MILLER BEER GAME MODEL

MODEL DATA

MILLER								
IT								
Week	ROR	REI	WOR	WEI	DOR	DEI	FOR	FEI
1	4	12	4	12	4	12	4	12
2	4	12	4	12	4	12	4	12
3	9	12	6	12	3	12	5	12
4	9	12	6	12	5	12	4	12
5	9	8	5	7	8	10	3	13
6	9	4	10	2	4	8	5	13
7	9	5	15	-1	8	6	10	9
8	9	6	12	-4	5	1	5	8
9	9	6	20	-8	3	-6	10	5
10	9	4	18	-7	15	-14	6	10
11	9	1	20	-7	30	-26	20	12
12	9	3	20	-12	20	-39	5	7
13	9	4	20	-13	20	-56	30	-17
14	9	0	20	-17	50	-61	30	-17
15	9	0	10	-23	30	-66	50	-32
16	12	-3	10	-17	30	-66	100	-52
17	12	-8	10	-13	10	-71	30	-52
18	12	-1	12	-5	20	-51	30	-32
19	12	4	5	-12	10	-31	32	8
20	12	16	1	6	10	7	20	18
21	12	13	1	24	3	44	5	38
22	10	29	5	46	0	63	5	60
23	10	33	5	28	5	62	2	77
24	10	47	10	19	0	67	0	82
25	10	61	10	10	5	65	0	82
26	10	63	15	4	0	70	0	84
27	6	65	10	-1	5	60	0	79
28	6	67	7	-1	10	45	0	79
29	6	68	3	3	3	45	0	74
30	6	70	3	12	3	38	0	64
31	6	69	3	16	3	35	0	61
32	6	67	3	14	0	42	0	58
33	6	65	5	17	0	42	0	55
34	6	63	5	11	0	42	0	55
35	6	61	5	8	0	40	5	55
36	6	59	5	5	0	35	0	55
37	6	57	6	4	0	30	0	55
38	6	55	7	3	3	25	0	60
39	6	53	10	2	7	19	0	60
40	6	51	9	1	10	12	0	57

NAPOLY BEER GAME MODEL

RME GRG NonLinear

RETAILE	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	0	0								
1	4	0.00	4	-0.993527	4.60503	-0.60503	0.36606116	12	12	12
2	4	0.02	4	-1.851717	3.763853	0.236147	0.05576541	12	12	12
3	4	0.03	4	-0.250254	5.382256	-1.382256	1.91063253	12	12	12
4	4	0.05	7	0.645797	6.295176	0.7048243	0.49677729	12	12	12
5	8	0.07	7	-1.809908	4.684071	2.3159292	5.36352812	8	8	15
6	8	0.10	10	-0.585053	6.770468	3.2295325	10.4298801	4	4	18
7	8	0.13	15	-0.756645	7.365317	7.6346827	58.2883803	0	0	24
8	8	0.17	5	2.37147	10.27367	-5.273665	27.8115437	-1	0	32
9	8	0.20	8	-1.532861	6.465948	1.5340516	2.35331429	-2	0	30
10	8	0.23	6	-0.426097	7.669186	-1.669186	2.78618053	0	0	28
11	8	0.27	4	0.356117	8.421122	-4.421122	19.5463177	-4	0	30
12	8	0.30	2	-1.655357	6.569143	-4.569143	20.8770714	-4	0	26
13	8	0.33	4	-1.02351	7.42365	-3.42365	11.7213804	-4	0	20
14	8	0.37	8	-0.194947	8.28482	-0.28482	0.08112287	-8	0	20
15	8	0.40	8	-0.594178	7.791449	0.2085512	0.0434936	-12	0	24
16	8	0.43	19	0.447937	8.770938	10.229062	104.633714	-15	0	27
17	8	0.46	20	1.195708	9.171073	10.828927	117.26566	-16	0	39
18	8	0.50	2	0.518804	7.956483	-5.956483	35.479688	-22	0	57
19	8	0.53	8	0.919219	8.483775	-0.483775	0.23403813	-25	0	54
20	8	0.56	8	-2.039942	5.683007	2.3169931	5.36845686	-21	0	50
21	8	0.59	4	0.823092	8.704299	-4.704299	22.1304286	-17	0	46
22	8	0.62	0	-0.111467	8.465954	-8.465954	71.6723715	0	0	25
23	8	0.65	0	-2.044199	5.822631	-5.822631	33.9030339	5	5	12
24	8	0.68	8	-0.293647	7.857648	0.1423515	0.02026395	5	5	4
25	8	0.72	8	-0.171803	8.806758	-0.806758	0.65085798	1	1	8
26	8	0.75	8	-0.951833	8.03518	-0.03518	0.00123764	-7	0	16
27	8	0.78	15	-1.213849	7.550795	7.4492052	55.4906575	-15	0	24
28	8	0.81	15	0.39923	8.973026	6.0269745	36.3244212	-15	0	31
29	8	0.84	8	0.290302	8.673119	-0.673119	0.45308917	-15	0	38
30	8	0.87	8	-1.890453	6.522822	1.4771781	2.18205507	-15	0	38
31	8	0.90	0	-0.254844	8.410325	-8.410325	70.73357	-8	0	31
32	8	0.93	1	-0.684667	8.485486	-7.485486	56.0325044	-1	0	16
33	8	0.96	8	-1.561115	7.860675	0.1393246	0.01941134	-1	0	9
34	8	0.99	8	0.369387	9.82112	-1.82112	3.31647926	-1	0	9
35	8	1.02	8	0.307581	9.535911	-1.535911	2.35902327	-9	0	17
36	9	1.05	16	-0.679554	8.356898	7.6431015	58.4170006	-16	0	24
37	10	1.08	8	-0.707813	8.109236	-0.109236	0.0119326	-16	0	32
38	11	1.12	8	-1.284057	7.570917	0.4290828	0.18411207	-16	0	32
39	12	1.16	8	-0.206426	8.690565	-0.690565	0.47688012	-16	0	32
40	13	1.21	14	-0.999487	8.196814	5.8031863	33.6769711	-8	0	24
	mean of the disturbance			-0.407064		-0.381605	mean of the standard errors			
	std dev of the disturbance			1.043698						

Σ (AO-Ot)2	673.1683	constraints		
θ	0.00	>=0	<=1	
αs	0.23	>=0	<=1	
β	0.14	>=0	<=1	
S'	37.92	>=0	<=100	INT

GRG NonLinear

Incoming Orders:
IO = COR
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = ROP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = REI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = RSL = RSD1+RSD2+WIO+WBL

NAPOLY BEER GAME MODEL

WME - GRG NonLinear

WHOLES	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	2.606352	4	-0.254145	2.950709	1.0492909	1.10101131	12	12	12
2	4	3.514436	4	-0.105836	4.007102	-0.007102	5.0444E-05	12	12	12
3	4	3.830824	4	-0.852119	3.577207	0.422793	0.17875394	12	12	12
4	4	3.941057	4	0.08945	4.62901	-0.62901	0.3956531	12	12	12
5	7	3.979464	4	1.786231	6.364197	-2.364197	5.58942719	12	12	12
6	7	5.947609	8	-0.534447	7.134035	0.865965	0.74989536	9	9	12
7	10	6.633334	8	-0.931858	8.47783	-0.47783	0.22832113	6	6	16
8	15	8.827013	12	-2.977238	10.80398	1.1960212	1.4304667	0	0	20
9	5	12.84926	20	-0.494315	17.17536	2.8246365	7.97857139	-11	0	28
10	8	7.734775	18	-0.460853	11.89367	6.1063295	37.2872606	-8	0	40
11	6	7.907593	10	-0.044132	12.31598	-2.315981	5.36376895	-8	0	50
12	4	6.664628	10	-0.268105	10.74871	-0.748707	0.56056262	-10	0	56
13	2	4.928388	10	-0.756337	8.423899	1.5761012	2.48409497	-10	0	62
14	4	3.020286	8	0.945461	8.13398	-0.13398	0.01795053	-7	0	67
15	8	3.658656	6	-0.890453	6.919713	-0.919713	0.8458721	-4	0	68
16	8	6.487424	11	1.740132	12.31218	-1.312175	1.72180361	-10	0	72
17	19	7.473	16	-0.037813	11.41947	4.5805294	20.98125	-13	0	78
18	20	14.98386	20	-0.2932	18.60805	1.3919525	1.93753173	-20	0	82
19	2	18.25232	25	2.828788	24.86471	0.1352867	0.0183025	-28	0	90
20	8	7.662501	12	0.365464	11.81158	0.1884249	0.03550394	-5	0	90
21	8	7.882411	10	-1.028059	9.939883	0.0601171	0.00361407	2	2	87
22	4	7.959031	0	0.08945	5.024752	-5.024752	25.2481338	19	19	72
23	0	5.379374	0	1.786231	0	0	0	40	40	47
24	0	1.874238	0	-0.534447	0	0	0	63	63	24
25	8	0.653007	0	-0.781863	0	0	0	83	83	4
26	8	5.44022	0	-0.030201	0	0	0	79	79	0
27	8	7.108142	0	0.017779	0	0	0	71	71	0
28	15	7.689266	4	0.557404	0	4	16	63	63	0
29	15	12.45285	0	0.537611	0.254299	-0.254299	0.06466797	48	48	4
30	8	14.11254	8	2.182806	9.171038	-1.171038	1.37133082	33	33	4
31	8	10.12968	8	-0.928245	4.936334	3.0636657	9.38604745	25	25	12
32	0	8.742007	4	-0.781863	5.124643	-1.124643	1.2648227	21	21	16
33	1	3.04582	0	-0.030201	0.113227	-0.113227	0.0128203	21	21	20
34	8	1.712788	4	0.017779	0	4	16	28	28	12
35	8	5.80946	4	0.557404	1.04628	2.9537198	8.72446065	28	28	8
36	8	7.23679	4	0.537611	3.950311	0.0496889	0.00246899	24	24	8
37	16	7.734088	12	2.182806	9.018902	2.9810977	8.88694377	16	16	12
38	8	13.12006	10	-0.928245	15.64952	-5.649522	31.917098	4	4	20
39	8	9.783889	10	-0.781863	13.85589	-3.855893	14.8679133	0	0	26
40	8	8.621528	10	-0.030201	13.34486	-3.344858	11.1880719	-4	0	32
	mean of the disturbance			0.013893		0.5090908	mean of the standard errors			
	std dev of the disturbance			1.089456						

Σ (AO-Ot)2	233.8444		constraints		
θ	0.65		>=0	<=1	
αs	0.37		>=0	<=1	
β	0.04		>=0	<=1	
S'	14.14		>=0	<=100	INT

Standard GRG NonLinear

Incoming Orders:
IO = WIO
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = WOP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = MWEI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = WSL = WSD1+WSD2+DIO+DBL

NAPOLY BEER GAME MODEL

DME - GRG NonLinear

DISTRIB	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	0.020343	4	-0.365466	4.837791	-0.837791	0.70189297	12	12	12
2	4	0.040583	4	-0.291779	4.931717	-0.931717	0.86809667	12	12	12
3	4	0.060719	2	-1.492236	3.751397	-1.751397	3.06739031	12	12	12
4	4	0.080753	4	0.066332	5.329999	-1.329999	1.76889846	12	12	10
5	4	0.100686	2	1.242472	6.526071	-4.526071	20.485323	12	12	10
6	4	0.120517	4	0.693214	5.996644	-1.996644	3.98658817	12	12	8
7	8	0.140247	4	0.999484	7.466091	-3.466091	12.0137877	10	10	10
8	8	0.180219	5	-0.365466	8.428007	-3.428007	11.7512303	6	6	10
9	12	0.219989	15	-0.291779	11.9718	3.0281969	9.16997665	0	0	13
10	20	0.279899	10	-1.492236	10.83126	-0.831256	0.69098695	-8	0	24
11	18	0.38019	14	0.066332	12.49012	1.5098837	2.27974891	-24	0	30
12	10	0.4698	24	1.242472	13.75587	10.244134	104.942283	-37	0	39
13	10	0.518268	20	0.693214	13.25508	6.7449241	45.4940008	-40	0	56
14	10	0.56649	20	0.999484	13.60957	6.3904322	40.8376235	-48	0	74
15	8	0.614467	25	-0.365466	12.29259	12.707406	161.47817	-53	0	89
16	6	0.652028	5	-0.291779	12.40384	-7.403842	54.8168742	-49	0	102
17	11	0.679226	5	-1.492236	11.23058	-6.230583	38.8201684	-43	0	95
18	16	0.731715	13	0.066332	12.84164	0.1583593	0.02507766	-29	0	75
19	20	0.809365	20	1.242472	14.09543	5.9045689	34.8639337	-30	0	73
20	25	0.906964	10	-1.513812	11.43675	-1.436746	2.06423816	-25	0	68
21	12	1.029495	10	1.648145	14.72123	-4.721234	22.2900495	-25	0	53
22	10	1.085288	7	-0.283796	12.84509	-5.845086	34.1650309	-14	0	40
23	0	1.130626	7	-0.599997	12.57422	-5.574223	31.0719643	-4	0	27
24	0	1.124876	5	-1.977402	7.760729	-2.760729	7.62162186	6	6	24
25	0	1.119156	0	0.183698	4.198874	-4.198874	17.6305395	16	16	19
26	0	1.113464	0	0.83033	0.837751	-0.837751	0.70182654	23	23	12
27	0	1.107801	0	-1.5853	0	0	0	30	30	5
28	0	1.102167	0	-0.221915	0	0	0	35	35	0
29	4	1.096562	10	-1.543894	0	10	100	35	35	0
30	0	1.111328	4	-0.683291	0	4	16	31	31	10
31	8	1.105676	5	-2.056355	0	5	25	31	31	14
32	8	1.140739	3	-1.564771	0	3	9	23	23	19
33	4	1.175623	0	0.173774	2.530248	-2.530248	6.40215252	19	19	18
34	0	1.189987	4	-0.24668	4.411051	-0.411051	0.16896316	15	15	18
35	4	1.183935	2	0.633166	2.426229	-0.426229	0.18167078	20	20	17
36	4	1.198257	5	-0.046517	1.760867	3.2391327	10.4919805	20	20	15
37	4	1.212506	10	0.317635	1.567545	8.4324552	71.1063014	21	21	15
38	12	1.226682	8	-1.513812	0.893721	7.106279	50.4992014	19	19	23
39	10	1.281473	8	1.648145	10.97115	-2.971148	8.82772198	7	7	31
40	10	1.325813	12	-0.283796	13.08561	-1.085611	1.17855045	-1	0	37
	mean of the disturbance			-0.226992		0.2060668	mean of the standard errors			
	std dev of the disturbance			1.026133						

Σ (AO-Ot)2	962.4639		constraints		
θ	0.01		>=0	<=1	
αs	0.57		>=0	<=1	
β	0.00		>=0	<=1	
S'	21.07		>=0	<=100	INT
	GRG NonLinear				

Incoming Orders:
IO = DIO
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = DOP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = MDEI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = DSL = DSD1+DSD2+FIO+FBL

NAPOLY BEER GAME MODEL

FME - GRG NonLinear

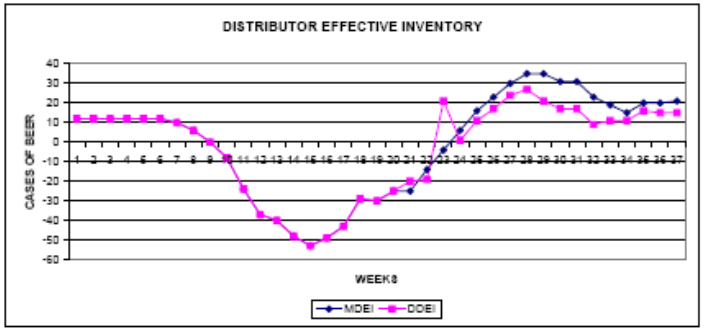
FACTOR	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	2.49446	4	1.803443	0	4	16	12	12	8
2	4	3.433337	0	0.570549	0	0	0	12	12	8
3	4	3.786717	4	-0.250784	0	4	16	12	12	4
4	2	3.919723	4	-2.398477	0	4	16	12	12	4
5	4	2.722555	0	-0.558812	0	0	0	10	10	8
6	2	3.519189	4	0.405464	0	4	16	10	10	4
7	4	2.5718	2	-0.423248	0	2	4	12	12	4
8	4	3.462447	2	-1.473118	0	2	4	8	8	6
9	5	3.797673	2	-0.138262	0	2	4	8	8	4
10	15	4.547462	5	0.562692	1.669515	3.3304852	11.0921318	5	5	4
11	10	11.06582	12	1.38203	14.00721	-2.007212	4.02890142	-8	0	7
12	14	10.40116	12	0.84764	12.80816	-0.80816	0.65312317	-16	0	17
13	24	12.64545	25	-0.360496	13.84431	11.155685	124.449312	-25	0	24
14	20	19.72632	15	2.129541	23.41522	-8.41522	70.81592	-37	0	37
15	20	19.89699	25	0.472828	21.92918	3.0708208	9.42994026	-45	0	40
16	25	19.96123	25	0.014169	21.53476	3.4652409	12.0078947	-40	0	40
17	5	23.10348	25	-0.427568	24.23527	0.7647256	0.5848053	-50	0	50
18	5	11.81388	20	-1.168324	12.20492	7.7950828	60.7633159	-30	0	50
19	13	7.564643	10	-0.262522	8.861481	1.1385185	1.29622443	-10	0	45
20	20	10.95421	10	-0.698418	9.815156	0.1848441	0.03416734	2	2	30
21	10	16.5953	10	0.74996	16.90462	-6.904622	47.6738088	2	2	20
22	10	12.48237	5	-1.38723	10.6545	-5.654504	31.9734178	2	2	20
23	7	10.93433	2	-0.234497	10.25919	-8.259192	68.2142491	2	2	15
24	7	8.480822	2	0.39418	5.434363	-3.434363	11.7948502	5	5	7
25	5	7.557359	2	-0.221182	5.895538	-3.895538	15.1752164	3	3	4
26	0	5.962552	0	-0.735582	6.786331	-6.786331	46.054291	0	0	4
27	0	2.244215	0	0.650143	2.453719	-2.453719	6.02073832	2	2	2
28	0	0.844689	0	-1.10573	0	0	0	4	4	0
29	0	0.317928	0	1.38203	0	0	0	4	4	0
30	10	0.119664	5	0.84764	0	5	25	4	4	0
31	4	6.281189	4	-0.360496	7.480054	-3.480054	12.1107736	-6	0	5
32	5	4.858605	5	2.129541	8.547508	-3.547508	12.5848132	-10	0	9
33	3	4.946781	2	-0.569302	5.93684	-3.93684	15.4987119	-10	0	9
34	0	3.732739	0	-1.229862	4.062239	-4.062239	16.5017852	-9	0	7
35	4	1.404947	2	-0.888728	2.07558	-0.07558	0.00571238	-4	0	2
36	2	3.023261	2	0.886138	5.46876	-3.46876	12.0322931	-6	0	2
37	5	2.38514	5	0.678391	4.622892	0.3771076	0.14221012	-8	0	4
38	10	4.015806	10	0.284331	5.859498	4.1405023	17.1437593	-11	0	7
39	8	7.747639	25	-0.083664	9.223336	15.776664	248.903128	-19	0	15
40	8	7.905015	25	-0.477641	8.986735	16.013265	256.424667	-22	0	35
	mean of the disturbance			-0.015737		-0.166162	mean of the standard errors			
	std dev of the disturbance			1.043475						

