The Role and the Limitations of the Private Sector in Innovation. Some theoretical insights and a comparison between France/Europe and Japan

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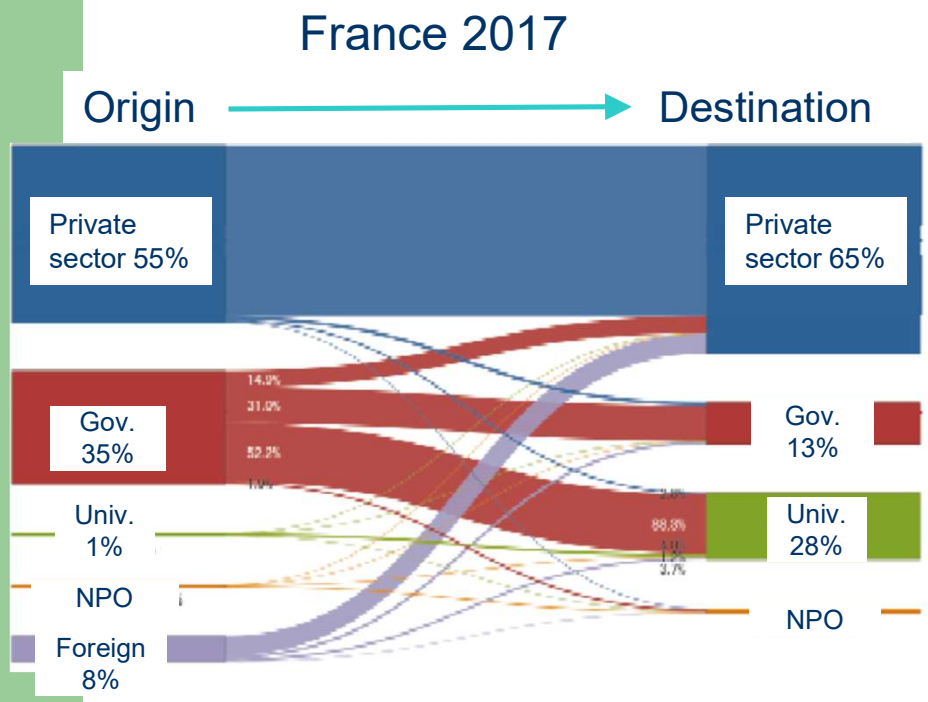
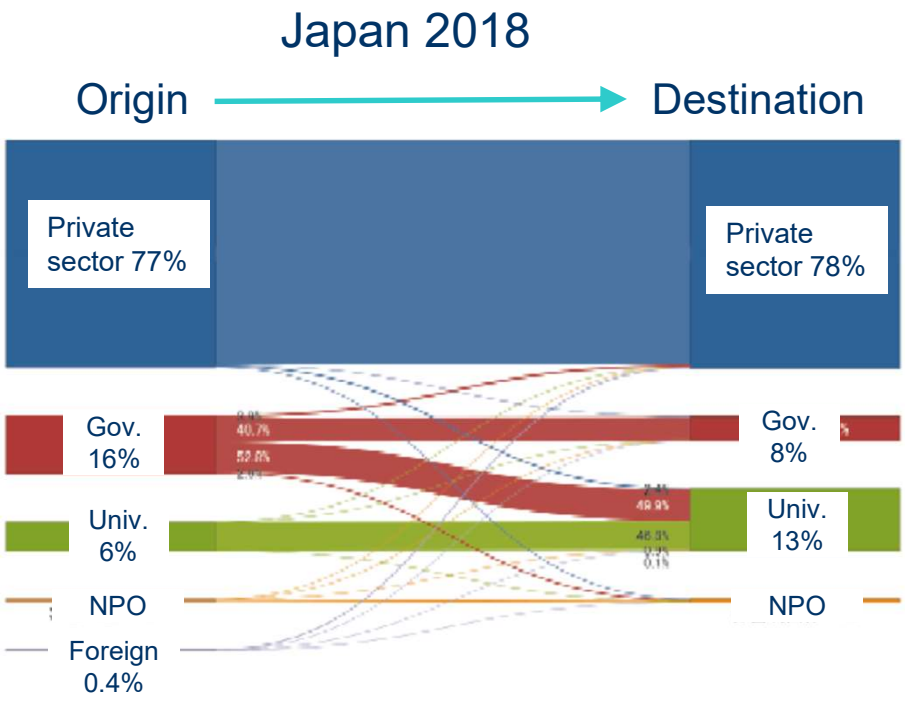
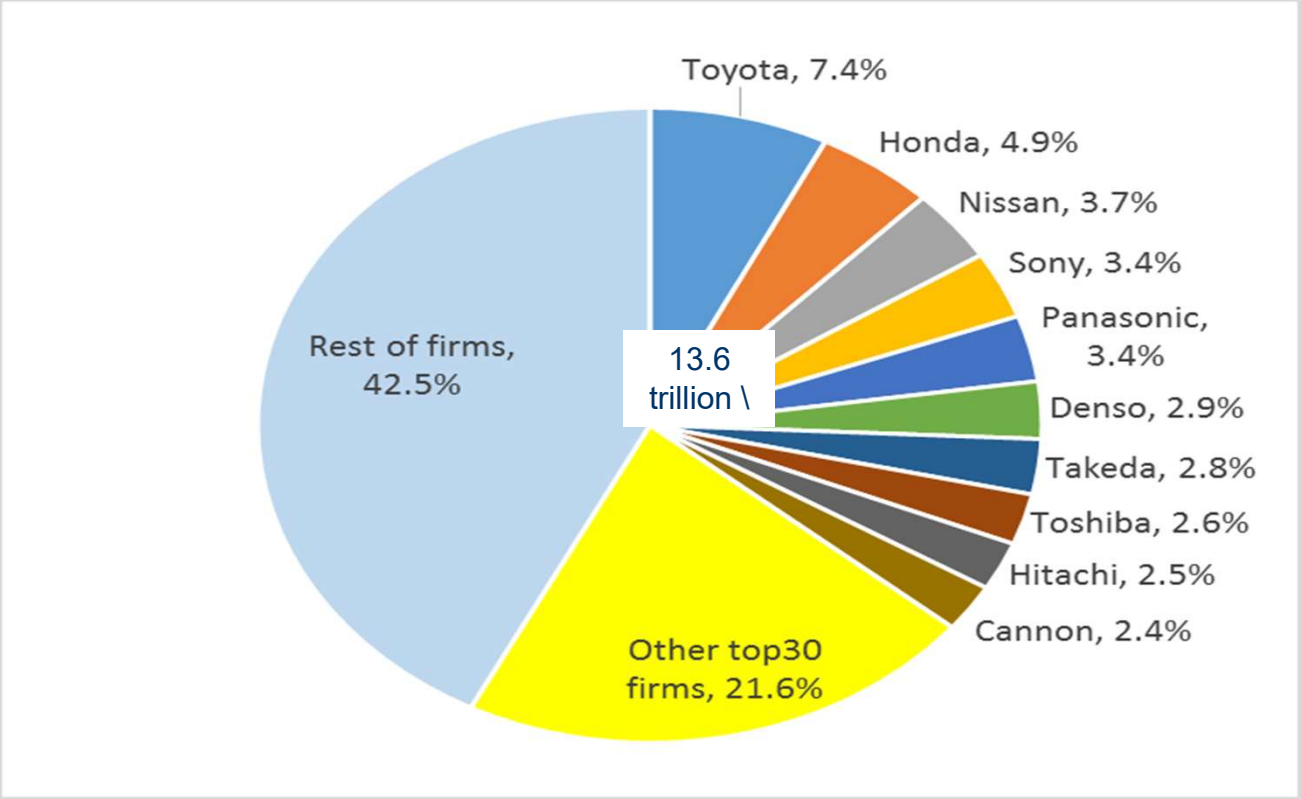
Setting the scene: Flow of R&D expenditure in France and in Japan





