



CA2 Model documentation, analysis and reporting

Sample project S02

Instructions to the candidate

- (i) Read the attached document, which describes the background to this project. You will also be given an additional piece of information later on in the day.
- (ii) Summarise the sales data using a chart and determine to which class it is most likely the unclassified data belongs.
- (iii) Project the data to determine the number of lots to be expected to be offered at the next auction.
- (iv) Determine all possible combinations of work schedules for the four auctioneers. For each combination construct a schedule showing the number of lots sold in each classification by each auctioneer.
- (v) Determine which of the combinations in (iv) best meets the criteria set by the client and produce a suitable chart illustrating this combination.
- (vi) Repeat steps (iv) and (v) in light of the additional information given to you later in the day.
- (vii) Prepare a summary of five or six pages, capturing the main features and results. You can assume that the summary is being prepared for your manager, a qualified actuary, who will present it to the client. You should cover the following:
 - Data, approach and assumptions used
 - Results which answer Ms Spinks' questions, including charts
 - Results using the new information
 - Conclusions, including suggested next steps

Background

You work for a small consultancy in Actuarial. Your team has recently acquired a new client, Christie Spinks.

Ms Spinks has recently purchased an auction house, Northby's, now called Spinks-Northby's. Ms Spinks has had to employ four new auctioneers to replace the members of the Northby family who retired when they sold the business.

The Northby auction house has held monthly auctions for the past twenty years, the last one was conducted on 1 July 2011. Ms Spinks is planning to hold the first Spinks-Northby's auction on 1 August 2011 and has asked your manager to advise her on the work schedule for her four auctioneers.

The Actuarial Auction Association (AAA) has strict rules on auction conduct. These rules state that:

- an auctioneer can work for a maximum of 2 hours in any one day
- selling time must be restricted to a maximum of 8 hours in any one day when a sale is taking place

Ms Spinks wishes to consider using all four of her auctioneers for the next sale, each working for a single session of 2 hours. The sale will run from 8am to 5pm with a 1-hour break for lunch at 12 noon.

Items sold at auction are termed "lots". Lots at the Spinks-Northby's auctions fall into one of four classifications:

- Silverware & Jewellery
- Works of Art
- Furniture & Clocks
- Ceramics

Traditionally, Northby's auctions have sold their lots in the above order. Ms Spinks wishes to continue with this pattern as she believes this will encourage Northby's existing customer base to continue to attend the sales. As soon as the lots in one classification are sold, the auctioneer moves immediately to the lots in the next classification.

Only one auctioneer is selling at any one time. The time taken for one auctioneer to take over from another is negligible.

Some lots have a reserve price attached where the lot will not sell if bidding does not reach or exceed the reserve price. However, the Northby's auction house was renowned for successfully selling all lots put up for sale. Ms Spinks expects this reputation to be upheld at Spinks-Northby's.

An auctioneer's performance is measured by the time taken, in minutes, for him or her to complete the sale of an individual lot. The time taken depends on the following factors:

- the classification (e.g. works of art sell for more, on average, so usually take longer to sell than ceramics)
- the competence of the individual auctioneer (the more competent, the less time taken to sell a lot)
- whether or not the auctioneer is a specialist in a particular classification

An article recently published in “That’s Your Lot” magazine gave the National Average for the number of minutes auctioneers take to sell a lot under each of the four classifications as:

Classification	Minutes per lot
Silverware & Jewellery	2.5
Works of Art	3
Furniture & Clocks	4
Ceramics	1

Ms Spinks’ four new auctioneers are Sam, Wally, Fred and Clive who are all Fellows of the AAA. The AAA publishes statistics on individual Fellows’ speeds and specialisms as follows:

Specialist Category		Speed factor* (specialist)	Speed factor* (non-specialist)
Sam	Silverware & Jewellery and Ceramics	60%	140%
Wally	Works of Art	40%	80%
Fred	Furniture & Clocks	80%	100%
Clive	None	n/a	90%

* Speed factor indicates an individual auctioneer’s speed of selling lots compared with the National Average. For example, a factor of 50% means the auctioneer on average takes half the National Average time to sell a lot in that category.

As the order in which the lot classifications will be sold during the next auction has been fixed Ms Spinks realises that the order in which she schedules her four auctioneers to work their shifts will have an impact on how many lots can be sold during the day.

Spinks-Northby’s has supplied details of the numbers of lots sold at twenty previous auctions from 1 March 2009 to 1 October 2010 inclusive (see below). For the earliest five auctions some of the lots were not classified, though there is evidence to suggest that all the unclassified lots came from the same category.

Ms Spinks has asked your manager to use this data set to estimate the number of lots she should expect to have available for sale at the next auction on 1 August 2011, split by classification.

In order to continue Northby’s reputation of selling everything that is put up for sale, Ms Spinks wants to know which combinations of auctioneers’ work schedules will result in the sale of all the lots she expects to have available for sale at the next auction.

Ms Spinks has also asked for recommendations as to which of the auctioneers’ work schedules produced for the next auction result in:

- (a) the highest number of lots being sold
- (b) the auction being completed in the shortest time with all available lots being sold

A further piece of information will be provided later on in the day.

END

Data (this will be available electronically)

Number of lots sold at auction 1 March 2009 to 1 October 2010 inclusive

Date	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09
Silverware and Jewellery	46	53	47	54	47	48	53	49	50	47
Works of Art	0	0	0	0	0	0	0	0	0	0
Furniture and Clocks	56	55	51	55	50	78	74	76	65	64
Ceramics	93	89	94	99	98	95	101	105	118	115
Not specified	51	35	42	35	38	0	0	0	0	0

Date	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10
Silverware and Jewellery	50	47	54	51	51	53	48	50	54	47
Works of Art	0	44	39	31	49	47	25	52	42	40
Furniture and Clocks	65	63	58	55	49	49	45	43	39	40
Ceramics	107	127	129	117	123	126	128	129	155	160
Not specified	0	0	0	0	0	0	0	0	0	0

END

Additional information

Ms Spinks has just heard about an outbreak of “Gavel-Finger”. This is a debilitating disease affecting auctioneers, increasing the time they take to sell lots.

Her four auctioneers have all had a medical examination and the doctor’s report is as follows:

Doctor’s Report on employees of Spinks-Northby’s

I have examined the four auctioneers Sam, Wally, Fred and Clive to determine the extent to which they will be affected in the workplace by Gavel-Finger and my findings are as follows:

Sam is suffering from Grade A Gavel-Finger.

Wally and Fred are suffering from Grade B Gavel-Finger.

Clive was immunised against Gavel-Finger in 2009 and is therefore unaffected by the outbreak.

*Signed
A. Doctor*

A recent article in “That’s Your Lot” magazine on Gavel-Finger states that Grade A Gavel-Finger will increase the time taken to sell lots by 50% but Grade B Gavel-Finger is less severe and will only increase the time taken to sell lots by 25%.

Ms Spinks would like to know whether any of the auctioneers’ work schedules would still enable her to sell all the lots expected to be available at the auction on 1 August 2011. If none of the combinations achieves this, she would like to know which work schedule would maximise the number of lots that could be sold and so how many lots she would need to defer to a later sale.

END