



 **avance**

Turning options into decisions



Goals

1. Understand the financial drivers of a deal
2. Use valuation as a support in negotiation



Agenda

- Deal Structures
- Deal Valuation and Deal Metrics
- Interpretation of Deals

What we dream of



Press release Dec 19, 2006:

Upfront of £ 52 million, and GSK will invest £ 183 million to purchase shares of Genmab.

The **total potential value** of this agreement, in the event of full commercial success, in cancer and various autoimmune and inflammatory diseases, **could exceed £ 1.1 billion**, including the initial license fee and equity purchase, **milestone payments, totaling £ 0.8 billion** and expected development, commercial manufacturing and commercialization costs.

In addition, Genmab will be entitled to receive tiered **double digit royalties** on global sales of HuMax-CD20.

Back in 2006: 1GBP=2USD

Licensing in Pharma/Biotech

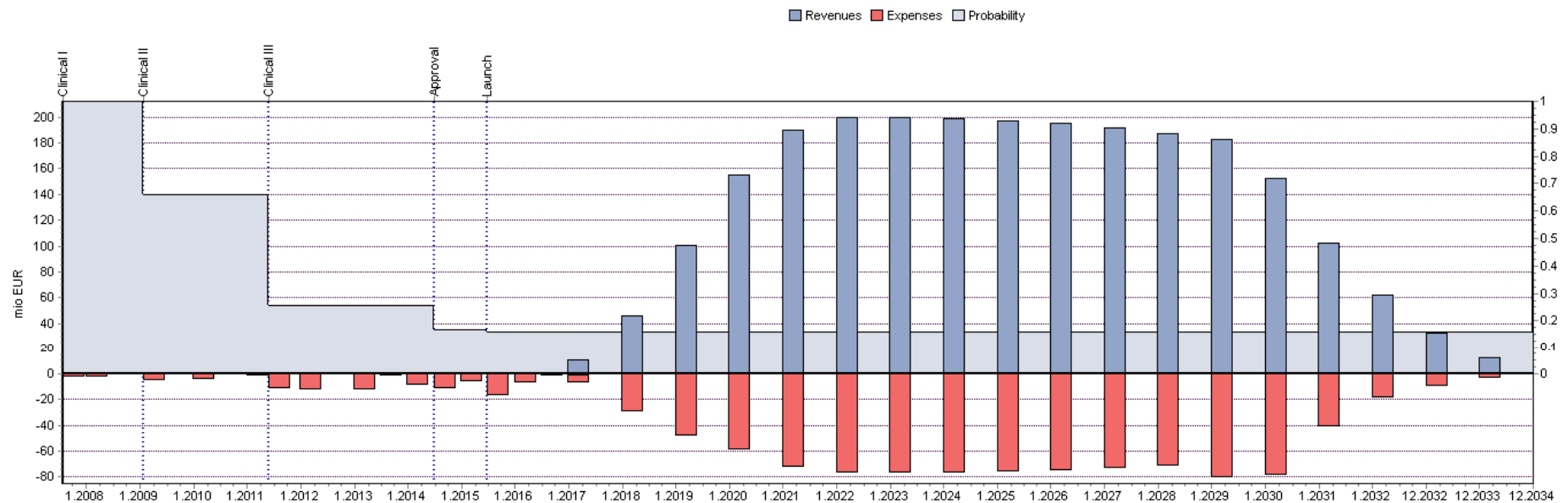


- Biotech: Access to resources
 - Non-dilutive capital
 - Marketing know-how and sales network
 - Production know-how and facilities
 - Development know-how
- Pharma: Access to innovative products
- Risk management
 - Securitisation
 - Diversification

Licence Contracts - Valuation



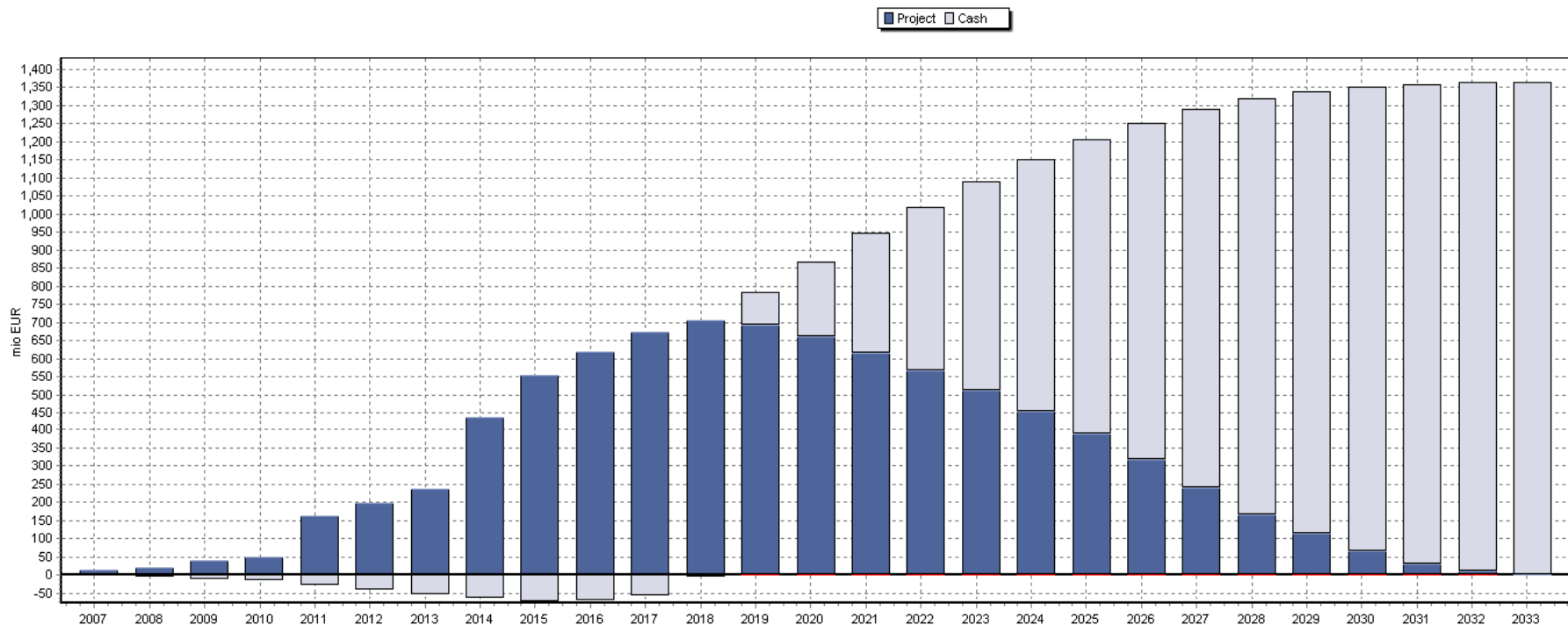
If the project is self-conducted, then we have large costs in the beginning.



Licence Contracts - Valuation



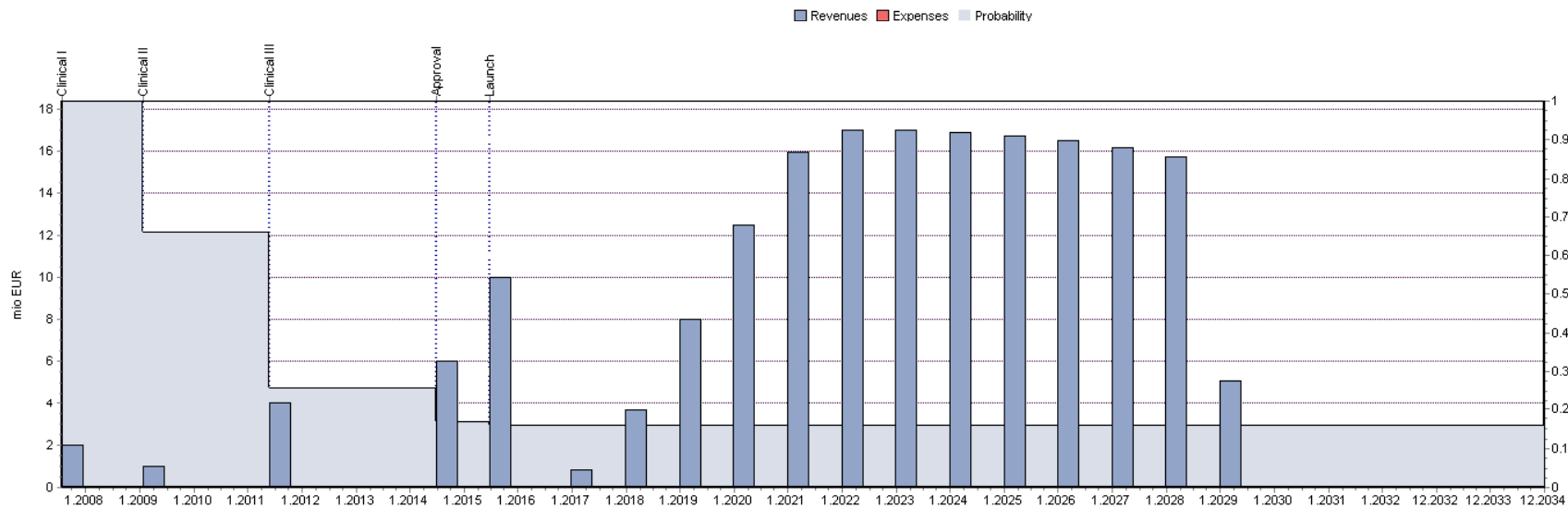
The company has to invest before revenues arrive.



Licence Contracts - Valuation



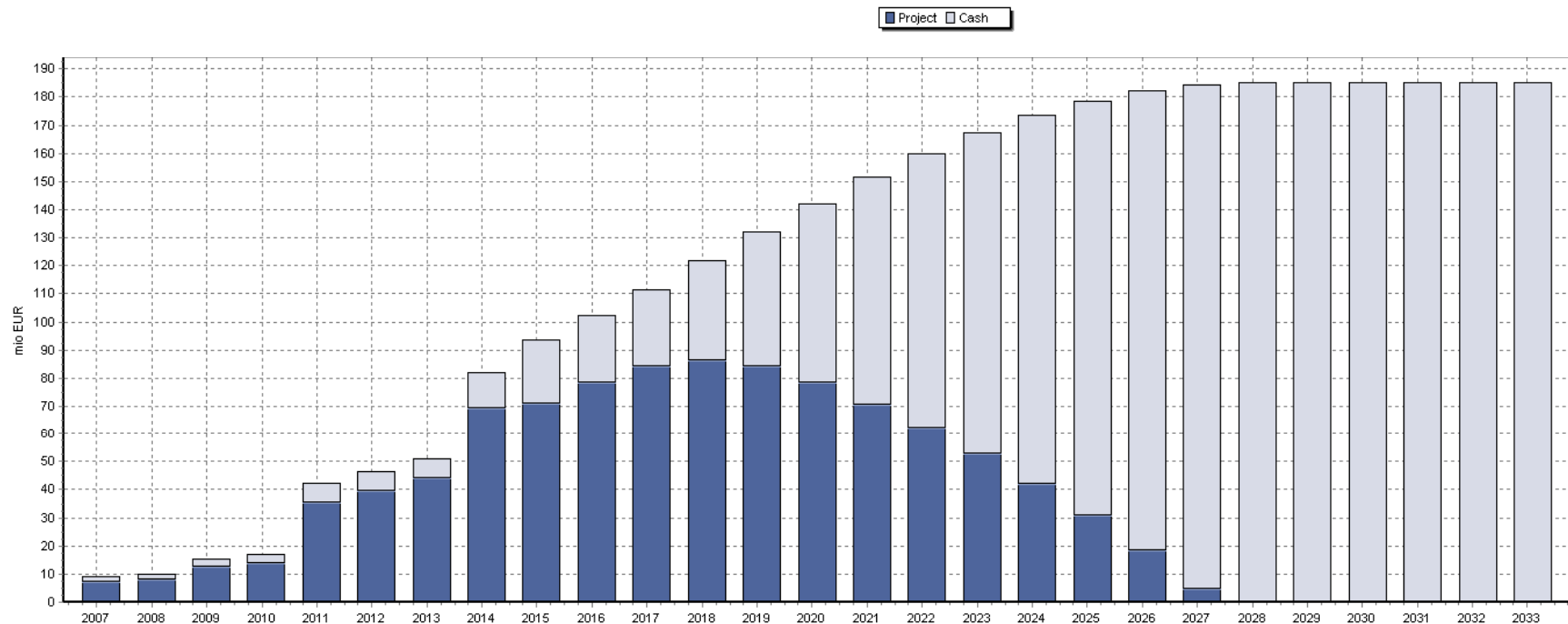
With a license contract, biotech starts making revenues.



