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Marcel Sieke

Supply Chain Contract Management

A Performance Analysis of Efficient
Supply Chain Contracts

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*And then, that hour the star rose up,
the clearest, brightest star, that always heralds
the newborn light of day, the deep-sea-going ship
made landfall on the island ... Ithaca, at last.
(The Odyssey, Book 13, Homer)*

Sometimes the PhD process felt like the Odyssey: You are determined to finish the voyage one day, but sometimes you get blown off your course and you have to find your way through. Fortunately, my Odyssey was significantly shorter and less perilous than the original one and the existence of this book should be evidence enough of the successful completion. However, what this work does not adequately show are the people I met on this voyage. For them I would like to dedicate some words.

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Cologne, July 2008

Marcel Sieke

Contents

List of Tables	xi
List of Figures	xiii
List of Abbreviations	xv
List of Symbols	xvii
1 Introduction	1
1.1 Motivation	2
1.2 Research Objectives	4
1.3 Outline	6
2 Inventory Management	9
2.1 Basic Concepts of Inventory Management	10
2.1.1 Inventory Types	10
2.1.2 Inventory Systems	11
2.1.3 Reasons for Holding Inventory	12
2.1.4 Types of Inventory Costs	15
2.1.5 Inventory System Characteristics	17
2.1.6 Measuring Inventories	18
2.2 Stochastic Inventory Theory	20
2.2.1 Objective Functions	21
2.2.1.1 Expected Cost Criterion	21

2.2.1.2	Service Level-Based Models	23
2.2.1.3	Alternative Objective Functions	25
2.2.2	Single-Echelon Inventory Control Policies	25
2.2.2.1	Cost Objective	27
2.2.2.2	Service Level Objective	30
2.2.3	Multi-Echelon Inventory Control Policies	33
2.2.3.1	Serial Supply Chain Model	33
2.2.3.2	Allocation Policies for Distribution Sys- tems	34
2.2.3.3	Service Levels in Multi-Echelon Systems	35
3	Supply Chain Contracts	37
3.1	Motivation for Contracts	38
3.2	Classification of Contracts	40
3.3	Contracting Models	42
3.3.1	One-Period Contracting Models	42
3.3.2	Base Stock Contracts	44
4	Service Level Contracts	47
4.1	Introduction	47
4.2	Model Description	49
4.3	Supplier Response	53
4.3.1	Flat Penalty Contract	54
4.3.2	Unit Penalty Contract	57
4.4	Coordinating Contracts	58
4.4.1	Optimal Centralized Solution	59
4.4.2	Coordinating Flat Penalty Contract	60
4.4.3	Coordinating Unit Penalty Contract	64
4.5	Contract Consistent Service Levels	67
4.6	Conclusion	69
4.7	Proofs	70

5	Optimal Inventory Allocation	77
5.1	Introduction	77
5.2	Supply Chain Model	79
5.3	Single-Contract Allocation	83
5.4	Multiple-Contract Allocation	88
5.4.1	Inventory Balancing	89
5.4.2	Contract Balancing	90
5.5	Retailer Performance Analysis	98
5.6	Conclusion	100
5.7	Proofs	101
6	Optimal Channel Selection	109
6.1	Introduction	109
6.2	Supply Chain Model	111
6.3	Manufacturer Solution	115
6.4	Centralized Solution	117
6.5	Supply Chain Optimal Contracts	122
6.5.1	Wholesale Price Contract	122
6.5.2	Equal Share Contract	123
6.5.3	Fair Share Contract	124
6.6	Channel Opportunity Costs	129
6.7	Alternative Holding Costs	133
6.8	Conclusion	135
6.9	Proofs	136
7	Conclusion and Critical Review	143
7.1	Contributions	143
7.2	Critical Review	145
7.3	Future Research	146
	Bibliography	149

List of Tables

6.1	Supply Chain Efficiency	121
6.2	Coordinating Equal Share Contracts	126
6.3	Expected Profits of Coordinating Equal Share Contracts	127
6.4	Coordinating Fair Share Contracts	128
6.5	Expected Profits of Coordinating Fair Share Contracts .	128
6.6	Unselective vs. Selective Supply Chain	130

