

APPENDIXES

APPENDIX 1

DATA FOR DIJON'S 35 STORES

Six-month Average Values For 2001

ENCRYPTED DATA FOR 35 DIJON STORES*

Store		Gross Sales Volume	Salesperson Hours	Cashier Hours	Sales and General Expenses	Marketing	Store Surface
(1)		(2)	(3)	(3)	(2)	(2)	(4)
ID	<i>k</i>	Y	X1	X2	X3	X4	X5
202	1	1,669.40	5.559	1.790	18.350	13.346	10.90
204	2	1,515.18	6.431	2.143	10.673	7.438	9.00
211	3	2,153.81	6.120	1.532	14.534	11.672	7.55
224	4	1,692.30	6.710	1.341	13.500	12.000	12.25
225	5	2,650.00	6.699	1.340	22.338	14.056	10.72
226	6	2,528.90	6.817	1.975	19.270	17.344	12.62
232	7	1,987.10	4.287	2.143	41.013	9.829	7.31
234	8	4,016.10	6.817	1.950	29.906	20.352	24.42
235	9	2,495.91	5.359	3.216	16.968	12.313	9.94
236	10	3,098.80	6.699	1.340	16.105	21.966	10.74
237	11	2,990.90	5.359	1.340	17.553	15.278	14.02
238	12	1,818.40	6.699	1.340	16.171	14.086	14.38
239	13	3,025.80	5.959	1.190	20.389	15.640	16.52
240	14	2,825.20	6.699	1.340	30.158	13.844	17.81
242	15	2,287.10	5.359	1.340	23.454	11.207	14.73
243	16	2,499.20	4.019	1.340	24.021	12.678	15.29
244	17	4,625.10	7.653	2.320	30.606	22.803	29.97
245	18	3,383.60	7.653	1.532	23.002	16.673	19.51
246	19	2,966.10	5.359	1.340	18.659	14.624	15.07
247	20	2,597.50	6.120	1.533	14.667	12.818	10.407
248	21	3,025.80	5.959	1.190	25.765	16.211	17.86
250	22	2,922.10	5.959	1.190	18.087	17.862	18.87
251	23	2,383.50	4.598	1.533	18.712	12.110	9.462
252	24	2,689.50	6.431	1.072	20.581	13.844	20.19
254	25	2,827.90	5.359	1.340	18.921	13.857	19.01
256	26	2,597.70	7.146	1.190	27.332	12.761	14.06
257	27	2,558.90	6.699	1.340	21.564	12.539	16.96
258	28	2,689.50	6.699	1.340	15.135	13.674	17.76
259	29	3,224.10	6.699	1.340	23.859	16.371	17.41
260	30	3,337.60	5.359	2.144	24.662	16.407	21.08
262	31	1,731.00	6.120	1.533	9.504	9.836	6.610
263	32	3,173.60	4.759	2.379	24.234	15.647	16.18
264	33	3,315.76	6.120	1.533	20.943	16.344	16.84
265	34	3,115.70	4.287	2.144	23.304	15.361	17.24
266	35	1,452.80	4.287	2.144	14.485	7.119	15.90

(1) For store identification, DIJON uses a 200 series, but in the DEA programs, the stores are identified by the integers, $k = 1, 2, \dots, 35$.

(2) Monetary values per period are in D\$, which stands for Dijon Monetary Unit.

(3) Salesperson and cashier hours are in thousand-hour units per six-months period.

(4) Store surface is in DSU, which stands for Dijon Area Unit

* The encrypted data correspond to average values, in real terms, for 1 January 2000 to 31 December 2001. Monetary values are deflated to the AU\$ values at 29 December 2001. Original data are taken from the accounting records that the branch manager uses for decision making.

APPENDIX 2

PRICES AND COSTS OF ADJUSTMENT DISCRETIONARY VARIABLES

Six-month Average Values For 2001

**COSTS AND COSTS OF DJJUSTMENT
DISCRETIONARY VARIABLES**

Six-months Average Values for 2001

This encrypted data corresponds to costs for six months. The values are average values for 1 January to 31 December 2001. Costs of adjustment have specific units. Monetary values are deflated to 29 December 2001. Original data are taken from the accounting records that the branch manager uses for decisions making.

VALUES FOR SIX MONTHS

Store 202 Input	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Sales & General Costs, D\$	10.90	0.000	1.15
Salesperson Hours, D\$/1000 Hours	4.36	7.12	12.63
Cashier Hours, D\$/1000 Hours	2.07	2.07	3.38
Marketing, D\$	13.46	0.000	0.148

Store 204 Input	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Sales & General Costs, D\$	10.99	0.000	1.12
Salesperson Hours, D\$/1000 Hours	3.38	6.45	12.95
Cashier Hours, D\$/1000 Hours	1.58	1.55	3.23
Marketing, D\$	7.723	0.000	0.148

Store 211 Input	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Sales & General Costs, D\$	15.11	0.000	1.46
Salesperson Hours, D\$/1000 Hours	3.80	6.45	12.95
Cashier Hours, D\$/1000 Hours	1.52	1.58	3.25
Marketing, D\$	14.97	0.000	0.148

Store 224	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	15.33	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.38	6.45	12.92
Cashier Hours, D\$/1000 Hours	1.56	1.56	3.23
Marketing, D\$	15.53	0.000	0.148

Store 225	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	22.98	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.47	6.45	12.80
Cashier Hours, D\$/1000 Hours	1.56	1.56	3.25
Marketing, D\$	15.69	0.000	0.148

Store 226	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	14.26	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.47	6.45	12.95
Cashier Hours, D\$/1000 Hours	1.56	1.56	3.25
Marketing, D\$	14.96	0.000	0.148

Store 232	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	24.35	0.000	2.04
Salesperson Hours, D\$/1000 Hours	3.65	6.40	12.98
Cashier Hours, D\$/1000 Hours	1.56	1.56	3.30
Marketing, D\$	15.80	0.000	0.140

Store 234	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	30.65	0.000	1.74
Salesperson Hours D\$/1000 Hours	3.34	6.45	12.70
Cashier Hours, D\$/1000 Hours	1.56	1.56	3.28
Marketing, D\$	15.86	0.000	0.148

Store 235	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	17.62	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.39	6.45	12.85
Cashier Hours, D\$/1000 Hours	1.56	1.56	3.26
Marketing, D\$	15.956	0.000	0.148

Store 236	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	16.65	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.25	6.45	12.70
Cashier Hours, D\$/1000 Hours	1.60	1.60	3.27
Marketing, D\$	14.86	0.000	0.148

Store 237	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	18.00	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.397	6.45	12.95
Cashier Hours, D\$/1000 Hours	1.58	1.58	3.30
Marketing, D\$	15.60	0.000	0.148

Store 238	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	16.71	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.347	6.45	12.60
Cashier Hours, D\$/1000 Hours	1.58	1.58	3.25
Marketing, D\$	14.86	0.000	0.148

Store 239	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	21.05	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.40	6.45	12.65
Cashier Hours, D\$/1000 Hours	1.55	1.55	3.30
Marketing, D\$	14.75	0.000	0.148

Store 240	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	31.12	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.35	6.45	12.75
Cashier Hours, D\$/1000 Hours	1.58	1.55	3.30
Marketing, D\$	15.06	0.000	0.148

Store 242	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	24.12	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.25	6.45	12.65
Cashier Hours, D\$/1000 Hours	1.60	1.55	3.20
Marketing, D\$	14.30	0.000	0.148

Store 243	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	24.62	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.37	6.45	12.29
Cashier Hours, D\$/1000 Hours	1.56	1.56	3.27
Marketing, D\$	14.59	0.000	0.148

Store 244	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	31.55	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.35	6.45	12.60
Cashier Hours, D\$/1000 Hours	1.60	1.56	3.25
Marketing, D\$	14.60	0.000	0.148

Store 245	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	23.72	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.38	6.45	12.65
Cashier Hours, D\$/1000 Hours	1.68	1.56	3.50
Marketing, D\$	14.36	0.000	0.148

Store 246	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	19.29	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.37	6.45	12.65
Cashier Hours, D\$/1000 Hours	1.78	1.58	3.55
Marketing, D\$	14.56	0.000	0.148

Store 247	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	15.15	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.30	6.45	12.70
Cashier Hours, D\$/1000 Hours	1.75	1.60	3.17
Marketing, D\$	14.30	0.000	0.148

Store 248	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	26.54	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.35	6.45	12.75
Cashier Hours, D\$/1000 Hours	1.80	1.60	3.35
Marketing, D\$	14.55	0.000	0.148

Store 250	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	18.65	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.377	6.45	12.60
Cashier Hours, D\$/1000 Hours	1.88	1.70	3.40
Marketing, D\$	14.75	0.000	0.148

Store 251	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	9.35	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.339	6.45	12.60
Cashier Hours, D\$/1000 Hours	1.78	1.75	3.45
Marketing, D\$	14.90	0.000	0.148

Store 252	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	21.31	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.40	6.45	12.60
Cashier Hours, D\$/1000 Hours	1.58	1.68	3.18
Marketing, D\$	14.86	0.000	0.148

Store 254	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	19.52	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.41	6.45	12.75
Cashier Hours, D\$/1000 Hours	1.65	1.55	3.25
Marketing, D\$	14.96	0.000	0.148

Store 256	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	28.25	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.45	6.45	12.70
Cashier Hours, D\$/1000 Hours	1.75	1.70	3.20
Marketing, D\$	14.78	0.000	0.148

Store 257	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	22.21	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.35	6.45	12.55
Cashier Hours, D\$/1000 Hours	1.80	1.70	3.35
Marketing, D\$	14.82	0.000	0.148

Store 258	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	15.63	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.57	6.45	12.40
Cashier Hours, D\$/1000 Hours	1.80	1.65	3.75
Marketing, D\$	14.36	0.000	0.148

Store 259	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	24.60	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.60	6.45	12.70
Cashier Hours, D\$/1000 Hours	1.80	1.65	3.75
Marketing, D\$	14.30	0.000	0.148

Store 260	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	25.41	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.60	6.45	12.70
Cashier Hours, D\$/1000 Hours	1.66	1.55	3.65
Marketing, D\$	14.40	0.000	0.148

Store 262	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	10.04	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.70	6.45	12.60
Cashier Hours, D\$/1000 Hours	1.65	1.50	3.55
Marketing, D\$	14.80	0.000	0.148

Store 263	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	24.99	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.65	6.45	12.75
Cashier Hours, D\$/1000 Hours	1.88	1.55	3.45
Marketing, D\$	15.01	0.000	0.148

Store 264	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	21.60	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.66	6.45	12.60
Cashier Hours, D\$/1000 Hours	1.68	1.70	3.35
Marketing, D\$	14.92	0.000	0.148

Store 265	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	24.01	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.71	6.45	12.60
Cashier Hours, D\$/1000 Hours	1.57	1.65	3.65
Marketing, D\$	15.09	0.000	0.148

Store 266	Cost	Cost of Increasing One Unit	Cost of Decreasing One Unit
Input			
Sales & General Costs, D\$	14.96	0.000	1.74
Salesperson Hours, D\$/1000 Hours	3.61	6.45	12.40
Cashier Hours, D\$/1000 Hours	1.61	1.65	3.65
Marketing, D\$	15.026	0.000	0.148

APPENDIX 3

DATA CORRELATION MATRIX

Correlation Matrix				
Sample Correlation Coefficient, r				
Marked correlations are significant at $p < 0.01$				
N= 35 (Case-wise deletion of missing data)				
	Salesperson-hours	Cashier-hours	Sales & Adm. Expenses	Marketing
Salesperson-hours	1.000	0.194	-0.040	0.325
Cashier-hours	0.194	1.000	0.376	0.589
Sales & Administration Expenses	-0.040	0.376	1.000	0.340
Marketing	0.325	0.589	0.340	1.000

APPENDIX 4

OPTIMAL PATH OF ADJUSTMENT PROGRAM

DATA OF STORE 202

Period: Six Months.

