

## Which parameters are inconveniently uncertain?

### Survey

In December 2011 Avance initiated an online survey in LinkedIn. The question was: *What is the parameter you most wish to have better estimates on or want to be more reliable in your biotech valuations?* The question might be a little clumsy, but we were not interested in the most uncertain parameters, but in the parameters that are most disturbingly uncertain. On the one hand there are parameters that are difficult to estimate, but have little effect on the value. On the other hand, there are parameters that are maybe easier to delimitate in a certain range, but have a much greater impact on the value. Typically, the respondents should name the one parameter they think could most falsify their valuation. They were given a choice of answers:

- Success rates
- Discount rate
- Timelines and costs
- Sales estimates, pricing, COGS, M&S
- Qualitative aspects (team, science, etc.)

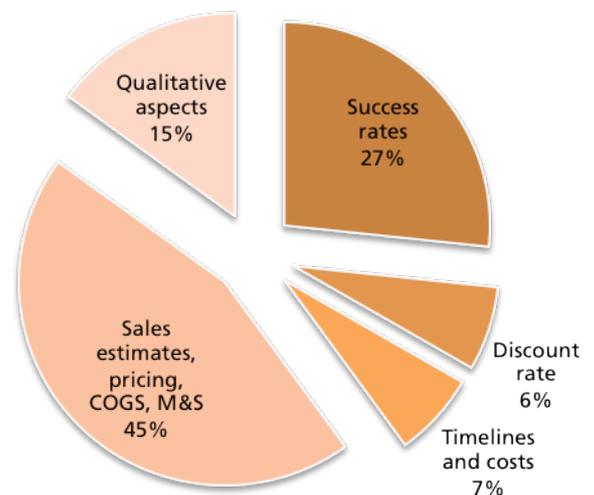
### Results

In total 60 persons took part in the survey. We can suppose that the respondents were knowledgeable about valuation and the required input parameters, because the survey was only posted in two groups that are aimed at biotech valuation professionals.

Almost half of the respondents ticked sales estimates as the most critical parameter. Success rates are

the second most named parameter, followed by qualitative aspects. Timelines and costs and discount rate received very few mentions.

We could not detect any pattern of experienced vs. less experienced participants.



**Figure 1: Survey results.**

### Discussion

At first sight, it is little surprising that sales and pricing issues come out on top. Eventually, companies are in the drug development business to make money. And sales are the only source of that money (if we generously disregard any transactions along the development path). The sales are the final payoff of the venture. Clearly it is disturbing not to know what you actually work towards. Second, the odds also impact the sense and motivation of the venture. We are, however, a bit surprised how few respondents ticked discount rate. Especially on a project level and in an industry where many

companies are private the discount rate is practically unobservable and leaves quite some room for manipulation. But it is reassuring that professionals seem to value operational parameters higher than financial parameters.

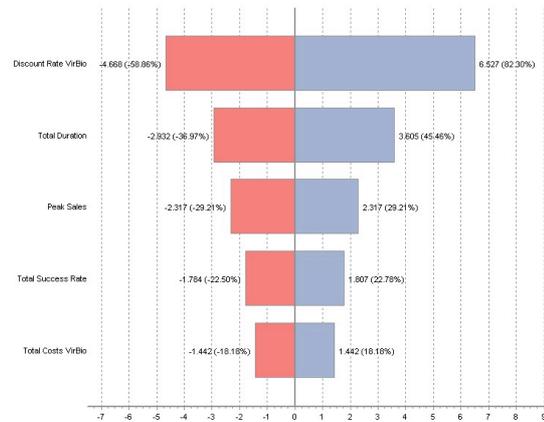
Qualitative aspects have been included in the list of answers in to give the people an option who say that valuation is more of an art than a science. The question remains how this impacts the valuation. It is our view that qualitative aspects must translate in some hard input parameters. The team could have an impact on costs and timelines, maybe success rates, scientific aspects could lead to a change of success rates and sales.

While the question in the survey was kept rather general, we now want to have a closer look at the impact of these parameter changes in two particular project valuations. We first take a look at a preclinical (i.e. early-stage) project, and then at a phase 3 (i.e. late-stage) project. We look at a project with the following assumptions:

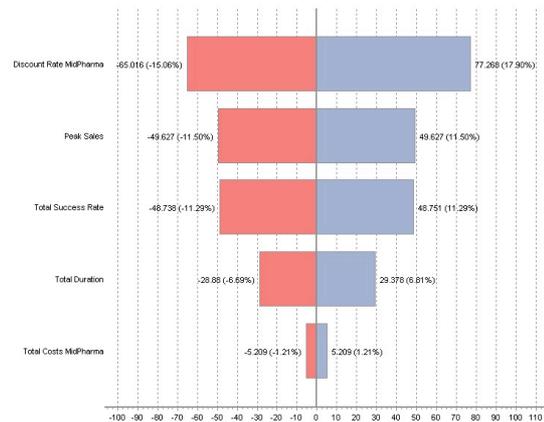
**Table 1: Valuation parameters.**

Parameter	Preclinical	Phase 3
Peak Sales	USD 770 mn	USD 770 mn
Success rate	11.4%	52%
Time to market	10.5 years	5 years
Discount rate	19%	13.5%
Costs	USD 90 mn	USD 65 mn

If we shock each parameter by +/- 10% of its value we get the following sensitivities for the two projects (the values of the two projects are USD 8 mn and USD 432 mn).



**Figure 2: 10% sensitivities for preclinical project.**



**Figure 3: 10% sensitivities of phase 3 project**

For the preclinical project the order of most sensitive parameters is:

1. Discount rate
2. Time to market
3. Peak sales
4. Success Rate
5. Costs

The ranking for the phase 3 project:

1. Discount rate
2. Peak sales
3. Success rate
4. Time to market
5. Costs

In any case, costs do not seem to matter that much. This is mainly explained by the fact that a project value is leveraged, i.e. the sales must outweigh the costs by a multiple because of discounting and success rate. Changing the sales a bit has a stronger impact than changing the costs.

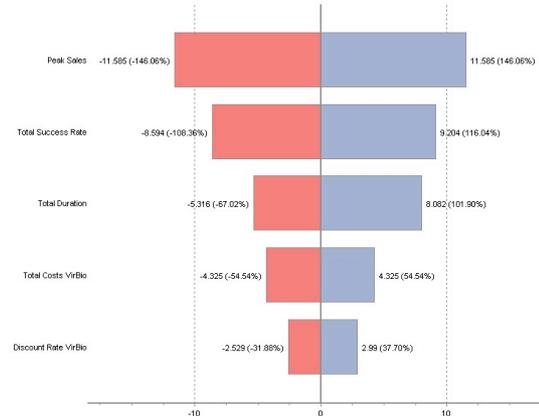
But we must consider that not each parameter is equally easy to estimate. For the success rates, for instance, some parameter sets diverge enormously. For phase 1 cancer compounds Kola and Landis (Nautre Reviews Drug Discovery, 2004) indicate a success rate of 5% while Di-Masi (Journal of Clinical Oncology, 2007) mentions 26%. That is a factor 5 that also translates to a similar value increase. For trial costs, however, one can get rather precise quotes from CROs. If we want to analyse the potential impact of parameters on value, we should take a look at ranges of equal probability. We therefore propose the following parameter intervals instead of the general +/- 10%:

**Table 2: Parameter changes of equal probability.**

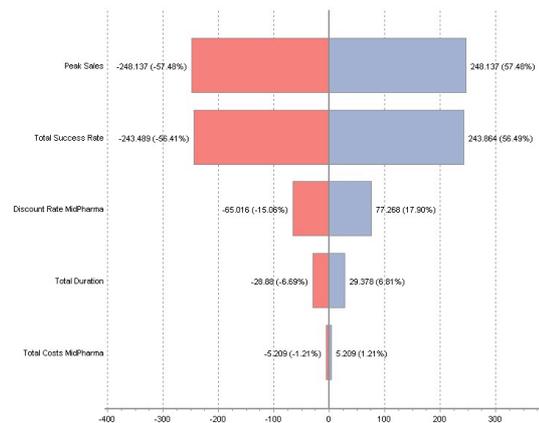
Parameter	Preclinical	Phase 3
Peak Sales	+/- 50%	+/-50%
Success rate	+/- 50%	+/- 50%
Time to market	+/- 20%	+/- 10%
Discount rate	+/- 5%	+/- 10%
Costs	+/- 30%	+/- 10%

It might not seem coherent that in phase 3 the uncertainty about the success rate and peak sales is still +/- 50%. First, once at that stage one feels much more uncomfortable about that uncertainty, because success is relatively close. Second, for

this analysis only the comparative-ness to the other parameters counts. We get the following realistic sensitivities:



**Figure 4: Realistic sensitivities for a preclinical project.**



**Figure 5: Realistic sensitivities for a phase 3 project.**

The ranking for the preclinical project has now become:

1. Peak sales
2. Success rate
3. Time to market
4. Costs
5. Discount rate

And for the phase 3 project:

1. Peak sales
2. Success rates
3. Discount rate
4. Time to market
5. Costs

Peak sales and success rates clearly are on top of the list each time. Depending on the market or the available data sometimes the one, sometimes the other input is easier to determine. The analysis actually tells us that we should focus most of our effort on getting good estimates for these two parameters.