

Learning-by-Doing in the Newsvendor Problem:

On-Line Appendix: **Sample materials for the experiment**

A1. Written instructions given to subjects for high safety stock, 100-option treatment. Instructions for low safety stock condition differed only in terms of per unit cost and demand distribution (see section 2.2). All additional changes for other treatments are marked in bold.

General. The purpose of this session is to study how people make decisions in a particular situation. If you have any questions, feel free to raise your hand and a monitor will assist you. From now until the end of the session, unauthorized communication of any nature with other participants is prohibited.

During the session you will play a game from which you can earn ‘francs.’ The francs you earn will be converted into U.S. dollars at a rate of 1000 francs per \$1. **The exchange rate for 10P was 10000 francs per dollar.** Upon completion of the game, you will be paid your total earnings in U.S. cash plus a \$5 show-up fee.

Description of the game. You are a retailer who sells a single (fictional) item, the widget. In each round of the game, you order widgets from a supplier at a cost of 3 francs per unit, and sell widgets to your customers at a price of 12 francs per unit. In each round, you also pay a fixed overhead cost (‘rent’) of 200 francs. Your goal is to maximize the profit you make totaled over all the rounds of the game.

In each round, widgets must be ordered from the supplier before you know for certain what quantity your customers will demand. **The additional sentence for the 3-option high safety stock treatment of study 1:** You may order widgets in one of just three quantities: 35, 50 or 75 widgets. **For the 3-option low safety stock treatment of study 1:** You may order widgets in one of just three quantities: 75, 100 or 115 widgets. **Analogous for 9-option treatments (listed lowest to highest).**

Once you place your order, the computer randomly selects the demand quantity from a range of 1 to 100 units, with each number in the range equally likely. That is, there is a 1/100 chance that demand will be 1, a 1/100 chance that demand will be 2, and so on.

The demand drawn for any one round is independent of the demand from earlier rounds. So a small or large demand in earlier rounds has no influence on whether demand is small or large in later rounds.

Calculating profit. If the number of widgets ordered, W , is the same or less than the quantity demanded, D , then your profit for the round is

$$\text{Profit} = 12W - 3W - 200$$

For example, if you order 35 widgets and the demand is 60, then your profit for the round is $12(35) - 3(35) - 200 = 115$ francs. Note that when the number of widgets ordered is less than demand, you lose opportunities for sales.

If the number of widgets ordered, W , is greater than the quantity demanded, D , then your profit for the round is

$$\text{Profit} = 12D - 3W - 200$$

For example, if you order 75 widgets and demand is 60, then your profit for the round is $12(60) - 3(75) - 200 = 115$ francs. When the number of widgets ordered is greater than demand, you must dispose of the unsold units (widgets go stale after a round, and cannot be carried as inventory into future rounds).

The following paragraph appears in the 10P treatments: When you may order. You may change your order quantity only once every 10 rounds. So for example, whatever quantity you order in round 1 (35, 50 or 75) will be the quantity delivered in rounds 1 through 10. You will then be given an opportunity to change the quantity for each round 11 through 20, and so on.

The following paragraph appears in the UPFRONT treatment: Information to help you in your decision. You have been given a sheet that displays the profit you will make for each quantity you could order, and every demand

level that might subsequently result. The sheet also provides some summary statistics. A pen and blank sheet of paper have been provided for any calculations of notes you might wish to make.

After placing an inventory order, you will receive the demand and profit results for the round. **In FORE treatments:** You will also be shown the results that would have occurred if you had ordered either of the other order quantities. **In the MAVG treatment:** Additionally you will see the average profit that would have resulted from each of the three order quantities for 10 most-recent rounds.

The computer will display the history of play (how much you ordered, how much you made) to date.

Number of decisions. The game lasts for 100 decisions.

Consent Forms. If you wish to participate in this study, please read and sign the accompanying consent form prior to beginning the game.

A2. Game screens prior to decision order

Go Back to Instructions Round: 51 out of the total of 100

Inventory Information

For every unit you sell you receive 12 and for every unit you buy you pay 3.

In each round, you also pay a fixed overhead cost ('rent') of -200 tokens.

Demand Description: Once you place your order, the computer randomly selects the demand quantity from a range of 1 to 100, with each integer in the range equally likely. That is, there is a 1/100 chance that the demand will be 1, 1/100 chance that demand will be 2, and so on.

Enter your order and click on SUBMIT button.

My Quantity is:

SUBMIT

In treatments with 9-options or 3-options, order quantities were restricted (see section 3.1). After the "Submit" button is clicked, the decision's outcome is displayed in the pop-up box (see Appendix A3).

Profitability Information

Last Decision's Profit: 527

Total Profit (in tokens): **28750.00**

In the MAVG treatment there was an additional small table on the screen listing the 10-round moving average of the profit for each of the three options (see Table 1).

