Forecast of Business Performance using an Agent-based Model and Its Application to a Decision Tree-Monte Carlo Business Valuation

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In business valuation, the net present value is calculated for an investment decision. The calculated net present value can vary due to three uncertain factors: the discount rate, volatility of performance, and reliability of the business plane. The reliability of the business plane in particular is poor and forecast of business performance remains a technical challenge. In this paper, a forecast of business performance is made using an agent-based model for the semiconductor (LSI) industry, personal computer (PC) industry, and liquid crystal display (LCD) industry. A simple model, where a single agent represents each industry, is developed in order to forecast demands for the three industries simultaneously. The demand is decomposed to a trend curve, market fluctuation, and Brownian motion, and the market fluctuation is modeled using agents. Although the model is simple, forecasted demands reproduced actual markets fairly well (Fig.1). Furthermore, based on the forecasted demands, a business valuation was made using a decision tree-Monte Carlo simulation for the LCD industry (Fig.2). Realistic probability for each business scenario is calculated in this model, because the forecasted demand is obtained as a probability density. Using the simulation result, major scenarios with large probabilities are chosen, and it is possible to construct a business plane in order to cope with the major scenarios.
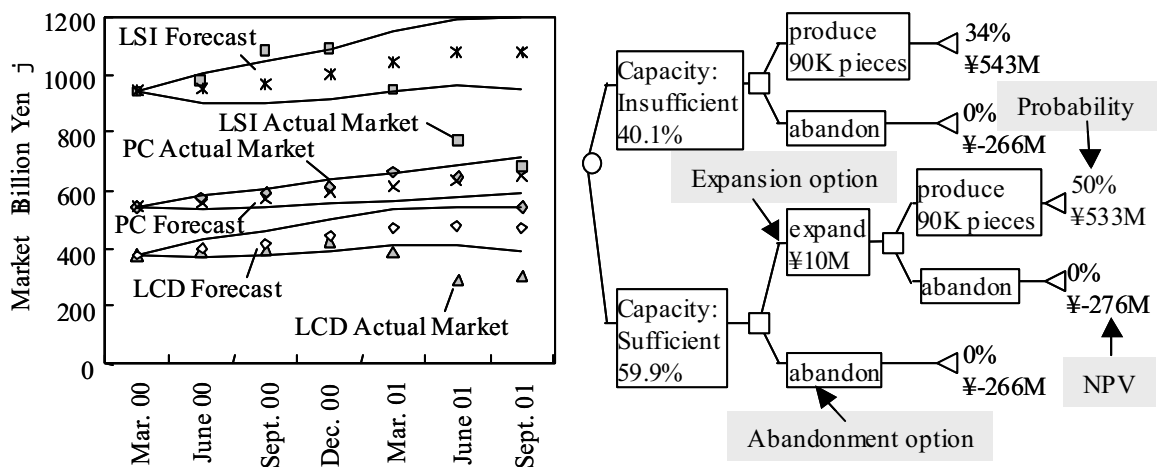

Fig. 1 Comparison of forecasts with markets   Fig.2 Decision tree-Monte Carlo simulation