ICT Progress, Globalization, Ageing Population and Japanese Corporations

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To start with, …

- My presentation today is
  - Not as a deputy governor representing the Bank of Japan,
  - But as a former researcher who studied the microeconomic foundations of macroeconomic analysis, with a particular interest in consumer and corporate behavior in the specific context of the Japanese economy
- The starting point (Section 1) is
  - Corporate Behavior/Strategy Analysis of Chapters 2 and 3 in *The Japanese Economy: Inconspicuous Structural Transformation,*Tokyo:Nihon Keizai Shinbun, September 2004.
  - Although it was written more than five years ago, the analysis still seems relevant today (indeed, perhaps more relevant today than it was five years ago)

1. Three Dimensions of Market Competition among Corporations

1.1. Sources of Value-Added:
Product versus Process Innovation

1.2. Product Architecture:
"Modular" versus "Integral" Architecture

1.3. Sources of Profits:
Horizontal Monopoly versus
Vertical Enclosure

1.1. Sources of Value-Added

Product Innovation: Create new demand

- Novel, unprecedented combination of existing ideas and/or materials that produces new utility for which consumers are willing to pay
- A chance event for a talented few
- Often fail with poor quality and unreliable production in large-scale production

- Process Innovation: Given demand, improve quality and reduce costs simultaneously
  - Incessant improvement of production process
  - Time-earned skills of many employees and suppliers
  - Most profitable in large-scale production

1.2. Product Architecture

- “Modular” Architecture
  - Standardized interface of components (modules)
  - Products are simply assembled components
  - Quality of components is more important than that of assembling
  - Example: Personal Computers
- “Integral” Architecture
  - Simply assembling components does not produce good-quality final products
  - Quality of assembly is the most important (durability, appearance, etc.)
  - Finer adjustment/incessant re-adjustment among components is absolutely necessary for producing good-quality final-products
  - Example: Passenger Cars

1.3. Sources of Profits

- Horizontal monopoly
  - Monopolize the core components (modules) of many final products
  - Example: CPU in personal computers
- Vertical enclosure
  - Seek consumer loyalty, organize suppliers to improve product quality
  - Example: Passenger cars.

1.4. Corporate Behavior/Strategy

- Corporate Behavior/Strategy: Three dimensional choice
  - Two dominant/natural combinations
- Product innovation (combinatorial experimentation) + Modular architecture + Horizontal monopoly
  ➔ Type US: Stylized profitable US corporations (Information and Technology Firms)
  - Based on quick combinatorial experimentation/optimization
- Process innovation (processing improvement) + Integral architecture + Vertical enclosure
  ➔ Type JP: Stylized profitable Japanese corporations (Carmakers)
  - Based on relation-specific, time-earned (meister-like) skills
- Asian companies may lie between Type US and Type JP

1.5. Determinants of Success

- Stylized Industrial Dynamics

  Product Innovation

  ➔ Establishment of Dominant Product Architecture

  ➔ Process Innovation

- Determinants of success: Stability of dominant product architecture
  - The dominant architecture is stable for a long time
    ➔ Type JP advantage
  - Frequent changes in product architecture
    ➔ Type US advantage

1.6. Examples

- Computers

  Mainframe computers (integral architecture)

  Steady advancement of Type JP corporations

  ➔IBM System/360

  (introduction of modular architecture)

  ➔ Personal computers (modular architecture)

  Success of Type US corporations (“Intel in IT”)

- Automobiles
  - The basic product architecture was established more than 50 years ago

    Success of Type JP corporations (“Lexus”)

2. Two Economic Forces That Shaped the World

- Rapid advancement of information and communication technology (ICT)
- Globalization – Integration of former communist countries into the market-economy world

2.1. Computer Programs Replace Human Skills

1. Idiosyncratic (human) skills are replaced by non-idiosyncratic but complex computer programs
2. Quick combinatorial experimentation/optimization becomes substantially less expensive than before, compared with relation-specific, time-earned (meister-like) skills

➔ IT-related product innovation becomes relatively straightforward.

➔ The scope of process innovation is reduced.

■ The most dramatic effects are seen in US service sectors, especially in the financial sector ("new financial products")

* Shadow banking and securitization overtaking conventional lending

2.2. Dramatic Reduction of Communication Costs

1. Communications costs are slashed, especially international communications costs.
2. Globalization 1: Former communist countries with an industrial base and inexpensive labor were available as potential production sites

➔Globally efficient supply-chain network

3. Globalization 2: New demand in these countries

■ Japanese manufacturing corporations incorporating ICT benefited from these cost savings.

2.3. Decoupling of Content from Physical Products

1. The decoupling of content from physical products in information and entertainment industries and beyond.
   * The quality of physical final products becomes less important.

- Certain integral-architecture products become modular.

2. Perfect, almost costless reproduction and transmission become possible for non-idiosyncratic but complex computer programs
   * Without intellectual property rights protection (combating piracy), their price would drop to zero – no profits.