Source: NISTEP Japanese Science and Technology Indicators 2019

Business Expenditure of R&D in Japan, about 10 years ago (2014)



Source: Toyo-Keizai Online, http://toyokeizai.net/articles/-/115008
and NISTEP "Japanese Science and Technology Indicators 2016"

Two characteristics of the Japanese innovation system: historical perspective and international Comparison

- **Active involvement of industries**
  - Proportion of R&D exp. funded by industries
    Japan 73% (1991) -> 69% (2001)
    USA 57% (1991) -> 69% (2001)
  - Proportion of R&D exp. funded by government
    Japan 18% (1991) -> 21% (2001)
    USA 39% (1991) -> 27% (2001)
- **Larger role played by big firms**
  - Proportion of industrial R&D by large firms (with 10,000+ employees)
    Japan 69%, USA 55%
  - Proportion of biotechnology patents by large firms in 2000 (among the top 100 applicants)
    Japan 72%, USA 21%

The dominant view on innovation

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The dominant view regarding innovation and its role in the prosperity of advanced nations

- Major Hypotheses/conclusions:

1. Innovation is the driving force of growth and this is all the more true in the emerging knowledge-economy
2. The **Silicon Valley "model** (entrepreneurship, venture capital, collaboration firms/universities) has been the best set of institutions to promote innovation in the new technological environment (ITC or biotech) that has emerged from the 1980s-1990s
3. In particular**, startups** are the drivers of innovation and should be the focus of public policies
4. Universities and public research institutes can play a role if they are able to marketize their scientific contribution

The dominant view regarding innovation in France and Japan

1. Japan and France are lagging behind in terms of innovation because of their backward institutions
2. Their innovation capabilities have declined
3. The symbol is the lack of entrepreneurship, the low rate of startups creation, their low survival rate and their low growth rate
4. To put it differently, inadequate innovation system explains the poor performance of Japan and France in the manufacturing industries related to the “new economy”

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A Neo-Schumpeterian view

- Beyond the creative desruction view, several hypotheses:

1. All social problem have technological solution
2. Private actors are the drivers of innovation
3. Among private actors, startups are the most important; importance of entrepreneurship
4. Role of the state should be limited to the definition of IPR and eventually « infrastructure » (including education)

Limitations of the dominant view on innovation

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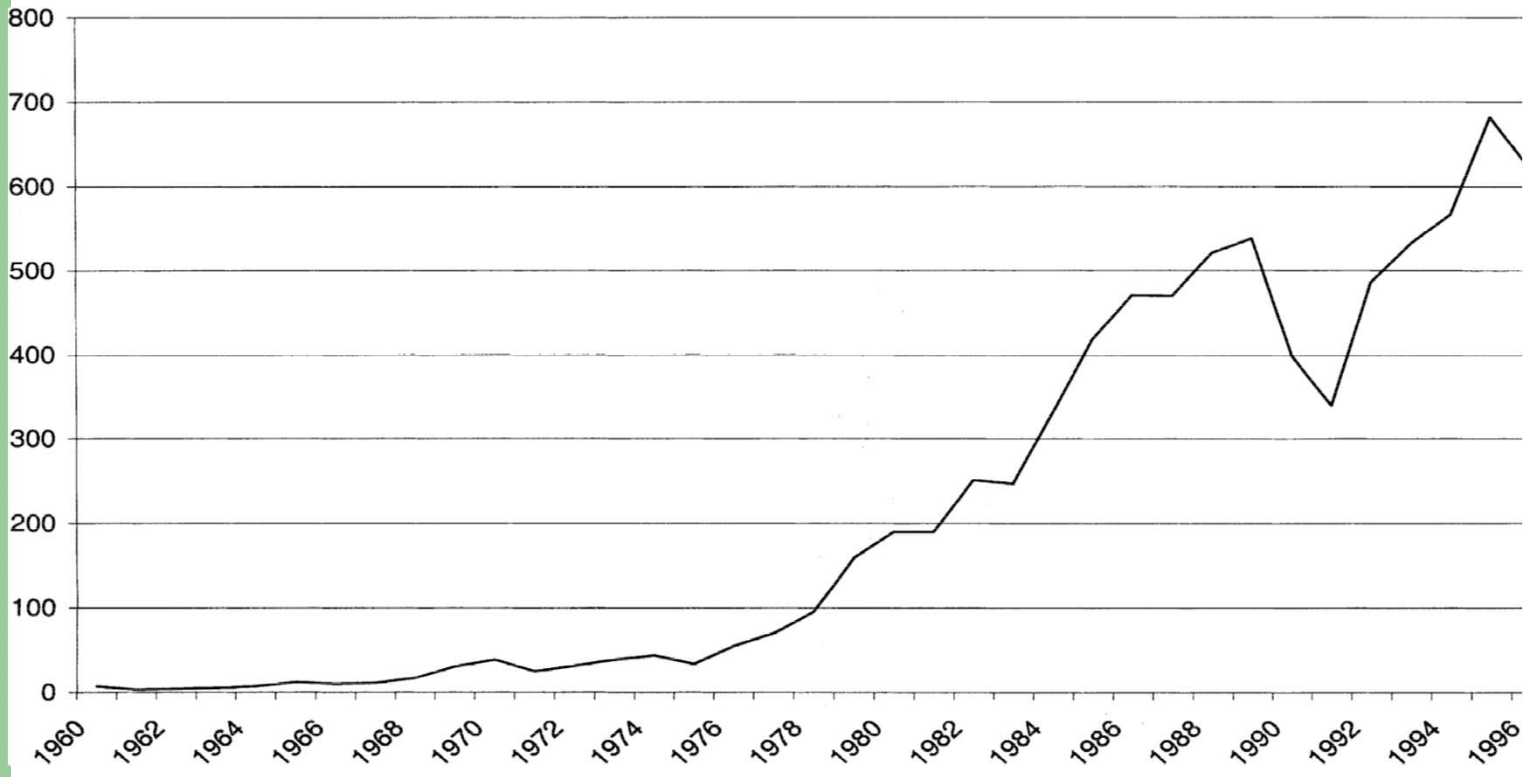
Four limitations and an alternative framework

