Summaries

Position and Dynamics of the Information Sector within the Industrial Structure

Satoshi Egami

For this chapter, our aim is to examine the direction in which the advanced information society is headed. The proliferation of electronic information in the age of the Internet has engendered enormous change not only in industry but also in the consumer economy and daily life. In this chapter, we perform a semi-macroeconomic analysis of the dynamics of the information sector at an industrial level. We use input-out tables for this analysis. More specifically, we use input-output tables prepared by a consortium of 10 governmental agencies including the Ministry of Internal Affairs and Communications. These input-output tables break out individual industrial sectors, including the information and communications sector, and data represented by these tables are well-suited for performing an economic analysis of an information society.

Our analysis examines the position and dynamics of the information and communications industry within Japan's industrial structure. Our approach isolates information-and-communications-related industrial sectors from among the goods-oriented primary and secondary industries, and services-oriented tertiary industries, and defines these collectively as the "information and communications sector." All other industrial sectors are grouped together as "other sectors." We then analyze the relationships between the information and communications sector and other sectors.

How to perceive information in an information-oriented society is an important question. We begin by referring to *Detabesu no Chishiki* (Understanding Databases) by Akira Yamazaki (Nikkei , Inc., 1986) for a general understanding. From that work, we can picture a pyramid-like structure, starting with actual goods and concepts as a base, supporting (bottom-to-top) data, information, knowledge, and theory (Yamazaki, p43). Our positioning of information follows the basic lines laid out by Yamazaki.

This paper focuses on the question of whether the dynamics of today's industrial society are following this "information, knowledge, theory" progression, in examining the direction in which it is headed and details of its composition. Public education is, of course, critical to the processes that give rise to knowledge and theory. Our view is of an industrial-level process in which information begets information, accumulations of information beget knowledge, and knowledge leads to systematic theories. From a more concrete semi-macroeconomic, industrial sector perspective, we are examining the

question of whether new knowledge industries will emerge. It is from that angle that we examine the information-oriented society.

It is necessary to ensure that information takes a more public direction. Having said that, however, the use of information as a for-profit, private asset in business activities within the reality of a capitalistic society is now firmly rooted. Our aim is to include this double-faced aspect of the information-oriented society in shedding light on the reality of an advanced information-oriented society.

On a Mathematical Model of Market share

Hideo Osawa

In this paper, we examine the probabilistic modeling of market shares for companies or products. In the past, market shares were estimated based on meticulous statistical surveys. Here, we construct a mathematical model of market shares and undertake a theoretical analysis.

Considering that market shares change with changes in consumer selection behavior, we model as a stochastic process changes in numbers of consumers making selections of the subject products. This model is similar to the queuing network models that have become well known in connection with queuing theory, and is formulated as a Jackson network with a Markov routine Jackson Network.

Applying results obtained from queuing theory, it is shown that the model has a product-form stationary distribution, and that result is used as the basis for examining market shares.

The Current Status and Significance of Public Product Testing Magazines

Manao Kidachi, Michiko Takechi

In this paper, we perform a more concrete examination of public consumer information, the topic of this project. Public consumer information is product testing information provided by consumer organizations. Consumers are now faced with a flood of print advertisements, television commercials, and other information put out by companies. In a society in which Internet access is so widespread, the media for communicating this information is highly diverse. And information is delivered by email and other means directly to individual consumers. On the consumer side, word-of-mouth information on products and services is readily exchanged among consumers via services such as Facebook and Twitter. Unlike ever before, consumers can now use smartphones and other devices to access product information whenever and wherever they want it. We now live in an advanced consumer information society.

New problems, however, are emerging. Stealth marketing (commonly referred to as "stema" in Japanese) is but one example. In stealth marketing, what appears to be a recommendation for a particular product is posted on a social networking site or other online resource. In actuality, however, someone connected to the manufacturer or another company with an interest in selling the product has engaged in the malicious activity of pretending to be an ordinary consumer commenting on the product. Through stealth marketing, companies are also able to use social networking sites, for example, to obtain massive amounts of consumer data. In the era of big data, companies can collect consumer data in a highly organized and specialized fashion. Consumers, it can be noted, have seen an increase in their ability to obtain and act on product and other information. Even so, however, the capabilities major companies enjoy in terms of collecting and using information are immensely more specialized than those of consumers. This can be seen as an indicator that an unprecedented level of asymmetric consumer information is giving rise to an unprecedented information gap. Under such conditions, there is a need for more reliable public consumer information. This paper focuses on product testing magazines as a source of consumer information provided by public organizations. It begins with an international comparison of such information magazines, then proceeds with a description of current conditions and problems in Japan, and seeks to identify problem causes.