- How to make profits in content where production costs are high but reproduction costs are negligible?

2.4. Summing-Up: Conditions as of Summer 2007…

- ICT ➔ The scope of the modular architecture was expanding while that of the integral architecture shrinking. ➔Type US corporations flourish in IT and services (esp. financial) sectors.
- Globalization ➔ The remaining integral architecture industries (esp. automobile) benefit from expanding global demand and supply bases, incorporating some modular architecture and ICT. ➔Type JS corporations flourish in automobile and machine tool industries

3. After Summer 2007: Developments and Challenges

3.1. Collapse of Global Asset Bubbles: Implications

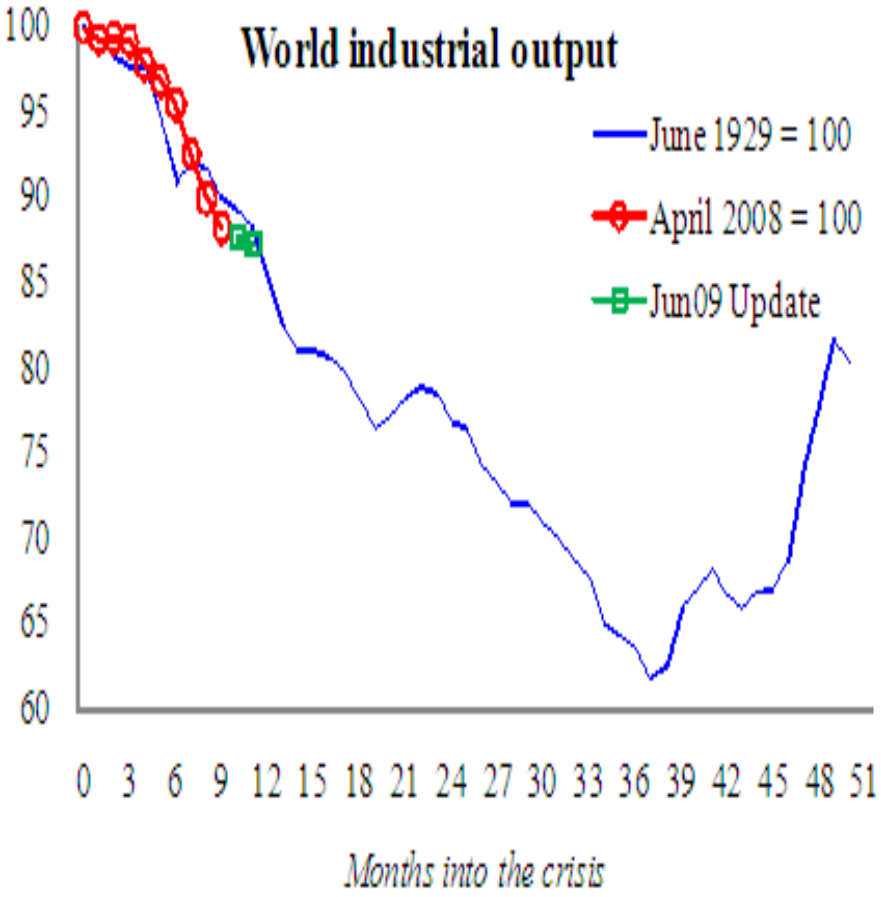
3.2. Ageing Population
(Japan and the Market-Economy World)

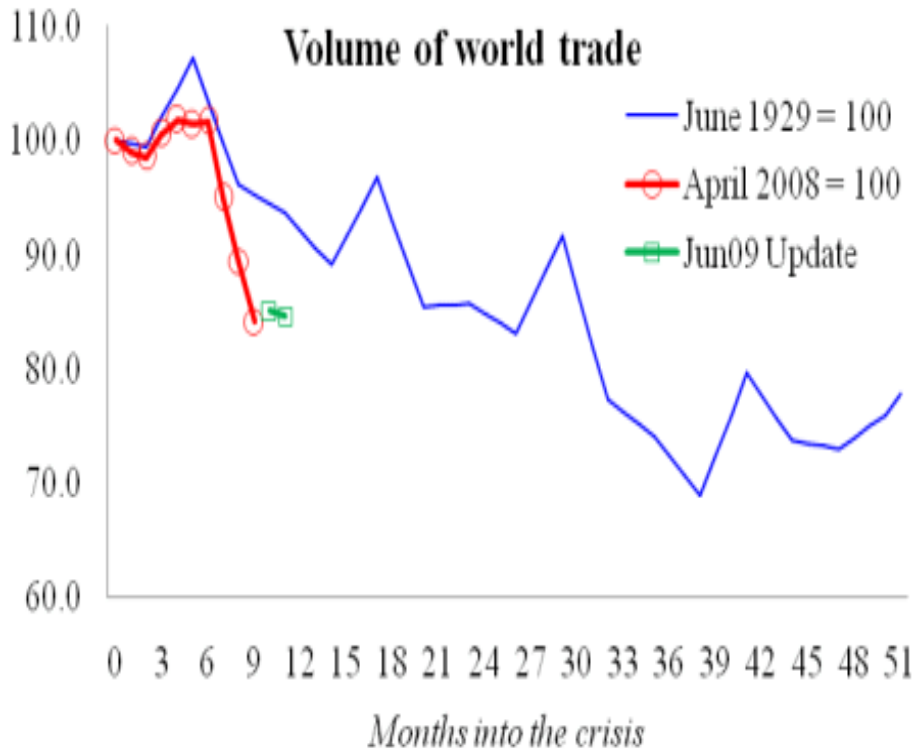
3.3. Non-Renewable Resource and
Environmental Constraints

