

Innovation vs. Learning by Doing : Implications of Japan's "lost decade" in the Information Age

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Innovation vs. Learning by Doing

Implications of Japan's "lost decade" in the Information Age

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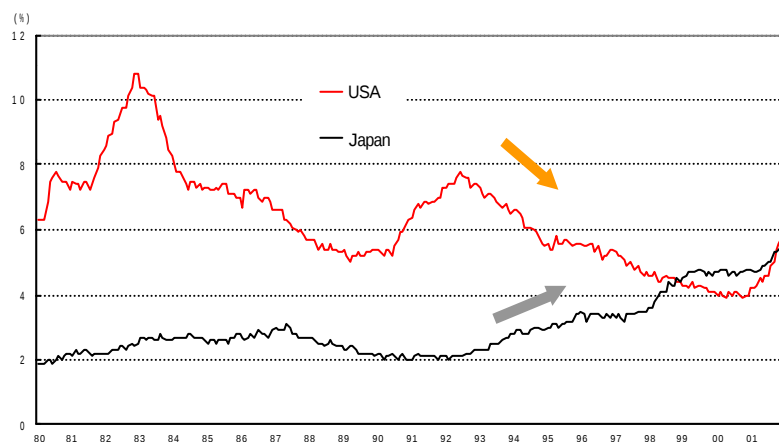
Outline

- ◆ **Two Topics in 1990s**
 - Contrast in Economic Performances; Japan and U.S.
 - Transition to "*Information Age*" ---- Chandler(2000)
- ◆ **Questions**
 - Are there some relations between the two topics from the viewpoint of *innovation*?
- ◆ **Goal**
 - Implications for building an appropriate RIS

Economic Performance in GDP

GDP	1960s	1970s	1980s	1990s	(92-00)
JPN	10.4	5.2	3.8	1.7	(1.0)
USA	4.4	3.3	3.0	3.0	(3.6)

Economic Performance in the Job Market



Economic Performance in Fixed Investment

INV	1960s	1970s	1980s	1990s	(92-00)
JPN	19.1	4.0	7.8	0.8	(-0.5)
USA	7.2	5.4	3.3	6.9	(9.0)

Importance of Fixed Investment

- ◆ Demand side
“current” “boom”
“business cycle”
- ◆ Supply side
“future” “capacity”
“productivity”

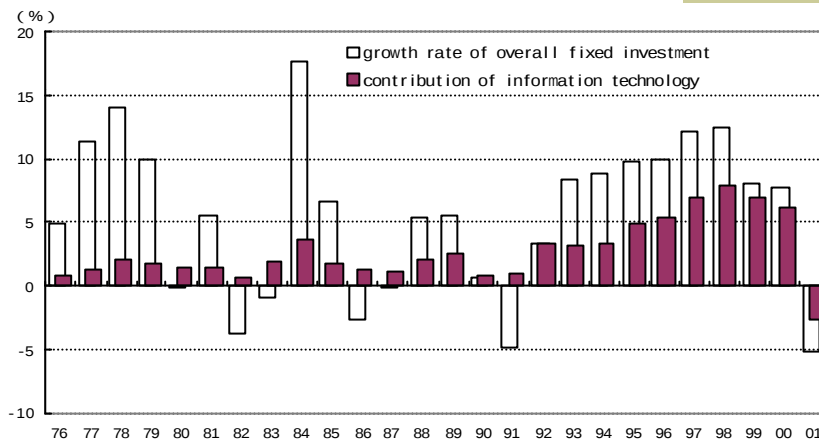
over-invest:
business failure



under-invest: losing
competitiveness

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U.S. Investment in IT



Technology Pays Off

- ◆ ‘We can see the computer age everywhere but in the productivity statistics,’ “We’d Better Watch Out,” *New York Times*, July 12, 1987



- ◆ ‘You can now see computers in the productivity statistics,’ “Productivity Finally Shows the Impact of Computers,” *New York Times*, March 12, 2000

Solow Paradox Disappeared

Many academic research provide evidence that investment in technology pays off.

