SUPPLY CHAIN OPTIMIZATION IN A STOCHASTIC ENVIRONMENT

An Undergraduate Research Scholars Thesis

By

SHERWIN S. CHIU

Submitted to Honors and Undergraduate Research
Texas A&M University
in partial fulfillment of the requirements for the designation as

Undergraduate Research Scholar

Approved by Research Advisor: Dr. Antonio Arreola-Risa

May 2013

Major: Supply Chain Management

TABLE OF CONTENTS

ABSTRACT

Supply Chain Optimization in a Stochastic Environment (May 2013)

Sherwin S. Chiu
Department of
Information and Operations Management
Texas A&M University

Research Advisor: Dr. Antonio Arreola-Risa
Department of
Information and Operations Management

The emerging field of supply-chain management has changed forever the way global businesses operate. By taking advantage of information technologies, supply-chain management attempts to coordinate all the companies in a supply chain in order to optimize their operation. One of the major challenges faced by real-world decision makers when trying to optimize the operation of supply chains is that normal business intuition has proven to be ineffective. In turn, the main reason for such ineffectiveness is the inherent complexity of supply chains due to the many unpredictable events that affect them.

In order to help real world decision makers, the impact of economic, operational, and marketing parameters must be understood when optimizing supply chain systems. To gain an understanding of these effects, this research simulates supply chains in two extreme production environments. Since the deterministic environment and the exponential environment are essentially a lower bound and an upper bound, respectively, of real world situations, this research provides clues about how real world supply chains behave. This shows that although the impact sometimes is intuitive, many times it is not.

Through simulation, the supply chain dynamics of randomized demand and capacity were modeled. These results were then exhaustively searched in order to find the optimum scenarios, and the data from all cases were analyzed. After analyzing and interpreting the results, it was shown that the impact of the parameters was not always intuitive. Some of the major findings included the convergence of optimum cost, quantity, and reorder point along several dimensions, the induction of unique patterns for each parameter, and the optimal behavior between the lower and upper bounds sometimes being essentially the same. Based on the data, we can say that optimizing supply chain operations is difficult to accomplish with intuition and reasoning. Essentially, real world decision makers must know about the patterns and trends found in this study. Being aware of the identified convergences, patterns, and bounds will help businesses to adjust their supply chains to improve performance. Further research is recommended to expand the scope of this study as well as for businesses to apply this research methodology to better understand supply chain optimization.

ACKNOWLEDGEMENTS

I would like to thank everyone who provided feedback so that I could improve the quality of this research. I would especially like to thank Dr. Antonio Arreola-Risa for his extensive dedication of time, teaching, and guidance throughout the entire process, without which this research would not have been possible.

NOMENCLATURE

EOQ	Economic Order Quantity
Q	Order Quantity (Lot Size)
R	Reorder Point
Q*	Optimum Order Quantity
R*	Optimum Reorder Point
C*	Optimum Cost
e	Exponential
d	Deterministic
n	Number of Homogenous Products
λ	Average Demand Rate
k	Ordering Cost
h	Holding Cost
p/h	Backorder Cost to Holding Cost Ratio
ρ	Capacity Utilization

CHAPTER I

INTRODUCTION

In 1959, the results of research by Andrew J. Clark and Herbert Scarf determined that there was hope for an optimal solution of relatively complex inventory policies. Specifically, they demonstrated it is possible to find a relatively simple method which can be used in multi-echelon inventory systems to provide an optimal solution [1]. Later research by Paul Zipkin found that the total cost of inventory policies exhibits convex behavior. This finding provided more evidence of the existence of a solution that would produce the lowest cost inventory system. However, this work was still too theoretical due to eight assumptions to allow for a general approach [2]. Further work on the theory can be found in Antonio Arreola-Risa’s work which models an exact inventory problem of real companies. The importance of this work is that past research depended on approximations and that this work explored the exact interaction between the inventory system and the randomness in a manufacturing environment [3]. The results of this research produced evidence that the modeled solution does work in an environment with randomness similar to real-world companies.

The next major step in this area was applying theory to a real world company. Antonio Arreola-Risa worked with a relatively small company in order to test the possibility of creating a model that could mirror the company’s production-inventory system, which is in a stochastic environment with random variables in manufacturing that affect inventory [4]. This research exemplified a model that could be used to analyze manufacturing randomness as well as providing a proposed model which could be adapted for use in future studies of stochastic systems [4]. The previous research received criticism due to the relatively small size of the company. Thus, similar work was performed by Antonio Arreola-Risa, Victor M. Giménez-García, and José Luis Martínez-Parra. This time, the researchers worked with a large oil and gas company to optimize a stochastic production-inventory system using a heuristic based approach. The results of this research proved that a "heuristic optimization method [5]" was able to produce results with a low enough cost error for practical use, as found through simulation [5]. The motive for this research is to improve control models which are vital to improving companies' supply chain performance. There is always a complex trade-off between batch sizes and safety stock sizes and the optimum levels of either can be found through simulation. However, the number of simulations required to optimize production-inventory systems are so immense that optimization becomes difficult, if not impossible. Previous research has been done to determine heuristics that can simplify the process of optimizing stochastic systems such that large numbers of simulations would not be necessary [5]. Therefore this research is intended to gather data for improving or developing new heuristics through simulations that reveal the effects of altering decision variables. The standard EOQ model can provide results that range from the exact optimum to several levels away from the optimum based on the changing parameters. To better understand these scenarios, simulations under different conditions will be run to find optimal settings and costs.

CHAPTER II

METHODS

Procedure

This project involved multiple steps including modifying an Excel interface, generating and collecting data for 1,944 cases, and then analyzing the data.

The experiment was conducted using the simulation program developed under and used by Antonio Arreola-Risa. As part of his research, he used an Excel Workbook as an interface to input variables for each case and to read output data as well as perform calculations to determine simulated costs for each case. Modifications made in this experiment were removing unnecessary calculations that were used in previous research or used to test the software, adding the ability to automatically optimize and save data, and setting a timer to prevent Excel from continuing without data being generated.

In order to generate data for each case, a series of variables had to be entered into the simulation program. The variables can be found in Table 1. All input parameters remain constant throughout experiment unless otherwise noted.

Table 1: Variables and the Ranges

Simulation run time	100,000
Sampling start time	10,000
Sampling stop time	100,000
Number of parallel machines/production processes	1
Production rate+	
Number of periods in a year	365
Annual Demand+	
EOQ+	
Integer EOQ+	
Exponential (E) or Deterministic (D) #	E, D
Case Number#	1 – 972
n#	1, 5, 10, 50
λ#	0.5, 2, 8
k#	10, 50, 200
h#	0.5, 2, 6
p/h#	5, 10, 30
ρ#	0.5, 0.7, 0.9

- variable changed based on case
+ - parameter calculated based on variables

The E environment allows the simulation to take into account variation in demand and in the manufacturing environment. The D environment allows the simulation to ignore variation in the manufacturing environment and only account for variation in demand. These two environments represent high variability, E, and low variability, D, so that the data simulated will be on the outer bounds of real world supply chains, such that the E environment is the upper bound and the D environment is the lower bound.

The number of homogenous products, n, is how many products that are physically different but share the same economic and operational parameters that a system produces, such as different colored markers. They were made homogenous to keep the simulation experiment manageable when studying cases with more than one product.

The average demand rate, λ, is the demand per period, which is days in this simulation.

The ordering cost, k, is the amount it costs to place one order.

The holding cost, h, is the cost to hold one unit per period.

The backorder cost, p/h, is the penalty incurred for every demand that is not satisfied immediately from current inventory, or the cost for making a customer wait. It is represented by a ratio to provide this parameter with a measure of relative impact p, which is the procedure used in similar research.

The capacity utilization, ρ, is the portion of the total capacity that is being used by the system.

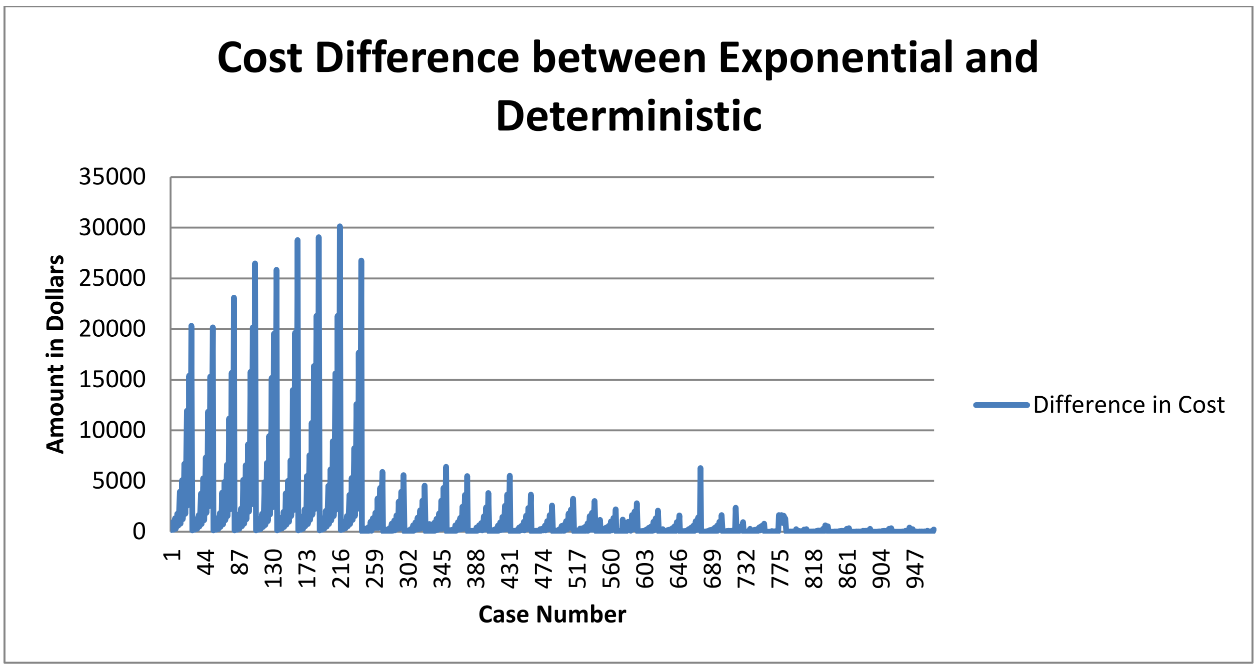
After entering each case's variables, the simulation was run and generated data that reflects how the parameters affect the costs of a real world supply chain. The data produced represents 10 different supply chain settings based on 9 different Qs that surround the EOQ Q*. The R* value was then found for each Q value and the Q* and R*, the values that generated the lowest total cost, were recorded along with the C*.

CHAPTER III

RESULTS

The results of simulating 1,944 cases proved that business intuition was unable to predict all of the patterns evident in the data. As shown in Figure 1, there was an unexpected convergence of the cost for Exponential and Deterministic environments, such that the optimal costs were essentially equal in a system with 50 homogenous products.

Figure 1



Economic Parameters

The patterns created by holding cost, h, followed current business knowledge. As predicted by the EOQ model, as holding cost increases, Q* will decrease. This trend can be seen in Figures 2, 3, and 4. It can also be seen that there is some variability in the accuracy of the EOQ model, where the E line or D line are above or below the EOQ line. However, as the case number increases, the variability decreases, reflecting the convergence shown in Figure 1.

Figure 2

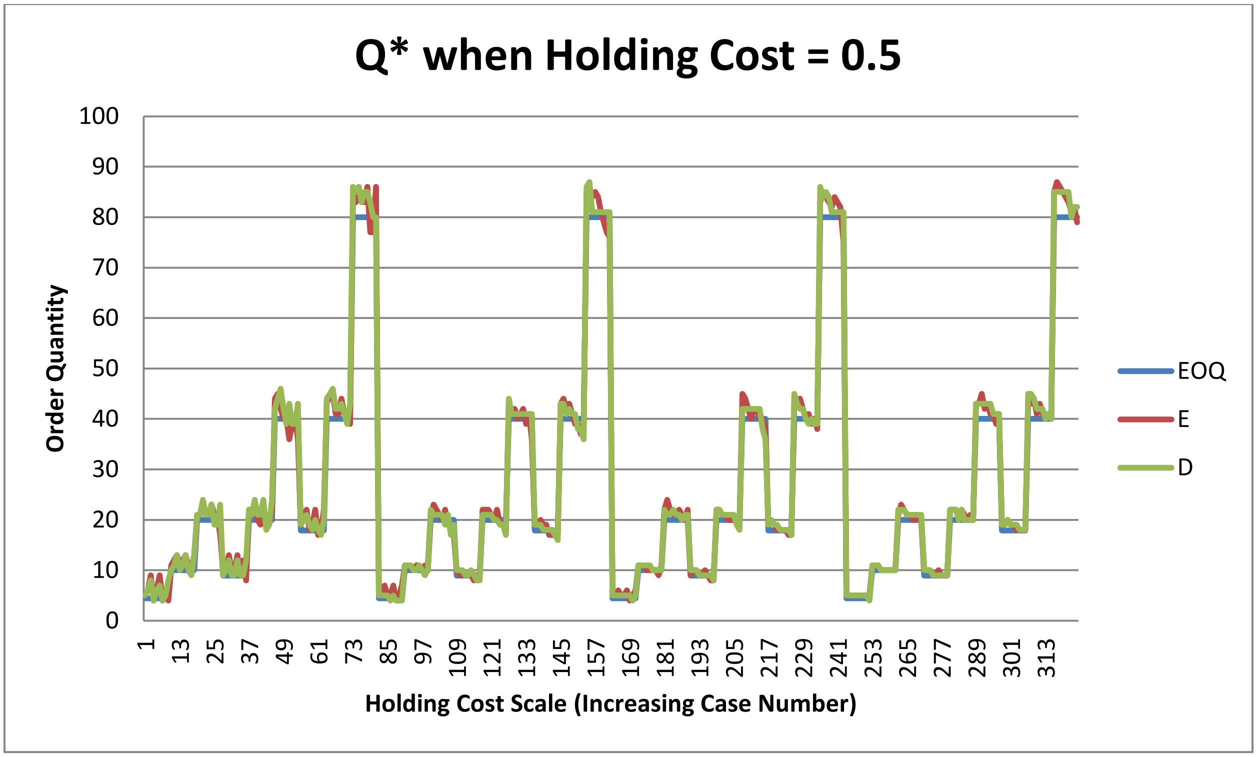


Figure 3

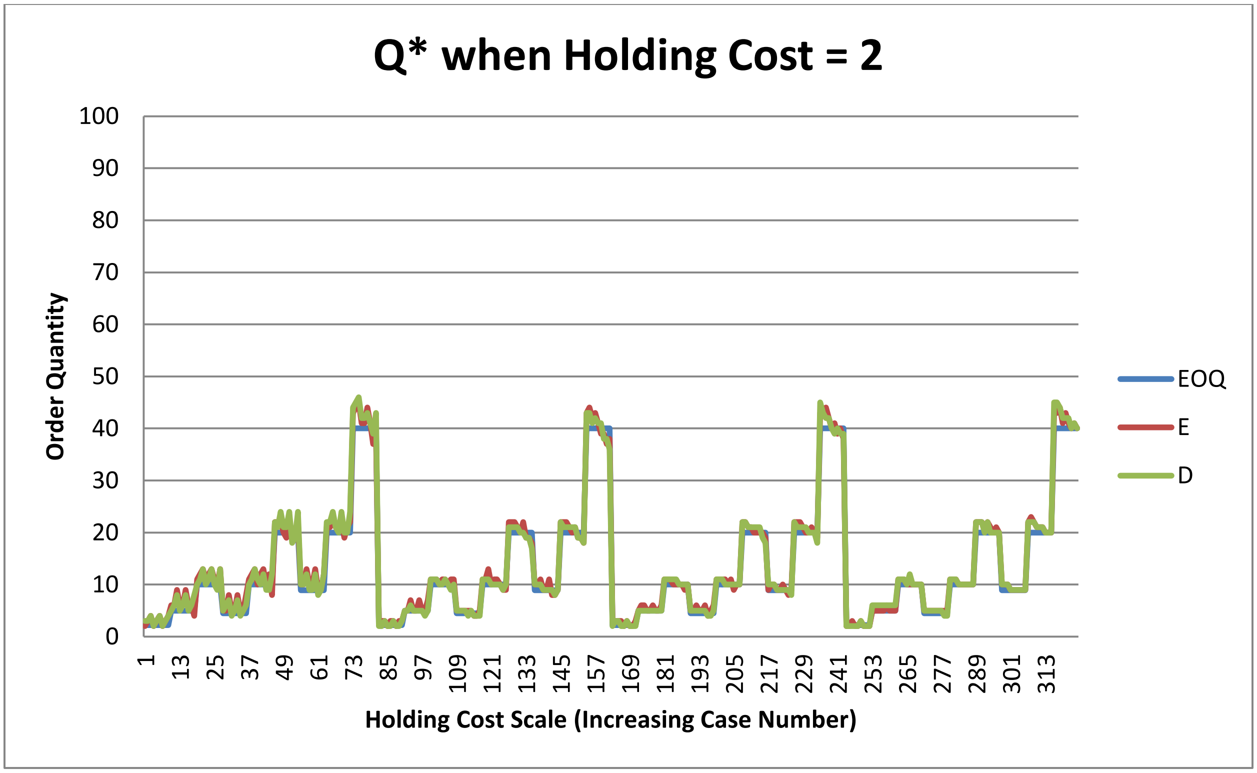
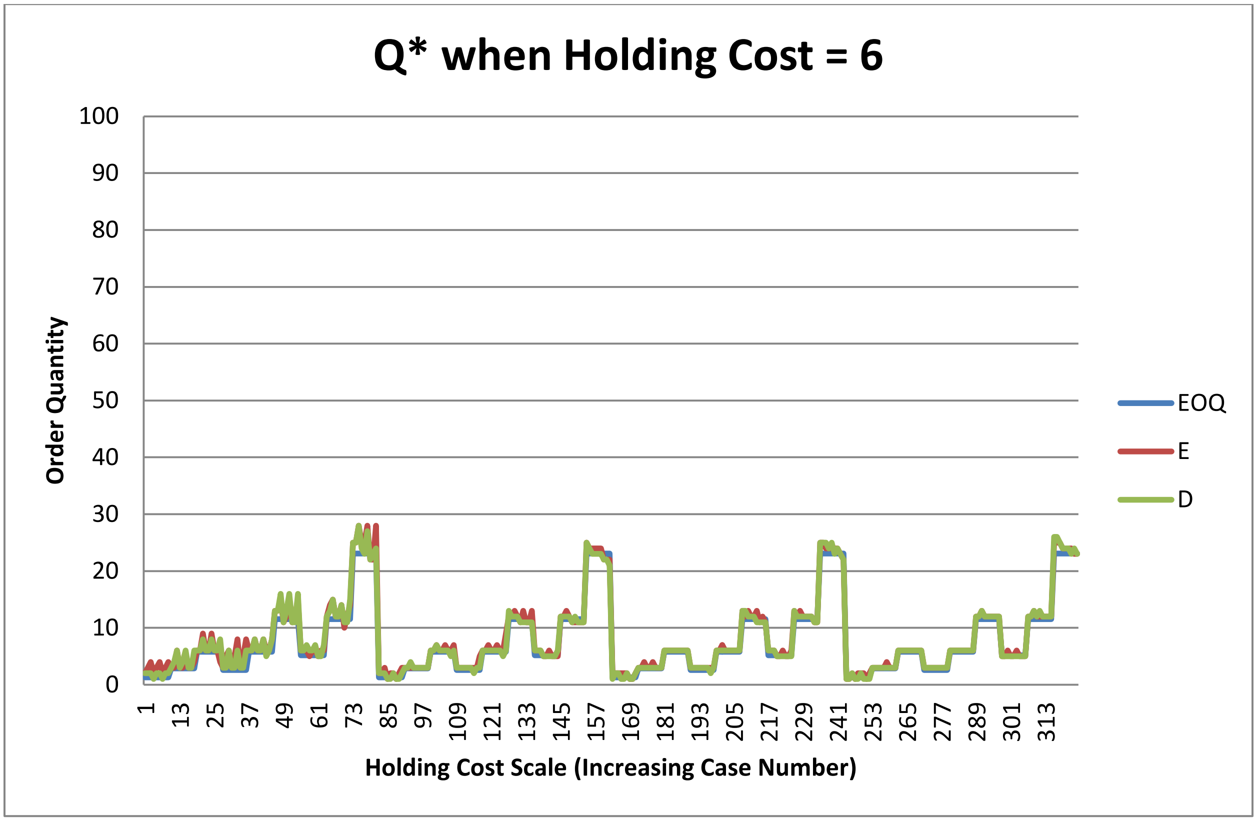


Figure 4



In terms of variability from the EOQ prediction, R* also behaves like Q*; however, as the data shows, when h increases from 0.5 to 2, there is a significant drop in R*, and there is a smaller drop from 2 to 6. Furthermore, as the case number increased, the R* decreased continuously. For this, refer to Figures 5, 6, and 7.

Figure 5

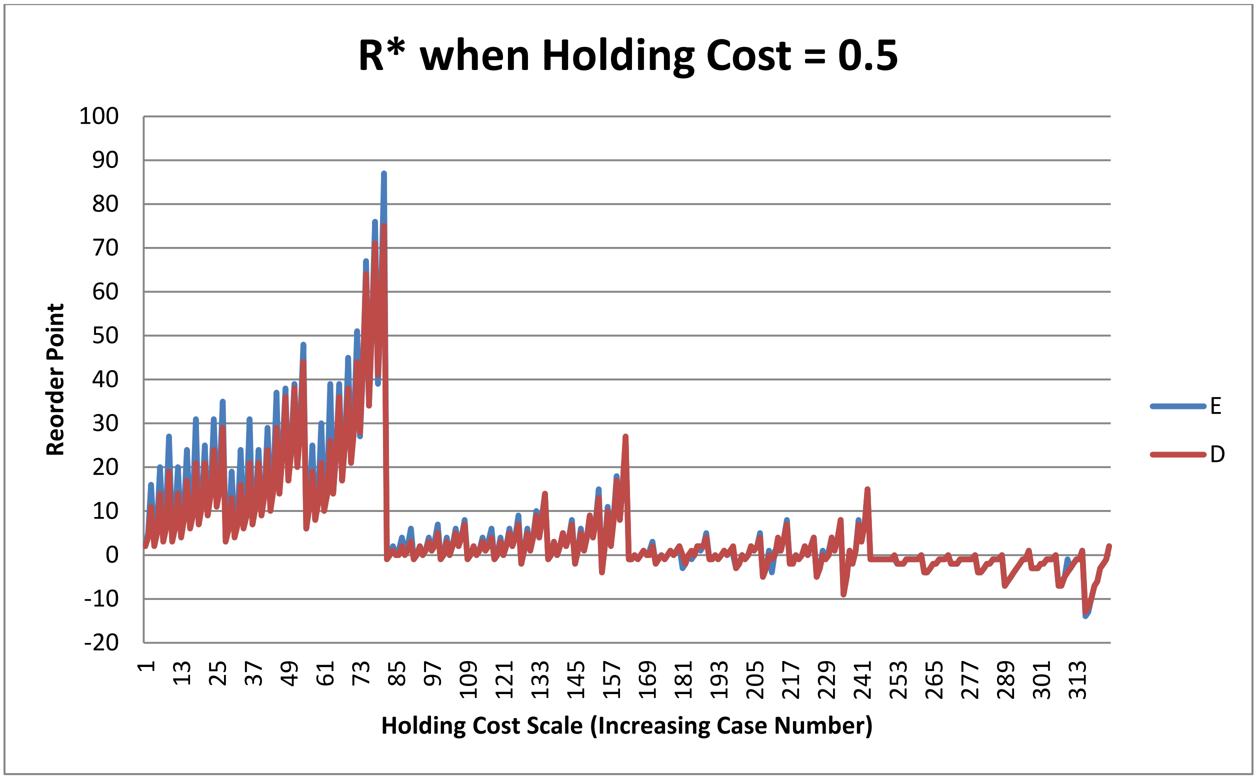


Figure 6

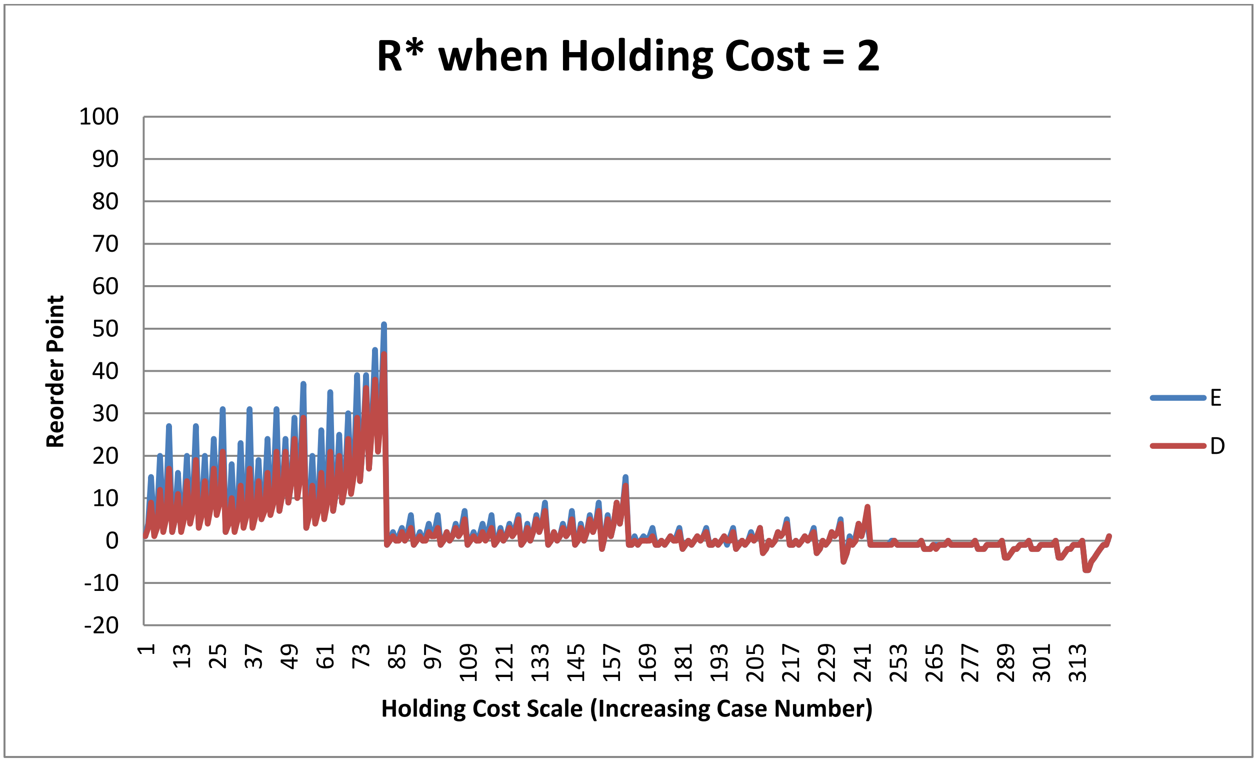
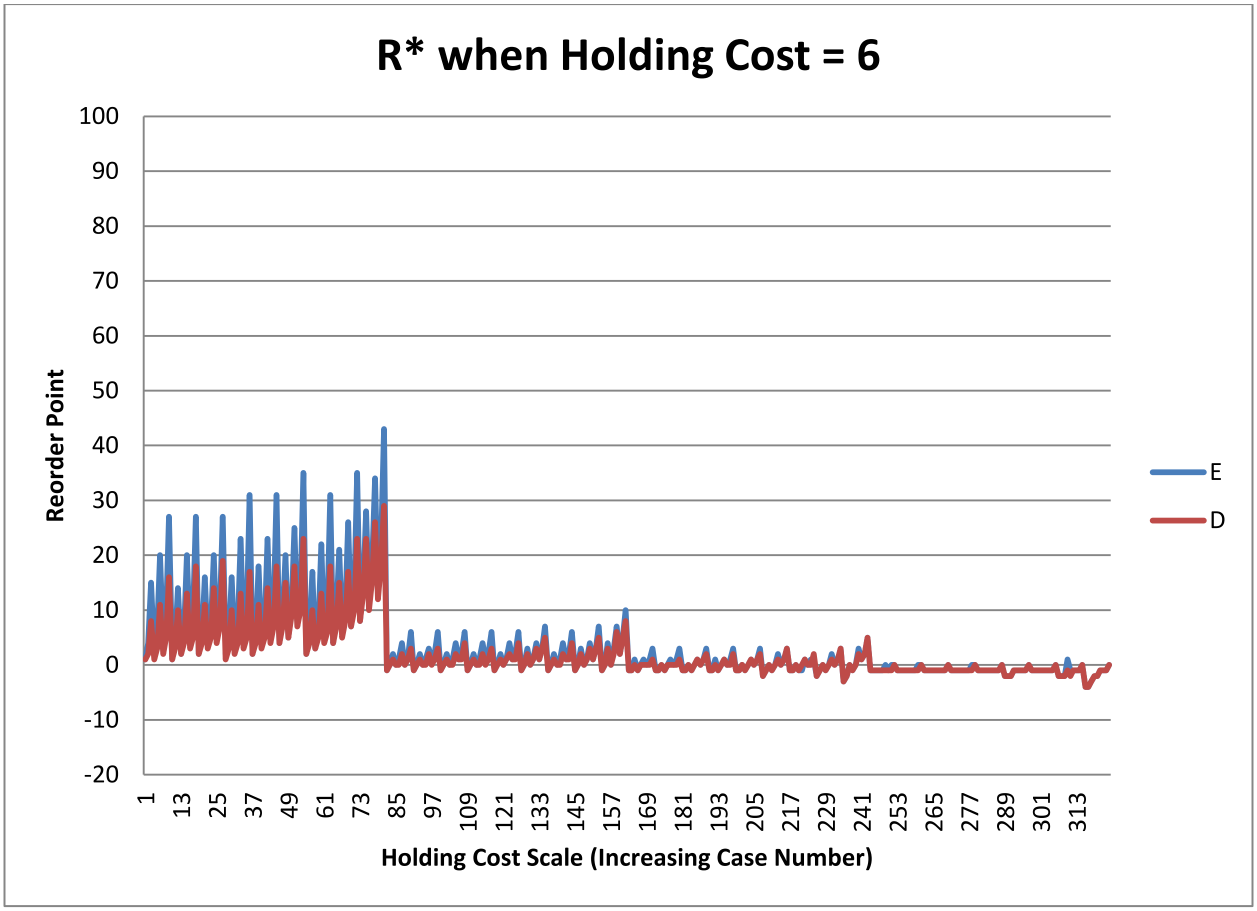


Figure 7



In terms of costs on the supply chain, as h increases, the total cost increases and the amount of variability in the first cases increases dramatically; however, similar to Q* and R*, the variability constantly decreases as the case number increases. For this, refer to Figures 8, 9, and 10.