Licence Contracts - Valuation



Part of the value is securitised before commercialisation.



Licence Contracts - Payments



	Attrition Risk	Market Risk
Upfront		
Milestones	x	
Royalties	x	x
Sales Milestones	x	(x)

Deal Terms



Upfront

- Cash
- Shares of licensee
- Equity investment

Milestones

- When reaching a defined goal

Royalties

- % of net sales
- Minimum-maximum
- Barriers
- Early royalty scheme
- Anti-stacking

Licence Contracts - Structure



- Straight license
- Co-development
- R&D Funding with option to step in
- Co-marketing/Co-promotion

Special Clauses



Sublicensing

- Facilitates ongoing development
- Licensor participates in upside

Right of first look

- Licensee keeps a foot in the door
- Often linked to
 - Option fee
 - R&D funding
 - Later redemption of costs

Call-back options

Nature of licensing



REGENERON



Press release Nov 28, 2007:

\$85 million upfront payment to Regeneron and **up to \$475 million of funding** for identifying and validating potential drug discovery targets and developing fully human therapeutic antibodies against such targets (the “Discovery Program”) over the next five years.

The parties will **equally share profits** from sales **within the United States** and will share profits outside the United States on a sliding scale based on sales starting at 65% (Sanofi)/35% (Regeneron) and ending at 55% (Sanofi)/45% (Regeneron). The parties have also agreed to **share losses** associated with commercialization. In addition to profit sharing, Regeneron is entitled to receive **up to \$250 million in sales milestone payments**, with milestone payments commencing after aggregate annual sales outside the United States exceed \$1 billion on a rolling twelve month basis.

Regeneron has agreed to sell to Sanofi 12,000,000 shares of its Common Stock, par value \$0.001 per share (the “Common Stock”), at an aggregate cash price of **\$312 million**.



Quality of Deal vs. Success



A good deal does not necessarily lead to successful future.

May 2008:

License Deal between **Myriad** and **Lundbeck** for EU rights of **phase 3** product tarenflurbil in **Alzheimer's** disease:

Upfront **100 m\$** + MP > **250 m\$** + Commercial MP + escalating royalties of **20%-39%**.

One month after deal: Trial halted!





Agenda

- Deal Structures
- Deal Valuation and Deal Metrics
- Interpretation of Deals

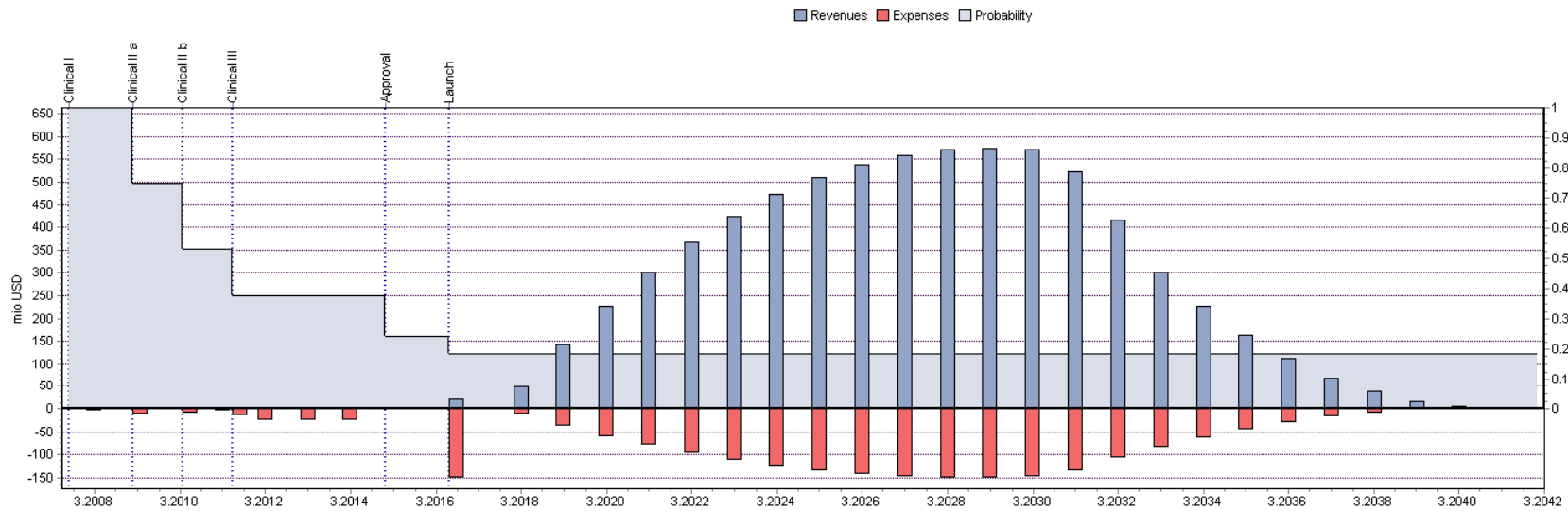


« We have raised EUR 30 mio over the past three years,
therefore the company value is at least EUR 30 mio »
CEO

Value



The value of a project/license is determined by its cash flows.



Cash Flows – Value



Cash flows are defined by

- Size (and sign)
- Time
- Probability

The value is sensitive to these three properties.

DCF – Discounted Cash Flows



$$NPV = \sum CF_t (1 + \text{discount})^{-t}$$

Σ : Sum

CF: Cash flow

t: Time

DCF – Success Rates



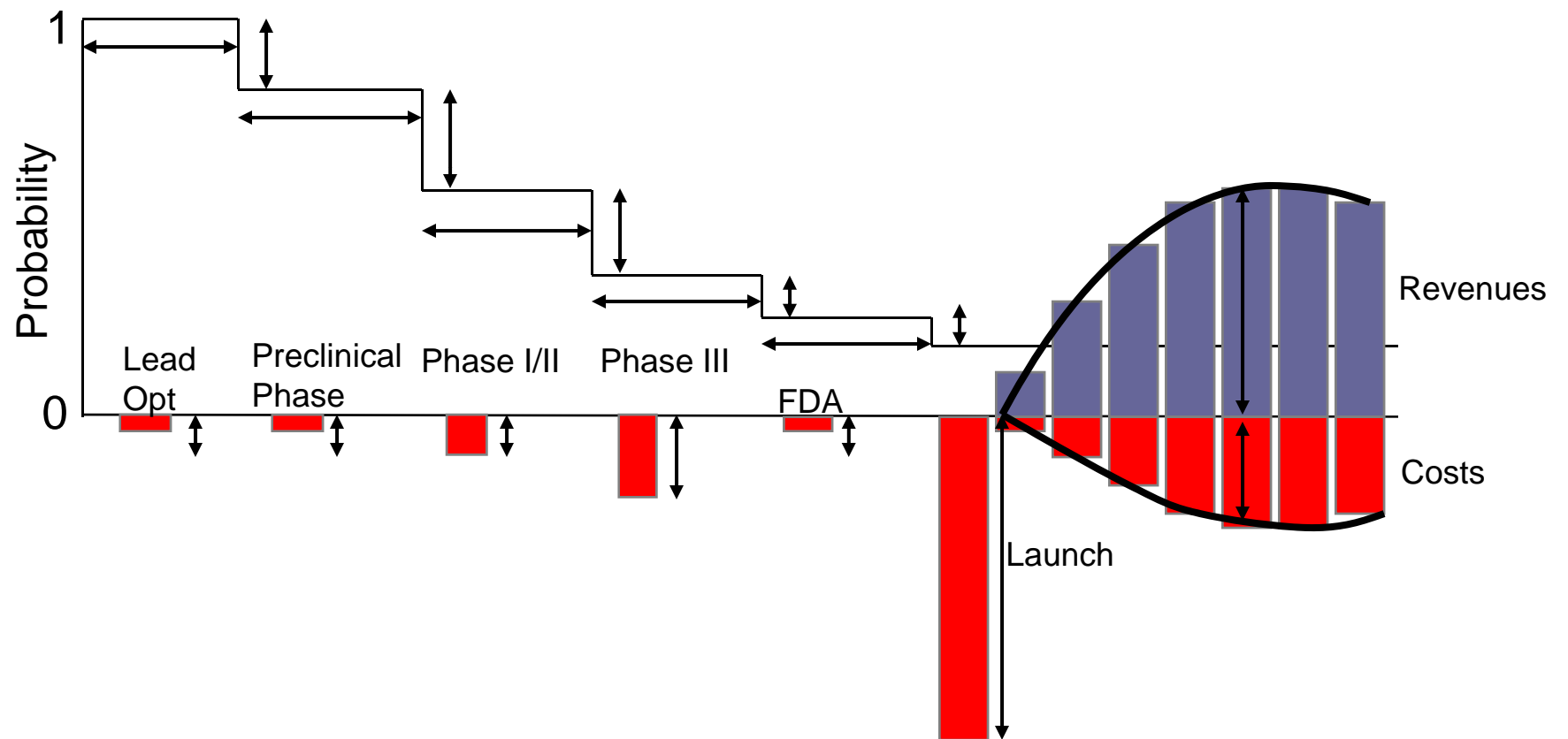
- Some cash flows are uncertain
- The probability is given by the success rates

Example:

- Head: 2 \$, Tail: 0 \$.
- On average we receive 1 \$.
 - We multiply the results with their probability.
 - Risk aversion is not yet considered, this is done by means of the discount rate.

→ Multiply all cash flows with their probability

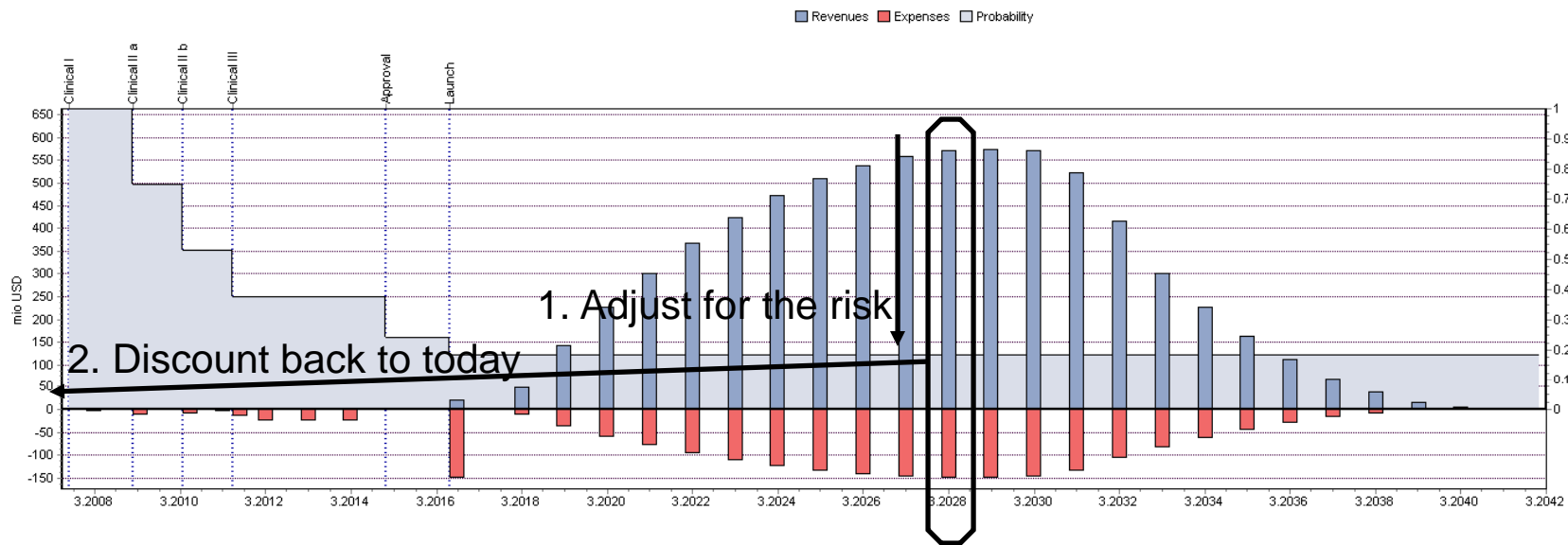
Input Parameters



Value of a Drug Development Project



The value is the sum of all risk adjusted discounted cash flows.

