USING SIMULATION TO SUPPORT THE R&D DECISION OF A PHARMACEUTICAL FIRM

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ABSTRACT

This paper illustrates how simulation modeling can be employed to support the R&D decision of a pharmaceutical firm. We do this in the context of a simplified but realistic example, where a drug company has just successfully completed the second phase of a three-phase process for assessing the effectiveness of a proposed drug in treating a targeted ailment with acceptable levels of side-effects. We provide step-by-step instruction for simulating the net present value and the internal rate of return of a ten-year pharmaceutical R&D project. The uncertainty lies in the efficacy of proposed drug and that of an alternative drug. Random too, are the initial size of the total market, and its subsequent exponential growth rate. Market share depends on the efficacy of proposed drug relative to that of the alternative drug, as well as, the subsequent introduction of new, alternative drugs in the market, which arrive in a random fashion. Finally, the ratio of cost of goods sold to sales and the terminal EBITDA multiple are also random. The problem is a variation of the Newdrug examples in chapters 19-21 of Andrew Metrick and Ayako Yasuda's (2010) venture capital finance text.

Keywords: *simulation, R&D, pharmaceutical*