Figure 8

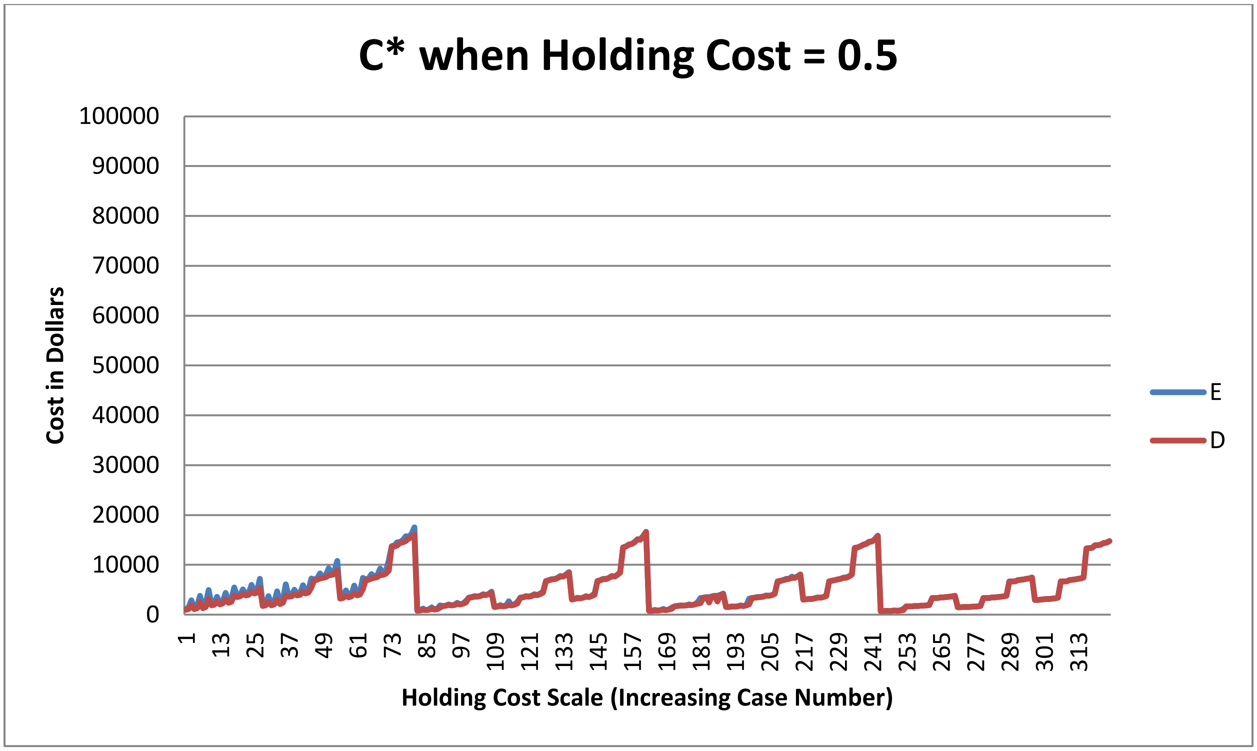


Figure 9

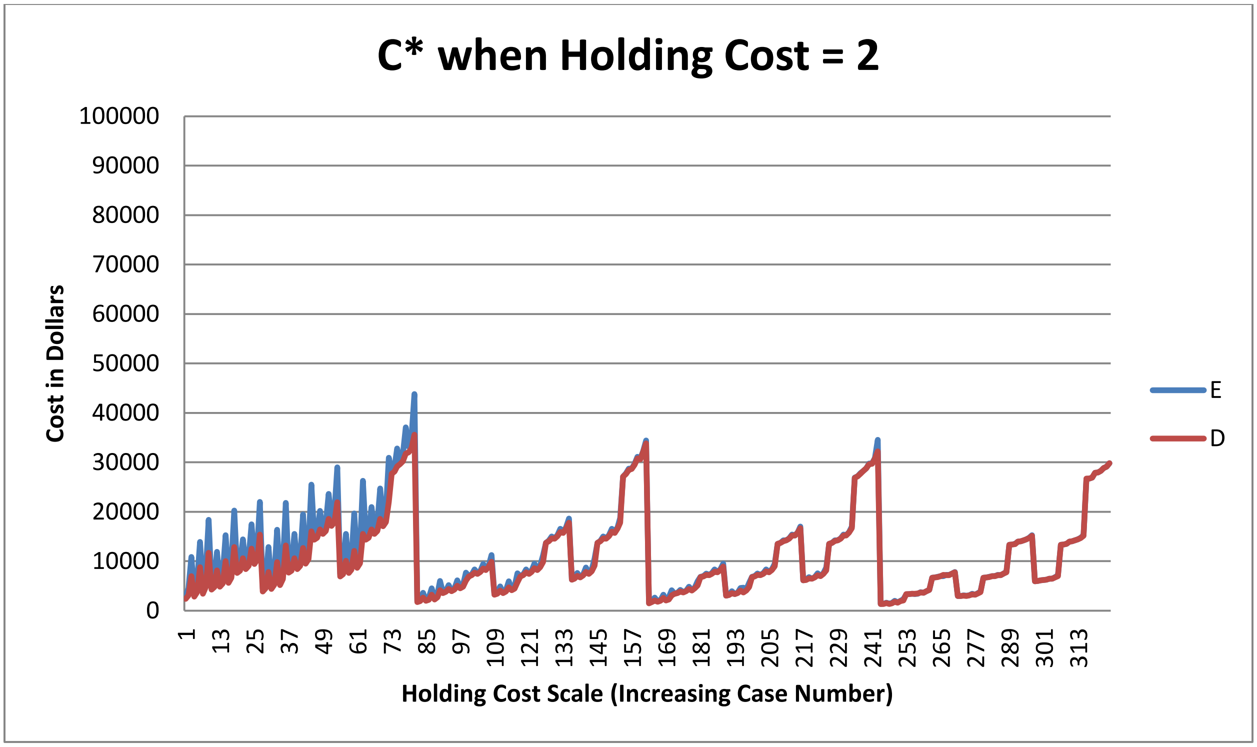
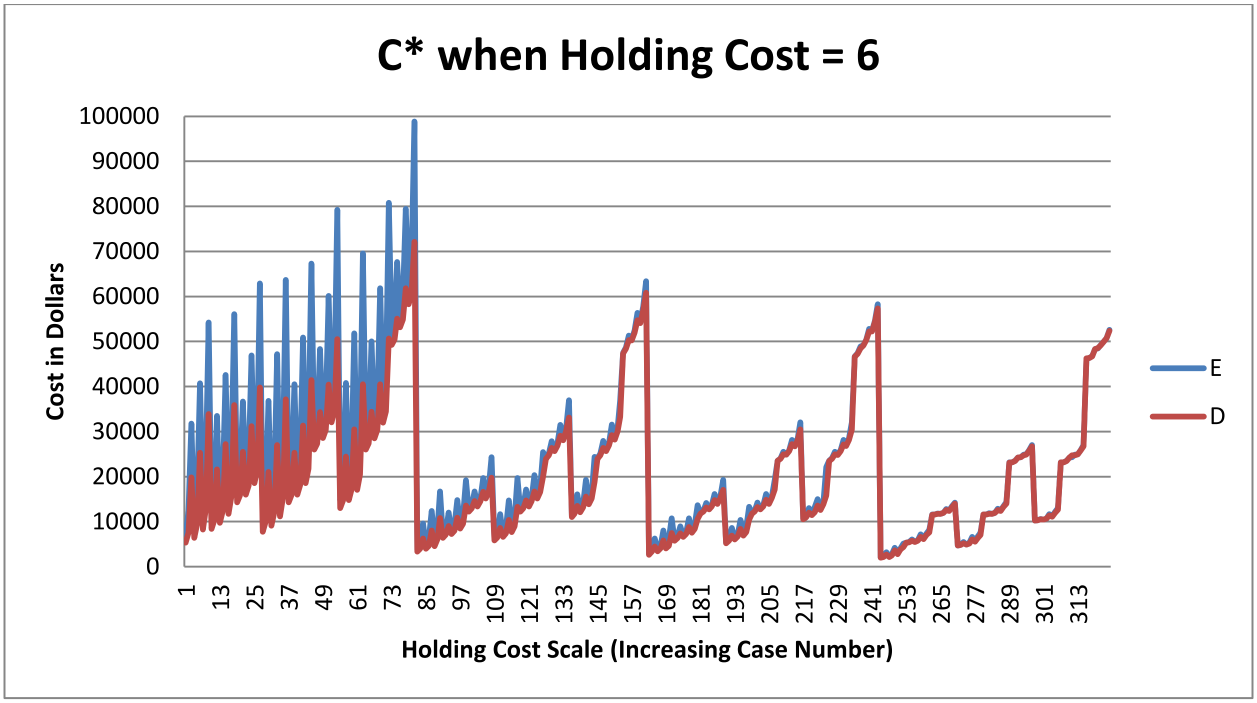


Figure 10



The next economic parameter examined was the backorder cost, p/h. In this case, there was almost no change in Q* as backorder cost increased. For this, refer to Figures 11, 12, and 13.

Figure 11

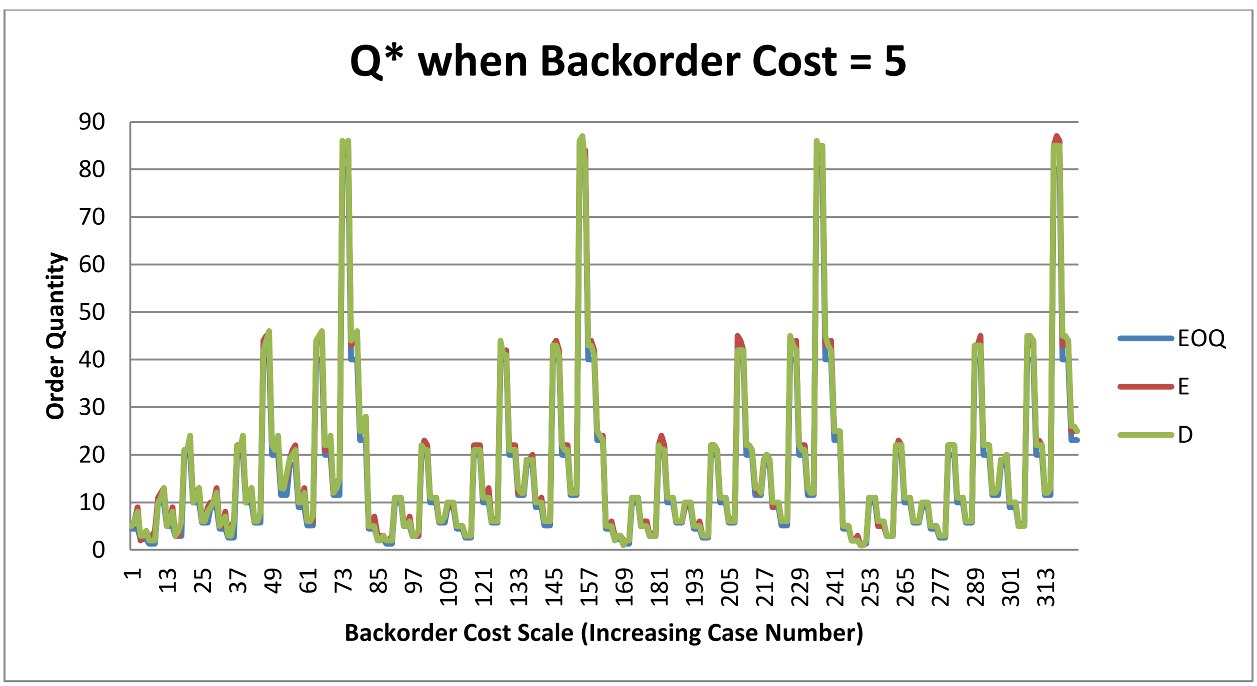


Figure 12

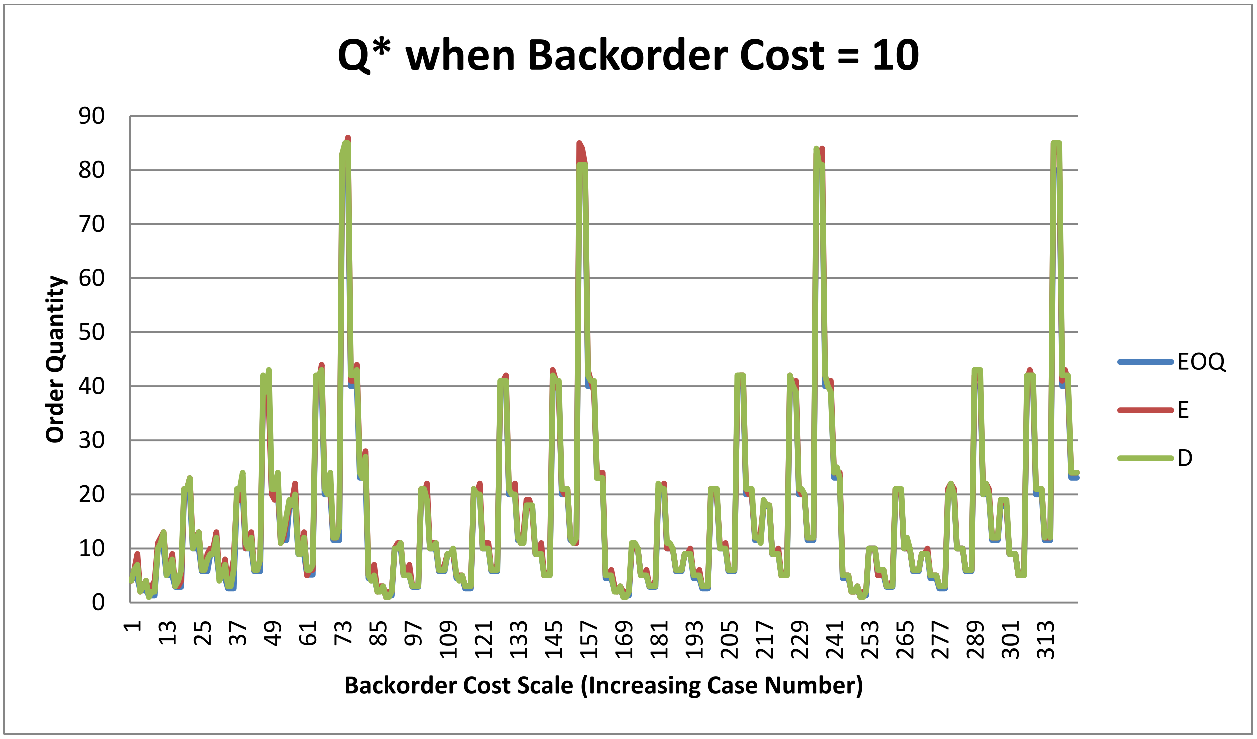
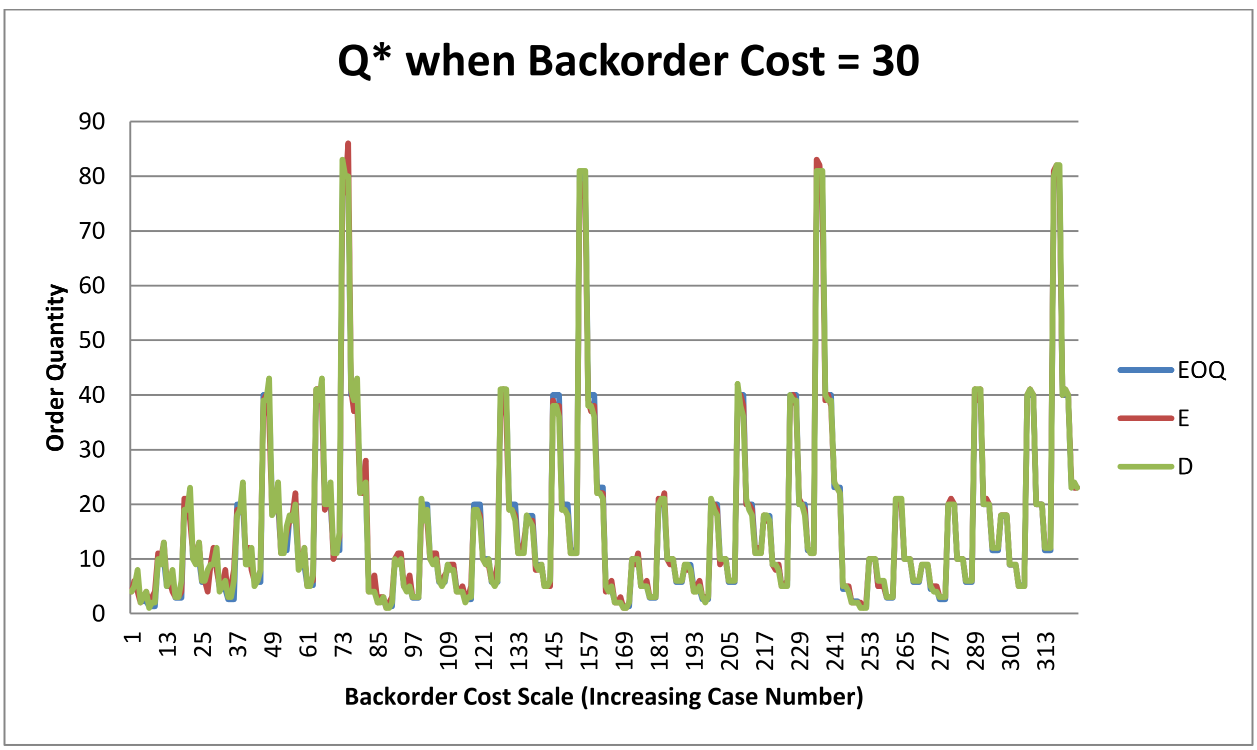


Figure 13



In terms of R*, there was a very slight increase in variability as p/h increased but no significant patterns aside from the decrease in R* as case number increased. For this, refer to Figures 14, 15, and 16.

Figure 14

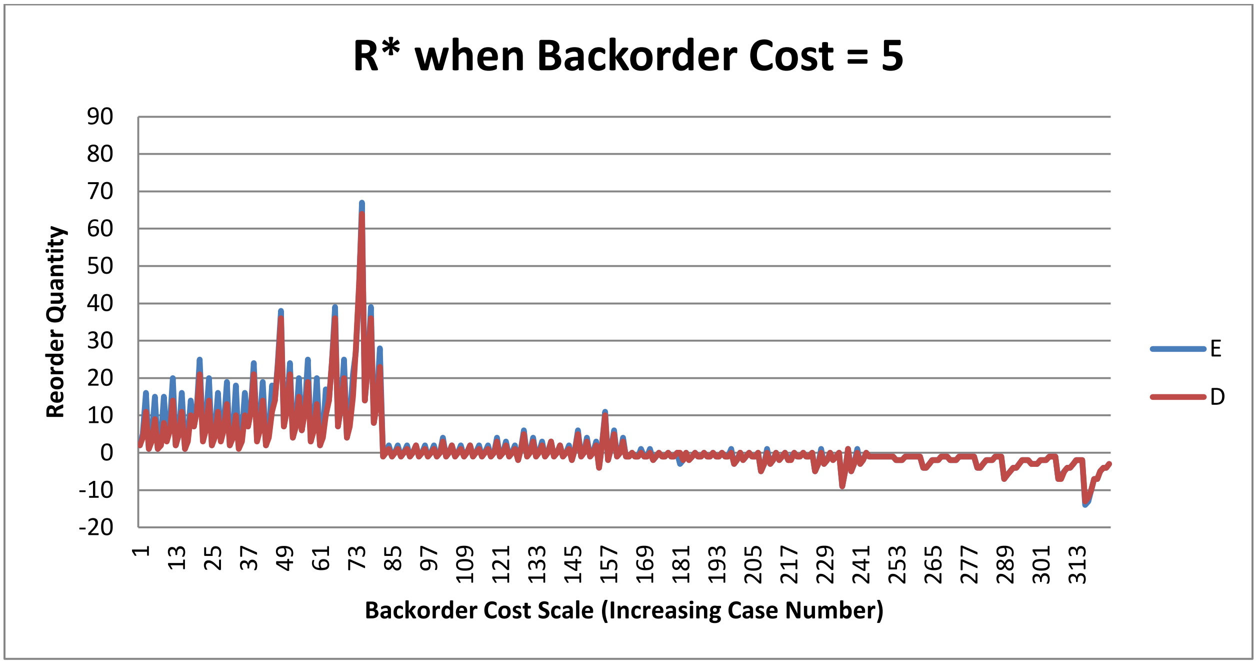


Figure 15

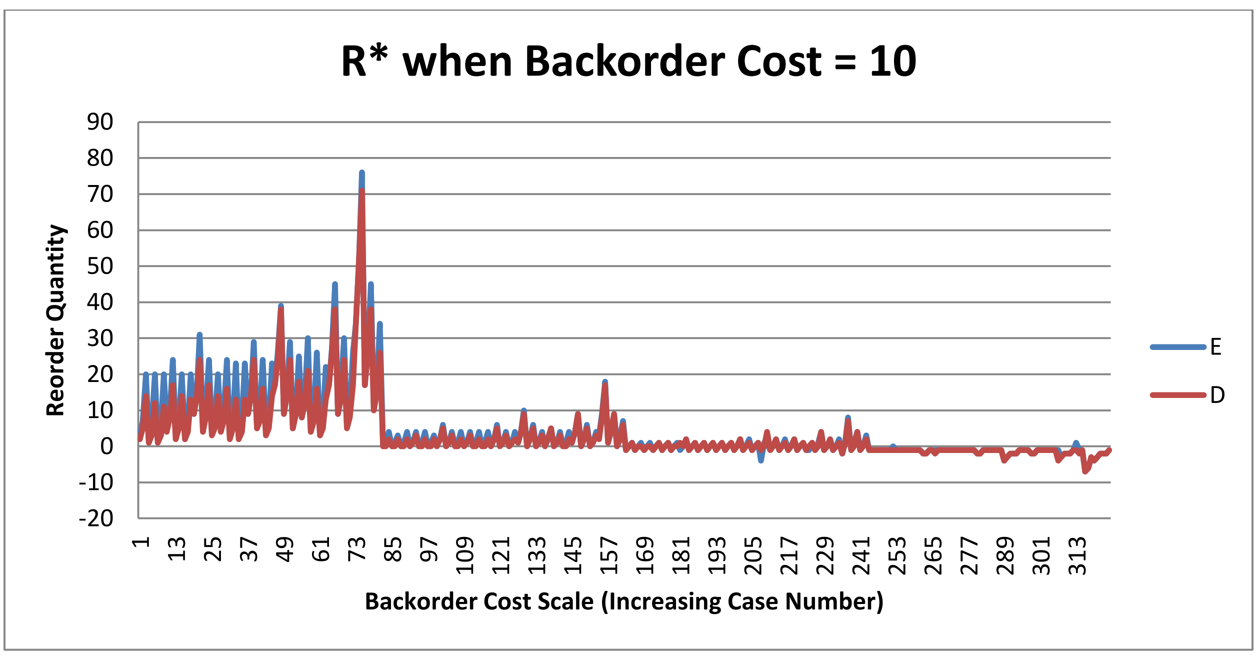
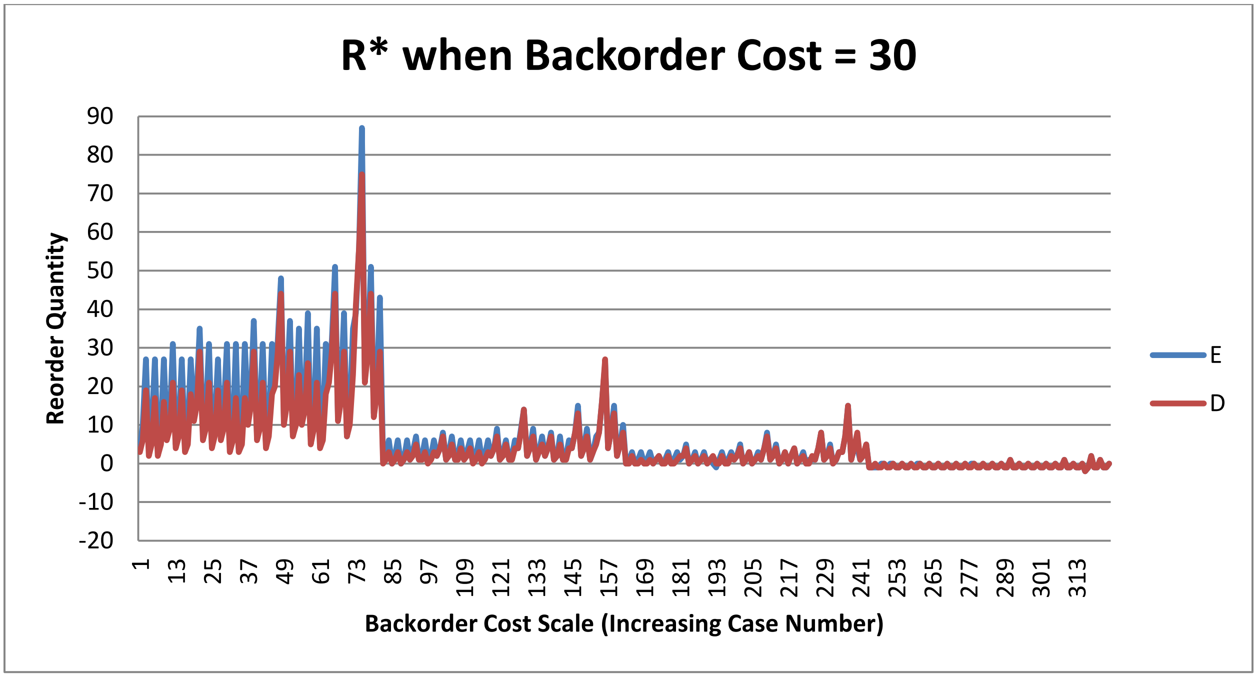


Figure 16



Just as the variability of Q* and R* were hardly affected by increasing backorder cost, the variability in total cost remains the same while the total cost slightly increases as backorder cost increases. For this, refer to Figures 17, 18, and 19.

