Chapter 7

Conclusion and Critical Review

In this thesis, we have presented approaches for designing efficient supply chain contracts. We used an alternative formulation of the service level metric that allowed us to design contracts that are enforceable and easy to understand. Furthermore, we analyzed how demand variability can be consciously admitted to the supply chain and how this admission policy affects the pricing policy.

In this chapter, we conclude the thesis and summarize our main findings. More precisely, we highlight our contributions to current research and we critically review our models. Last, we provide an outlook into further research possibilities on the proposed contracts.

7.1 Contributions

In Chapter 4, we used a finite-horizon service level measure that was proposed by Thomas (2005). We developed two different service level contracts, a flat penalty and a unit penalty contract. We used these contracts to develop a supply chain model that is similar to Cachon and
Zipkin (1999). Thereby, we could identify optimal contract values for these service level contracts and could compare these values with the traditional service level measures. This issue has not been analyzed in literature yet. Our analysis is based on the log-concave property of the demand distribution. We derived contract parameter values for both contract types that are able to coordinate the supply chain. We also found out that it is not always optimal for the manufacturer to offer the supplier a contract with a high service level and a high penalty payment at the same time. Rather, the manufacturer has to take the supplier’s response into account when deciding on optimal contract parameters.

In Chapter 5, we extended current research on inventory allocation models, as for example proposed by McGavin et al. (1993) and van der Heijden (1999). We have shown that a manufacturer can realize significant cost savings from the risk pooling effect among the retailers and that an optimal allocation strategy can further enhance a manufacturer’s profit. We developed the contract balancing approach that excludes retailers whose last period demand was exceptionally high or low from subsequent replenishments. Our analyses also show that the contract balancing approach deviates significantly from the traditional inventory balancing approach that replenishes the retailer with the lowest inventory level first and that this deviation can lead to incentive conflicts between manufacturer and retailers.

In Chapter 6, we proposed a model that selectively admits variability to the supply chain. This issue has not been analyzed in literature until now. We have shown that it is beneficial for a manufacturer to exclude some retailers or distribution channels. We derived an efficient optimization approach to find the profit maximizing channel selection and developed a wholesale pricing scheme that leads to a coordinated supply chain. We also extended our model to situations where channel opportunity costs are relevant. In addition, we use a game theoretic model - the Shapley value - to allocate profits fairly among the retailers.