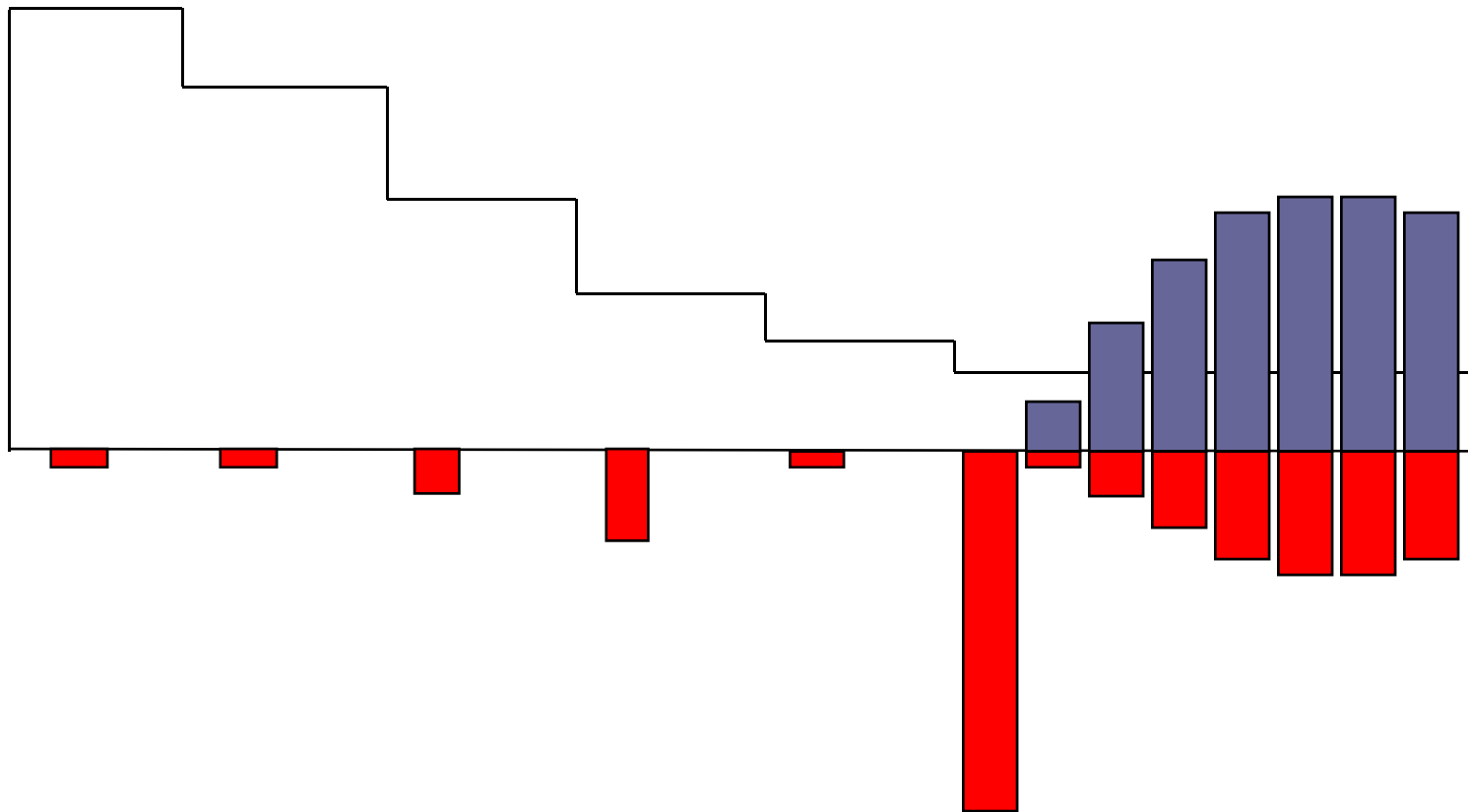


3. Sum all adjusted cash flows

Value of a Drug Development Project



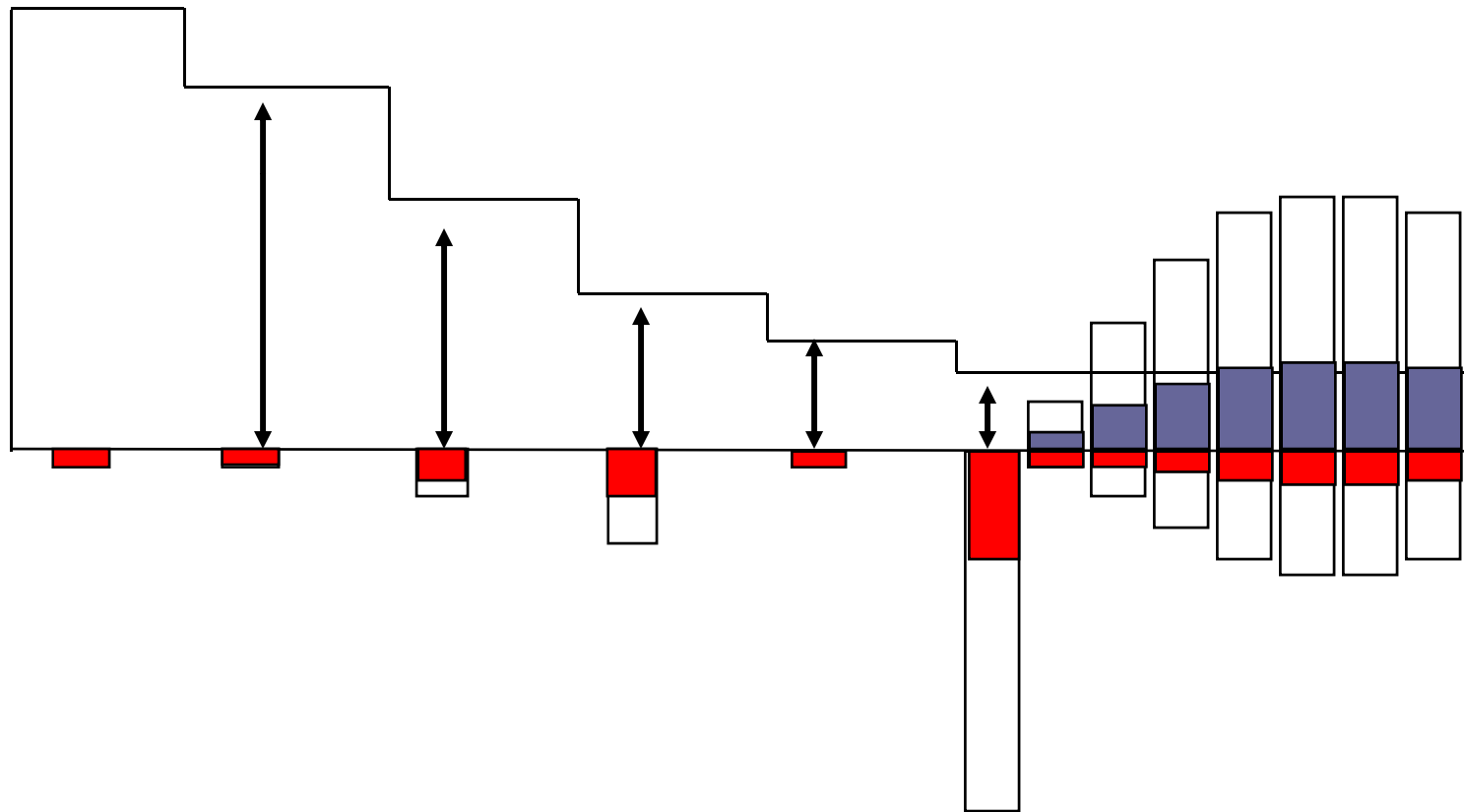
Sum of all risk adjusted discounted **cash flows**.



Value of a Drug Development Project



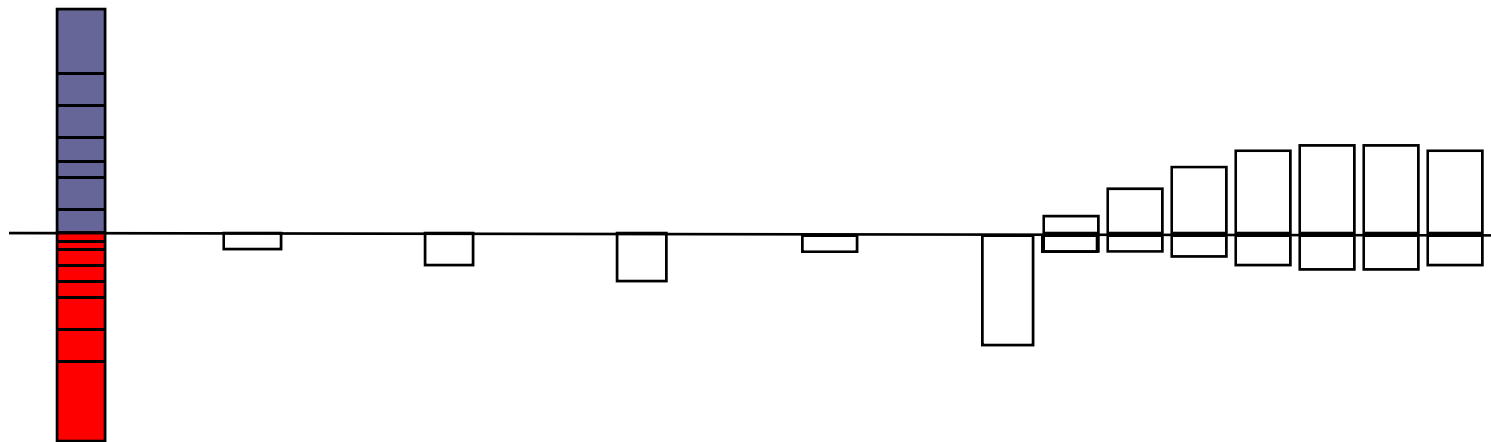
Sum of all **risk adjusted** discounted cash flows.



Value of a Drug Development Project



Sum of all risk adjusted **discounted** cash flows.



Value of a Drug Development Project



Sum of all risk adjusted discounted cash flows.