Analysis of the Activities of the National Consumer Affairs Centers of Japan

Satoshi Egami, Hideo Osawa

We believe that the activities of the National Consumer Affairs Centers of Japan have taken on unprecedented importance in the midst of a highly information-oriented society. Given the research objective of this project, its most important aspect is the analysis of public consumer organizations. Having said that, however, a survey of past research turns up few examples of work focusing on this topic. We, therefore, took it upon ourselves to analyze the activities of public consumer organizations. Our work included an international comparative analysis. We introduce, as one example, the pioneering effort in the UK to encourage consumption of low-salt food products – an initiative that warrants close attention – in an effort to highlight problems in Japan's consumer organizations. The topic we address is closely related to the international comparison of product testing magazines, which was undertaken as part of this research project and constitutes chapter five of the report.

In pursuing our work, we requested consumer centers in core regional economic blocks in Japan to respond to a survey. Responses were received from 15 consumer centers. These centers are affiliated with Aichi, Ehime, Miyagi, Kyoto, Niigata, Kanagawa, and Hyogo Prefectures, and the cities of Yokohama, Kyoto, Matsuyama, Niigata, Kobe, Sendai, Osaka, and Nagoya. Based on a statistical analysis of the data received, we analyzed the problems presently facing consumer centers, and described them in detail.

The accumulation of research on consumer organizations will help to advance consumer protection regulation and consumer information in the direction of greater diversity and abundance for consumers. We believe that economists and others should focus their attention on public organizations directly involved in consumer affairs for the benefit of consumer-protection regulation. The thought that that may contribute to arguments opposing research that supports market fundamentalism, which has given rise to problems such as societies with extreme disparities in wealth, is what motivates our research.

In concluding, we would like to express our thanks to the consumer centers that cooperated with our research by responding to our survey.

Transformation of Consumption Patterns in a Highly Information-Oriented Society

Daisuke Nakanishi

The discussion of the new relationship between marketing and consumption has been underway for some time now. P. Kotler et al., for example, see marketing as evolving over the past 60 years from product-centric, as "marketing 1.0," to consumer-oriented, as "marketing 2.0," and the present values-driven "marketing 3.0."

They point, in particular, to blogs, Twitter, Facebook, and other forms of social media as constituting the environmental change that led to the emergence of marketing 3.0. They argue that consumers, via social media, have come to play a central role in product value creation.

Marketing 3.0, as a stage in which social media has come to the fore, is none other than the highly information-oriented society. And in the view of Kotler et al., because consumers in a highly information-oriented society play a central role in value creation, consumption patterns, defined as "differences in the ways and means of satisfying needs" or "the set of relationships in which a consumer unit becomes involved during the act of consumption," too, can be seen as determined by conscious, deliberate selection behavior on the part of consumers. This view reflects a consumption pattern that differs vastly from the consumption pattern compatible with the logic of capital accumulation, which A. F. Firat, the leading proponent of macro-marketing theory, and others hold is dominant in an advanced capitalistic society.

But in a highly information-oriented society, are consumption patterns really determined by the conscious, deliberate selection behavior of consumers? Or does social media change the consumption pattern compatible with the logic of capital accumulation? If the latter is the case, is it the case that social media plays a public consumer information role in a highly information-oriented society? Such questions would appear to demand consideration in advancing the discussion of the new relationship between marketing and consumption.

This paper, therefore, examines consumption pattern changes in a highly information-oriented society. As such, it is thought that it will also constitute an examination of the potential of public consumer information in a highly information-oriented society.