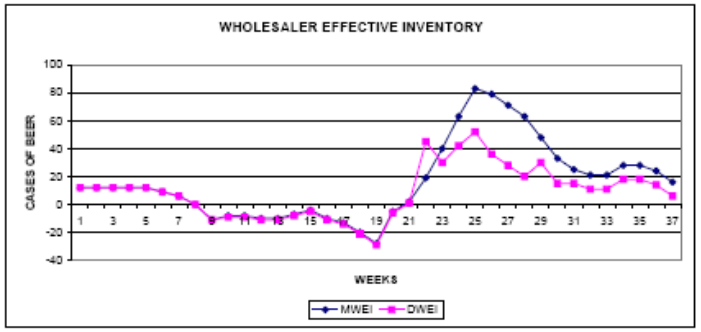
Σ (AO-Ot)2	1214.41		constraints		
θ	0.62		>=0	<=1	
αs	1.00		>=0	<=1	
β	0.00		>=0	<=1	
S'	1.56		>=0	<=100	INT
	GRG NonLinear				

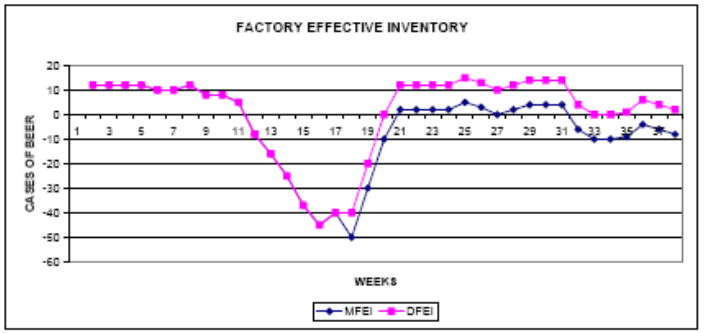
Incoming Orders:
IO = FIO
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = FPR
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = MFEI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = FSL = FPD1+FPD2

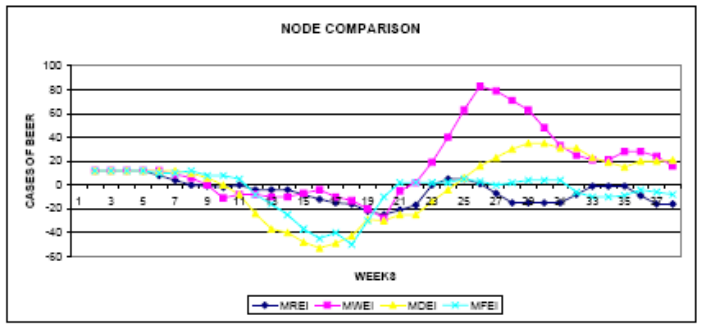
NAPOLY BEER GAME MODEL

MODEL CHARTS



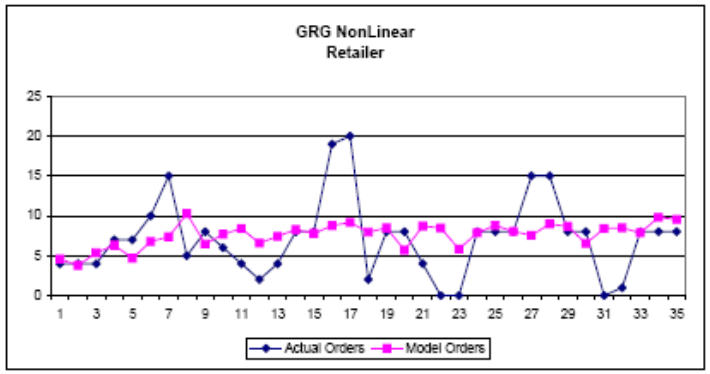


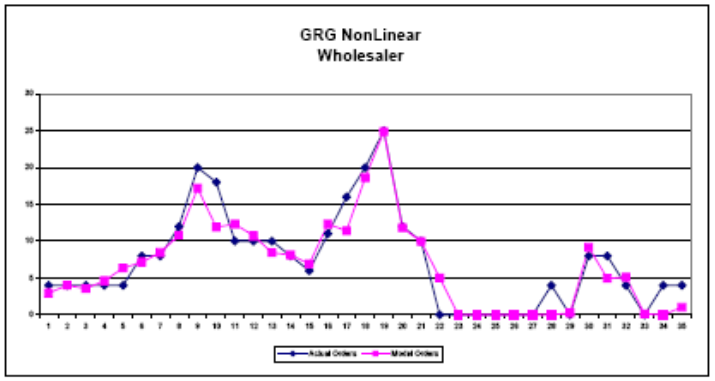


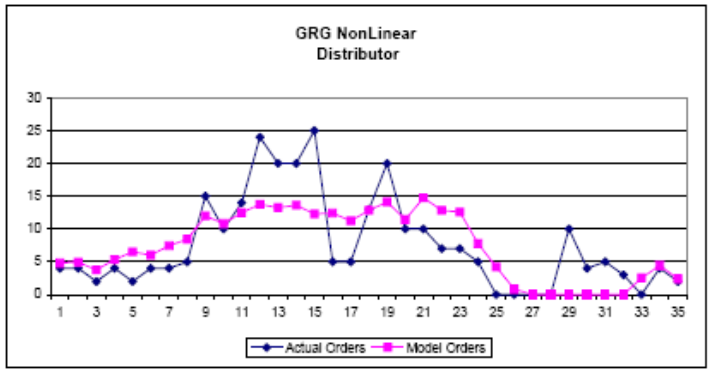


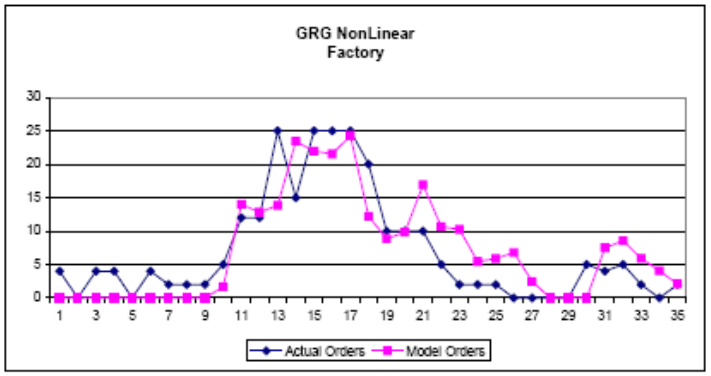
NAPOLY BEER GAME MODEL

ORDER CHARTS









NAPOLY BEER GAME MODEL

MODEL WORKSHEET

STEP 1
Receive The Inventory and Advance the shipping Delays

STEP 2
Look at the incoming orders and fill orders
all incoming orders + backlog

NAPOLY	No IT	NAPOLY	Retailer	No IT
Team Costs	$ 1,936.00	Costs	$ 345.50	

WEEK	COR	RINV1	RSD1	RSD2	RBL	RSR	RINV2	MREI	*DREI*	RCOSTS	ROP	WIO	RSL		WINV1	WSD1
0	0	12	4	4	0	4	12			0	4	4			12	4
1	4	16	4	4	0	4	12	12	*12*	6	4	4	12		16	4
2	4	16	4	4	0	4	12	12	*12*	12	4	4	12		16	4
3	4	16	4	4	0	4	12	12	*12*	18	4	4	12		16	4
4	4	16	4	4	0	4	12	12	*12*	24	7	4	12		16	4
5	8	16	4	4	0	8	8	8	*8*	28	7	7	15		16	4
6	8	12	4	7	0	8	4	4	*4*	30	10	7	18		16	4
7	8	8	7	7	0	8	0	0	*0*	30	15	10	24		13	4
8	8	7	7	10	1	7	0	-1	*-1*	31	5	15	32		10	4
9	8	7	10	4	2	7	0	-2	*-2*	33	8	5	30		4	8
10	8	10	4	8	0	10	0	0	*0*	33	6	8	28		8	8
11	8	4	8	8	4	4	0	-4	*-4*	37	4	6	30		8	4
12	8	8	8	4	4	8	0	-4	*0*	41	2	4	26		4	4
13	8	8	4	4	4	8	0	-4	*0*	45	4	2	20		4	5
14	8	4	4	5	8	4	0	-8	*-4*	53	8	4	20		5	7
15	8	4	5	7	12	4	0	-12	*-8*	65	8	8	24		7	2
16	8	5	7	2	15	5	0	-15	*-11*	80	19	8	27		2	5
17	8	7	2	5	16	7	0	-16	*-12*	96	20	19	39		5	12
18	8	2	5	12	22	2	0	-22	*-18*	118	2	20	57		12	12
19	8	5	12	12	25	5	0	-25	*-21*	143	8	2	54		12	25
20	8	12	12	25	21	12	0	-21	*-17*	164	8	8	50		25	15
21	8	12	25	13	17	12	0	-17	*-13*	181	4	8	46		15	25
22	8	25	13	8	0	25	0	0	*4*	181	0	4	25		27	25
23	8	13	8	4	0	8	5	5	*0*	183.5	0	0	12		44	23
24	8	13	4	0	0	8	5	5	*1*	186	8	0	4		63	20
25	8	9	0	0	0	8	1	1	*1*	186.5	8	8	8		83	4
26	8	1	0	8	7	1	0	-7	*-7*	193.5	8	8	16		87	0
27	8	0	8	8	15	0	0	-15	*-7*	208.5	15	8	24		79	0
28	8	8	8	8	15	8	0	-15	*-7*	223.5	15	15	31		71	0
29	8	8	8	15	15	8	0	-15	*-7*	238.5	8	15	38		63	0
30	8	8	15	15	15	8	0	-15	*-7*	253.5	8	8	38		48	0
31	8	15	15	8	8	15	0	-8	*0*	261.5	0	8	31		33	4
32	8	15	8	8	1	15	0	-1	*7*	262.5	1	0	16		29	0
33	8	8	8	0	1	8	0	-1	*-1*	263.5	8	1	9		21	8
34	8	8	0	1	1	8	0	-1	*7*	264.5	8	8	9		29	8
35	8	0	1	8	9	0	0	-9	*-1*	273.5	8	8	17		36	4
36	8	1	8	8	16	1	0	-16	*-8*	289.5	16	8	24		32	0
37	8	8	8	8	16	8	0	-16	*-8*	305.5	8	16	32		24	4
38	8	8	8	16	16	8	0	-16	*-8*	321.5	8	8	32		20	4
39	8	8	16	8	16	8	0	-16	*-8*	337.5	8	8	32		8	4
40	8	16	8	4	8	16	0	-8	*-6*	345.5	14	8	24		4	12

NAPOLY BEER GAME MODEL

MODEL WORKSHEET

STEP 3
Record your inventory or backlog

STEP 4
Advance the order slips and the brewery Brews

					NAPOLY	Wholesaler		No IT									NAPOLY
					Costs	$ 509.50											Costs
WEEK	**WSD2**	**WBL**	**WINV2**	**MWEI**	***DWEI***	**WCOSTS**	**WOP**	**DIO**	**WSL**		**DINV1**	**DSD1**	**DSD2**	**DBL**	**DINV2**	**MDEI**	***DDEI***
0	4	0	12			0	4	4			12	4	4	0	12		
1	4	0	12	12	*12*	6	4	4	12		16	4	4	0	12	12	*12*
2	4	0	12	12	*12*	12	4	4	12		16	4	4	0	12	12	*12*
3	4	0	12	12	*12*	18	4	4	12		16	4	4	0	12	12	*12*
4	4	0	12	12	*12*	24	4	4	12		16	4	4	0	12	12	*12*
5	4	0	12	12	*12*	30	4	4	12		16	4	2	0	12	12	*12*
6	4	0	9	9	*9*	34.5	8	4	12		16	2	4	0	12	12	*12*
7	4	0	6	6	*6*	37.5	8	8	16		14	4	2	0	10	10	*10*
8	8	0	0	0	*0*	37.5	12	8	20		14	2	4	0	6	6	*6*
9	8	11	0	-11	*-11*	48.5	20	12	28		8	4	4	0	0	0	*0*
10	4	8	0	-8	*-9*	56.5	18	20	40		4	4	5	8	0	-8	*-8*
11	4	8	0	-8	*-9*	64.5	10	18	50		4	5	7	24	0	-24	*-24*
12	5	10	0	-10	*-11*	74.5	10	10	56		5	7	2	37	0	-37	*-37*
13	7	10	0	-10	*-11*	84.5	10	10	62		7	2	5	40	0	-40	*-40*
14	2	7	0	-7	*-8*	91.5	8	10	67		2	5	12	48	0	-48	*-48*
15	5	4	0	-4	*-5*	95.5	6	8	68		5	12	12	53	0	-53	*-53*
16	12	10	0	-10	*-11*	105.5	11	6	72		12	12	25	49	0	-49	*-49*
17	12	13	0	-13	*-14*	118.5	16	11	78		12	25	15	43	0	-43	*-43*
18	25	20	0	-20	*-21*	138.5	20	16	82		25	15	25	29	0	-29	*-29*
19	15	28	0	-28	*-29*	166.5	25	20	90		15	25	25	30	0	-30	*-30*
20	25	5	0	-5	*-6*	171.5	12	25	90		25	25	23	25	0	-25	*-25*
21	25	0	2	2	*1*	172.5	10	12	87		25	23	20	25	0	-25	*-20*
22	23	0	19	19	*45*	182	0	10	72		23	20	10	14	0	-14	*-19*
23	20	0	40	40	*30*	202	0	0	47		20	10	10	4	0	-4	*21*
24	4	0	63	63	*42*	233.5	0	0	24		10	10	7	0	6	6	*1*
25	0	0	83	83	*52*	275	0	0	4		16	7	7	0	16	16	*11*
26	0	0	79	79	*36*	314.5	0	0	0		23	7	5	0	23	23	*17*
27	0	0	71	71	*28*	350	0	0	0		30	5	0	0	30	30	*24*
28	0	0	63	63	*20*	381.5	4	0	0		35	0	0	0	35	35	*27*
29	0	0	48	48	*30*	405.5	0	4	4		35	0	0	0	35	35	*21*
30	4	0	33	33	*15*	422	8	0	4		35	0	0	0	31	31	*17*
31	0	0	25	25	*15*	434.5	8	8	12		31	0	4	0	31	31	*17*
32	8	0	21	21	*11*	445	4	8	16		31	4	0	0	23	23	*9*
33	8	0	21	21	*11*	455.5	0	4	20		27	0	5	0	19	19	*11*
34	4	0	28	28	*18*	469.5	4	0	12		19	5	4	0	15	15	*11*
35	0	0	28	28	*18*	483.5	4	4	8		20	4	5	0	20	20	*16*
36	4	0	24	24	*14*	495.5	4	4	8		24	5	2	0	20	20	*15*
37	4	0	16	16	*6*	503.5	12	4	12		25	2	0	0	21	21	*15*
38	4	0	4	4	*-6*	505.5	10	12	20		23	0	2	0	19	19	*15*
39	12	0	0	0	*-10*	505.5	10	10	26		19	2	2	0	7	7	*17*
40	9	4	0	-4	*-14*	509.5	10	10	32		9	2	5	1	0	-1	*0*

NAPOLY BEER GAME MODEL

MODEL WORKSHEET

STEP 5
Place and record your orders

	Distributor		No IT									NAPOLY	Factory	No IT	
	$ 649.50											Costs	$ 431.50		
WEEK	DCOSTS	DOP	FIO	DSL		FPD1	FPD2	FSD2	FBL	FINV2	MFEI	*DFEI*	FCOSTS	FPR	FSL
0	0	4	4	12		12	4	4	0	12			0	4	8
1	6	4	4	12		16	4	4	0	12	12	*12*	6	4	8
2	12	4	4	12		16	4	4	0	12	12	*12*	12	0	8
3	18	2	4	12		16	4	0	0	12	12	*12*	18	4	4
4	24	4	2	10		16	0	4	0	12	12	*12*	24	4	4
5	30	2	4	10		12	4	4	0	10	10	*10*	29	0	8
6	36	4	2	8		14	4	0	0	10	10	*10*	34	4	4
7	41	4	4	10		14	0	4	0	12	12	*12*	40	2	4
8	44	5	4	10		12	4	2	0	8	8	*8*	44	2	6
9	44	15	5	13		12	2	2	0	8	8	*8*	48	2	4
10	52	10	15	24		10	2	2	0	5	5	*5*	50.5	5	4
11	76	14	10	30		7	2	5	8	0	-8	*-8*	58.5	12	7
12	113	24	14	39		2	5	12	16	0	-16	*-16*	74.5	12	17
13	153	20	24	56		5	12	12	25	0	-25	*-25*	99.5	25	24
14	201	20	20	74		12	12	25	37	0	-37	*-37*	136.5	15	37
15	254	25	20	89		12	25	15	45	0	-45	*-45*	181.5	25	40
16	303	5	25	102		25	15	25	40	0	-40	*-40*	221.5	25	40
17	346	5	5	95		15	25	25	50	0	-50	*-40*	271.5	25	50
18	375	13	5	75		25	25	25	30	0	-30	*-20*	301.5	20	50
19	405	20	13	73		25	25	20	10	0	-10	*0*	311.5	10	45
20	430	10	20	68		25	20	10	0	2	2	*12*	312.5	10	30
21	455	10	10	53		22	10	10	0	2	2	*12*	313.5	10	20
22	469	7	10	40		12	10	10	0	2	2	*12*	314.5	5	20
23	473	7	7	27		12	10	5	0	2	2	*12*	315.5	2	15
24	476	5	7	24		12	5	2	0	5	5	*15*	318	2	7
25	484	0	5	19		10	2	2	0	3	3	*13*	319.5	2	4
26	495.5	0	0	12		5	2	2	0	0	0	*10*	319.5	0	4
27	510.5	0	0	5		2	2	0	0	2	2	*12*	320.5	0	2
28	528	0	0	0		4	0	0	0	4	4	*14*	322.5	0	0
29	545.5	10	0	0		4	0	0	0	4	4	*14*	324.5	0	0
30	561	4	10	10		4	0	0	0	4	4	*14*	326.5	5	0
31	576.5	5	4	14		4	0	5	6	0	-6	*4*	332.5	4	5
32	588	3	5	19		0	5	4	10	0	-10	*0*	342.5	5	9
33	597.5	0	3	18		5	4	5	10	0	-10	*0*	352.5	2	9
34	605	4	0	18		4	5	2	9	0	-9	*1*	361.5	0	7
35	615	2	4	17		5	2	0	4	0	-4	*6*	365.5	2	2
36	625	5	2	15		2	0	2	6	0	-6	*4*	371.5	2	2
37	635.5	10	5	15		0	2	2	8	0	-8	*2*	379.5	5	4
38	645	8	10	23		2	2	5	11	0	-11	*0*	390.5	10	7
39	648.5	8	8	31		2	5	10	19	0	-19	*0*	409.5	25	15
40	649.5	12	8	37		5	10	25	22	0	-22	*0*	431.5	25	35