Figure 17

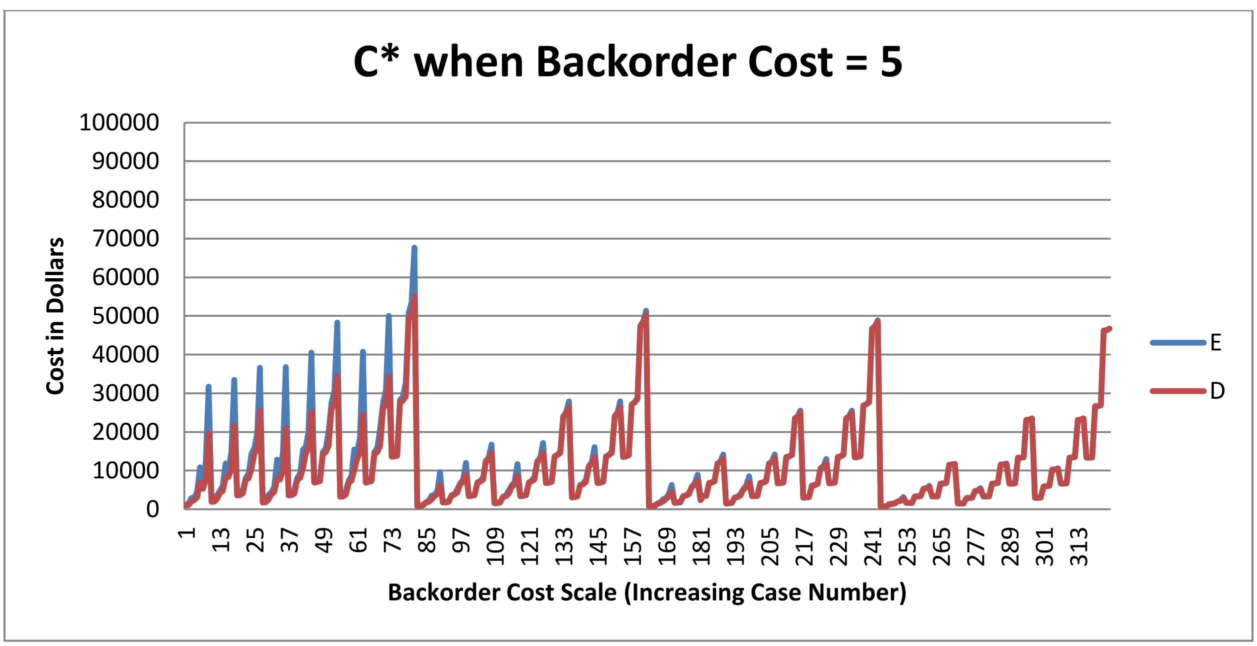


Figure 18

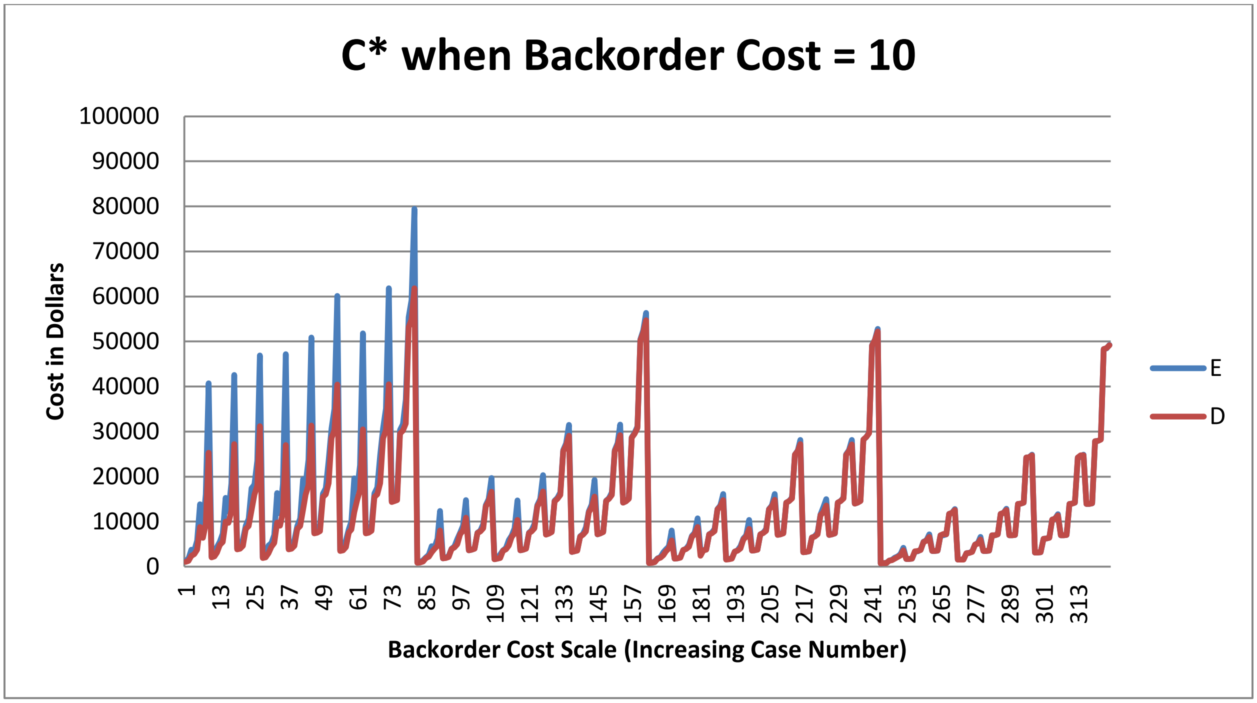
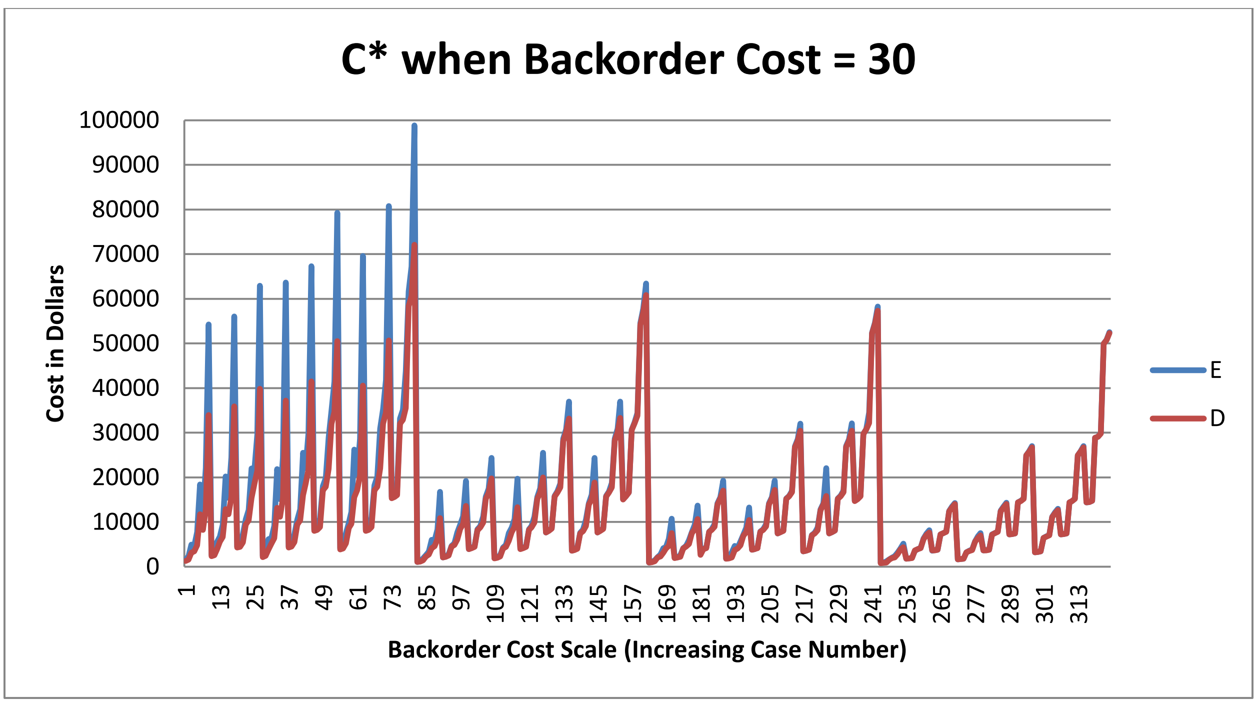


Figure 19



The final economic parameter examined was ordering cost, k. Similar to holding cost, ordering cost also followed current business knowledge. As the EOQ model predicted, as k increases, the Q* also increases. Again, although the Q* increases, the variability between the D, E, and EOQ predictions remains relatively constant as k increases, but decreases with increasing case number. For this, refer to Figures 20, 21, and 22.

Figure 20

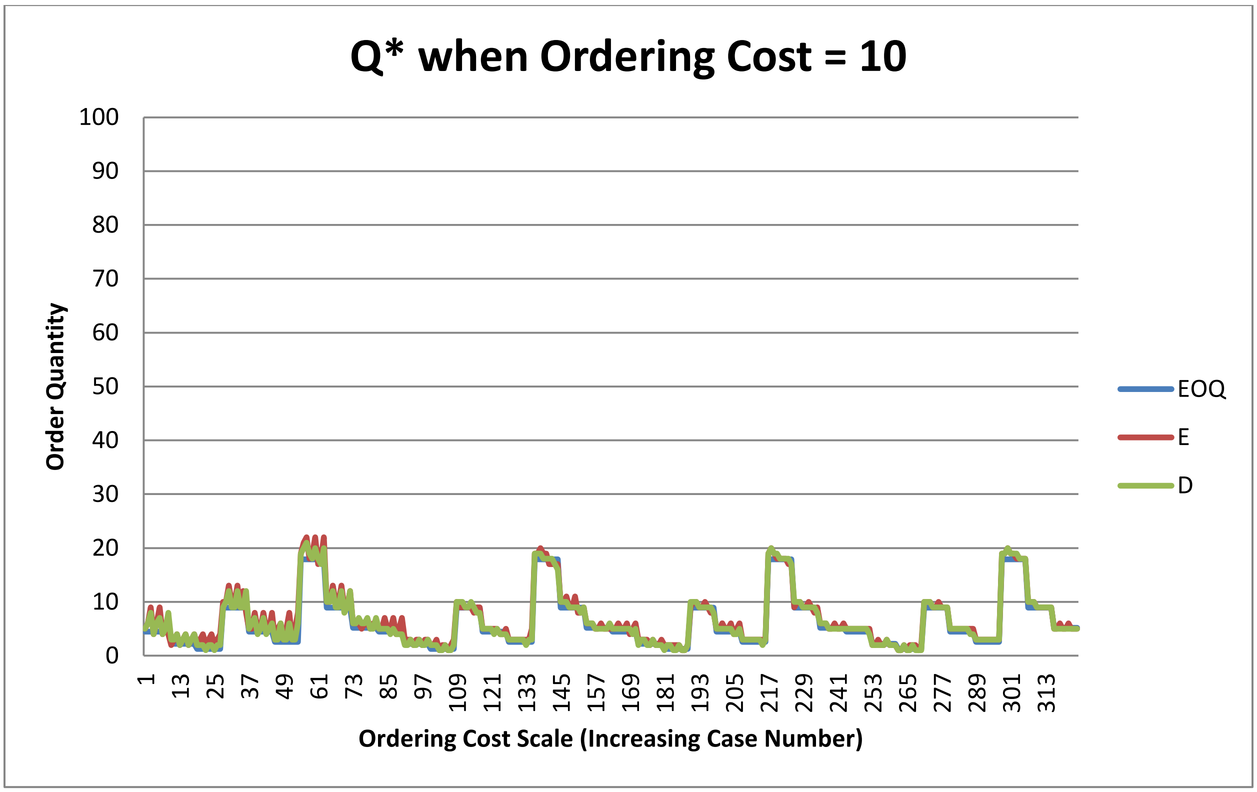


Figure 21

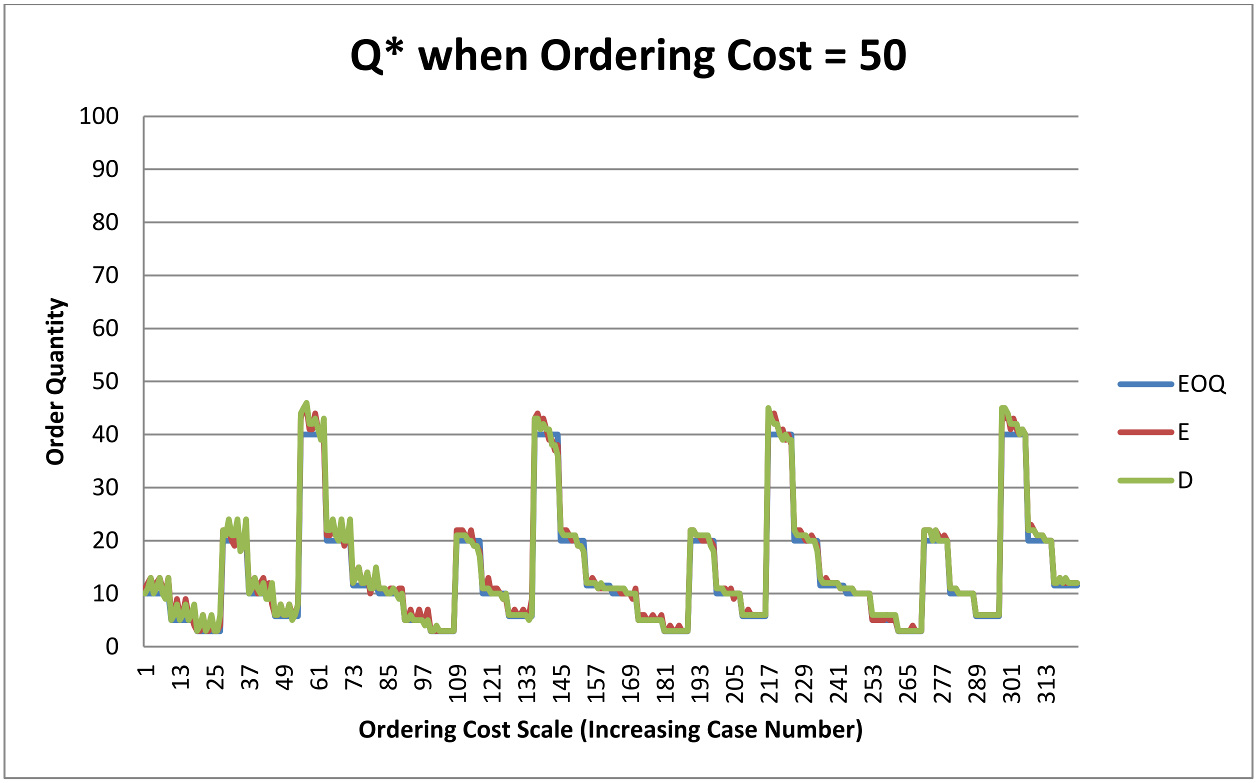
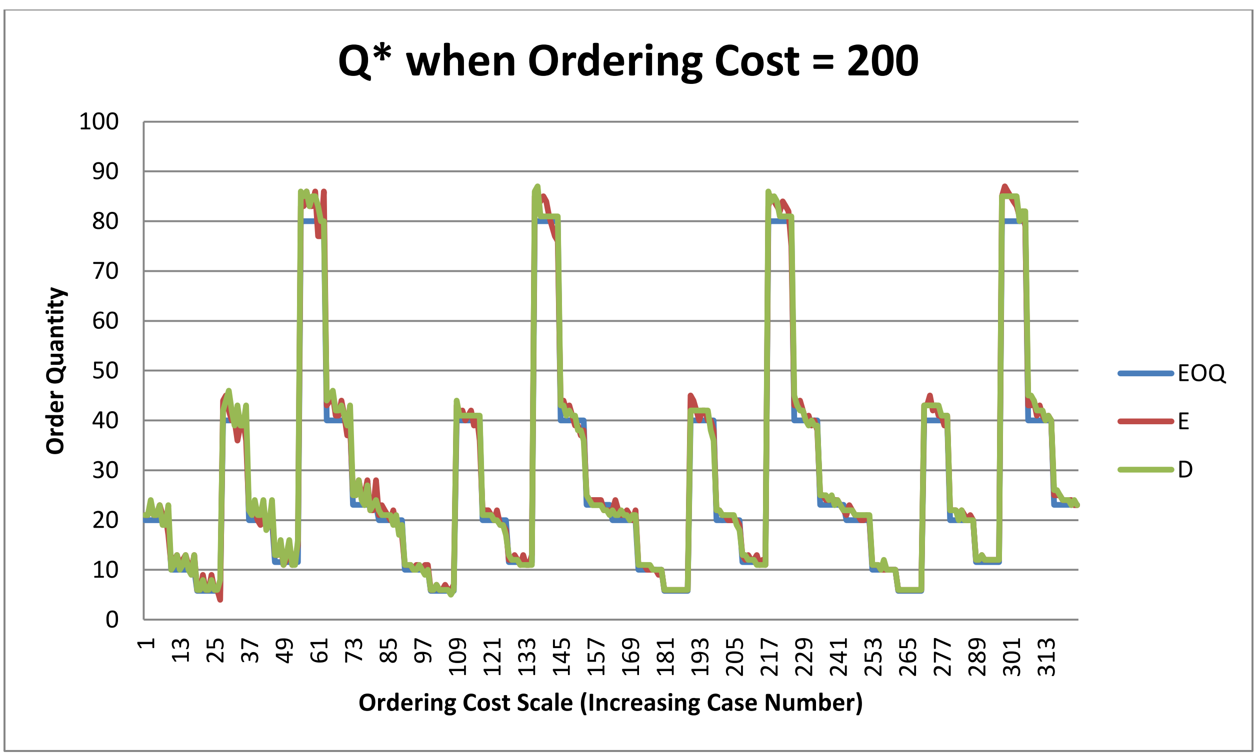


Figure 22



In terms of R*, there was a slight increase but the overall pattern remained the same. For this, refer to Figures 23, 24, and 25.

Figure 23

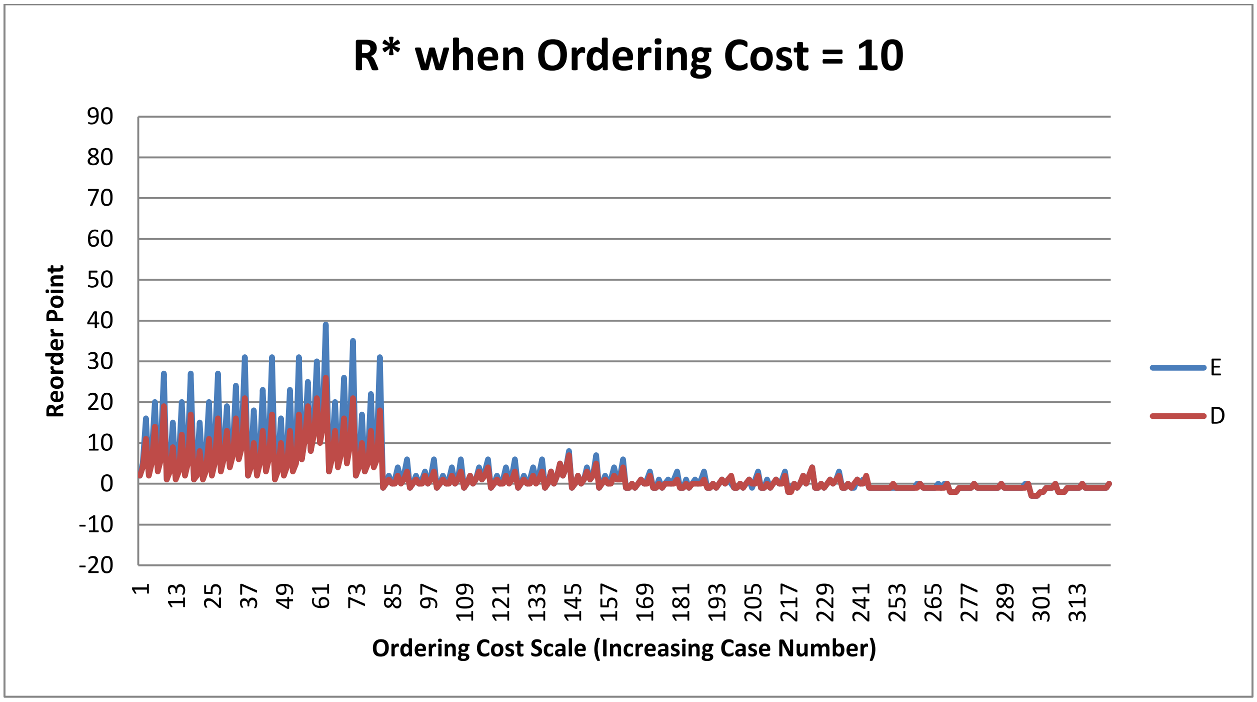


Figure 24

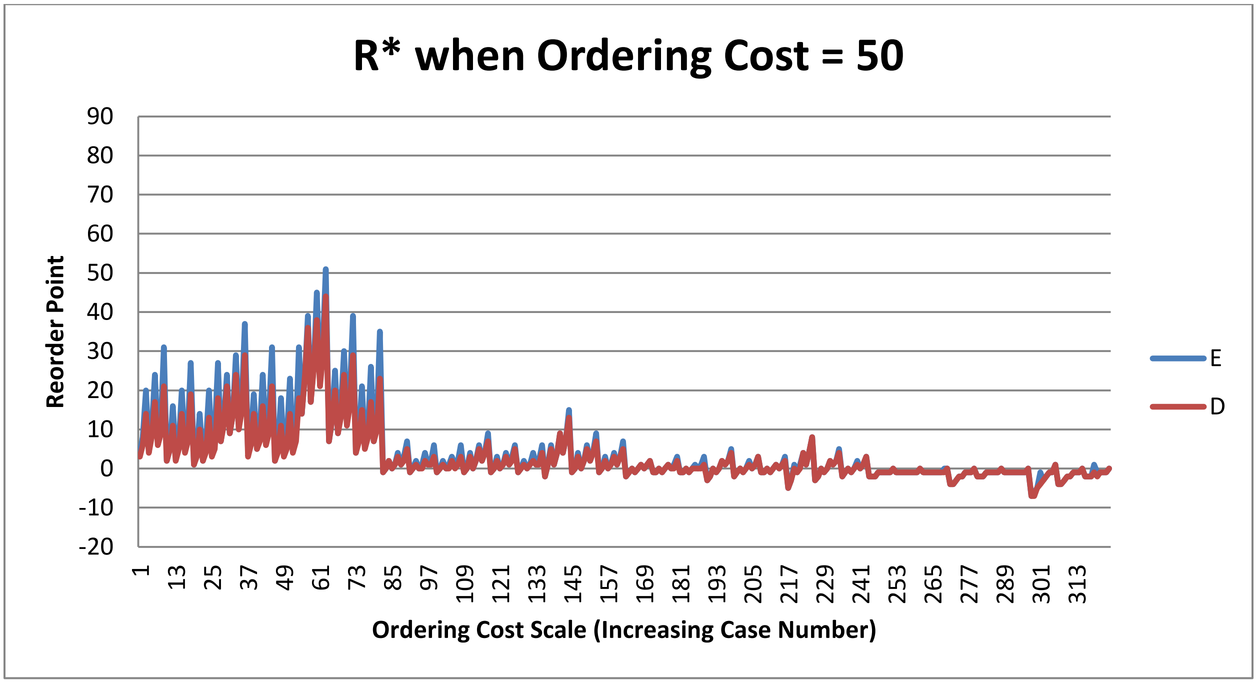
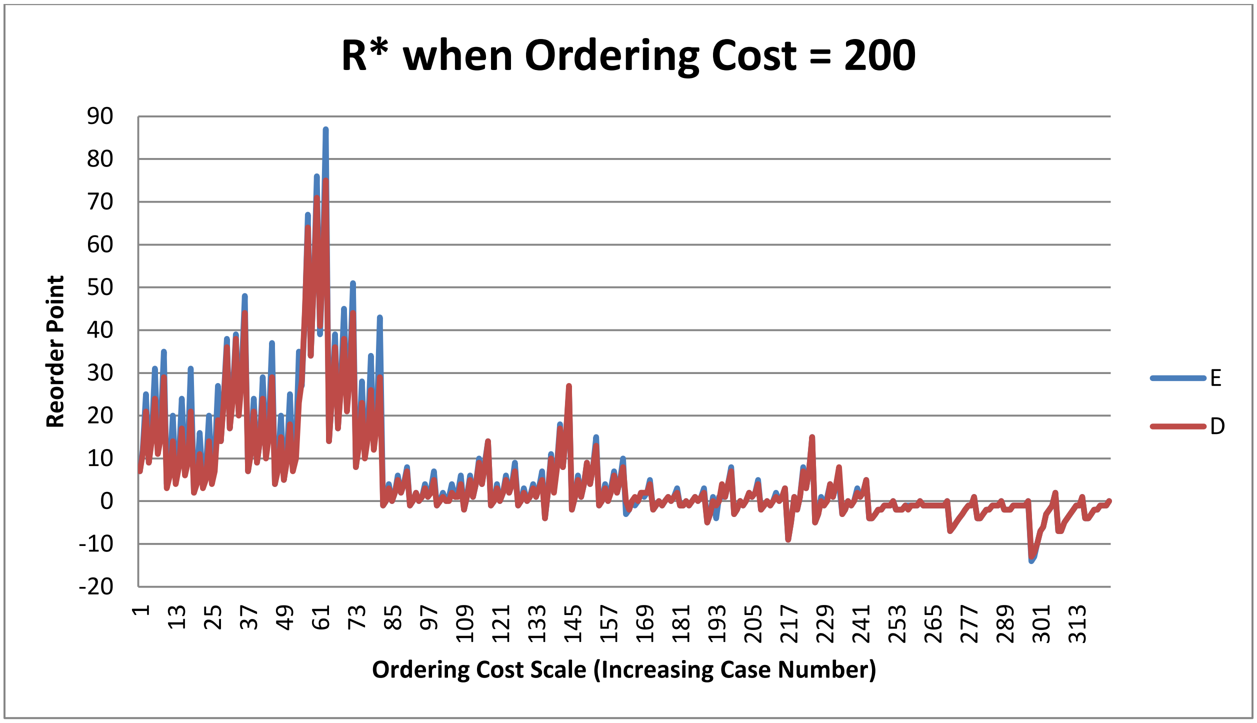


Figure 25



The parameter k's effects on total cost were similar to p/h. The total cost increases, with high variability in the first cases and decreasing variability in later cases. For this, refer to Figures 26, 27, and 28.

Figure 26

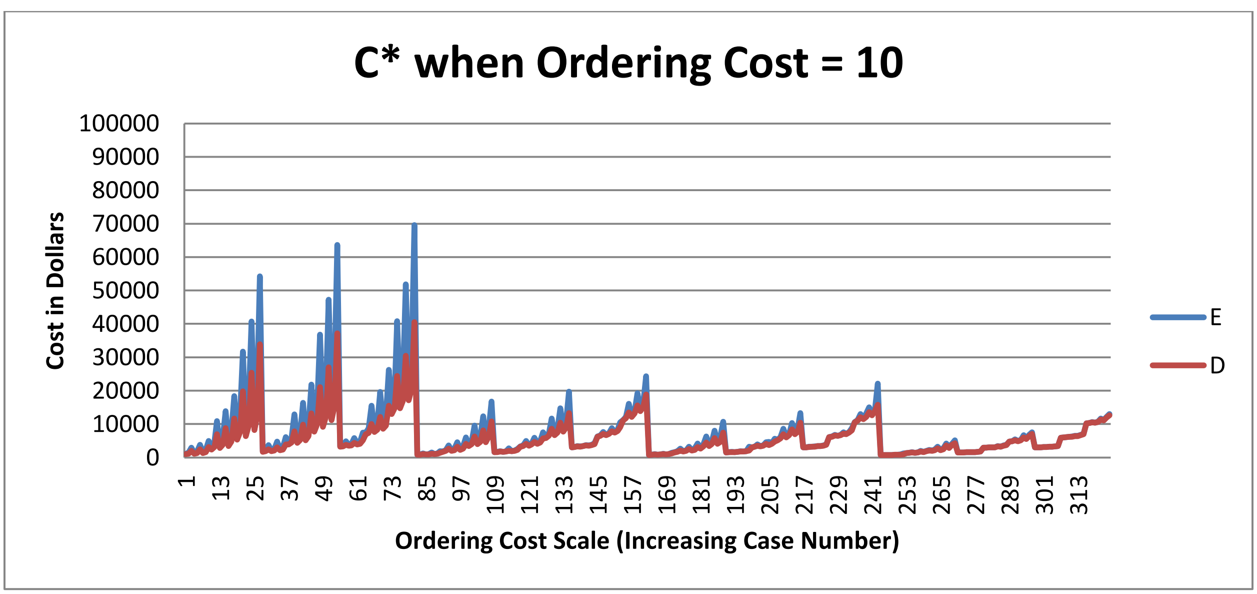


Figure 27

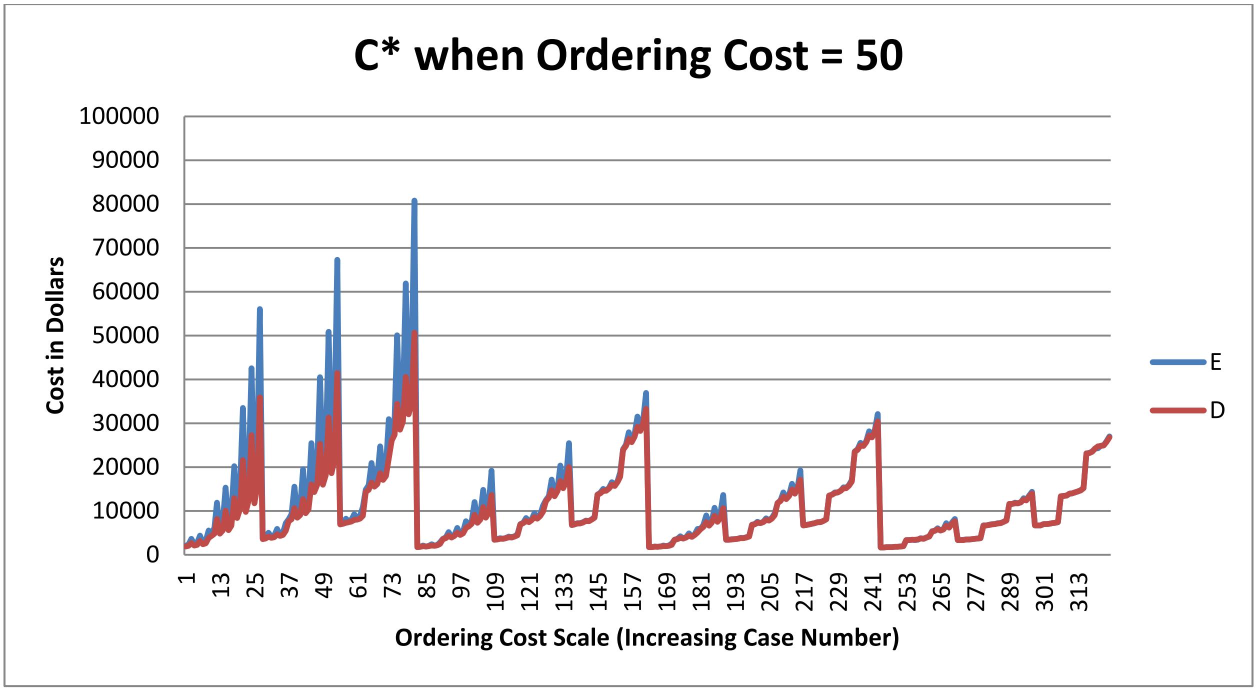
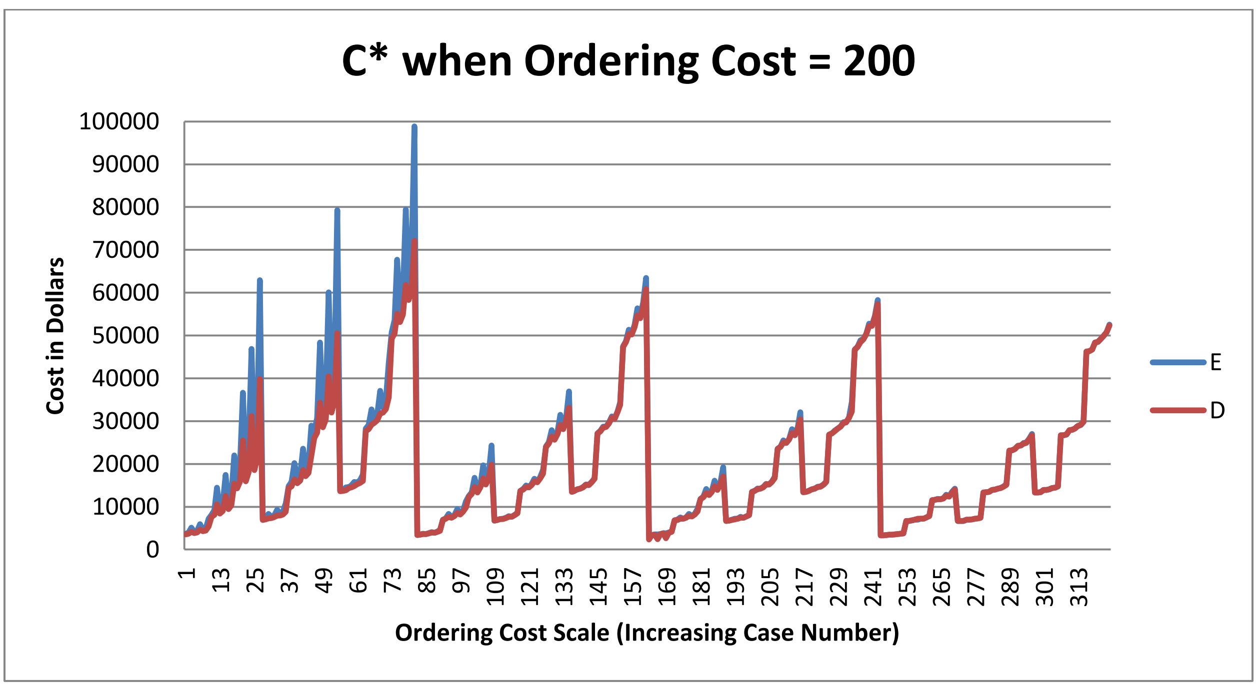


Figure 28



Operational Parameter

For the capacity utilization, ρ, Q* did not increase significantly as ρ increased. On the other hand, as ρ increased, there was more variability in the earlier cases; however, reflective of Figure 1, the variability converged as the case number increased. For this, refer to Figure 29, 30, and 31.

