

### 12.24    Yield management

An airline is selling tickets for flights to a particular destination. The flight will depart in three weeks' time. It can use up to six planes each costing £50 000 to hire. Each plane has the following:

- 37 First Class seats
- 38 Business Class seats
- 47 Economy Class seats.

Up to 10% of seats in any one category can be transferred to an adjacent category.

It wishes to decide a price for each of these seats. There will be further opportunities to update these prices after one week and two weeks. Once a customer has purchased a ticket, there is no cancellation option.

For administrative simplicity, three price level options are possible in each class (one of which must be chosen). The same option need not be chosen for each class. These are given in Table 12.17 for the current period (period 1) and two future periods.

Table 12.17

	Option 1	Option 2	Option 3	
First	£1200	£1000	£950	Period 1
Business	£900	£800	£600	
Economy	£500	£300	£200	
First	£1400	£1300	£1150	Period 2
Business	£1100	£900	£750	
Economy	£700	£400	£350	
First	£1500	£900	£850	Period 3
Business	£820	£800	£500	
Economy	£480	£470	£450	

Demand is uncertain but will be affected by price. Forecasts have been made of these demands according to a probability distribution that divides the demand levels into three scenarios for each period. The probabilities of the three scenarios in each period are as follows:

Scenario 1	0.1
Scenario 2	0.7
Scenario 3	0.2

The forecast demands are shown in Table 12.18.

Table 12.18

	Price option 1	Price option 2	Price option 3	
First	10	15	20	Period 1 Scenario 1
Business	20	25	35	
Economy	45	55	60	
First	20	25	35	Period 1 Scenario 2
Business	40	42	45	
Economy	50	52	63	
First	45	50	60	Period 1 Scenario 3
Business	45	46	47	
Economy	55	56	64	
First	20	25	35	Period 2 Scenario 1
Business	42	45	46	
Economy	50	52	60	
First	10	40	50	Period 2 Scenario 2
Business	50	60	80	
Economy	60	65	90	
First	50	55	80	Period 2 Scenario 3
Business	20	30	50	
Economy	10	40	60	
First	30	35	40	Period 3 Scenario 1
Business	40	50	55	
Economy	50	60	80	
First	30	40	60	Period 3 Scenario 2
Business	10	40	45	
Economy	50	60	70	
First	50	70	80	Period 3 Scenario 3
Business	40	45	60	
Economy	60	65	70	

Decide price levels for the current period, how many seats to sell in each class (depending on demand), the provisional number of planes to book and provisional price levels and seats to sell in future periods in order to maximise expected yield. You should schedule to be able to meet commitments under all possible combinations of scenarios.

With hindsight (i.e. not known until the beginning of the next period), it turned out that demand in each period (depending on the price level you chose) was as shown in Table 12.19.

Table 12.19

	Price option 1	Price option 2	Price option 3	
First	25	30	40	Period 1
Business	50	40	45	
Economy	50	53	65	
First	22	45	50	Period 2
Business	45	55	75	
Economy	50	60	80	
First	45	60	75	Period 3
Business	20	40	50	
Economy	55	60	75	

Use the actual demands that resulted from the prices you set in period 1 to rerun the model at the beginning of period 2 to set price levels for period 2 and provisional price levels for period 3.

Repeat this procedure with a rerun at the beginning of period 3. Give the final operational solution.

Contrast this solution to one obtained at the beginning of period 1 by pricing to maximise yield based on expected demands.

## 12.25 Car rental 1

A small (‘cut price’) car rental company, renting one type of car, has depots in Glasgow, Manchester, Birmingham and Plymouth. There is an estimated demand for each day of the week except Sunday when the company is closed. These estimates are given in Table 12.20. It is not necessary to meet all demand.

Table 12.20

	Glasgow	Manchester	Birmingham	Plymouth
Monday	100	250	95	160
Tuesday	150	143	195	99
Wednesday	135	80	242	55
Thursday	83	225	111	96
Friday	120	210	70	115
Saturday	230	98	124	80

Cars can be rented for one, two or three days and returned to either the depot from which rented or another depot at the start of the next morning. For example, a 2-day rental on Thursday means that the car has to be returned on Saturday morning; a 3-day rental on Friday means that the car has to be returned on Tuesday morning. A 1-day rental on Saturday means that the car has to be returned on Monday morning and a 2-day rental on Tuesday morning.