The following is the general path of adjustment program, with specific data for Store 202. The program includes expected period-to-period variation of output.

!PATH OF ADJUSTMENT PROGRAM

PART ONE: STORE IDENTIFICATION AND DATA

STORE 202

DATA SECTION;

```
!Input Quantity Vector, Initial Values;
  x10=5.539;  x20=1.7900;  x30=18.350;  x40=13.346;

!Output and Store Area;
  OUTPUT=1669.4;  AREA=10.90;

!Expected Output Expansion Factors;
O101T=1.001; O1011=1.00985; O1012=1.0198; O1013=1.0299; O1014=1.04;

!Price of Inputs;
  w1 =4.36;  w2=2.07;  w3=10.90;  w4=13.46;

!Costs of Adjustment of Inputs
  Cost of Increasing;
wI1=7.12;  wI2=2.07;  wI3=0.00;  wI4= 0.00;

! Cost of Decreasing;
  wD1=12.63;  wD2= 3.38;  wD3=1.15;  wD4= 1.48;
!
```

PART TWO: ECONOMIC FACTORS EVALUATION

```
FOUR ADJUSTMENT PERIODS INTENDED
Wi= price of input i
WDi= cost of decreasing input i
Wii= cost of increasing input i
X1j= Salesperson Khours, at adjustment period j
X2j= Cashier Khours, at adjustment period j
X3j= Sales and Administration Expenses, at adjustment period j
X4j= Marketing [D$], at adjustment period j
XIij= quantity increasing Variable Xi, at adjustment period j
XDij= quantity decreasing Variable Xi, at adjustment period j
i= 1,2,3,4
j= 1,2,3,4;

!Present worth factors;

s1=1/(1.09); s2=s1*s1; s3=s2*s1; s4=s3*s1; s5=s4*s1;
s6=s5*s1; s7=s6*s1; s8=s7*s1;
```



```

s48=s4+s5+s6+s7+s8;

!Cost of inputs at adjustment period j, j= 0,1,2,3,4;

C0=(w1*x10+w2*x20+w3*x30+w4*x40);
C1=(w1*x11+w2*x21+w3*x31+w4*x41);
C2=(w1*x12+w2*x22+w3*x32+w4*x42);
C3=(w1*x13+w2*x23+w3*x33+w4*x43);
C4=(w1*x14+w2*x24+w3*x34+w4*x44);
CT=(W1*Sales_Person + W2*Cashier_Hours +
     W3*Sales_Admin_Expenses + W4*Marketing);

!Present value of cost of initial quantity input vector for eight
periods;
PVInput0= C0*(1+s1+s2+s3+s48);

!Present value of cost of optimal quantity input vector for eight
periods;
PVInput8= C4*(1+s1+s2+s3+s48);

!Present value of cost of period-to-period input quantity vector;
PVinputs=C0 + C1*s1 + C2*s2 + C3*s3 + C4*s48;

!Cost of adjustment and present value of cost of adjustment
of inputs at adjustment period j, j= 1,2,3,4;

COSTO1=(wI1*XI11+WD1*XD11)+(WI2*XI21+WD2*XD21)+
        (WI3*XI31+WD3*XD31)+(WI4*XI41+WD4*XD41);
PRESENT_VALUE_COSTO1= COSTO1;

COSTO2=(wI1*XI12+WD1*XD12)+(WI2*XI22+WD2*XD22)+
        (WI3*XI32+WD3*XD32)+(WI4*XI42+WD4*XD42);
PRESENT_VALUE_COSTO2= COSTO2*S1;

COSTO3=(wI1*XI13+WD1*XD13)+(WI2*XI23+WD2*XD23)+
        (WI3*XI33+WD3*XD33)+(WI4*XI43+WD4*XD43);
PRESENT_VALUE_COSTO3= COSTO3*S2;

COSTO4=(wI1*XI14+WD1*XD14)+(WI2*XI24+WD2*XD24)+
        (WI3*XI34+WD3*XD34)+(WI4*XI44+WD4*XD44);
PRESENT_VALUE_COSTO4= COSTO4*S3;

!Cost of adjustment if performed in the first adjustment period;
VAdjust= COSTO1+COSTO2+COSTO3+COSTO4;

!Present value of cost of adjustment of inputs;
PVAdjust= PRESENT_VALUE_COSTO1 + PRESENT_VALUE_COSTO2+
          PRESENT_VALUE_COSTO3+ PRESENT_VALUE_COSTO4;

!Economic Efficiency at adjustment period j, j= 0,1,2,3,4;
EE0=CT/C0;
EE1=CT/C1;
EE2=CT/C2;
EE3=CT/C3;
EE4=CT/C4;
!

```

PART THREE: OBJECTIVE FUNCTION;

```
MIN = PVinputs
!Present value of cost of optimal quantity inputs vector;
    + PVAdjust;
!Present value of cost of adjustment of inputs;
```

```
!Cost of Target quantity inputs vector. This term may be included because
is is independent of all specific variables of optimal path of
adjustment;
```

! PART FOUR: TRANSITION EQUATIONS

;

```
X11 = X10+XI11-XD11;
X21 = X20+XI21-XD21;
X31 = X30+XI31-XD31;
X41 = X40+XI41-XD41;
```

```
X12 = X11 +XI12-XD12;
X22 = X21 +XI22-XD22;
X32 = X31 +XI32-XD32;
X42 = X41 +XI42-XD42;
```

```
X13 = X12 +XI13-XD13;
X23 = X22 +XI23-XD23;
X33 = X32 +XI33-XD33;
X43 = X42 +XI43-XD43;
```

```
X14 = X13 +XI14-XD14;
X24 = X23 +XI24-XD24;
X34 = X33 +XI34-XD34;
X44 = X43 +XI44-XD44;
```

! PART FIVE: TRANSFORMATION FUNCTION AND DATA ENVELOPMENT ANALYSIS

MINIMUM COST OF INPUTS TARGETS PROGRAM

This program assigns inputs that minimize the total cost of inputs

```
Input Orientated System
Constant Returns to Scale Technology
Includes non-discretionary variable AREA
O101j is the Output Expansion Factor of output 1, from adjustment period
1 to adjustment period j, j= 0,1,2,3,4,T.
```

OUTPUT

Gross Sales Volume [D\$];
1669.4*LT1 + 1515.18*LT2 + 2153.81*LT3 + 1692.3*LT4 + 2650.0*LT5
+ 2528.9*LT6 + 1987.1*LT7 + 4016.1*LT8 + 2495.91*LT9 + 3098.8*LT10
+ 2990.9*LT11 + 1818.4*LT12 + 3025.8*LT13 + 2825.2*LT14 + 2287.1*LT15
+ 2499.2*LT16 + 4625.1*LT17 + 3383.6*LT18 + 2966.1*LT19 + 2597.5*LT20
+ 3025.8*LT21 + 2922.1*LT22 + 2383.5*LT23 + 2689.5*LT24 + 2827.9*LT25
+ 2597.7*LT26 + 2558.9*LT27 + 2689.5*LT28 + 3224.1*LT29 + 3337.6*LT30
+ 1731.0*LT31 + 3173.6*LT32 + 3315.76*LT33 + 3115.7*LT34 + 1452.8*LT35
>O101T*OUTPUT;

!

INPUTS

Quantitative and Discretionary Inputs

Salesperson Khours;
5.559*LT1 + 6.431*LT2 + 6.120*LT3 + 6.710*LT4 + 6.699*LT5
+ 6.817*LT6 + 4.287*LT7 + 6.817*LT8 + 5.359*LT9 + 6.699*LT10
+ 5.359*LT11 + 6.699*LT12 + 5.959*LT13 + 6.699*LT14 + 5.359*LT15
+ 4.019*LT16 + 7.653*LT17 + 7.653*LT18 + 5.359*LT19 + 6.120*LT20
+ 5.959*LT21 + 5.959*LT22 + 4.598*LT23 + 6.431*LT24 + 5.359*LT25
+ 7.146*LT26 + 6.699*LT27 + 6.699*LT28 + 6.699*LT29 + 5.359*LT30
+ 6.120*LT31 + 4.759*LT32 + 6.120*LT33 + 4.287*LT34 + 4.287*LT35
< Sales_Person;

!

Cashier Khours;
1.790*LT1 + 2.143*LT2 + 1.532*LT3 + 1.3410*LT4 + 1.340*LT5
- 1.975*LT6 + 2.143*LT7 + 1.950*LT8 + 3.216*LT9 + 1.340*LT10
- 1.340*LT11 + 1.340*LT12 + 1.190*LT13 + 1.340*LT14 + 1.340*LT15
- 1.340*LT16 + 2.320*LT17 + 1.532*LT18 + 1.340*LT19 + 1.533*LT20
+ 1.190*LT21 + 1.190*LT22 + 1.533*LT23 + 1.072*LT24 + 1.340*LT25
+ 1.190*LT26 + 1.340*LT27 + 1.340*LT28 + 1.340*LT29 + 2.144*LT30
+ 1.533*LT31 + 2.379*LT32 + 1.533*LT33 + 2.144*LT34 + 2.144*LT35
< Cashier_Hours;

!

Sales and Administration Expenses [D\$];
18.35*LT1 + 10.673*LT2 + 14.534*LT3 + 13.500*LT4 + 22.338*LT5
+ 19.27*LT6 + 41.013*LT7 + 29.906*LT8 + 16.968*LT9 + 16.105*LT10
+ 17.553*LT11 + 16.171*LT12 + 20.389*LT13 + 30.158*LT14 + 23.454*LT15
+ 24.021*LT16 + 30.606*LT17 + 23.002*LT18 + 18.659*LT19 + 14.667*LT20
+ 25.765*LT21 + 18.087*LT22 + 18.712*LT23 + 20.581*LT24 + 18.921*LT25
+ 27.332*LT26 + 21.564*LT27 + 15.135*LT28 + 23.859*LT29 + 24.662*LT30
+ 9.504*LT31 + 24.234*LT32 + 20.943*LT33 + 23.304*LT34 + 14.485*LT35
< Sales_Admin_Expenses;

!

