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Residual Income as a Performance Measure for Switching Options

4.1 Residual Income-Based Performance Evaluation and Real Options

The last chapter analyzed capital rationing as an incentive device when information is asymmetrically distributed and growth options are present. The derived mechanism between headquarters and a manager was central in the sense that the manager reports her knowledge about investment costs to headquarters and the final investment decisions are made by headquarters. The underlying model structure seems to be reasonable for situations where the manager cannot or only marginally influence revenues, but has better information about costs as is the case for many R&D investment projects. From an organizational perspective, this kind of incentive device is likely to be more prevalent in companies that organize their activities in functional divisions along the value chain like for instance R&D, procurement, operations and sales.

In divisionalized companies with divisions being responsible for products or product lines and consequently for both cost and revenues and long-term consequences of decisions, capital rationing does not seem to be the appropriate mechanism, since it only affects the input side. In this organizational form, decision-making authority even for investment decisions is often delegated to divisional managers, who can influence both cost and revenues of their divisions. In order to induce the manager to make proper investment decisions, headquarters can rely on performance measures that motivate the manager to take the right actions. The present and the following chapter analyze situations, where investment decisions are completely delegated and headquarters uses performance-based compensation to induce the right actions.

The objective of this work is to analyze investment incentives, where investment has real options features. The set of available real options can strongly differ from situation to situation. While growth options and abandonment options are prevalent in the context of R&D, manufacturing decisions frequently involve the decision to switch from the production of one output to an alternative output. In order to explore the full range of different real options and the underlying decision situations, this chapter analyzes another real option, different from the growth option in the previous chapter. I use the case of investment in a flexible manufacturing system to analyze the incentive properties of residual income in the presence of real options. A flexible manufacturing system provides the flexibility to switch from one output to an alternative output, if conditions change. This flexibility creates additional value that is not included in the basic value of the original production plan. This additional value is the option to switch.[1]

Among the set of possible performance measures, I restrict myself on the analysis of incentives provided by residual income based performance measures. The reason for this confinement is twofold.[2] First, starting from practical experience and empirical evidence[3], a growing number of firms has started to use residual income as a performance measure for managers. Consulting firms have helped to popularize this concept under different labels, the most popular of which is probably the concept of Economic Value Added (EVA).[4] Second, parallel to this development, the academic literature came up with strong support for the use of residual income as a performance measure. Numerous papers showed that residual income has advantages compared to alternative performance measures such as income or cash flows.[5]

This chapter addresses the question, if the strong incentive properties of residual income still hold for the case when real options are present. There is at least some anecdotal evidence that this is not the case. Performance measures based on residual income are often suspected to support short-term orientation of the management and hamper managerial decisions that are beneficial only in the long run. One way, practitioners deal with this problem is the implementation of bonus

[1] See Margrabe (1978) and Carr (1988) for the valuation of the option to switch in a single-person decision context.

[2] See also the discussion in section 2.2.3.

[3] See Pellens, et al. (1998).

[4] See, e.g., Ehrbar (1998); Stern et al. (2001); Young & O'Byrne (2001).

[5] See particularly Rogerson (1997); Reichelstein (1997). See also Baldenius (2002); Dutta & Reichelstein (1999); Dutta & Reichelstein (2002b); Dutta & Reichelstein (2002a); Pfeiffer (2000); Reichelstein (2000); Wagenhofer (2003).