Chapter 7 - Forecasting

Forecasting

- ## The simplistic case
  - Long-term forecasting problems
  - Short-term forecasting problems
- ## Many variables
  - Lag relationship
- ## Structure
  - Sales of Brand = Total population **x** Proportion of potential beer drinkers **x** Average net disposable income per capita of beer drinkers **x** Proportion of food expenditure spent on beverages **x** proportion of alcohol which is beer **x** proportion of beer sales which are for the brand in question.

Forecasting

- Accuracy and scope
  - How accurate are our forecasts?
  - How far ahead one should attempt to forecast?
- Relevance
  - Effect of errors in the prior distributions that have been used
  - Effect of errors in the forecasts themselves on the consequences of the decision.

Nirvana Residential Homes

Nirvana Residential Homes

- Nirvana Residential Homes (NRH) owns and operates a very large chain of homes for elder people.

- The board is concerned at the level of quality in a number of the homes and have invited an OR analyst from a local university to survey a sample of homes and to make recommendations for raising the general level.

- Analyst report.

What do you think are the possible criteria?
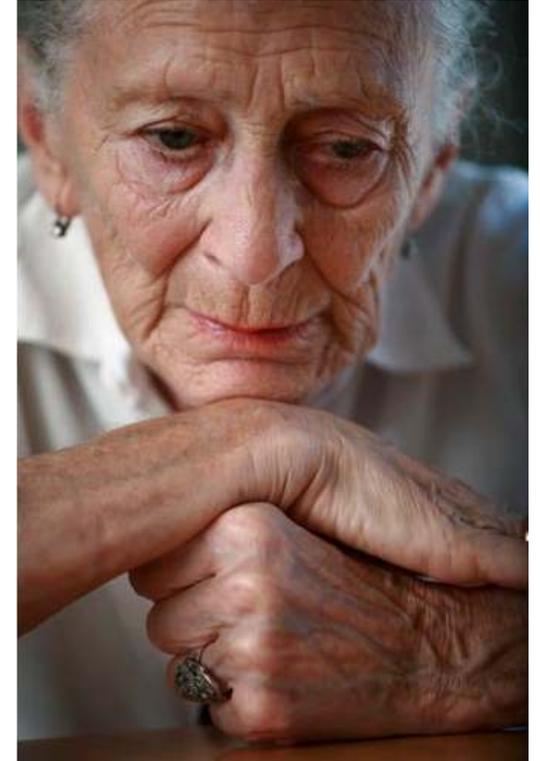
What do you think are the possible criteria?

- Central heating
- Indoor lavatory
- Separate bathroom and lavatory
- Constant hot water
- Private grounds
- Security from outsiders
- On-site security

- Proximity to shops
- Proximity to church
- Buses near by
- Chiropodist visits
- Communal lounge
- Meals provided
- Mini buses available
- Trustees visit regularly
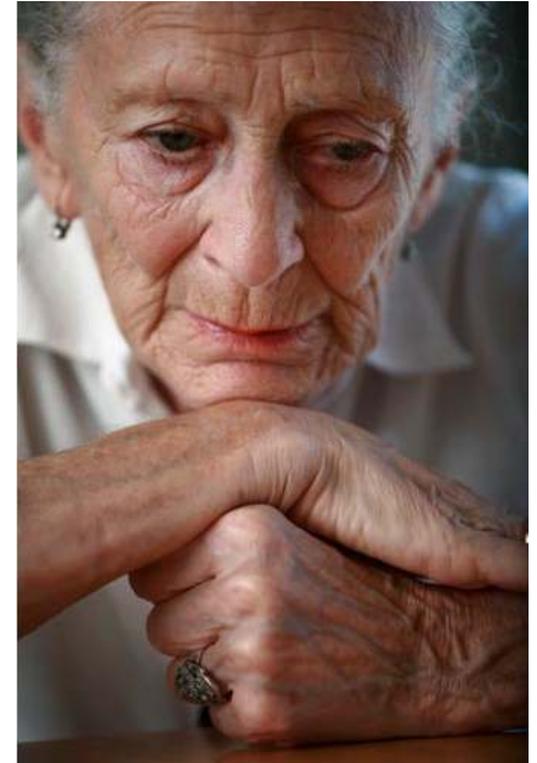
How would you decide the important criteria?