Figure 29

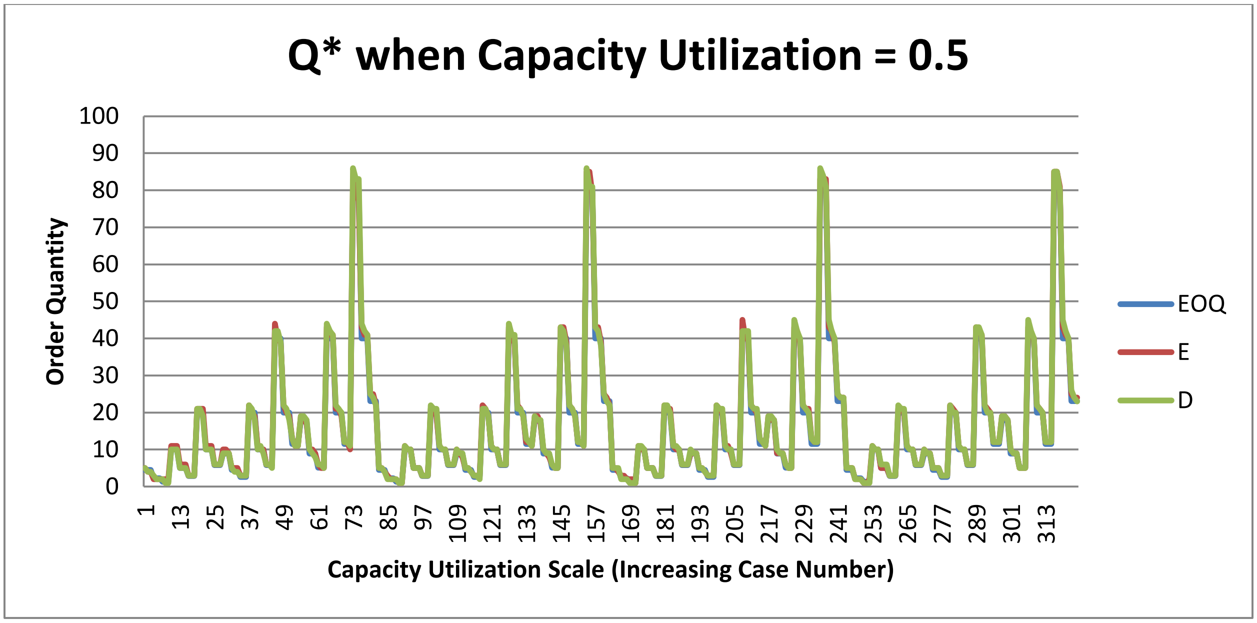


Figure 30

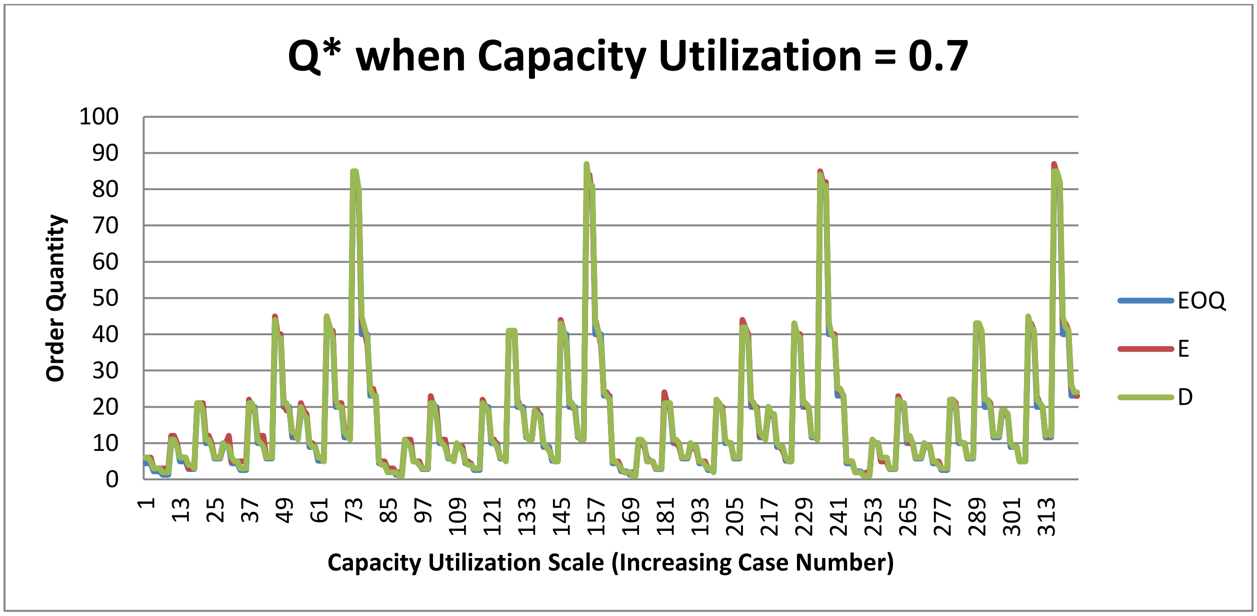
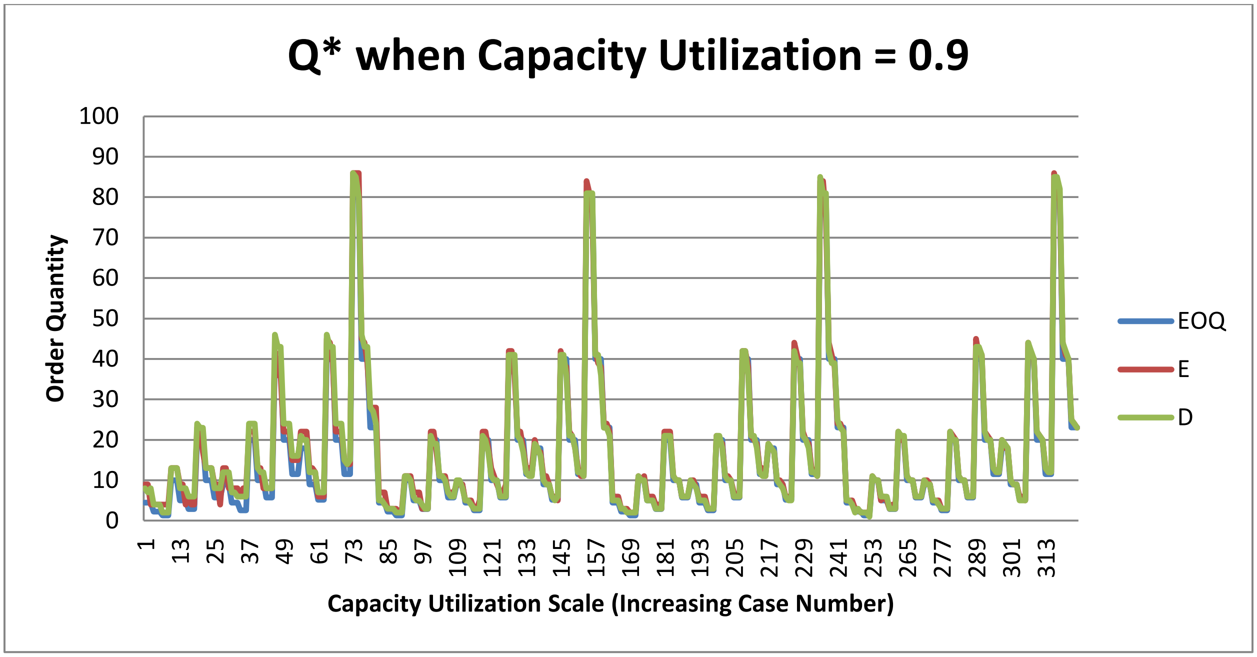


Figure 31



For R*, the variability and the R* decreased as the case number increased; however, there was a significant increase in the amount of variability in R*. For this, refer to Figures 32, 33, and 34.

Figure 32

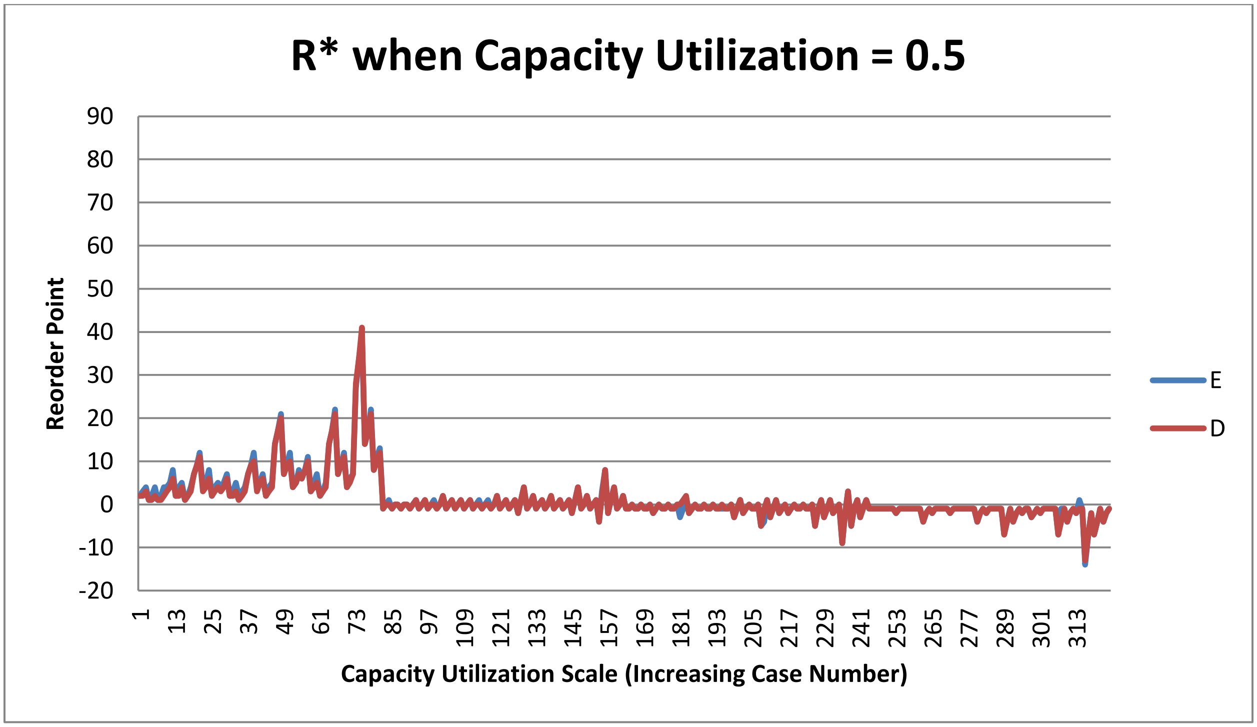


Figure 33

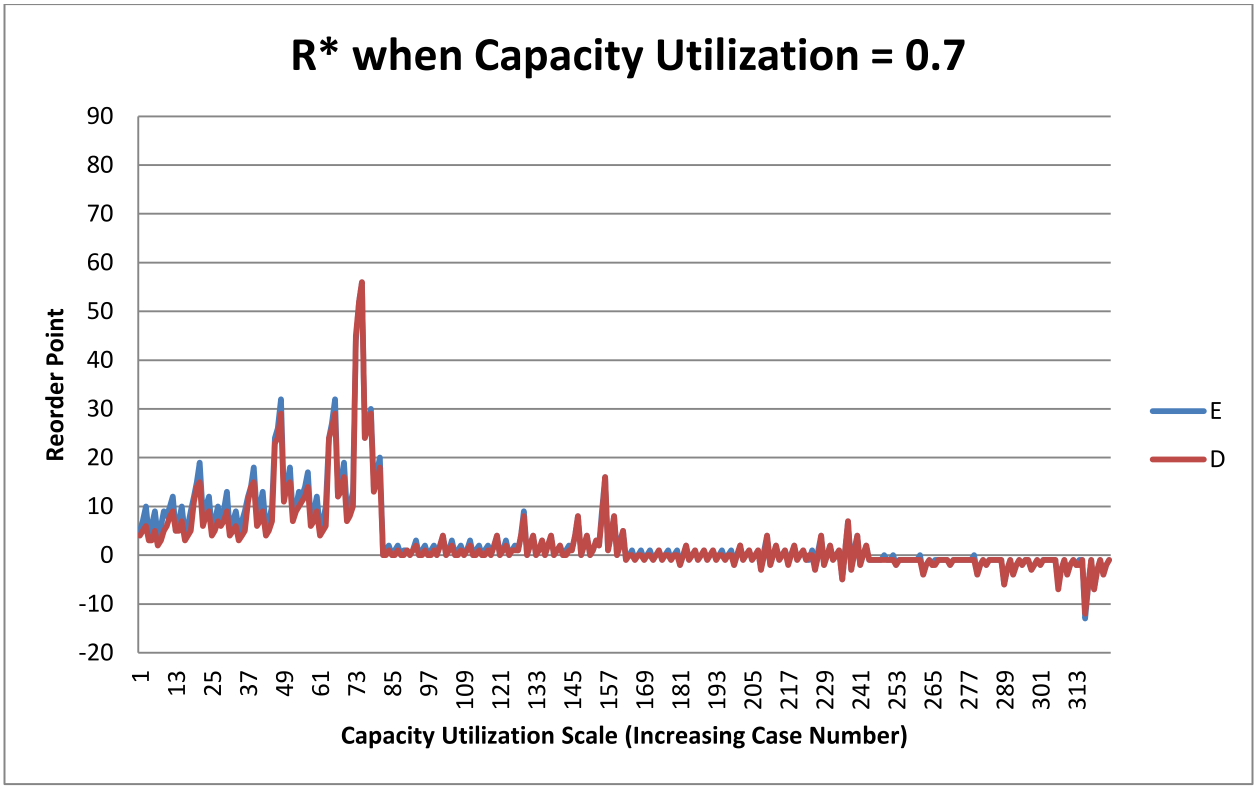
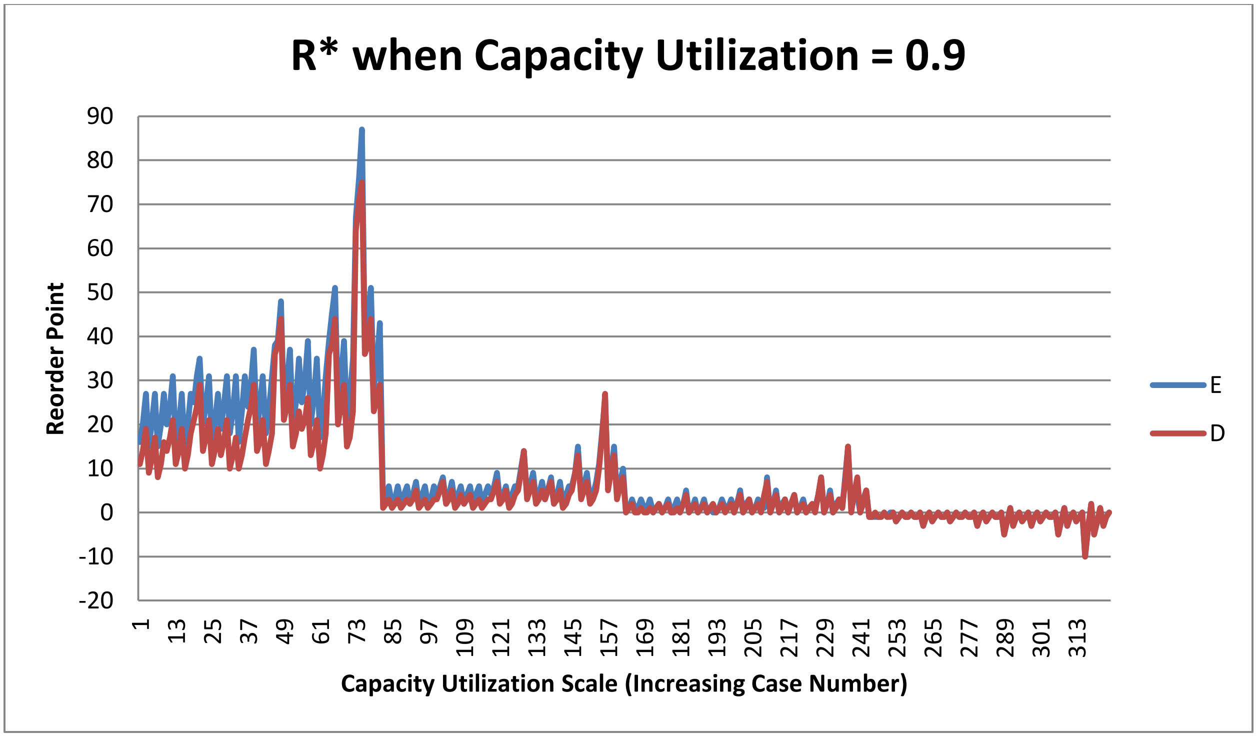


Figure 34



Similar to R*, the total cost's variability increased as ρ increased; however, unlike R*, the total cost increased as ρ increased. For this, refer to Figures 35, 36, and 37.

Figure 35

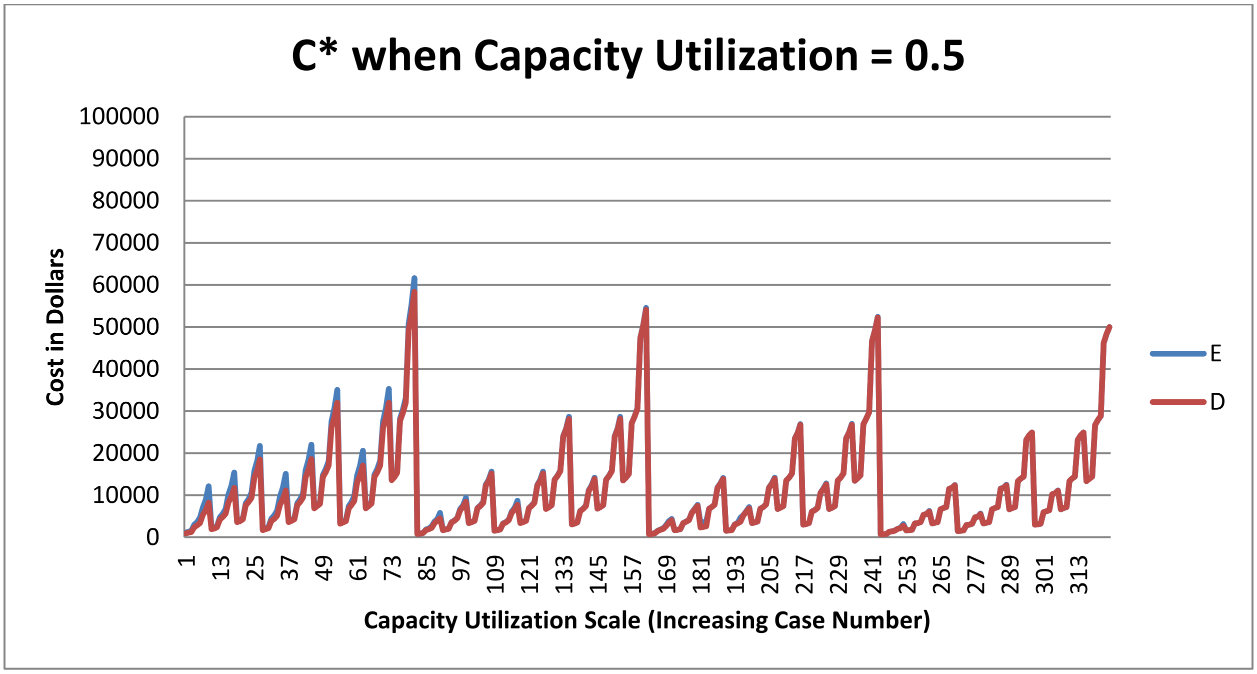


Figure 36

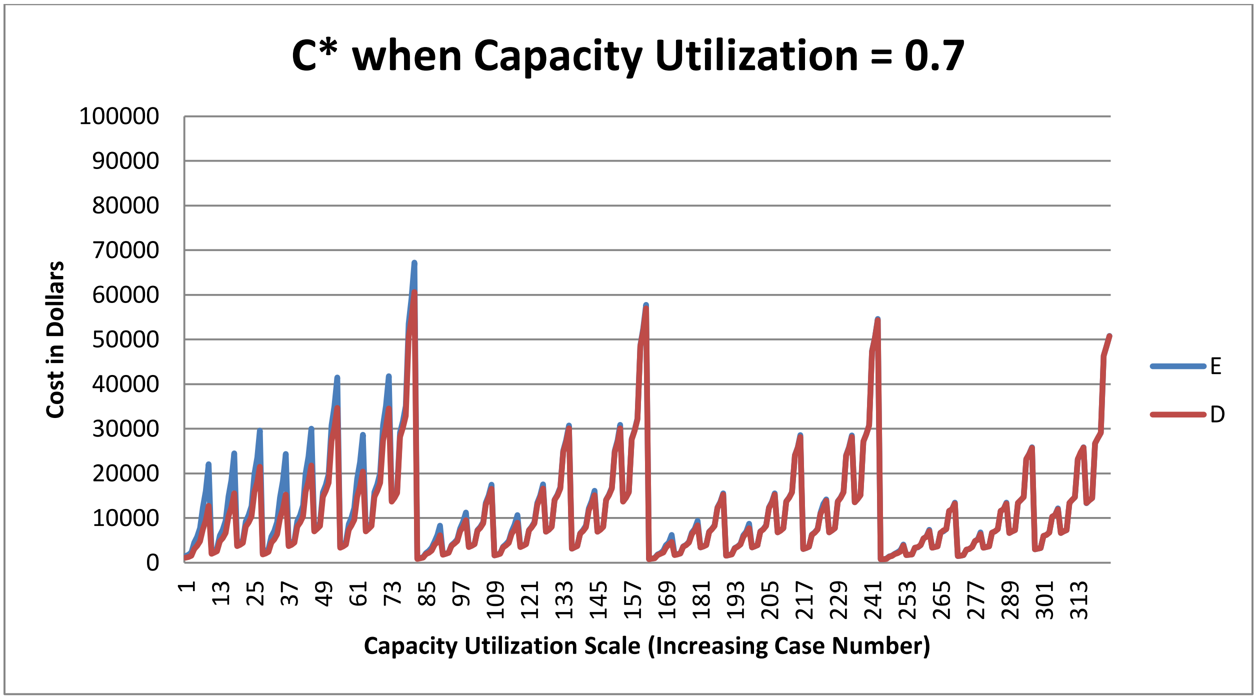
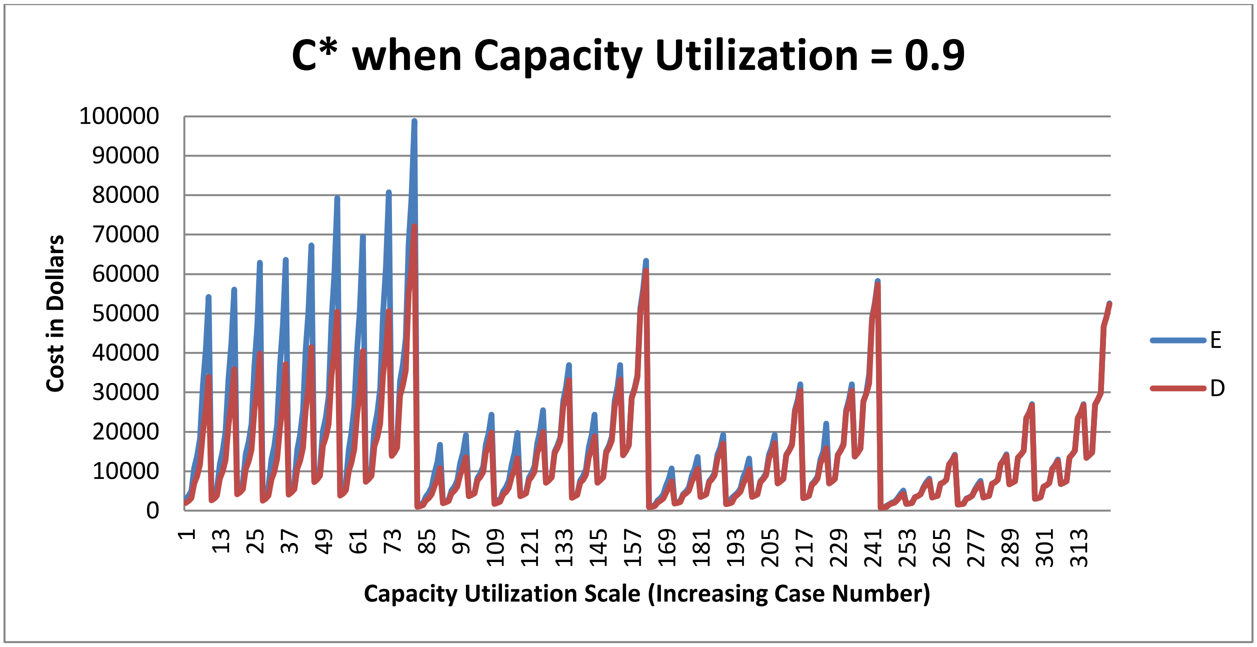


Figure 37



Market Parameters

For Q*, the average demand rate, λ, behaves similarly to ordering cost, such that the Q* increases as λ increases, but the variability between D, E, and EOQ does not change much from changing λ. For this, refer to Figures 38, 39, and 40.

