The estimation problem of dynamic pricing

We consider the following generic estimation problem in dynamic pricing. A firm sells a single product over a finite selling season. However, it can only observe purchases. It wishes to estimate (i) market-size (ii) price-sensitivity. This problem is not estimable. However in many RM and retail settings there is competition and firms have access to competitor price information. This by itself is not enough for identification either. But in many industries firms also have access to aggregate competitor sales information. We exploit this to estimate not just market-size and price-sensitivity but also a competitor attractiveness factor. Further complications in the real-world are endogeneity of price and market-size, unobservable competitor initial capacity, capacity-constrained sales and network effects. Surprisingly some of these complications actually help in identifying the parameters of the model. We survey related methods from network tomography and marketing and compare the performance of our method with them on synthetic as well as real hotel data sets. (joint work with Muge Tekin, UPF)