Oliner & Sichel (2000), Whelan (2000), Jorgenson (2001), Economic Report of the President (2000, 2001), Baily (2002), and even Gordon (2002)

Accounting for the Productivity Acceleration Since 1995

[Private non-farm business sector; average annual rates] (%)

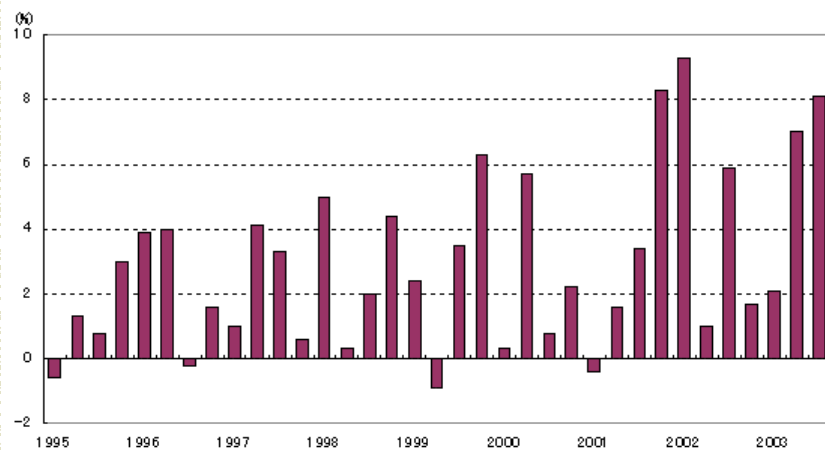
	1973-95 (1)	95-2002 (2)	Acceleration (2)-(1)	2000-02
Productivity growth rate	1.39	2.81	1.42	3.05
Business cycle effect	0.02	-0.28	-0.30	-0.15
Structural productivity	1.37	3.10	1.73	3.21

Solow Added

‘I will feel better about the endurance
of the productivity improvement after
it survives its first recession,’

“Productivity Finally Shows the Impact of
Computers,” *New York Times*, March 12, 2000

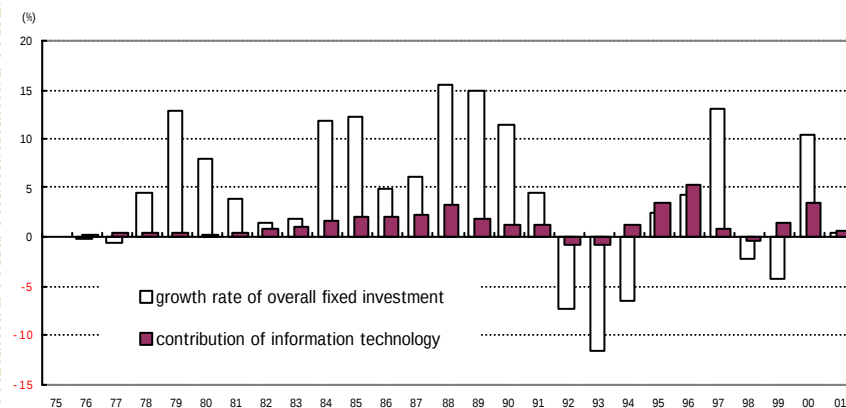
Productivity Gain Remains



Nominal IT Investment Growth

		81→85年	86→90年	91→95年	96→00年
J P N	Total IT investment	18.7	14.5	2.2	7.2
	Hardware	17.6	10.0	2.6	5.3
	Computers	20.6	11.9	1.3	5.7
	Communications	14.3	6.3	8.7	7.8
	Software	34.0	40.0	2.0	12.9
U S A	Total IT investment	14.0	5.6	8.7	13.2
	Hardware	12.8	2.5	7.6	10.8
	Computers	22.7	3.1	11.2	11.2
	Communications	9.2	3.7	5.0	14.4
	Software	19.2	14.5	10.8	17.0