Table 1

		Raw score
		95
1	Central heating	50
2	Indoor lavatory	50
3	Separate bathroom and lavatory	70
4	Constant hot water	115
5	Private grounds	15
6	Security from outsiders	40
7	On site warden	20
8	Proximity to shops	10
9	Proximity to church	50
10	Buses near by	10
11	Chiropodist visits	15
12	Hairdresser visits	10
13	Communal lounge	10
14	Meals provided	20
15	Mini buses available	70
16	Trustees visit regularly	650

- How would you decide whether a home is in a good condition or not?

How would you decide the important criteria?

Table 1

		Raw score	Score
1	Central heating	95	15
2	Indoor lavatory	50	8
3	Separate bathroom and lavatory	50	8
4	Constant hot water	70	11
5	Private grounds	115	17
6	Security from outsiders	15	2
7	On site warden	40	6
8	Proximity to shops	20	3
9	Proximity to church	10	2
10	Buses near by	50	8
11	Chiropodist visits	10	1
12	Hairdresser visits	15	2
13	Communal lounge	10	1
14	Meals provided	10	1
15	Mini buses available	20	3
16	Trustees visit regularly	70	11
		650	100

6 of the list account for 70 points, then 75 points should be the minimum acceptable standard?

- How would you decide whether a home is in a good condition or not?

How would you decide the important criteria?

Table 1

		Raw score	Score
		95	15
1	Central heating	50	8
2	Indoor lavatory	50	8
3	Separate bathroom and lavatory	70	11
4	Constant hot water	115	17
5	Private grounds	15	2
6	Security from outsiders	40	6
7	On site warden	20	3
8	Proximity to shops	10	2
9	Proximity to church	50	8
10	Buses near by	10	1
11	Chiropodist visits	15	2
12	Hairdresser visits	10	1
13	Communal lounge	10	1
14	Meals provided	20	3
15	Mini buses available	70	11
16	Trustees visit regularly	650	100

- Although some homes have a score of 75, they report that they are not happy !!

- Who is right? Why is the list not acceptable?

What next?

Table 2

	Category	Trustees	Residents
1	Central heating	15	15
2	Indoor lavatory	8	20
3	Separate bathroom and lavatory	8	4
4	Constant hot water	11	10
5	Private grounds	17	3
6	Security from outsiders	2	8
7	On site warden	6	8
8	Proximity to shops	3	12
9	Proximity to church	2	3
10	Buses near by	8	2
11	Chiropodist visits	1	1
12	Hairdresser visits	2	5
13	Communal lounge	1	0
14	Meals provided	1	0
15	Mini buses available	3	7
16	Trustees visit regularly	11	2
		100	100

What happened if they become ill?

Cost data to be collected

Table 3 Unit costing (legal fees, planning approval, site preparation: £10 000)

Size	Construction (£)	Medical/nursing (£)	Materials (£)
5 beds	60 000	50 000 p.a.	10 000 p.a.
10 beds	90 000	65 000 p.a.	20 000 p.a.
15 beds	120 000	80 000 p.a.	30 000 p.a.
20 beds	150 000	95 000 p.a.	40 000 p.a.