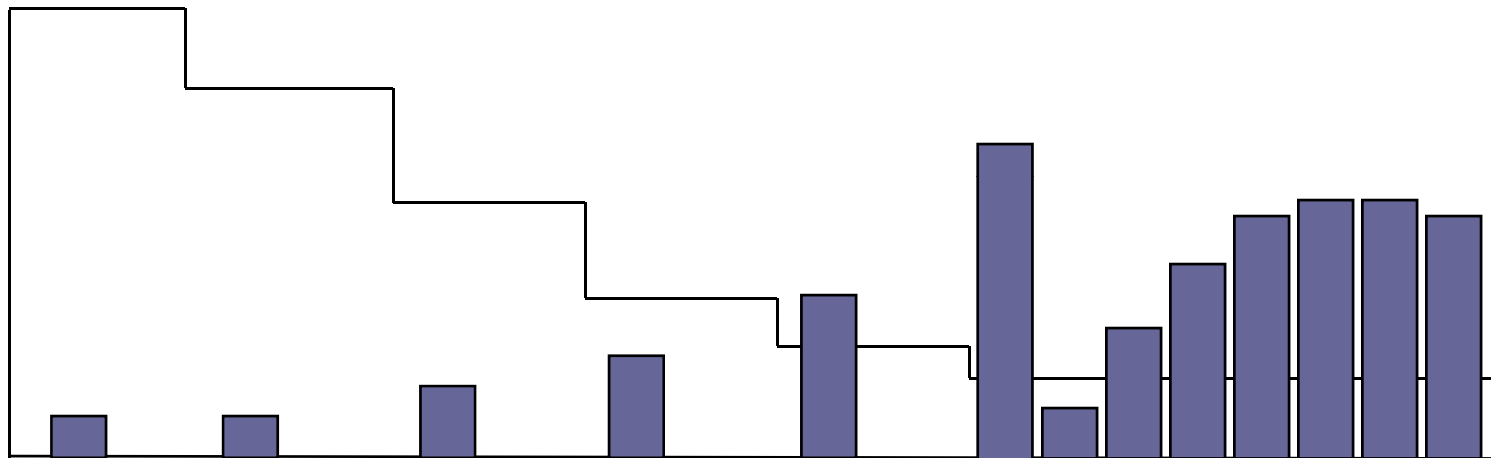
« They have closed a USD 300 Mio deal. So they are worth at least USD 300 Mio. »

Analyst

Value of a License Contract



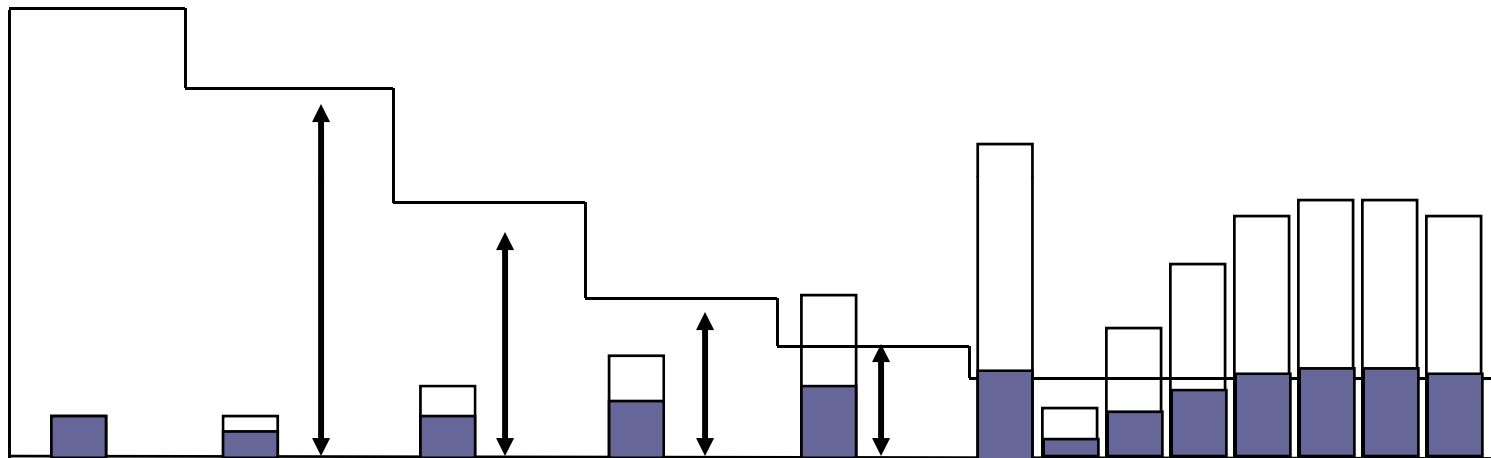
Sum of all risk adjusted discounted **cash flows**.



Value of a Drug Development Project



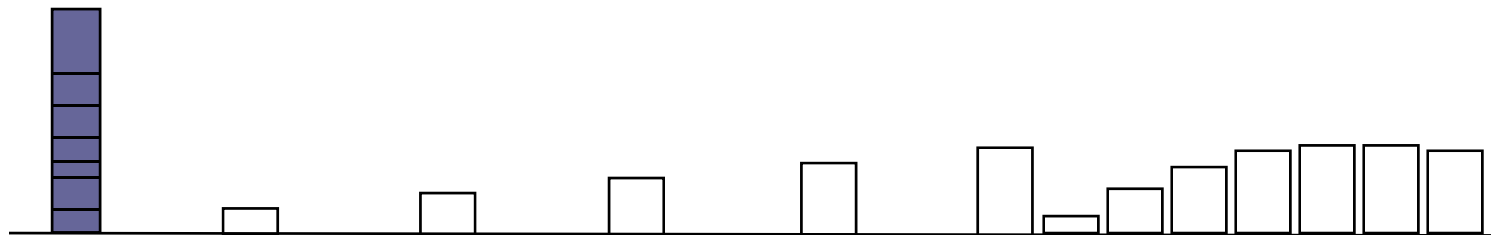
Sum of all **risk adjusted** discounted cash flows.



Value of a Drug Development Project



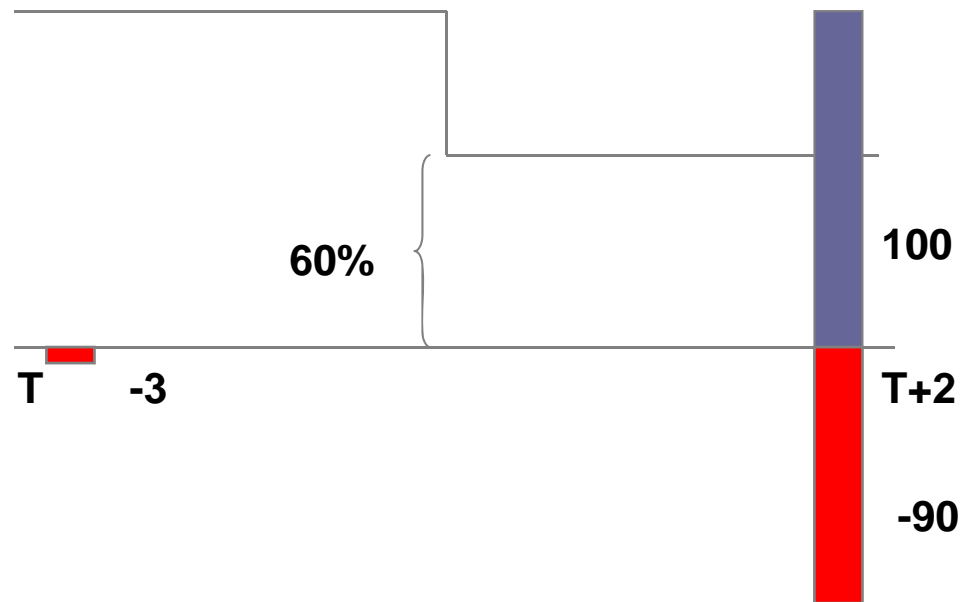
Sum of all risk adjusted **discounted** cash flows.



DCF - Example



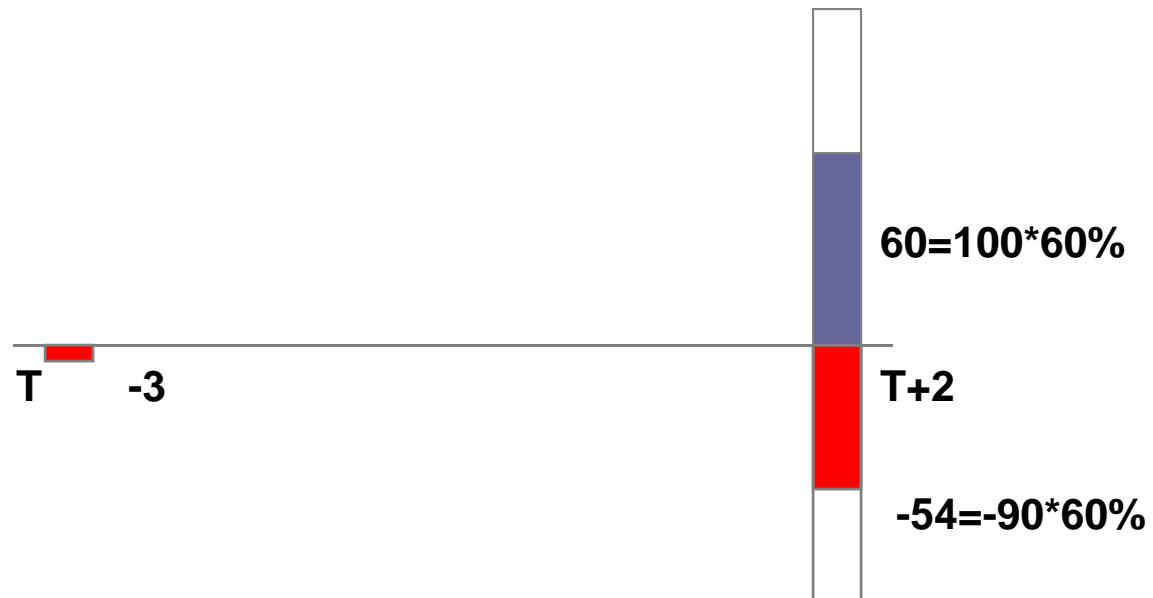
risk-adjusted net present value:



DCF - Example



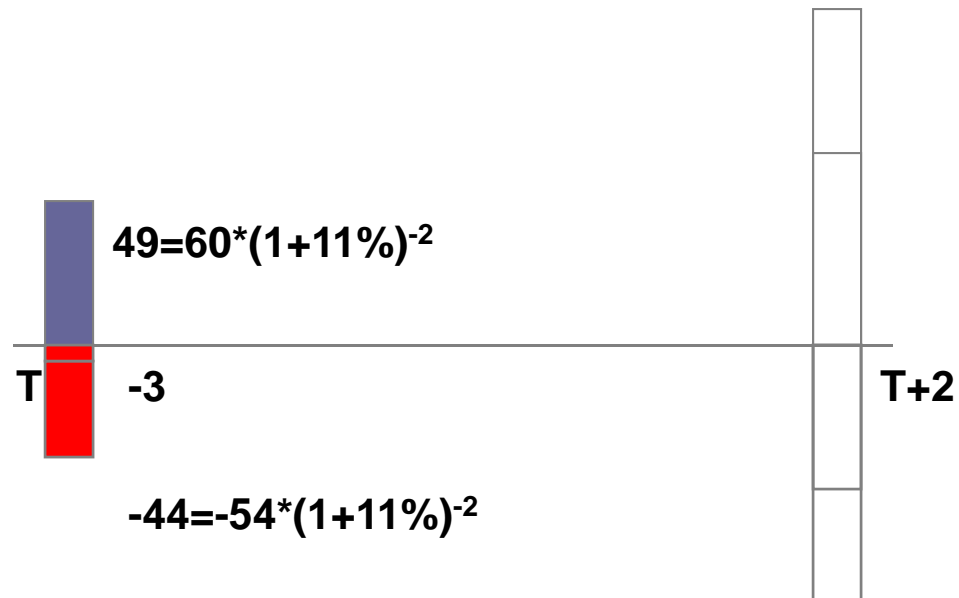
risk adjusted net present value:



DCF - Example



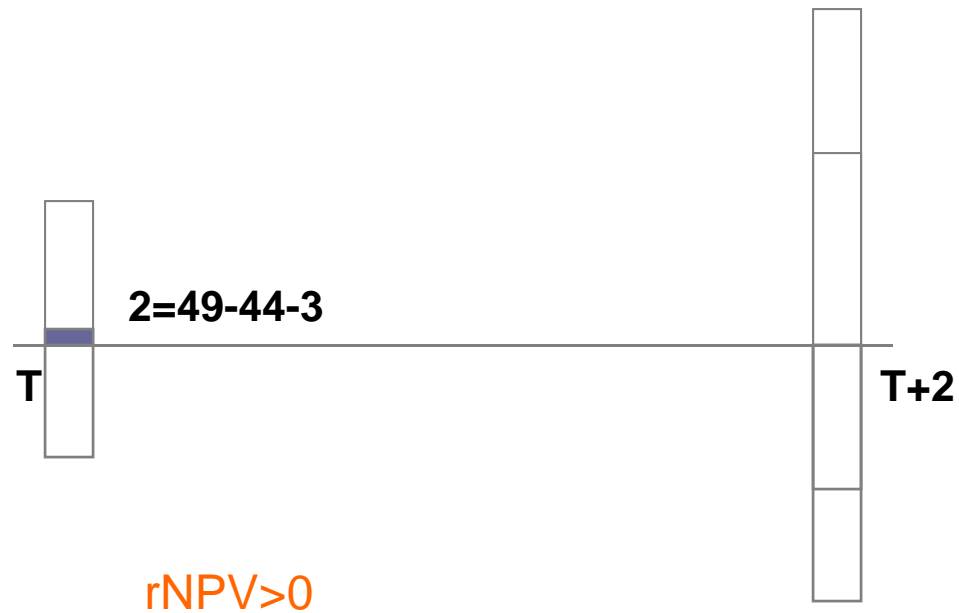
risk adjusted net present value:



DCF - Example



risk adjusted **net** present value:



Valuation Methods



- rNPV (or eNPV)
- Decision Tree
- IRR
- Payback Method
- Comparables
- Real Options

Recent license contracts



Analysis of 22 license contracts:

- Discovery or preclinical
- Different disease categories
- NCEs and NBEs
- Including all clauses (R&D funding, co-development...)
- Valuation with ri:val®
- rNPV with discount rate of 12%

Licence Contracts - Financial Criteria



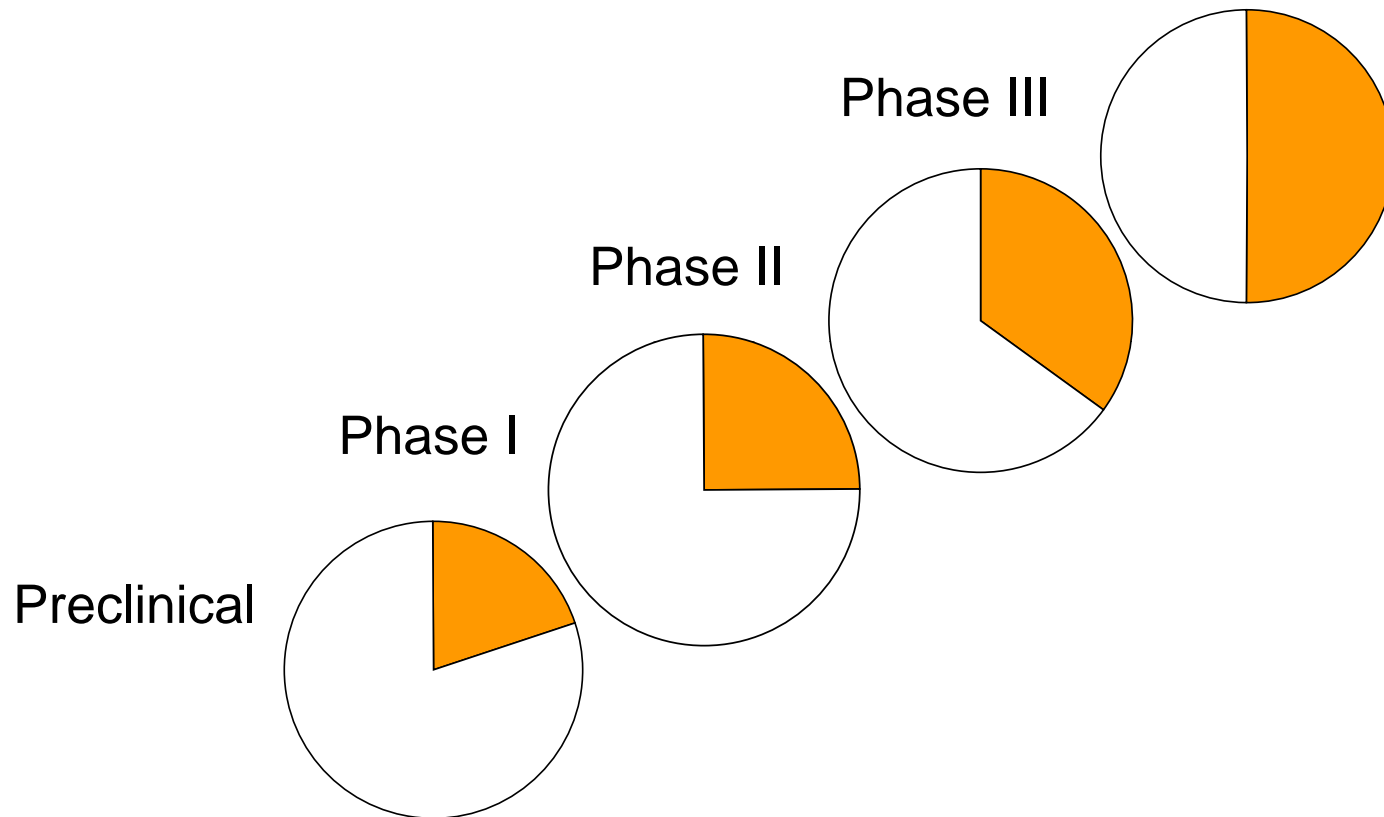
(Mio US\$)	Discovery	Preclinical
Upfront	0.9 (0.0-5.5)	1.9 (0.1-10.0)
Milestones	55.2 (0.5-260)	63.5 (1-300)
Royalties	4.7% (0%-14%)	5.9% (2%-14%)

Licence Contracts - Performance



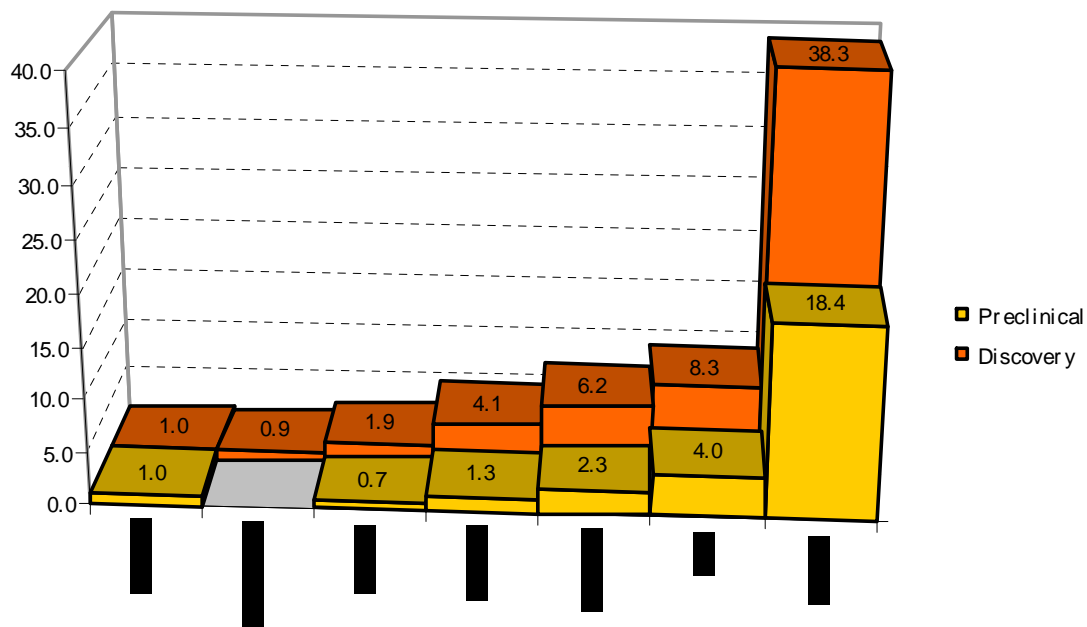
	Discovery	Preclinical
Total Value	US\$ 40.5 Mio	US\$ 55.1 Mio
ROI	20.5%	20.8%
Value Split	17.6% - 82.4%	20.1% - 79.9%

Licence Contracts – Value Share Principle



Biotech
Pharma

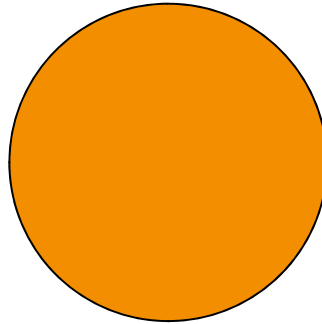
Licence Contracts - Weights



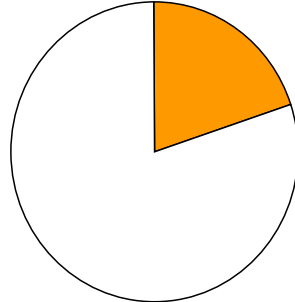
Value Share Principle



At the beginning biotech owns 100% of project.



After licensing it to pharma it owns just a share.

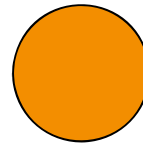


Why should it give away all the rest?

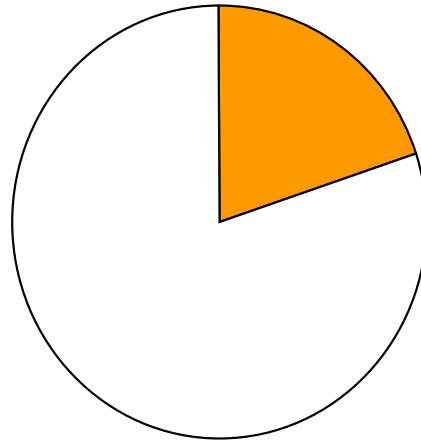
Value Share Principle



Biotech's pie.



Pharma's pie



Value share principle fails to explain the economic rationale of licensing.



A license contract corresponds to a sale of a project:

- Biotech has one project less
- Pharma has one project more
- Pharma pays biotech for project

The transaction payments are staged:

- Information asymmetry
- Biotech wants to keep an upside

Virtual Company



Assume that Biotech forms a company with the project as the only asset: DRUG Inc.

- Biotech is the sole shareholder
- Biotech wants to sell this company
- Pharma wants to buy this company

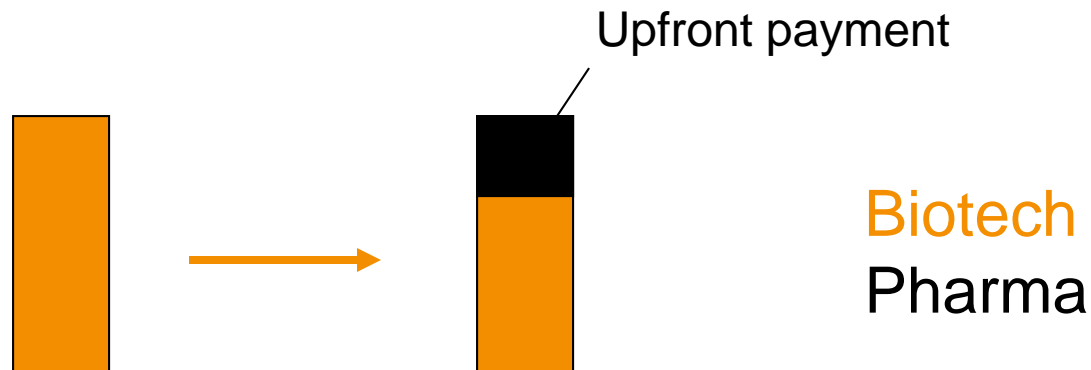
At the end Pharma should acquire 100% of DRUG Inc.