Marketing [D\$];
13.346*LT1 + 7.438*LT2 + 11.672*LT3 + 12.00*LT4 + 14.056*LT5
+ 17.344*LT6 + 9.829*LT7 + 20.352*LT8 + 12.313*LT9 + 21.966*LT10
+ 15.278*LT11 + 14.086*LT12 + 15.640*LT13 + 13.844*LT14 + 11.207*LT15
+ 12.678*LT16 + 22.803*LT17 + 16.673*LT18 + 14.624*LT19 + 12.818*LT20
+ 16.211*LT21 + 17.862*LT22 + 12.110*LT23 + 13.844*LT24 + 13.857*LT25
+ 12.761*LT26 + 12.539*LT27 + 13.674*LT28 + 16.371*LT29 + 16.407*LT30
+ 9.836*LT31 + 15.647*LT32 + 16.344*LT33 + 15.361*LT34 + 7.119*LT35
< Marketing;

! Quantitative and Non-Discretionary Inputs

Store Surface [DSU];
10.90*LT1 + 9.00*LT2 + 7.55*LT3 + 12.25*LT4 + 10.72*LT5 + 12.62*LT6
+ 7.31*LT7 + 24.42*LT8 + 9.94*LT9 + 10.74*LT10 + 14.02*LT11 + 14.38*LT12
+ 16.52*LT13 + 17.81*LT14 + 14.73*LT15 + 15.29*LT16 + 29.97*LT17
+ 19.51*LT18 + 15.07*LT19 + 10.407*LT20 + 17.86*LT21 + 18.87*LT22
+ 9.462*LT23 + 20.19*LT24 + 19.01*LT25 + 14.06*LT26+ 16.96*LT27
+ 17.76*LT28 + 17.41*LT29 + 21.08*LT30 + 6.61*LT31+16.18*LT32
+ 16.84*LT33 + 17.24*LT34 + 15.90*LT35 = AREA;

!
END OF TARGETS PROGRAM

PATH OF ADJUSTMENT PROGRAM

Budget Constraints;

COSTO1<0.01*(OUTPUT-C0);

COSTO2<0.01*(OUTPUT-C0);

!
!
PERIOD ONE

OUTPUT

Gross Sales Volume [D\$];
1669.4*LA1 + 1515.18*LA2 + 2153.81*LA3 + 1692.3*LA4 + 2650.0*LA5
+ 2528.9*LA6 + 1987.1*LA7 + 4016.1*LA8 + 2495.91*LA9 + 3098.8*LA10
+ 2990.9*LA11 + 1818.4*LA12 + 3025.8*LA13 + 2825.2*LA14 + 2287.1*LA15
+ 2499.2*LA16 + 4625.1*LA17 + 3383.6*LA18 + 2966.1*LA19 + 2597.5*LA20
+ 3025.8*LA21 + 2922.1*LA22 + 2383.5*LA23 + 2689.5*LA24 + 2827.9*LA25
+ 2597.7*LA26 + 2558.9*LA27 + 2689.5*LA28 + 3224.1*LA29 + 3337.6*LA30
+ 1731.0*LA31 + 3173.6*LA32 + 3315.76*LA33 + 3115.7*LA34 + 1452.8*LA35
> O1011*OUTPUT;

!
INPUTS

Quantitative and Discretionary Inputs

Salesperson Khours;
5.559*LA1 + 6.431*LA2 + 6.120*LA3 + 6.710*LA4 + 6.699*LA5
+ 6.817*LA6 + 4.287*LA7 + 6.817*LA8 + 5.359*LA9 + 6.699*LA10
+ 5.359*LA11 + 6.699*LA12 + 5.959*LA13 + 6.699*LA14 + 5.359*LA15
+ 4.019*LA16 + 7.653*LA17 + 7.653*LA18 + 5.359*LA19 + 6.120*LA20
+ 5.959*LA21 + 5.959*LA22 + 4.598*LA23 + 6.431*LA24 + 5.359*LA25
+ 7.146*LA26 + 6.699*LA27 + 6.699*LA28 + 6.699*LA29 + 5.359*LA30
+ 6.120*LA31 + 4.759*LA32 + 6.120*LA33 + 4.287*LA34 + 4.287*LA35
< X11;

!
Cashier Khours;

1.790*LA1 + 2.143*LA2 + 1.532*LA3+ 1.3410*LA4 + 1.340*LA5
+ 1.975*LA6 + 2.143*LA7 + 1.950*LA8 + 3.216*LA9 + 1.340*LA10
+ 1.340*LA11 + 1.340*LA12 + 1.190*LA13 + 1.340*LA14 + 1.340*LA15
+ 1.340*LA16 + 2.320*LA17 + 1.532*LA18 + 1.340*LA19 + 1.533*LA20
+ 1.190*LA21 + 1.190*LA22 + 1.533*LA23 + 1.072*LA24 + 1.340*LA25
+ 1.190*LA26 + 1.340*LA27 + 1.340*LA28 + 1.340*LA29 + 2.144*LA30
+ 1.533*LA31 + 2.379*LA32 + 1.533*LA33 + 2.144*LA34 + 2.144*LA35
< X21;
!

Sales and Administration Expenses [D\$];
18.35*LA1 + 10.673*LA2 + 14.534*LA3 + 13.500* LA4 + 22.338*LA5
+ 19.27*LA6 + 41.013*LA7 + 29.906*LA8 + 16.968* LA9 + 16.105* LA10
+ 17.553*LA11 + 16.171*LA12 + 20.389*LA13+ 30.158*LA14 + 23.454*LA15
+ 24.021*LA16 + 30.606*LA17 + 23.002*LA18 + 18.659*LA19 + 14.667*LA20
+ 25.765*LA21 + 18.087*LA22 + 18.712*LA23 + 20.581*LA24 + 18.921*LA25
+ 27.332*LA26 + 21.564*LA27 + 15.135*LA28 + 23.859*LA29 + 24.662*LA30
+ 9.504*LA31 + 24.234*LA32 + 20.943*LA33 + 23.304*LA34 + 14.485*LA35
< X31;
:

Marketing [D\$];
13.346*LA1 + 7.438*LA2 + 11.672*LA3 + 12.00*LA4 + 14.056*LA5
+ 17.344*LA6 + 9.829*LA7 + 20.352*LA8 + 12.313*LA9 + 21.966*LA10
+ 15.278*LA11 +14.086*LA12 + 15.640*LA13 + 13.844*LA14 + 11.207*LA15
+ 12.678*LA16 + 22.803*LA17 + 16.673*LA18 + 14.624*LA19 + 12.818*LA20
+ 16.211*LA21 + 17.862*LA22 + 12.110*LA23 + 13.844*LA24 + 13.857*LA25
+ 12.761*LA26 + 12.539*LA27 + 13.674*LA28 + 16.371*LA29 + 16.407*LA30
+ 9.836*LA31 + 15.647*LA32 + 16.344*LA33+ 15.361*LA34 +7.119*LA35
< X41;

! Quantitative and Non-Discretionary Inputs

Store Surface [DSU];
10.90*LA1 + 9.00*LA2 + 7.55*LA3 + 12.25*LA4 + 10.72*LA5
+ 12.62*LA6 + 7.31*LA7 + 24.42*LA8 + 9.94*LA9 + 10.74*LA10
+ 14.02*LA11 + 14.38*LA12 + 16.52*LA13 + 17.81*LA14 + 14.73*LA15
+ 15.29*LA16 + 29.97*LA17 + 19.51*LA18 + 15.07*LA19 + 10.407*LA20
+ 17.86*LA21 + 18.87*LA22 + 9.462*LA23 + 20.19*LA24 + 19.01*LA25
+ 14.06*LA26 + 16.96*LA27 + 17.76*LA28 + 17.41*LA29 + 21.08*LA30
+ 6.61*LA31 + 16.18*LA32 + 16.84*LA33 + 17.24*LA34 + 15.90*LA35
= AREA;

!
END OF PATH OF PERIOD ONE

PERIOD TWO

OUTPUT

Gross Sales Volume [D\$];
1669.4*LB1 + 1515.18*LB2 + 2153.81*LB3 + 1692.3*LB4 + 2650.0*LB5
+ 2528.9*LB6 + 1987.1*LB7 + 4016.1*LB8 + 2495.91*LB9 + 3098.8*LB10
+ 2990.9*LB11 + 1818.4*LB12 + 3025.8*LB13 + 2825.2*LB14 + 2287.1*LB15
+ 2499.2*LB16 + 4625.1*LB17 + 3383.6*LB18 + 2966.1*LB19 + 2597.5*LB20
+ 3025.8*LB21 + 2922.1*LB22 + 2383.5*LB23 + 2689.5*LB24 + 2827.9*LB25
+ 2597.7*LB26 + 2558.9*LB27 + 2689.5*LB28 + 3224.1*LB29 + 3337.6*LB30
+ 1731.0*LB31 + 3173.6*LB32 + 3315.76*LB33 + 3115.7*LB34 + 1452.8*LB35
> O1012*OUTPUT;

!

INPUTS

Quantitative and Discretionary Inputs

Salesperson Khours;
5.559*LB1 + 6.431*LB2 + 6.120*LB3 + 6.710*LB4 + 6.699*LB5
+ 6.817*LB6 + 4.287*LB7 + 6.817*LB8 + 5.359*LB9 + 6.699*LB10
+ 5.359*LB11 + 6.699*LB12 + 5.959*LB13 + 6.699*LB14 + 5.359*LB15
+ 4.019*LB16 + 7.653*LB17 + 7.653*LB18 + 5.359*LB19 + 6.120*LB20
+ 5.959*LB21 + 5.959*LB22 + 4.598*LB23 + 6.431*LB24 + 5.359*LB25
- 7.146*LB26 + 6.699*LB27 + 6.699*LB28 + 6.699*LB29 + 5.359*LB30
- 6.120*LB31 + 4.759*LB32 + 6.120*LB33 + 4.287*LB34 + 4.287*LB35
< X12;

!

Cashier Khours;
1.790*LB1 + 2.143*LB2 + 1.532*LB3 + 1.3410*LB4 + 1.340*LB5
+ 1.975*LB6 + 2.143*LB7 + 1.950*LB8 + 3.216*LB9 + 1.340*LB10
+ 1.340*LB11 + 1.340*LB12 + 1.190*LB13 + 1.340*LB14 + 1.340*LB15
+ 1.340*LB16 + 2.320*LB17 + 1.532*LB18 + 1.340*LB19 + 1.533*LB20
+ 1.190*LB21 + 1.190*LB22 + 1.533*LB23 + 1.072*LB24 + 1.340*LB25
+ 1.190*LB26 + 1.340*LB27 + 1.340*LB28 + 1.340*LB29 + 2.144*LB30
+ 1.533*LB31 + 2.379*LB32 + 1.533*LB33 + 2.144*LB34 + 2.144*LB35
< X22;

!

Sales and Administration Expenses [D\$];
18.35*LB1 + 10.673*LB2 + 14.534*LB3 + 13.500*LB4 + 22.338*LB5
+ 19.27*LB6 + 41.013*LB7 + 29.906*LB8 + 16.968*LB9 + 16.105*LB10
+ 17.553*LB11 + 16.171*LB12 + 20.389*LB13 + 30.158*LB14 + 23.454*LB15
+ 24.021*LB16 + 30.606*LB17 + 23.002*LB18 + 18.659*LB19 + 14.667*LB20
+ 25.765*LB21 + 18.087*LB22 + 18.712*LB23 + 20.581*LB24 + 18.921*LB25
+ 27.332*LB26 + 21.564*LB27 + 15.135*LB28 + 23.859*LB29 + 24.662*LB30
+ 9.504*LB31 + 24.234*LB32 + 20.943*LB33 + 23.304*LB34 + 14.485*LB35
< X32;

!