List of Figures

2.1	Distribution System and Serial Supply Chain	13
2.2	Installation and Echelon Stock	20
3.1	Supply Chain with Physical, Financial, and Information Flows	39
4.1	Demand Space Partitioning	54
4.2	Holding Cost, Penalty Cost, and Total Cost for a Flat Penalty Contract	56
4.3	Weighted Demand Partition	56
4.4	Holding Cost, Penalty Cost, and Total Cost for a Unit Penalty Contract	58
4.5	Coordinating Flat Penalty Contracts	62
4.6	Penalty Payment Probabilities for Different Service Levels	63
4.7	Coordinating Unit Penalty Contracts	65
4.8	Expected Number of Units Short for Different Service Levels	66
4.9	Consistent Contracts with $\alpha = 50\%$ and $\beta = 82.75\%$. .	68
5.1	Supply Chain Setup	80
5.2	Demand Partitions for $SL < 1$ and $S_{i1} \ll R$	85
5.3	Demand Partition for $SL < 1$ and $S_{i1} \leq R$	86
5.4	Demand Partition for $SL = 1$	87

5.5 Contract Inventory Level 93

5.6 Contract Sets for Optimization 95

5.7 Contract Balancing vs. Inventory Balancing 96

5.8 Expected Costs for Different ω and R 97

5.9 Expected Backorders and Expected Costs 100

6.1 Supply Chain Setup 112

List of Abbreviations

c.c.d.f.	Complementary Cumulative Distribution Function
c.d.f.	Cumulative Distribution Function
cf.	Confer
CR	Critical Ratio
CV	Coefficient of Variation
DCF	Discounted Cash Flow
e.g.	Exempli gratia
et al.	Et alii
HP	Hewlett-Packard
i.e.	Id est
i.i.d.	Independent and identically distributed
IT	Information Technology
MTO	Make-to-Order
p.d.f.	Probability Density Function
POS	Point of Sale
ROI	Return on Investment
RPM	Resale Price Maintenance
SC	Supply Chain
s.t.	Such that

U.S.	United States
VaR	Value-at-Risk
VMI	Vendor-Managed Inventory
VP	Vice President
vs.	Versus
WACC	Weighted Average Cost of Capital
WIP	Work-in-Process

List of Symbols

α	Type I-Service, In-Stock Probability
β	Type II-Service, Fill Rate
B	Expected Backorder Level
BO	Backorder Level
b	Unit Backorder Cost; Buyback Price
C	Total Cost
CR	Critical Ratio
c	Unit Purchasing or Production Cost
c_u	Unit Underage Cost
c_o	Unit Overage Cost
D	Demand Random Variable
$d(\cdot)$	Distribution Cost Function
E	Expectation
$F(\cdot)$	Demand c.d.f.
$f(\cdot)$	Demand p.d.f.
g	Loss-of-Goodwill Cost
γ	Type III-Service
h	Unit Holding Cost

I	Expected Inventory Level
IL	Inventory Level
IP	Inventory Position
K	Fixed Cost
L_x	Lead Time to Echelon x
λ	Profit Share Factor
μ	Mean Demand
N	Number of Retailers
O	Opportunity Cost
OH	On-Hand Inventory
OO	Open Orders (Pipeline Stock)
P	Penalty Cost Function
Π	Total Profits
$\hat{\Pi}$	Reservation Profit
Q	Order Quantity; Batch Size
R	Production Size; Review Period
r	Unit Selling Price
ω	Reservation Factor
S	Order-Up-To Level; Shipment Quantity
SL	Contract Service Level
s	Reorder Point
σ	Standard Deviation
T	Number of Periods
t	Time Index
t_x	Transfer Payment to x

u	Revenue Sharing Fraction
$u(\cdot)$	Variability Cost Function
V	Coalition
v	Salvage Value
$v(\cdot)$	Value Function
w	Wholesale Price
x	Supply Chain Channel Configuration
ξ	Demand Random Variable
y	Base Stock Level
$\emptyset$	Empty Set
$\#$	Number
$ \dots $	Vector Sum Operator
$\cdot^*$	Optimality (superscript)
$(x)^+$	Positive Part of x , i.e., $\max\{x; 0\}$