Japan's Investment in IT



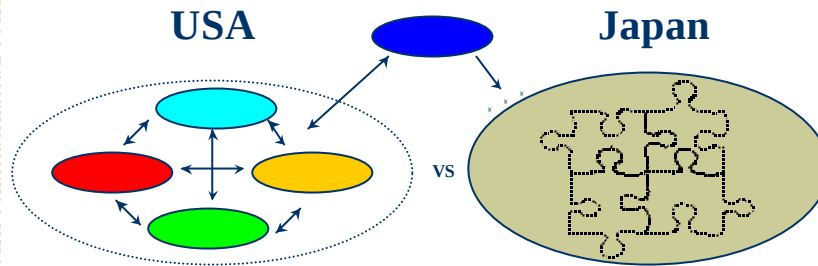
Question Arises

- ◆ Why did Japan fail to reap the benefit of information technology innovation in the 1990s?
- ◆ Are there some impediments to introduce new technology in Japan?

Strengths of Japanese System

- ◆ Strength --- Economic Planning Agency (1990)
 - intensive human network
 - share information informally
 - flexible organizational structure
 - long term relationship

Modularity vs. Integrality



integral Japanese economic system

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Two Types of R&D

- ◆ Learning by Doing--- 'Kaizen' improvement
continuous improvement, long-term relation, flying geese, integrality, common culture, closed system
----- e.g. automobiles and consumer electronics industries
- ◆ Discrete Innovation--- Joseph Schumpeter
disruptive change, new combination, leaping frogs, modularity, variety & freshness, open system
----- e.g. innovative new industries

Economies of Information Age

- ◆ Emerging Information Age
 - Network Effects
 - Economies of Outsourcing
- ◆ Matured Industrial Age
 - Economies of Scale
 - Economies of Scope