NAPOLY BEER GAME MODEL

MODEL DATA

NAPOLY								
No IT								
Week	ROR	REI	WOR	WEI	DOR	DEI	FOR	FEI
1	4	12	4	12	4	12	4	12
2	4	12	4	12	4	12	0	12
3	4	12	4	12	2	12	4	12
4	7	12	4	12	4	12	4	12
5	7	8	4	12	2	12	0	10
6	10	4	8	9	4	12	4	10
7	15	0	8	6	4	10	2	12
8	5	-1	12	0	5	6	2	8
9	8	-2	20	-11	15	0	2	8
10	6	0	18	-9	10	-8	5	5
11	4	-4	10	-9	14	-24	12	-8
12	2	0	10	-11	24	-37	12	-16
13	4	0	10	-11	20	-40	25	-25
14	8	-4	8	-8	20	-48	15	-37
15	8	-8	6	-5	25	-53	25	-45
16	19	-11	11	-11	5	-49	25	-40
17	20	-12	16	-14	5	-43	25	-40
18	2	-18	20	-21	13	-29	20	-20
19	8	-21	25	-29	20	-30	10	0
20	8	-17	12	-6	10	-25	10	12
21	4	-13	10	1	10	-20	10	12
22	0	4	0	45	7	-19	5	12
23	0	0	0	30	7	21	2	12
24	8	1	0	42	5	1	2	15
25	8	1	0	52	0	11	2	13
26	8	-7	0	36	0	17	0	10
27	15	-7	0	28	0	24	0	12
28	15	-7	4	20	0	27	0	14
29	8	-7	0	30	10	21	0	14
30	8	-7	8	15	4	17	5	14
31	0	0	8	15	5	17	4	4
32	1	7	4	11	3	9	5	0
33	8	-1	0	11	0	11	2	0
34	8	7	4	18	4	11	0	1
35	8	-1	4	18	2	16	2	6
36	16	-8	4	14	5	15	2	4
37	8	-8	12	6	10	15	5	2
38	8	-8	10	-6	8	15	10	0
39	8	-8	10	-10	8	17	25	0
40	14	-6	10	-14	12	0	25	0

NORTHEAST BEER GAME MODEL

RME GRG NonLinear

RETAILE	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	0	0								
1	4	0.00	4	2.167352	6.424807	-2.424807	5.87968962	12	12	12
2	4	0.40	4	-2.675843	1.976695	2.0233048	4.09376227	12	12	12
3	4	0.75	4	-2.144587	2.864012	1.1359884	1.29046954	12	12	12
4	4	1.07	4	-0.563047	4.766444	-0.766444	0.5874364	12	12	12
5	8	1.36	8	0.860895	8.202874	-0.202874	0.04115792	8	8	12
6	8	2.02	8	-1.513115	8.182829	-0.182829	0.03342654	4	4	16
7	8	2.61	12	0.816298	12.80144	-0.801441	0.64230744	0	0	20
8	8	3.14	16	-0.242531	12.22511	3.7748903	14.2497967	-4	0	28
9	8	3.62	8	-0.042212	12.85532	-4.855322	23.5741487	-4	0	36
10	8	4.05	8	-0.274608	13.0555	-5.055498	25.5580439	-4	0	36
11	8	4.44	8	0.46921	14.18916	-6.18916	38.3057033	-4	0	36
12	8	4.79	8	-1.11299	12.93326	-4.933258	24.3370304	-8	0	40
13	8	5.11	10	0.032479	14.37032	-4.370321	19.099706	-12	0	44
14	8	5.40	8	-0.790712	13.81997	-5.819973	33.8720836	-12	0	46
15	8	5.65	8	1.010267	15.87813	-7.878129	62.0649236	-12	0	46
16	8	5.89	10	-2.178531	12.92937	-2.929367	8.58119249	-11	0	45
17	8	6.09	10	2.141494	17.44375	-7.443755	55.4094885	-11	0	47
18	8	6.28	11	-1.633645	13.82556	-2.825564	7.98381415	-14	0	52
19	8	6.45	19	1.124899	16.73498	2.265016	5.13029749	-14	0	55
20	8	6.60	27	-1.078961	14.61516	12.384842	153.384313	-14	0	66
21	8	6.74	31	1.030946	16.75643	14.243567	202.879209	-12	0	83
22	8	6.87	28	-0.669659	15.04854	12.951458	167.740263	-10	0	104
23	8	6.98	18	-1.223906	14.46222	3.5377772	12.5158674	-13	0	127
24	8	7.08	24	-0.03933	15.69132	8.3086798	69.0341608	-12	0	136
25	8	7.17	25	-0.64327	15.05307	9.9469288	98.9413918	-16	0	156
26	8	7.25	25	1.006397	16.62815	8.3718515	70.0878967	-24	0	181
27	8	7.33	23	-2.238628	13.30044	9.6995587	94.0814382	-32	0	206
28	8	7.39	23	2.35106	17.81268	5.1873245	26.9083355	-40	0	229
29	8	7.45	21	1.391623	16.80052	4.1994831	17.6356582	-43	0	247
30	8	7.51	14	-1.223906	14.15765	-0.157645	0.02485206	-43	0	260
31	8	7.56	8	-0.03933	15.36589	-7.365888	54.2562801	-41	0	264
32	8	7.60	11	-0.64327	14.88097	-3.88097	15.0619279	-29	0	252
33	8	7.64	0	1.006397	16.61402	-16.61402	276.025758	-19	0	245
34	8	7.67	0	-2.238628	13.46726	-13.46726	181.36703	-17	0	235
35	8	7.71	0	2.35106	0	0	0	87	87	123
36	9	7.74	0	1.391623	0	0	0	99	99	103
37	10	7.86	0	-1.223906	0	0	0	111	111	83
38	11	8.07	0	-0.03933	0	0	0	123	123	63
39	12	8.36	0	-0.64327	0	0	0	135	135	43
40	13	8.72	0	1.006397	0	0	0	137	137	33
	mean of the disturbance			-0.155667		-0.003824	mean of the standard errors			
	std dev of the disturbance			1.410717						

Σ (AO-Ot)2	1770.678	constraints		
θ	0.10	>=0	<=1	
αs	0.43	>=0	<=1	
β	0.01	>=0	<=1	
S'	22.06	>=0	<=100	INT

GRG NonLinear

Incoming Orders:
IO = COR
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = ROP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = REI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = RSL = RSD1+RSD2+WIO+WBL

NORTHEAST BEER GAME MODEL

WME - GRG NonLinear

WHOLES	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	3.148456	4	0.676977	2.631812	1.3681882	1.87193883	12	12	12
2	4	3.818718	4	1.190041	3.815138	0.1848619	0.03417391	12	12	12
3	4	3.961408	4	0.821775	3.589562	0.4104383	0.16845957	12	12	12
4	4	3.991784	4	1.52972	4.327883	-0.327883	0.10750724	12	12	12
5	4	3.998251	4	0.117727	2.922357	1.077643	1.16131453	12	12	12
6	8	3.999628	4	0.203959	3.009965	0.9900345	0.98016834	12	12	12
7	8	7.148376	4	0.400846	8.39174	-4.39174	19.2873837	8	8	12
8	12	7.818701	8	-0.370797	10.32656	-2.326561	5.41288762	4	4	12
9	16	11.10986	8	1.168903	17.02959	-9.029588	81.5334563	-4	0	16
10	8	14.95896	12	1.00125	20.54706	-8.547062	73.052273	-16	0	20
11	8	9.481465	12	-0.378432	13.36195	-1.361947	1.85489948	-20	0	28
12	8	8.315383	15	0.117966	12.52829	2.471707	6.10933572	-20	0	32
13	8	8.067141	10	0.56248	12.43762	-2.437616	5.94197363	-20	0	39
14	10	8.014293	5	-0.588382	11.19291	-6.192914	38.3521894	-19	0	40
15	8	9.577271	9	-0.770009	12.69724	-3.697243	13.6696022	-21	0	37
16	8	8.335779	0	-1.026014	11.03578	-11.03578	121.788339	-24	0	41
17	10	8.071483	0	1.212036	13.33747	-13.33747	177.888101	-24	0	33
18	10	9.589446	15	0.676977	14.64831	0.3516854	0.12368262	-26	0	25
19	11	9.912599	10	1.190041	15.27957	-5.279569	27.8738466	-26	0	30
20	19	10.76851	10	0.821775	15.76721	-5.767212	33.2607298	-27	0	30
21	27	17.24763	10	1.181526	22.40112	-12.40112	153.787838	-41	0	35
22	31	24.92386	30	0.105514	28.96034	1.0396564	1.08088538	-59	0	36
23	28	29.70647	90	-1.73139	30.84025	59.15975	3499.87602	-86	0	62
24	18	28.36328	30	-0.45265	27.08647	2.9135309	8.48866234	-114	0	152
25	24	20.2062	20	-0.020919	18.13134	1.8686629	3.49190092	-132	0	182
26	25	23.19235	10	0.382137	20.7007	-10.7007	114.504879	-156	0	202
27	25	24.61518	10	0.97862	22.51504	-12.51504	156.62623	-176	0	207
28	23	24.91808	20	0.654823	22.41216	-2.412157	5.81850271	-193	0	209
29	23	23.40833	20	-1.812628	18.02504	1.9749642	3.90048372	-206	0	219
30	21	23.08693	20	-0.731331	18.78493	1.2150713	1.47639834	-209	0	219
31	14	21.44428	10	-0.830742	16.96088	-6.960883	48.4538882	-212	0	221
32	8	15.58478	5	0.82948	12.76161	-7.76161	60.2425914	-216	0	221
33	11	9.614695	20	0.0038	10.35205	9.6479532	93.0830007	-112	0	114
34	0	10.70509	20	-0.079797	11.35884	8.6411562	74.6695804	-103	0	114
35	0	2.279964	20	-0.040624	2.971893	17.028107	289.95643	-83	0	114
36	0	0.48516	10	0.96679	2.185502	7.8144978	61.066376	-63	0	114
37	0	0.103284	5	0.932648	2.17941	2.8205896	7.95572596	-43	0	104
38	0	0.021988	5	0.594722	1.965151	3.034849	9.21030872	-33	0	99
39	0	0.004681	5	0.336144	1.484303	3.5156969	12.3601245	-33	0	104
40	0	0.000996	0	0.105514	1.045026	-1.045026	1.09207848	-33	0	109
	mean of the disturbance			0.199847		-0.461162	mean of the standard errors			
	std dev of the disturbance			0.841007						

Σ (AO-Ot)2	5217.614		constraints		
θ	0.79		>=0	<=1	
αs	0.51		>=0	<=1	
β	0.08		>=0	<=1	
S'	10.62		>=0	<=100	INT

Standard GRG NonLinear

Incoming Orders:
IO = WIO
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = WOP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = MWEI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = WSL = WSD1+WSD2+DIO+DBL

NORTHEAST BEER GAME MODEL

DME - GRG NonLinear

DISTRIB	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	3.752455	4	-0.104702	3.381279	0.618721	0.38281564	12	12	12
2	4	3.98468	4	-0.146991	3.571215	0.4287848	0.18385642	12	12	12
3	4	3.999052	4	1.905281	5.637859	-1.637859	2.68258086	12	12	12
4	4	3.999941	4	1.167417	4.900883	-0.900883	0.811591	12	12	12
5	4	3.999996	4	0.769247	4.502769	-0.502769	0.25277653	12	12	12
6	4	4	4	0.089996	3.823521	0.1764789	0.03114479	12	12	12
7	4	4	4	0.892441	4.625967	-0.625967	0.39183425	12	12	12
8	4	4	5	-0.104702	3.628824	1.3711762	1.88012414	12	12	12
9	8	4	8	-0.146991	3.586535	4.4134652	19.4786752	12	12	13
10	8	7.752455	5	1.905281	9.480087	-4.480087	20.0711777	8	8	17
11	12	7.98468	8	1.167417	9.063272	-1.063272	1.13054795	4	4	18
12	12	11.75151	8	-1.405986	10.34552	-2.345521	5.5014688	-3	0	21
13	15	11.98462	10	0.070894	12.05552	-2.055516	4.22514694	-7	0	21
14	10	14.81339	10	-0.755137	14.05825	-4.058253	16.4694147	-17	0	26
15	5	10.29788	10	-1.450327	8.847556	1.1524441	1.3281275	-19	0	28
16	9	5.327866	4	-2.025312	3.302554	0.6974465	0.48643161	-16	0	30
17	0	8.772746	4	-1.201006	7.571739	-3.571739	12.7573224	-15	0	24
18	0	0.542912	0	-0.051352	0.49156	-0.49156	0.24163134	-5	0	18
19	15	0.033599	0	-0.862645	0	0	0	5	5	8
20	10	14.07379	0	0.025117	14.0989	-14.0989	198.779088	-6	0	4
21	10	10.25211	5	1.33544	11.58755	-6.587551	43.3958291	-12	0	0
22	10	10.0156	8	1.388596	11.4042	-3.404198	11.5885649	-22	0	5
23	30	10.00097	10	1.799218	11.80018	-1.800183	3.24066	-32	0	13
24	90	28.76234	20	0.032709	28.79504	-8.795045	77.3528098	-62	0	23
25	30	86.21023	90	-1.307873	84.90236	5.0976389	25.9859225	-147	0	38
26	20	33.47864	30	0.612614	34.09125	-4.091251	16.7383383	-169	0	120
27	10	20.83414	20	2.213262	23.0474	-3.047404	9.28667116	-179	0	140
28	10	10.67048	20	-0.522498	10.14799	9.8520141	97.0621818	-169	0	140
29	20	10.04149	20	-0.246122	9.795371	10.204629	104.134449	-161	0	142
30	20	19.38371	20	-0.174798	19.20891	0.7910921	0.62582673	-171	0	152
31	20	19.96186	20	-0.517656	19.4442	0.5557963	0.30890951	-79	0	60
32	10	19.99764	10	1.160953	21.15859	-11.15859	124.514199	-79	0	60
33	5	10.61872	0	-1.604359	9.014357	-9.014357	81.2586281	-69	0	50
34	20	5.347721	0	1.922108	7.269829	-7.269829	52.8504202	-54	0	30
35	20	19.09323	0	0.663552	19.75678	-19.75678	390.330283	-54	0	10
36	20	19.94388	0	-2.40183	17.54205	-17.54205	307.723636	-64	0	0
37	10	19.99653	0	-1.527898	18.46863	-18.46863	341.090248	-84	0	0
38	5	10.61865	0	0.513618	11.13227	-11.13227	123.927328	-94	0	0
39	5	5.347717	0	-0.603681	4.744036	-4.744036	22.5058737	-99	0	0
40	5	5.021519	5	-0.23502	4.786499	0.2135012	0.04558278	-104	0	0
	mean of the disturbance			0.185517		-2.154224	mean of the standard errors			
	std dev of the disturbance			1.135172						

Σ (AO-Ot)2	2121.052		constraints	
θ	0.94	>=0	<=1	
αs	0.02	>=0	<=1	
β	0.00	>=0	<=1	
S'	0.00	>=0	<=100	INT

GRG NonLinear

Incoming Orders:
IO = DIO
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = DOP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = MDEI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = DSL = DSD1+DSD2+FIO+FBL

NORTHEAST BEER GAME MODEL

FME - GRG NonLinear

FACTOR	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	2.079166	4	0.710172	20.07794	-16.07794	258.500295	12	12	8
2	4	3.077599	4	-0.943411	19.42279	-15.42279	237.862578	12	12	8
3	4	3.557055	8	0.136907	20.98257	-12.98257	168.547095	12	12	8
4	4	3.787294	4	-1.674972	18.61725	-14.61725	213.663982	12	12	12
5	4	3.897857	8	0.641091	21.04388	-13.04388	170.14268	12	12	12
6	4	3.95095	4	0.292646	17.52457	-13.52457	182.914079	16	16	12
7	4	3.976446	0	0.441749	17.69917	-17.69917	313.26068	16	16	12
8	4	3.988689	4	-0.045706	15.56737	-11.56737	133.804023	20	20	4
9	5	3.994568	0	-0.298665	15.32229	-15.32229	234.772535	20	20	4
10	8	4.517183	15	0.136907	20.30841	-5.308414	28.1792577	15	15	4
11	5	6.327521	15	-1.674972	21.3757	-6.375705	40.6496111	11	11	15
12	8	5.637487	50	0.641091	24.09287	25.907127	671.179238	6	6	30
13	8	6.865501	10	0.292646	12.47333	-2.473333	6.11737522	13	13	65
14	10	7.455204	10	0.441749	8.549825	1.4501749	2.10300732	20	20	60
15	10	8.777967	0	-0.045706	0	0	0	60	60	20
16	10	9.413169	0	-0.298665	0	0	0	60	60	10
17	4	9.718199	0	0.136907	0	0	0	60	60	0
18	4	6.745928	0	-1.674972	0	0	0	56	56	0
19	0	5.318618	0	0.641091	0	0	0	52	52	0
20	0	2.554046	0	0.292646	0	0	0	52	52	0
21	0	1.226475	0	0.441749	0	0	0	52	52	0
22	5	0.588964	2	-0.045706	0	2	4	52	52	0
23	8	2.881783	2	-0.298665	0	2	4	47	47	2
24	10	5.542188	5	-0.567557	1.285254	3.7147458	13.7993365	39	39	4
25	20	7.859321	10	-1.218472	8.811612	1.1883883	1.41226663	31	31	7
26	90	14.16994	150	-0.785601	28.49552	121.50448	14763.3385	13	13	15
27	30	53.58576	30	-0.219964	50.54643	-20.54643	422.155639	-72	0	160
28	20	41.32608	40	-1.351221	33.2371	6.7629027	45.7368528	-92	0	180
29	20	30.24097	20	0.479687	14.90655	5.0934483	25.9432155	38	38	70
30	20	24.9178	10	-0.523943	2.479078	7.5209216	56.5642614	48	48	60
31	20	22.36157	0	0.611949	0	0	0	68	68	30
32	20	21.13405	0	0.177605	0	0	0	68	68	10
33	10	20.54458	0	-0.065715	2.259403	-2.259403	5.10489991	58	58	0
34	0	15.0636	0	1.017106	5.921117	-5.921117	35.059628	48	48	0
35	0	7.233668	0	-0.814383	0	0	0	48	48	0
36	0	3.47367	0	-1.14234	0	0	0	48	48	0
37	0	1.668086	0	-0.930209	0	0	0	48	48	0
38	0	0.801029	0	0.178312	0	0	0	48	48	0
39	0	0.384661	0	-0.67423	0	0	0	48	48	0
40	0	0.184718	0	-1.058855	0	0	0	48	48	0
	mean of the disturbance			-0.143103		0.1142845	mean of the standard errors			
	std dev of the disturbance			0.735785						

Σ (AO-Ot)2	18039.81		constraints	
θ	0.52		>=0	<=1	
αs	0.81		>=0	<=1	
β	0.24		>=0	<=1	
S'	35.39		>=0	<=100	INT
	GRG NonLinear				

Incoming Orders:

IO = FIO

Expected Incoming Orders:

$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$

Actual Orders:

AO = FPR

Disturbance:

normally distributed white noise

mean = 0

std dev = 1

Model Orders:

$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$

Error Term:

$AO - O_t$

Squared errors:

$(AO - O_t)^2$

Effective Inventory:

EI = MFEI

Stock:

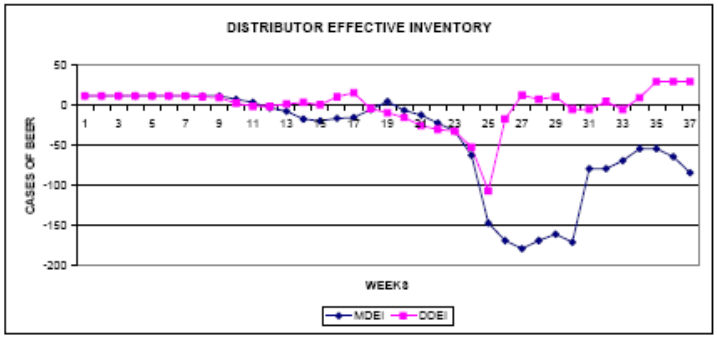
St = MAX(0,EI)