Figure 38

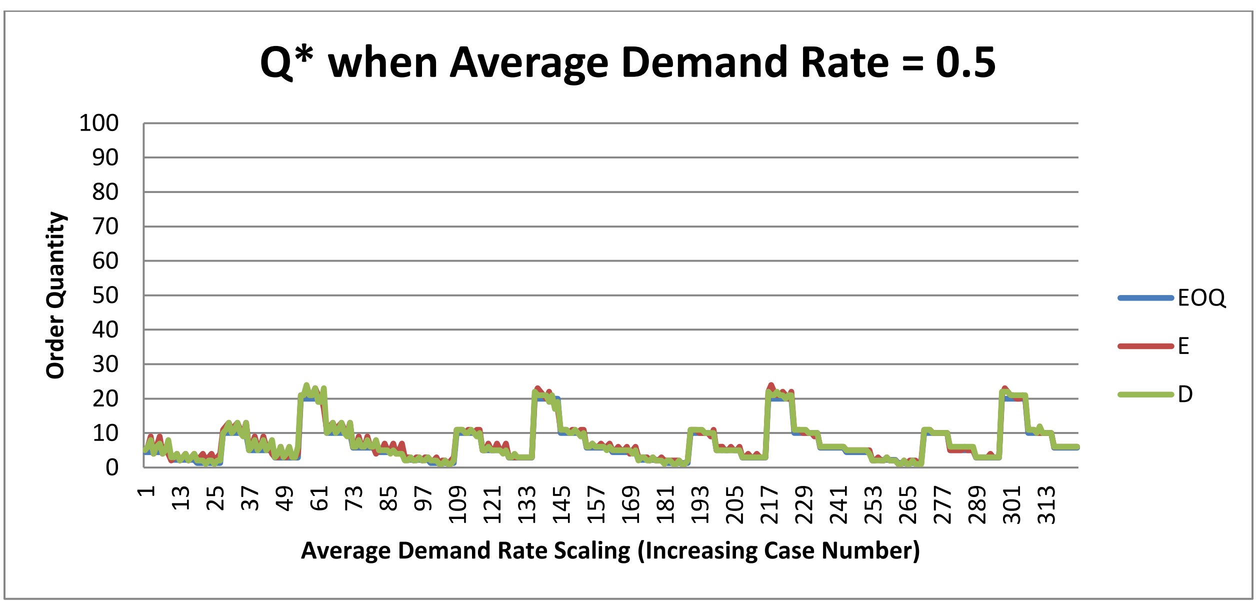


Figure 39

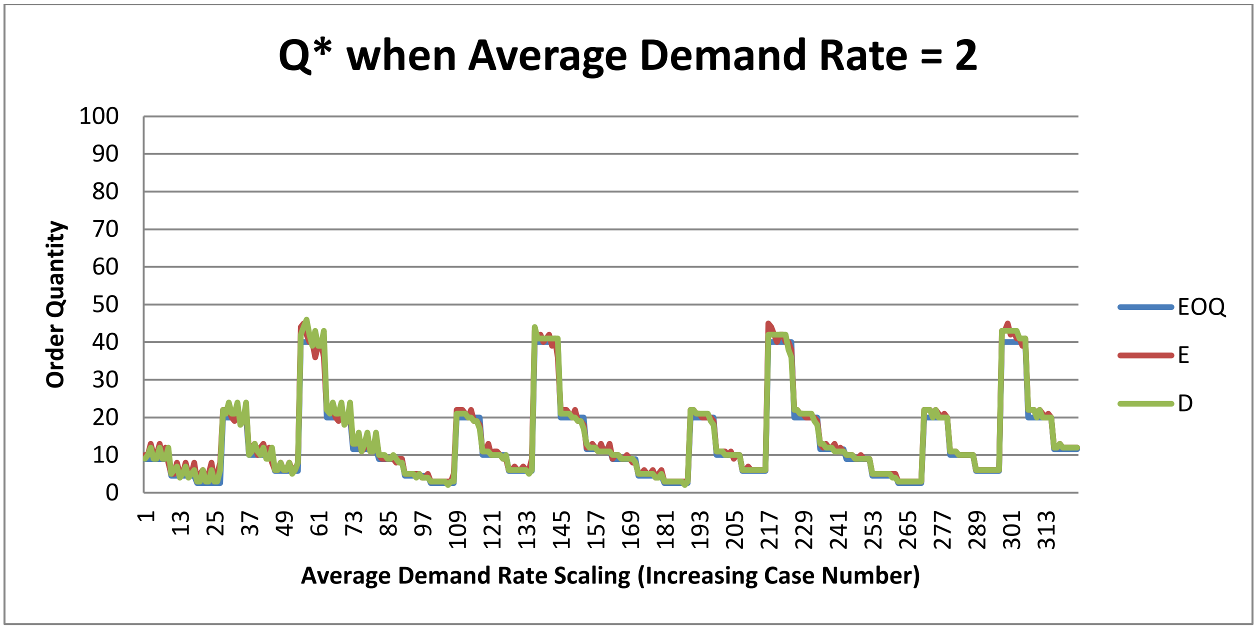
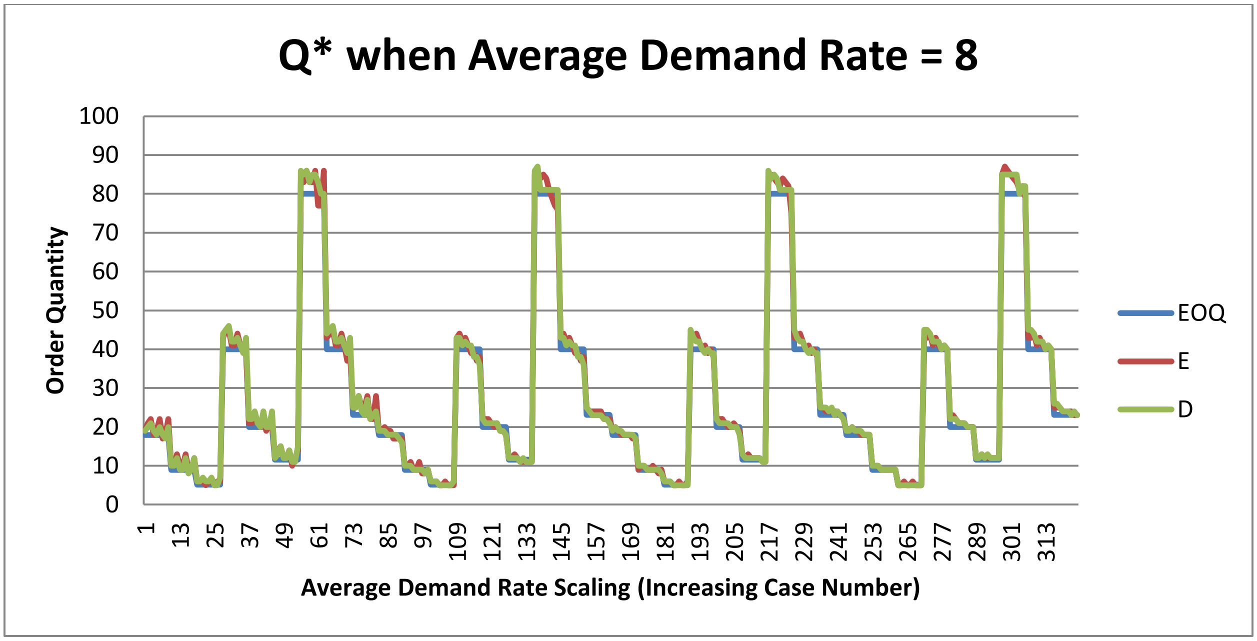


Figure 40



R* does increase slightly as λ increases, but the difference between the D and E predictions stay about the same. The pattern of convergence repeats. For this, refer to Figures 41, 42, and 43.

Figure 41

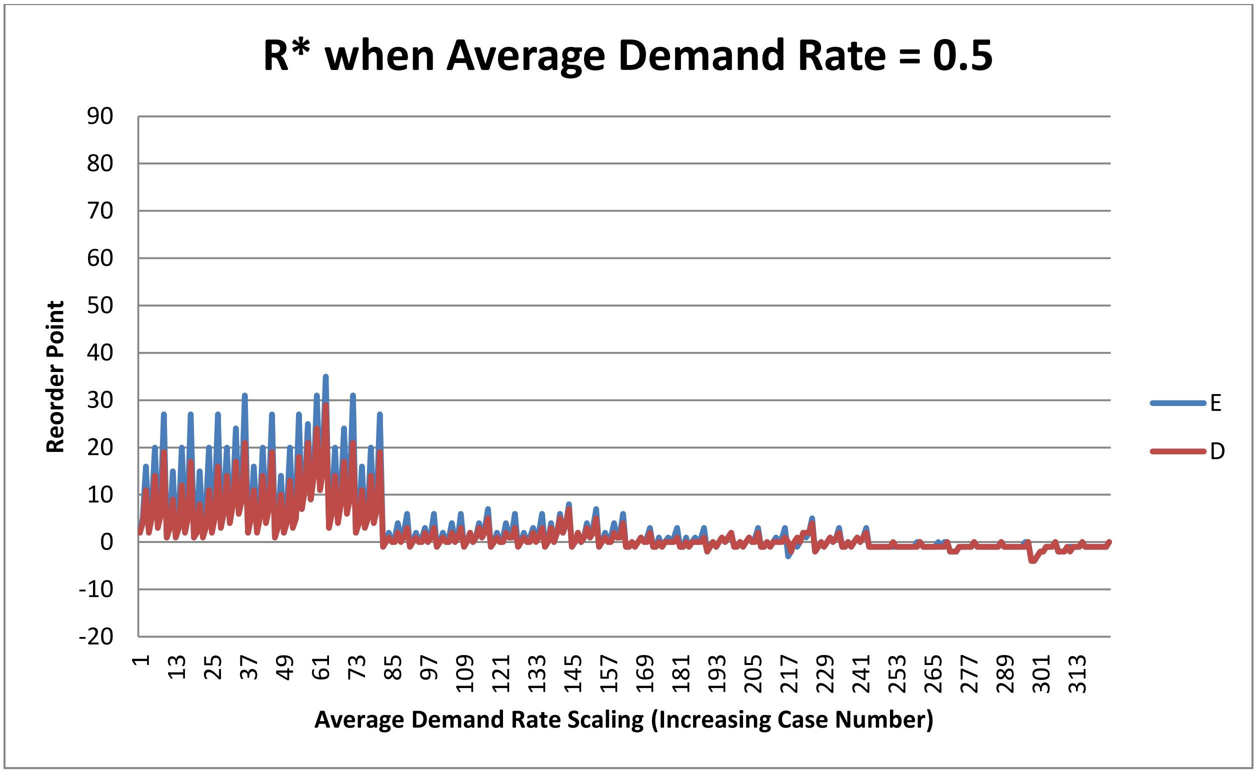


Figure 42

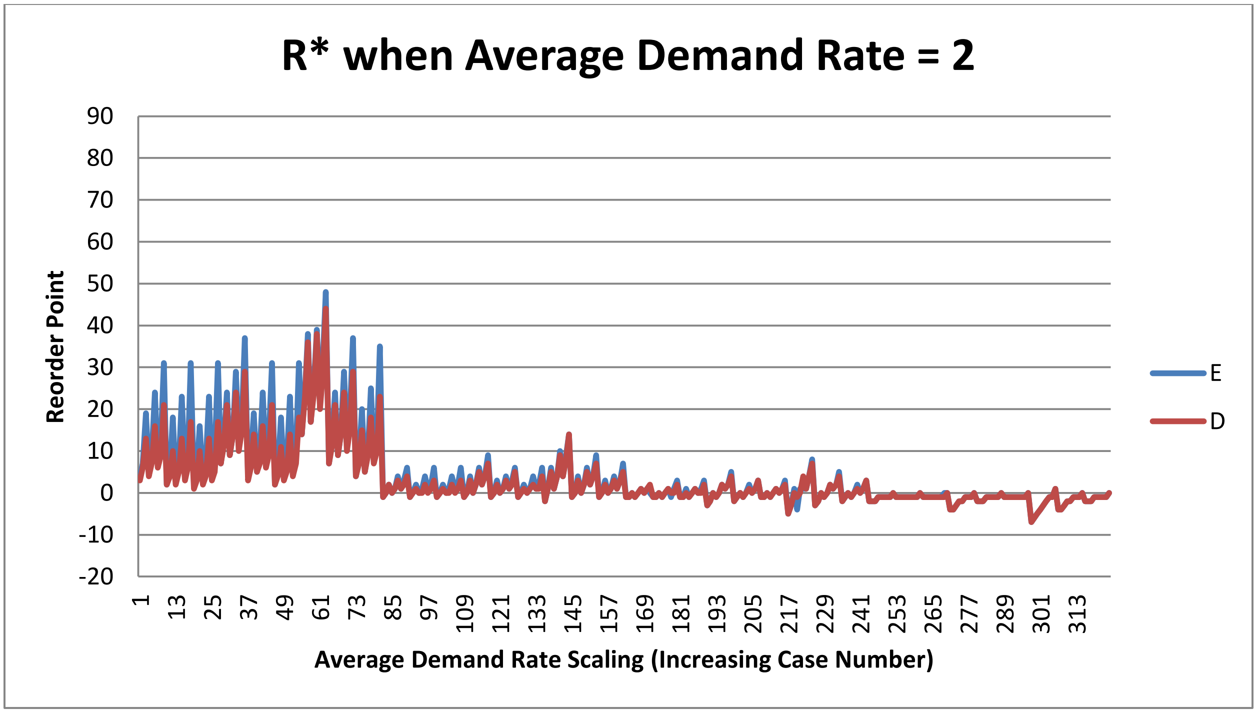
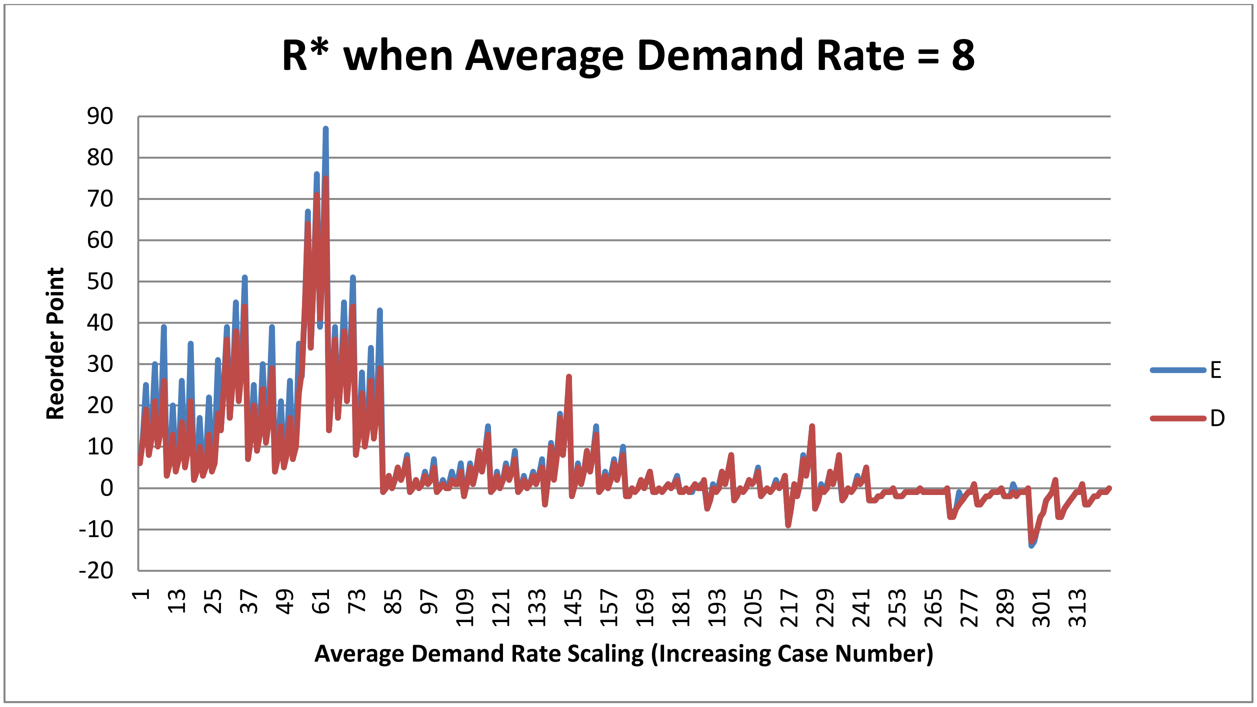


Figure 43



Similar to R*, the total cost increases as λ increases, but the variability is consistent. For this, refer to Figures 44, 45, and 46.

Figure 44

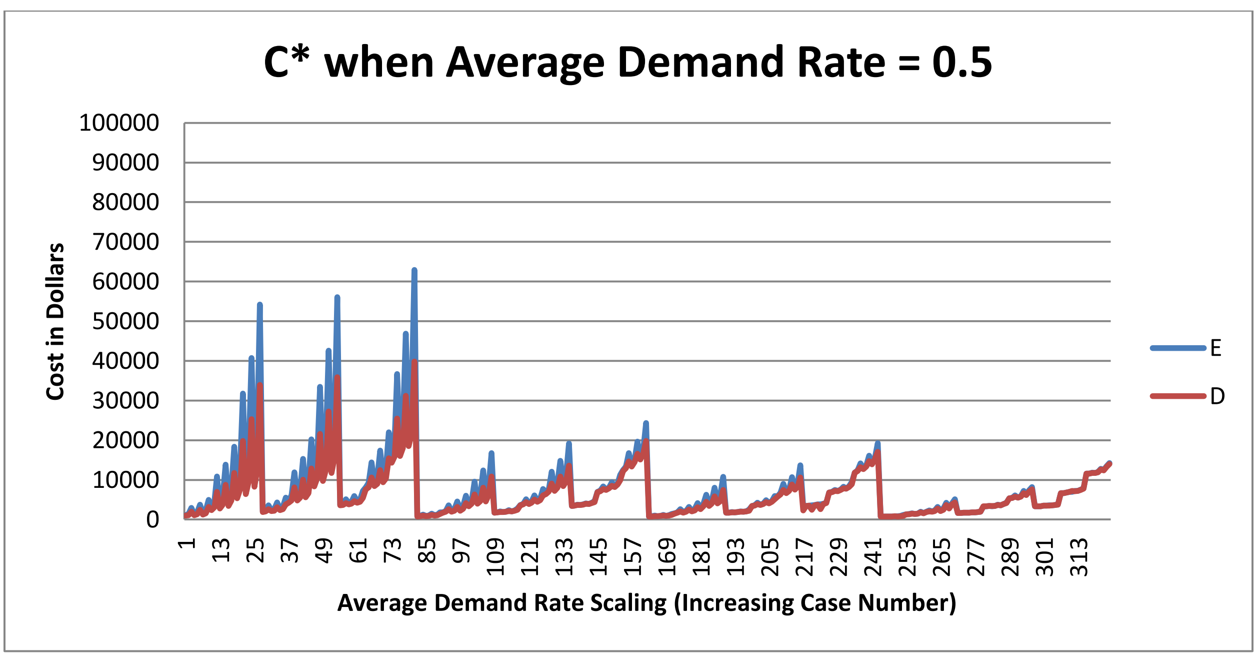


Figure 45

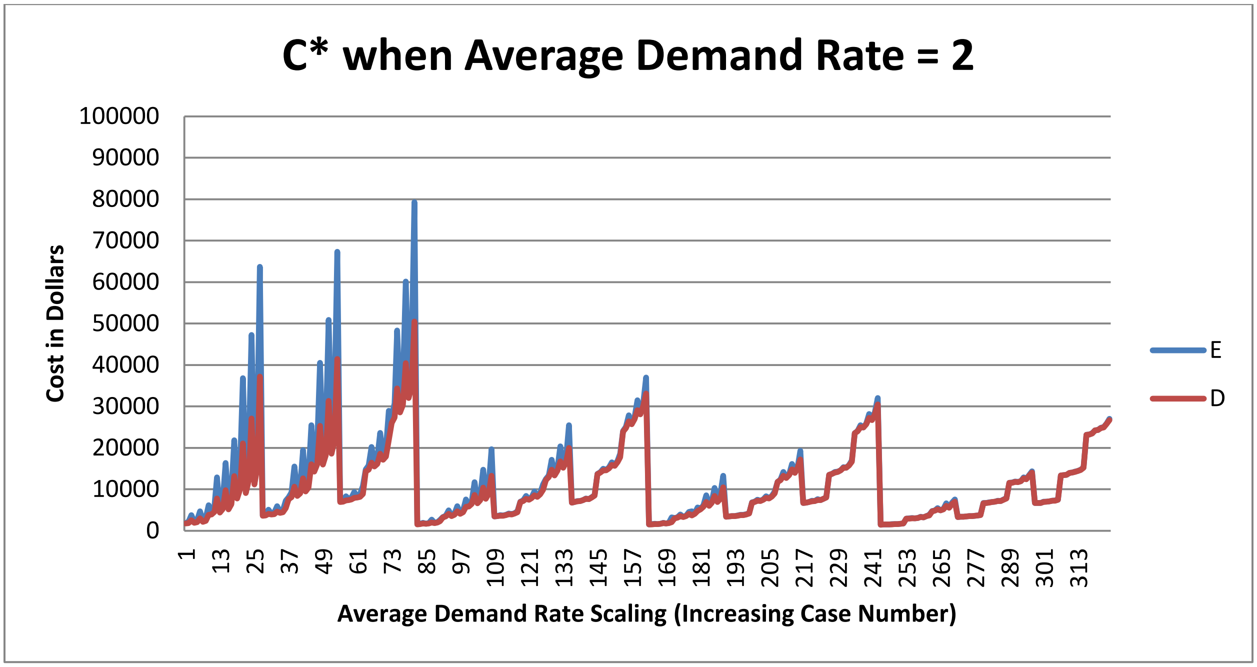
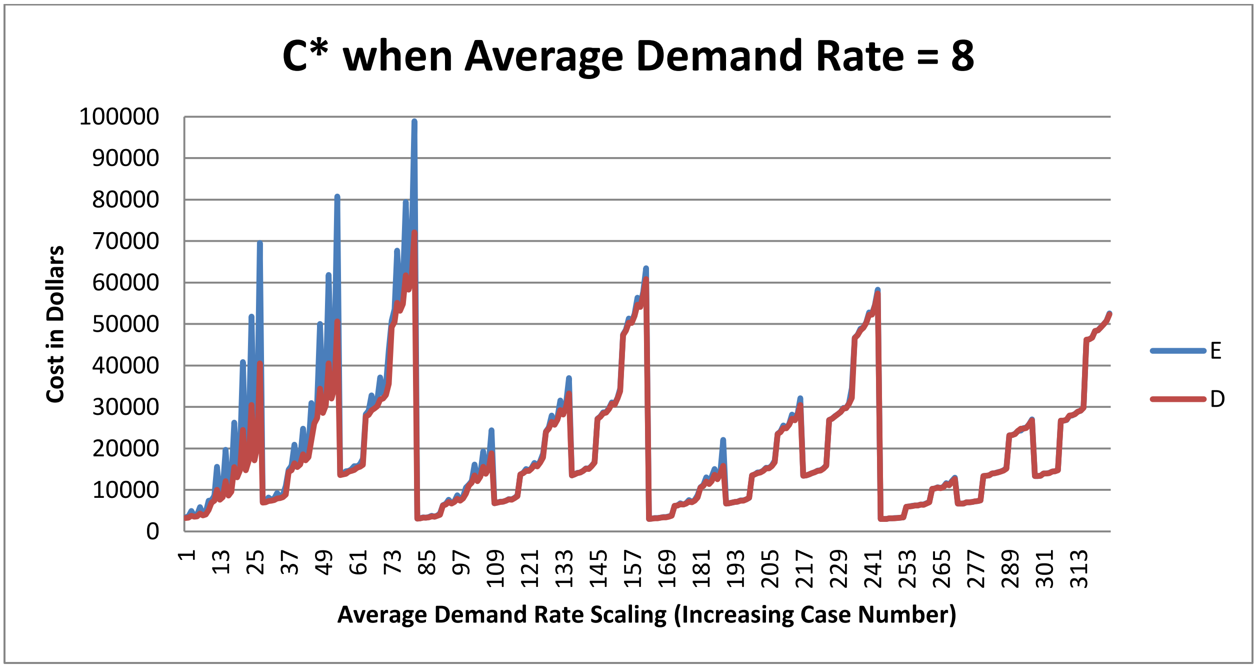


Figure 46



For the number of homogenous products, n, the Q stays approximately the same as n increases, but the variability decreases. This is reflective of Figure 1, where the difference between costs converges at higher case numbers. For this, refer to Figures 47, 48, 49, and 50.

