

Foreword

Revenue management has been successfully applied to service-oriented industries for a long time. In the more recent past, besides these classical application areas, it has been introduced to other production and logistics processes as well.

For the automobile industry so far, only a few revenue management models have been developed but practically none for its used car sector. Being a sector with suitable prerequisites and a low profit margin, this is a promising application area for price-based revenue management. As used cars are “individual” and “durable” goods – unlike seat or room bookings –, a different approach is necessary with “dynamic pricing” as the main control strategy. A somewhat similar problem can only be found in the real estate sector.

Thus, a conceptual framework of an appropriate revenue management model based on dynamic pricing must be developed. Using current and historical market data, the price-response function has to be estimated which then can serve as the basis for determining the optimal dynamic pricing strategy.

For two central components of this framework, optimization and estimation, innovative approaches are proposed.

Based on results from Control Theory, different possible models are suggested and extensively evaluated. Finally, a stochastic discrete-time model is identified as the most appropriate. With this, it is possible to develop iterative algorithms to determine the optimal pricing strategy even for problems without closed-form solution.

For estimating the specific demand function for a specific type of used car, methods from Survival Analysis are introduced, based on available market data and evaluated, with an accelerated failure time model resulting as the most fitting.

The conceptual work, the development of the model, the software implementation, and its evaluation based on practical data provide various valuable results for this area of research.

The proposed comprehensive dynamic pricing model (data, demand, estimation, optimization, pricing etc.) provides new theoretical insight for the revenue management in the used car sector.

But besides these contributions to theory, the results are also of great practical value. Being developed in close cooperation with experts from practice, this framework has already been implemented in software, thoroughly evaluated and successfully applied to real-world data.

With its novel modeling and algorithmic concepts as well its strong economic results, this contribution will be of interest to both researchers and practitioners alike.

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