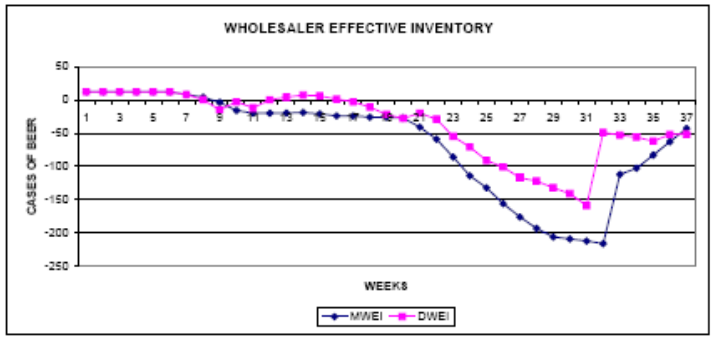
Supply Line:

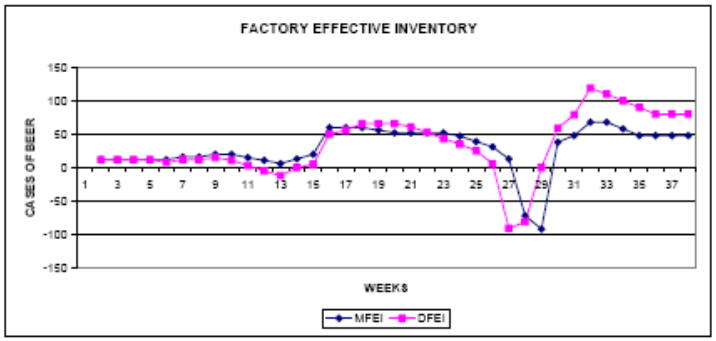
SLt = FSL = FPD1+FPD2

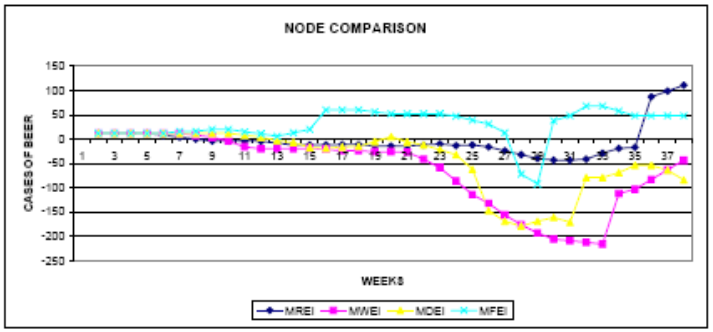
NORTHEAST BEER GAME MODEL

MODEL CHARTS



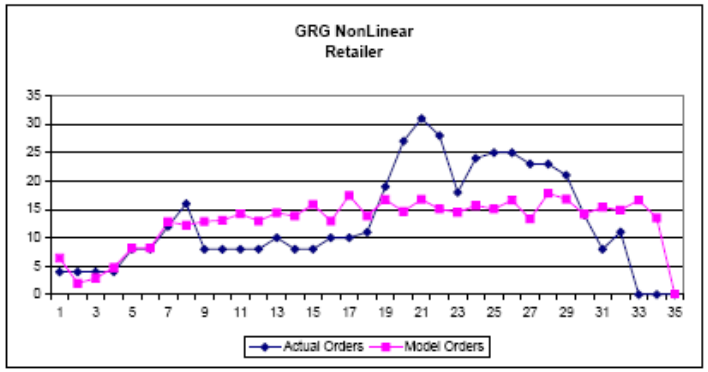


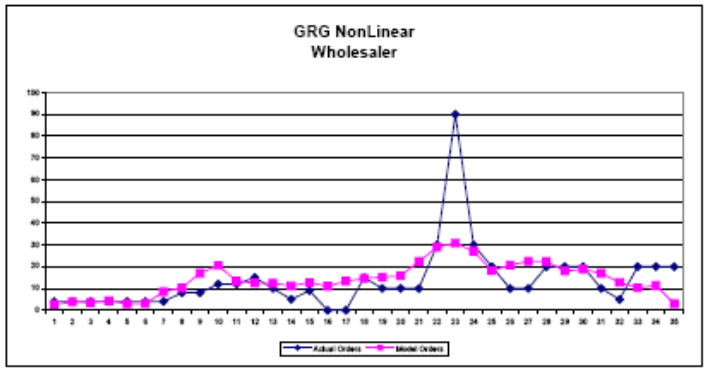


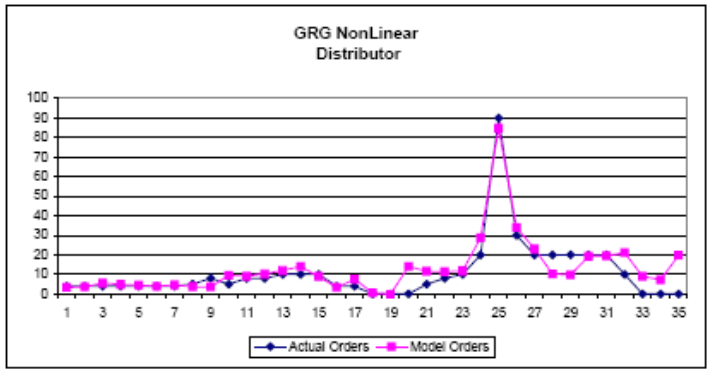


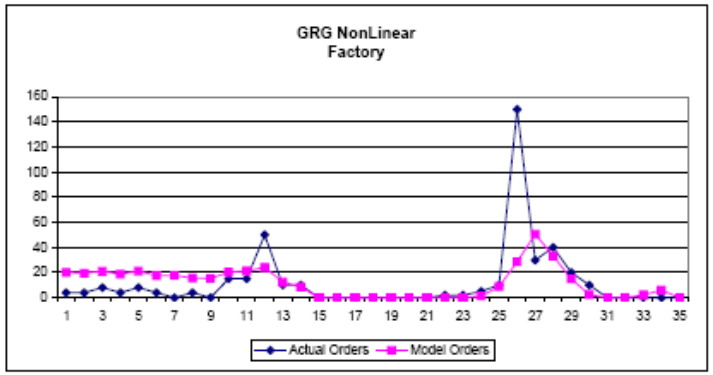
NORTHEAST BEER GAME MODEL

ORDER CHARTS









NORTHEAST BEER GAME MODEL

MODEL WORKSHEET

STEP 1
Receive The Inventory and Advance the shipping Delays

STEP 2
Look at the incoming orders and fill orders
all incoming orders + backlog

NORTH EAST	NO IT
Team Costs	$ 6,355.00

NORTH EAST	Retailer	NO IT
Costs	$ 851.00	

WEEK	COR	RINV1	RSD1	RSD2	RBL	RSR	RINV2	MREI	*DREI*	RCOSTS	ROP	WIO	RSL		WINV1	WSD1
0	0	12	4	4	0	4	12			0	4	4			12	4
1	4	16	4	4	0	4	12	12	*12*	6	4	4	12		16	4
2	4	16	4	4	0	4	12	12	*12*	12	4	4	12		16	4
3	4	16	4	4	0	4	12	12	*12*	18	4	4	12		16	4
4	4	16	4	4	0	4	12	12	*12*	24	4	4	12		16	4
5	8	16	4	4	0	8	8	8	*8*	28	8	4	12		16	4
6	8	12	4	4	0	8	4	4	*4*	30	8	8	16		16	4
7	8	8	4	8	0	8	0	0	*0*	30	12	8	20		16	4
8	8	4	8	8	4	4	0	-4	*-4*	34	16	12	28		12	4
9	8	8	8	8	4	8	0	-4	*-4*	38	8	16	36		8	4
10	8	8	8	4	4	8	0	-4	*-4*	42	8	8	36		4	4
11	8	8	4	4	4	8	0	-4	*0*	46	8	8	36		4	8
12	8	4	4	8	8	4	0	-8	*-2*	54	8	8	40		8	8
13	8	4	8	8	12	4	0	-12	*-2*	66	10	8	44		8	9
14	8	8	8	9	12	8	0	-12	*-2*	78	8	10	46		9	8
15	8	8	9	8	12	8	0	-12	*-2*	90	8	8	46		8	5
16	8	9	8	5	11	9	0	-11	*-2*	101	10	8	45		5	8
17	8	8	5	8	11	8	0	-11	*-10*	112	10	10	47		8	8
18	8	5	8	8	14	5	0	-14	*-8*	126	11	10	52		8	10
19	8	8	8	10	14	8	0	-14	*-11*	140	19	11	55		10	10
20	8	8	10	10	14	8	0	-14	*-19*	154	27	19	66		10	5
21	8	10	10	5	12	10	0	-12	*-27*	166	31	27	83		5	9
22	8	10	5	9	10	10	0	-10	*-31*	176	28	31	104		9	4
23	8	5	9	4	13	5	0	-13	*-28*	189	18	28	127		4	0
24	8	9	4	0	12	9	0	-12	*-18*	201	24	18	136		0	0
25	8	4	0	0	16	4	0	-16	*-24*	217	25	24	156		0	0
26	8	0	0	0	24	0	0	-24	*-25*	241	25	25	181		0	5
27	8	0	0	5	32	0	0	-32	*-25*	273	23	25	206		5	8
28	8	0	5	8	40	0	0	-40	*-23*	313	23	23	229		8	10
29	8	5	8	10	43	5	0	-43	*-23*	356	21	23	247		10	20
30	8	8	10	20	43	8	0	-43	*-21*	399	14	21	260		20	18
31	8	10	20	18	41	10	0	-41	*-14*	440	8	14	264		18	10
32	8	20	18	10	29	20	0	-29	*-8*	469	11	8	252		10	112
33	8	18	10	112	19	18	0	-19	*-11*	488	0	11	245		112	20
34	8	10	112	20	17	10	0	-17	*2*	505	0	0	235		20	20
35	8	112	20	20	0	25	87	87	*114*	548.5	0	0	123		20	20
36	8	107	20	20	0	8	99	99	*111*	598	0	0	103		20	20
37	8	119	20	20	0	8	111	111	*108*	653.5	0	0	83		20	10
38	8	131	20	10	0	8	123	123	*110*	715	0	0	63		10	0
39	8	143	10	0	0	8	135	135	*102*	782.5	0	0	43		0	0
40	8	145	0	0	0	8	137	137	*114*	851	0	0	33		0	0

NORTHEAST BEER GAME MODEL

MODEL WORKSHEET

STEP 3
Record your inventory or backlog

STEP 4
Advance the order slips and the brewery Brews

					NORTH EAST	Wholesaler		NO IT									NORTH EAST
					Costs	$ 2,592.00											Costs
WEEK	WSD2	WBL	WINV2	MWEI	*DWEI*	WCOSTS	WOP	DIO	WSL		DINV1	DSD1	DSD2	DBL	DINV2	MDEI	*DDEI*
0	4	0	12			0	4	4			12	4	4	0	12		
1	4	0	12	12	*12*	6	4	4	12		16	4	4	0	12	12	*12*
2	4	0	12	12	*12*	12	4	4	12		16	4	4	0	12	12	*12*
3	4	0	12	12	*12*	18	4	4	12		16	4	4	0	12	12	*12*
4	4	0	12	12	*12*	24	4	4	12		16	4	4	0	12	12	*12*
5	4	0	12	12	*12*	30	4	4	12		16	4	4	0	12	12	*12*
6	4	0	12	12	*12*	36	4	4	12		16	4	4	0	12	12	*12*
7	4	0	8	8	*8*	40	4	4	12		16	4	4	0	12	12	*12*
8	4	0	4	4	*0*	42	8	4	12		16	4	4	0	12	12	*11*
9	4	4	0	-4	*-15*	46	8	8	16		16	4	4	0	12	12	*10*
10	8	16	0	-16	*-3*	62	12	8	20		16	4	5	0	8	8	*3*
11	8	20	0	-20	*-12*	82	12	12	28		12	5	8	0	4	4	*-1*
12	9	20	0	-20	*0*	102	15	12	32		9	8	5	3	0	-3	*-1*
13	8	20	0	-20	*4*	122	10	15	39		8	5	8	7	0	-7	*2*
14	5	19	0	-19	*7*	141	5	10	40		5	8	8	17	0	-17	*4*
15	8	21	0	-21	*6*	162	9	5	37		8	8	10	19	0	-19	*1*
16	8	24	0	-24	*1*	186	0	9	41		8	10	10	16	0	-16	*11*
17	10	24	0	-24	*-3*	210	0	0	33		10	10	10	15	0	-15	*16*
18	10	26	0	-26	*-11*	236	15	0	25		10	10	4	5	0	-5	*-4*
19	5	26	0	-26	*-22*	262	10	15	30		10	4	4	0	5	5	*-9*
20	9	27	0	-27	*-28*	289	10	10	30		9	4	0	6	0	-6	*-15*
21	4	41	0	-41	*-20*	330	10	10	35		4	0	0	12	0	-12	*-25*
22	0	59	0	-59	*-29*	389	30	10	36		0	0	0	22	0	-22	*-30*
23	0	86	0	-86	*-55*	475	90	30	62		0	0	5	32	0	-32	*-32*
24	0	114	0	-114	*-71*	589	30	90	152		0	5	8	62	0	-62	*-52*
25	5	132	0	-132	*-91*	721	20	30	182		5	8	10	147	0	-147	*-107*
26	8	156	0	-156	*-101*	877	10	20	202		8	10	20	169	0	-169	*-17*
27	10	176	0	-176	*-117*	1053	10	10	207		10	20	18	179	0	-179	*13*
28	20	193	0	-193	*-122*	1246	20	10	209		20	18	10	169	0	-169	*8*
29	18	206	0	-206	*-132*	1452	20	20	219		18	10	112	161	0	-161	*11*
30	10	209	0	-209	*-141*	1661	20	20	219		10	112	20	171	0	-171	*-5*
31	112	212	0	-212	*-159*	1873	10	20	221		112	20	20	79	0	-79	*-5*
32	20	216	0	-216	*-49*	2089	5	10	221		20	20	20	79	0	-79	*5*
33	20	112	0	-112	*-53*	2201	20	5	114		20	20	20	69	0	-69	*-5*
34	20	103	0	-103	*-56*	2304	20	20	114		20	20	10	54	0	-54	*10*
35	20	83	0	-83	*-62*	2387	20	20	114		20	10	0	54	0	-54	*30*
36	10	63	0	-63	*-52*	2450	10	20	114		10	0	0	64	0	-64	*30*
37	0	43	0	-43	*-52*	2493	5	10	104		0	0	0	84	0	-84	*30*
38	0	33	0	-33	*-32*	2526	5	5	99		0	0	0	94	0	-94	*20*
39	0	33	0	-33	*-22*	2559	5	5	104		0	0	0	99	0	-99	*15*
40	0	33	0	-33	*-12*	2592	0	5	109		0	0	0	104	0	-104	*10*

NORTHEAST BEER GAME MODEL

MODEL WORKSHEET

STEP 5
Place and record your orders

	Distributor		NO IT									NORTH EAST	Factory	NO IT	
	$ 2,054.50											Costs	$ 857.50		
WEEK	DCOSTS	DOP	FIO	DSL		FPD1	FPD2	FSD2	FBL	FINV2	MFEI	*DFEI*	FCOSTS	FPR	FSL
0	0	4	4	12		12	4	4	0	12			0	4	8
1	6	4	4	12		16	4	4	0	12	12	*12*	6	4	8
2	12	4	4	12		16	4	4	0	12	12	*12*	12	4	8
3	18	4	4	12		16	4	4	0	12	12	*12*	18	8	8
4	24	4	4	12		16	4	8	0	12	12	*12*	24	4	12
5	30	4	4	12		16	8	4	0	12	12	*8*	30	8	12
6	36	4	4	12		20	4	8	0	16	16	*12*	38	4	12
7	42	4	4	12		20	8	4	0	16	16	*12*	46	0	12
8	48	5	4	12		24	4	0	0	20	20	*15*	56	4	4
9	54	8	5	13		24	0	4	0	20	20	*11*	66	0	4
10	58	5	8	17		20	4	0	0	15	15	*3*	73.5	15	4
11	60	8	5	18		19	0	15	0	11	11	*-5*	79	15	15
12	63	8	8	21		11	15	15	0	6	6	*-12*	82	50	30
13	70	10	8	21		21	15	50	0	13	13	*0*	88.5	10	65
14	87	10	10	26		28	50	10	0	20	20	*5*	98.5	10	60
15	106	10	10	28		70	10	10	0	60	60	*50*	128.5	0	20
16	122	4	10	30		70	10	0	0	60	60	*56*	158.5	0	10
17	137	4	4	24		70	0	0	0	60	60	*66*	188.5	0	0
18	142	0	4	18		60	0	0	0	56	56	*66*	216.5	0	0
19	144.5	0	0	8		56	0	0	0	52	52	*66*	242.5	0	0
20	150.5	0	0	4		52	0	0	0	52	52	*61*	268.5	0	0
21	162.5	5	0	0		52	0	0	0	52	52	*53*	294.5	0	0
22	184.5	8	5	5		52	0	0	0	52	52	*43*	320.5	2	0
23	216.5	10	8	13		52	0	2	0	47	47	*35*	344	2	2
24	278.5	20	10	23		47	2	2	0	39	39	*25*	363.5	5	4
25	425.5	90	20	38		41	2	5	0	31	31	*6*	379	10	7
26	594.5	30	90	120		33	5	10	0	13	13	*-91*	385.5	150	15
27	773.5	20	30	140		18	10	150	72	0	-72	*-81*	457.5	30	160
28	942.5	20	20	140		10	150	30	92	0	-92	*0*	549.5	40	180
29	1103.5	20	20	142		150	30	40	0	38	38	*59*	568.5	20	70
30	1274.5	20	20	152		68	40	20	0	48	48	*79*	592.5	10	60
31	1353.5	20	20	60		88	20	10	0	68	68	*119*	626.5	0	30
32	1432.5	10	20	60		88	10	0	0	68	68	*110*	660.5	0	10
33	1501.5	0	10	50		78	0	0	0	58	58	*100*	689.5	0	0
34	1555.5	0	0	30		58	0	0	0	48	48	*90*	713.5	0	0
35	1609.5	0	0	10		48	0	0	0	48	48	*80*	737.5	0	0
36	1673.5	0	0	0		48	0	0	0	48	48	*80*	761.5	0	0
37	1757.5	0	0	0		48	0	0	0	48	48	*80*	785.5	0	0
38	1851.5	0	0	0		48	0	0	0	48	48	*80*	809.5	0	0
39	1950.5	0	0	0		48	0	0	0	48	48	*80*	833.5	0	0
40	2054.5	5	0	0		48	0	0	0	48	48	*80*	857.5	0	0