Macro Analysis of the Information Sector based on 2005 Japan-U.S. Input-Output Tables

Yuya Kawata

The development of information and communication technology (ICT) has undoubtedly facilitated the coordination of production and distribution systems, bringing about greater productivity and making distribution more efficient. In the area of production, the use of ICT has enabled the formation of networks of specialized providers of production, component trading, and other production-related services, reducing lead times and improving production processes. Meanwhile, in distribution, advances in POS functions have resulted in not only greater efficiency in warehouse and order management but also simplified the collection of consumer data, which is used for purposes such as merchandising and product development, as well.

Through such coordination of production and distribution systems, many industries have established network-style organizations and strengthened connections to the information sector. This has made the information sector into a greater contributor to GDP. The flow of added value to the information sector, however, remains opaque; which industry sectors are most strongly connected to the information sector is unclear. There are multiple examples of analysis performed at the micro level, but little, if any, research has been performed at the national level or in the form of international comparisons, making macro analysis of the information sector a contemporary topic.

This paper examines the macroeconomic position of the information sector, which engages in information and communication operations, research and development, and other activities. It does so by applying input-output analysis and focusing on induced value addition (Value Added Induced by Final Demands). More specifically, the 2005 Japan-U.S. Input-output Tables, published by the Japanese Ministry of Economy, Trade and Industry, are analyzed to examine the relationship between the information and other industry sectors in Japan and the U.S. In so doing, it seeks to shed light on differences between Japanese and U.S. attitudes toward production and marketing.

Mathematical and Simulation Models on the Roundabout

Hideo Osawa

In this paper, we examine the efficiency of road intersections not controlled by traffic signals. Many European countries employ roundabouts – intersections that are comprised of circular sections of road that are not controlled by traffic signals. In Japan, as well, several areas are experimenting with roundabouts. The current research uses mathematical models and simulations to compare the efficiency of roundabouts, a traffic control approach still unfamiliar in Japan, to the existing signal-control approach.

This paper begins with an explanation of traffic rules for roundabouts and then proceeds to an examination of a mathematical model based on these rules. Traffic flows within roundabouts are extremely complex and would be too difficult to accurately model or simply subject to logical analysis. This paper, therefore, supplements mathematical modeling with the examination of simulations performed over extremely short discrete time intervals. This research approach was used to model and simulate an actual roundabout in Cambridge, England. Then, to compare to traffic conditions given the use of traffic signals, a simulation was performed on an equivalent, hypothetical intersection. Results indicated that under heavy traffic conditions roundabouts can suffer from significant traffic congestion and become impossible to control. In contrast, for the intersection controlled with traffic signals, traffic flows that were relatively rhythmically stable were observed. Results, in other words, support the inference that the effectiveness of roundabouts depends on traffic volume.

A System of ODEs Describing a Default Risk

Masaaki Nakamura

We introduce systems of ordinary differential equations (ODEs), which nonlinearly extend a looping default model of defaultable firms. Unknown functions are defined through a weighted integral of the tail distribution functions of the first jump time.

We show that various types of solutions with various characters exist, and examine the significance of the results for financial economics.

We also made a numerical simulation of these equations in order to describe the various types of behavior.

Ruin Probability and Ruin Time for the Risk Reserve Process

Makoto Doi

In this paper, we examine the risk reserve process as applied to stochastic economics.

Companies and various other types of legal entities set aside funds as risk reserves (liability reserves) as a matter of course. The key question as, for example, in the case of earthquake or other types of insurance is what amount of resources should be set aside for plausible future large-scale demand.

The first step in addressing this question is to build a mathematical model. In considering probability distributions for the timing of future demands and their scale, however, it is quickly realized that predictions of timing are impossible; that scale is predictable to some extent; and that both involve high degrees of randomness. Exponential distributions, therefore, are applied in both cases. For scale, however, there are times when two or more random variables are summed. One example can be seen in the addition of hospitalization insurance to life insurance.

In the past, the writers have sought to calculate ruin probabilities by building integro-differential equations. On these occasions, however, the ruin probabilities were for processes with substantial passages of time. In this paper, we assumed an initial amount of reserves and succeeded in estimating, with a time constraint, the ruin probability, non-ruin probability, and ruin time distribution.