
Calculation of option values

NORDEN's valuation of purchase and extension options follows standard pricing of American options, which simulates future scenarios for T/C rates and vessel prices under assumptions of price volatility and correlation between the change in T/C rates and the change in vessel prices. In each segment, the volatility in vessel prices and the correlation between vessel prices and T/C rates are assumed to be constant over time and are estimated based on historical data. The volatility in T/C rates is assumed to vary over time and differs for each segment. The 1-year T/C volatility for Dry Cargo is determined as the implicit volatility in options on FFA contracts. For Tankers, the 1-year T/C volatility is calculated based on historical data. The 20-year T/C volatility is equal to the vessel price volatility, whereas the other points are determined by interpolation.

An important input to the model is the T/C rate curve for each vessel type. The curve consists of the following elements: expected market rates for the first 5 years and a long-term T/C rate (20 years), calculated as the implicit rate used to equate the discounted value of future cash flows with the market price for a secondhand 5-year old vessel. Between year 5 and year 20, the T/C curve is determined by interpolation. In addition, market prices are used for interest rates, exchange rates and running costs. On the basis of the future scenarios for T/C rates and vessel prices, the optimum value of the purchase and extension option for each vessel is determined. Purchase options under which the price for the vessel is stated in JPY are translated at the forward JPY/USD rate before the pricing.