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Session 1: Index theory and practice

Dynamic pricing as a challenge for consumer price statistics

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The online market is increasingly gaining in importance. Consumers buy more and more goods on the online market due to the great variety of product offers and time saving. For the German Consumer Price Statistics, which comprises the National Consumer Price Index (CPI) and the Harmonised Index of Consumer Prices (HICP), the Federal Statistical Office (FSO) collects approximately 10,000 prices for products on websites of online retailers. The share of these products on the overall basket of goods and services amounts to approximately five per cent and will probably be rising in the forthcoming years. Furthermore, prices for services are collected online as well.

Thanks to fairly easy to adjust prices on the internet, shops are able to react to market conditions or consumer's behaviour by adjusting prices automatically in short intervals, applying algorithms that take into account different parameters. This phenomenon is known as dynamic pricing. First studies investigating dynamic pricing in Germany have shown that different variants of dynamic pricing exist and are very heterogeneous and not transparent. Dynamic pricing of online shops may lead to a bias in the index calculation since the traditional way of price collection via internet is done generally at one time during the month due to limited resources and therefore cannot capture rapidly changing prices.

For this reason, the FSO conducted a study concerning the incidence of dynamic pricing and used the technique of web scraping to collect online prices in short intervals. With the help of modern IT tools, automated price collections may be initiated at any time of the day, week or month with infinite repetitions. Therefore, a survey of roughly 2,700 products, distributed among 14 online shops, was compiled and their prices were collected hourly and seven days a week for nearly three months. Findings of the study relate to the frequency of and mechanism behind price changes of every single online shop, as well as main targets for dynamic pricing in terms of product groups. One main implication may be an increased use of web scraping techniques for the monthly price collection on websites for certain shops. A further solution would be the use of transaction data (scanner data) to capture all dynamic and individualized prices on the market.