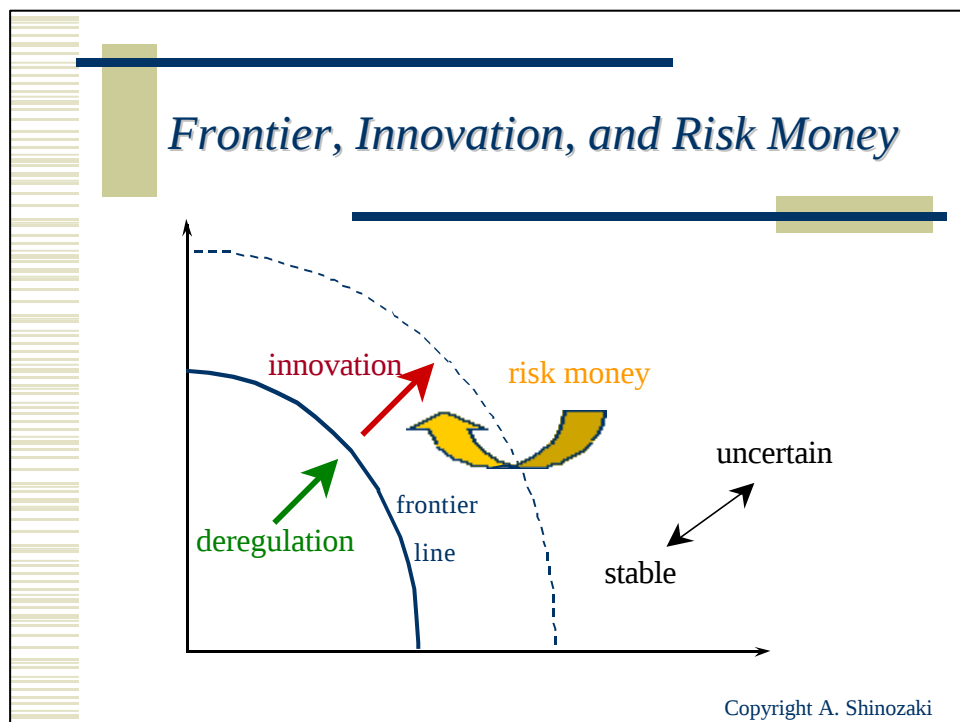
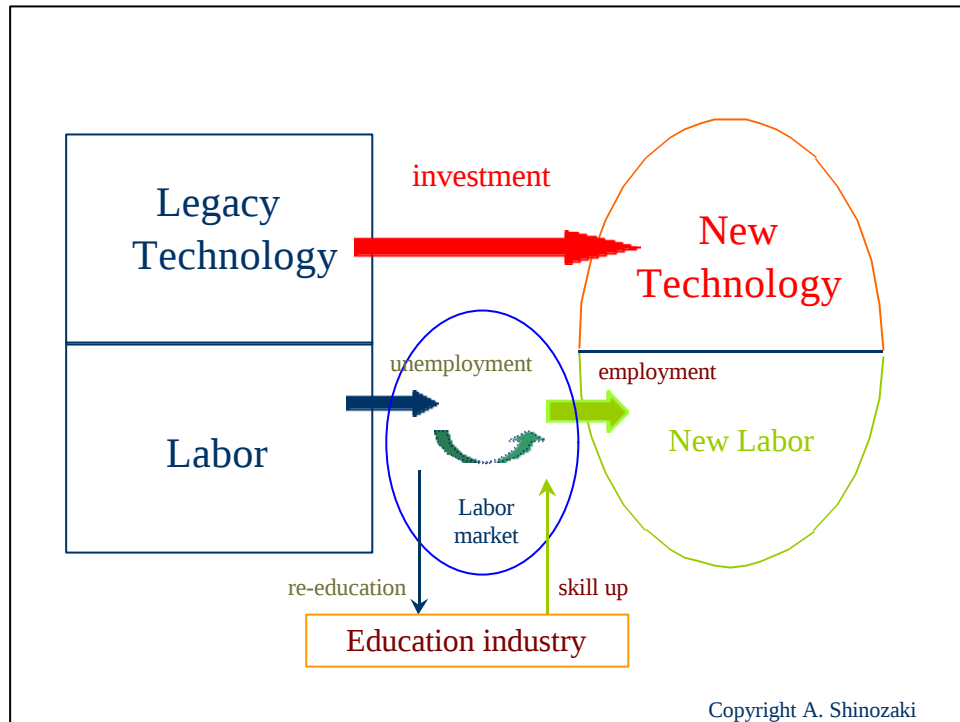
	Emerging Information Age	Matured Industrial Age
Scale Merit	Network Effects --consumers' merit	Economies of Scale --producers' merit
Resource Merit	Economies of Outsourcing --outside resources --multiple organizations --synergy effect --innovations (new combinations)	Economies of Scope --in-house resources --integral organization --cost saving --learning by doing
Industrial Organization	Multiple small players Competitive market Compatibility Modularity	Larger organization Oligopoly, monopoly Continuity Integrality

Weaknesses of Japanese System

- ◆ Weakness
 - locational limitation
 - taking time to make decisions
 - difficulty of drastic reorganization
 - small chance of new combination

Knowledge and Finance

- ◆ Knowledge
 - On the Job Training (in-house training)
 - Firm-specific skill (life time employment)
- ◆ Finance
 - Main Bank System (low risk loan)
 - Credit analysis on “past” performance (monitoring)



Conclusion

For appropriate Regional Innovation System, we need

- (1) To understand the strengths and weaknesses of
 - innovation vs. learning by doing
 - integrality vs. modularity
- (2) To create open atmosphere that enhances
 - “new combination”
 - “economies of outsourcing”

Silicon Sea-belt Initiative

System LSI Research Center
at Kyushu University



<http://www.slrc.kyushu-u.ac.jp/index.html>