

## Statistical properties of relation between sales and prices in retail

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We analyze a huge amount of retail sales data. It is consisted of about 1.2 million kinds of items sold in about 300 supermarkets in Japan for the period of 1988-2005. The time stamp is daily and the numbers of sold items in each supermarket are recorded with prices. In the field of marketing science Tellis analyzed about 350 kinds of items on the relation between sales numbers and prices [1]. Here, we follow the similar analysis for the whole 1.2 million kinds of items.

In order to evaluate the relation between sales and prices quantitatively, we observe the price elasticity. The price elasticity is defined as  $e \equiv -(ds/s)/(dp/p)$ , where  $s$  and  $p$  denote sales numbers and prices, respectively, and  $ds$  and  $dp$  represent the increase of sales numbers when the price is changed to  $p+dp$ . For most cases the value of  $e$  can be estimated independent of the value of  $p$ , that means,  $s$  and  $p$  satisfies an inverse power law. It is confirmed that the values of elasticity take similar values for those items in the same category such as instant noodles. There is a tendency for foods that the price elasticity of short life items is generally smaller than those of long life items. This is a natural consequence that long life foods can be stored, so that more sales are expected than short life items which go bad easily. This is true for both store-side and customer-side. This is just one example of our analysis and more detail results will be presented in my talk.

[1] GERARD J. TELLIS, Journal of Marketing Research Vol. XXV 331-341 November 1988