Figure 47

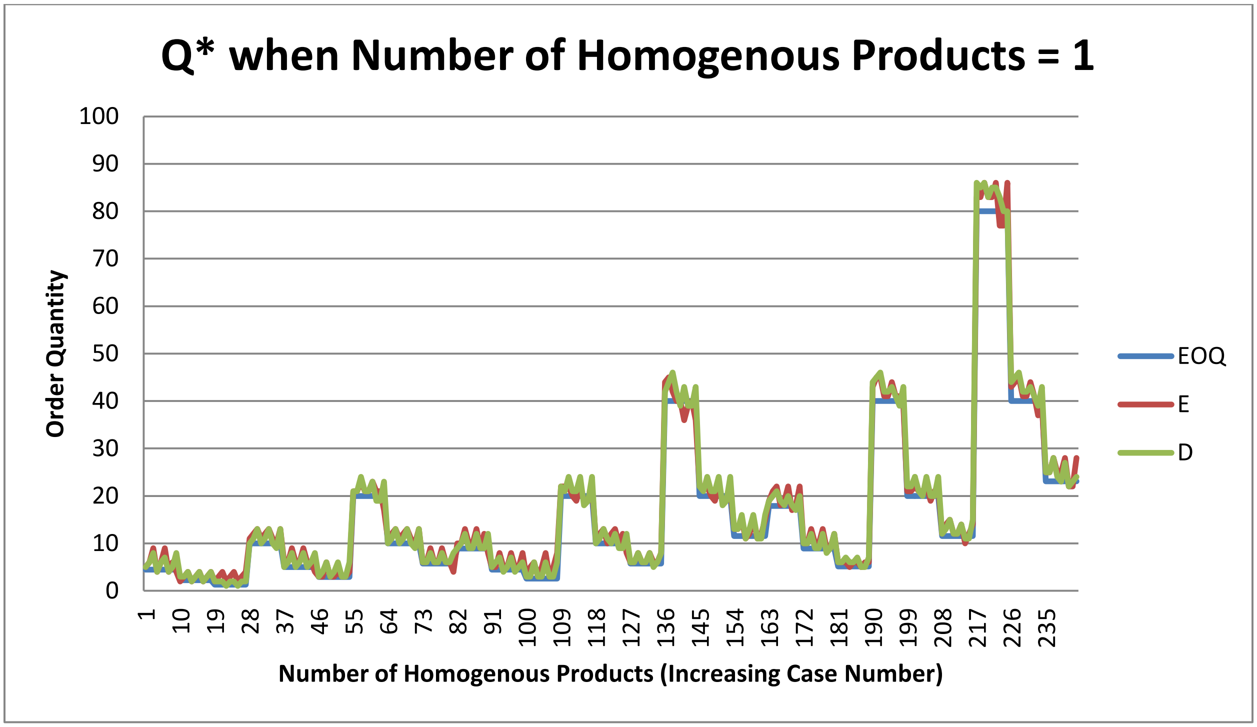


Figure 48

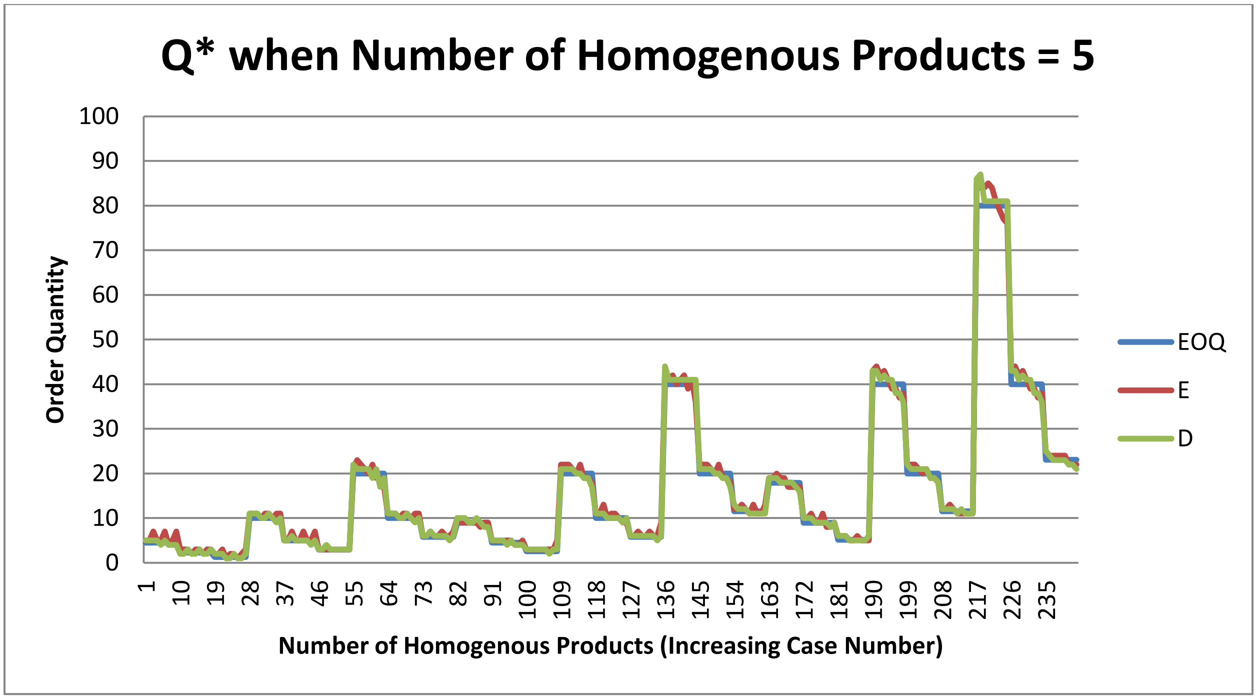


Figure 49

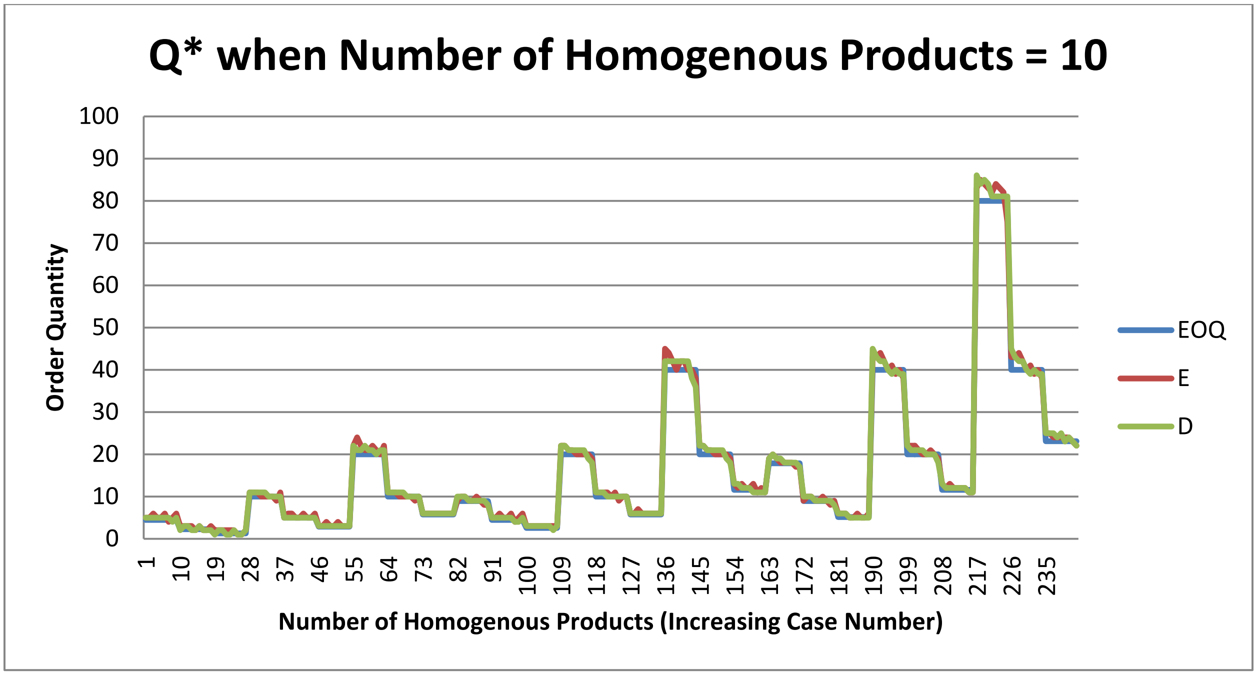
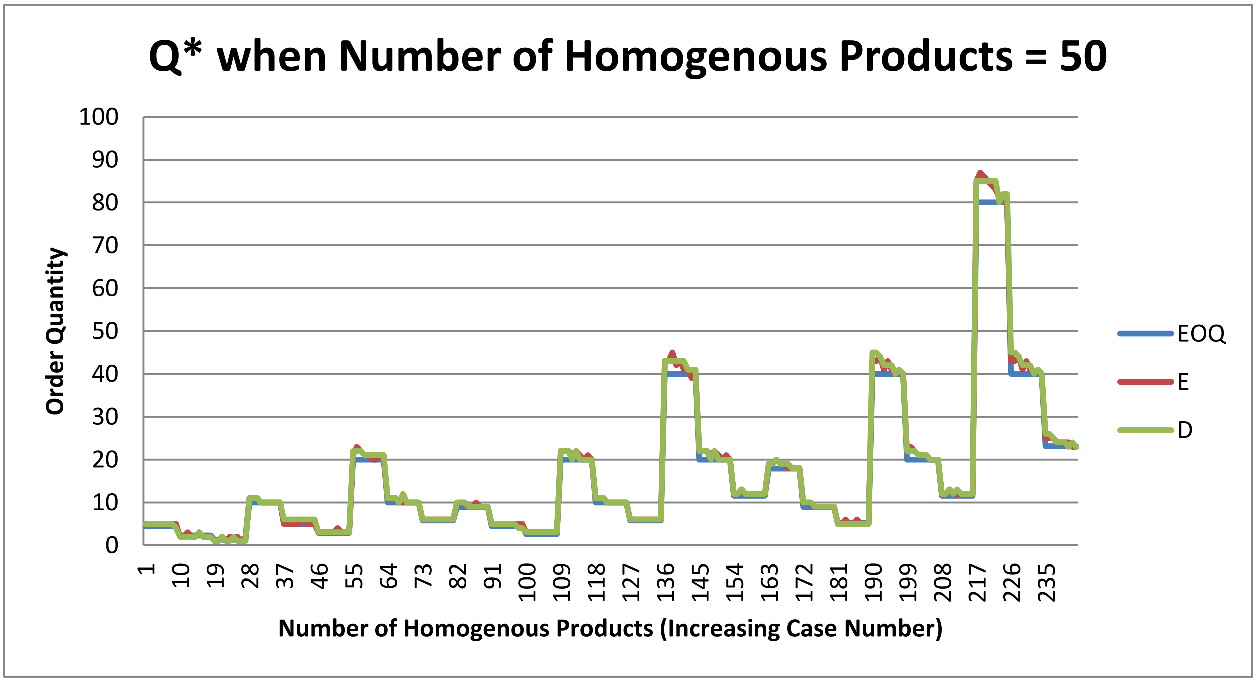


Figure 50



In contrast to almost all the other trends for R*, R* actually decreases as n increases.

Surprisingly, this decrease moves R* into negative values. For this, refer to Figures 51, 52, 53, and 54.

Figure 51

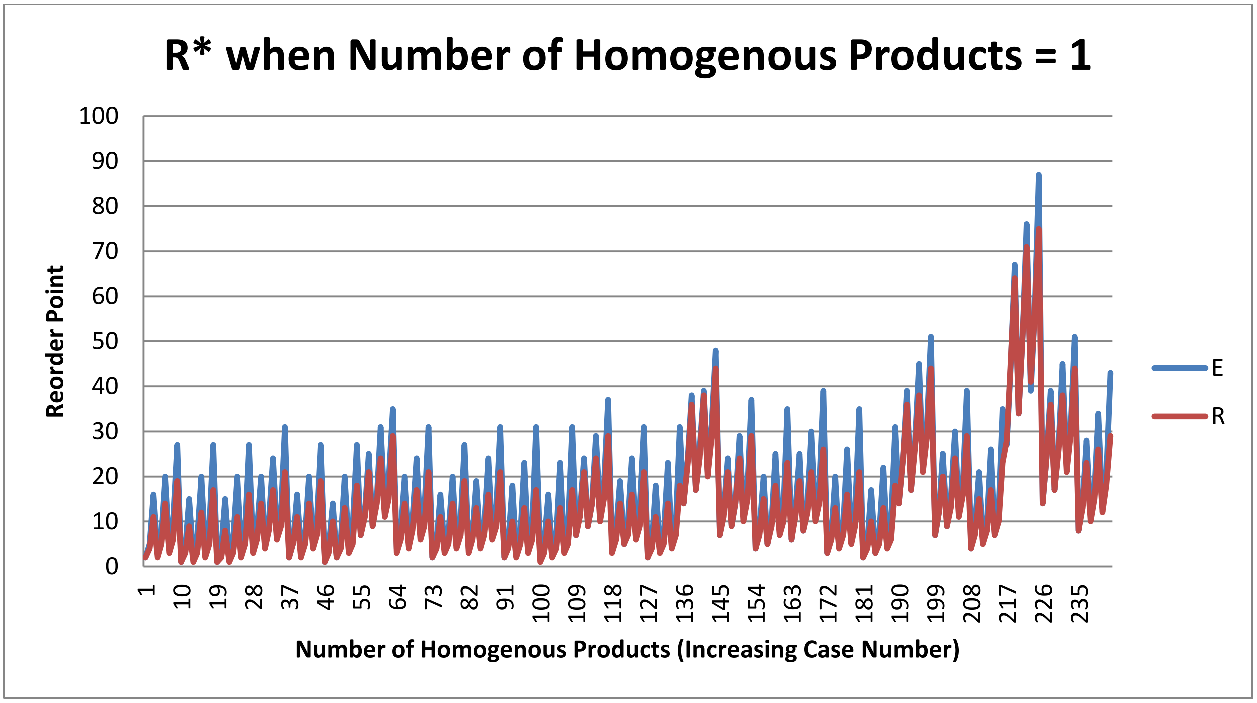


Figure 52

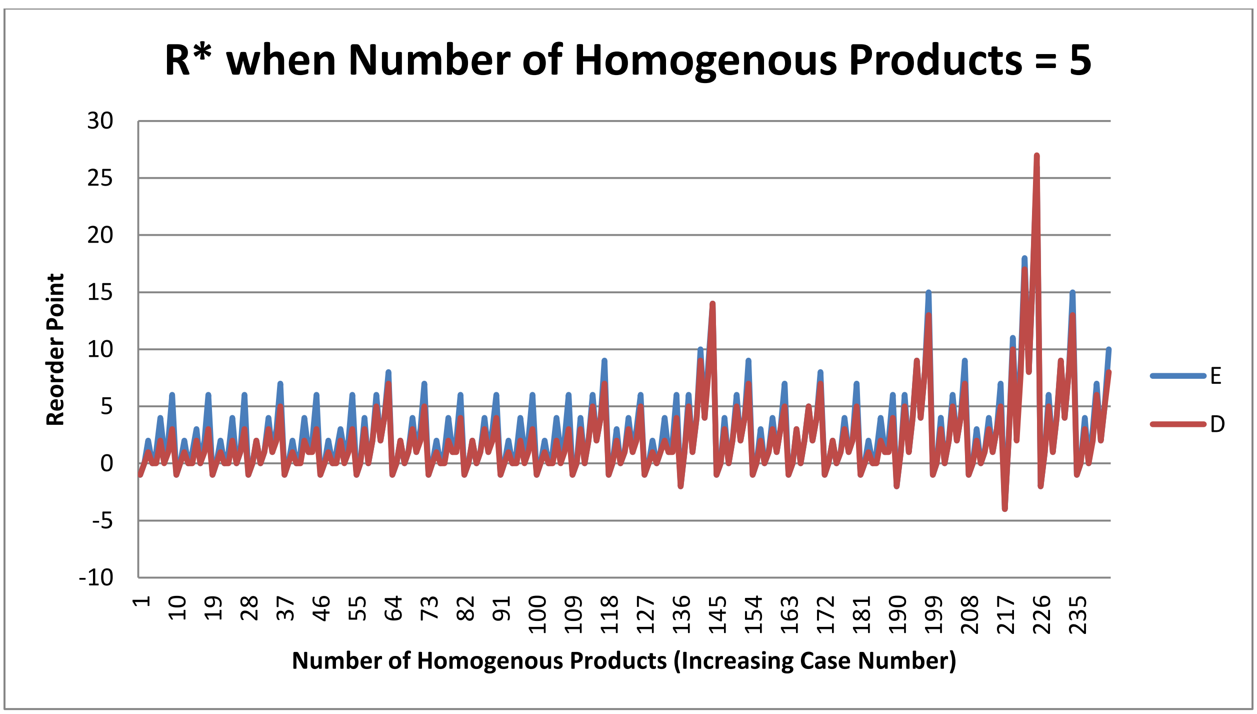


Figure 53

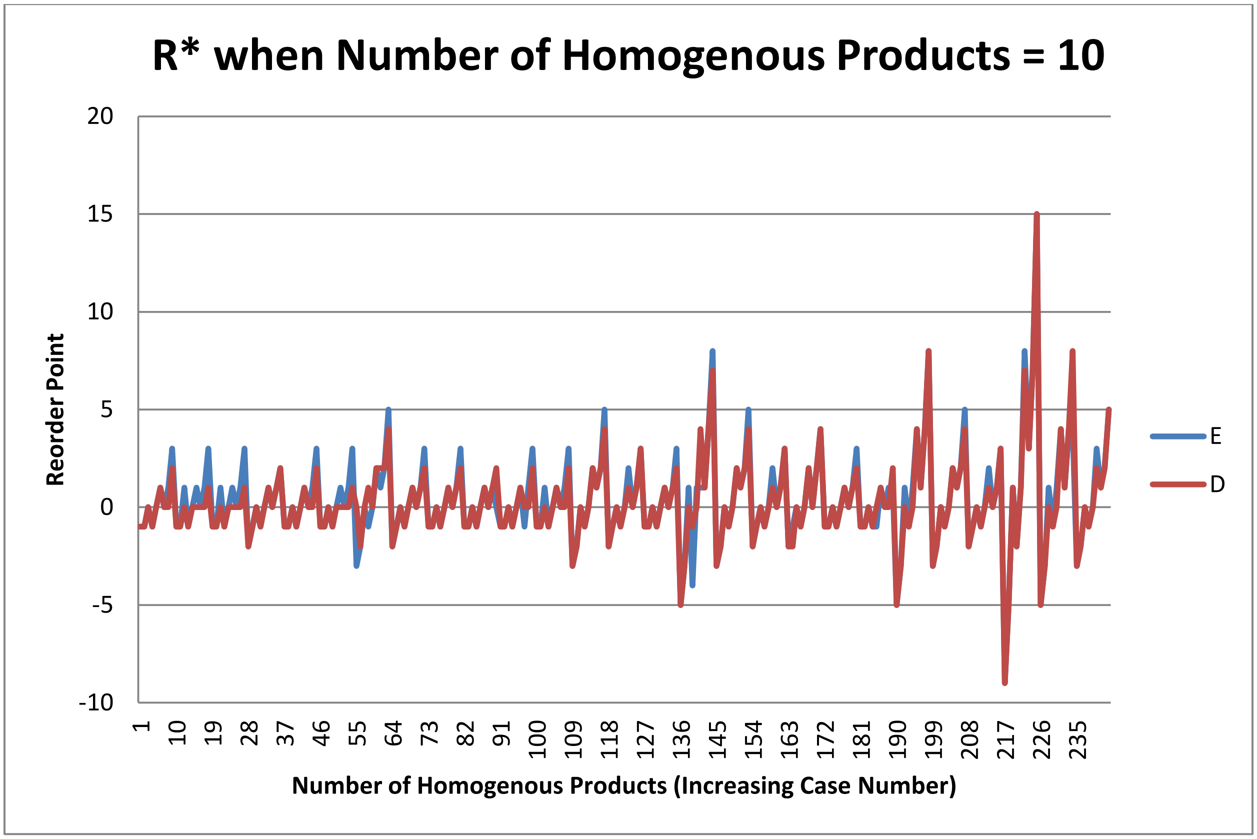
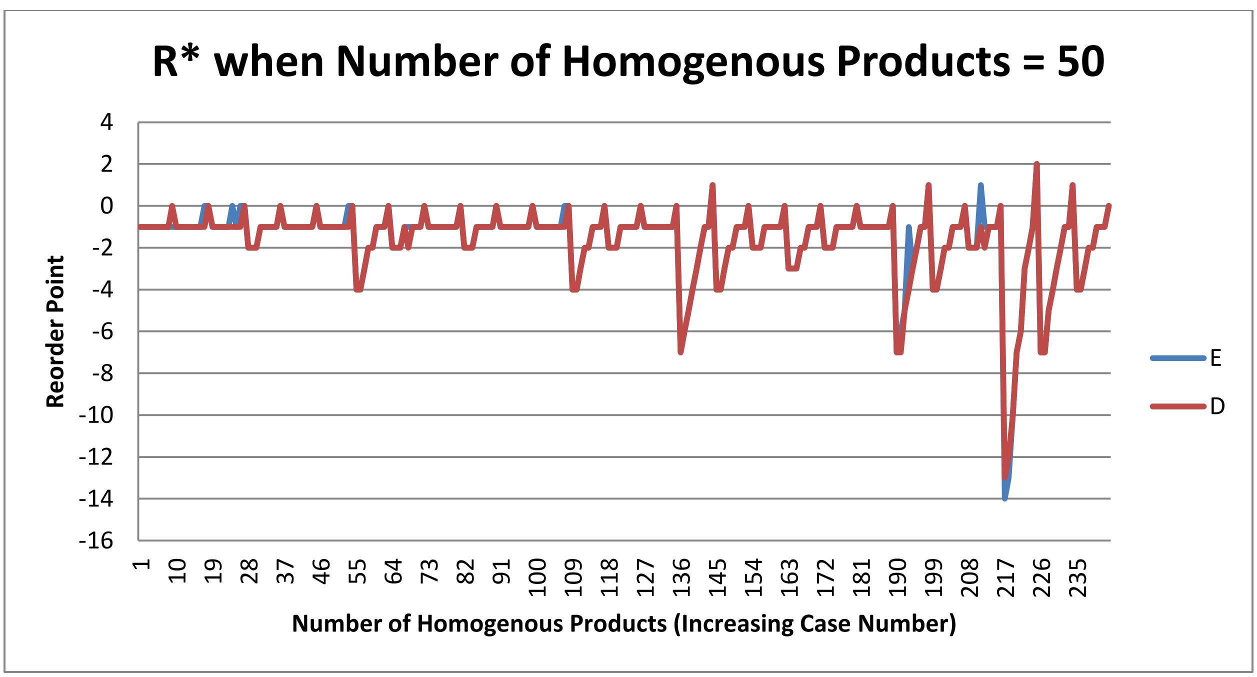


Figure 54



For total cost, as n increases, total cost decreases slightly but there is a significant convergence in costs. In fact, by n = 50, there was almost no difference between the cost in a D environment and an E environment. For this, refer to Figures 55, 56, 57, and 58.

Figure 55

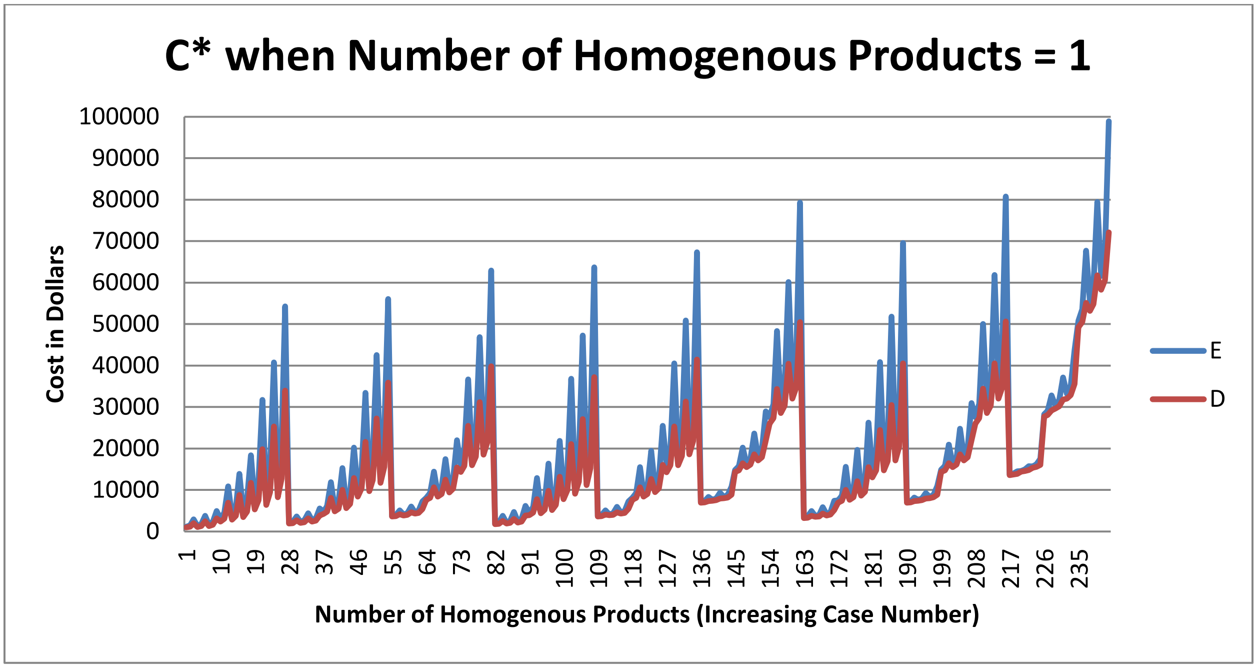


Figure 56

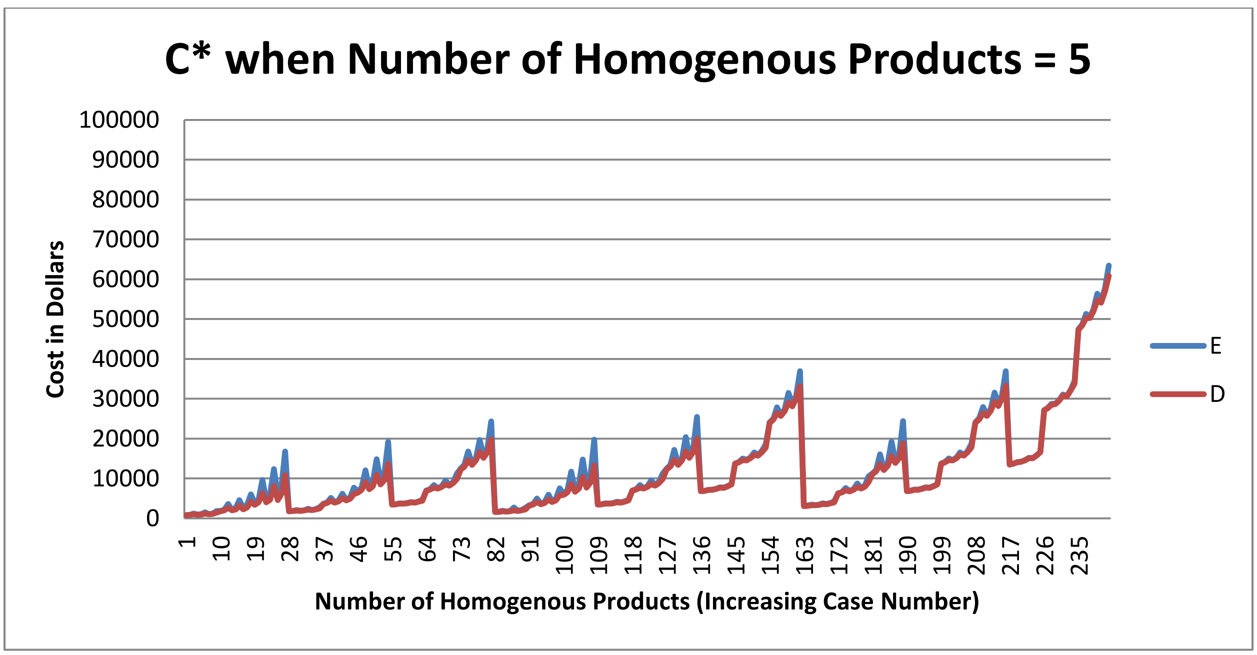


Figure 57

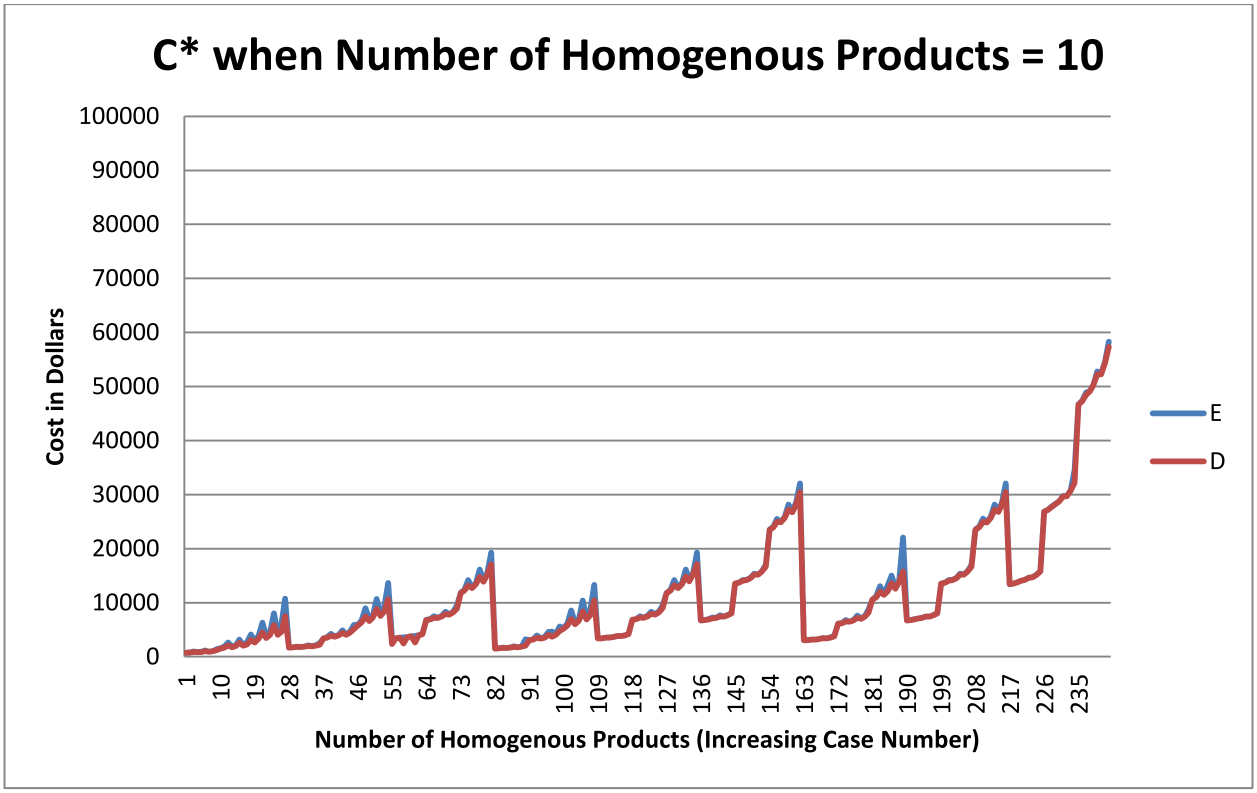
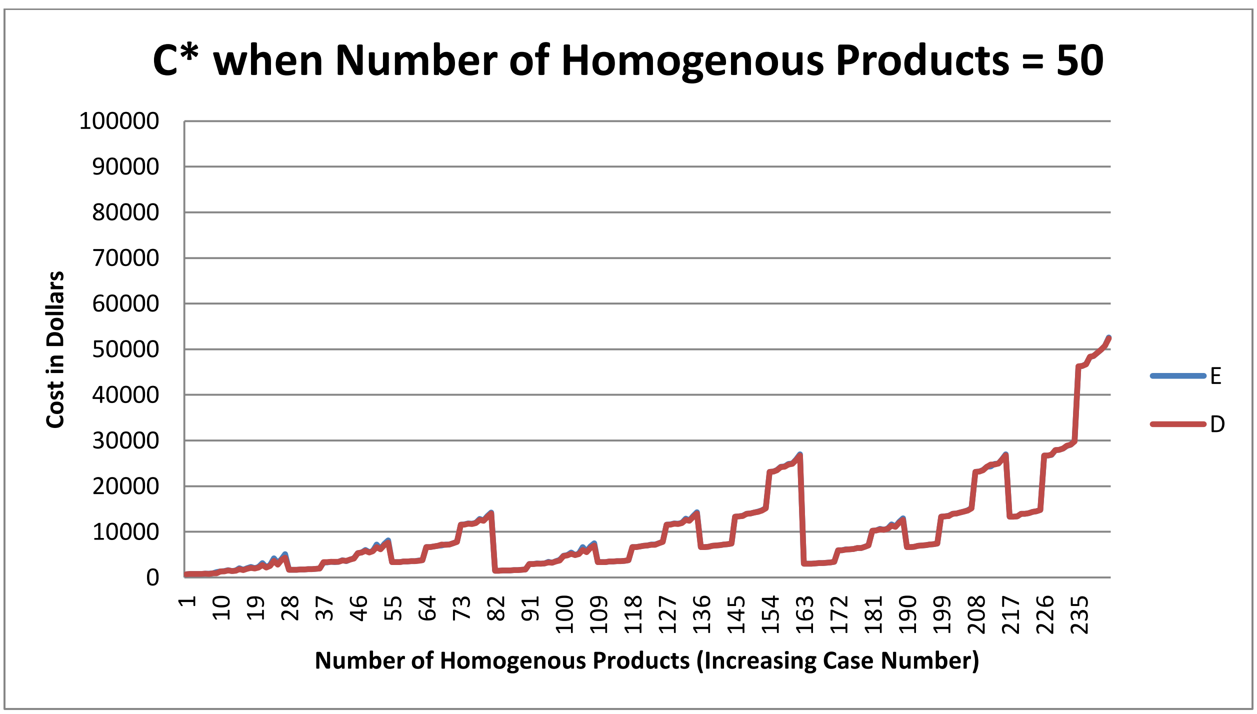


Figure 58



CHAPTER IV

Discussion and Conclusions

Discussion

Each of the parameters created unique patterns between the deterministic environment, the exponential environment, and the EOQ model. Some of these patterns provided evidence that supports the EOQ model and provides data that confirms current business intuition; however, there were several cases where the patterns generated defied intuition and revealed areas for further research. The analysis in this research focused on how the D and E environments differ, how the parameter affects the optimal values, and how well the EOQ model is able to predict Q*. Some patterns were consistent throughout all of the analysis. These patterns involved the differences between D and E for C* and for R*. In all cases, C* and R* was higher in the E environment than their counterparts in the D environment. This was understood as the effects of increased variability. By adding variability, total costs will almost always increase and reorder points must be higher to buffer for the additional uncertainty.

