

## Early-stage project valuation myths

### **“Early stage projects *always* have a negative NPV”**

Everybody might have heard it already when discussing with people from pharmaceutical companies: “Early-stage projects cannot be valued, DCF methods are fundamentally flawed because you never get to a positive value. Decisions are based on other criteria such as innovativeness, feasibility, or other mostly soft factors.

Let’s have a closer look at this: biotech companies have a positive value, but they are only composed of early-stage projects. This already contradicts the statement. Of course, one could say that only fools invest at that stage and that maybe the return is not sufficient. You can easily find some strong evidence for this argument. However, there are other flaws (the biotech business model with few projects, funded by VCs) that contribute to the poor performance of the biotech industry. The pharmaceutical industry is interestingly highly profitable. Actually, there is no other industry as profitable like the pharmaceutical industry, with profit margins between 20% and 30%. And since each and every commercialised drug of a pharmaceutical company was once an early stage project, even such early-stage projects should have a positive value. Of course, regulation and costs have become a larger burden. But drug prices have increased as well. And finally, early-stage drug development cannot be that bad, otherwise the pharmaceutical companies wouldn’t do it anymore.

Clearly there are some projects that arguable have a negative value and are not worthwhile further development. But some definitely should be developed

and this must be reflected in the valuation. Possible reasons for the earlier statement, that all early-stage projects have negative values, include:

- Over-conservative sales assumptions.
- High cost-estimates due to securing R&D budget in large corporates.
- Conservative time-lines.
- Wrong discount rates.

Doubtlessly each valuation can be modified in a way that at the end a positive or a negative value shows up. If you regularly value early-stage projects you should, first of all, apply always the same standards in terms of realism. Second, try calibrating your valuation results to industry values. You will never find a perfect comparable, but developing your valuation you can also predict the value of your project once it were in a later stage and compare it then to some observable values either from licensing deals, acquisition prices, or market capitalisations.

### **“It is impossible to predict sales so far in the future. Why should we bother?”**

Many employees within pharmaceutical R&D organisation are frustrated because a project they have been working on has been abandoned because of prioritisation reasons. On the other hand they see how wrong the forecasts that have lead to the abandonment decision can be. Table 1 exhibits some forecasts and the actual realised sales. One of the most prominent examples is probably Pfizers Exubera (inhaled insulin), which has been discontinued due to lack of patients’ interest, although sales have been predicted in the multi-billion dollar range.

**Table 1: Forecasted and actual sales<sup>1</sup>.**

Drug	Company	Fore'd	Actual	□
Avastin	Genentech/Roche	3,000	5,900	97%
Alvesco	Altana/Aventis	1,200	85	-93%
Arcoxia	Merck	2,500	377	-85%
Caduet	Pfizer	1,090	590	-46%
Cymbalta	Lilly	2,200	3,000	36%
Zocor	Merck/Schering-Plough	3,000	6,600	120%
Lyrica	Pfizer	2,000	2,900	45%
Spiriva	Böhringer Ingelheim/Pfizer	1,340	3,300	146%

Well, it is true that forecasted sales are always inaccurate; some more, some less. And it is equally true that you can find some very annoying examples where the decisions based on valuation went horribly wrong. Exubera is one example. Another example could be Tracleer. In the late 90ies Roche decided to discontinue the development of bosentan. A group of entrepreneurs spun out the project into a company called Actelion. They developed the drug and received approval for it. Today the substance is known under the brand Tracleer and generates more than USD 1 bn in sales. Clearly, Roche did not expect that 15 years ago.

But the unreliability of the forecasts is no reason to condemn the whole methodology of valuation. Let us sketch an analogy from an equally uncertain world, the casino. When playing Black

Jack you can actually consistently (i.e. on average) make money. However, it takes quite some skills; you need to count the cards that have been dealt, draw cards and bet accordingly. The system is actually that challenging that only very few persons manage to do it right. Tellingly, this system has been discovered and put into practice by mathematicians, some from the MIT (it has also been the topic of the movie "21"). Now, when you play according to this system, you place a bet and hit, double down, split, or stand according to the cards on the table and the previously dealt cards. However, even if the system tells you to bet high and double down you are not sure to win. The dealer can become lucky and can deal himself, maybe with a very improbable series of cards, a better hand than yours. You can loose even though you behaved correctly according to the system. This can be very frustrating for the player and he might well start doubting the system. But the system works, you can prove it mathematically; and you cannot argue with mathematics (it's even challenging to argue with mathematicians...). However, if the player starts deviating from the system at some occurrences, he doesn't play optimally anymore. He actually might get lucky and even win a hand he wouldn't have won otherwise, but on average he is worse off and probably even starts losing. You can only win consistently (with the best margin) if you play strictly according to the system.

The same is true in drug development; actually in any industry. You will only make profit consistently if you behave

<sup>1</sup> Source: Arthur G. Cook, „Forecasting in the pharmaceutical industry“.

according to the recommendation of your valuations. Sure, there are some examples where the valuation actually gives you wrong advice, just like in Black Jack. But on average – and this is the actual meaning of “consistently” – you only win if you follow the valuation results. Of course, the normal results are not very interesting. We never mention that they were right all along the R&D path with continuing the development of Lipitor, Avastin, Diovan, and all the other successful drugs. But we do hear often about the cases where it went wrong. Don’t be fooled by this bias.

The biotech industry suffers actually from the very difference between “winning” and “consistently winning”. While entrepreneurs and employees are interested in the company’s success only, investors are interested in a positive return on their whole portfolio. They can afford the one or other failure as long as another very successful investment compensates it. It’s like in the casino; you don’t have to win every hand. But your pile of chips should increase with time. Automatically, interests between investors and managers are misaligned. Management only plays one hand – the fate of their company. Investors play several hands. While investors play systematically, managers participate in a gamble. Knowing that valuation sometimes can give wrong recommendations they rather trust their gut-feeling, to the disadvantage of the whole industry, whose return is hampered that way. For this reason biotech companies have trouble abandoning projects. A pharmaceutical company on the other

hand is a systematic player. Each pharmaceutical company has its valuation group. This implies some uncomfortable decisions that lead to the above-cited reactions, but look at the consistent profit margins of pharma. They have a point.

### Conclusion

Not valuing projects and blindly investing into or abandoning projects corresponds to gambling; with a lot of money, that is most often not your own. Valuation might sometimes be wrong, but these cases should be rather investigated more closely in order to improve the forecasting methodology than abused to discredit valuation as a whole.

Finally, if people say that some projects are impossible to value, we wonder on what grounds they base their decision. In one way or another the value must always be justified by some future scenario. If you cannot think of any then you must reconsider the business model. Otherwise you can save a lot of time by going straight to the casino.

In general the following rather simple motto holds: *If you cannot value it, you cannot decide!*