Marketing [D\$];
13.346*LB1 + 7.438*LB2 + 11.672*LB3 + 12.00*LB4 + 14.056*LB5
+ 17.344*LB6 + 9.829*LB7 + 20.352*LB8 + 12.313*LB9 + 21.966*LB10
+ 15.278*LB11 + 14.086*LB12 + 15.640*LB13 + 13.844*LB14 + 11.207*LB15
+ 12.678*LB16 + 22.803*LB17 + 16.673*LB18 + 14.624*LB19 + 12.818*LB20
+ 16.211*LB21 + 17.862*LB22 + 12.110*LB23 + 13.844*LB24 + 13.857*LB25
+ 12.761*LB26 + 12.539*LB27 + 13.674*LB28 + 16.371*LB29 + 16.407*LB30
+ 9.836*LB31 + 15.647*LB32 + 16.344*LB33 + 15.361*LB34 + 7.119*LB35
< X42;

! Quantitative and Non-Discretionary Inputs

Store Surface [DSU];
10.90*LB1 + 9.00*LB2 + 7.55*LB3 + 12.25*LB4 + 10.72*LB5
+ 12.62*LB6 + 7.31*LB7 + 24.42*LB8 + 9.94*LB9 + 10.74*LB10
+ 14.02*LB11 + 14.38*LB12 + 16.52*LB13 + 17.81*LB14 + 14.73*LB15
+ 15.29*LB16 + 29.97*LB17 + 19.51*LB18 + 15.07*LB19 + 10.407*LB20
+ 17.86*LB21 + 18.87*LB22 + 9.462*LB23 + 20.19*LB24 + 19.01*LB25
+ 14.06*LB26 + 16.96*LB27 + 17.76*LB28 + 17.41*LB29 + 21.08*LB30
+ 6.61*LB31 + 16.18*LB32 + 16.84*LB33 + 17.24*LB34 + 15.90*LB35
= AREA;

!

END OF PATH OF PERIOD TWO

PERIOD THREE

CONSTRAINTS FOR ADJUSTMENT IF DONE IN ONE PERIOD

OUTPUT

Gross Sales Volume [D\$];
1669.4*LC1 + 1515.18*LC2 + 2153.81*LC3 + 1692.3*LC4 + 2650.0*LC5
+ 2528.9*LC6 + 1987.1*LC7 + 4016.1*LC8 + 2495.91*LC9 + 3098.8*LC10
+ 2990.9*LC11 + 1818.4*LC12 + 3025.8*LC13 + 2825.2*LC14 + 2287.1*LC15
+ 2499.2*LC16 + 4625.1*LC17 + 3383.6*LC18 + 2966.1*LC19 + 2597.5*LC20
+ 3025.8*LC21 + 2922.1*LC22 + 2383.5*LC23 + 2689.5*LC24+ 2827.9*LC25
+ 2597.7*LC26 + 2558.9*LC27 + 2689.5*LC28 + 3224.1*LC29 + 3337.6*LC30
+ 1731.0*LC31 + 3173.6*LC32 + 3315.76*LC33 + 3115.7*LC34 + 1452.8*LC35
> O1013*OUTPUT;

!

INPUTS

Quantitative and Discretionary Inputs

Salesperson Khours;
5.559*LC1 + 6.431*LC2 + 6.120*LC3 + 6.710*LC4 + 6.699*LC5
+ 6.817*LC6 + 4.287*LC7 + 6.817*LC8 + 5.359*LC9 + 6.699*LC10
+ 5.359*LC11 + 6.699*LC12 + 5.959*LC13 + 6.699*LC14 + 5.359*LC15
+ 4.019*LC16 + 7.653*LC17 + 7.653*LC18 + 5.359*LC19 + 6.120*LC20
+ 5.959*LC21 + 5.959*LC22 + 4.598*LC23 + 6.431*LC24 + 5.359*LC25
+ 7.146*LC26 + 6.699*LC27 + 6.699*LC28 + 6.699*LC29 + 5.359*LC30
+ 6.120*LC31 + 4.759*LC32 + 6.120*LC33 + 4.287*LC34 + 4.287*LC35
< X13;

!

Cashier Khours;

1.790*LC1 + 2.143*LC2 + 1.532*LC3+ 1.3410*LC4 + 1.340*LC5
+ 1.975*LC6 + 2.143*LC7 + 1.950*LC8 + 3.216*LC9 + 1.340*LC10
+ 1.340*LC11 + 1.340*LC12 + 1.190*LC13 + 1.340*LC14 + 1.340*LC15
+ 1.340*LC16 + 2.320*LC17 + 1.532*LC18 + 1.340*LC19 + 1.533*LC20
+ 1.190*LC21 + 1.190*LC22 + 1.533*LC23 + 1.072*LC24 + 1.340*LC25
+ 1.190*LC26 + 1.340*LC27 + 1.340*LC28 + 1.340*LC29 + 2.144*LC30
+ 1.533*LC31 + 2.379*LC32 + 1.533*LC33 + 2.144*LC34 + 2.144*LC35
< X23;

!

Sales and Administration Expenses [D\$];
18.35*LC1 + 10.673*LC2 + 14.534*LC3 + 13.500*LC4 + 22.338*LC5
+ 19.27*LC6 + 41.013*LC7 + 29.906*LC8 + 16.968*LC9 + 16.105*LC10
+ 17.553*LC11 + 16.171*LC12 + 20.389*LC13 + 30.158*LC14 + 23.454*LC15
+ 24.021*LC16 + 30.606*LC17 + 23.002*LC18 + 18.659*LC19 + 14.667*LC20
+ 25.765*LC21 + 18.087*LC22 + 18.712*LC23 + 20.581*LC24 + 18.921*LC25
+ 27.332*LC26 + 21.564*LC27 + 15.135*LC28 + 23.859*LC29 + 24.662*LC30
+ 9.504*LC31 + 24.234*LC32 + 20.943*LC33 + 23.304*LC34 + 14.485*LC35
< X33;

!

Marketing [D\$];
13.346*LC1 + 7.438*LC2 + 11.672*LC3 + 12.00*LC4 + 14.056*LC5
+ 17.344*LC6 + 9.829*LC7 + 20.352*LC8 + 12.313*LC9 + 21.966*LC10
+ 15.278*LC11 + 14.086*LC12 + 15.640*LC13 + 13.844*LC14 + 11.207*LC15
+ 12.678*LC16 + 22.803*LC17 + 16.673*LC18 + 14.624*LC19 + 12.818*LC20
+ 16.211*LC21 + 17.862*LC22 + 12.110*LC23 + 13.844*LC24 + 13.857*LC25
+ 12.761*LC26 + 12.539*LC27 + 13.674*LC28 + 16.371*LC29 + 16.407*LC30
+ 9.836*LC31 + 15.647*LC32 + 16.344*LC33+ 15.361*LC34 + 7.119*LC35
< X43;

! Quantitative and Non-Discretionary Inputs

Store Surface [DSU];
10.90*LC1 + 9.00*LC2 + 7.55*LC3 + 12.25*LC4 + 10.72*LC5
+ 12.62*LC6 + 7.31*LC7 + 24.42*LC8 + 9.94*LC9 + 10.74*LC10
+ 14.02*LC11 + 14.38*LC12 + 16.52*LC13 + 17.81*LC14 + 14.73*LC15
+ 15.29*LC16 + 29.97*LC17 + 19.51*LC18 + 15.07*LC19 + 10.407*LC20
+ 17.86*LC21 + 18.87*LC22 + 9.462*LC23 + 20.19*LC24 + 19.01*LC25
+ 14.06*LC26 + 16.96*LC27 + 17.76*LC28 + 17.41*LC29 + 21.08*LC30
+ 6.61*LC31 + 16.18*LC32 + 16.84*LC33 + 17.24*LC34 + 15.90*LC35
= AREA;

!

END OF PATH OF PERIOD THREE

PERIOD FOUR

OUTPUT

Gross Sales Volume [D\$];
1669.4*LD1 + 1515.18*LD2 + 2153.81*LD3 + 1692.3*LD4 + 2650.0*LD5
+ 2528.9*LD6 + 1987.1*LD7 + 4016.1*LD8 + 2495.91*LD9 + 3098.8*LD10
+ 2990.9*LD11 + 1818.4*LD12 + 3025.8*LD13 + 2825.2*LD14 + 2287.1*LD15
+ 2499.2*LD16 + 4625.1*LD17 + 3383.6*LD18 + 2966.1*LD19 + 2597.5*LD20
+ 3025.8*LD21 + 2922.1*LD22 + 2383.5*LD23 + 2689.5*LD24 + 2827.9*LD25
+ 2597.7*LD26 + 2558.9*LD27 + 2689.5*LD28 + 3224.1*LD29 + 3337.6*LD30
+ 1731.0*LD31 + 3173.6*LD32 + 3315.76*LD33 + 3115.7*LD34 + 1452.8*LD35
> O1014*OUTPUT;

INPUTS

Quantitative and Discretionary Inputs

Salesperson Khours;

5.559*LD1 + 6.431*LD2 + 6.120*LD3 + 6.710*LD4 + 6.699*LD5
+ 6.817*LD6 + 4.287*LD7 + 6.817*LD8 + 5.359*LD9 + 6.699*LD10
+ 5.359*LD11 + 6.699*LD12 + 5.959*LD13 + 6.699*LD14 + 5.359*LD15
+ 4.019*LD16 + 7.653*LD17 + 7.653*LD18 + 5.359*LD19 + 6.120*LD20
+ 5.959*LD21 + 5.959*LD22 + 4.598*LD23 + 6.431*LD24 + 5.359*LD25
+ 7.146*LD26 + 6.699*LD27 + 6.699*LD28 + 6.699*LD29 + 5.359*LD30
+ 6.120*LD31 + 4.759*LD32 + 6.120*LD33 + 4.287*LD34 + 4.287*LD35
< X14;

!

Cashier Khours;

1.790*LD1 + 2.143*LD2 + 1.532*LD3 + 1.3410*LD4 + 1.340*LD5
+ 1.975*LD6 + 2.143*LD7 + 1.950*LD8 + 3.216*LD9 + 1.340*LD10
+ 1.340*LD11 + 1.340*LD12 + 1.190*LD13 + 1.340*LD14 + 1.340*LD15
+ 1.340*LD16 + 2.320*LD17 + 1.532*LD18 + 1.340*LD19 + 1.533*LD20
+ 1.190*LD21 + 1.190*LD22 + 1.533*LD23 + 1.072*LD24 + 1.340*LD25
+ 1.190*LD26 + 1.340*LD27 + 1.340*LD28 + 1.340*LD29 + 2.144*LD30
+ 1.533*LD31 + 2.379*LD32 + 1.533*LD33 + 2.144*LD34 + 2.144*LD35
< X24;

!

Sales and Administration Expenses [D\$];

18.35*LD1 + 10.673*LD2 + 14.534*LD3+ 13.500*LD4 + 22.338*LD5
+ 19.27*LD6 + 41.013*LD7 + 29.906*LD8 + 16.968*LD9 + 16.105*LD10
+ 17.553*LD11 + 16.171*LD12 + 20.389*LD13 + 30.158*LD14 + 23.454*LD15
+ 24.021*LD16 + 30.606*LD17 + 23.002*LD18 + 18.659*LD19 + 14.667*LD20
+ 25.765*LD21 + 18.087*LD22 + 18.712*LD23 + 20.581*LD24 + 18.921*LD25
+ 27.332*LD26 + 21.564*LD27 + 15.135*LD28 + 23.859*LD29 + 24.662*LD30
+ 9.504*LD31 + 24.234*LD32 + 20.943*LD33 + 23.304*LD34 + 14.485*LD35
< X34;

!

