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Net Profit

Bionest's Frédéric Desdouits and Catherine Pichereau compare methods of valuing biotech and find that public markets offer a means to value companies even with as little information as is available on their website

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While more biotech companies are trying to go public in Europe there are only a few specialised investors, and the vast majority of shareholders are not familiar with the specifics of the sector in terms of valuation methodologies.

Investors like to compare companies and usually look at a limited number of variables within a sector: growth and growth prospect, margins, multiples and newsflow. Unfortunately, due to their loss-making structure, traditional P/E or EV/EBITDA valuation multiples cannot be applied to drug discovery companies. Even discounted cash flow-type valuation (DCF) is often the subject of controversy, as mastering the 'fair valuation' of a biotech company requires a large number of assumptions: probability of success, competitive positioning, time-to-profitability, cash requirements and discount rate, to name but a few.

FAIR VALUE: A MYTH

As an example of the disparate valuations an investor can get from different experts, consider a pharmaceutical compound in development and entering Phase II with a sales potential of roughly US$170-200 million. What follows are two scenarios that differ only slightly in a few key hypotheses for which non-specialists would find it impossible to assert the correct figures (see Table 1).

Conducting a direct net present value (NPV) of the project, it is interesting to note that even without considering the risk of failure inherent to the industry, by simply delaying the date of launch by one year and reducing the peak sales by 10 per cent, the value of the project is reduced by about 25 per cent. Note also that both scenarios give a NPV before adjusting the cash flow to their probability of realisation – between seven and eight times the level of required investments.

Table 1: Discounted cash flow models with slightly different hypothesis

The two models (A & B) differ by only a year's delay and a lower peak sale for scenario B. Both models have a 10-year market exclusivity period. There is no terminal value.

Year	N	N+1	N+2	N+3	N+4	N+5	N+6	N+7	N+8	...	N+14	N+15	N+16
Model A													
Status	p2	p3	p3	R	L								
Cashflow	(5)	(15)	(15)	(5)	51	101	141	151	161	...	196	201	
NPV at 15% discount rate	405												
NPV at 20% discount rate	262												
Model B (one year delay and peak sales reduced by 10 per cent)													
Status	p2	p2	p3	p3	R	L							
Cashflow	(5)	(5)	(15)	(15)	(5)	46	91	127	136	...	172	176	181
NPV at 15% discount rate	311												
NPV at 20% discount rate	190												

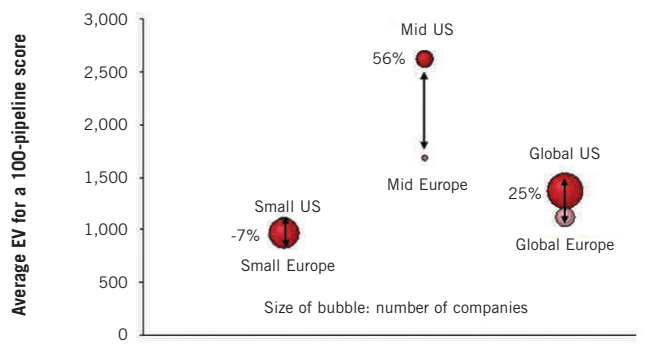
Source: Bionest Partners

Table 2: Probability weighted NPV models

	Model A	Model B	Difference
Probability of 1p2 success	50%	45%	11%
Probability of p3 success	30%	25%	20%
Probability of registration success	90%	85%	6%
Overall probability of success	14%	10%	41%
NPV at 15% discount rate	43	16	174%
NPV at 20% discount rate	25	6	342%

Source: Bionest Partners

Figure 1: Decision tree model



Source: Bionest Partners

Unfortunately, the healthcare industry is famous for its high rate of failure in new product development. Therefore, observers of the sector have developed various approaches to valuing projects, while taking into account their risk of failure. In a more industrial sector, the risk is mainly accounted for through the discount rate, and thus the expected return on investment: the higher the risk the greater the expected return.

In the healthcare industry, asserting the probabilities of success of any given project at various stages remains difficult to confirm. Major differences can occur depending on the source of information. This could have a dramatic impact on the value of a project and hence a company.

Usually, valuation in the healthcare industry tries to account for the probability of success of any given project at its different stages of development (or its risk of failure, referred to as 'attrition rate'). The most classical approach is called 'weighted NPV.' This consists of multiplying expected cash flows by their respective probabilities of occurrence. Unfortunately, by only slightly modifying some probabilities of success in a project, its 'fair value' can vary dramatically. If we take our previous example and apply the probabilities mentioned in Table 2, the value of the compound ranges now between US$16 million and US$43 million, a 2.7 fold difference. Even for sector experts it is impossible to make a wise choice between the hypothesis of scenario A and scenario B for any given project.

