

Options and investment

The world of corporate finance throws up several ways of evaluating the profitability of an investment project. The simplest approach is just to find the net-present discounted value of future cash flows relative to the cost of the investment. More sophisticated approaches would incorporate an element of risk- such as the Capital Asset Pricing Model (CAPM which is discussed in chapter 6). These traditional approaches though tend not to be liked by managers- partly because they exclude any role for management. However, real options theory actually places the manager at the heart of the process.

This is not the only reason why the theory is popular- it is also due to the limitations of existing approaches to investment appraisal. Any method which tries to discount future earnings runs into practical problems. First, estimating future cash flows is difficult. Second, applying the proper rate of discount can be even harder still. In the CAPM model the discount rate should reflect the opportunity cost of undertaking that investment- i.e. the rate that is achievable on another project of similar risk. It is obvious that not all investment projects have close substitutes. In addition, because more risky projects have higher discount rates, CAPM measures often return negative net present discounted values for exciting strategic opportunities. For example, given the uncertainties would any company ever invest in oil exploration, or in new technologies and pharmaceutical products?

The CAPM and other forms of investment appraisal based on present discounted values can only be applied with information that is already known. Given that investment projects are long-lasting and are expected to yield cash flows over many years, it is more likely that the information set of the investor will improve over time. CAPM and its variants though assume that once a project is undertaken the capital is held passively by the firm from there-on in. Instead it seems more plausible that managers would be employed to react to the changing information set as events unfold. If firms actually hire managers specifically to do this- then the managerial flexibility must be worth something.

Real option theory (see Dixit and Pindyck (1994) - *Investment under uncertainty*; Princeton University Press) starts from the standpoint that investment projects have managerial options embedded within them. For example- if a firm believes that it has discovered an oil field it does not know how much oil there is and at what future price it can be sold at. Before pumping the firm may then buy or lease the land and survey. If oil is not found then the costs can be capped at the outlay already sunk. If oil is discovered they can then assemble drilling equipment, but if the oil price then slumps managers can put the project on hold or perhaps sell the land. If the oil price recovers they can then start up production. Given all the uncertainties the options to produce have value in themselves because they enable firms to respond optimally to new information as it becomes available. CAPM does not follow this step-by-step approach. It simply assumes that all bets are made upfront, rather than small incremental bets to just stay in the game.

Financial options are valuable because they allow investors to limit their exposure to price changes by guaranteeing the right to undertake transactions at a given price. These options are more valuable the longer it lasts and the more volatile are underlying asset prices. For investment projects the same maxims would apply. Where projects involve potentially large sunk costs and future returns are uncertain, options enable the investor to limit the extent to which sunk costs are committed whilst uncertainty is resolved. A traditional CAPM approach on the other hand would deal with long horizons and uncertainty very harshly.