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Title: Price Optimization and Competition for Multi-products under the Nested Logit Model with Product-differentiated Price Coefficients

Abstract: This paper studies that firms sell multiple differentiated substitutable products and customer demand follows the Nested Logit model, of which the Multinomial Logit model is a special case. In the Nested Logit model, customers make product selection decision sequentially: they first select a class or a nest of products and subsequently choose a product within the selected class. We consider the general Nested Logit model with product-differentiated price coefficients and general nest-heterogenous degrees and show that the *adjusted markup*, which is defined as price minus cost minus the reciprocal of the price coefficient, is constant across all the products in each nest at optimal prices. When optimizing multiple nests of products, the *adjusted nested markup* is also constant for each nest. By using this result, the multi-product or the multi-nest optimization problem can be reduced to a single-dimensional problem in a bounded interval, which is easy to solve. We also use this result to simplify the oligopolistic price competition and characterize the Nash equilibrium. Furthermore, we investigate its application in dynamic pricing and revenue management, and extend to the Nested Attraction model.

Joint work with Guillermo Gallego.