 25% rule
DCF (Discounted Cash Flow)	Valuing future cash flows and adjusting for project risk
Real Options Analysis (Harvard Business Review, T. Luehrman)	Evaluates each investment based on contingent outcomes
Auction	Testing the market for a specific opportunity

The background of the slide is a dark blue field filled with glowing fiber optic lines and bokeh light effects. The lines are thin and radiate from various points, creating a sense of depth and connectivity. The bokeh consists of soft, out-of-focus circles of light in shades of blue and white.

Benchmarking and Industry Standards

Benchmarking – comparison with similar deals

- Benchmarking
 - Historical transactions
 - Use of widely accepted standard industry rates
 - Isis database
 - Isis colleagues
 - Other tech transfer companies
 - Public information – usually relates to later stage technologies
- Advantages
 - Useful to be able to point to precedents, particularly if public
- Disadvantages
 - Often very difficult to find good precedents, in terms of both type of technology and stage of development

Benchmarking standards

Market comparable approach	Historical transactions on a case by case basis
Paradigm Licensing rates	Use of widely accepted standard rates and terms
Rating or ranking Several criteria, may use non-financial measures	Historic agreements using systematic comparisons

Typical pharma royalties for different stages of development

• Stage of Development	% Royalty range
• Pre-clinical	0 - 5
• Phase I	5 -10
• Phase II	8 - 15
• Phase III	10 – 20
• Launched products	20+

from Medius Assoc

Rating and Ranking

Ranking Decision Table

Criteria	Sore(1-5)	Weight (1-3)	Weighted Score
Market Size	3	2	6
Product Margins	5	3	15
IP Strength	3	2	6
IP breadth	2	3	6
Stage of development	5	3	15
External Environment	1	1	2

“Rules of Thumb”

Rules of Thumb

- 25% rule (25% to seller/75% to buyer)
- Of added value eg cost savings or sales increase

Income Approach and 25% Rule

- 25% Rule = The licensee pays a royalty rate equivalent to 25% of its expected operating profits (EBIT Earnings Before Interest and Taxes) OR 25% of Gross Revenue for the product that incorporates the IP
- E.g. Company X licenses Company Y's IP and develops Product A, which will use this IP.
- - Product A will sell for £200 per unit, with Company X making £40 operating profit on each unit at full manufacturing scale-up.
- - Using the 25% rule, the royalty that should be payable to Company Y is calculated at 25% of $(40/200) = 5\%$

- Advantages:
 - Relatively simple
 - Fits with industry data when empirically assessed
- Disadvantages:
 - Requires knowledge of expected operating profit – a potential licensee may or may not provide this.

Net Present Value & Discounted Cash Flow Analysis

Basics of Discounted Cash Flow (DCF)

Which would you prefer, £100 now or £100 in one years time?

Hopefully you would prefer £100 now!

Why?

£100 today can be invested now to earn a return, making it more valuable in the future

Basics of Discounted Cash Flow (DCF)

Assume the interest rate is 10% per year

The £100 can therefore be invested now at 10%

In one years time therefore, the £100 is worth:

$$£100 + (£100 * 10\%) = £110$$

The future value (FV) of the £100 in 1 year is therefore £110

$$\begin{array}{ccccccc} \text{Present Value (PV)} & * & (1 + \text{Interest Rate}) & = & \text{Future Value} \\ \text{PV} & * & (1 + r) & = & \text{FV} \end{array}$$

Basics of Discounted Cash Flow (DCF)

Consider now that you are to receive £110 in one years time.

What is the Present Value (PV) of this £110?

Given:

$$PV * (1 + r) = FV$$

Then:

$$FV / (1 + r) = PV$$

Therefore, the Present Value of the £110 is:

$$£110 / (1 + 10\%) = £100$$

Basics of Discounted Cash Flow (DCF)

An investor is therefore indifferent between receiving:

- £100 today (t_0)
- £110 in one years time (t_1)
- These two amounts have the same value today given an interest rate (r) of 10%

Basics of Discounted Cash Flow (DCF)

Now invest the £100 available today (t_0) for two years

How much is £100 worth at the end of year 2 (t_2)

Over the first year:

$$£100 * (1 + 10\%) = £110$$

$$PV * (1 + r) = FV_{t_1}$$

Over the second year:

$$£110 * (1 + 10\%) = £121$$

$$FV_{t_1} * (1 + r) = FV_{t_2}$$

Combining the two years together:

$$£100 * (1 + 10\%) * (1 + 10\%) = £121$$

$$PV * (1 + r)^2 = FV_{t_2}$$

Basics of Discounted Cash Flow (DCF)

Given:

$$PV * (1 + r)^2 = FV_{t2}$$

Then:

$$FV_{t2} / (1 + r)^2 = PV$$

Therefore, the present value of cash received at Time n :

$$PV_{t0} = FV_{tn} / (1 + r)^n$$

We can now therefore state the value today of cash received in the future

Basics of Discounted Cash Flow (DCF)

Valuation of a series of cash flows

Year	1	2	3	4	5
Cash flow	100	120	140	160	180

We can now state the present value of each cash flow using

$$PV_{t0} = FV_{tn} / (1 + r)^n$$

Year	1	2	3	4	5
Cash flow	100	120	140	160	180
Present Value	91	99	105	109	112

Basics of Discounted Cash Flow (DCF)

Year	1	2	3	4	5
Cash flow	100	120	140	160	180
Present Value	91	99	105	109	112

The PV of the time series is therefore the sum of the individual PV

$$\begin{aligned} \text{PV} &= 91 + 99 + 105 + 109 + 112 \\ &= 516 \end{aligned}$$