Table 4 Annual mortgate repayments per £10 000 borrowed

Term in years	10	15	20
Payment p.a. (£)	1500	1150	1000

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Table 4 Annual mortgate repayments per £10 000 borrowed

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Build a model for the cost per year of building and operating a unit
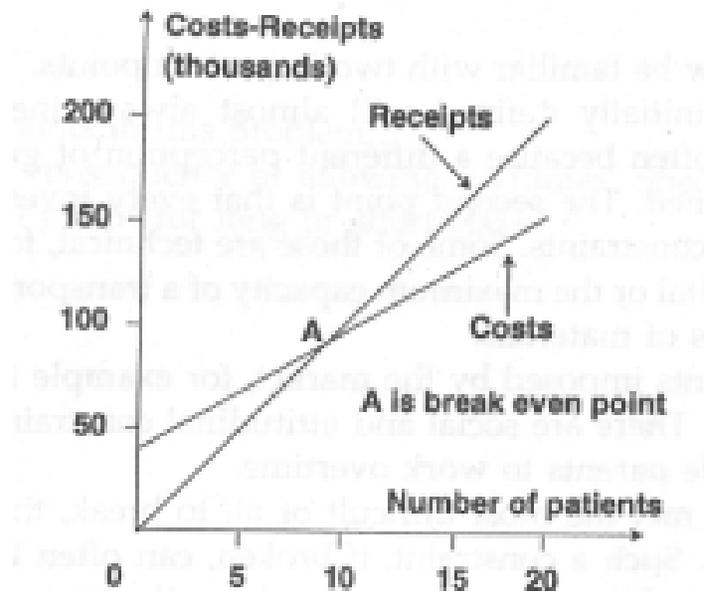
Table 5 Annual costs (£'000s)

Loan period	Number of patients			
	5	10	15	20
10	71	100	130	159
15	68	96	125	153
20	67	95	123	151

Note: Those who wish can express all the above in algebra.

- 65000 + 20000 = 85000
- 90000 + 10000 = 100000
  - (100000/10000)*1000 = 10000
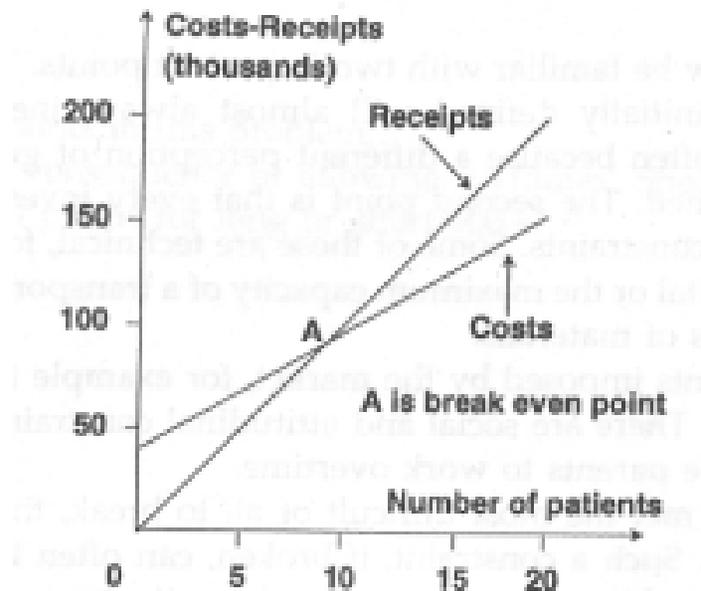- 85000 + 10000 = **95000**

What's the income to meet these costs?

	Number of people			
	5	**10**	**15**	**20**
Cost	68	96	125	153
Receipts	50	100	150	200

What's the income to meet these costs?

- What is the critical mass of patients?
  = 9

  What does this mean?

What's the income to meet these costs?

- Distribution of size of homes:

Number of residents	1–10	11–20	21–30	31–41	41–50	51–60	61–70	70+
Number of homes	4	10	15	18	25	30	50	30

- What is the number of houses (at most) that can build a special unit?

Reflections

- The break point
  - Problem as initially defined will almost always change during a study, often because a different perception of goals and objectives has been obtained.
  - Every investigation is carried within a set of constraints. Some of these are technical, for example the capacity of a hospital or the maximum capacity of a transport system or the physical properties of materials. But there are constraints imposed by the market such as saturation sales of a product.