Virtual Company



Pharma's acquisition of DRUG Inc. starts with an upfront payment.

Biotech sells shares of DRUG Inc. to Pharma equivalent to the upfront payment.

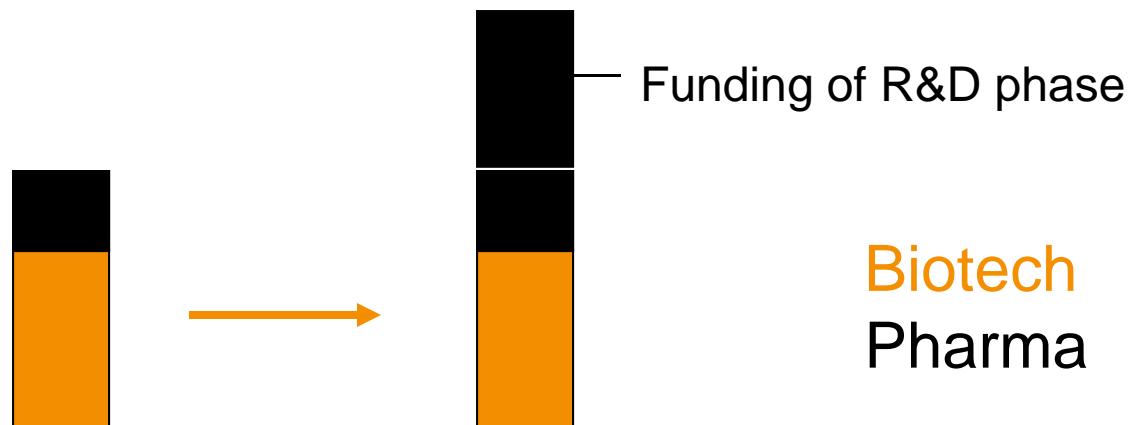


Virtual Company



The project has to be developed further.
Therefore DRUG Inc. needs funding.

Pharma provides funding and dilutes Biotech.

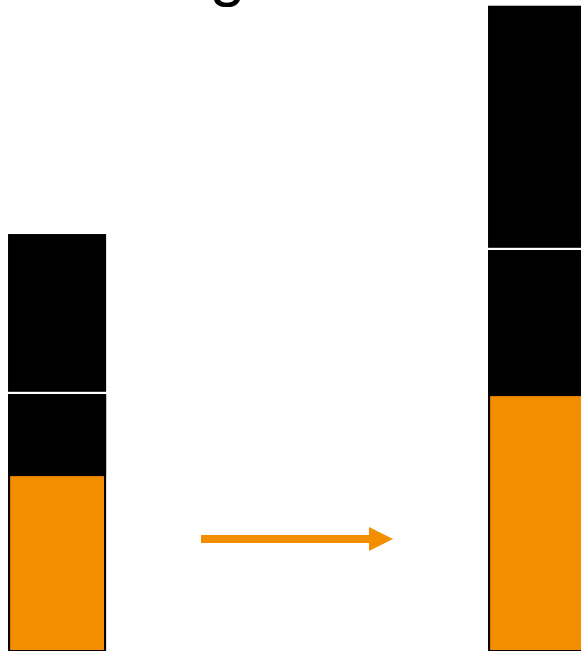


Virtual Company



When a phase is completed successfully then
The value of DRUG Inc. increases.

Shareholdings remain the same.



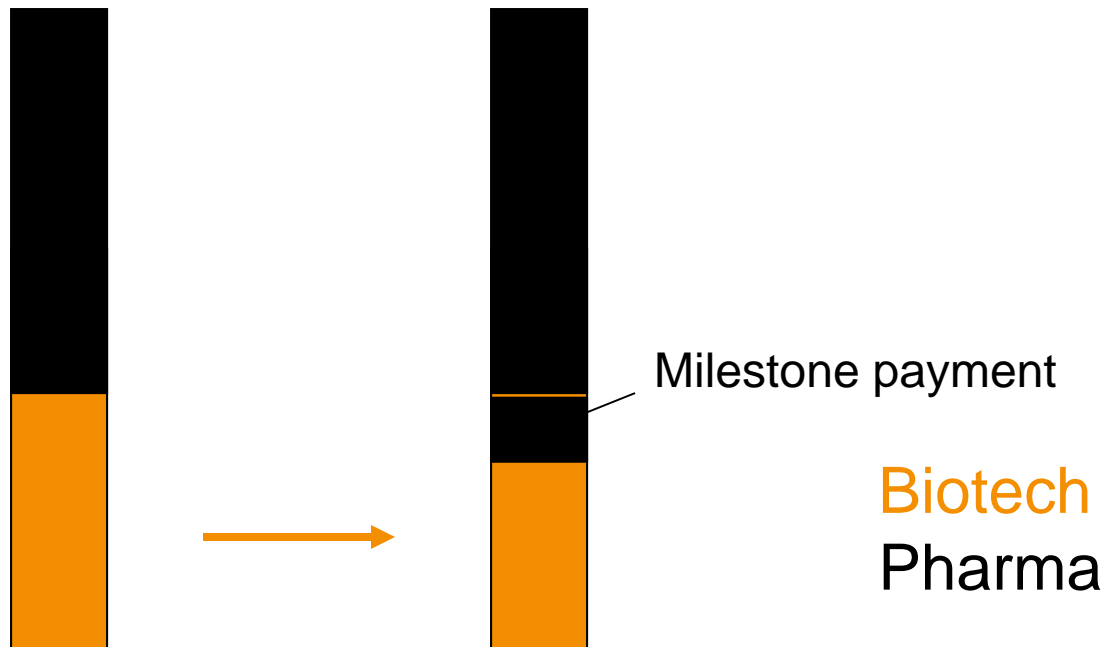
Biotech
Pharma

Virtual Company



Before starting the next R&D phase Pharma purchases another share package from Biotech (milestone payment).

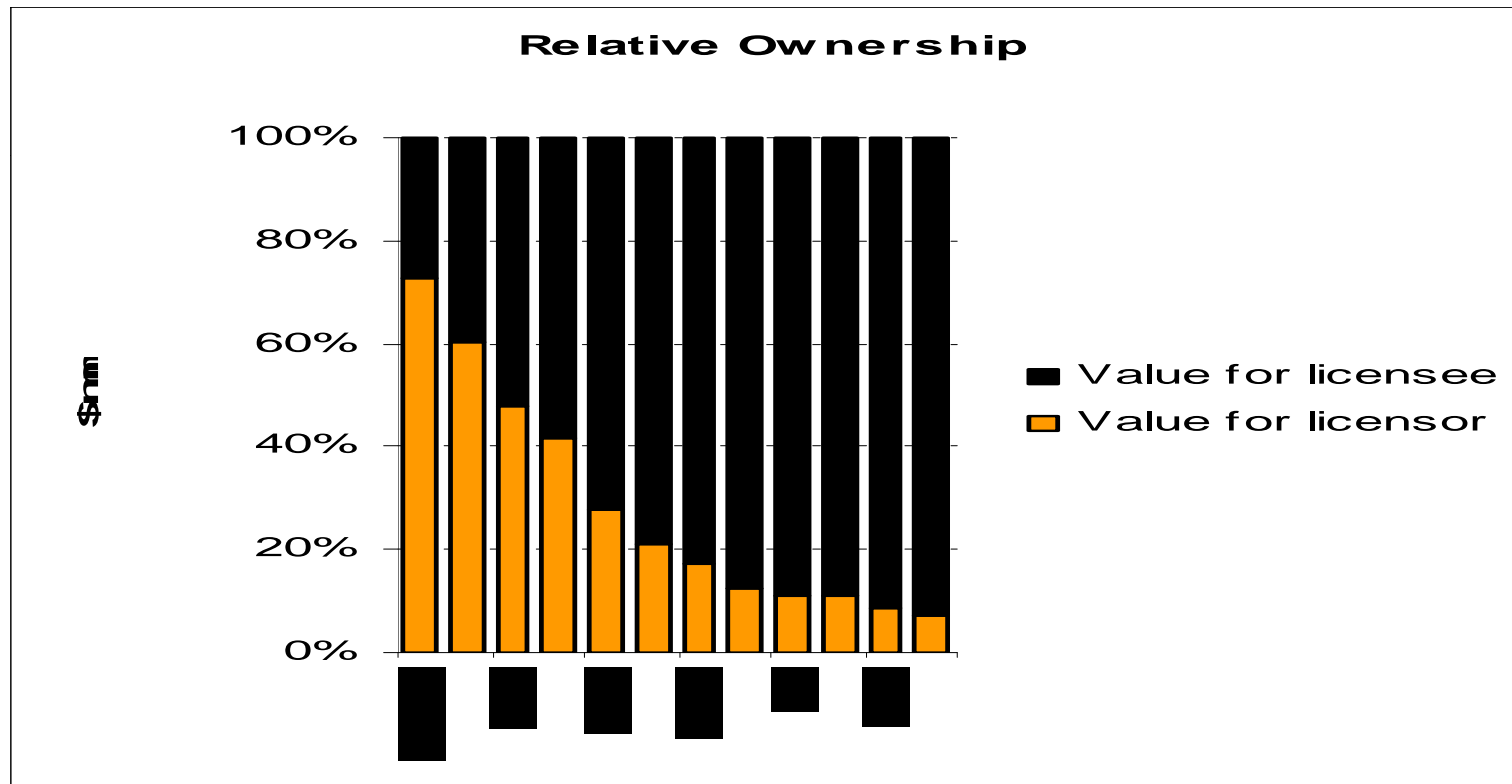
The shares have become more valuable now.



Virtual Company



Pharma gains continuously shares in DRUG Inc.



Virtual Company



Pharma continues increasing its stake in DRUG Inc. by

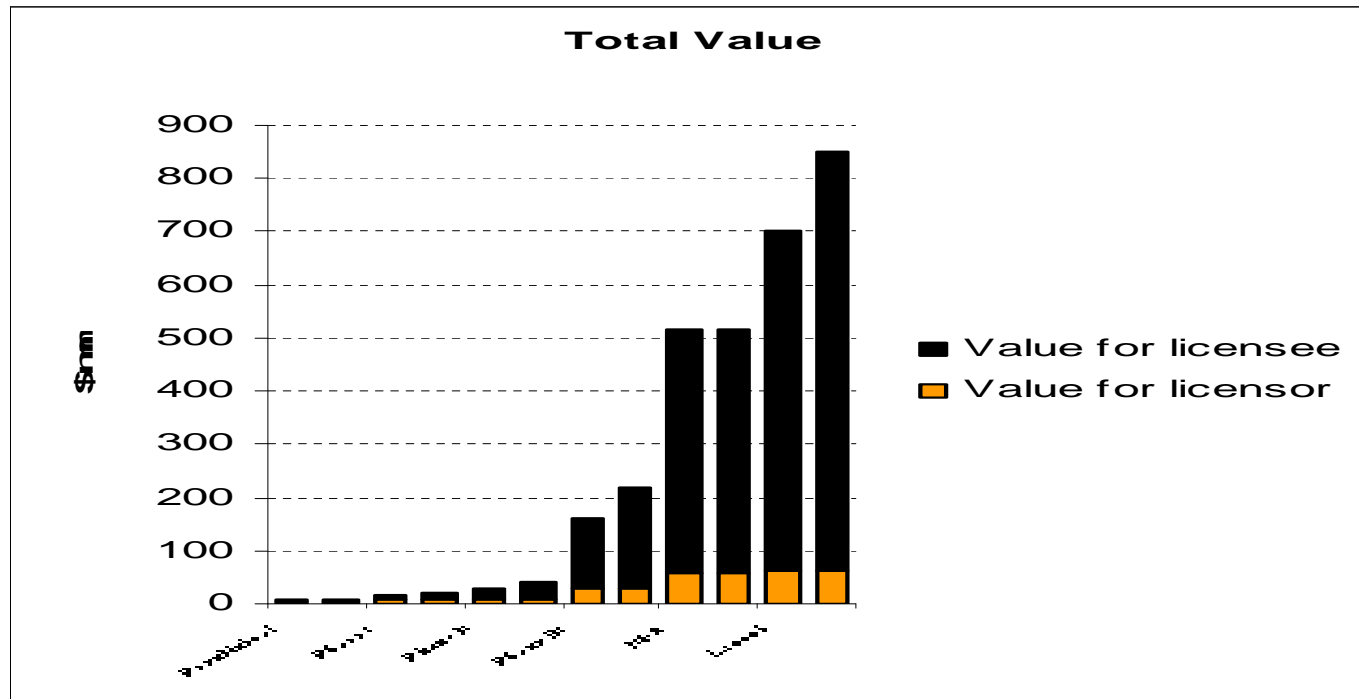
- Purchasing shares from Biotech (milestone payments)
- Funding development (diluting biotech)

When the product is launched Biotech is left with a small stake in DRUG Inc..