NORTHEAST BEER GAME MODEL

MODEL DATA

NORTH EAST								
NO IT								
Week	ROR	REI	WOR	WEI	DOR	DEI	FOR	FEI
1	4	12	4	12	4	12	4	12
2	4	12	4	12	4	12	4	12
3	4	12	4	12	4	12	8	12
4	4	12	4	12	4	12	4	12
5	8	8	4	12	4	12	8	8
6	8	4	4	12	4	12	4	12
7	12	0	4	8	4	12	0	12
8	16	-4	8	0	5	11	4	15
9	8	-4	8	-15	8	10	0	11
10	8	-4	12	-3	5	3	15	3
11	8	0	12	-12	8	-1	15	-5
12	8	-2	15	0	8	-1	50	-12
13	10	-2	10	4	10	2	10	0
14	8	-2	5	7	10	4	10	5
15	8	-2	9	6	10	1	0	50
16	10	-2	0	1	4	11	0	56
17	10	-10	0	-3	4	16	0	66
18	11	-8	15	-11	0	-4	0	66
19	19	-11	10	-22	0	-9	0	66
20	27	-19	10	-28	0	-15	0	61
21	31	-27	10	-20	5	-25	0	53
22	28	-31	30	-29	8	-30	2	43
23	18	-28	90	-55	10	-32	2	35
24	24	-18	30	-71	20	-52	5	25
25	25	-24	20	-91	90	-107	10	6
26	25	-25	10	-101	30	-17	150	-91
27	23	-25	10	-117	20	13	30	-81
28	23	-23	20	-122	20	8	40	0
29	21	-23	20	-132	20	11	20	59
30	14	-21	20	-141	20	-5	10	79
31	8	-14	10	-159	20	-5	0	119
32	11	-8	5	-49	10	5	0	110
33	0	-11	20	-53	0	-5	0	100
34	0	2	20	-56	0	10	0	90
35	0	114	20	-62	0	30	0	80
36	0	111	10	-52	0	30	0	80
37	0	108	5	-52	0	30	0	80
38	0	110	5	-32	0	20	0	80
39	0	102	5	-22	0	15	0	80
40	0	114	0	-12	5	10	0	80

ROOT 66 BEER GAME MODEL

RME GRG NonLinear

RETAILE	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	0	0								
1	4	0.00	4	-1.058257	5.040095	-1.040095	1.08179808	12	12	12
2	4	0.01	4	1.187129	7.300315	-3.300315	10.8920823	12	12	12
3	4	0.03	6	-0.950906	5.177059	0.822941	0.67723182	12	12	12
4	4	0.04	4	0.668878	6.811567	-2.811567	7.90490774	12	12	14
5	8	0.06	7	-1.037109	7.186721	-0.186721	0.03486481	8	8	14
6	8	0.09	10	0.129634	10.44928	-0.449285	0.20185681	4	4	17
7	8	0.12	10	1.218059	12.60038	-2.600385	6.76200171	2	2	21
8	8	0.15	14	0.400316	12.84511	1.154891	1.33377325	-2	0	27
9	8	0.18	14	0.648389	13.1223	0.877696	0.77035019	-3	0	34
10	8	0.21	14	-0.109793	12.39314	1.606865	2.58201498	-1	0	38
11	8	0.23	10	-0.966628	11.04859	-1.048588	1.09953737	1	1	42
12	8	0.26	10	-0.883268	10.12751	-0.127512	0.01625927	3	3	42
13	8	0.29	14	0.628355	12.70106	1.2989368	1.68723682	1	1	46
14	8	0.32	20	0.928621	13.54653	6.4534667	41.6472322	0	0	53
15	8	0.35	14	-0.074083	11.53907	2.4609278	6.05616582	2	2	63
16	8	0.38	14	-0.813165	11.34498	2.6550171	7.04911595	1	1	70
17	8	0.41	12	-1.291691	9.861489	2.1385106	4.57322759	3	3	74
18	8	0.43	12	-0.966628	10.73133	1.2686652	1.60951145	2	2	79
19	8	0.46	10	-0.883268	10.84276	-0.842755	0.71023649	2	2	83
20	8	0.49	10	0.628355	12.38233	-2.382334	5.67551434	2	2	85
21	8	0.52	8	0.928621	11.67722	-3.677216	13.5219152	4	4	85
22	8	0.55	6	-0.074083	6.569315	-0.569315	0.32411914	12	12	77
23	8	0.57	1	-0.813165	2.75817	-1.75817	3.09116178	18	18	69
24	8	0.60	1	-1.291691	0.240715	0.7592854	0.57651438	22	22	58
25	8	0.63	1	-0.966628	0	1	1	34	34	39
26	8	0.66	1	-0.883268	0	1	1	52	52	14
27	8	0.68	1	0.628355	0	1	1	56	56	3
28	8	0.71	1	0.928621	0	1	1	49	49	3
29	8	0.74	1	-0.074083	0	1	1	42	42	3
30	8	0.76	1	-0.813165	0	1	1	35	35	3
31	8	0.79	1	-1.291691	0	1	1	28	28	3
32	8	0.82	4	-0.966628	1.299097	2.7009031	7.29487761	21	21	3
33	8	0.84	8	-0.41629	5.492399	2.5076007	6.28806116	14	14	6
34	8	0.87	10	-2.30748	7.244075	2.7559247	7.59512105	7	7	13
35	8	0.90	10	-0.181295	13.01303	-3.013027	9.0783334	0	0	22
36	9	0.92	12	0.241928	13.46259	-1.462593	2.13917723	-4	0	28
37	10	0.95	12	0.514606	13.76522	-1.765224	3.11601683	-4	0	32
38	11	0.99	12	0.193387	13.47755	-1.477555	2.18316868	-2	0	34
39	12	1.02	12	-0.260664	13.06064	-1.060638	1.1249533	0	0	36
40	13	1.06	12	0.563181	11.85872	0.141284	0.01996116	4	4	36
		mean of the disturbance		-0.291172		0.3615527	mean of the standard errors			
		std dev of the disturbance		0.882308						

Σ (AO-Ot)2	165.7183		constraints		
θ	0.00		>=0	<=1	
αs	0.52		>=0	<=1	
β	0.00		>=0	<=1	
S'	23.80		>=0	<=100	INT

GRG NonLinear

Incoming Orders:
IO = COR
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = ROP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = REI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = RSL = RSD1+RSD2+WIO+WBL

ROOT 66 BEER GAME MODEL

WME - GRG NonLinear

WHOLES	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	3.156833	4	0.359216	3.526517	0.473483	0.22418619	12	12	12
2	4	3.822267	4	0.035863	3.868598	0.1314016	0.01726639	12	12	12
3	4	3.962535	9	1.051226	5.02423	3.9757705	15.806751	12	12	12
4	6	3.992103	7	0.307692	4.310263	2.6897374	7.23468723	12	12	17
5	4	5.576752	6	0.142141	5.892865	0.1071349	0.01147789	10	10	20
6	7	4.332366	5	-0.808302	3.698037	1.3019634	1.69510872	10	10	22
7	10	6.437685	6	0.000856	6.449009	-0.449009	0.20160868	12	12	18
8	10	9.249093	7	-1.224218	8.2806	-1.2806	1.63993519	9	9	17
9	14	9.841715	10	-0.792507	9.631942	0.3680585	0.13546703	5	5	18
10	14	13.12347	7	0.868702	14.98366	-7.983664	63.7388964	-4	0	23
11	14	13.81523	10	0.055934	14.86266	-4.862663	23.6454905	-12	0	24
12	10	13.96105	16	2.261209	17.21376	-1.213756	1.47320461	-19	0	27
13	10	10.83496	12	0.44802	12.27447	-0.274472	0.07533502	-19	0	33
14	14	10.176	14	0.61782	11.78532	2.2146834	4.90482263	-22	0	38
15	20	13.19393	14	-1.153582	13.03184	0.9681553	0.93732471	-26	0	42
16	14	18.56534	25	-1.275001	18.28183	6.7181696	45.1338025	-39	0	49
17	14	14.96234	20	1.616798	17.57063	2.4293717	5.90184708	-45	0	66
18	12	14.20285	15	-0.282512	14.91184	0.0881648	0.00777303	-51	0	78
19	12	12.48434	15	-0.700974	12.75486	2.2451361	5.04063592	-53	0	83
20	10	12.09788	15	0.035863	13.12524	1.874763	3.5147363	-49	0	82
21	10	10.44222	14	1.051226	12.48494	1.5150639	2.29541863	-45	0	83
22	8	10.09322	10	-0.452999	10.63171	-0.631711	0.3990583	-43	0	85
23	6	8.441233	4	0.272291	9.705018	-5.705018	32.5472279	-31	0	75
24	1	6.514592	0	-1.194957	6.311129	-6.311129	39.8303534	-11	0	53
25	1	2.162431	2	-1.802498	0	2	4	27	27	14
26	1	1.245031	2	-0.500099	0	2	4	36	36	6
27	1	1.05165	2	1.483455	0.338265	1.6617348	2.76136239	39	39	4
28	1	1.010887	1	-0.02971	0	1	1	38	38	6
29	1	1.002295	1	-1.051274	0	1	1	39	39	5
30	1	1.000484	2	-0.468159	0	2	4	40	40	4
31	1	1.000102	0	-0.550898	0	0	0	41	41	4
32	1	1.000021	1	-2.489518	0	1	1	41	41	3
33	4	1.000005	0	2.072929	0.712588	-0.712588	0.50778234	41	41	3
34	8	3.367626	1	0.028436	1.19922	-0.19922	0.03968879	39	39	1
35	10	7.023534	4	0.970566	6.451276	-2.451276	6.00875591	31	31	2
36	10	9.372585	6	-0.058072	8.50746	-2.50746	6.28735602	22	22	5
37	12	9.867746	10	-1.182924	8.69529	1.3047099	1.70226797	12	12	11
38	12	11.55054	12	-1.861113	10.59917	1.4008322	1.96233092	1	1	20
39	12	11.90526	14	-1.081509	11.81524	2.1847569	4.77316283	-7	0	28
40	12	11.98003	14	0.099846	13.07137	0.9286303	0.86235427	-13	0	36
	mean of the disturbance			-0.031342		0.1625053	mean of the standard errors			
	std dev of the disturbance			1.060945						

Σ (AO-Ot)2	298.3175		constraints	
θ	0.79		>=0	<=1
αs	0.08		>=0	<=1
β	0.00		>=0	<=1
S'	12.13		>=0	<=100	INT

Standard GRG NonLinear

Incoming Orders:
IO = WIO
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = WOP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = MWEI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = WSL = WSD1+WSD2+DIO+DBL

ROOT 66 BEER GAME MODEL

DME - GRG NonLinear

DISTRIB	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	2.363363	4	-0.187283	0	4	16	12	12	12
2	4	3.330355	4	0.202971	0.902292	3.0977081	9.59579554	12	12	12
3	4	3.726009	6	-0.44668	0.648295	5.3517053	28.6407494	12	12	12
4	9	3.887894	6	-0.273484	0.983375	5.0166245	25.1665216	12	12	14
5	7	6.908335	6	2.435268	11.71257	-5.712569	32.633439	7	7	16
6	6	6.962494	8	0.012681	12.34414	-4.344142	18.871568	4	4	18
7	5	6.393813	6	0.640907	12.40369	-6.403686	41.0071974	4	4	20
8	6	5.570292	8	-0.173557	9.765701	-1.765701	3.11769915	5	5	20
9	7	5.824181	8	-0.253466	9.939681	-1.939681	3.76236079	5	5	22
10	10	6.518903	6	-0.289438	9.59843	-3.59843	12.9487011	6	6	22
11	7	8.575677	8	0.221741	16.16638	-8.166384	66.6898333	2	2	22
12	10	7.644703	8	-0.728175	13.28549	-5.285494	27.936448	3	3	22
13	16	9.036309	10	-0.019486	17.38579	-7.385789	54.549875	1	1	22
14	12	13.15074	16	-0.284778	22.23493	-6.234929	38.8743443	-9	0	26
15	14	12.47084	16	-0.033251	21.80655	-5.806552	33.7160449	-13	0	34
16	14	13.37433	25	1.482526	24.22582	0.7741798	0.59935443	-19	0	42
17	25	13.744	25	0.137287	23.25025	1.7497464	3.06161248	-23	0	57
18	20	20.3945	40	2.863179	32.62665	7.3733501	54.3662915	-32	0	66
19	15	20.16142	50	-0.697724	28.83266	21.167342	448.056388	-38	0	92
20	15	17.11184	50	1.078564	27.55937	22.44063	503.581865	-41	0	130
21	15	15.86408	30	-1.758917	23.47413	6.525872	42.5870053	-36	0	160
22	14	15.35355	20	-0.18495	24.53756	-4.537562	20.5894656	-25	0	164
23	10	14.55382	10	-0.605161	22.31762	-12.31762	151.723768	1	1	144
24	4	11.86324	0	-0.010794	0	0	0	51	51	94
25	0	7.217315	0	-0.805805	0	0	0	111	111	30
26	2	2.953031	0	-0.745559	0	0	0	131	131	10
27	2	2.389941	0	-0.023197	0	0	0	139	139	0
28	2	2.159548	0	-0.142028	0	0	0	137	137	0
29	1	2.065281	0	-0.354606	0	0	0	135	135	0
30	1	1.435869	0	0.037419	0	0	0	134	134	0
31	2	1.17834	0	-1.131278	0	0	0	133	133	0
32	0	1.66381	0	-0.033598	0	0	0	131	131	0
33	1	0.680763	0	-1.33404	0	0	0	131	131	0
34	0	0.869381	0	-1.082735	0	0	0	130	130	0
35	1	0.355715	0	0.575958	0	0	0	130	130	0
36	4	0.736385	0	0.477425	0	0	0	129	129	0
37	6	2.664862	0	-1.375534	0	0	0	125	125	0
38	10	4.635316	0	0.251629	0	0	0	119	119	0
39	12	7.80499	0	-1.654489	0	0	0	109	109	0
40	14	10.28357	0	-1.165488	0	0	0	97	97	0
	mean of the disturbance			-0.054614		0.1142463	mean of the standard errors			
	std dev of the disturbance			0.922025						

			constraints	
Σ (AO-Ot)2	1638.076			
θ	0.59		>=0	<=1
αs	1.00		>=0	<=1
β	0.00		>=0	<=1
S'	9.37		>=0	<=100	INT

GRG NonLinear

Incoming Orders:
IO = DIO
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = DOP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = MDEI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = DSL = DSD1+DSD2+FIO+FBL

ROOT 66 BEER GAME MODEL

FME - GRG NonLinear

FACTORY	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	4	4	0.887259	27.79275	-23.79275	566.095137	12	12	8
2	4	4	4	-2.50136	24.40414	-20.40414	416.328736	12	12	8
3	4	4	4	0.579794	27.48529	-23.48529	551.558785	12	12	8
4	6	4	4	0.570237	27.47573	-23.47573	551.110011	12	12	8
5	6	6	4	0.606293	30.66967	-26.66967	711.271182	10	10	8
6	6	6	6	-0.544765	30.67649	-24.67649	608.929097	8	8	8
7	8	6	8	1.175776	33.55491	-25.55491	653.053381	6	6	10
8	6	8	6	-0.38486	36.31003	-30.31003	918.698063	2	2	14
9	8	6	8	-0.48741	34.20748	-26.20748	686.832089	2	2	14
10	8	8	8	0.732057	37.42695	-29.42695	865.945301	2	2	14
11	6	8	10	-1.265582	36.58719	-26.58719	706.878628	0	0	16
12	8	6	12	0.606293	35.30119	-23.30119	542.945238	2	2	18
13	8	8	10	-0.544765	36.15013	-26.15013	683.829136	2	2	22
14	10	8	14	1.175776	36.71279	-22.71279	515.870762	4	4	22
15	16	10	12	-0.38486	35.99427	-23.99427	575.725167	6	6	24
16	16	16	20	-0.48741	45.36536	-25.36536	643.401534	0	0	26
17	25	16	26	0.732057	46.58483	-20.58483	423.735141	-2	0	32
18	25	25	40	-1.265582	53.58719	-13.58719	184.61171	-15	0	46
19	40	25	60	0.606293	55.45906	4.5409353	20.6200933	-20	0	66
20	50	40	100	-0.544765	69.30801	30.691994	941.99848	-34	0	100
21	50	50	250	1.175776	81.02855	168.97145	28551.3518	-44	0	160
22	30	50	250	-0.38486	79.46791	170.53209	29081.1931	-34	0	350
23	20	30	100	-0.48741	38.52353	61.476468	3779.3561	36	36	500
24	10	20	0	0.732057	0	0	0	266	266	350
25	0	10	0	-1.265582	0	0	0	506	506	100
26	0	0	0	0.342014	0	0	0	606	606	0
27	0	0	0	0.527051	0	0	0	606	606	0
28	0	0	0	-0.201958	0	0	0	606	606	0
29	0	0	0	-1.280978	0	0	0	606	606	0
30	0	0	0	-1.280134	0	0	0	606	606	0
31	0	0	0	1.495607	0	0	0	606	606	0
32	0	0	0	2.161635	0	0	0	606	606	0
33	0	0	0	-0.787428	0	0	0	606	606	0
34	0	0	0	0.483071	0	0	0	606	606	0
35	0	0	0	1.464652	0	0	0	606	606	0
36	0	0	0	-0.799013	0	0	0	606	606	0
37	0	0	0	0.398518	0	0	0	606	606	0
38	0	0	0	-2.369353	0	0	0	606	606	0
39	0	0	0	0.934481	0	0	0	606	606	0
40	0	0	0	-1.910216	0	0	0	606	606	0
	mean of the disturbance			0.055828		-0.002098	mean of the standard errors			
	std dev of the disturbance			1.013582						

Σ (AO-Ot)2	73181.34		constraints		
θ	1.00		>=0	<=1	
αs	0.58		>=0	<=1	
β	0.00		>=0	<=1	
S'	51.56		>=0	<=100	INT
	GRG NonLinear				

Incoming Orders:

IO = FIO

Expected Incoming Orders:

$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$

Actual Orders:

AO = FPR

Disturbance:

normally distributed white noise

mean = 0

std dev = 1

Model Orders:

$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$

Error Term:

$AO - O_t$

Squared errors:

$(AO - O_t)^2$

Effective Inventory:

EI = MFEI

Stock:

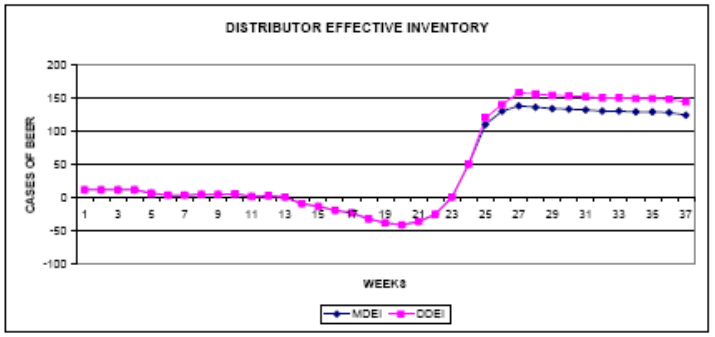
St = MAX(0,EI)

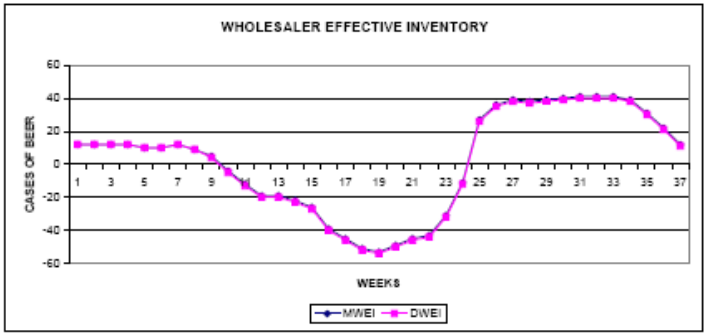
Supply Line:

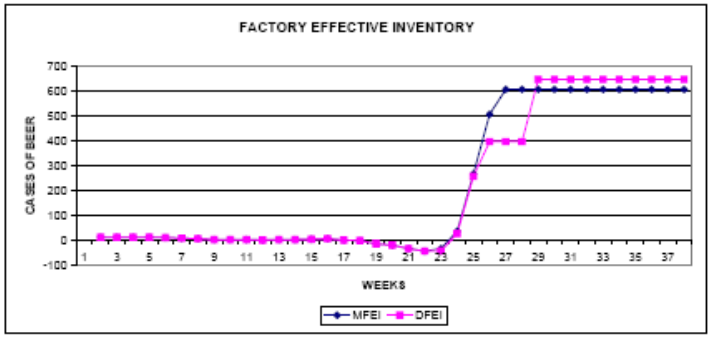
SLt = FSL = FPD1+FPD2

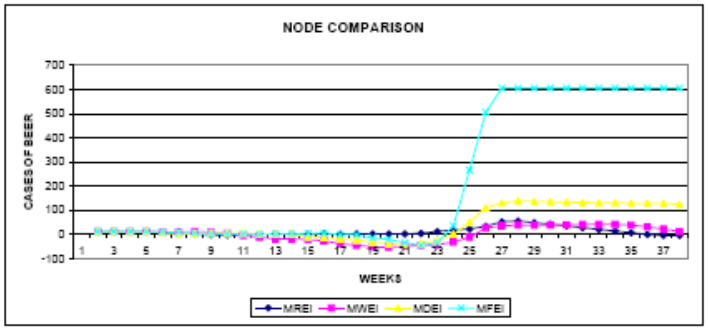
ROOT 66 BEER GAME MODEL

MODEL CHARTS



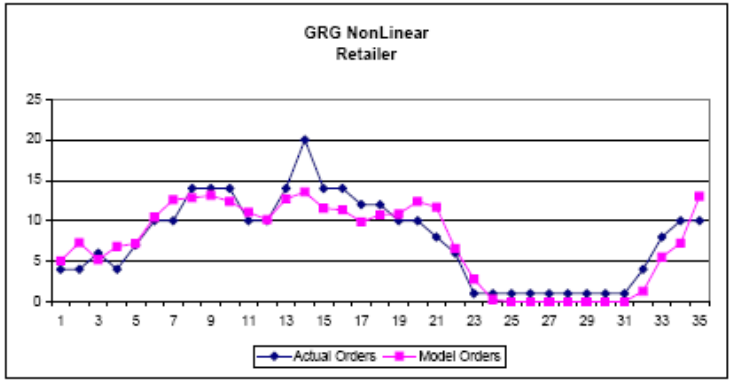


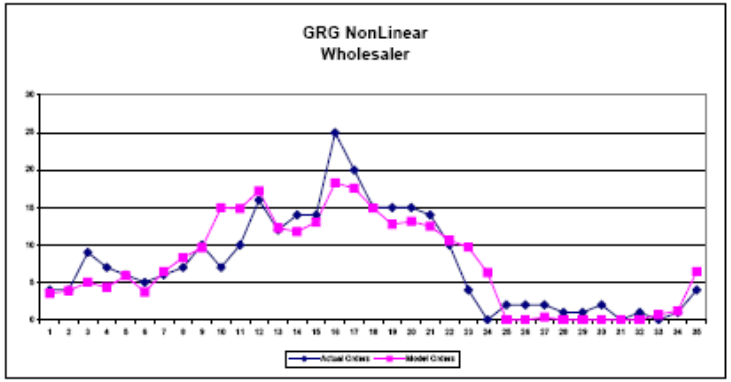


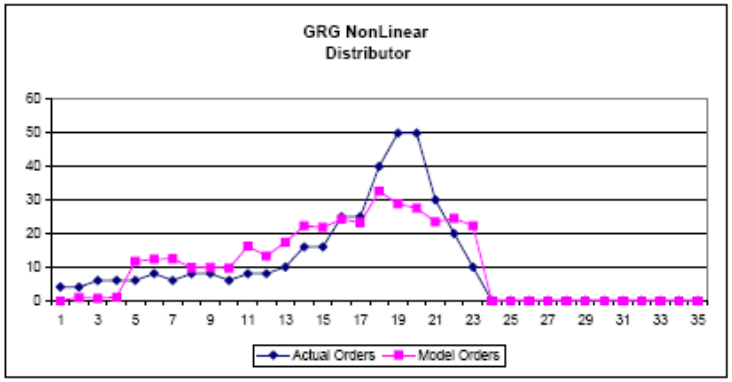


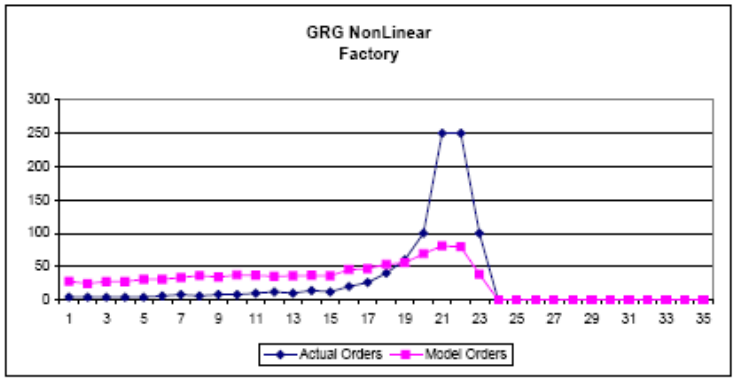
ROOT 66 BEER GAME MODEL

ORDER CHARTS









ROOT 66 BEER GAME MODEL

MODEL WORKSHEET

STEP 1
Receive The Inventory and Advance the shipping Delays

STEP 2
Look at the incoming orders and fill orders
all incoming orders + backlog

ROOT 66	NO IT	ROOT 66	Retailer	NO IT
Team Costs	$ 7,473.00	Costs	$ 254.50	

WEEK	COR	RINV1	RSD1	RSD2	RBL	RSR	RINV2	MREI	*DREI*	RCOSTS	ROP	WIO	RSL	WINV1	WSD1
0	0	12	4	4	0	4	12			0	4	4		12	4
1	4	16	4	4	0	4	12	12	*12*	6	4	4	12	16	4
2	4	16	4	4	0	4	12	12	*12*	12	4	4	12	16	4
3	4	16	4	4	0	4	12	12	*12*	18	6	4	12	16	4
4	4	16	4	4	0	4	12	12	*12*	24	4	6	14	16	4
5	8	16	4	6	0	8	8	8	*8*	28	7	4	14	16	4
6	8	12	6	4	0	8	4	4	*4*	30	10	7	17	14	9
7	8	10	4	7	0	8	2	2	*2*	31	10	10	21	19	7
8	8	6	7	10	2	6	0	-2	*-2*	33	14	10	27	19	6
9	8	7	10	10	3	7	0	-3	*-3*	36	14	14	34	15	5
10	8	10	10	10	1	10	0	-1	*-1*	37	14	14	38	10	6
11	8	10	10	6	0	9	1	1	*2*	37.5	10	14	42	6	7
12	8	11	6	7	0	8	3	3	*3*	39	10	10	42	7	10
13	8	9	7	10	0	8	1	1	*1*	39.5	14	10	46	10	7
14	8	8	10	7	0	8	0	0	*0*	39.5	20	14	53	7	10
15	8	10	7	10	0	8	2	2	*2*	40.5	14	20	63	10	7
16	8	9	10	7	0	8	1	1	*1*	41	14	14	70	7	8
17	8	11	7	8	0	8	3	3	*3*	42.5	12	14	74	8	8
18	8	10	8	8	0	8	2	2	*2*	43.5	12	12	79	8	10
19	8	10	8	10	0	8	2	2	*2*	44.5	10	12	83	10	16
20	8	10	10	16	0	8	2	2	*2*	45.5	10	10	85	16	14
21	8	12	16	14	0	8	4	4	*4*	47.5	8	10	85	14	12
22	8	20	14	12	0	8	12	12	*12*	53.5	6	8	77	12	20
23	8	26	12	20	0	8	18	18	*18*	62.5	1	6	69	20	26
24	8	30	20	26	0	8	22	22	*22*	73.5	1	1	58	26	39
25	8	42	26	12	0	8	34	34	*34*	90.5	1	1	39	39	10
26	8	60	12	1	0	8	52	52	*52*	116.5	1	1	14	37	4
27	8	64	1	1	0	8	56	56	*57*	144.5	1	1	3	40	0
28	8	57	1	1	0	8	49	49	*50*	169	1	1	3	39	2
29	8	50	1	1	0	8	42	42	*43*	190	1	1	3	40	2
30	8	43	1	1	0	8	35	35	*37*	207.5	1	1	3	41	2
31	8	36	1	1	0	8	28	28	*29*	221.5	1	1	3	42	1
32	8	29	1	1	0	8	21	21	*22*	232	4	1	3	42	1
33	8	22	1	1	0	8	14	14	*15*	239	8	4	6	42	2
34	8	15	1	4	0	8	7	7	*8*	242.5	10	8	13	43	0
35	8	8	4	8	0	8	0	0	*1*	242.5	10	10	22	39	1
36	8	4	8	10	4	4	0	-4	*-3*	246.5	12	10	28	32	0
37	8	8	10	10	4	8	0	-4	*-3*	250.5	12	12	32	22	1
38	8	10	10	12	2	10	0	-2	*-1*	252.5	12	12	34	13	4
39	8	10	12	5	0	10	0	0	*1*	252.5	12	12	36	5	6
40	8	12	5	6	0	8	4	4	*5*	254.5	12	12	36	6	10

ROOT 66 BEER GAME MODEL

MODEL WORKSHEET

STEP 3
Record your inventory or backlog

STEP 4
Advance the order slips and the brewery Brews

					ROOT 66 Costs	Wholesaler $ 759.50		NO IT									ROOT 66 Costs
WEEK	WSD2	WBL	WINV2	MWEI	*DWEI*	WCOSTS	WOP	DIO	WSL		DINV1	DSD1	DSD2	DBL	DINV2	MDEI	*DDEI*
0	4	0	12			0	4	4			12	4	4	0	12		
1	4	0	12	12	*12*	6	4	4	12		16	4	4	0	12	12	*12*
2	4	0	12	12	*12*	12	4	4	12		16	4	4	0	12	12	*12*
3	4	0	12	12	*12*	18	9	4	12		16	4	4	0	12	12	*12*
4	4	0	12	12	*12*	24	7	9	17		16	4	4	0	12	12	*12*
5	9	0	10	10	*10*	29	6	7	20		16	4	6	0	7	7	*7*
6	7	0	10	10	*10*	34	5	6	22		11	6	6	0	4	4	*4*
7	6	0	12	12	*12*	40	6	5	18		10	6	6	0	4	4	*4*
8	5	0	9	9	*9*	44.5	7	6	17		10	6	8	0	5	5	*5*
9	6	0	5	5	*4*	47	10	7	18		11	8	6	0	5	5	*5*
10	7	4	0	-4	*-5*	51	7	10	23		13	6	8	0	6	6	*6*
11	10	12	0	-12	*-13*	63	10	7	24		12	8	8	0	2	2	*2*
12	7	19	0	-19	*-20*	82	16	10	27		10	8	6	0	3	3	*3*
13	10	19	0	-19	*-20*	101	12	16	33		11	6	8	0	1	1	*1*
14	7	22	0	-22	*-23*	123	14	12	38		7	8	8	9	0	-9	*-9*
15	8	26	0	-26	*-27*	149	14	14	42		8	8	10	13	0	-13	*-13*
16	8	39	0	-39	*-40*	188	25	14	49		8	10	16	19	0	-19	*-19*
17	10	45	0	-45	*-46*	233	20	25	66		10	16	14	23	0	-23	*-23*
18	16	51	0	-51	*-52*	284	15	20	78		16	14	12	32	0	-32	*-32*
19	14	53	0	-53	*-54*	337	15	15	83		14	12	20	38	0	-38	*-38*
20	12	49	0	-49	*-50*	386	15	15	82		12	20	26	41	0	-41	*-41*
21	20	45	0	-45	*-46*	431	14	15	83		20	26	40	36	0	-36	*-36*
22	26	43	0	-43	*-44*	474	10	14	85		26	40	60	25	0	-25	*-25*
23	39	31	0	-31	*-32*	505	4	10	75		40	60	64	0	1	1	*1*
24	10	11	0	-11	*-12*	516	0	4	53		61	64	20	0	51	51	*51*
25	4	0	27	27	*26*	529.5	2	0	14		115	20	10	0	111	111	*121*
26	0	0	36	36	*35*	547.5	2	2	6		131	10	0	0	131	131	*141*
27	2	0	39	39	*38*	567	2	2	4		141	0	0	0	139	139	*159*
28	2	0	38	38	*37*	586	1	2	6		139	0	0	0	137	137	*157*
29	2	0	39	39	*38*	605.5	1	1	5		137	0	0	0	135	135	*155*
30	1	0	40	40	*39*	625.5	2	1	4		135	0	0	0	134	134	*154*
31	1	0	41	41	*40*	646	0	2	4		134	0	0	0	133	133	*153*
32	2	0	41	41	*40*	666.5	1	0	3		133	0	0	0	131	131	*151*
33	0	0	41	41	*40*	687	0	1	3		131	0	0	0	131	131	*151*
34	1	0	39	39	*38*	706.5	1	0	1		131	0	0	0	130	130	*150*
35	0	0	31	31	*30*	722	4	1	2		130	0	0	0	130	130	*150*
36	1	0	22	22	*21*	733	6	4	5		130	0	0	0	129	129	*149*
37	4	0	12	12	*11*	739	10	6	11		129	0	0	0	125	125	*145*
38	6	0	1	1	*0*	739.5	12	10	20		125	0	0	0	119	119	*139*
39	10	7	0	-7	*-8*	746.5	14	12	28		119	0	0	0	109	109	*129*
40	12	13	0	-13	*-14*	759.5	14	14	36		109	0	0	0	97	97	*117*

ROOT 66 BEER GAME MODEL

MODEL WORKSHEET

STEP 5
Place and record your orders

	Distributor		NO IT									ROOT 66	Factory	NO IT	
	$ 1,315.00											Costs	$ 5,144.00		
WEEK	DCOSTS	DOP	FIO	DSL		FPD1	FPD2	FSD2	FBL	FINV2	MFEI	*DFEI*	FCOSTS	FPR	FSL
0	0	4	4	12		12	4	4	0	12			0	4	8
1	6	4	4	12		16	4	4	0	12	12	*12*	6	4	8
2	12	4	4	12		16	4	4	0	12	12	*12*	12	4	8
3	18	6	4	12		16	4	4	0	12	12	*12*	18	4	8
4	24	6	6	14		16	4	4	0	12	12	*12*	24	4	8
5	27.5	6	6	16		16	4	4	0	10	10	*10*	29	4	8
6	29.5	8	6	18		14	4	4	0	8	8	*8*	33	6	8
7	31.5	6	8	20		12	4	6	0	6	6	*6*	36	8	10
8	34	8	6	20		10	6	8	0	2	2	*2*	37	6	14
9	36.5	8	8	22		8	8	6	0	2	2	*2*	38	8	14
10	39.5	6	8	22		10	6	8	0	2	2	*2*	39	8	14
11	40.5	8	6	22		8	8	8	0	0	0	*0*	39	10	16
12	42	8	8	22		8	8	10	0	2	2	*2*	40	12	18
13	42.5	10	8	22		10	10	12	0	2	2	*2*	41	10	22
14	51.5	16	10	26		12	12	10	0	4	4	*4*	43	14	22
15	64.5	16	16	34		16	10	14	0	6	6	*6*	46	12	24
16	83.5	25	16	42		16	14	12	0	0	0	*0*	46	20	26
17	106.5	25	25	57		14	12	20	2	0	-2	*-2*	48	26	32
18	138.5	40	25	66		12	20	26	15	0	-15	*-15*	63	40	46
19	176.5	50	40	92		20	26	40	20	0	-20	*-20*	83	60	66
20	217.5	50	50	130		26	40	60	34	0	-34	*-34*	117	100	100
21	253.5	30	50	160		40	60	100	44	0	-44	*-44*	161	250	160
22	278.5	20	30	164		60	100	250	34	0	-34	*-44*	195	250	350
23	279	10	20	144		100	250	250	0	36	36	*26*	213	100	500
24	304.5	0	10	94		286	250	100	0	266	266	*256*	346	0	350
25	360	0	0	30		516	100	0	0	506	506	*396*	599	0	100
26	425.5	0	0	10		606	0	0	0	606	606	*396*	902	0	0
27	495	0	0	0		606	0	0	0	606	606	*396*	1205	0	0
28	563.5	0	0	0		606	0	0	0	606	606	*646*	1508	0	0
29	631	0	0	0		606	0	0	0	606	606	*646*	1811	0	0
30	698	0	0	0		606	0	0	0	606	606	*646*	2114	0	0
31	764.5	0	0	0		606	0	0	0	606	606	*646*	2417	0	0
32	830	0	0	0		606	0	0	0	606	606	*646*	2720	0	0
33	895.5	0	0	0		606	0	0	0	606	606	*646*	3023	0	0
34	960.5	0	0	0		606	0	0	0	606	606	*646*	3326	0	0
35	1025.5	0	0	0		606	0	0	0	606	606	*646*	3629	0	0
36	1090	0	0	0		606	0	0	0	606	606	*646*	3932	0	0
37	1152.5	0	0	0		606	0	0	0	606	606	*646*	4235	0	0
38	1212	0	0	0		606	0	0	0	606	606	*646*	4538	0	0
39	1266.5	0	0	0		606	0	0	0	606	606	*646*	4841	0	0
40	1315	0	0	0		606	0	0	0	606	606	*646*	5144	0	0

ROOT 66 BEER GAME MODEL

MODEL DATA

ROOT 66								
NO IT								
Week	ROR	REI	WOR	WEI	DOR	DEI	FOR	FEI
1	4	12	4	12	4	12	4	12
2	4	12	4	12	4	12	4	12
3	6	12	9	12	6	12	4	12
4	4	12	7	12	6	12	4	12
5	7	8	6	10	6	7	4	10
6	10	4	5	10	8	4	6	8
7	10	2	6	12	6	4	8	6
8	14	-2	7	9	8	5	6	2
9	14	-3	10	4	8	5	8	2
10	14	-1	7	-5	6	6	8	2
11	10	2	10	-13	8	2	10	0
12	10	3	16	-20	8	3	12	2
13	14	1	12	-20	10	1	10	2
14	20	0	14	-23	16	-9	14	4
15	14	2	14	-27	16	-13	12	6
16	14	1	25	-40	25	-19	20	0
17	12	3	20	-46	25	-23	26	-2
18	12	2	15	-52	40	-32	40	-15
19	10	2	15	-54	50	-38	60	-20
20	10	2	15	-50	50	-41	100	-34
21	8	4	14	-46	30	-36	250	-44
22	6	12	10	-44	20	-25	250	-44
23	1	18	4	-32	10	1	100	26
24	1	22	0	-12	0	51	0	256
25	1	34	2	26	0	121	0	396
26	1	52	2	35	0	141	0	396
27	1	57	2	38	0	159	0	396
28	1	50	1	37	0	157	0	646
29	1	43	1	38	0	155	0	646
30	1	37	2	39	0	154	0	646
31	1	29	0	40	0	153	0	646
32	4	22	1	40	0	151	0	646
33	8	15	0	40	0	151	0	646
34	10	8	1	38	0	150	0	646
35	10	1	4	30	0	150	0	646
36	12	-3	6	21	0	149	0	646
37	12	-3	10	11	0	145	0	646
38	12	-1	12	0	0	139	0	646
39	12	1	14	-8	0	129	0	646
40	12	5	14	-14	0	117	0	646