The comparison of models A and B is made with the same discount rate of 15 per cent – a current discount rate used by analysts on the sector. However, this sole variable has a major impact on the valuation and could vary broadly between investors, as it is not uncommon to find investors referring to a 20-25 per cent discount rate in the biotech sector. At a discount rate of 20 per cent the weighted NPV of model A drops from US$43 million to US$25 million.

Because of the specificity of the sector, even more technical methodologies have been developed – option models and decision trees, for example. However, the alternative methodologies are more or less variants of the DCF. They are all based on trying to approach the 'fair value' by weighing the future cash flows against their probability of success. They mostly differ in their approach to the probability of success.

The decision tree and real option models are the two most common approaches. Both detail a step-by-step decision-making process from the beginning of a programme to its launch. The aim is to be as accurate as possible on the timelines for each stage of development, and to assess the probability of success at each stage.

In 'weighted NPV' we only approach the probability of success by estimating future cash flow – a cash flow of

Table 3: Comparison of different biotech valuation methodologies		
Methodology	**Main advantages**	**Main drawbacks**
DCF (1)	Well established Widely used among diverse industries Allow to identify key variables (sensitivity)	The justification of the choice of some variables is difficult Very sensitive to some hypothesis (see text example)
Multiples	Simple to use Give a reading of the value without having to understand the underlying business	Not applicable in loss-making companies
Real option	Very detailed approach allowing professionals of the biotech sector to discuss the assumptions of a project	Requires an intimate knowledge of the projects to be valued and, most of the time, their competitors
B&S (2)	Allow investors not familiar with the biotech sector but with the financial derivatives to approach the sector uncertainty	The 'black box' model proved to work poorly in the past
MPV (3)	Allow to compare a given pipeline with public market benchmark Very rapid sense of the value and/or market discrepancies	Certainly valuable for a basket of companies but less for a given company in particular when the value is driven by a major project and not a balanced portfolio

100 with a probability of 20 per cent of occurrence is adjusted to 20, for example.

In a decision tree model, each step creates two possible scenarios (success or failure, for instance) and the value of each scenario is calculated. The value of the project will be the weighted value of the two scenarios, and this mechanism can be applied at each and every stage. This approach is simple to apply, understand and communicate.

More sophisticated models have also been proposed. Real option models usually require good computer and technical skills and are thus less common. They are one step further than the decision tree in approaching the probability of occurrence of an event. Real option models mostly require Monte-Carlo type simulations – hundreds of randomly selected scenarios to approximate 'real life' statistics. However, this is also a limitation of the system as it is complex and occasionally difficult to communicate the results to a third party.

IS IT POSSIBLE TO COMPARE BIOTECH COMPANIES?

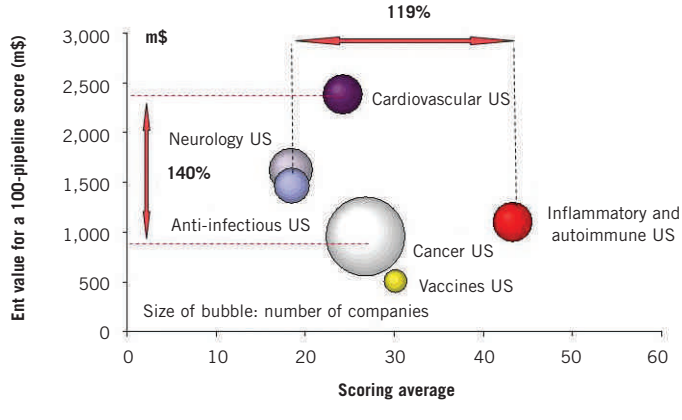
Multiple approaches and ratios have been proposed in the past which calculated the value of the company as a multiple of the R&D spending or, alternatively, by calculating the profitability of the company, excluding R&D spending. But neither approach proved meaningful. The first assumes that the more you spend, the more expensive you should be. The second is even worse, as it supposes that value is not created by investment in R&D.

In this context, a non-specialist investor cannot assess at a glance the price of a research-based company as he usually does with peer groups and multiples in other sectors. And, unfortunately, too many fund managers avoid the sector because of a low understanding of the companies' assets valuation. However, specialised analysts and investors have an instinctive approach to valuing biotech companies. They can usually tell you in a few minutes how much a company is worth based largely on their experience.

There is no good way to best describe the value of a loss-making biotech company, but there are tens of them trading on the public markets. And it is the public market that remains the best way to gauge thermometer of the value of a company. Thus, an alternative way to calculate the 'fair value' of a biotech company would be to compare it to a portfolio of listed companies. The best way to compare biotech companies is to compare their key assets: their pipelines. By going one step further and trying to take the position of non-specialised investors, it is evident that the ideal tool would enable the comparison of any pipeline to a market benchmark with simple, even simplistic, parameters. This approach is known as market pipeline value (MPV).