Virtual Company



Although the stake might be small, the value is relatively large – it is a share in an approved product.





DRUG Inc. now starts making profits.

These profits are paid out to the shareholders as dividends.

Hence the royalties correspond to these dividends.

Virtual Company



- Biotech receives the full value of the project
- Biotech and Pharma have to agree on parameters
 - Discount = IRR for Pharma
 - Discount can be chosen 20% or higher
- The initial value of DRUG Inc. must exceed the project value to Biotech



Properties of the virtual company model:

- Clear definition of participation rates
- Easy consideration of co-development terms
- Explains reason for increasing royalty tiers
- Explains rationale for licensing
- De-emotionalize negotiations
 - By definition terms are fair
 - Focus on well-defined parameters

Virtual Company



Experience with virtual company model:

- Once explained it is accepted
- Open and transparent negotiations
- Both parties happy

Early-Stage Contracts



Licensee licenses the product again (sublicense)

- Better potential:
 - Licensor wants to participate
- Worse potential:
 - Original terms should not prevent a deal

How to determine the participation rates?

Early-Stage Contracts



- University of Queensland (AUS) licenses vaccine in early stage to CSL (AUS)
- CSL continues development
- Large potential recognised
- Sublicense to Merck (USA)



Agenda

- Deal Structures
- Deal Valuation and Deal Metrics
- Interpretation of Deals



How to read a deal:

Deal between Biotech and Pharma for a preclinical drug candidate

- Upfront and deferred equity payments of US\$ 20 Mio
- Potential US\$ 416 Mio future payments
- Royalties and co-promote

Licence Contracts - Benchmarking



The real structure of the deal:

- \$ 8 Mio upfront
 - \$ 12 Mio deferred equity
 - opt-in payments US\$ 20-40 Mio
 - Milestones
 - Phase II: 8
 - Phase III: 12
 - Filing FDA: 16
 - Filing EMEA: 8
 - Approval FDA: 24/12
 - Approval EMEA: 16/8
 - Approval Japan: 12
 - Royalties
 - US: 12%/16%/20%
 - ROW: 8%/10%/12%
- 20
- 136

Licence Contracts - Benchmarking



\$ 20 Mio upfront, equity
+\$ 136 Mio milestones and option fees

+\$ 80 Mio for four more indications

+\$ 200 Mio for second project

\$ 436 Mio TOTAL

Reading Deals: Example 1



Licensors: Active Biotech (Sweden)
Licensee: Teva (Israel)

Year: 2004
License: Worldwide
Indications: Multiple Sclerosis
Compound: Laquinimod, Phase 2

Upfront: USD 5 Mio
Milestones: USD 92 Mio (development, approval, and sales)
Royalties: tiered, double digit

Reading Deals: Example 1



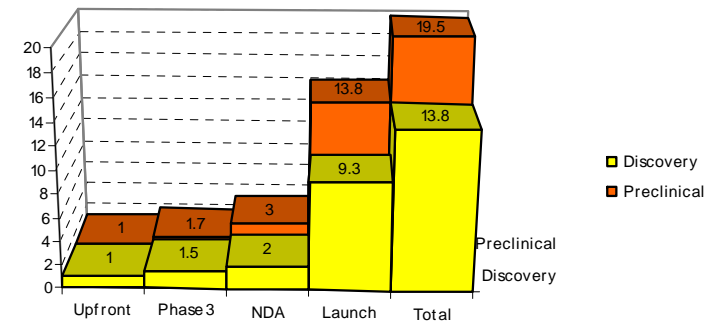
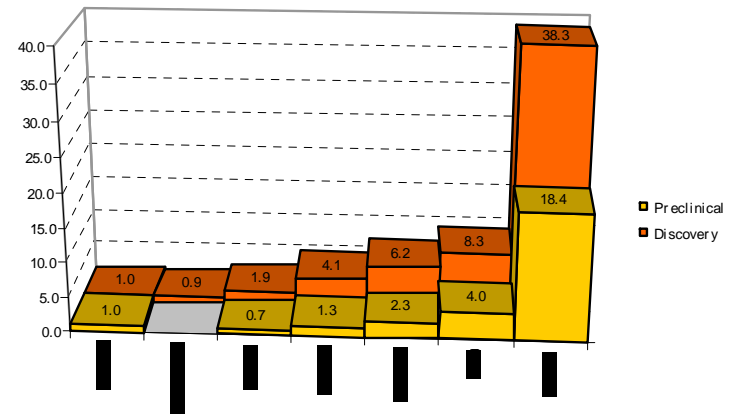
Readjusting milestone weights

- Upfront = Phase 2 = 1 unit

$92:5=17.4$

- Take preclinical dataset

	Weight	Milestone
Upfront	1	USD 5 Mio
Phase 3	1.7	USD 8.5 Mio
NDA	3	USD 15 Mio
Launch/Sales	remainder	USD 63.5 Mio
Total	17.4	USD 92 Mio



Reading Deals: Example 1



In 2007: Initiation of Phase 3 and USD 10 Mio Milestone.

Readjustment of milestones:

	old	new
Upfront	USD 5 Mio	USD 5 Mio
Phase 3	USD 8.5 Mio	USD 10 Mio
NDA	USD 15 Mio	USD 15 Mio
Launch/Sales	USD 63.5 Mio	USD 62 Mio
Total	USD 92 Mio	USD 92 Mio

Milestone number probably not blown up as no other indication is mentioned.

Royalties?

Reading Deals: Example 1



For the royalty calculation we need to know the sales expectations.

- Copaxone in 2003: USD 720 Mio
- Copaxone in 2007: USD 1,713 Mio

Value share calculated at 12%:

Royalty	USD 1 bio	USD 2 bio
15%	67%-33%	77%-23%

Usually we would expect about 33%. Assuming sales between USD 1-2 bio royalties between 15% and 20% look reasonable.

Reading Deals: Example 2



Licensors: Kyowa Hakko Kirin (Jp)
Licensee: Amgen (USA)

KYOWA KIRIN



AMGEN

Year: 2008
License: Worldwide except Asian countries
Indications: Lymphoma, Allergic Rhinitis
Compound: MAB, Phase 1

Upfront: USD 100 Mio
Milestones: up to USD 420 Mio (development, approval, and sales)
Royalties: double digit

Reading Deals: Example 2



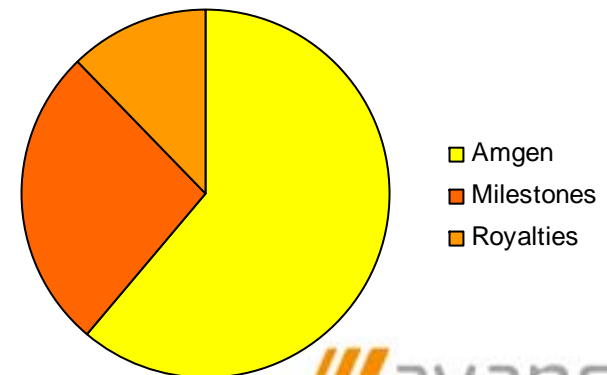
First Remarks:

- High upfront compared to rest of milestones (incl. 2 indications)
- Double digit royalties for Phase 1 deal indicates high sales potential

Even if we backload the deal and keep it minimal we get:

Sales	Upfront	Ph 2	Ph 3	NDA	Launch/ Sales	Roy	Value Share	IRR Amgen	Roy/ Deal
USD 1 bio	100	10	20	40	350	10%	58%	15.9%	22%
USD 2 bio	100	10	20	40	350	10%	31%	22.2%	39%

We can conclude with certainty that Amgen expects high sales. Even with minimal royalties USD 2 bio do not seem high (VS, Roy/Deal).



Reading Deals: Example 3



REGENERON



Press release Nov 28, 2007:

\$85 million upfront payment to Regeneron and **up to \$475 million of funding** for identifying and validating potential drug discovery targets and developing fully human therapeutic antibodies against such targets (the “Discovery Program”) over the next five years.

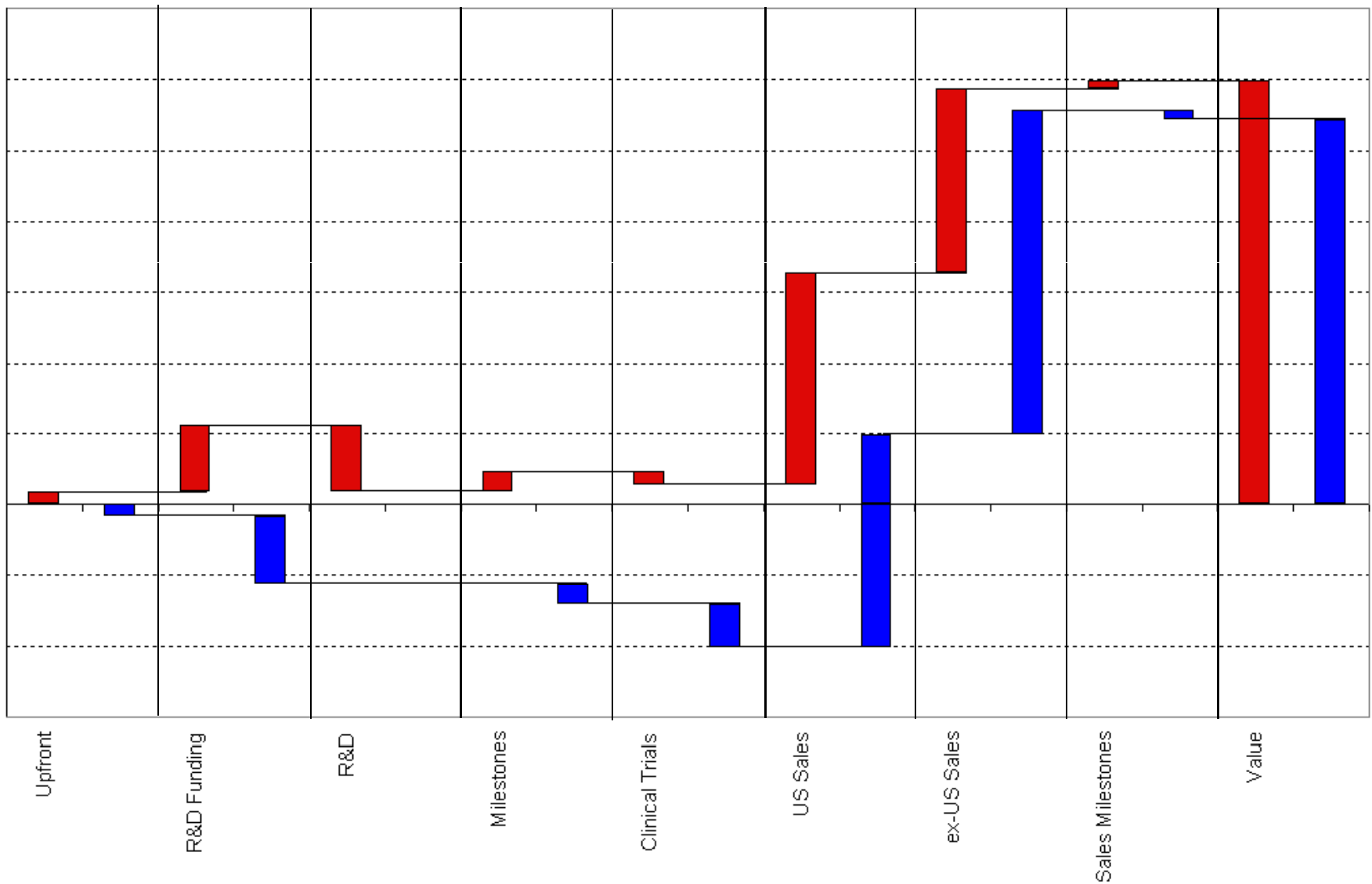
The parties will **equally share profits** from sales **within the United States** and will share profits outside the United States on a sliding scale based on sales starting at 65% (Sanofi)/35% (Regeneron) and ending at 55% (Sanofi)/45% (Regeneron). The parties have also agreed to **share losses** associated with commercialization. In addition to profit sharing, Regeneron is entitled to receive **up to \$250 million in sales milestone payments**, with milestone payments commencing after aggregate annual sales outside the United States exceed \$1 billion on a rolling twelve month basis.

