

Why Drug Prices Must Be High

“Drugs are too expensive” or “Pharma companies are excessively profitable”

In almost every country drug prices are under attack. “How can it be that pharmaceutical companies ask 10- to 100-fold the production price of a drug? This is in no relation to other industries.” Pharmaceutical companies immediately mention their huge expenditures for R&D, which justify the high drug prices, especially when considering the large attrition rate in drug development.

Table 1: R&D expenditures.

Company	Year	Currency	Revenues (in bio)	R&D	In % of revenues
Nokia	2008	EUR	50.7	6.0	12%
Pfizer	2009	USD	50.0	7.8	16%
Sanofi-Aventis	2009	EUR	29.3	4.6	16%
GSK	2009	GBP	28.4	4.1	14%
Roche	2009	CHF	49.1	9.9	20%
Novartis	2009	USD	44.3	7.5	17%

Table 2: Profit margins (pre-tax) in various industries.

Company	Industry	Year	Currency	Revenues (in bio)	Operating Profit (in bio)	In % of revenues
Nokia	Technology	2008	EUR	50.7	5.0	10%
Deutsche Telekom	Communication	2009	EUR	18.2	1.8	10%
Holcim	Construction	2009	CHF	21.1	2.8	13%
Royal Dutch Shell	Petrol	2008	USD	458	26	6%
Pfizer	Pharma	2009	USD	50.0	10.8	22%
Sanofi-Aventis	Pharma	2009	EUR	29.3	11.2	38%
GSK	Pharma	2009	GBP	28.4	8.4	30%
Roche	Pharma	2009	CHF	49.1	15.0	31%
Novartis	Pharma	2009	USD	44.3	10.0	23%

Table 1 displays that the R&D expenditures are indeed enormous. But they are not so big when you compare them to the overall revenues or more importantly to the operating profit. Table 2 juxtaposes profit margins of differ-

ent industries and 5 pharmaceutical companies. Pharma companies could double their R&D expenditures and would still be profitable. It seems that critics of high drug prices have here an argument that is difficult to counter.

Don't kill innovation

There is no doubt that pharmaceutical companies are very profitable enterprises; you hardly ever see a pharmaceutical company that has to communicate a loss. At first sight, as described, this makes the impression as if pharma profits excessively from unhealthy people; quite immoral. But this falls short of the particularities of the drug development industry. Almost every article about the industry mentions that drug development is lengthy, costly, and risky. And these properties even aggravate with increased regulation. One might say that the pharmaceutical companies apparently still cope very well with these difficulties. True. But when we talk about drug development, we must consider that innovation today often does not take place in the pharma companies' labs but at universities and other research institutes all over the world. These innovations are then spun out into start-ups that develop these treatments further until they can either be licensed to pharma or commercialised. And when you look around, virtually all governments want to promote entrepreneurship, create programs for start-up companies, and invest in infrastructure to attract growth companies. But if these companies should have a chance, they must be able to attract capital; otherwise they obviously cannot develop something as capital intensive as a drug. This means, that these projects need to

have a positive value, i.e. they must be able to give the investors a decent return, at least on average. But since a start-up company is linked with much more risks than commercialising pharmaceutical company, a start-up investor naturally expects a much higher return than someone who buys a share of a pharmaceutical company. When investing in a start-up company, you deal with a lot of uncertainties like unclear sales forecasts, long development times and subsequent possible changes in competition or regulation, inexperienced management team, etc. You also find most of these risks in a pharmaceutical company, but they have much less impact, as the value of a pharmaceutical company is mainly driven by its current products, whose sales can be estimated to a good degree of accuracy thanks to historical data of the same products.

Pharma and biotech are in different stages of maturity

Let's discuss the following figures to understand this crucial line of thought. Figure 1 displays the net cash flows of a one-compound company (in discovery stage). Most companies start as a one compound company, even though there might be the possibility to expand at a later stage and apply the same technology to other indications. The cash flows (yellow) turn very big once the project is on market. We are again tempted to say that this profitability is not necessary to that extent. But the risk-adjusted cash flows display already a whole different picture. The early costs are rather certain, but the late high profits are very uncertain. The risk-adjusted cash flows do not exhibit an immorally exaggerated

profitability anymore. But things come even worse, as these cash flows have to be discounted, for early-stage companies typically with a rate around 20% or even higher. The dotted line indicates the discount factor by which we must reduce the cash flows of the respective years. We actually do not display the risk-adjusted discounted cash flows, as they wouldn't be recognisable. A biotech company that has the potential of becoming as profitable as USD 300 Mio per year actually struggles to get a positive valuation. If drug prices were lower, then the profitability at the back end would be much lower and would never compensate for the certain early expenses. As a consequence, start-up companies would not get funded and innovation would be seriously endangered.