Marketing [D\$];

13.346*LD1 + 7.438*LD2 + 11.672*LD3 + 12.00*LD4 + 14.056*LD5
+ 17.344*LD6 + 9.829*LD7 + 20.352*LD8 + 12.313*LD9 + 21.966*LD10
+ 15.278*LD11 + 14.086*LD12 + 15.640*LD13 + 13.844*LD14 + 11.207*LD15
+ 12.678*LD16 + 22.803*LD17 + 16.673*LD18 + 14.624*LD19 + 12.818*LD20
+ 16.211*LD21 + 17.862*LD22 + 12.110*LD23 + 13.844*LD24 + 13.857*LD25
+ 12.761*LD26 + 12.539*LD27 + 13.674*LD28 + 16.371*LD29 + 16.407*LD30
+ 9.836*LD31 + 15.647*LD32 + 16.344*LD33 + 15.361*LD34 + 7.119*LD35
< X44;

! Quantitative and Non-Discretionary Inputs

Store Surface [DSU];

10.90*LD1 + 9.00*LD2 + 7.55*LD3 + 12.25*LD4 + 10.72*LD5
+ 12.62*LD6 + 7.31*LD7 + 24.42*LD8 + 9.94*LD9 + 10.74*LD10
+ 14.02*LD11 + 14.38*LD12 + 16.52*LD13 + 17.81*LD14 + 14.73*LD15
+ 15.29*LD16 + 29.97*LD17 + 19.51*LD18 + 15.07*LD19 + 10.407*LD20
+ 17.86*LD21 + 18.87*LD22 + 9.462*LD23 + 20.19*LD24 + 19.01*LD25
+ 14.06*LD26 + 16.96*LD27 + 17.76*LD28 + 17.41*LD29 + 21.08*LD30
+ 6.61*LD31 + 16.18*LD32 + 16.84*LD33 + 17.24*LD34 + 15.90*LD35
= AREA;

!

END OF PATH OF PERIOD FOUR

COMPARISON OF TARGET AND OPTIMAL INPUT QUANTITY VECTOR

```
;  
ERROR_Salesperson= X14-Sales_person;  
ERROR_Cashier = X24- Cashier_Hours;  
ERROR_Sales_Admin_Expenses = X34- Sales_Admin_Expenses;  
ERROR_MARKETING = X44- Marketing;  
!
```

END OF PATH OF ADJUSTMENT PROGRAM;

```
!last revision:01/08/03;
```

```
End;
```

APPENDIX 5

TECHNICAL, ALLOCATIVE AND ECONOMIC EFFICIENCIES MEASURED AT INITIAL CONDITIONS TARGETS FOR MINIMUM COST OF INPUTS

35 DIJON STORES

**ECONOMIC EFFICIENCIES
TARGETS FOR MINIMUM COST OF INPUTS**

35 DIJON STORES

Store	Economic Efficiency	Targets for Minimum Cost of Inputs				Peer Stores
		Salesperson Hours	Cashier Hours	Sales and General Expenses	Marketing	
202	0.5801	4.152	0.8361	9.395	8.480	247, 258
204	0.8339	3.7218	0.7905	8.534	7.646	247,258
211	0.9834	4.687	0.9562	11.265	14.928	236, 247
224	0.7456	4.329	1.085	10.599	8.558	258, 266
225	0.7550	6.249	1.560	14.963	13.083	247, 258
226	0.7407	6.0873	1.404	14.26	12.62	247, 258
232	0.4039	4.4484	0.9827	10.679	12.401	236, 247
234	0.8013	9.8944	2.0753	22.615	20.297	247, 258
235	0.9061	5.859	1.456	14.044	12.556	236, 247
236	1	6.699	1.340	16.105	21.966	236
237	0.9794	7.1525	1.6931	16.873	14.877	247,256
238	0.7237	4.7807	1.4402	12.606	9.1446	258, 266
239	0.8951	7.3572	1.6301	17.053	15.185	258
240	0.6284	6.9931	1.4376	15.905	14.315	258
242	0.6663	5.6773	1.1527	12.873	11.607	247, 258
243	0.6990	6.162	1.288	14.073	12.637	247, 258
244	0.9085	11.491	2.3246	26.032	23.482	247,258
245	0.8947	8.2809	1.7861	19.062	17.040	247, 258
246	0.9530	7.1537	1.6377	16.725	14.820	247, 258
247	1	6.120	1.533	14.667	12.818	247
248	0.7455	7.4267	1.5826	17.043	15.262	247, 258
250	0.8871	7.256	1.471	16.447	14.832	247, 258
251	0.8722	5.7001	1.4279	13.651	11.847	211, 247
252	0.9024	6.957	1.887	17.566	13.5712	258, 262
254	0.9356	7.079	1.485	16.250	14.363	258, 262
256	0.6384	6.301	1.404	14.641	13.029	247, 258
257	0.7797	6.380	1.289	14.463	13.008	258, 266
258	1	6.699	1.340	15.135	13.674	258
259	0.8372	7.8293	1.7437	18.172	16.169	247, 258
260	0.8507	8.264	1.6969	18.789	16.914	247, 258
262	0.9560	4.394	1.100	10.49	8.857	211, 247
263	0.8309	7.657	1.750	17.894	15.860	247, 258
264	0.9475	7.997	1.831	18.697	16.567	247, 258
265	0.8494	7.588	1.6704	17.558	15.649	247, 258
266	1	4.287	2.144	14.485	7.119	266

**TECHNICAL AND ALLOCATIVE EFFICIENCY
AT INITIAL CONDITIONS¹**

Store	Technical Efficiency	Allocative Efficiency
202	0.6132	0.9460
224	0.7751	0.9619
226	0.7552	0.9808
238	0.7816	0.9259

¹ Only these four stores are not technically efficient at initial conditions.

APPENDIX 6

OPTIMAL PATHS OF ADJUSTMENT FOR 35 DIJON STORES

PATHS OF ADJUSTMENT

		Store	202	204	211	224	225	
Period		Output, D\$	1,669.40	1,515.18	2,153.81	1,692.30	2,650.00	
		Area DS	10.90	9.00	7.55	12.25	10.72	
0		Salesperson Hours, khours	5.539	6.431	6.120	6.710	6.699	
		Cashier Hours, khours	1.790	2.143	1.532	1.341	1.340	
		Sales & General Expenses D\$	18.350	10.673	14.534	13.50	22.338	
		Marketing D\$	13.346	7.438	11.672	12.00	14.056	
		Cost of Inputs D\$	407.51	199.86	419.92	418.09	759.20	
		Technical Efficiency	0.6132	1.000	1.000	0.7751	1.000	
		Economic Efficiency	0.5801	0.8339	0.9834	0.7456	0.7550	
	Weight	Peer 204		0.0576				
		Peer 235		0.0365				
		Peer 240		0.0038				
Peer 254			0.5235					
Peer 258						0.6668		
	Peer 266				0.0256			
1		Salesperson Hours, khours	5.539	5.938	5.134	6.218	6.263	
		Cashier Hours, khours	1.790	0.7905	1.136	1.085	1.560	
		Sales & General Expenses, D\$	9.395	8.5340	12.285	10.599	14.962	
		Marketing, D\$	11.778	7.6456	13.912	8.558	13.083	
		Cost of Inputs, D\$	288.79	174.15	415.12	318.10	573.28	
		Cost of Adjustment, D\$	12.619	13.153	17.339	12.742	18.908	
		Technical Efficiency	0.9981	1.000	1.0000	1.000	1.000	
		Economic Efficiency	0.9813	0.9570	0.9948	0.9799	0.9999	
	Weight	Peer 211			0.3121			
		Peer 236		0.0096	0.4431			
Peer 247				0.1491	0.0417	1.005		
Peer 258			0.6022	0.4194		0.5371		
Peer 264			0.0060					
	Peer 266				0.1705			
2		Salesperson Hours, khours	5.1815	4.9220	4.687	5.232	6.249	
		Cashier Hours, khours	0.8361	0.7905	0.9562	1.085	1.560	
		Sales & General Expenses, D\$	9.395	8.5340	11.264	10.599	14.963	
		Marketing, D\$	8.480	7.6456	14.928	8.558	13.083	
		Cost of Inputs, D\$	240.88	170.72	412.94	314.77	573.23	
		Cost of Adjustment, D\$	12.619	13.153	7.867	12.742	0.1726	
		Technical Efficiency	1.000	1.000	1.0000	1.000	1.0000	
		Economic Efficiency	0.9813	0.9763	1.0000	0.9903	1.0000	
	Weight	Peer 236			0.6442			
		Peer 247		0.0184	0.1491	0.0607	1.005	
Peer 258			0.6030	0.4194		0.5371		
Peer 266					0.1705			
3		Salesperson Hours, khours	4.152	3.7218	4.687	4.329	6.249	
		Cashier Hours, khours	0.8361	0.7905	0.9562	1.085	1.560	
		Sales & General Expenses, D\$	9.395	8.5340	11.265	10.599	14.963	
		Marketing, D\$	8.480	7.6456	14.928	8.558	13.083	
		Cost of Inputs, D\$	236.39	166.66	412.94	311.72	573.23	
		Cost of Adjustment, D\$	6.5255	15.541	0.00	11.660	0.00	
		Technical Efficiency	1.000	1.000	1.0000	1.0000	1.0000	
		Economic Efficiency	1.000	1.000	1.0000	1.0000	1.0000	
	Weight	Peer 236			0.6442			
		Peer 247		0.0184	0.1491	0.0607	1.005	
Peer 258			0.6030	0.4194		0.5371		
Peer 266					0.1705	0.0147		
4		Salesperson Hours, khours	4.152	3.7218	4.687	4.329	6.249	
		Cashier Hours, khours	0.8361	0.7905	0.9562	1.085	1.560	
		Sales & General Expenses, D\$	9.395	8.5340	11.265	10.599	14.963	
		Marketing, D\$	8.480	7.6456	14.928	8.558	13.083	
		Cost of Inputs, D\$	236.39	166.66	412.94	311.72	573.23	
		Cost of Adjustment, D\$	0.00	0.00	0.00	0.00	0.00	
		Technical Efficiency	1.000	1.000	1.0000	1.0000	1.0000	
		Economic Efficiency	1.000	1.000	1.0000	1.0000	1.0000	
	Weight	Peer 236			0.6442			
		Peer 247		0.0184	0.1491	0.0607	1.005	
Peer 258			0.6030	0.4194		0.5371		
Peer 266					0.1705	0.0147		