Adjusting for Risk

- It is important to adjust expected revenues by a risk factor, which can be tied to the stage of development. According to the Milken Inst and CMR Intl, typical probabilities of a small molecule pharmaceutical product reaching the market are:

- **Development stage Probability of success**

- Preclinical 10%
- Phase I 25%
- Phase II 35%
- Phase III 72%
- Regulatory submission 81%

- (From Milken Inst)

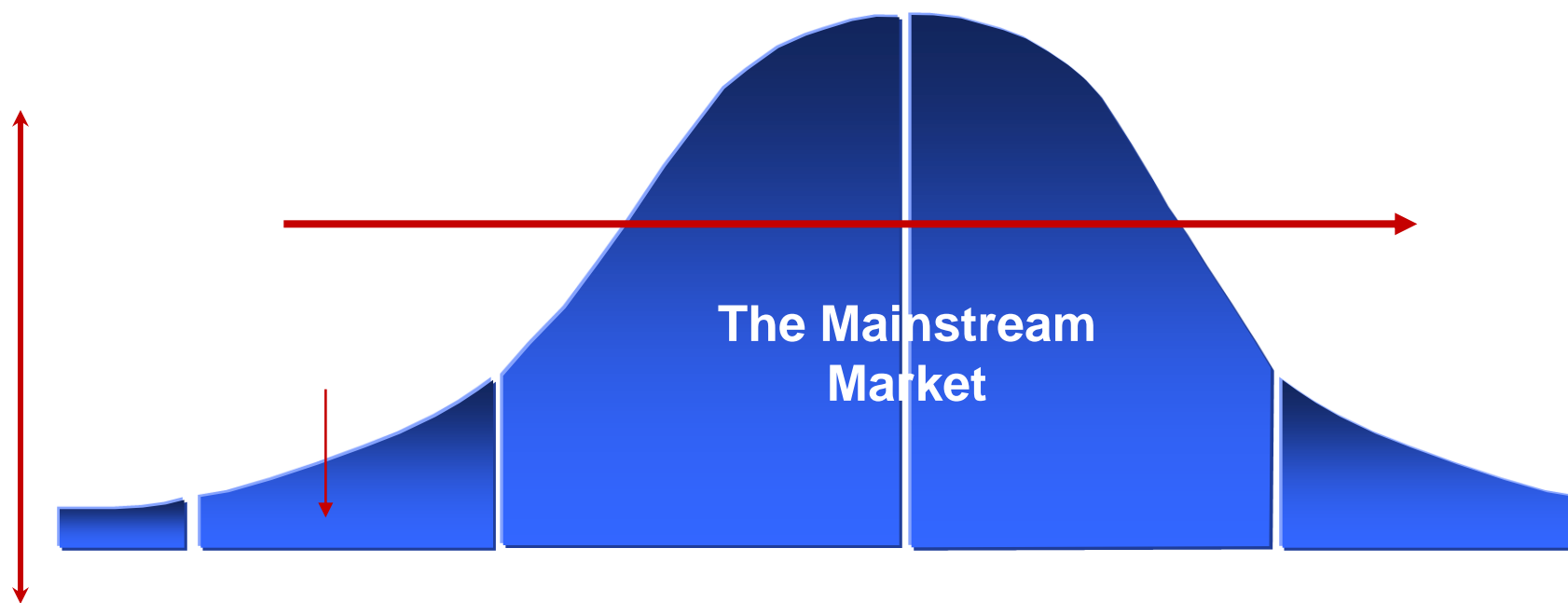
Discounted Cash Flow

- Advantages
 - Much more sophisticated technique which allows adjustment of discrete assumptions and refinement of model to reflect negotiations
- Disadvantages
 - Relies on reasonably accurate estimates for future costs and revenues, which can be very difficult to predict for an early stage technology, especially those which will form one part of a larger whole in terms of IP.
 - Not straightforward to generate licence terms from NPV
 - Assumes that all the cash flows will occur
 - Real options analysis is arguably more fit for purpose when valuing higher risk investment opportunities

Concepts of Value

Technology Adoption Life-Cycle

To determine the value of any technology, it is critical to assess the pattern of adoption by understanding the technology adoption life cycle



Extracting Value – knowing where the value lies with the Licensee

Licensee

Intrinsic
Value

Synergistic
Value

Strategic
Value

Strategic benefits such as achieving industry leadership, securing supplies, eliminate competitions, etc.

Extracting Value – knowing where the value lies with the Licensee

Licensee

Intrinsic Value

- Improve sales – eg. better products
- Reduce cost – eg. more efficient process
- Improve productivity – eg utilisation

Synergistic Value

- Enter new markets
- Introduce new products/services
- Develop new technologies

Strategic Value

- Forward or backward integration
- Minimise potential risk of infringement
- Block competitors

Building a portfolio of technologies

Conclusion

- Know the technology and the stage of development
- Funding requirements
- Ascertain technical merits
- Assess market readiness
- Estimate the value of the technology
- Quantify the value as much as possible from the Licensee's perspective
- Focus on the positive – win/win arrangement

Valuation of Technology Exercise

- Working in groups:
 - Read the description of the technology and opportunity
 - The market for this technology is hospitals, clinics and national healthcare systems
 - List five issues or features that Increase the value of the technology
 - List five issues or characteristics that Decrease the value of the technology
 - List the three most important pieces of information that you would need to make a better determination of the value