Regeneron has agreed to sell to Sanofi 12,000,000 shares of its Common Stock, par value \$0.001 per share (the “Common Stock”), at an aggregate cash price of **\$312 million**.

Reading Deals: Example 3



■ Regeneron ■ Sanofi-Aventis



Reading Deals: Example 4



PDL BioPharma and Bristol-Myers Squibb, August 19, 2008

Bristol-Myers Squibb Company and PDL BioPharma, Inc. enter an agreement for the global development and commercialization of PDL BioPharma's anti-CS1 antibody, elotuzumab, currently in **Phase I** development for **multiple myeloma**.

Upfront cash payment of \$30 million for the development and marketing rights to elotuzumab and for an option to expand the collaboration to include PDL241.

Additional payments of up to **\$480 million** based on pre-defined development and regulatory **milestones**.

Up to **\$200 million** based on pre-defined **sales-based milestones**.

The companies will **share development costs**, with Bristol-Myers Squibb providing 80% of the funding and PDL BioPharma providing 20%.

The companies would **share profits** on sales of elozutumab **in the US**. PDL BioPharma would receive **royalties on net sales outside the US**.

If Bristol-Myers Squibb exercises its **option to expand** the collaboration to include PDL241, PDL BioPharma would receive an additional cash payment of **\$15 million** and could receive additional payments of up to **\$230 million** based on pre-defined development and regulatory **milestones** and up to **\$200 million** based on pre-defined **sales-based milestones**. The same division of development costs and profit sharing that apply to elotuzumab would apply to PDL241.

Reading Deals: Example 4

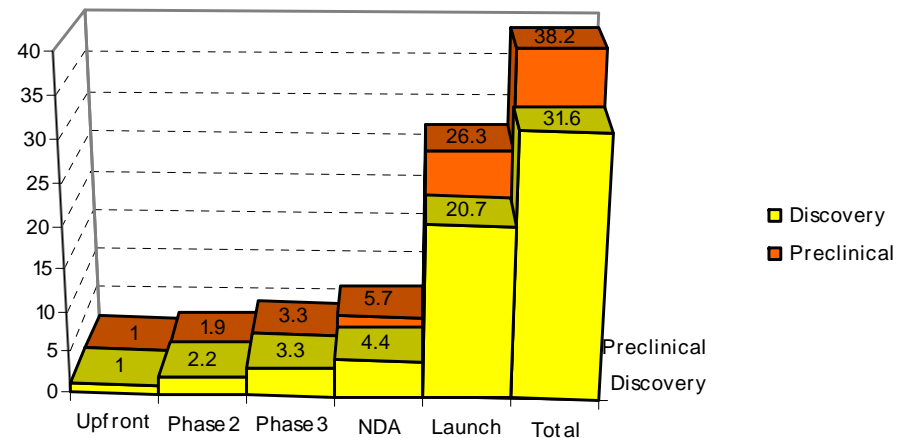


USD 30 Mio Upfront (includes an option fee)
 USD 480 Mio Milestones
 USD 200 Mio Sales Milestones

USD 710 Mio “Total Deal Value” (24x upfront)

Upfront alone: USD 22.5 Mio, Rest: Option fee

Milestone	USD Mio
Upfront	22.5
Phase 2	49
Phase 3	73
Filing	98
Approval	260
Sales Milestones	200



Reading Deals: Example 4

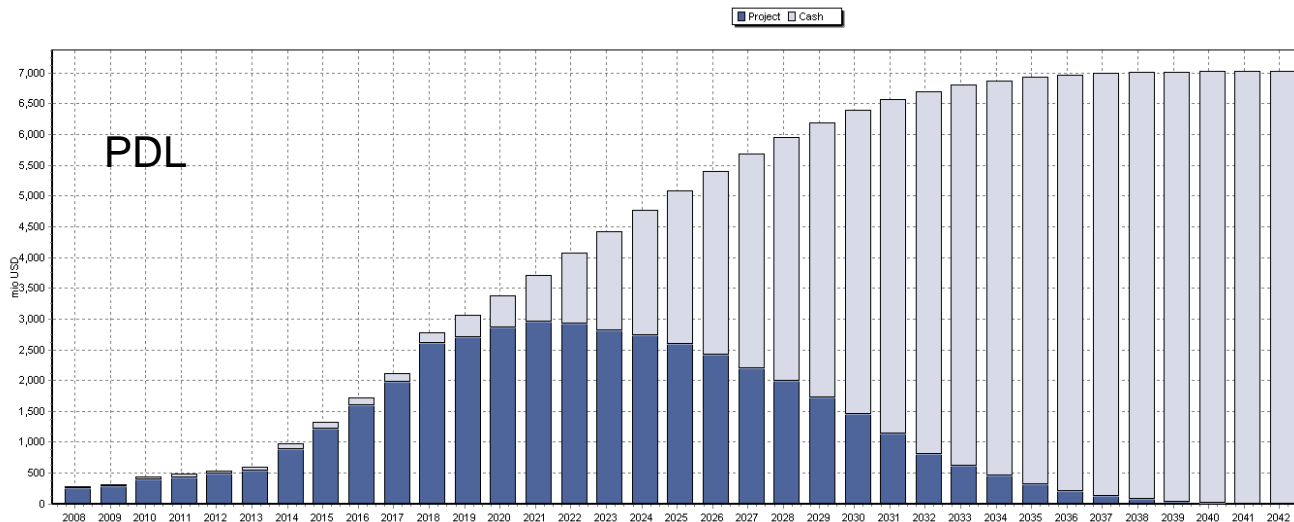


Milestone	From weights	Ind 1	Ind 2	Ind 3	non-cancer
Upfront	22.5	25			
Phase 2	49	50			
Phase 3	73	70			
Filing	98	100			
Approval	260	150	50	50	10
Sales Milestones	200		200		

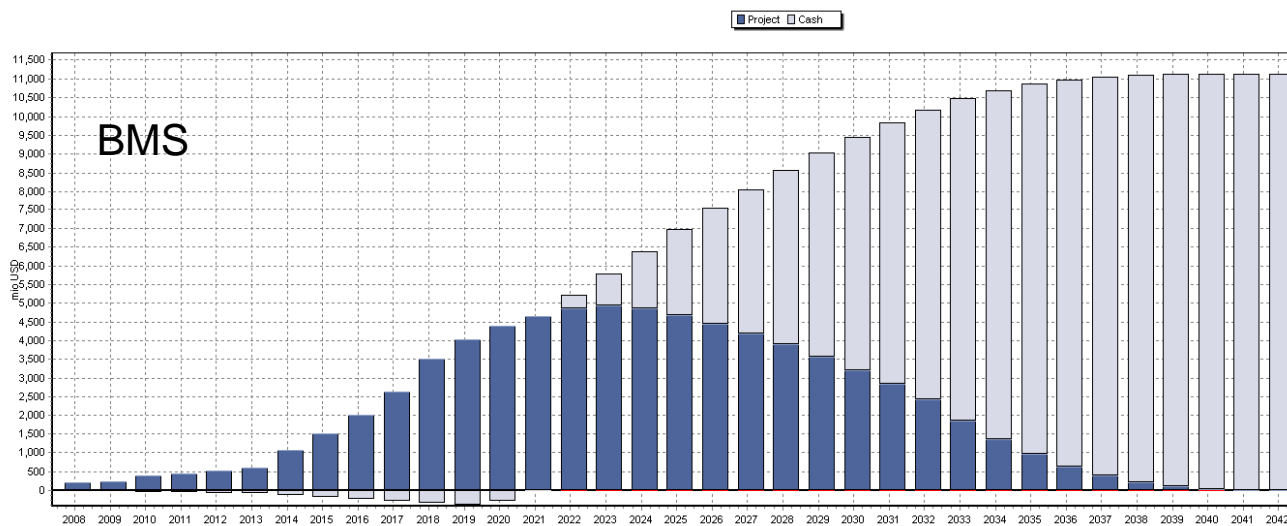
Assuming royalties of 15%-20% outside US we receive the following deal metrics:

Sales scenario	Value Share	IRR BMS
1,000/1,000/500	49%-51%	25.2%
1,000/500/500	59%-41%	19.8%
500/250/250	83%-17%	15.6%

Reading Deals: Example 4



Even though BMS' value might be lower at the start, it will take more profit from the project if it reaches commercialisation because of its larger stake in the ex-US market.



For high-value deals value share is less important as the licensee can increase its pipeline value simply by signing the contract (in this case USD 200 Mio).

Reading Deals: Example 4



Remarks:

- PDL pays 20% of R&D costs.
 - This can refer to 50% of US share in global market,
 - but can also contain an additional milestone.
 - Milestones are fix, contribution can change.
- The milestones correspond to 50% of US and 100% of ROW.
 - PDL does not license 50% of US market.
- 15%-20% royalties can be too high, but seem fair given the milestones
- MAB deals are high because of unclear biosimilar regulation

Conclusion



Valuation is extremely helpful in business development:

- Identifying negotiation leeways
- Analyzing and designing term sheets
- Decomposing industry deals
- Planning ahead

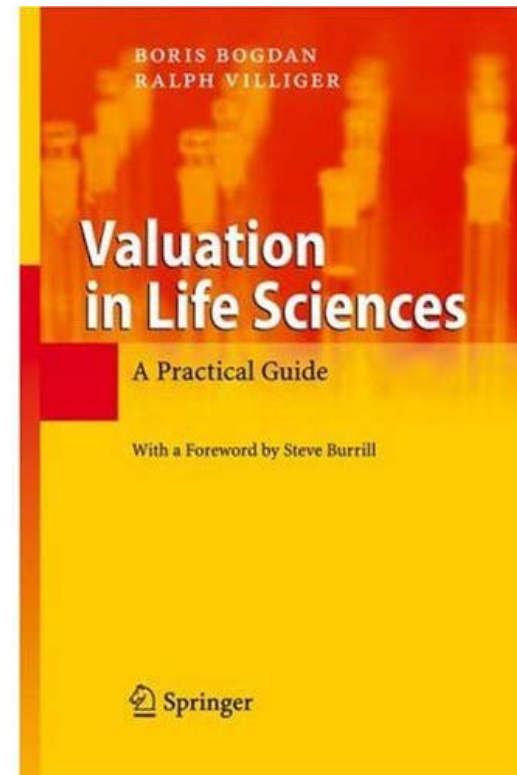
Book



Valuation in Life Sciences

Springer Verlag, 2008

2nd edition





 **avance**

Turning options into decisions