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VALUATION

Real-Options Valuation for a Biotechnology Company

David Kellogg & John M. Charnes

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Abstract

Many companies in the biotechnology industry have significant valuations despite having no product revenue because their products are in early stages of development. In the past 10–15 years, investors have bid up the stock prices of companies showing promise [illegible]thod and binomial [illegible]e a biotechn[illegible]s of its drug-develop[illegible]ment of an initial ne[illegible]e value of a subse[illegible] market value[illegible]cept, a drug used to [illegible]

Many co[illegible]despite having n[illegible]f develop[illegible]es of companies that show promise of developing a blockbuster drug. This phenomenon is

similar to the more recent rise in stock prices of Internet start-up companies, most of which have shown losses throughout their existence.

Methods used in real-options valuation can be used to assess the value investors place on companies with promise but no current revenue. The value of the company is derived from the expected profits of the company's current products and services together with the potential for growth of the company into one with many profitable products and services. Real-options valuation methods can be applied to estimate the value of individual projects, but the problem addressed in our article is how to use real-options valuation models to assess the value of a company when it is viewed as a portfolio of projects.

We explain decision-tree and binomial-lattice methods and use them to the compute the value of a biotechnology company, Agouron Pharmaceutical, as the sum of the values of its current projects. We find each project's real-options value by using the two real-options valuation methods. We then compare our computed values of Agouron with the actual market values at selected points in time during the development of the company's Viracept product, a drug used to treat HIV-positive patients.

Our intention is to illustrate how real-options valuation methods can be used for financial analysis. Because in our analysis we used data based on results from prior studies (primarily, industry averages), the results reflect the value of Agouron under the assumption that its situation matches that of a typical research-intensive pharmaceutical company in the 1980s and early 1990s. We discuss some of the ways in which Agouron's situation differed from that assumed by the models, which a securities analyst w worked best to find th in early stages o e later stages o rmation than we progress and a particular stock

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companies can use these methods to increase their understanding of the value of their projects and convey that value to investors. Finally, for academic readers, this case study provides empirical evidence of the usefulness of real-options valuation methodologies.