	Store	226	232	234	235	236	
	Output	2,528.90	1,987.10	4,016.10	2,495.91	3,098.80	
Period	Area	12.62	7.31	24.42	9.94	10.74	
0	Salesperson Hours, hours	6.817	4.287	6.817	5.359	6.699	
	Cashier Hours, hours	1.975	2.143	1.950	3.216	1.340	
	Sales & General Expenses, D\$	19.27	41.013	29.906	16.968	16.105	
	Marketing, D\$	17.344	9.829	20.352	12.313	21.966	
	Cost of Inputs, D\$	560.99	1,172.96	1,265.2	518.63	618.48	
	Technical Efficiency	0.7552	1.000	1.000	1.000	1.000	
	Economic Efficiency	0.7407	0.4039	0.8013	0.9061	1.000	
		Peer 236	0.0399				
		Peer 237	0.5121				
		Peer 247	0.1122				
	Peer 258	0.2164					
1	Salesperson Hours, hours	6.168	4.287	9.1961	5.859	6.699	
	Cashier Hours, hours	1.404	2.143	1.9500	1.456	1.340	
	Sales & General Expenses, D\$	14.261	37.022	22.915	14.044	16.105	
	Marketing, D\$	12.623	10.137	20.437	12.556	21.966	
	Cost of Inputs, D\$	415.79	1,080.64	1,060.2	469.92	618.48	
	Cost of Adjustment, D\$	19.679	8.1414	27.509	14.053	0.00	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	0.9993	0.4384	0.9916	1.000	1.000	
	Weight	Peer 211		0.0176			
		Peer 232		0.8580			
Peer 236			0.0413		0.0358		
Peer 237				0.3654			
Peer 244				0.0112			
Peer 247		0.6048			0.9182		
Peer 251			0.0487				
Peer 258	0.3562		1.0677				
2	Salesperson Hours, hours	6.087	4.287	9.8944	5.859	6.699	
	Cashier Hours, hours	1.404	2.143	2.0753	1.456	1.340	
	Sales & General Expenses, D\$	14.26	33.031	22.615	14.044	16.105	
	Marketing, D\$	12.62	10.445	20.297	12.556	21.966	
	Cost of Inputs, D\$	415.52	988.32	1,051.38	469.92	618.48	
	Cost of Adjustment, D\$	1.038	5.633	5.2411	14.053	0.00	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	0.4793	1.000	1.000	1.000	
	Weight	Peer 211		0.0353			
		Peer 232		0.7159			
Peer 236			0.08262		0.0358		
Peer 247		0.6048		0.3113	0.9182		
Peer 251			0.09753				
Peer 258		0.3562		1.1923			
3	Salesperson Hours, hours	6.087	4.448	9.8944	5.859	6.699	
	Cashier Hours, hours	1.404	0.9827	2.0753	1.456	1.340	
	Sales & General Expenses, D\$	14.26	10.679	22.615	14.044	16.105	
	Marketing, D\$	12.62	12.401	20.297	12.556	21.966	
	Cost of Inputs, D\$	415.52	473.73	1,051.38	469.92	618.48	
	Cost of Adjustment, D\$	0.00	50.456	5.2411	14.053	0.00	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 236		0.3888		0.0358	
		Peer 247	0.6048	0.3011	0.3113	0.9182	
Peer 258		0.3562		1.1923			
4	Salesperson Hours, hours	6.087	4.448	9.8944	5.859	6.699	
	Cashier Hours, hours	1.404	0.9827	2.0753	1.456	1.340	
	Sales & General Expenses, D\$	14.26	10.679	22.615	14.044	16.105	
	Marketing, D\$	12.62	12.401	20.297	12.556	21.966	
	Cost of Inputs, D\$	415.52	473.73	1,051.38	469.92	618.48	
	Cost of Adjustment, D\$	0.00	0.00	5.2411	14.053	0.00	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 236		0.3888		0.0358	
		Peer 247	0.6048	0.3011	0.3113	0.9182	
Peer 258		0.3562		1.1923			

	Store	237	238	239	240	242	
	Output	2,990.90	1,818.40	3,025.80	2,825.20	2,287.10	
Period	Area	14.02	14.38	16.52	17.81	14.73	
0	Salesperson Hours, hours	5.359	6.699	5.959	6.699	5.359	
	Cashier Hours, hours	1.340	1.340	1.190	1.340	1.340	
	Sales & General Expenses, D\$	17.553	16.171	20.389	30.158	23.454	
	Marketing, D\$	15.278	14.086	15.640	13.844	11.207	
	Cost of Inputs, D\$	574.61	504.07	681.98	1,171.57	745.53	
	Technical Efficiency	1.000	0.7816	1.000	1.000	1.000	
	Economic Efficiency	0.9794	0.7237	0.8951	0.6284	0.6663	
		Peer 250		0.0239			
		Peer 252		0.0607			
		Peer 254		0.0487			
	Peer 258		0.6631				
1	Salesperson Hours, hours	7.1525	6.2188	7.3572	6.699	5.359	
	Cashier Hours, hours	1.6931	1.441	1.6301	1.340	1.340	
	Sales & General Expenses, D\$	16.873	12.606	17.053	20.654	14.594	
	Marketing, D\$	14.877	9.1445	15.185	13.858	11.298	
	Cost of Inputs, D\$	562.77	369.63	610.48	876.02	533.14	
	Cost of Adjustment, D\$	13.368	13.143	15.572	16.536	15.275	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	0.9870	1.000	0.8404	0.9318	
		Peer 247	0.8495		0.5130	0.0365	0.0837
		Peer 254				0.7308	0.5718
	Peer 256				0.1922		
	Peer 258	0.2916	0.4729	0.6295	0.0496	0.1682	
	Peer 266		0.3762				
2	Salesperson Hours, hours	7.1525	5.1756	7.3572	6.9931	5.6773	
	Cashier Hours, hours	1.6931	1.4402	1.6301	1.4376	1.1527	
	Sales & General Expenses, D\$	16.873	12.606	17.053	15.905	12.873	
	Marketing, D\$	14.877	9.1446	15.185	14.315	11.607	
	Cost of Inputs, D\$	562.77	366.14	610.48	736.25	496.77	
	Cost of Adjustment, D\$	13.368	13.143	0.00	10.321	5.6472	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	0.9964	1.000	1.000	1.000	
		Peer 247	0.8495		0.5130	0.1254	0.0553
	Weight	Peer 256	0.2916				
	Peer 258		0.4729	0.6295	0.9293	0.79701	
	Peer 266		0.3762				
3	Salesperson Hours, hours	7.1525	4.7807	7.3572	6.9931	5.6773	
	Cashier Hours, hours	1.6931	1.4402	1.6301	1.4376	1.1527	
	Sales & General Expenses, D\$	16.873	12.606	17.053	15.905	12.873	
	Marketing, D\$	14.877	9.1446	15.185	14.315	11.607	
	Cost of Inputs, D\$	562.77	364.81	610.48	736.25	496.77	
	Cost of Adjustment, D\$	13.368	4.976	0.00	0.00	5.6472	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
		Peer 247	0.8495		0.1254	0.0553	0.0553
	Weight	Peer 256	0.2916				
	Peer 258		0.4729	0.9293	0.79701	0.79701	
	Peer 266		0.3762				
4	Salesperson Hours, hours	7.1525	4.7807	7.3572	6.9931	5.6773	
	Cashier Hours, hours	1.6931	1.4402	1.6301	1.4376	1.1527	
	Sales & General Expenses, D\$	16.873	12.606	17.053	15.905	12.873	
	Marketing, D\$	14.877	9.1446	15.185	14.315	11.607	
	Cost of Inputs, D\$	562.77	364.81	610.48	736.25	496.77	
	Cost of Adjustment, D\$	13.368	0.00	0.00	0.00	5.6472	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
		Peer 247	0.8495		0.1254	0.1254	0.0553
	Weight	Peer 256	0.2916				
	Peer 258		0.4729	0.9293	0.9293	0.79701	
	Peer 266		0.3762				

	Store	243	244	245	246	247	
	Output	2,499.20	4,625.100	3,383.60	2,966.10	2,597.50	
Period	Area	15.29	29.97	19.51	15.07	10.407	
0	Salesperson Hours, hours	4.019	7.653	7.653	5.359	6.120	
	Cashier Hours, hours	1.340	2.320	1.532	1.340	1.533	
	Sales & General Expenses, D\$	24.021	30.606	23.002	18.659	14.667	
	Marketing, D\$	12.678	22.803	16.673	14.624	12.818	
	Cost of Inputs, D\$	792.00	1,327.9	813.47	593.30	428.38	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	0.6990	0.9085	0.8947	0.9530	1.000	
1	Salesperson Hours, hours	4.4566	11.491	8.2809	7.1537	6.120	
	Cashier Hours, hours	1.3400	2.3246	1.7861	1.6377	1.533	
	Sales & General Expenses, D\$	15.850	26.032	19.062	16.725	14.667	
	Marketing, D\$	12.461	23.482	17.040	14.820	12.818	
	Cost of Inputs, D\$	589.14	1,206.35	727.83	565.43	428.38	
	Cost of Adjustment, D\$	17.072	32.719	11.302	15.41	0.00	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	0.9397	1.000	1.000	1.000	1.000	
	Weight	Peer 237	0.1756				
		Peer 244	0.3624				
Peer 247			0.0848	0.4201	0.6696	1.000	
Peer 258		0.1108	1.6378	0.8524	0.4562		
2	Salesperson Hours, hours	6.162	11.491	8.2809	7.1537	6.120	
	Cashier Hours, hours	1.288	2.3246	1.7861	1.6377	1.533	
	Sales & General Expenses, D\$	14.073	26.032	19.062	16.725	14.667	
	Marketing, D\$	12.637	23.482	17.040	14.820	12.818	
	Cost of Inputs, D\$	553.62	1,206.35	727.83	593.30	428.38	
	Costo of Adjustment, D\$	14.267	32.719	0.000	0.000	0.000	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 247	0.1799	0.0848	0.4201	0.6696	1.000
		Peer 258	0.7555	1.6378	0.8524	0.4562	
3	Salesperson Hours, hours	6.162	11.491	8.2809	7.1537	6.120	
	Cashier Hours, hours	1.288	2.3246	1.7861	1.6377	1.533	
	Sales & General Expenses, D\$	14.073	26.032	19.062	16.725	14.667	
	Marketing, D\$	12.637	23.482	17.040	14.820	12.818	
	Cost of Inputs, D\$	553.62	1,206.35	727.83	593.30	428.38	
	Costo of Adjustment, D\$	14.267	32.719	0.000	0.000	0.000	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 247	0.1799	0.0848	0.4201	0.6696	1.000
		Peer 258	0.7555	1.6378	0.8524	0.4562	
4	Salesperson Hours, hours	6.162	11.491	8.2809	7.1537	6.120	
	Cashier Hours, hours	1.288	2.3246	1.7861	1.6377	1.533	
	Sales & General Expenses, D\$	14.073	26.032	19.062	16.725	14.667	
	Marketing, D\$	12.637	23.482	17.040	14.820	12.818	
	Cost of Inputs, D\$	553.62	1,206.35	727.83	593.30	428.38	
	Costo of Adjustment, D\$	14.267	32.719	0.000	0.000	0.000	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 247	0.1799	0.0848	0.4201	0.6696	1.000
		Peer 258	0.7555	1.6378	0.8524	0.4562	