MPV is based on the benchmark of over 160 pipelines of publicly listed research-based biotech companies in Europe and the US.

Figure 2: Comparing pipeline value in Europe and the US according to the size of the company



Source: Bionest Partners, Hinvest Partners

Risk assessment is key. Most of the time, a company or project valuation is done for a reason: either investment or transaction. Valuation is a means towards attaining this end result. Buying or investing in an asset requires detailed analysis, and the valuation process is a negotiation on each and every variable of the financial model.

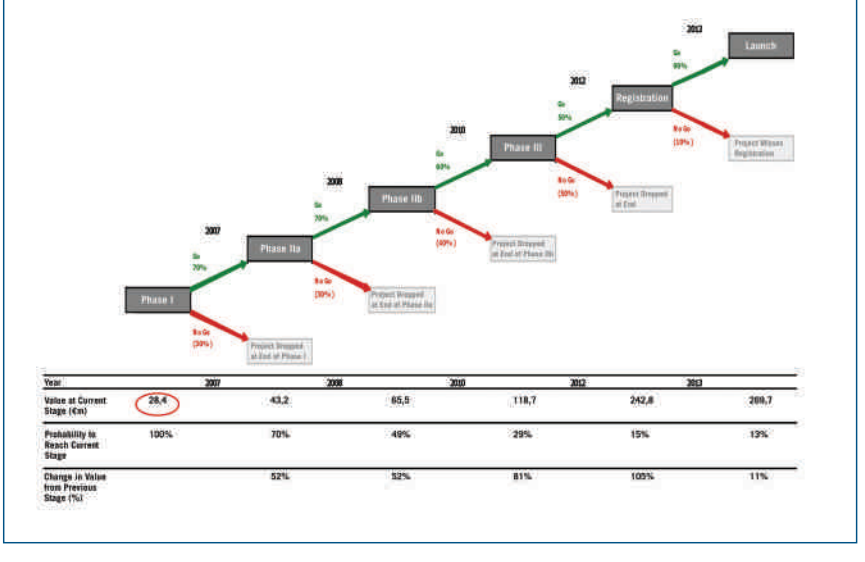
With a pipeline scoring system for products in clinics and a comparison of these scores to market valuation, MPV shows that the market follows certain trends when valuating research-based companies. One can address the market value of a pipeline by calculating its score and comparing it to the database. This simple approach mimics the 'instinctive valuations' of experts.

While simplistic in concept, this methodology turns out to be robust in its results. For instance, a basket of undervalued companies detected by MPV outperformed the biotech sector by more than 20 per cent between June and November 2006. In addition, the MPV calculation seems particularly predictive in identifying investment opportunities at the IPO stage.

The MPV methodology also provides a means by which to compare companies in clusters: geographical, therapeutical or by size, for example. MPV shows that contrary to common belief, small companies (with market caps below US$400 million) with similar pipeline scores are priced similarly in the US and Europe. More mature companies are much more expensive in the US than similar companies in Europe. There is also a large discrepancy of pipeline value among the different therapeutic areas, with oncology currently being the cheapest area both in Europe and the US.

MPV provides investors with a simple valuation tool, as all the necessary information is public and can be found on the companies' websites. Unfortunately, as with every valuation method, it is not a magic tool. In particular, MPV is statistical, so it is most relevant to a portfolio of companies or companies with large pipelines. A major advantage of MPV, however, is that it allows investors to rapidly decrypt valuation discrepancies, screen for opportunities and open a discussion with the management of the company.

Figure 3: Comparing pipeline value of different therapeutic areas in the US



VALUE IS ALL ABOUT RISK ASSERTION

Different approaches have been developed over the years to tackle the complexity of 'value creation' in the pharmaceutical industry. There is a paradox:

- No one should put all their money in a single early stage product, as doing so is akin to gambling. Thus, there is no value in a single project.
- The pharmaceutical industry remains one the most profitable industries, with one of the highest returns on investment. Thus, investing in parallel in several projects still makes a lot of sense.

This mechanism, known as portfolio theory, is experienced by financial investors who are used to lowering their risk by diversifying investment vehicles.

Risk assessment is key. Most of the time, a company or project valuation is done for a reason: either investment or transaction. Valuation is a means towards attaining this end result. Buying or investing in an asset requires detailed analysis, and the valuation process is a negotiation on each and every variable of the financial model. Alternatively, looking at the value of publicly listed companies/pipelines is another way to evaluate the level of risk perceived by investors who aim to invest in hundreds of companies, and manage their risk in portfolios.

Valuation remains as much an art as a science, and the methodology that will better serve the 'fair valuation' needs to take into account its purpose. ◆

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