

5 Risk and the Economic Value of the Software Producer

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Abstract: The economic worth of a commercial organization is a function of the present value of its future profits, discounted for both time and risk. Consequently, the economic value of a software firm is greatly affected by the predictability of the organization's software development projects, since unpredictable projects warrant large risk premiums. We can quantitatively approximate the value of increased predictability, and evaluate the effectiveness of efforts, such as process improvement, to improve the predictability of software development projects.

Keywords: Financial Risk, Return on Investment, Process Improvement, Capital Budgeting.

5.1. Introduction

As pointed out by Berry and Aurum in Chapter 8, “decision making within a value-based software engineering framework requires the inclusion of indicators of value.” Since the primary obligation of a business organization is to increase the wealth of its shareholders, establishing a well-accepted measure of the economic worth of an organization (and consequently, its contribution to the wealth of its shareholders) is central to any discussion of valuation of the artifacts that lead to that worth.

In this chapter, we explore the components of economic value, and the effect of financial risk upon valuation, particularly within the context of commercial software producers. We divide the discussion into three parts. Sections 5.2 through 5.5 provide the fundamental concepts necessary to discussion valuation and financial risk. Sections 5.6 through 5.9 extend the concepts to the measurement of the predictability of software projects, with particular application focused on software process improvement and its effects on predictability. Sections 5.10 through 5.12 introduce the concept of “relative risk” with respect to predicting the economic contribution of software projects to the economic value of the firm and illustrate how this concept may be used to assign value to risk mitigation efforts such as process improvement efforts.

5.2. The Value of the Firm

The economic worth of a commercial organization is a function of the total profit it can generate over its remaining lifetime (Brealey and Myers, 2000). For a software company, this translates into the profits derived from its software products. Obviously, if a firm has a finite lifetime, as it ages its economic worth decreases, all other things being constant, since fewer years remain over which it can generate profits.

Because firms are usually established with the intention of perpetual operation, this concept is difficult to realize in practice. However, if we consider a somewhat contrived example we can illustrate this concept very easily.

Assume the date is January 1, 1999. We have just established a consultancy to mitigate the effect of the Y2K problem. We have contracted to provide services to a single customer for our actual costs, plus \$1,000,000, payable on December 31, 1999, at the end of the contract period. These funds are in an escrow account, guaranteeing that they will be paid at the end of twelve months. Sadly, we have no plans or prospects for additional business after December 31, 1999. Our solution must be deployed before January 1, 2000, and once deployed we can claim no further revenue from the technology.

The economic value of the firm is therefore \$1,000,000. Certainly, a rational businessperson would pay no more than \$1,000,000 (and in fact would probably refuse to pay even that much) for our consultancy since they could expect to receive only \$1,000,000 in return.

5.3. The Time Value of Money

The economic value of a firm is less if the expected profits accrue later in time rather than earlier. We call this phenomenon *the time value of money*.

For the sake of argument, let us say that we have found a wealthy entrepreneur with a desire to enter the Y2K market. Just as our investor gets ready to purchase our consultancy, he announces his intention to instead purchase our competitor who has a very similar arrangement with another customer.

Why the change of heart? We are puzzled to learn that his decision was based on the fact that while our payment was due on December 31, 1999 at the end of the contract period, our competitor had shrewdly specified that their payment was due at the beginning of their contract period on January 1, 1999.

In this case, a million dollars a year in the future is not the same as a million dollars today. Our wealthy investor cleverly noted that with our competitor, he would immediately receive his million dollars upon purchasing the company, allowing him to reinvest the proceeds at 5% interest for a year, yielding \$1,050,000 at the end of the year as opposed to the \$1,000,000 he would receive had he bought our company.

So how much is our company really worth, if the purchaser has to wait 12 months to receive the proceeds of the contract? Obviously if the spoiler in our ear-