HISTORY
(if necessary use the scroll bar to view the entire history)

Round	Demand	Averages Quantity	Profit	Hypothetical profit information			Details
				35	50	75	
6	44.00	75.00	503.00	515.00	578.00	503.00	Details
5	47.78	75.00	529.67	465.67	538.00	529.67	Details
4	52.91	75.00	582.64	470.27	539.82	582.64	Details
3	42.00	75.00	449.67	432.33	467.33	449.67	Details
2	67.90	75.00	685.40	485.00	578.00	685.40	Details

In 10P treatments, this information represents averages over 10 demand-periods (hence the decimals). In all other treatments, the label "Averages" was dropped.

Hypothetical information was provided only in the treatments with FORE information (see Table 1).

The "Details" buttons were shown in the 10P treatments only. Clicking them opened up the pop-up window displayed in Appendix 3.2.

A3. Pop-up windows that appear immediately after the ordering decision has been placed. The pop-up windows display results of the decision that has just been made. Clicking the “OK” button at the bottom of the pop-up window closes it and returns the participant to the decision screen (see Appendix A2).

A3.1 In All but 10P Treatments:

Last Decision's Results:

You ordered: 75
 Demand was: 99
 This period's profit was: 875

Hypothetical Profitability Information:

Order	profit you would have made over the decision period
35	515
50	650
75	875

OK

The “Last Decision’s Results” portion was displayed in all treatments.

The hypothetical profitability information as displayed in treatments with FORE information without the 10P restriction (see Table 1).

A3.2 10P Treatments:

wait2 : Form

Last Decision's Results:

You ordered: 75
 Average Demand was: 67.9
 Average Profit was: 685.4

Round	Demand	Quantity	Profit	Hypothetical profit information		
				35	50	75
68	68	75	791	515	650	791
69	25	75	275	395	350	275
68	3	75	11	131	86	11
67	34	75	383	503	458	383
66	84	75	875	515	650	875
65	27	75	299	419	374	299
64	74	75	863	515	650	863
63	89	75	875	515	650	875
62	49	75	563	515	638	563
61	7	75	59	179	134	59

Record: 1 of 70

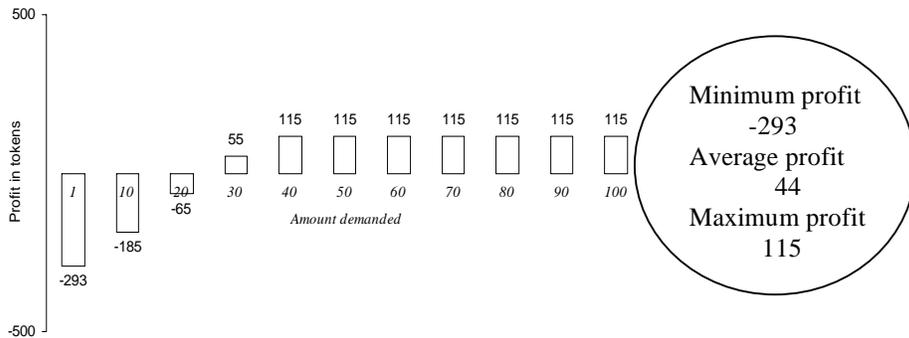
OK

Displayed only in the 10P treatments: The detail information about the actual demand realizations, the actual profit, and the (foregone) profit that would have been realized for each of the three options in each of the 10 demand periods covered by the standing order.

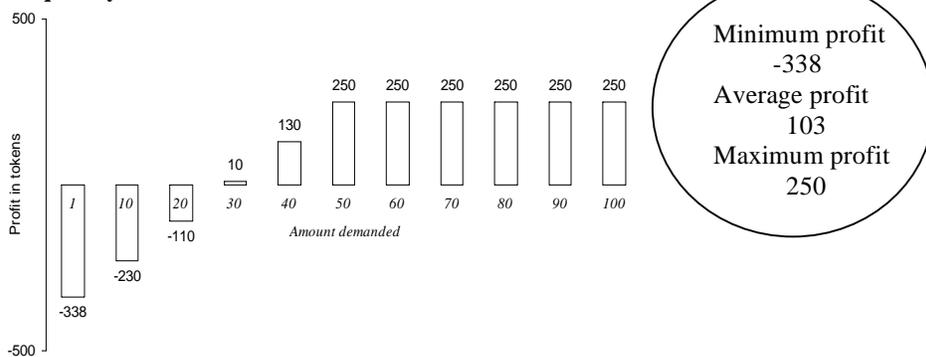
A4. Chart given to UPFRONT treatment subjects at the beginning of the session. Prior to the commencement of the game, we handed out the chart below to the subjects. We also verbally explained the chart, including the meaning of the maximum/average/minimum profit (circled in the diagram) associated with each of the three options. We then asked for questions.

SUMMARY OF PROFIT OPPORTUNITIES EACH ROUND, by ORDER QUANTITY

Order quantity of 35



Order quantity of 50



Order quantity of 75

