

Residual Income as a Performance Measure in the Presence of Waiting Options

5.1 Relevance of Waiting Options for Investment Decisions

So far I have analyzed real options that are available only if an initial investment has been made. A growth option requires investment in a first stage, which is necessary to open the opportunity for a subsequent investment. In order to be able to exercise a switching option, it is necessary to previously having invested in a flexible production facility. A different type of a real option is the option to wait. This option does not necessarily require an initial investment. It is available, when an investment opportunity exists that can be postponed. Postponement of a project is often an option that proves to be valuable in situations with huge uncertainty. There are many situations, when this option to wait is of practical importance. The exploration and development of natural resources with uncertain spot prices is a prominent example.¹ Further examples include the timing of a market entry with uncertain demand, the timing of adoption of a new technology, or the timing of starting a new business.² Moreover, for many major investment projects it is quite common to postpone the final decision, if the arrival of valuable new information is expected that can alter the final decision.

When considering the properties of residual income with respect to giving investment incentives, the theoretical literature has mainly taken the following view. At each point in time, there is a set of investment opportunities, in general not mutually exclusive, and the manager can pick the project she likes and leave the projects undone she does not

¹ See, e.g., Ekern (1988); Paddock, et al. (1988); Smit (1997).

² For these and further applications see Copeland & Antikarov (2001).

like. Once a project is rejected, the opportunity is gone forever.³ Of course, this simple view does not meet reality at all and conflicts with the notion of waiting options. As illustrated by the above examples, in many situations an available project can be carried out either now or later. In particular

Only recently some authors have started to develop models of asymmetric information that include investment decisions with the option to postpone a project. The pioneering work has been done by Antle et al. (2000) who derived an optimal contract in a two-period adverse selection model with a timing option. Chapter 3 analyzes a similar model for a single investment decision that includes a growth option. Due to the complexity of these models, and since their focus is on capital budgeting, they do not explicitly give recommendations with respect to performance measures. Their investment policy is characterized by hurdle rates that determine the investment threshold. Arya & Glover (2001) also analyze a situation with a timing option in the presence of incentive problems. In their model, an incentive problem makes the option to wait valuable when it would not have been valuable otherwise. Stark (2000) considers the option to wait and the option to abandon a project when residual income is used as a performance measure. He makes the point that the accounting system must record the value of the option to wait. Using the same performance measure, Crasselt (2003a) analyzes different options, including a timing option.⁴ For his set of assumptions, he comes up with the fairly pessimistic conclusion that "it is generally impossible for the owner to create an incentive scheme that does not give the manager any incentives to deviate from the first-best investment strategy if the investment decision has real options features." Contrary to this finding, I show that in my setting with a timing option, it is relatively straightforward to obtain two different forms of goal congruent residual income measures.

This chapter continues and extends the existing work on combined issues of the valuation of the option to wait and the analysis of performance measures for investment decision making. Interestingly, it shows that using residual income calculated according to a simple depreciation policy leads to a wrong exercise of the timing option. The manager will invest too early, which is a form of overinvestment. This result in the context of waiting options contrasts to the result in the previous chapter that suggests underinvestment in the presence of switching options. As a consequence, it seems to be important to exactly specify the nature of

³ For this assumption see Rogerson (1997) and Reichelstein (1997).

⁴ See also Crasselt (2003b).