

SALES AND PURCHASES DISTRIBUTIONS OF BOOKS, CDS, AND DVDS IN ONLINE STORE

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In this presentation, we show the result to analyze the real sales data of the books, CDs, DVDs in online store. The data which we analyze is the data taken from “Rakuten Books” (<http://books.rakuten.co.jp/>), which is one of the biggest online stores in Japan, and the target term is from April 2005 to March 2007 [1]. In the presentation, we also compare it to the result of analyzing POS data of over 2,000 bookstores in all areas of Japan [2]. Note that this research was done as an analysis by Rakuten Institute of Technology, and the data do not include any personal information.

As a result of analysis, it became clear that the distributions of the sales volume of books, CDs, and DVDs follow power law respectively (Fig.1). Power law in a market means that there are very few top sale products while the rest of them sold few, and surprisingly all of products in the market follow a simple statistical law. The results are observed in the case of annual sales and monthly sales. In addition, it became clear that the distributions of the purchases volume of books, CDs, and DVDs follow power law respectively, too (Fig.2).

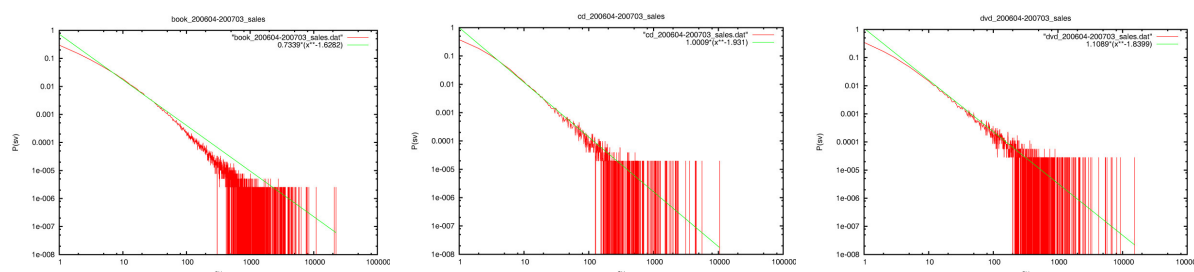


Fig.1 Sales Distributions of Books, CDs, DVDs

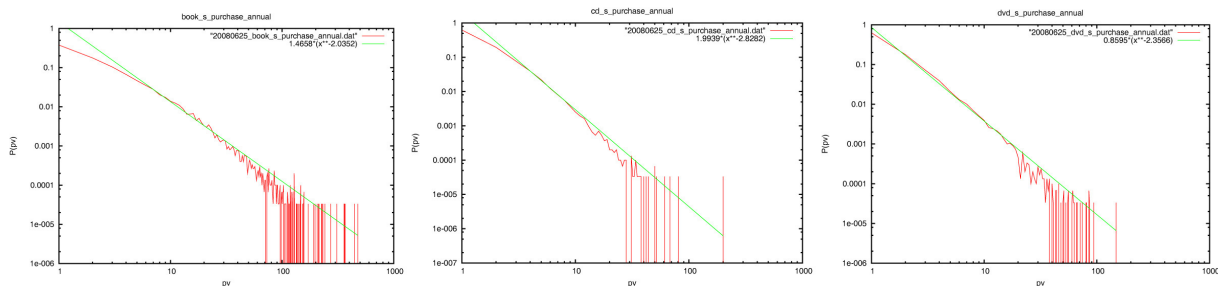


Fig.2 Purchases Distributions of Books, CDs, DVDs

The result has two significant implications. First, the macroscopic law is emerged from the interactions despite that the customers buy products by their own decision. It means that the law is called as an “emergent order” in market level, which cannot be reduced to individual level. Second, the fact that the law is the “power law” implies that the fundamental mechanism is similar to other natural and social phenomena. Therefore there is chance to understand the market mechanism analogically by knowing that of other phenomena.

When the consumers purchase products, they are mostly influenced by friends' opinions, window advertisements, or mass media. The choice of products by each consumer is “contingent”, which means that the individual result of selection is not inevitable and it can be otherwise. However, the order in the market is generated by accumulating of the result of the contingency. It is because the exposure of top sales affects the choice of other consumers. The kind of multilayered interactions make the market self-organize to critical state.

The fact that the law we found in the market is “power law” implies that the fundamental principle of self-organization is similar to other natural and social phenomena that follows the power law [3][4][5]. From the principle of “universality” in non-equilibrium physics, the phenomena which belong to the same class of universality work in the same mechanism to form the order. It means that there is chance to understand the market mechanism analogically by knowing that of other phenomena, like avalanches on sand pile, earthquakes, or growth of cities. Here is a new way to understand market and consumers behavior.

This approach can lead us to understand the mesoscopic mechanism, which it is difficult to investigate in the study of consumer’s behavior due to the difficulty of observation. As a conclusion, finding the power-law distribution in the market is important not only because it is the “emergent order”, but also because it opens up new chance to study market and consumers behavior with using the analogy from systems belonging to same class.

Keywords

Sales analysis, purchase analysis, power law, self-organizing criticality

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