SHINER BEER GAME MODEL

RME GRG NonLinear

RETAILE	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	0	0								
1	4	0.00	4	0.184225	4.953658	-0.953658	0.90946315	12	12	12
2	4	0.01	6	0.277911	5.060518	0.9394822	0.88262684	12	12	12
3	4	0.03	8	-0.027798	4.704732	3.2952682	10.8587927	12	12	14
4	4	0.04	6	1.416028	6.035229	-0.035229	0.00124111	12	12	18
5	8	0.05	8	-0.133264	7.191343	0.8086572	0.65392648	8	8	20
6	8	0.08	8	2.290105	10.95546	-2.955465	8.73477185	6	6	22
7	8	0.10	8	-0.537682	8.153768	-0.153768	0.02364469	6	6	22
8	8	0.13	8	-0.203431	9.828599	-1.828599	3.34377451	4	4	24
9	8	0.16	6	2.188942	12.24689	-6.246891	39.0236473	4	4	24
10	8	0.18	8	-0.01603	10.78825	-2.788249	7.77433169	3	3	23
11	8	0.21	10	1.504912	13.64952	-3.649515	13.3189609	1	1	25
12	8	0.23	12	-0.666599	12.06614	-0.066143	0.0043749	-1	0	29
13	8	0.26	10	-0.33444	12.13944	-2.139444	4.57722077	-6	0	38
14	8	0.28	18	-1.375961	10.93379	7.0662067	49.9312767	-10	0	44
15	8	0.31	14	0.069468	11.96218	2.0378249	4.1527304	-14	0	58
16	8	0.34	20	-0.235773	11.61905	8.3809467	70.2402684	-10	0	60
17	8	0.36	12	-0.069527	11.43129	0.568707	0.3234276	-10	0	72
18	8	0.39	12	0.184225	11.58379	0.4162108	0.1732314	-10	0	76
19	8	0.41	12	0.754106	12.05233	-0.052332	0.00273859	-10	0	80
20	8	0.44	12	0.164818	11.48804	0.5119617	0.26210482	-6	0	80
21	8	0.46	12	-1.583463	9.76467	2.2353302	4.99670108	-2	0	80
22	8	0.49	12	-1.255673	6.767642	5.2323576	27.3775659	5	5	77
23	8	0.51	4	0.833204	11.384	-7.384004	54.5235166	1	1	85
24	8	0.54	10	-0.244374	8.485646	1.5143536	2.2932669	4	4	78
25	8	0.56	0	-0.696946	5.365301	-5.365301	28.7864508	8	8	76
26	8	0.58	0	-2.394208	0	0	0	15	15	61
27	8	0.61	4	-0.620138	0	4	16	37	37	31
28	8	0.63	0	-0.859683	0	0	0	60	60	4
29	8	0.66	0	0.120415	0	0	0	52	52	4
30	8	0.68	0	-0.039675	0	0	0	44	44	4
31	8	0.71	0	0.129672	0	0	0	40	40	0
32	8	0.73	2	0.512001	0	2	4	32	32	0
33	8	0.75	2	0.619716	0	2	4	24	24	2
34	8	0.78	4	-0.636156	2.408116	1.5918838	2.53409391	16	16	4
35	8	0.80	8	-0.05926	8.39352	-0.39352	0.15485787	8	8	8
36	9	0.83	20	-1.071604	11.34861	8.6513864	74.8464873	2	2	14
37	10	0.85	12	-1.944753	11.3113	0.6887003	0.47430806	-4	0	32
38	11	0.88	12	0.164818	13.19817	-1.198169	1.43560777	-8	0	40
39	12	0.92	4	-1.583463	11.3568	-7.356796	54.122442	-8	0	44
40	13	0.95	8	-1.255673	9.471192	-1.471192	2.16440695	4	4	28
	mean of the disturbance			-0.021095		0.2453449	mean of the standard errors			
	std dev of the disturbance			0.957331						

Σ (AO-Ot)2	492.9023			
		constraints		
θ	0.00	>=0	<=1	
αs	0.69	>=0	<=1	
β	0.05	>=0	<=1	
S'	19.47	>=0	<=100	INT

GRG NonLinear

Incoming Orders:
IO = COR
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = ROP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = REI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = RSL = RSD1+RSD2+WIO+WBL

SHINER BEER GAME MODEL

WME - GRG NonLinear

WHOLES	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	3.100126	4	0.128225	6.687613	-2.687613	7.22326162	12	12	12
2	4	3.797557	5	-2.064065	5.192754	-0.192754	0.03715393	12	12	12
3	6	3.954457	5	-2.886571	4.527148	0.4728523	0.22358927	12	12	13
4	8	5.539817	5	-0.297037	8.902743	-3.902743	15.2314055	10	10	14
5	6	7.446536	6	1.068308	12.57621	-6.57621	43.2465428	6	6	15
6	8	6.325425	6	-1.40493	9.082213	-3.082213	9.50003407	5	5	16
7	8	7.623273	7	0.642108	12.72815	-5.72815	32.8117032	2	2	17
8	8	7.915248	7	1.18844	13.76716	-6.767158	45.794434	-1	0	19
9	8	7.980934	10	-1.869352	10.77505	-0.775052	0.60070498	-3	0	20
10	6	7.995711	7	1.967014	14.62619	-7.626195	58.1588489	-5	0	24
11	8	6.448972	13	0.096753	11.2092	1.7908049	3.20698235	-8	0	28
12	10	7.651067	10	1.584318	13.89886	-3.898856	15.2010797	-12	0	37
13	12	9.471564	13	-2.127755	12.00728	0.9927211	0.98549522	-18	0	43
14	10	11.43118	20	1.821867	17.91652	2.0834815	4.34089505	-18	0	44
15	18	10.32197	30	-0.618819	14.36662	15.633377	244.402488	-20	0	56
16	14	16.27268	35	-0.042012	20.89414	14.105857	198.975196	-30	0	78
17	20	14.51128	40	1.061416	20.23617	19.763831	390.609031	-36	0	105
18	12	18.76521	25	-0.223576	23.20511	1.7948949	3.22164757	-44	0	133
19	12	13.52196	20	1.584318	19.76975	0.2302513	0.05301567	-44	0	146
20	12	12.34239	15	-2.127755	14.87811	0.1218919	0.01485764	-41	0	151
21	12	12.07703	20	1.821867	18.56236	1.4376351	2.06679486	-49	0	162
22	12	12.01733	15	-0.618819	16.06198	-1.061981	1.1278028	-50	0	171
23	12	12.0039	10	-0.042012	16.62536	-6.625357	43.8953552	-50	0	174
24	4	12.00088	15	1.061416	17.72576	-2.725763	7.4297839	-47	0	169
25	10	5.799946	10	-0.223576	10.23984	-0.23984	0.05752327	-21	0	154
26	0	9.05512	0	1.584318	11.89099	-11.89099	141.395549	34	34	99
27	0	2.037117	0	-2.127755	0	0	0	108	108	25
28	4	0.458287	0	1.821867	0	0	0	123	123	10
29	0	3.203226	4	-0.618819	0	4	16	129	129	0
30	0	0.720625	0	-0.042012	0	0	0	129	129	4
31	0	0.162118	0	1.061416	0	0	0	129	129	4
32	0	0.036471	0	-0.223576	0	0	0	129	129	4
33	2	0.008205	10	1.584318	0	10	100	133	133	0
34	2	1.551909	5	-1.876001	0	5	25	131	131	10
35	4	1.899194	5	0.35902	0	5	25	129	129	15
36	8	3.527385	5	1.71175	0	5	25	125	125	20
37	20	6.993802	5	-0.435754	0	5	25	127	127	15
38	12	17.07401	10	-0.153598	10.34461	-0.344613	0.11875778	112	112	15
39	12	13.14149	10	0.074868	7.343012	2.6569878	7.05958404	105	105	20
40	4	12.2568	10	-0.129869	6.956037	3.0439629	9.26571034	98	98	25
	mean of the disturbance			0.028644		0.5327637	mean of the standard errors			
	std dev of the disturbance			1.40266						

Σ (AO-Ot)2	1502.255		constraints	
θ	0.78		>=0	<=1
αs	0.10		>=0	<=1
β	0.00		>=0	<=1
S'	46.47		>=0	<=100	INT

Standard GRG NonLinear

Incoming Orders:
IO = WIO
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = WOP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = MWEI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = WSL = WSD1+WSD2+DIO+DBL

SHINER BEER GAME MODEL

DME - GRG NonLinear

DISTRIB	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	1.128843	4	0.310431	8.865805	-4.865805	23.6760547	12	12	12
2	4	1.939115	6	-1.484171	7.881474	-1.881474	3.53994506	12	12	12
3	5	2.520719	2	-0.753449	9.193801	-7.193801	51.75077	12	12	14
4	5	3.220399	0	0.35897	12.0059	-12.0059	144.141615	11	11	12
5	5	3.722622	2	0.641312	13.79046	-11.79046	139.015047	10	10	8
6	6	4.083112	4	-0.723624	11.78602	-7.786018	60.6220725	11	11	4
7	6	4.624078	4	0.387777	17.43839	-13.43839	180.590213	7	7	6
8	7	5.012378	12	3.442785	26.88169	-14.88169	221.464806	1	1	10
9	7	5.573307	10	-0.225319	24.77452	-14.77452	218.286391	-4	0	20
10	10	5.975935	12	-0.164181	25.23828	-13.23828	175.252175	-7	0	26
11	7	7.11157	18	-0.852577	25.68552	-7.685523	59.067263	-13	0	34
12	13	7.080083	12	1.174837	27.68145	-15.68145	245.907902	-8	0	40
13	10	8.750748	6	0.477917	28.6552	-22.6552	513.257896	-13	0	44
14	13	9.1033	8	-0.107658	28.42217	-20.42217	417.06514	-15	0	42
15	20	10.20299	10	0.303075	29.9326	-19.9326	397.308419	-20	0	42
16	30	12.96781	18	0.174419	32.56876	-14.56876	212.248851	-28	0	40
17	35	17.77448	25	0.451818	37.65283	-12.65283	160.09407	-46	0	46
18	40	22.63571	50	-0.369242	41.693	8.3070029	69.0062965	-66	0	56
19	25	27.5361	60	0.177775	47.1404	12.859595	165.369185	-102	0	102
20	20	26.82038	80	1.669601	47.91652	32.083484	1029.34993	-116	0	151
21	15	24.8956	80	0.201534	44.52366	35.476337	1258.57049	-124	0	219
22	20	22.10295	90	0.878901	42.40839	47.591615	2264.9618	-124	0	284
23	15	21.50948	80	0.641312	41.57732	38.42268	1476.30234	-114	0	344
24	10	19.67243	80	-0.723624	38.37534	41.624661	1732.61244	-64	0	359
25	15	16.94277	30	0.387777	30.75707	-0.757075	0.57316246	6	6	359
26	10	16.3945	10	3.442785	0	10	100	71	71	309
27	0	14.5899	0	-0.225319	0	0	0	161	161	219
28	0	10.47247	0	1.108288	0	0	0	241	241	139
29	0	7.517028	0	-0.614577	0	0	0	341	341	39
30	4	5.395641	0	-0.485192	0	0	0	380	380	0
31	0	5.001776	0	-1.793402	0	0	0	376	376	0
32	0	3.590221	0	-0.2521	0	0	0	376	376	0
33	0	2.577022	0	0.942033	0	0	0	376	376	0
34	10	1.849758	0	-0.125467	0	0	0	376	376	0
35	5	4.149845	0	0.333732	0	0	0	366	366	0
36	5	4.389768	0	0.937962	0	0	0	361	361	0
37	5	4.561982	0	-1.254474	0	0	0	356	356	0
38	5	4.685595	0	0.70148	0	0	0	351	351	0
39	10	4.774324	0	-1.097232	0	0	0	346	346	0
40	10	6.249066	0	-1.792866	0	0	0	336	336	0
	mean of the disturbance			0.245919		0.2900979	mean of the standard errors			
	std dev of the disturbance			1.077327						

Σ (AO-Ot)2	11320.03	constraints		
θ	0.28	>=0	<=1	
αs	1.00	>=0	<=1	
β	0.00	>=0	<=1	
S'	19.43	>=0	<=100	INT

GRG NonLinear

Incoming Orders:
IO = DIO
Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$
Actual Orders:
AO = DOP
Disturbance:
normally distributed white noise
mean = 0
std dev = 1
Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$
Error Term:
$AO - O_t$
Squared errors:
$(AO - O_t)^2$
Effective Inventory:
EI = MDEI
Stock:
St = MAX(0,EI)
Supply Line:
SLt = DSL = DSD1+DSD2+FIO+FBL

SHINER BEER GAME MODEL

FME - GRG NonLinear

FACTOR	incoming orders	expected incoming orders	actual orders	disturb-ance	model orders	error term	squared errors	effective inventory	Stock	Supply line
WEEK	IO	eIO	AO	ε	O_t	(AO-Ot)	$(AO-Ot)^2$	EI	S_t	SL_t
0	4	0								
1	4	4	4	-0.043359	8.899033	-4.899033	24.0005292	12	12	8
2	4	4	6	0.172476	9.114869	-3.114869	9.70240608	12	12	8
3	6	4	6	0.737662	9.680054	-3.680054	13.5427986	12	12	10
4	2	6	5	-0.355303	11.03781	-6.037811	36.4551671	10	10	12
5	0	2	3	-1.062137	5.429533	-2.429533	5.90263282	14	14	11
6	2	0	0	0.145329	3.284833	-3.284833	10.7901304	20	20	8
7	4	2	0	-1.56982	2.893602	-2.893602	8.37293094	23	23	3
8	4	4	2	-1.358152	5.33063	-3.33063	11.0930966	22	22	0
9	12	4	8	0.193548	7.783774	0.2162257	0.04675354	18	18	2
10	10	12	8	-0.031703	18.26285	-10.26285	105.326188	6	6	10
11	12	10	12	-1.362423	16.2843	-4.284301	18.3552363	-2	0	16
12	18	12	12	0.00171	19.64843	-7.648434	58.4985421	-6	0	20
13	12	18	15	0.867275	26.514	-11.514	132.572177	-16	0	24
14	6	12	4	0.492545	20.13927	-16.13927	260.475992	-16	0	27
15	8	6	11	-1.855371	11.79135	-0.791352	0.62623857	-10	0	19
16	10	8	12	0.317825	15.96455	-3.964549	15.7176487	-3	0	15
17	18	10	15	0.6112	18.25792	-3.257924	10.6140677	-9	0	23
18	25	18	30	0.579292	26.22602	3.7739839	14.2429541	-16	0	27
19	50	25	65	0.127188	32.77391	32.226088	1038.52076	-29	0	45
20	60	50	80	0.824248	58.47097	21.529028	463.499044	-64	0	95
21	80	60	80	0.414909	68.06163	11.938367	142.524603	-94	0	145
22	80	80	100	-0.32681	87.31991	12.680087	160.784595	-109	0	160
23	90	80	80	-0.178008	87.46872	-7.468716	55.7817117	-109	0	180
24	80	90	100	-1.541527	96.1052	3.8948032	15.1694916	-119	0	180
25	80	80	80	1.878688	89.52541	-9.525412	90.7334765	-99	0	180
26	30	80	100	-1.863828	85.7829	14.217104	202.12606	-99	0	180
27	10	30	30	0.446311	38.09303	-8.093035	65.4972147	-29	0	180
28	0	10	20	-0.554867	7.852057	12.147943	147.572518	41	41	130
29	0	0	15	-2.284125	0	15	225	141	141	50
30	0	0	0	-0.20277	0	0	0	171	171	35
31	0	0	0	-0.33282	0	0	0	191	191	15
32	0	0	0	1.501396	0	0	0	206	206	0
33	0	0	0	1.139175	0	0	0	206	206	0
34	0	0	0	0.716943	0	0	0	206	206	0
35	0	0	0	0.717665	0	0	0	206	206	0
36	0	0	0	2.453593	0	0	0	206	206	0
37	0	0	0	0.127188	0	0	0	206	206	0
38	0	0	0	0.824248	0	0	0	206	206	0
39	0	0	0	0.414909	0	0	0	206	206	0
40	0	0	0	-0.686535	0	0	0	206	206	0
	mean of the disturbance			-0.08679		0.4286691	mean of the standard errors			
	std dev of the disturbance			0.998256						

Σ (AO-Ot)2	3343.545		constraints		
θ	1.00		>=0	<=1	
αs	0.23		>=0	<=1	
β	0.00		>=0	<=1	
S'	33.93		>=0	<=100	INT
	GRG NonLinear				

Incoming Orders:
IO = FIO

Expected Incoming Orders:
$eIO = \theta * IO_{(t-1)} + (1-\theta) * eIO_{(t-1)}$

Actual Orders:
AO = FPR

Disturbance:
normally distributed white noise
mean = 0
std dev = 1

Model Orders:
$Ot = MAX(0, eIO + \alpha s(s' - S_t - \beta SL_t) + \varepsilon$

Error Term:
$AO - O_t$

Squared errors:
$(AO - O_t)^2$

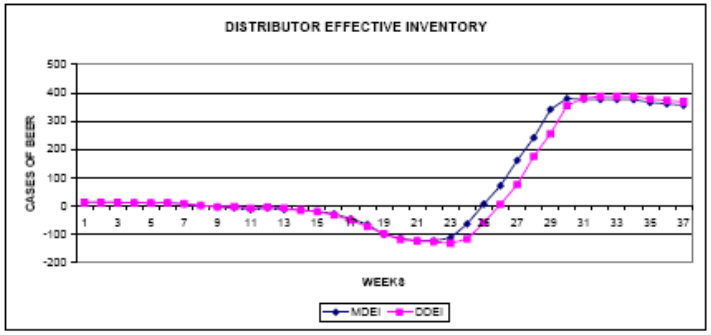
Effective Inventory:
EI = MFEI

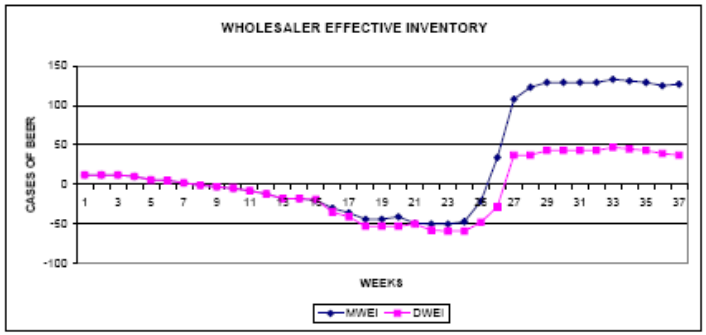
Stock:
St = MAX(0,EI)

