

January 11, 2008

## *Information Economy Analyses: What Do We Know about Japan?*

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The purpose of this report is to illustrate a comprehensive perspective of information economy analysis, reviewing major academic research and empirical studies. Through this survey, it will be revealed that the Japanese economy faces some challenges in corporate and institutional reform, if it is to reap the benefits of innovation in information technology; and that industrial studies are needed to address Japan's problems and to arrive at solutions.

### *Neither a "Solow Paradox" nor a "New Economy" in Japan*

Intensive argument on productivity paradox, or "Solow paradox," prompted a large number of studies on the economic impact of information technology (IT) in the 1990s. This gave rise to a new field of study called "Information Economy Analyses." The scope of this new field is not limited to "Information Economics", which derived from the applied studies of micro-economics. It, however, encompasses the perspective of macro analyses (which have connections to "Studies of Informatized Society") of the impact of IT on society as a whole. For a long time, the two disciplines of "Information Economics" and "Studies of Informatized Society" were like "oil and water" in that they were in completely different fields of research and never converged. Productivity debates, however, have given a point of contact between them. Today, comprehensive economic analyses such as macroeconomic, microeconomic, and industrial analyses are conducted on the impact of information technology.

In macro analyses, a common method is to measure the contribution of IT to productivity, using a growth accounting model. A growth accounting analysis of the Japanese economy, based on data from the final report on gross domestic product (GDP) released in June 2007, reveals the following facts.

First, the rate of structural productivity, which declined sharply in the latter half of the 1990s, has been recovering since 2001. Second, IT's contribution to productivity improvement sharply increased through the second half of the 1980s, but has been lackluster since the 1990s. Putting these findings together reveals the very interesting fact that in Japan neither a "Solow Paradox" nor a "New Economy" exists. While the

introduction of IT contributed to productivity improvement before the 1990s, it has had no such effect in Japan since the latter half of the 1990s (Table), a fact which is in sharp contrast to the United States.

**Table Productivity and Contribution from IT (information capital)**

	76-80	81-85	86-90	91-95	96-00	01-05	Change from 5-year period to 5-year period				
	a	b	c	d	e	f	b-a	c-b	d-c	e-d	f-e
Economic growth rate	4.8	3.3	5.0	1.6	0.9	1.5	-1.5	1.6	-3.3	-0.7	0.5
Labor input	1.4	0.9	1.3	-0.3	-0.5	-0.8	-0.4	0.3	-1.5	-0.3	-0.3
Labor productivity	3.4	2.4	3.7	1.9	1.5	2.3	-1.1	1.3	-1.8	-0.4	0.8
Cyclical factors	1.2	-0.0	0.3	-0.8	0.1	0.3	-1.2	0.3	-1.1	0.9	0.2
Structural factors	2.3	2.4	3.4	2.7	1.4	2.0	0.1	1.0	-0.7	-1.3	0.6
Capital equipment ratio of	1.7	1.5	1.8	1.6	1.0	0.8	-0.2	0.3	-0.2	-0.5	-0.3
General capital	1.6	1.3	1.3	1.2	0.6	0.4	-0.3	0.0	-0.1	-0.6	-0.2
Information capital	0.1	0.2	0.4	0.3	0.4	0.4	0.1	0.3	-0.1	0.1	-0.0
All-factor productivity	0.6	1.0	1.6	1.2	0.4	1.2	0.4	0.7	-0.5	-0.8	0.8

Source: *New ESRI Working Paper Series*, No. 4.

In the United States, “Solow Paradox” disappeared in the 1990s and a “New Economy” emerged because, while IT was evolving from a mere automatic transaction machine into an effective communication tool, corporate reforms at the firm-level as well as institutional reforms at the macro-level were synergetic in bringing about a decade-long investment boom. On the contrary, the momentum of Japan’s IT investment has slowed down since the 1990s and the influence of IT on productivity has been lost. These facts imply that the Japanese economy failed in making reforms in response to technological changes, and hence IT has failed to have its full effect on economic growth.

### *Challenges for Radical Corporate Reform*

Firm-level analyses are necessary for further studies of corporate reforms such as business process reengineering, business unit restructuring, and human resource management. Based on a nation-wide survey of 9,500 firms, a multiple comparison analysis reveals two facts. First, reforms in organizational structures and human resource management significantly affect the successful use of information technology. Second, smaller firms experience difficulties in business process reengineering and in training their employees in the effective use of the technology.

A more in-depth analysis using logit model shows that reforms, such as paperless transactions, make the business process efficient both internally and between firms whereas drastic and fundamental organizational reforms, such as changes in the top management’s decision-making process, business unit restructuring through mergers and acquisitions, and the revision of long-term relationships with suppliers and customers, are not fully paying off yet. The analysis also found that human resource management is more effective and important than organizational reforms in reaping the benefits of information technology, but that, so far, the major effectiveness of human resource management appears in merely training existing employees rather than hiring new experts from outside.

It appears that although Japanese businesses are changing due to the introduction of IT, they are still at the stage of making gradual reform at worksite-level rather than taking on radical reform. They seem ill-equipped for drastic reform, which would shake the “homeostasis” of the existing system.

### *Is Japan Really an Outlier?*

Here, we need international comparisons to elucidate the challenges and opportunities faced by Japan. Japan’s uniqueness is observable from a joint study at InfoCom Research, Inc. in Japan. Based on a multinational survey of 18,500 firms in Japan, the United States, Germany and South Korea, it is revealed that in many aspects of corporate reforms, the percentage of Japanese companies that actually conducted reforms is lower than that of companies in the United States, Germany and South Korea, especially with regard to reforms which have implications outside of corporate walls.

Due perhaps to their stance toward corporate reforms, Japanese firms are considerably behind in the effective use of IT in the following two areas; (1) management, such as decision-making at top management level, and (2) the creation of a new value chain beyond corporate walls, such as the development of new markets and customers. Therefore, Japanese companies appear as outliers among the four countries, even though they are on a par with their counterparts in the three other countries in the effective use of IT at the shop-floor level, such as inventory reduction and workers’ job efficiency. What should be stressed here is that there are no significant differences among firms in the U.S., Germany, and South Korea in terms of corporate reforms or the effectiveness of IT investment, while it is clear that Japanese firms lag conspicuously behind the other countries’ firms.

In order to explore this point, further studies are needed with the following two approaches. One is to identify the characteristics of the Japanese economic system and apply them to information economy analyses. The other is an industrial study to identify the major problems and solutions by industry because institutional changes must accompany technological changes. Institutions are composed of formal rules, or legal regulations, and informal constraints, or business practices, in each industry. Thus, in-depth analyses are required in both IT-using industries (e.g., healthcare, retail, and finance) and IT-producing industries (e.g., broadcasting, telecommunications, and information service providers).

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