	Store	248	250	251	252	254	
	Output	3,025.80	2,922.10	2,383.50	2,689.50	2,827.90	
Period	Area	17.86	18.87	9.462	20.19	19.01	
0	Salesperson Hours, hours	5.959	5.959	4.598	6.431	5.359	
	Cashier Hours, hours	1.190	1.190	1.533	1.072	1.340	
	Sales & General Expenses, D\$	25.765	18.087	18.712	20.581	18.921	
	Marketing, D\$	16.211	17.862	12.110	13.844	13.857	
	Cost of Inputs, D\$	941.78	623.15	373.48	667.86	597.12	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	0.7455	0.8871	0.8722	0.9024	0.9356	
1	Salesperson Hours, hours	6.814	7.256	5.7001	6.957	7.079	
	Cashier Hours, hours	1.462	1.471	1.4279	1.887	1.485	
	Sales & General Expenses, D\$	17.275	16.447	13.651	17.566	16.250	
	Marketing, D\$	15.399	14.832	11.847	13.571	14.363	
	Cost of Inputs, D\$	708.00	552.78	325.73	602.63	558.67	
	Costo of Adjustment, D\$	20.840	12.146	16.320	10.046	15.968	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	0.9917	1.000	1.000	1.000	1.000	
	Weight	Peer 211			0.0812		
		Peer 237	0.3418				
Peer 247		0.0240	0.0632	0.8503			
Peer 258		0.7217	1.0255		0.7919	1.0227	
	Peer 266				0.3853	0.0533	
2	Salesperson Hours, hours	7.4267	7.256	5.7001	6.957	7.079	
	Cashier Hours, hours	1.5826	1.471	1.4279	1.887	1.485	
	Sales & General Expenses, D\$	17.043	16.447	13.651	17.566	16.250	
	Marketing, D\$	15.262	14.832	11.847	13.571	14.363	
	Cost of Inputs, D\$	702.11	552.78	325.73	602.63	558.67	
	Costo of Adjustment, D\$	4.571	0.000	0.000	0.000	0.000	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 211			0.0812		
		Peer 247	0.3144	0.0632	0.8503		
Peer 258		0.8214	1.0255		0.7919	1.0227	
Peer 266					0.3853	0.0533	
3	Salesperson Hours, hours	7.4267	7.256	5.7001	6.957	7.079	
	Cashier Hours, hours	1.5826	1.471	1.4279	1.887	1.485	
	Sales & General Expenses, D\$	17.043	16.447	13.651	17.566	16.250	
	Marketing, D\$	15.262	14.832	11.847	13.571	14.363	
	Cost of Inputs, D\$	702.11	552.78	325.73	602.63	558.67	
	Costo of Adjustment, D\$	0.000	0.000	0.000	0.000	0.000	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 211			0.0812		
		Peer 247	0.3144	0.0632	0.8503		
Peer 258		0.8214	1.0255		0.7919	1.0227	
Peer 266					0.3853	0.0533	
4	Salesperson Hours, hours	7.4267	7.256	5.7001	6.957	7.079	
	Cashier Hours, hours	1.5826	1.471	1.4279	1.887	1.485	
	Sales & General Expenses, D\$	17.043	16.447	13.651	17.566	16.250	
	Marketing, D\$	15.262	14.832	11.847	13.571	14.363	
	Cost of Inputs, D\$	702.11	552.78	325.73	602.63	558.67	
	Costo of Adjustment, D\$	0.000	0.000	0.000	0.000	0.000	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 211			0.0812		
		Peer 247	0.3144	0.0632	0.8503		
Peer 258		0.8214	1.0255		0.7919	1.0227	
Peer 262					0.3853	0.0533	

	Store	248	250	251	252	254	
	Output	3,025.80	2,922.10	2,383.50	2,689.50	2,827.90	
Period	Area	17.86	18.87	9.462	20.19	19.01	
0	Salesperson Hours, hours	5.959	5.959	4.598	6.431	5.359	
	Cashier Hours, hours	1.190	1.190	1.533	1.072	1.340	
	Sales & General Expenses, D\$	25.765	18.087	18.712	20.581	18.921	
	Marketing, D\$	16.211	17.862	12.110	13.844	13.857	
	Cost of Inputs, D\$	941.78	623.15	373.48	667.86	597.12	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	0.7455	0.8871	0.8722	0.9024	0.9356	
1	Salesperson Hours, hours	6.814	7.256	5.7001	6.957	7.079	
	Cashier Hours, hours	1.462	1.471	1.4279	1.887	1.485	
	Sales & General Expenses, D\$	17.275	16.447	13.651	17.566	16.250	
	Marketing, D\$	15.399	14.832	11.847	13.571	14.363	
	Cost of Inputs, D\$	708.00	552.78	325.73	602.63	558.67	
	Costo of Adjustment, D\$	20.840	12.146	16.320	10.046	15.968	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	0.9917	1.000	1.000	1.000	1.000	
	Weight	Peer 211			0.0812		
		Peer 237	0.3418				
Peer 247		0.0240	0.0632	0.8503			
Peer 258		0.7217	1.0255		0.7919	1.0227	
	Peer 266				0.3853	0.0533	
2	Salesperson Hours, hours	7.4267	7.256	5.7001	6.957	7.079	
	Cashier Hours, hours	1.5826	1.471	1.4279	1.887	1.485	
	Sales & General Expenses, D\$	17.043	16.447	13.651	17.566	16.250	
	Marketing, D\$	15.262	14.832	11.847	13.571	14.363	
	Cost of Inputs, D\$	702.11	552.78	325.73	602.63	558.67	
	Costo of Adjustment, D\$	4.571	0.000	0.000	0.000	0.000	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 211			0.0812		
		Peer 247	0.3144	0.0632	0.8503		
Peer 258		0.8214	1.0255		0.7919	1.0227	
Peer 266					0.3853	0.0533	
3	Salesperson Hours, hours	7.4267	7.256	5.7001	6.957	7.079	
	Cashier Hours, hours	1.5826	1.471	1.4279	1.887	1.485	
	Sales & General Expenses, D\$	17.043	16.447	13.651	17.566	16.250	
	Marketing, D\$	15.262	14.832	11.847	13.571	14.363	
	Cost of Inputs, D\$	702.11	552.78	325.73	602.63	558.67	
	Costo of Adjustment, D\$	0.000	0.000	0.000	0.000	0.000	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 211			0.0812		
		Peer 247	0.3144	0.0632	0.8503		
Peer 258		0.8214	1.0255		0.7919	1.0227	
Peer 266					0.3853	0.0533	
4	Salesperson Hours, hours	7.4267	7.256	5.7001	6.957	7.079	
	Cashier Hours, hours	1.5826	1.471	1.4279	1.887	1.485	
	Sales & General Expenses, D\$	17.043	16.447	13.651	17.566	16.250	
	Marketing, D\$	15.262	14.832	11.847	13.571	14.363	
	Cost of Inputs, D\$	702.11	552.78	325.73	602.63	558.67	
	Costo of Adjustment, D\$	0.000	0.000	0.000	0.000	0.000	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 211			0.0812		
		Peer 247	0.3144	0.0632	0.8503		
Peer 258		0.8214	1.0255		0.7919	1.0227	
Peer 262					0.3853	0.0533	

	Store	256	257	258	259	260	
	Output	2,597.70	2,558.90	2,689.50	3,224.10	3,337.60	
Period	Area	14.06	16.96	17.76	17.41	21.08	
0	Salesperson Hours, hours	7.146	6.699	6.699	6.699	5.359	
	Cashier Hours, hours	1.190	1.340	1.340	1.340	2.144	
	Sales & General Expenses, D\$	27.332	21.564	15.135	23.859	24.662	
	Marketing, D\$	12.761	12.539	13.674	16.371	16.407	
	Cost of Inputs, D\$	987.47	689.62	459.25	847.57	885.77	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	0.6384	0.7797	1.000	0.8372	0.8507	
1	Salesperson Hours, hours	7.146	6.380	6.699	7.8293	7.696	
	Cashier Hours, hours	1.190	1.289	1.340	1.7437	2.144	
	Sales & General Expenses, D\$	18.078	14.463	15.135	18.172	19.233	
	Marketing, D\$	12.787	13.007	13.674	16.169	16.928	
	Cost of Inputs, D\$	726.43	537.68	459.25	709.57	763.73	
	Costo of Adjustment, D\$	16.10	16.527	0.000	17.882	24.518	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	0.8678	1.000	1.000	1.000	0.9867	
	Weight	Peer 237					0.1602
		Peer 244					0.0731
		Peer 246	0.4679				
		Peer 247				0.5752	
		Peer 254	0.1597				
		Peer 256	0.1406				
Peer 258			0.9461		0.6432	0.9371	
Peer 264	0.1185						
Peer 266		0.0990					
2	Salesperson Hours, hours	6.378	6.380	6.699	7.8293	8.264	
	Cashier Hours, hours	1.404	1.289	1.340	1.7437	1.6969	
	Sales & General Expenses, D\$	14.641	14.463	15.135	18.172	18.789	
	Marketing, D\$	13.029	13.008	13.674	16.169	16.914	
	Cost of Inputs, D\$	630.64	537.68	459.25	709.57	753.56	
	Costo of Adjustment, D\$	16.10	0.000	0.000	0.000	6.069	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	0.9996	1.000	1.000	1.000	1.000	
	Weight	Peer 247	0.4586			0.5752	0.1423
		Peer 258	0.5229	0.9461		0.6432	1.1036
Peer 266			0.0990				
3	Salesperson Hours, hours	6.310	6.380	6.699	7.8293	8.264	
	Cashier Hours, hours	1.404	1.289	1.340	1.7437	1.6969	
	Sales & General Expenses, D\$	14.641	14.463	15.135	18.172	18.789	
	Marketing, D\$	13.029	13.008	13.674	16.169	16.914	
	Cost of Inputs, D\$	630.41	537.68	459.25	709.57	753.56	
	Costo of Adjustment, D\$	0.860	0.000	0.000	0.000	0.000	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 247	0.4586			0.5752	0.1423
		Peer 258	0.5229	0.9461		0.6432	1.1036
Peer 266			0.0990				
4	Salesperson Hours, hours	6.301	6.380	6.699	7.8293	8.264	
	Cashier Hours, hours	1.404	1.289	1.340	1.7437	1.6969	
	Sales & General Expenses, D\$	14.641	14.463	15.135	18.172	18.789	
	Marketing, D\$	13.029	13.008	13.674	16.169	16.914	
	Cost of Inputs, D\$	630.41	537.68	459.25	709.57	753.56	
	Costo of Adjustment, D\$	0.000	0.000	0.000	0.000	0.000	
	Technical Efficiency	1.000	1.000	1.000	1.000	1.000	
	Economic Efficiency	1.000	1.000	1.000	1.000	1.000	
	Weight	Peer 247	0.4586			0.5752	0.1423
		Peer 258	0.5229	0.9461		0.6432	1.1036
Peer 266			0.0990				