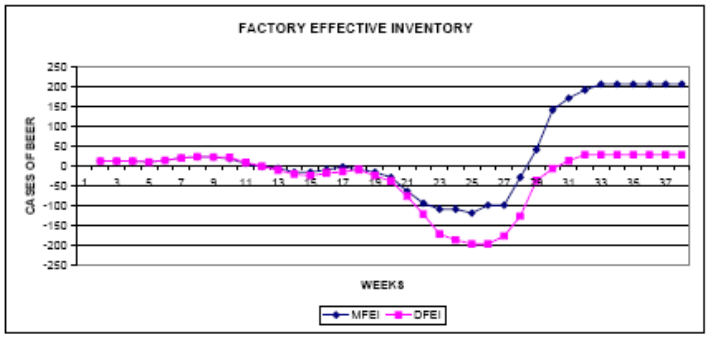
Supply Line:
SLt = FSL = FPD1+FPD2

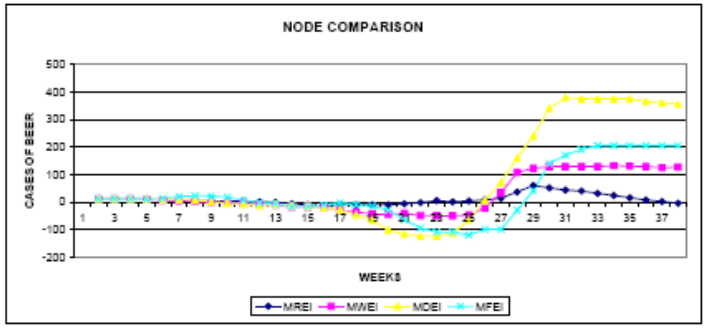
SHINER BEER GAME MODEL

MODEL CHARTS



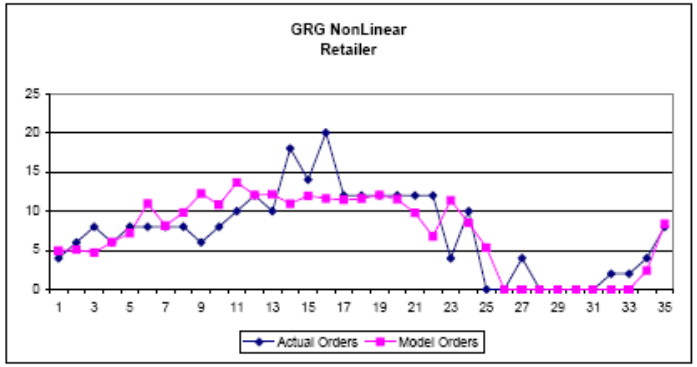


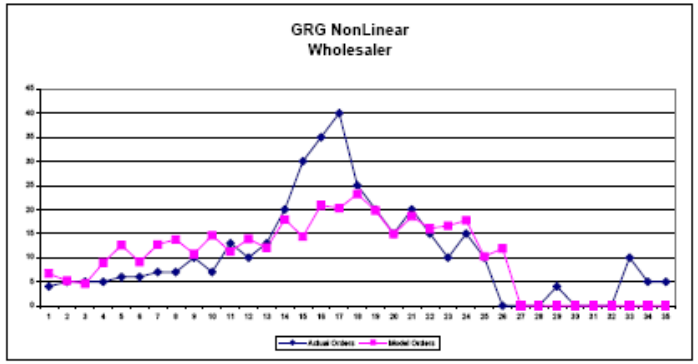


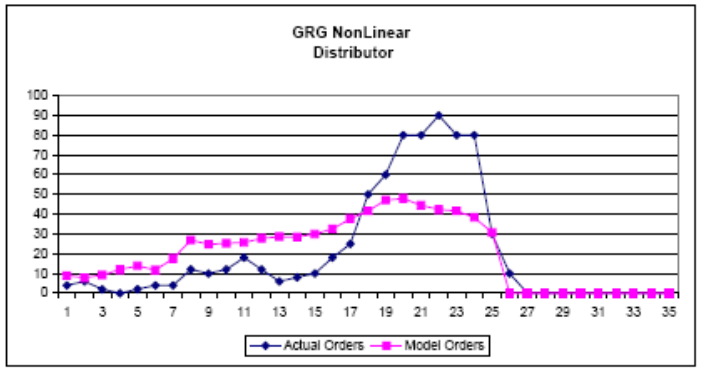


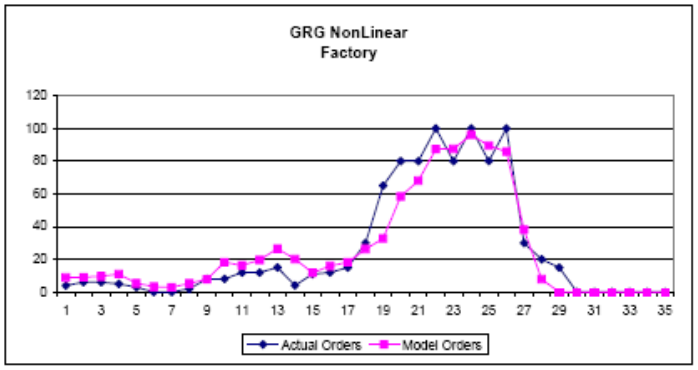
SHINER BEER GAME MODEL

ORDER CHARTS









SHINER BEER GAME MODEL

MODEL WORKSHEET

STEP 1
Receive The Inventory and Advance the shipping Delays

STEP 2
Look at the incoming orders and fill orders
all incoming orders + backlog

	SHINER	NO IT							SHINER	Retailer	NO IT					
	Team Costs	$ 7,126.50							Costs	$ 315.00						
WEEK	COR	RINV1	RSD1	RSD2	RBL	RSR	RINV2	MREI	*DREI*	RCOSTS	ROP	WIO	RSL		WINV1	WSD1
0	0	12	4	4	0	4	12			0	4	4			12	4
1	4	16	4	4	0	4	12	12	*12*	6	4	4	12		16	4
2	4	16	4	4	0	4	12	12	*12*	12	6	4	12		16	4
3	4	16	4	4	0	4	12	12	*12*	18	8	6	14		16	4
4	4	16	4	6	0	4	12	12	*12*	24	6	8	18		16	4
5	8	16	6	8	0	8	8	8	*8*	28	8	6	20		14	5
6	8	14	8	6	0	8	6	6	*6*	31	8	8	22		11	5
7	8	14	6	8	0	8	6	6	*6*	34	8	8	22		10	5
8	8	12	8	7	0	8	4	4	*4*	36	8	8	24		7	6
9	8	12	7	6	0	8	4	4	*4*	38	6	8	24		6	6
10	8	11	6	6	0	8	3	3	*3*	39.5	8	6	23		6	3
11	8	9	6	3	0	8	1	1	*1*	40	10	8	25		3	4
12	8	7	3	4	1	7	0	-1	*-1*	41	12	10	29		4	4
13	8	3	4	4	6	3	0	-6	*-6*	47	10	12	38		4	12
14	8	4	4	12	10	4	0	-10	*-10*	57	18	10	44		12	8
15	8	4	12	8	14	4	0	-14	*0*	71	14	18	58		8	8
16	8	12	8	8	10	12	0	-10	*0*	81	20	14	60		8	8
17	8	8	8	8	10	8	0	-10	*-14*	91	12	20	72		8	12
18	8	8	8	12	10	8	0	-10	*-10*	101	12	12	76		12	12
19	8	8	12	12	10	8	0	-10	*-9*	111	12	12	80		12	15
20	8	12	12	15	6	12	0	-6	*-15*	117	12	12	80		15	4
21	8	12	15	4	2	12	0	-2	*-15*	119	12	12	80		4	11
22	8	15	4	11	0	10	5	5	*-15*	121.5	12	12	77		11	12
23	8	9	11	12	0	8	1	1	*-11*	122	4	12	85		12	15
24	8	12	12	15	0	8	4	4	*-7*	124	10	4	78		15	30
25	8	16	15	30	0	8	8	8	*0*	128	0	10	76		30	65
26	8	23	30	31	0	8	15	15	*-4*	135.5	0	0	61		65	74
27	8	45	31	0	0	8	37	37	*9*	154	4	0	31		108	15
28	8	68	0	0	0	8	60	60	*29*	184	0	4	4		123	10
29	8	60	0	4	0	8	52	52	*52*	210	0	0	4		133	0
30	8	52	4	0	0	8	44	44	*44*	232	0	0	4		129	0
31	8	48	0	0	0	8	40	40	*48*	252	0	0	0		129	0
32	8	40	0	0	0	8	32	32	*38*	268	2	0	0		129	4
33	8	32	0	0	0	8	24	24	*24*	280	2	2	2		133	0
34	8	24	0	2	0	8	16	16	*16*	288	4	2	4		133	0
35	8	16	2	2	0	8	8	8	*8*	292	8	4	8		131	0
36	8	10	2	4	0	8	2	2	*2*	293	20	8	14		129	10
37	8	4	4	8	4	4	0	-4	*-4*	297	12	20	32		135	5
38	8	4	8	20	8	4	0	-8	*-8*	305	12	12	40		132	5
39	8	8	20	12	8	8	0	-8	*-8*	313	4	12	44		117	5
40	8	20	12	12	0	16	4	4	*4*	315	8	4	28		110	5

SHINER BEER GAME MODEL

MODEL WORKSHEET

STEP 3
Record your inventory or backlog

STEP 4
Advance the order slips and the brewery Brews

					SHINER	Wholesaler		NO IT									SHINER
					Costs	$ 1,397.00											Costs
WEEK	WSD2	WBL	WINV2	MWEI	*DWEI*	WCOSTS	WOP	DIO	WSL		DINV1	DSD1	DSD2	DBL	DINV2	MDEI	*DDEI*
0	4	0	12			0	4	4			12	4	4	0	12		
1	4	0	12	12	*12*	6	4	4	12		16	4	4	0	12	12	*12*
2	4	0	12	12	*12*	12	5	4	12		16	4	4	0	12	12	*12*
3	4	0	12	12	*12*	18	5	5	13		16	4	4	0	12	12	*12*
4	5	0	10	10	*10*	23	5	5	14		16	4	6	0	11	11	*11*
5	5	0	6	6	*6*	26	6	5	15		15	6	2	0	10	10	*10*
6	5	0	5	5	*5*	28.5	6	6	16		16	2	0	0	11	11	*11*
7	6	0	2	2	*2*	29.5	7	6	17		13	0	2	0	7	7	*7*
8	6	1	0	-1	*-1*	30.5	7	7	19		7	2	4	0	1	1	*1*
9	3	3	0	-3	*-3*	33.5	10	7	20		3	4	4	4	0	-4	*-4*
10	4	5	0	-5	*-5*	38.5	7	10	24		4	4	12	7	0	-7	*-3*
11	4	8	0	-8	*-8*	46.5	13	7	28		4	12	8	13	0	-13	*-9*
12	12	12	0	-12	*-12*	58.5	10	13	37		12	8	8	8	0	-8	*-4*
13	8	18	0	-18	*-18*	76.5	13	10	43		8	8	8	13	0	-13	*-8*
14	8	18	0	-18	*-18*	94.5	20	13	44		8	8	12	15	0	-15	*-16*
15	8	20	0	-20	*-19*	114.5	30	20	56		8	12	12	20	0	-20	*-21*
16	12	30	0	-30	*-35*	144.5	35	30	78		12	12	15	28	0	-28	*-33*
17	12	36	0	-36	*-41*	180.5	40	35	105		12	15	4	46	0	-46	*-51*
18	15	44	0	-44	*-53*	224.5	25	40	133		15	4	11	66	0	-66	*-74*
19	4	44	0	-44	*-53*	268.5	20	25	146		4	11	12	102	0	-102	*-99*
20	11	41	0	-41	*-53*	309.5	15	20	151		11	12	15	116	0	-116	*-120*
21	12	49	0	-49	*-50*	358.5	20	15	162		12	15	30	124	0	-124	*-125*
22	15	50	0	-50	*-58*	408.5	15	20	171		15	30	65	124	0	-124	*-128*
23	30	50	0	-50	*-59*	458.5	10	15	174		30	65	80	114	0	-114	*-133*
24	65	47	0	-47	*-59*	505.5	15	10	169		65	80	80	64	0	-64	*-118*
25	74	21	0	-21	*-48*	526.5	10	15	154		80	80	100	0	6	6	*-60*
26	15	0	34	34	*-28*	543.5	0	10	99		86	100	80	0	71	71	*5*
27	10	0	108	108	*37*	597.5	0	0	25		171	80	100	0	161	161	*75*
28	0	0	123	123	*37*	659	0	0	10		241	100	39	0	241	241	*175*
29	0	0	129	129	*43*	723.5	4	0	0		341	39	0	0	341	341	*255*
30	0	0	129	129	*43*	788	0	4	4		380	0	0	0	380	380	*355*
31	4	0	129	129	*43*	852.5	0	0	4		380	0	0	0	376	376	*381*
32	0	0	129	129	*43*	917	0	0	4		376	0	0	0	376	376	*388*
33	0	0	133	133	*47*	983.5	10	0	0		376	0	0	0	376	376	*388*
34	0	0	131	131	*45*	1049	5	10	10		376	0	0	0	376	376	*388*
35	10	0	129	129	*43*	1113.5	5	5	15		376	0	0	0	366	366	*378*
36	5	0	125	125	*39*	1176	5	5	20		366	0	0	0	361	361	*373*
37	5	0	127	127	*37*	1239.5	5	5	15		361	0	0	0	356	356	*368*
38	5	0	112	112	*26*	1295.5	10	5	15		356	0	0	0	351	351	*363*
39	5	0	105	105	*19*	1348	10	10	20		351	0	0	0	346	346	*358*
40	10	0	98	98	*12*	1397	10	10	25		346	0	0	0	336	336	*348*

SHINER BEER GAME MODEL

MODEL WORKSHEET

STEP 5
Place and record your orders

	Distributor		NO IT									SHINER	Factory	NO IT	
	$ 3,312.00											Costs	$ 2,102.50		
WEEK	DCOSTS	DOP	FIO	DSL		FPD1	FPD2	FSD2	FBL	FINV2	MFEI	*DFEI*	FCOSTS	FPR	FSL
0	0	4	4	12		12	4	4	0	12			0	4	8
1	6	4	4	12		16	4	4	0	12	12	*12*	6	4	8
2	12	6	4	12		16	4	4	0	12	12	*12*	12	6	8
3	18	2	6	14		16	4	6	0	12	12	*12*	18	6	10
4	23.5	0	2	12		16	6	6	0	10	10	*10*	23	5	12
5	28.5	2	0	8		16	6	5	0	14	14	*14*	30	3	11
6	34	4	2	4		20	5	3	0	20	20	*20*	40	0	8
7	37.5	4	4	6		25	3	0	0	23	23	*23*	51.5	0	3
8	38	12	4	10		26	0	0	0	22	22	*22*	62.5	2	0
9	42	10	12	20		22	0	2	0	18	18	*21*	71.5	8	2
10	49	12	10	26		18	2	8	0	6	6	*9*	74.5	8	10
11	62	18	12	34		8	8	8	2	0	-2	*-1*	76.5	12	16
12	70	12	18	40		8	8	12	6	0	-6	*-11*	82.5	12	20
13	83	6	12	44		8	12	12	16	0	-16	*-21*	98.5	15	24
14	98	8	6	42		12	12	15	16	0	-16	*-25*	114.5	4	27
15	118	10	8	42		12	15	4	10	0	-10	*-19*	124.5	11	19
16	146	18	10	40		15	4	11	3	0	-3	*-15*	127.5	12	15
17	192	25	18	46		4	11	12	9	0	-9	*-10*	136.5	15	23
18	258	50	25	56		11	12	15	16	0	-16	*-25*	152.5	30	27
19	360	60	50	102		12	15	30	29	0	-29	*-39*	181.5	65	45
20	476	80	60	151		15	30	65	64	0	-64	*-77*	245.5	80	95
21	600	80	80	219		30	65	80	94	0	-94	*-122*	339.5	80	145
22	724	90	80	284		65	80	80	109	0	-109	*-172*	448.5	100	160
23	838	80	90	344		80	80	100	109	0	-109	*-187*	557.5	80	180
24	902	80	80	359		80	100	80	119	0	-119	*-197*	676.5	100	180
25	905	30	80	359		100	80	100	99	0	-99	*-197*	775.5	80	180
26	940.5	10	30	309		80	100	80	99	0	-99	*-177*	874.5	100	180
27	1021	0	10	219		100	80	100	29	0	-29	*-127*	903.5	30	180
28	1141.5	0	0	139		80	100	30	0	41	41	*-37*	924	20	130
29	1312	0	0	39		141	30	20	0	141	141	*-7*	994.5	15	50
30	1502	0	0	0		171	20	15	0	171	171	*13*	1080	0	35
31	1690	0	0	0		191	15	0	0	191	191	*28*	1175.5	0	15
32	1878	0	0	0		206	0	0	0	206	206	*28*	1278.5	0	0
33	2066	0	0	0		206	0	0	0	206	206	*28*	1381.5	0	0
34	2254	0	0	0		206	0	0	0	206	206	*28*	1484.5	0	0
35	2437	0	0	0		206	0	0	0	206	206	*28*	1587.5	0	0
36	2617.5	0	0	0		206	0	0	0	206	206	*28*	1690.5	0	0
37	2795.5	0	0	0		206	0	0	0	206	206	*28*	1793.5	0	0
38	2971	0	0	0		206	0	0	0	206	206	*28*	1896.5	0	0
39	3144	0	0	0		206	0	0	0	206	206	*28*	1999.5	0	0
40	3312	0	0	0		206	0	0	0	206	206	*28*	2102.5	0	0

SHINER BEER GAME MODEL

MODEL DATA

SHINER								
NO IT								
Week	ROR	REI	WOR	WEI	DOR	DEI	FOR	FEI
1	4	12	4	12	4	12	4	12
2	6	12	5	12	6	12	6	12
3	8	12	5	12	2	12	6	12
4	6	12	5	10	0	11	5	10
5	8	8	6	6	2	10	3	14
6	8	6	6	5	4	11	0	20
7	8	6	7	2	4	7	0	23
8	8	4	7	-1	12	1	2	22
9	6	4	10	-3	10	-4	8	21
10	8	3	7	-5	12	-3	8	9
11	10	1	13	-8	18	-9	12	-1
12	12	-1	10	-12	12	-4	12	-11
13	10	-6	13	-18	6	-8	15	-21
14	18	-10	20	-18	8	-16	4	-25
15	14	0	30	-19	10	-21	11	-19
16	20	0	35	-35	18	-33	12	-15
17	12	-14	40	-41	25	-51	15	-10
18	12	-10	25	-53	50	-74	30	-25
19	12	-9	20	-53	60	-99	65	-39
20	12	-15	15	-53	80	-120	80	-77
21	12	-15	20	-50	80	-125	80	-122
22	12	-15	15	-58	90	-128	100	-172
23	4	-11	10	-59	80	-133	80	-187
24	10	-7	15	-59	80	-118	100	-197
25	0	0	10	-48	30	-60	80	-197
26	0	-4	0	-28	10	5	100	-177
27	4	9	0	37	0	75	30	-127
28	0	29	0	37	0	175	20	-37
29	0	52	4	43	0	255	15	-7
30	0	44	0	43	0	355	0	13
31	0	48	0	43	0	381	0	28
32	2	38	0	43	0	388	0	28
33	2	24	10	47	0	388	0	28
34	4	16	5	45	0	388	0	28
35	8	8	5	43	0	378	0	28
36	20	2	5	39	0	373	0	28
37	12	-4	5	37	0	368	0	28
38	12	-8	10	26	0	363	0	28
39	4	-8	10	19	0	358	0	28
40	8	4	10	12	0	348	0	28