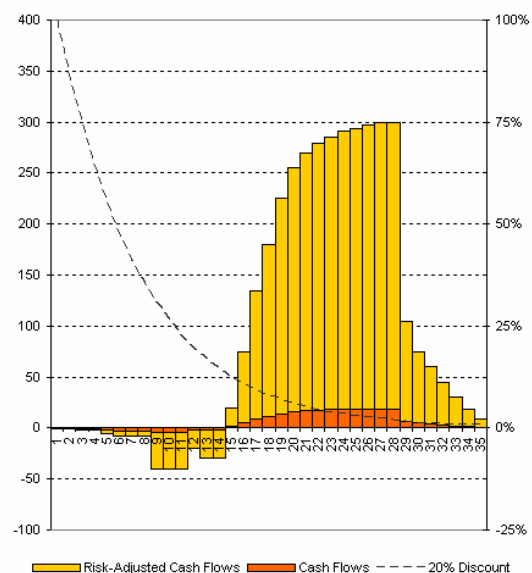


Figure 1: Cash Flows of a One-Compound Biotech Company

But how is it possible that pharmaceutical companies are so profitable? After all, they play the same game. Moreover, the vast majority of their

pipeline is still in development and hence not profitable. Novartis mentions 145 projects in clinical development in its 2009 annual report (we can expect a similar amount in earlier stages), compared to 83 patent protected products (whereof 24% account for 80% of the revenues).

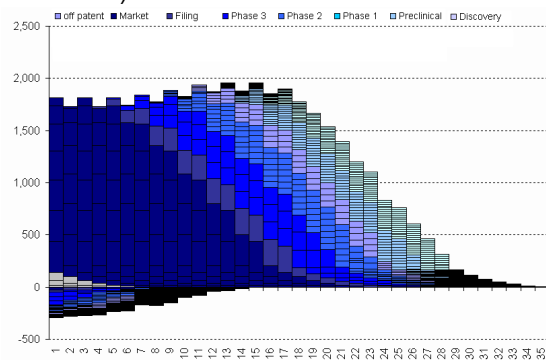


Figure 2: Risk-Adjusted CashFlows of a Pharma Company

Figure 2 displays the risk adjusted net cash flows stemming from the various projects of a stable pharma company (we have assumed the same project as for the biotech company, but the pharma pipeline is such that every 2 years (on average) the company launches a new product. The dark blue columns indicate cash flows from already marketed products, the fairer the blue the earlier the current stage of that project. We see that the cash flows are more or less stable, but the negative cash flows dry out and consequently also later the positive cash flows, because we have only considered projects that are up to today in discovery phase, and no future projects. Taxes and G&A are not considered. We see, that pharma reaches a high degree of profitability already early because of the products on market (dark blue). A pharma company is already at the stage where a biotech company ideally want to get to. Figure 3

displays the same cash flows, but discounted (with 12%). And in this graph it gets obvious that the value of a company is made up by its commercialised products, and that the pipeline is at best a little add-on.

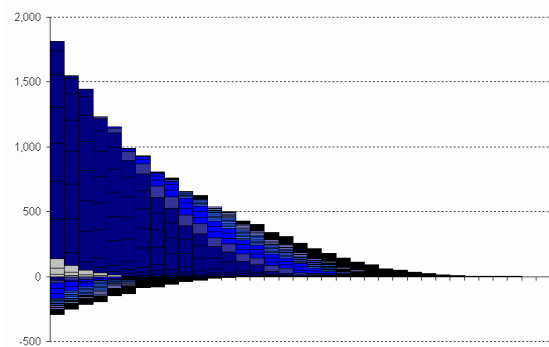


Figure 3: Risk-Adjusted Discounted Cash Flows of a Pharma Company

Conclusion

Pharmaceutical companies are extremely profitable, because they are already in a mature state of an R&D company, i.e. they have projects in each stage of the life cycle and a renewing portfolio (this is of course an idealised view, but holds true in general). A company that is in the beginning of such a life cycle must heavily discount and risk-adjust these future profits and spend relatively large sum during the long development cycle. Because of the small probability and the long development time profits on drugs, and consequently their price, must be high. Otherwise innovation would not pay off. As long as we want to keep up a high standard for safety and efficiency for drugs – which in return prolongs the development cycle and makes approval less likely – we must accept high drug prices.