3.1. Collapse of Global Asset Bubbles

The decline in world output and trade was sharper than it was in the 1930s.

Source: Eichengreen “How Crises End” Slides 8 and 9





3.1. Collapse of Global Asset Bubbles: Implications

- A non-negligible part of the rapid growth in global demand before 2007 was based on these asset bubbles, or the presumption of ever-rising asset prices. ➔Balance-sheet adjustment is necessary.
- More subdued demand growth worldwide
- Regional heterogeneity
  - Developed economies with B/S adjustment
    - Slow growth
  - Emerging economies without B/S adjustment
    - Relatively strong growth

3.2. The Ageing Population of the Market-Economy World

Estimated Population as of July 1 (in thousands)

Year	**Developed**	Market Economy						**Russia +China**	Non-Market => Market	
		Japan	USA	Germany	France	Italy	UK		Russia	China
1955	**474,475**	89,815	171,074	70,326	43,428	48,633	51,199	**720,407**	111,402	609,005
1980	**592,641**	116,807	230,917	78,289	53,880	56,434	56,314	**1,137,532**	138,655	998,877
2005	**690,277**	127,897	299,846	82,652	60,991	58,646	60,245	**1,456,932**	143,953	1,312,979
2030	**754,073**	118,252	366,187	79,348	66,605	57,519	66,162	**1,582,336**	123,915	1,458,421

Estimated Population Growth

Period	**Developed**	Market Economy						**Russia +China**	Non-Market => Market	
		Japan	USA	Germany	France	Italy	UK		Russia	China
1955-1980	**0.89%**	1.06%	1.21%	0.43%	0.87%	0.60%	0.38%	**1.84%**	0.88%	2.00%
1980-2005	**0.61%**	0.36%	1.05%	0.22%	0.50%	0.15%	0.27%	**0.99%**	0.15%	1.10%
2005-2030	**0.35%**	-0.31%	0.80%	-0.16%	0.35%	-0.08%	0.38%	**0.33%**	-0.60%	0.42%

- Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2005 Revision, http://esa.un.org/unpp, Wednesday, August 20

3.2. Ageing and Shrinking Population: Implications

- Growth in total consumer demand falls
  - In addition, a possible decline in private investment in light of slow growth in consumption
- The nature of demand changes: demand from younger people is less important and demand from older people is more important.
  - The young: relatively homogeneous in terms of both income/wealth distribution and preferences
  - The old: very heterogeneous, reflecting inequalities in income/wealth distribution and differences in past personal history

3.3. Challenges for Japanese Corporations

- Cope with reduced growth in global demand
- Respond to increasingly heterogeneous demand
  - Regional differences
    - Developed economies with balance-sheet adjustments versus emerging economies without balance-sheet adjustments
  - Generational differences
    - Relatively homogeneous demand from the younger generation versus heterogeneous demand from the older generation
- While maintaining the comparative advantage of their own behavior/strategy, how to incorporate new elements to respond to these challenges?

Example: Innovation for an Ageing Population (1)

- We need Product Innovation
- When the population is ageing rapidly, the demands of the old dominate the market.
- The characteristics of technology demanded by the old may differ substantially from those by the young
- Current youth-oriented technological progress may prove to be less value-creating that it was.

Example: Innovations for an Ageing Population (2)

- In fact, financial innovation is also needed.
- To offset possible shortfalls in private investment, we might be obliged to mobilize low-private-return projects, through public-private partnerships.
- We need financial innovation that will facilitate efficient private-public partnerships.
- Financial innovation is essential in an ageing world, where the financial needs of an older population are often very different from the risk and return profiles of existing assets.

Concluding Remarks: The Importance of This Conference

- A policymaker's unhappiness with the state of mainstream macroeconomics
  - Shocks are assumed to be exogenous, and the mechanism by which they propagate is analyzed.
- However, real-time knowledge about the nature of shocks (if they can't be anticipated) is critical in policymaking. The propagation of a shock may depend on its nature.
  - Mainstream macroeconomics views shock-induced changes in the propagation mechanism as structural changes that are exogenous.
- Insights into shocks and the changes they induce in the propagation mechanism cannot be obtained by simply looking at aggregate data. A microscopic investigation of corporate behavior may provide vital information.

➔ Looking forward to the contribution of this conference