For holding cost, there is minimal difference between D and E on Q*, but as h increases, Q* decreases. In this scenario, the EOQ model was relatively robust in predicting the Q*. Furthermore, as h increased, R* decreased. These trends supported current state of the art knowledge in that as holding costs increase, it is more beneficial for companies to hold less inventory, and thus the Q* and the R* will be lower such that small batches are ordered more frequently. This is because companies that have expensive products or high costs of capital, the sources of high holding costs, will save more money by having less stock in inventory and ordering more often.

For backorder cost, there was no significant change in Q* between D and E, nor did changing p/h affect the Q*. However, as p/h increased, R* did increase. In this case, EOQ was an accurate predictor of Q*. It was intriguing that Q* was unaffected while R* was affected. This shows that, although it is natural to buy protection when backorder costs are high, it is sufficient protection to only reorder sooner and not to increase lot size.

For ordering cost, there was little difference between the Q* of D and E but the Q* did increase as k increased. In addition, R* also increased as k increased. These trends shows that the EOQ model is relatively robust in this situation and that, as understood by current knowledge, higher ordering costs encourage companies to order larger amounts earlier. This is because larger Q* implies longer wait times for receiving orders, thus protection needs to be bought through ordering earlier, increasing R*.

For average demand rate, the same patterns as ordering cost can be seen. However, the reason behind the patterns is different. Specifically, when λ increases, more products are being demanded and sold, so that the company must order more products, larger Q*, which leads to longer wait times which in turn causes larger R* values.

For capacity utilization, there was no predictable behavior between D and E on Q*, but the discrepancy between D, E, and EOQ Q* became more pronounced as ρ increased. This showed that the EOQ lost its accuracy as ρ increased. Furthermore, increased ρ increased the spread between the R* of D and E. The reason for the unpredictable behavior eludes current intuition, but it can be understood that when ρ is high, capacity constraints play a larger role, thus variability that causes queues and overcapacity situations will have an increased effect on Q* and R*.

For the number of homogenous products, there was again no predictable behavior between the Q* of D, E, and EOQ. However, unlike capacity utilization, as n increased, the discrepancy decreased and the three Q*s essentially converged. This showed that EOQ becomes more robust when there are more products in a system. Furthermore, as n increased, the differences between R* also decreased and R* became negative. The convergence defied current state of the art knowledge, but can be understood as the effects of variability being eliminated. This was because as n increased, the amount of time each product spends in the process became so small that the wait time caused by variability had no significant effect on the overall time. Finally, the R* becoming negative also was a huge deviation from current business knowledge because it stated that it was beneficial to run out of stock. A possible cause of this is that products are being processed so fast that the lead time is short enough for customers to wait.

Conclusions

As these results show, there is still a significant amount of research to be done in this area. From this research, experts now have evidence that supports the EOQ and current business intuition, as well as insight into trends that have not been thoroughly examined. For all these times that data defied current intuition or knowledge, research must be done to understand why and how to create a model that predicts those trends. Moreover, even though nearly two thousand cases were studied in this work, there are always more scenarios to examine and simulate. Future research can use this initial work as a stepping stone for finding an understanding and creating models that increase the field of Supply Chain Management’s efficacy and knowledge.

REFERENCES

[1] Clark, Andrew J. and Herbert Scarf. "Optimal Policies for a Multi-Echelon Inventory Problem." *Management Science* 6.4 (1960): 475-490. Print.

[2] Zipkin, Paul H. "Models for Design and Control of Stochastic, Multi-Item Batch Production Systems." *Operations Research* 34.1 (Jan. – Feb. 1986): 91-104. Print.

[3] Arreola-Risa, Antonio. "Integrated Multi-Item Production-Inventory Systems." *European Journal of Operational Research* 89.2 (1996): 326-340. Print.

[4] Arreola-Risa, Antonio. "On Inventory Abatement via Manufacturing Randomness Reductions." *Decision Sciences* 29.4 (1998): 983-1004. Print.

[5] Arreola-Risa, Antonio, Victor M. Giménez-García, and José Luis Martínez-Parra. "Optimizing Stochastic Production-Inventory Systems: A Heuristic Based on Simulation and Regression Analysis." *European Journal of Operational Research* 213.1 (2011): 107-118. Print.

Appendix A

Summary Tables of Simulation Data for Deterministic Environment

n=1			λ=0.5											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	1	5	2	974	28	10	3	1909	55	21	7	3577
		0.7	2	6	4	1117	29	11	6	2020	56	21	11	3681
		0.9	3	8	11	1973	30	13	14	2651	57	24	21	4122
	10	0.5	4	4	2	1099	31	10	4	2101	58	21	9	3863
		0.7	5	6	5	1299	32	11	8	2255	59	21	14	4017
		0.9	6	7	14	2446	33	13	17	3127	60	23	24	4649
	30	0.5	7	4	3	1286	34	10	6	2359	61	19	11	4268
		0.7	8	5	6	1578	35	9	9	2591	62	19	15	4459
		0.9	9	8	19	3166	36	13	21	3854	63	23	29	5416
2	5	0.5	10	3	1	2383	37	5	2	4260	64	10	3	7634
		0.7	11	3	3	3091	38	6	5	4773	65	11	6	8082
		0.9	12	4	9	6945	39	8	11	8119	66	13	14	10602
	10	0.5	13	2	1	2820	40	5	2	4818	67	10	4	8403
		0.7	14	3	3	3755	41	6	5	5498	68	11	8	9019
		0.9	15	4	12	8794	42	8	14	10021	69	13	17	12509
	30	0.5	16	2	2	3422	43	5	4	5586	70	10	6	9434
		0.7	17	3	5	4785	44	6	7	6655	71	9	9	10363
		0.9	18	4	17	11704	45	8	19	12893	72	13	21	15417
6	5	0.5	19	2	1	5344	46	3	1	8365	73	6	2	14305
		0.7	20	2	2	7528	47	4	3	10391	74	6	4	15841
		0.9	21	2	8	19820	48	6	10	21612	75	8	11	25497
	10	0.5	22	1	1	6396	49	3	2	9725	76	6	3	15982
		0.7	23	2	3	9453	50	4	4	12403	77	6	5	18016
		0.9	24	2	11	25341	51	6	13	27248	78	8	14	31204
	30	0.5	25	1	2	8257	52	3	3	11730	79	6	4	18527
		0.7	26	2	5	12752	53	3	5	15570	80	6	7	21487
		0.9	27	2	16	33931	54	6	18	35908	81	8	19	39820

n=1			λ=2											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	82	9	3	1728	109	22	7	3588	136	42	14	6925
		0.7	83	10	6	1848	110	21	11	3690	137	44	23	7026
		0.9	84	12	13	2505	111	24	21	4106	138	46	36	7278
	10	0.5	85	9	4	1902	112	21	9	3881	139	42	17	7386
		0.7	86	9	7	2066	113	21	14	4021	140	39	24	7547
		0.9	87	12	16	3010	114	24	24	4642	141	43	38	7929
	30	0.5	88	9	6	2165	115	18	10	4276	142	39	20	7988
		0.7	89	9	9	2391	116	19	15	4475	143	39	29	8190
		0.9	90	12	21	3858	117	24	29	5486	144	43	44	8850
2	5	0.5	91	5	2	3897	118	10	3	7654	145	22	7	14352
		0.7	92	6	4	4498	119	11	6	8099	146	21	11	14759
		0.9	93	7	10	7797	120	13	14	10611	147	24	21	16423
	10	0.5	94	4	2	4402	121	11	5	8411	148	21	9	15525
		0.7	95	5	5	5241	122	10	7	9033	149	21	14	16082
		0.9	96	7	13	9798	123	12	16	12650	150	24	24	18567
	30	0.5	97	4	3	5164	124	9	6	9470	151	18	10	17106
		0.7	98	5	6	6380	125	9	9	10377	152	19	15	17899
		0.9	99	6	17	13199	126	12	21	16042	153	24	29	21945
6	5	0.5	100	3	1	7753	127	6	2	14279	154	13	4	26038
		0.7	101	3	3	9974	128	6	4	15928	155	13	7	27310
		0.9	102	6	10	21048	129	8	11	25309	156	16	15	34349
	10	0.5	103	3	2	9125	130	6	3	15988	157	11	5	28550
		0.7	104	3	4	12040	131	6	5	18168	158	13	9	30333
		0.9	105	6	13	27047	132	8	14	31329	159	16	18	40467
	30	0.5	106	3	3	11187	133	5	4	18580	160	11	7	32036
		0.7	107	3	5	15276	134	6	7	21760	161	11	10	34666
		0.9	108	6	17	37164	135	8	18	41452	162	16	23	50497

n=1			λ=8											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	163	19	6	3234	190	44	14	6923	217	86	28	13595
		0.7	164	20	11	3337	191	45	24	7030	218	85	45	13696
		0.9	165	21	19	3800	192	46	36	7287	219	86	64	13857
	10	0.5	166	19	8	3510	193	42	17	7399	220	83	34	14381
		0.7	167	18	12	3647	194	42	26	7551	221	85	52	14547
		0.9	168	20	21	4331	195	43	38	7948	222	85	71	14808
	30	0.5	169	18	10	3876	196	41	21	7998	223	83	41	15308
		0.7	170	17	14	4076	197	39	29	8212	224	80	56	15579
		0.9	171	20	26	5182	198	43	44	8888	225	80	75	16007
2	5	0.5	172	10	3	6918	199	22	7	14351	226	44	14	27691
		0.7	173	10	6	7388	200	22	12	14764	227	45	24	28121
		0.9	174	12	13	10053	201	24	20	16440	228	46	36	29146
	10	0.5	175	9	4	7614	202	21	9	15515	229	42	17	29598
		0.7	176	9	7	8279	203	20	13	16088	230	42	26	30204
		0.9	177	12	16	12098	204	24	24	18589	231	43	38	31790
	30	0.5	178	8	5	8632	205	20	11	17096	232	41	21	31992
		0.7	179	9	9	9580	206	20	16	17901	233	39	29	32848
		0.9	180	12	21	15510	207	24	29	22010	234	43	44	35553
6	5	0.5	181	6	2	13050	208	12	4	26024	235	25	8	49225
		0.7	182	6	4	14730	209	13	7	27342	236	25	13	50486
		0.9	183	7	10	24453	210	15	15	34409	237	28	23	55085
	10	0.5	184	6	3	14763	211	12	5	28512	238	24	10	53145
		0.7	185	6	5	16973	212	12	8	30341	239	23	15	54830
		0.9	186	7	13	30502	213	14	17	40537	240	27	26	61790
	30	0.5	187	5	4	17083	214	11	7	32010	241	22	12	58304
		0.7	188	5	6	20444	215	11	10	34504	242	23	18	60613
		0.9	189	7	18	40539	216	15	23	50636	243	24	29	72113

n=5			λ=0.5											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	244	5	-1	802	271	11	-1	1731	298	22	-1	3421
		0.7	245	5	0	858	272	11	0	1794	299	21	0	3499
		0.9	246	5	1	1004	273	11	2	1923	300	21	3	3640
	10	0.5	247	5	0	886	274	10	0	1861	301	21	0	3637
		0.7	248	4	0	964	275	10	1	1958	302	21	2	3761
		0.9	249	5	2	1162	276	11	3	2133	303	19	5	3964
	30	0.5	250	4	0	1024	277	10	1	2045	304	21	2	3931
		0.7	251	4	1	1102	278	9	2	2205	305	17	4	4145
		0.9	252	4	3	1422	279	10	5	2464	306	19	7	4391
2	5	0.5	253	2	-1	1737	280	5	-1	3572	307	11	-1	6923
		0.7	254	2	0	1950	281	5	0	3798	308	11	0	7178
		0.9	255	3	1	2626	282	6	1	4365	309	11	2	7691
	10	0.5	256	2	0	1968	283	5	0	3909	310	10	0	7444
		0.7	257	2	0	2190	284	5	0	4254	311	10	1	7830
		0.9	258	3	2	3218	285	5	2	5014	312	11	3	8531
	30	0.5	259	2	0	2251	286	5	1	4501	313	10	1	8180
		0.7	260	2	1	2690	287	4	1	4862	314	9	2	8819
		0.9	261	3	3	4128	288	5	3	6090	315	10	5	9856
6	5	0.5	262	2	-1	3385	289	3	-1	6444	316	6	-1	12261
		0.7	263	2	0	4025	290	3	0	7093	317	6	0	12941
		0.9	264	2	1	6304	291	4	1	9074	318	7	1	14612
	10	0.5	265	1	0	3999	292	3	0	7253	319	6	0	13365
		0.7	266	1	0	4654	293	3	0	8003	320	6	0	14508
		0.9	267	2	2	8069	294	3	2	10872	321	6	2	16620
	30	0.5	268	1	0	4564	295	3	0	8462	322	6	1	15162
		0.7	269	1	1	6156	296	3	1	9542	323	5	1	16564
		0.9	270	2	3	10844	297	3	3	13601	324	6	4	19795

n=5			λ=2											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	325	10	-1	1556	352	21	-1	3420	379	44	-2	6772
		0.7	326	10	0	1620	353	21	0	3501	380	41	1	6900
		0.9	327	10	2	1760	354	21	3	3645	381	41	5	7103
	10	0.5	328	9	0	1680	355	21	0	3636	382	41	1	7149
		0.7	329	9	1	1772	356	20	2	3767	383	41	4	7359
		0.9	330	10	3	1961	357	20	5	3978	384	41	9	7670
	30	0.5	331	9	1	1856	358	19	2	3923	385	41	4	7630
		0.7	332	8	2	1990	359	19	4	4149	386	41	8	8006
		0.9	333	8	4	2262	360	17	7	4438	387	41	14	8488
2	5	0.5	334	5	-1	3213	361	11	-1	6935	388	21	-1	13679
		0.7	335	5	0	3439	362	11	0	7192	389	21	0	14005
		0.9	336	5	1	4047	363	11	2	7728	390	21	3	14580
	10	0.5	337	5	0	3550	364	10	0	7455	391	21	0	14545
		0.7	338	4	0	3873	365	10	1	7841	392	20	2	15067
		0.9	339	5	2	4686	366	10	3	8574	393	20	5	15913
	30	0.5	340	4	0	4102	367	10	1	8198	394	19	2	15692
		0.7	341	4	1	4442	368	9	2	8806	395	19	4	16598
		0.9	342	4	3	5753	369	10	5	9840	396	17	7	17753
6	5	0.5	343	3	-1	5833	370	6	-1	12263	397	13	-1	23951
		0.7	344	3	0	6483	371	6	0	12956	398	12	0	24765
		0.9	345	3	1	8609	372	6	1	14697	399	12	2	26379
	10	0.5	346	3	0	6641	373	6	0	13371	400	12	0	25665
		0.7	347	3	0	7409	374	6	1	14521	401	11	1	26900
		0.9	348	3	2	10407	375	6	2	16735	402	11	3	29078
	30	0.5	349	2	0	7696	376	6	1	15179	403	11	1	28107
		0.7	350	3	1	8961	377	5	1	16590	404	11	3	30104
		0.9	351	3	3	13293	378	6	4	19981	405	11	5	33134

n=5			λ=8											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	406	19	-1	3064	433	43	-2	6775	460	86	-4	13483
		0.7	407	19	0	3145	434	43	1	6902	461	87	2	13693
		0.9	408	19	3	3291	435	41	5	7117	462	81	10	14045
	10	0.5	409	18	0	3262	436	42	1	7160	463	81	2	14197
		0.7	410	18	2	3392	437	41	4	7375	464	81	8	14541
		0.9	411	18	5	3601	438	41	9	7695	465	81	17	15098
	30	0.5	412	18	2	3530	439	38	4	7644	466	81	8	15044
		0.7	413	17	4	3742	440	38	8	8031	467	81	16	15729
		0.9	414	16	7	4022	441	36	13	8455	468	81	27	16576
2	5	0.5	415	10	-1	6230	442	22	-1	13692	469	43	-2	27098
		0.7	416	10	0	6484	443	21	0	14018	470	43	1	27609
		0.9	417	10	2	7057	444	21	3	14606	471	41	5	28469
	10	0.5	418	9	0	6713	445	21	0	14556	472	42	1	28638
		0.7	419	9	1	7087	446	21	2	15089	473	41	4	29502
		0.9	420	9	3	7842	447	21	5	15963	474	41	9	30781
	30	0.5	421	9	1	7414	448	19	2	15682	475	38	4	30576
		0.7	422	8	2	7962	449	19	4	16605	476	38	8	32122
		0.9	423	9	5	9086	450	18	7	17788	477	36	13	33822
6	5	0.5	424	6	-1	11057	451	12	-1	23955	478	25	-1	47305
		0.7	425	6	0	11750	452	12	0	24771	479	24	0	48418
		0.9	426	6	1	13528	453	12	2	26391	480	23	3	50296
	10	0.5	427	5	0	12113	454	12	0	25655	481	23	0	50241
		0.7	428	5	0	13150	455	11	1	26926	482	23	2	51917
		0.9	429	5	2	15576	456	12	3	29206	483	23	6	54685
	30	0.5	430	5	1	13885	457	11	1	28197	484	22	2	54075
		0.7	431	5	1	15116	458	11	3	30066	485	22	5	56932
		0.9	432	6	4	18844	459	11	5	33281	486	21	8	60842

n=10			λ=0.5											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	487	5	-1	756	514	11	-2	1700	541	22	0	2322
		0.7	488	5	-1	794	515	11	-1	1724	542	21	-2	3419
		0.9	489	5	0	878	516	11	0	1803	543	21	0	3500
	10	0.5	490	5	-1	829	517	11	-1	1795	544	22	1	2459
		0.7	491	5	0	887	518	11	0	1860	545	21	0	3628
		0.9	492	5	1	1007	519	10	1	1973	546	21	2	3768
	30	0.5	493	5	0	923	520	10	0	1940	547	20	2	2644
		0.7	494	4	0	1016	521	10	1	2050	548	21	2	3928
		0.9	495	5	2	1184	522	10	2	2228	549	21	4	4156
2	5	0.5	496	2	-1	1503	523	5	-1	3390	550	11	-2	6798
		0.7	497	3	-1	1710	524	5	-1	3542	551	11	-1	6897
		0.9	498	3	0	2073	525	5	0	3879	552	11	0	7211
	10	0.5	499	2	-1	1773	526	5	-1	3683	553	11	-1	7181
		0.7	500	2	0	1982	527	5	0	3913	554	11	0	7439
		0.9	501	3	0	2548	528	5	1	4392	555	10	1	7892
	30	0.5	502	2	0	2032	529	5	0	4059	556	10	0	7760
		0.7	503	2	0	2261	530	5	0	4490	557	10	1	8198
		0.9	504	2	1	3102	531	5	2	5100	558	10	2	8910
6	5	0.5	505	1	-1	2637	532	3	-1	5789	559	6	-1	11791
		0.7	506	2	-1	3328	533	3	-1	6348	560	6	-1	12203
		0.9	507	2	0	4491	534	3	0	7436	561	6	0	13163
	10	0.5	508	1	-1	3450	535	3	-1	6624	562	6	-1	12699
		0.7	509	1	0	4032	536	3	0	7263	563	6	0	13384
		0.9	510	2	0	5849	537	3	0	8861	564	6	1	14763
	30	0.5	511	1	0	4063	538	3	0	7526	565	6	0	13910
		0.7	512	1	0	4658	539	3	0	8388	566	6	1	15239
		0.9	513	2	1	7482	540	3	1	10632	567	6	2	17054

n=10			λ=2											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	568	10	-1	1529	595	22	-3	3375	622	42	-5	6713
		0.7	569	10	-1	1552	596	22	-2	3423	623	42	-3	6784
		0.9	570	10	0	1637	597	21	0	3513	624	42	0	6919
	10	0.5	571	9	-1	1614	598	21	-1	3548	625	42	-1	7048
		0.7	572	9	0	1679	599	21	0	3637	626	42	0	7179
		0.9	573	9	1	1798	600	21	2	3791	627	42	4	7411
	30	0.5	574	9	0	1748	601	21	1	3791	628	42	1	7426
		0.7	575	9	1	1859	602	19	2	3942	629	38	4	7696
		0.9	576	8	2	2042	603	18	4	4167	630	36	7	8044
2	5	0.5	577	5	-1	3027	604	11	-2	6810	631	22	-3	13500
		0.7	578	5	-1	3180	605	11	-1	6928	632	22	-2	13692
		0.9	579	5	0	3539	606	11	0	7255	633	21	0	14053
	10	0.5	580	5	-1	3324	607	10	-1	7192	634	21	-1	14193
		0.7	581	5	0	3549	608	10	0	7456	635	21	0	14546
		0.9	582	5	1	4054	609	10	1	7947	636	21	2	15165
	30	0.5	583	4	0	3691	610	10	0	7770	637	21	1	15165
		0.7	584	4	0	4048	611	10	1	8210	638	19	2	15767
		0.9	585	5	2	4782	612	10	3	9008	639	18	4	16668
6	5	0.5	586	3	-1	5186	613	6	-1	11780	640	13	-2	23498
		0.7	587	3	-1	5758	614	6	-1	12207	641	13	-1	23978
		0.9	588	3	0	6936	615	6	0	13232	642	12	0	24965
	10	0.5	589	3	-1	6023	616	6	-1	12700	643	12	-1	24884
		0.7	590	3	0	6667	617	6	0	13404	644	12	0	25695
		0.9	591	3	1	8393	618	6	1	14840	645	11	1	27210
	30	0.5	592	3	0	6920	619	6	0	13944	646	11	0	26728
		0.7	593	2	0	7714	620	6	1	15283	647	11	1	28162
		0.9	594	3	2	10461	621	6	2	17166	648	11	3	30463

n=10			λ=8											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	649	19	-2	3023	676	45	-5	6715	703	86	-9	13395
		0.7	650	20	-2	3071	677	43	-3	6789	704	84	-5	13512
		0.9	651	19	0	3154	678	42	0	6927	705	85	1	13738
	10	0.5	652	19	-1	3181	679	42	-1	7059	706	84	-2	14044
		0.7	653	18	0	3264	680	40	0	7188	707	81	1	14235
		0.9	654	18	2	3408	681	39	4	7409	708	81	7	14608
	30	0.5	655	18	0	3403	682	40	1	7426	709	81	3	14689
		0.7	656	18	2	3548	683	39	4	7687	710	81	7	15123
		0.9	657	17	4	3759	684	39	8	8049	711	81	15	15779
2	5	0.5	658	10	-1	6120	685	22	-3	13506	712	45	-5	26862
		0.7	659	10	-1	6213	686	21	-2	13699	713	43	-3	27156
		0.9	660	10	0	6536	687	21	0	14065	714	42	0	27706
	10	0.5	661	9	-1	6457	688	21	-1	14207	715	42	-1	28236
		0.7	662	9	0	6713	689	21	0	14554	716	40	0	28754
		0.9	663	9	1	7187	690	20	2	15168	717	39	4	29637
	30	0.5	664	9	0	6987	691	20	1	15177	718	40	1	29705
		0.7	665	9	1	7419	692	20	2	15761	719	39	4	30749
		0.9	666	8	2	8160	693	18	4	16672	720	39	8	32196
6	5	0.5	667	6	-1	10546	694	13	-2	23490	721	25	-3	46652
		0.7	668	6	-1	10974	695	12	-1	23943	722	25	-2	47286
		0.9	669	6	0	12020	696	12	0	24932	723	25	0	48463
	10	0.5	670	5	-1	11439	697	12	-1	24823	724	24	-1	49119
		0.7	671	5	0	12110	698	12	0	25661	725	25	0	50281
		0.9	672	5	1	13614	699	12	1	27186	726	23	2	52268
	30	0.5	673	5	0	12575	700	12	0	26774	727	24	1	52234
		0.7	674	5	0	13875	701	11	1	28184	728	23	2	54330
		0.9	675	5	2	15800	702	11	3	30447	729	22	5	57345

n=50			λ=0.5											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	730	5	-1	733	757	11	-2	1663	784	22	-4	3335
		0.7	731	5	-1	738	758	11	-2	1671	785	22	-4	3349
		0.9	732	5	-1	756	759	11	-2	1700	786	22	-3	3372
	10	0.5	733	5	-1	747	760	10	-1	1738	787	21	-2	3485
		0.7	734	5	-1	766	761	10	-1	1748	788	21	-2	3503
		0.9	735	5	-1	826	762	10	-1	1794	789	21	-1	3549
	30	0.5	736	5	-1	803	763	10	-1	1797	790	21	-1	3605
		0.7	737	5	-1	877	764	10	-1	1871	791	21	-1	3671
		0.9	738	4	0	927	765	10	0	1945	792	21	0	3781
2	5	0.5	739	2	-1	1319	766	6	-1	3346	793	11	-2	6654
		0.7	740	2	-1	1363	767	6	-1	3356	794	11	-2	6683
		0.9	741	2	-1	1525	768	6	-1	3412	795	11	-2	6799
	10	0.5	742	2	-1	1374	769	6	-1	3402	796	10	-1	6952
		0.7	743	2	-1	1469	770	6	-1	3468	797	12	-2	7233
		0.9	744	3	-1	1808	771	6	-1	3696	798	10	-1	7175
	30	0.5	745	2	-1	1591	772	6	-1	3625	799	10	-1	7189
		0.7	746	2	-1	1897	773	6	-1	3914	800	10	-1	7483
		0.9	747	2	0	2075	774	6	0	4161	801	10	0	7781
6	5	0.5	748	1	-1	1989	775	3	-1	5330	802	6	-1	11559
		0.7	749	1	-1	2158	776	3	-1	5436	803	6	-1	11589
		0.9	750	2	-1	2751	777	3	-1	5798	804	6	-1	11758
	10	0.5	751	1	-1	2153	778	3	-1	5496	805	6	-1	11726
		0.7	752	1	-1	2491	779	3	-1	5762	806	6	-1	11924
		0.9	753	2	-1	3648	780	3	-1	6642	807	6	-1	12610
	30	0.5	754	1	-1	2810	781	3	-1	6157	808	6	-1	12396
		0.7	755	1	-1	3822	782	3	-1	7067	809	6	-1	13264
		0.9	756	1	0	4318	783	3	0	7626	810	6	0	14005

n=50			λ=2											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	811	10	-2	1485	838	22	-4	3333	865	43	-7	6660
		0.7	812	10	-2	1494	839	22	-4	3347	866	43	-6	6675
		0.9	813	10	-2	1526	840	22	-3	3368	867	43	-5	6709
	10	0.5	814	9	-1	1549	841	20	-2	3487	868	43	-4	6964
		0.7	815	9	-1	1560	842	22	-2	3504	869	43	-3	6984
		0.9	816	9	-1	1606	843	20	-1	3554	870	43	-2	7051
	30	0.5	817	9	-1	1606	844	20	-1	3601	871	41	-1	7204
		0.7	818	9	-1	1678	845	20	-1	3670	872	41	-1	7270
		0.9	819	9	0	1747	846	20	0	3788	873	41	1	7443
2	5	0.5	820	5	-1	2932	847	11	-2	6656	874	22	-4	13332
		0.7	821	5	-1	2952	848	11	-2	6685	875	22	-4	13387
		0.9	822	5	-1	3024	849	11	-2	6801	876	22	-3	13474
	10	0.5	823	5	-1	2987	850	10	-1	6950	877	20	-2	13946
		0.7	824	5	-1	3063	851	10	-1	6991	878	22	-2	14017
		0.9	825	5	-1	3301	852	10	-1	7168	879	20	-1	14218
	30	0.5	826	5	-1	3208	853	10	-1	7183	880	20	-1	14404
		0.7	827	4	-1	3506	854	10	-1	7472	881	20	-1	14678
		0.9	828	4	0	3718	855	10	0	7771	882	20	0	15153
6	5	0.5	829	3	-1	4723	856	6	-1	11563	883	12	-2	23139
		0.7	830	3	-1	4825	857	6	-1	11594	884	12	-2	23197
		0.9	831	3	-1	5188	858	6	-1	11760	885	13	-2	23459
	10	0.5	832	3	-1	4887	859	6	-1	11731	886	12	-1	24211
		0.7	833	3	-1	5147	860	6	-1	11930	887	12	-1	24289
		0.9	834	3	-1	6028	861	6	-1	12611	888	12	-1	24749
	30	0.5	835	3	-1	5544	862	6	-1	12401	889	12	-1	24912
		0.7	836	3	-1	6435	863	6	-1	13274	890	12	-1	25748
		0.9	837	3	0	7015	864	6	0	13995	891	12	0	26733

n=50			λ=8											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	892	19	-3	2987	919	45	-7	6671	946	85	-13	13329
		0.7	893	19	-3	2993	920	45	-7	6681	947	85	-12	13352
		0.9	894	20	-3	3022	921	44	-5	6724	948	85	-10	13407
	10	0.5	895	19	-2	3116	922	42	-4	6974	949	85	-7	13922
		0.7	896	19	-2	3138	923	42	-3	6993	950	85	-6	13961
		0.9	897	19	-1	3182	924	42	-2	7063	951	85	-3	14065
	30	0.5	898	18	-1	3221	925	40	-1	7213	952	80	-2	14401
		0.7	899	18	-1	3294	926	41	-1	7279	953	82	-1	14481
		0.9	900	18	0	3403	927	40	1	7454	954	82	2	14766
2	5	0.5	901	10	-2	5936	928	22	-4	13341	955	45	-7	26685
		0.7	902	10	-2	5971	929	22	-4	13396	956	45	-7	26724
		0.9	903	10	-2	6101	930	22	-3	13494	957	44	-5	26894
	10	0.5	904	9	-1	6196	931	21	-2	13938	958	42	-4	27895
		0.7	905	9	-1	6244	932	21	-2	14008	959	42	-3	27970
		0.9	906	9	-1	6431	933	21	-1	14212	960	42	-2	28250
	30	0.5	907	9	-1	6426	934	20	-1	14410	961	40	-1	28851
		0.7	908	9	-1	6719	935	20	-1	14685	962	41	-1	29117
		0.9	909	9	0	7001	936	20	0	15152	963	40	1	29817
6	5	0.5	910	5	-1	10264	937	12	-2	23146	964	26	-4	46260
		0.7	911	5	-1	10319	938	12	-2	23202	965	26	-4	46341
		0.9	912	5	-1	10538	939	13	-2	23472	966	25	-3	46710
	10	0.5	913	5	-1	10430	940	12	-1	24229	967	24	-2	48354
		0.7	914	5	-1	10651	941	13	-2	24733	968	24	-2	48505
		0.9	915	5	-1	11372	942	12	-1	24767	969	24	-1	49188
	30	0.5	916	5	-1	11096	943	12	-1	24934	970	23	-1	49945
		0.7	917	5	-1	11978	944	12	-1	25771	971	24	-1	50746
		0.9	918	5	0	12638	945	12	0	26752	972	23	0	52341

