Business Risk Management Laboratory

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Key words	Management of technology (MOT), business of science, real options, option games theory, timing options

This laboratory is studying the following topics as Studies on Industrial clusters, Valuation of start-ups at death-valley, Option-games analysis, and Timing option.

### Theme 1 ▶ Study on open innovation and industrial clusters: MOT, business of science

Regardless of advances in information and communication technology, the world has not flattened out but is rather showing a tendency to form up into industrial clusters. While heavily concentrated industrial clusters display selective and concentrated economy, they are also vulnerable weak to uncertainty. This creates a necessary condition for a business or and financial engineering model that can achieve a return on investment from even high birth and high death rate projects from basic research. Our laboratory is conducting research on the investment strategy of the business portfolio that can respond to uncertainty as MOT (Management of Technology) and the business of science.
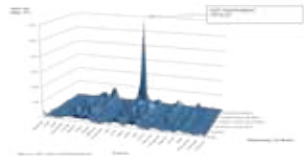
Japan's 3Dminesional Industrial Structure

Theme 2 ▶ Study into valuation of start-up's early negative profits period: Real options

When it comes to rapid conversion from projects of basic research, start-ups have superiority over major large companies from the perspectives of combing revolutionary technology and niche markets. However, start-ups also have a tendency to collapse in after a short time due to lack of funding. This creates a requirement for an optimal valuation and implementation method that will allow revolutionary ideas to be implemented during their negative profits period. Our laboratory is performing research into the investment potential of revolutionary but high risk projects by using real options to convert the negative NPV (Net Present Value) into the positive ENPV (Expended Net Present Value) of the project.
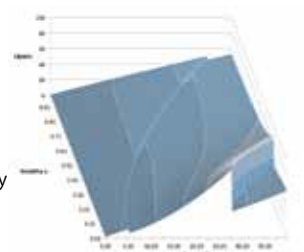
Option-games Model

Theme 3 ▶ Study on strategic partnership in the trade-off between flexibility and commitment: Option games

Real options are reliant on flexible values that wait until uncertainty has been reduced. There is also a requirement, however, to evaluate a commitment value - limiting the risk of being overtaken by a rival company - from game theory and then striking an overall balance. Therefore, during strategic alliances under uncertainty, there is a demand for the proposal of scenarios in which the information sharing strategy can shift Nash equilibrium from the Prisoner's Dilemma to Pareto optimality. Our laboratory is using an option games approach to a conduct research into the optimization of the tradeoff between these two values.
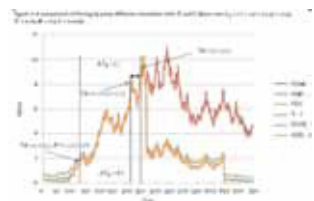
Timing Option

Theme 4 ▶ Study on optimal timing of irreversible investment under uncertainty: Timing option

In the development of technology and products, future profits are an uncertain and investment should become an irreversible sunk cost. At this severe condition, the optimum timing is decided by waiting to invest until the present value of total return on investment can exceed the investment value with the value of waiting option. Of course, it is also possible to instead quickly make a withdrawal investment in order to limit downside risk as the negative profits of project or calculate the potential value of expanding an R&D investment as a growth option in order to create an upside opportunity for the future new market. Our laboratory team is conducting research into the timing option of investment decision by developing a model of underlying asset behaviors under uncertainty.