		Store	262	263	264	265	266
		Output	1,731.00	3,173.6	3,315.76	3,115.7	1,452.80
Period		Area	6.610	16.180	16.840	17.240	15.90
0		Salesperson Hours, hours	6.120	4.759	6.120	4.287	4.287
		Cashier Hours, hours	1.533	2.379	1.533	2.144	2.144
		Sales & General Expenses, D\$	9.504	24.234	20.943	23.304	14.485
		Marketing, D\$	9.836	15.647	16.344	15.361	7.119
		Cost of Inputs, D\$	266.17	862.26	721.20	810.60	342.59
		Technical Efficiency	1.000	1.000	1.000	1.000	1.000
		Economic Efficiency	0.9560	0.8309	0.9475	0.8494	1.000
1		Salesperson Hours, hours	5.091	6.7272	7.9967	6.449	4.287
		Cashier Hours, hours	1.100	2.379	1.8310	2.144	2.144
		Sales & General Expenses, D\$	10.49	18.247	18.697	18.071	14.485
		Marketing, D\$	8.857	16.068	16.567	15.864	7.119
		Cost of Inputs, D\$	257.04	726.20	683.37	700.55	342.59
		Cost of Adjustment, D\$	14.648	23.113	16.520	23.051	
		Technical Efficiency	1.000	1.000	1.000	1.000	1.000
		Economic Efficiency	0.9900	0.9866	1.000	0.9828	1.000
	Weight	Peer 211	0.3014				
		Peer 237		0.5184		0.5793	
Peer 246							
Peer 244					0.0260		
Peer 247		0.4165	0.2677	0.7495			
	Peer 258		0.3449	0.5090	0.4696		
2		Salesperson Hours, hours	4.394	7.657	7.9967	7.588	4.287
		Cashier Hours, hours	1.100	1.750	1.8310	1.6704	2.144
		Sales & General Expenses, D\$	10.49	17.894	18.697	17.558	14.485
		Marketing, D\$	8.857	15.860	16.567	15.649	7.119
		Cost of Inputs, D\$	254.46	716.48	683.37	688.48	342.59
		Cost of Adjustment, D\$	8.787	8.810	0.000	9.997	
		Technical Efficiency	1.000	1.000	1.000	1.000	1.000
		Economic Efficiency	1.000	1.000	1.000	1.000	1.000
	Weight	Peer 211	0.3014				
		Peer 247	0.4165			0.7495	0.4943
Peer 258				0.5090	0.6810		
Peer 262			0.7495				
3		Salesperson Hours, hours	4.394	7.657	7.9967	7.588	4.287
		Cashier Hours, hours	1.100	1.750	1.8310	1.6704	2.144
		Sales & General Expenses, D\$	10.49	17.894	18.697	17.558	14.485
		Marketing, D\$	8.857	15.860	16.567	15.649	7.119
		Cost of Inputs, D\$	254.46	716.48	683.37	688.48	342.59
		Cost of Adjustment, D\$	0.000	0.000	0.000	0.000	
		Technical Efficiency	1.000	1.000	1.000	1.000	1.000
		Economic Efficiency	1.000	1.000	1.000	1.000	1.000
	Weight	Peer 211					
		Peer 247	0.7081	0.7081	0.7495	0.4943	
Peer 258		0.4961	0.4961	0.5090	0.6810		
Peer 262							
4		Salesperson Hours, hours	4.394	7.657	7.9967	7.588	4.287
		Cashier Hours, hours	1.100	1.750	1.8310	1.6704	2.144
		Sales & General Expenses, D\$	10.49	17.894	18.697	17.558	14.485
		Marketing, D\$	8.857	15.860	16.567	15.649	7.119
		Cost of Inputs, D\$	254.46	716.48	683.37	688.48	342.59
		Cost of Adjustment, D\$	0.000	0.000	0.000	0.000	
		Technical Efficiency	1.000	1.000	1.000	1.000	1.000
		Economic Efficiency	1.000	1.000	1.000	1.000	1.000
	Weight	Peer 211	0.3014				
		Peer 247	0.4165	0.7081	0.7495	0.4943	
Peer 258			0.4961	0.5090	0.6810		
Peer 262							

APPENDIX 7

CONDITIONS TO MAKE ADJUSTMENTS

APPENDIX 7

CONDITIONS TO MAKE ADJUSTMENTS

1. Introduction

The purpose of Appendix 7 is to determine the conditions that must be satisfied for a firm to make the adjustments of inputs from the initial quantities to the target ones.

2. Definitions of variables

For easier reading, this section restates the definitions of pertinent variables, as previously presented.

p_j = price of output j

$\mathbf{p} = \{p_1 \ p_2 \ \dots \ p_m \ \dots \ p_J\}$ vector of output prices, $1 \times J$;

r = rate of discount of cash flow, per cent per period ;

s_t = present value factor for a cash flow at end of period t ;

t = a particular time period that defines a base for evaluations; $t = 1, 2, \dots$;

T = number of periods or time horizon for evaluation of the present value of net cash flows;

w_i = price of input i ; $i = 1, 2, \dots, I$;

$\mathbf{w} = \{w_1 \ w_2 \ \dots \ w_i \ \dots \ w_I\}$ vector of input prices, $1 \times I$;

w_i^a = cost of adjusting input i by one unit; $i = 1, 2, \dots, I$;

$\mathbf{w}^a = \{w_1^a \ w_2^a \ \dots \ w_i^a \ \dots \ w_I^a\}$ vector of cost of adjusting inputs by one unit, $1 \times I$;

x_{ikt} = quantity of input i used by firm k in period t , $i = 1, 2, \dots, I$; $k = 1, 2, \dots, K$;

x_{ik} = quantity of input i used by firm k , $i = 1, 2, \dots, I$; $k = 1, 2, \dots, K$;

\mathbf{x}_{ik}^* = quantity of optimal input i used by firm k , $i = 1, 2, \dots, I$; $k = 1, 2, \dots, K$;

$\mathbf{x}_{kt} = \{x_{1kt} \ x_{2kt} \ \dots \ x_{ikt} \ \dots \ x_{Jkt}\}$ vector of quantities of inputs of firm k in period t , $I \times 1$;

$\mathbf{x}_{kt}^* = \{x_{1kt}^* \ x_{2kt}^* \ \dots \ x_{ikt}^* \ \dots \ x_{Jkt}^*\}$ vector of optimal inputs for firm k in period t , input-orientated systems, $I \times 1$;

$\mathbf{x}_k^* = \{x_{1k}^* \ x_{2k}^* \ \dots \ x_{ik}^* \ \dots \ x_{Jk}^*\}$ vector of optimal inputs, firm k , input-orientated systems, $I \times 1$;

x_{ikt}^a = amount by which firm k adjusts input i in period t , $i = 1, 2, \dots, I$; $k = 1, 2, \dots, K$;

$\mathbf{x}_{kt}^a = \{x_{1kt}^a \ x_{2kt}^a \ \dots \ x_{ikt}^a \ \dots \ x_{Jkt}^a\}$ vector of inputs adjustments for firm k in period t , input-orientated systems, $I \times 1$; $k = 1, 2, \dots, K$;

y_{jkt} = quantity of output j that firm k produces in period t , $j = 1, 2, \dots, J$; $k = 1, 2, \dots, K$;

y_{jk} = quantity of output j , produced by firm k , $j = 1, 2, \dots, J$; $k = 1, 2, \dots, K$;

$\mathbf{y}_k = \{y_{1k} \ \dots \ y_{jk} \ \dots \ y_{Jk}\}$ vector of quantities of outputs for firm k , $J \times 1$; $k = 1, 2, \dots, K$;

π_{kt} = profit of firm k in period t , $k = 1, 2, \dots, K$;

π_k^{T,t_a} = present value of profit of firm k that makes adjustments from $t=1$ to $t=t_a$; the horizon time is T ; and

$\mathbf{1}' = \{1, 1, \dots, 1\}$ is a row vector of ones, as many columns as needed.

3. Conditions to make adjustments

Consider that firm k operates at the initial input-output conditions; if no modification is done to the conditions, the present value of profit, evaluated over a time horizon T is:

$$\pi_k^{T,0} = (\mathbf{p} \mathbf{y}_k - \mathbf{w} \mathbf{x}_{k0}) \times (1 + s_1 + s_1^2 + s_1^3 + \dots + s_1^T) \quad (3.1)$$

$$\pi_k^{T,0} = (\mathbf{p} \mathbf{y}_k - \mathbf{w} \mathbf{x}_{k0}) \times \frac{1 - s_1^{T+1}}{1 - s_1} \quad (3.2)$$

If firm k makes adjustments to inputs, from period 1 up to period t_a , the present value of profit, evaluated over the time horizon, T , is:

$$\begin{aligned} \pi_k^{T,t_a} &= (\mathbf{p} \mathbf{y}_k - \mathbf{w} \mathbf{x}_{k0}) + \sum_{t=1}^{t_a-1} (\mathbf{p} \mathbf{y}_k - \mathbf{w} \mathbf{x}_{kt}) \times s_1^t + \sum_{t=t_a}^T (\mathbf{p} \mathbf{y}_k - \mathbf{w} \mathbf{x}_k^*) \times s_1^t - \sum_{t=1}^{t_a} \mathbf{w}^a \mathbf{x}_{kt}^a s_1^{t-1} \\ \pi_k^{T,t_a} &= (\mathbf{p} \mathbf{y}_k - \mathbf{w} \mathbf{x}_{k0}) + \sum_{t=1}^{t_a-1} (\mathbf{p} \mathbf{y}_k - \mathbf{w} \mathbf{x}_{kt}) s_1^t + (\mathbf{p} \mathbf{y}_k - \mathbf{w} \mathbf{x}_k^*) \frac{s_1^{t_a} - s_1^{T+1}}{1 - s_1} - \sum_{t=1}^{t_a} \mathbf{w}^a \mathbf{x}_{kt}^a s_1^{t-1} \end{aligned} \quad (3.3)$$

Firm k will make the adjustments only if the present value (3.3) is larger than the present value (3.1)

$$\pi_k^{T,t_a} - \pi_k^{T,0} > 0$$

Replacing

$$\pi_k^{T,t_a} - \pi_k^{T,0} = \sum_{t=1}^{t_a-1} \mathbf{w} (\mathbf{x}_{k0} - \mathbf{x}_{kt}) \times s_1^t + \mathbf{w} (\mathbf{x}_{k0} - \mathbf{x}_k^*) \frac{s_1^{t_a} - s_1^{T+1}}{1 - s_1} - \sum_{t=1}^{t_a} \mathbf{w}^a \mathbf{x}_{kt}^a s_1^{t-1} \quad (3.4)$$

Then,

$$\begin{aligned} \sum_{t=1}^{t_a-1} \mathbf{w} (\mathbf{x}_{k0} - \mathbf{x}_{kt}) \times s_1^t + \mathbf{w} (\mathbf{x}_{k0} - \mathbf{x}_k^*) \frac{s_1^{t_a} - s_1^{T+1}}{1 - s_1} - \sum_{t=1}^{t_a} \mathbf{w}^a \mathbf{x}_{kt}^a s_1^{t-1} > 0 \\ \sum_{t=1}^{t_a-1} \mathbf{w} (\mathbf{x}_{k0} - \mathbf{x}_{kt}) \times s_1^t + \mathbf{w} (\mathbf{x}_{k0} - \mathbf{x}_k^*) \frac{s_1^{t_a} - s_1^{T+1}}{1 - s_1} > \sum_{t=1}^{t_a} \mathbf{w}^a \mathbf{x}_{kt}^a s_1^{t-1} \end{aligned} \quad (3.5)$$

The left-hand side of (3.5) is the present value of savings derived from the adjustments of the inputs. The right-hand side of (3.5) is the present value of the costs of adjustments of the inputs. The savings is the difference between the costs of inputs at the current quantities, and the period-to-period costs of inputs at the adjusted quantities.

Corollary 1: A firm will make adjustments if the present value of savings, derived from the adjustments is larger than the present value of the costs of those adjustments.

By inspection of (3.3), π_k^{T,t_a} decreases if t_a increases, and increases if T increases.

Corollary 2: Under no budget constraint, the present value of net profit of a firm making adjustments has a maximum value if the adjustments are achieved at period 1. If budget constraints are present, the number of periods increases.

From (3.5), the value of T is

$$T > \frac{\log [s_1^{t_a} - (1-s_1) \frac{\sum_{t=1}^{t_a} w^a x_{kt}^a s_1^{t-1} - \sum_{t=1}^{t_a-1} w(x_{k0} - x_{kt}) s_1^t}{w(x_{k0} - x^*)}]}{|\log s_1|} - 1 \quad (3.6)$$

Corollary 3: In general terms, when feasible, select $T > t_a$.

Special case : $t_a=T$.

Substitution in (3.5) gives the condition for making adjustments:

$$\sum_{t=1}^T w(x_{k0} - x_{kt}) \times s_1^t > \sum_{t=1}^T w^a x_{kt}^a s_1^{t-1} \quad (3.7)$$

$$x_{kT} = x_k^*$$

Corollary 1 is also valid under this condition. As long as (3.7) holds, the present value of profit increases with increasing T .

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