Appendix B

Summary Tables of Simulation Data for Exponential Environment

n=1			λ=0.5											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	1	5	2	1115	28	11	4	2028	55	21	7	3696
		0.7	2	6	5	1451	29	12	8	2308	56	21	12	3932
		0.9	3	9	16	2919	30	13	20	3609	57	23	25	5090
	10	0.5	4	4	3	1293	31	11	5	2282	58	21	9	4037
		0.7	5	6	7	1761	32	12	10	2657	59	21	15	4362
		0.9	6	9	20	3771	33	13	24	4356	60	23	31	5971
	30	0.5	7	4	4	1574	34	11	8	2645	61	21	12	4527
		0.7	8	6	10	2261	35	10	12	3163	62	21	19	5002
		0.9	9	4	27	4938	36	13	31	5504	63	17	35	7235
2	5	0.5	10	2	1	2978	37	6	2	4774	64	11	4	8113
		0.7	11	3	4	4532	38	6	5	6108	65	12	8	9232
		0.9	12	4	15	10885	39	9	16	11880	66	13	20	14436
	10	0.5	13	2	2	3599	40	6	4	5558	67	11	5	9126
		0.7	14	3	6	5758	41	6	7	7348	68	12	10	10629
		0.9	15	4	20	13879	42	9	20	15285	69	13	24	17426
	30	0.5	16	2	4	4657	43	6	5	6724	70	11	8	10580
		0.7	17	3	9	7758	44	6	10	9349	71	10	12	12651
		0.9	18	4	27	18385	45	4	27	20210	72	13	31	22016
6	5	0.5	19	2	1	7108	46	3	1	10210	73	6	2	15842
		0.7	20	3	4	12381	47	3	4	14814	74	6	5	19846
		0.9	21	4	15	31744	48	6	14	33449	75	9	16	36654
	10	0.5	22	2	2	8971	49	3	2	12203	76	6	4	18194
		0.7	23	3	6	16057	50	3	6	18490	77	6	7	23566
		0.9	24	4	20	40725	51	4	20	42550	78	9	20	46870
	30	0.5	25	2	4	12145	52	3	4	15375	79	6	5	21693
		0.7	26	3	9	22058	53	3	9	24491	80	6	10	29567
		0.9	27	4	27	54243	54	4	27	56068	81	4	27	62912

n=1			λ=2											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	82	10	4	1858	109	22	7	3705	136	44	14	7057
		0.7	83	10	7	2157	110	22	12	3940	137	45	24	7287
		0.9	84	13	19	3735	111	22	24	5050	138	42	38	8306
	10	0.5	85	10	5	2085	112	20	9	4055	139	40	17	7593
		0.7	86	10	9	2502	113	19	14	4358	140	40	26	7933
		0.9	87	13	24	4721	114	22	29	5896	141	36	39	9293
	30	0.5	88	9	7	2442	115	19	12	4519	142	39	21	8300
		0.7	89	12	13	3052	116	19	18	4958	143	40	32	8817
		0.9	90	8	31	6140	117	22	37	7241	144	36	48	10788
2	5	0.5	91	5	2	4437	118	11	4	8115	145	22	7	14818
		0.7	92	5	5	5846	119	12	8	9275	146	22	12	15759
		0.9	93	8	18	12889	120	13	19	15500	147	22	24	20201
	10	0.5	94	5	3	5195	121	10	5	9070	148	20	9	16220
		0.7	95	5	7	7080	122	12	10	10664	149	19	14	17434
		0.9	96	8	23	16346	123	13	24	19445	150	22	29	23585
	30	0.5	97	5	5	6383	124	10	7	10502	151	19	12	18077
		0.7	98	5	9	9080	125	12	13	12817	152	19	18	19834
		0.9	99	8	31	21823	126	8	31	25473	153	22	37	28966
6	5	0.5	100	3	2	9729	127	6	2	15976	154	13	4	27573
		0.7	101	5	5	14617	128	6	5	19979	155	13	8	30703
		0.9	102	6	16	36826	129	8	18	40493	156	15	20	48337
	10	0.5	103	3	3	11805	130	6	4	18371	157	11	5	30676
		0.7	104	5	7	18319	131	6	7	23759	158	12	10	35034
		0.9	105	8	23	47213	132	8	23	50863	159	15	25	60096
	30	0.5	106	3	4	15081	133	6	5	22060	160	11	8	35037
		0.7	107	5	9	24320	134	6	10	29996	161	12	13	41493
		0.9	108	8	31	63644	135	8	31	67294	162	15	35	79265

n=1			λ=8											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	163	19	6	3358	190	43	14	7059	217	83	27	13737
		0.7	164	21	12	3605	191	45	24	7272	218	83	44	13966
		0.9	165	22	25	4903	192	45	39	8195	219	86	67	14497
	10	0.5	166	18	8	3690	193	41	17	7587	220	83	34	14593
		0.7	167	19	14	4027	194	41	27	7910	221	83	52	14951
		0.9	168	22	30	5851	195	44	45	9275	222	86	76	15762
	30	0.5	169	17	11	4150	196	41	22	8292	223	77	39	15662
		0.7	170	18	17	4645	197	41	32	8780	224	77	56	16205
		0.9	171	22	39	7401	198	39	51	10943	225	86	87	17540
2	5	0.5	172	10	3	7444	199	21	7	14850	226	43	14	28235
		0.7	173	10	7	8656	200	21	12	15809	227	44	24	29120
		0.9	174	13	20	15542	201	22	25	20939	228	45	39	32780
	10	0.5	175	10	5	8360	202	21	9	16252	229	41	17	30348
		0.7	176	10	9	10049	203	21	15	17537	230	41	27	31638
		0.9	177	13	26	19640	204	22	30	24732	231	44	45	37099
	30	0.5	178	9	7	9802	205	19	12	18210	232	41	22	33166
		0.7	179	9	12	12236	206	21	19	20101	233	37	30	35113
		0.9	180	12	35	26247	207	22	39	30931	234	39	51	43773
6	5	0.5	181	6	2	14732	208	12	4	27552	235	25	8	50752
		0.7	182	6	5	18773	209	14	9	30797	236	25	14	53554
		0.9	183	6	17	40788	210	15	21	50035	237	28	28	67673
	10	0.5	184	5	3	17013	211	12	6	30698	238	25	11	55368
		0.7	185	6	7	22514	212	12	10	35089	239	25	17	59231
		0.9	186	6	22	51794	213	14	26	61842	240	28	34	79448
	30	0.5	187	5	5	20619	214	10	7	35269	241	22	13	61616
		0.7	188	6	10	28662	215	12	13	41778	242	22	20	67182
		0.9	189	6	31	69587	216	14	35	80759	243	28	43	98856

n=5			λ=0.5											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	244	5	-1	819	271	11	-1	1744	298	21	-1	3424
		0.7	245	5	0	894	272	11	0	1820	299	23	0	3530
		0.9	246	7	2	1220	273	11	2	2081	300	22	4	3728
	10	0.5	247	5	0	909	274	10	0	1885	301	21	0	3650
		0.7	248	5	1	1025	275	11	1	1999	302	20	2	3811
		0.9	249	7	4	1466	276	11	4	2360	303	22	6	4099
	30	0.5	250	4	1	1059	277	10	1	2094	304	19	2	3952
		0.7	251	5	2	1217	278	11	3	2268	305	19	4	4205
		0.9	252	7	6	1854	279	11	7	2807	306	17	8	4625
2	5	0.5	253	3	-1	1833	280	5	-1	3642	307	11	-1	6978
		0.7	254	3	0	2145	281	5	0	3943	308	11	0	7279
		0.9	255	3	2	3603	282	7	2	5142	309	11	2	8322
	10	0.5	256	2	0	2070	283	5	0	4003	310	10	0	7541
		0.7	257	3	1	2642	284	5	1	4465	311	11	1	7996
		0.9	258	3	3	4532	285	7	4	6126	312	11	4	9441
	30	0.5	259	2	0	2595	286	5	1	4629	313	10	1	8374
		0.7	260	3	2	3335	287	5	2	5234	314	11	3	9072
		0.9	261	3	6	5983	288	7	6	7678	315	11	7	11230
6	5	0.5	262	2	-1	3760	289	3	-1	6717	316	6	-1	12496
		0.7	263	2	0	4735	290	3	0	7651	317	6	0	13365
		0.9	264	3	2	9594	291	3	2	12027	318	7	2	16731
	10	0.5	265	1	0	4377	292	3	0	7554	319	6	0	13678
		0.7	266	2	1	6193	293	3	1	9144	320	6	1	15006
		0.9	267	2	4	12379	294	3	3	14813	321	7	4	19682
	30	0.5	268	1	0	5835	295	3	1	9380	322	6	1	15665
		0.7	269	2	1	8326	296	3	2	11221	323	6	2	17453
		0.9	270	3	6	16733	297	3	6	19167	324	7	6	24338

n=5			λ=2											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	325	10	-1	1568	352	22	-1	3429	379	43	-2	6782
		0.7	326	9	0	1649	353	22	0	3532	380	41	1	6921
		0.9	327	9	2	1916	354	22	4	3746	381	42	6	7161
	10	0.5	328	9	0	1698	355	21	0	3659	382	40	1	7172
		0.7	329	9	1	1811	356	20	2	3816	383	41	4	7395
		0.9	330	9	4	2716	357	22	6	4133	384	42	10	7772
	30	0.5	331	8	1	1894	358	19	2	3961	385	39	4	7658
		0.7	332	9	3	2076	359	19	4	4222	386	41	9	8074
		0.9	333	9	6	2596	360	18	9	4653	387	36	14	8580
2	5	0.5	334	5	-1	3275	361	11	-1	6984	388	22	-1	13716
		0.7	335	5	0	3582	362	11	0	7297	389	22	0	14128
		0.9	336	5	2	4926	363	13	3	8360	390	22	4	14985
	10	0.5	337	5	0	3634	364	10	0	7539	391	21	0	14637
		0.7	338	5	1	4109	365	11	1	8028	392	20	2	15265
		0.9	339	5	4	5934	366	11	4	9501	393	22	6	16532
	30	0.5	340	4	1	4247	367	10	1	8367	394	19	2	15844
		0.7	341	4	2	4873	368	9	3	9116	395	19	4	16889
		0.9	342	5	6	7542	369	9	6	11196	396	18	9	18610
6	5	0.5	343	3	-1	6113	370	6	-1	12465	397	12	-1	24075
		0.7	344	3	0	7027	371	6	0	13365	398	12	0	25077
		0.9	345	3	2	11680	372	7	2	17138	399	13	3	27887
	10	0.5	346	3	0	6928	373	6	0	13650	400	12	0	25864
		0.7	347	3	1	8527	374	6	1	15028	401	11	1	27401
		0.9	348	3	4	14720	375	7	4	20356	402	13	4	31474
	30	0.5	349	3	1	8713	376	6	1	15621	403	11	1	28685
		0.7	350	3	2	10632	377	6	2	17513	404	11	3	30733
		0.9	351	5	6	19705	378	9	6	25476	405	13	7	36955

n=5			λ=8											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	406	19	-1	3073	433	43	-2	6781	460	85	-4	13490
		0.7	407	19	0	3168	434	44	1	6929	461	84	2	13712
		0.9	408	20	3	3396	435	42	6	7180	462	84	11	14084
	10	0.5	409	19	0	3282	436	43	1	7178	463	85	3	14212
		0.7	410	19	2	3429	437	41	4	7421	464	84	9	14601
		0.9	411	17	5	3752	438	39	9	7775	465	81	18	15188
	30	0.5	412	17	2	3568	439	39	4	7673	466	79	8	15089
		0.7	413	17	4	3803	440	37	8	8070	467	77	16	15812
		0.9	414	17	8	4268	441	38	15	8607	468	76	26	16641
2	5	0.5	415	10	-1	6281	442	22	-1	13714	469	43	-2	27124
		0.7	416	10	0	6594	443	22	0	14118	470	44	1	27717
		0.9	417	11	2	7636	444	22	4	15010	471	42	6	28720
	10	0.5	418	9	0	6791	445	21	0	14631	472	43	1	28713
		0.7	419	9	1	7257	446	20	2	15233	473	41	4	29685
		0.9	420	11	4	8743	447	21	6	16527	474	39	9	31100
	30	0.5	421	8	1	7569	448	19	2	15846	475	39	4	30694
		0.7	422	8	2	8289	449	19	4	16858	476	37	8	32280
		0.9	423	9	7	10525	450	18	9	18749	477	38	15	34429
6	5	0.5	424	6	-1	11227	451	12	-1	24081	478	25	-1	47439
		0.7	425	6	0	12140	452	12	0	25080	479	24	0	48651
		0.9	426	6	2	16082	453	13	3	27965	480	24	4	51323
	10	0.5	427	5	0	12339	454	12	0	25896	481	24	0	50470
		0.7	428	5	1	13799	455	11	1	27467	482	24	3	52442
		0.9	429	6	4	19246	456	11	4	31537	483	24	7	56334
	30	0.5	430	5	1	14193	457	11	1	28651	484	22	2	54512
		0.7	431	5	2	16138	458	11	3	30848	485	22	5	57749
		0.9	432	5	6	24363	459	11	7	36944	486	22	10	63421

n=10			λ=0.5											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	487	5	-1	761	514	11	-2	1707	541	22	-3	3378
		0.7	488	5	-1	814	515	11	-1	1742	542	24	-2	3433
		0.9	489	6	0	979	516	11	0	1873	543	22	0	3527
	10	0.5	490	5	-1	843	517	10	-1	1805	544	21	-1	3555
		0.7	491	5	0	907	518	10	0	1883	545	21	0	3656
		0.9	492	6	1	1140	519	10	1	2078	546	22	2	3820
	30	0.5	493	4	0	941	520	10	0	1957	547	21	1	3803
		0.7	494	5	1	1064	521	9	1	2084	548	20	2	3973
		0.9	495	6	3	1402	522	11	2	2532	549	22	5	4241
2	5	0.5	496	3	-1	1551	523	5	-1	3411	550	11	-2	6826
		0.7	497	3	-1	1843	524	6	-1	3611	551	11	-1	6966
		0.9	498	3	1	2632	525	6	0	4219	552	11	0	7492
	10	0.5	499	3	-1	1866	526	5	-1	3738	553	10	-1	7220
		0.7	500	2	0	2117	527	5	0	3995	554	10	0	7532
		0.9	501	3	1	3195	528	6	1	4864	555	10	1	8311
	30	0.5	502	2	0	2132	529	5	0	4135	556	10	0	7826
		0.7	503	2	1	2710	530	5	1	4621	557	9	1	8334
		0.9	504	3	3	4144	531	6	3	5913	558	10	3	9487
6	5	0.5	505	2	-1	2849	532	3	-1	5869	559	6	-1	11847
		0.7	506	2	-1	3907	533	3	-1	6746	560	6	-1	12355
		0.9	507	2	1	6289	534	4	0	8964	561	6	0	14179
	10	0.5	508	2	-1	3839	535	3	-1	6816	562	6	-1	12828
		0.7	509	2	0	4525	536	3	0	7578	563	6	0	13584
		0.9	510	2	1	8030	537	4	1	10714	564	6	1	16111
	30	0.5	511	1	0	4389	538	3	0	7717	565	6	0	14143
		0.7	512	1	1	6220	539	3	1	9349	566	6	1	15544
		0.9	513	2	3	10738	540	3	3	13647	567	6	3	19261

n=10			λ=2											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	568	9	-1	1531	595	22	-3	3380	622	45	-5	6721
		0.7	569	10	-1	1565	596	22	-2	3430	623	44	-3	6795
		0.9	570	10	0	1693	597	21	0	3549	624	42	1	6948
	10	0.5	571	9	-1	1619	598	21	-1	3557	625	40	-4	7225
		0.7	572	9	0	1698	599	20	0	3649	626	42	1	7197
		0.9	573	10	1	1895	600	20	2	3844	627	42	1	7648
	30	0.5	574	9	0	1759	601	20	1	3804	628	40	1	7427
		0.7	575	8	1	1889	602	20	2	3959	629	40	4	7707
		0.9	576	8	0	3227	603	19	5	4250	630	38	8	8085
2	5	0.5	577	5	-1	3051	604	11	-2	6830	631	22	-3	13518
		0.7	578	5	-1	3245	605	11	-1	6977	632	22	-2	13721
		0.9	579	6	0	3926	606	11	0	7478	633	21	0	14195
	10	0.5	580	5	-1	3375	607	11	-1	7226	634	21	-1	14228
		0.7	581	5	0	3621	608	10	0	7534	635	20	0	14596
		0.9	582	6	1	4573	609	11	2	8311	636	20	2	15376
	30	0.5	583	4	-1	4673	610	9	0	7848	637	20	1	15216
		0.7	584	5	1	4240	611	10	1	8361	638	20	2	15837
		0.9	585	6	3	5608	612	10	3	9495	639	19	5	17000
6	5	0.5	586	3	-1	5277	613	6	-1	11822	640	13	-2	23554
		0.7	587	3	-1	6113	614	6	-1	12360	641	12	-1	24043
		0.9	588	3	1	8580	615	7	0	14194	642	13	0	25498
	10	0.5	589	3	-1	6235	616	6	-1	12822	643	12	-1	24910
		0.7	590	3	0	6958	617	6	0	13599	644	12	0	25836
		0.9	591	3	1	10363	618	6	1	16153	645	13	2	28154
	30	0.5	592	3	0	7159	619	6	0	14170	646	11	0	26931
		0.7	593	3	1	8757	620	6	1	15552	647	12	1	28588
		0.9	594	3	3	13269	621	6	3	19256	648	11	3	32053

n=10			λ=8											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	649	19	-2	3027	676	43	-5	6719	703	83	-9	13407
		0.7	650	20	-1	3079	677	43	-3	6793	704	85	-5	13514
		0.9	651	19	0	3190	678	44	1	6947	705	84	1	13744
	10	0.5	652	18	-1	3187	679	42	-1	7062	706	83	-2	14043
		0.7	653	18	0	3280	680	40	1	7197	707	82	1	14251
		0.9	654	18	2	3462	681	41	4	7439	708	84	8	14654
	30	0.5	655	18	0	3416	682	39	1	7434	709	83	3	14714
		0.7	656	17	2	3571	683	40	4	7709	710	82	7	15169
		0.9	657	17	4	3857	684	38	8	8103	711	75	15	15859
2	5	0.5	658	9	-1	6130	685	22	-3	13513	712	43	-5	26876
		0.7	659	10	-1	6260	686	22	-2	13732	713	43	-3	27173
		0.9	660	10	0	6772	687	22	0	14202	714	44	1	27788
	10	0.5	661	9	-1	6487	688	21	-1	14229	715	42	-1	28247
		0.7	662	9	0	6786	689	20	0	14613	716	40	1	28789
		0.9	663	10	1	7582	690	20	2	15378	717	41	4	29757
	30	0.5	664	9	0	7061	691	21	1	15230	718	39	1	29735
		0.7	665	8	1	7567	692	20	2	15868	719	40	4	30835
		0.9	666	9	3	8740	693	19	5	17034	720	38	4	34565
6	5	0.5	667	6	-1	10598	694	13	-2	23539	721	25	-3	46701
		0.7	668	6	-1	11154	695	12	-1	24072	722	25	-2	47406
		0.9	669	6	0	13048	696	13	0	25533	723	24	0	48861
	10	0.5	670	5	-1	11581	697	12	-1	24919	724	24	-1	49195
		0.7	671	5	-1	13201	698	12	0	25885	725	24	0	50380
		0.9	672	6	1	15017	699	12	2	28161	726	24	3	52780
	30	0.5	673	5	0	12799	700	12	0	26981	727	24	1	52385
		0.7	674	5	1	14196	701	11	1	28537	728	23	2	54573
		0.9	675	6	1	22077	702	11	3	32075	729	22	5	58275

n=50			λ=0.5											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	730	5	-1	735	757	11	-2	1663	784	21	-4	3333
		0.7	731	5	-1	738	758	11	-2	1673	785	23	-4	3356
		0.9	732	5	-1	766	759	11	-2	1706	786	22	-3	3378
	10	0.5	733	5	-1	750	760	10	-1	1742	787	21	-2	3480
		0.7	734	5	-1	769	761	10	-1	1750	788	21	-2	3508
		0.9	735	5	-1	852	762	10	-1	1804	789	20	-1	3564
	30	0.5	736	5	-1	808	763	10	-1	1805	790	20	-1	3597
		0.7	737	5	-1	892	764	10	-1	1878	791	21	-1	3681
		0.9	738	5	-1	1198	765	10	0	1961	792	20	0	3806
2	5	0.5	739	2	-1	1329	766	5	-1	3304	793	11	-2	6651
		0.7	740	2	-1	1392	767	5	-1	3317	794	11	-2	6693
		0.9	741	3	-1	1613	768	5	-1	3429	795	11	-2	6822
	10	0.5	742	2	-1	1393	769	5	-1	3363	796	10	-1	6969
		0.7	743	2	-1	1529	770	5	-1	3440	797	10	-1	6999
		0.9	744	3	-1	2007	771	6	-1	3767	798	10	-1	7217
	30	0.5	745	2	-1	1650	772	5	-1	3598	799	10	-1	7219
		0.7	746	2	0	2008	773	5	-1	3932	800	10	-1	7510
		0.9	747	2	0	2312	774	5	0	4202	801	10	0	7845
6	5	0.5	748	1	-1	2044	775	3	-1	5348	802	6	-1	11568
		0.7	749	1	-1	2335	776	3	-1	5461	803	6	-1	11612
		0.9	750	2	-1	3189	777	3	-1	6057	804	6	-1	11817
	10	0.5	751	1	-1	2263	778	3	-1	5532	805	6	-1	11748
		0.7	752	2	-1	2762	779	3	-1	5844	806	6	-1	11980
		0.9	753	2	0	4217	780	4	-1	7205	807	6	-1	12822
	30	0.5	754	2	-1	3125	781	3	-1	6268	808	6	-1	12466
		0.7	755	1	0	4049	782	3	0	7361	809	6	-1	13452
		0.9	756	2	0	5110	783	3	0	8161	810	6	0	14246

n=50			λ=2											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	811	10	-2	1485	838	22	-4	3336	865	43	-7	6671
		0.7	812	10	-2	1497	839	22	-4	3346	866	43	-6	6676
		0.9	813	10	-2	1533	840	22	-3	3375	867	45	-5	6717
	10	0.5	814	9	-1	1549	841	21	-2	3485	868	42	-4	6969
		0.7	815	9	-1	1564	842	22	-2	3504	869	43	-3	6986
		0.9	816	10	-1	1621	843	21	-1	3559	870	41	-2	7059
	30	0.5	817	9	-1	1610	844	20	-1	3602	871	41	-1	7213
		0.7	818	9	-1	1691	845	21	-1	3679	872	39	-1	7280
		0.9	819	9	0	1774	846	20	0	3811	873	41	1	7452
2	5	0.5	820	5	-1	2935	847	11	-2	6663	874	22	-4	13343
		0.7	821	5	-1	2954	848	11	-2	6691	875	22	-4	13382
		0.9	822	5	-1	3066	849	11	-2	6819	876	22	-3	13501
	10	0.5	823	5	-1	2994	850	10	-1	6953	877	21	-2	13940
		0.7	824	5	-1	3077	851	10	-1	7005	878	22	-2	14018
		0.9	825	5	-1	3413	852	10	-1	7216	879	21	-1	14238
	30	0.5	826	5	-1	3229	853	10	-1	7197	880	20	-1	14407
		0.7	827	5	-1	3569	854	10	-1	7513	881	21	-1	14715
		0.9	828	5	0	3845	855	10	0	7852	882	20	0	15242
6	5	0.5	829	3	-1	4739	856	6	-1	11587	883	12	-2	23148
		0.7	830	3	-1	4875	857	6	-1	11618	884	12	-2	23198
		0.9	831	3	-1	5456	858	6	-1	11852	885	13	-2	23545
	10	0.5	832	3	-1	4922	859	6	-1	11768	886	12	-1	24232
		0.7	833	3	-1	5257	860	6	-1	11985	887	12	-1	24321
		0.9	834	3	-1	6639	861	6	-1	12882	888	12	-1	24881
	30	0.5	835	3	-1	5653	862	6	-1	12491	889	12	-1	24959
		0.7	836	3	0	6770	863	6	-1	13452	890	12	-1	25880
		0.9	837	3	0	7531	864	6	0	14333	891	12	0	27015

n=50			λ=8											
			k=10				k=50				k=200			
h	p/h	ρ	Case	q	r	cost	Case	q	r	cost	Case	q	r	cost
0.5	5	0.5	892	19	-3	2987	919	43	-7	6670	946	85	-14	13336
		0.7	893	19	-3	2994	920	43	-6	6680	947	87	-13	13345
		0.9	894	20	-3	3028	921	44	-5	6721	948	86	-10	13412
	10	0.5	895	19	-2	3115	922	41	-1	6973	949	85	-7	13934
		0.7	896	19	-2	3140	923	43	-3	6991	950	84	-6	13963
		0.9	897	18	-1	3186	924	41	-2	7071	951	83	-3	14075
	30	0.5	898	18	-1	3224	925	40	-1	7209	952	81	-2	14403
		0.7	899	18	-1	3298	926	41	-1	7280	953	82	-1	14488
		0.9	900	18	0	3413	927	40	1	7461	954	79	2	14778
2	5	0.5	901	10	-2	5937	928	22	-4	13341	955	43	-7	26680
		0.7	902	10	-2	5983	929	23	-4	13390	956	43	-7	26721
		0.9	903	10	-2	6135	930	22	-3	13504	957	44	-5	26883
	10	0.5	904	9	-1	6199	931	21	-2	13937	958	41	-4	27891
		0.7	905	9	-1	6250	932	21	-2	14015	959	43	-3	27964
		0.9	906	9	-1	6482	933	21	-1	14231	960	41	-2	28286
	30	0.5	907	9	-1	6442	934	20	-1	14413	961	40	-1	28838
		0.7	908	9	-1	6756	935	20	-1	14708	962	41	-1	29119
		0.9	909	9	0	7083	936	20	0	15241	963	40	1	29844
6	5	0.5	910	5	-1	10263	937	12	-2	23149	964	25	-4	46186
		0.7	911	5	-1	10325	938	12	-2	23203	965	25	-4	46335
		0.9	912	6	-1	10630	939	13	-2	23526	966	25	-3	46736
	10	0.5	913	5	-1	10443	940	12	1	24229	967	24	-2	48327
		0.7	914	5	-1	10695	941	12	-1	24314	968	24	-2	48503
		0.9	915	6	-1	11653	942	12	-1	24889	969	24	-1	49239
	30	0.5	916	5	-1	11161	943	12	-1	24960	970	24	-1	49950
		0.7	917	5	-1	12175	944	12	-1	25864	971	23	-1	50767
		0.9	918	5	0	12989	945	12	0	27012	972	23	0	52554