- (The truth about the SV model: a government (military) driven system of innovation)
- Back to the reality of innovation: importance of collaboration and role of public support to promote it
- Increasing science linkages and the importance of industry/university collaboration
- Rediscovering industrial and innovation policies and their benefits : Innovation Union strategy and EIC
- No one best way: the Japanese case

1. The true meaning of Toyotism;
2. The intrapreneurial regime of innovation in the case of personal robotics

- An alternative framework : National innovation systems

World-wide Increase in R&D Partnerships
(Hagedoorn, *Research Policy*, 2002)



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Where Do Innovations Come From?
by Block and Keller, UC Davis

R&D Magazine's top 100 innovations of the year (1971-2006)

The origin and funding supports, external collaboration

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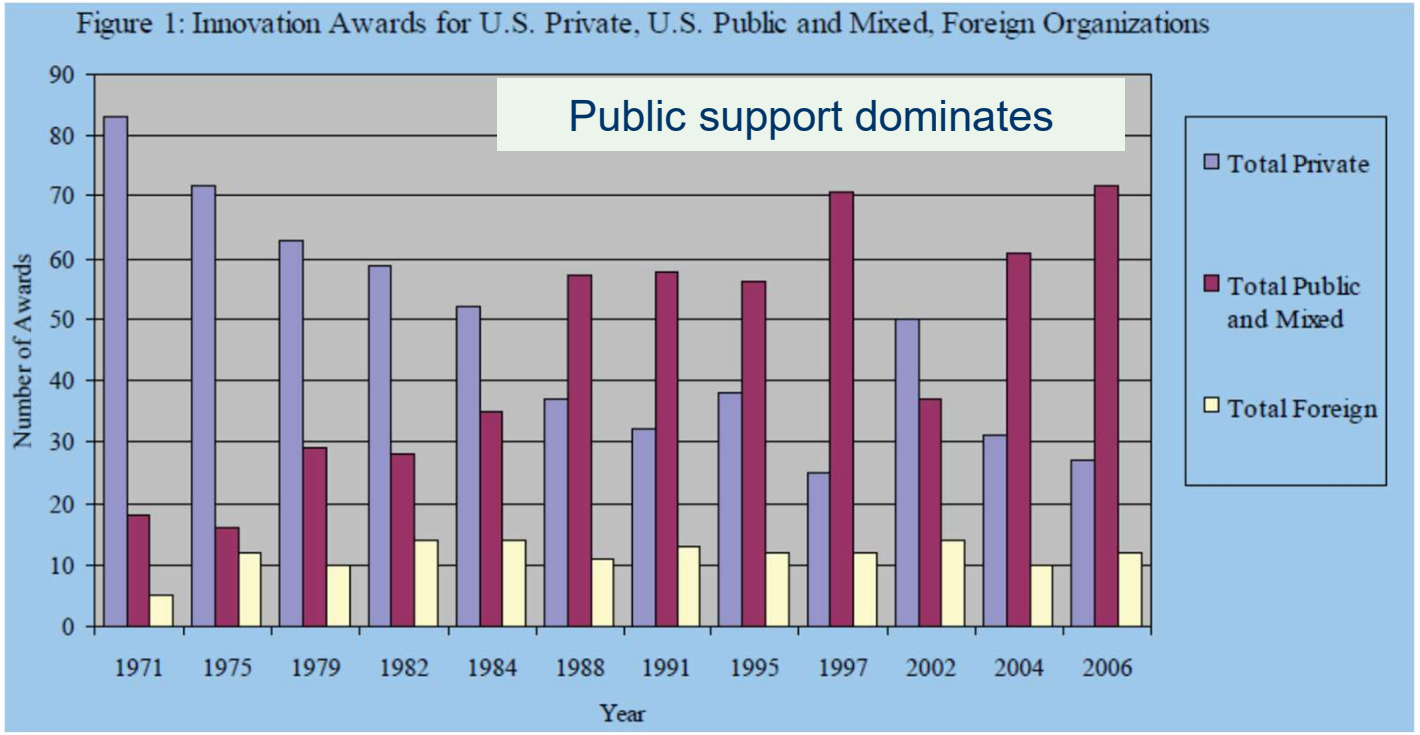
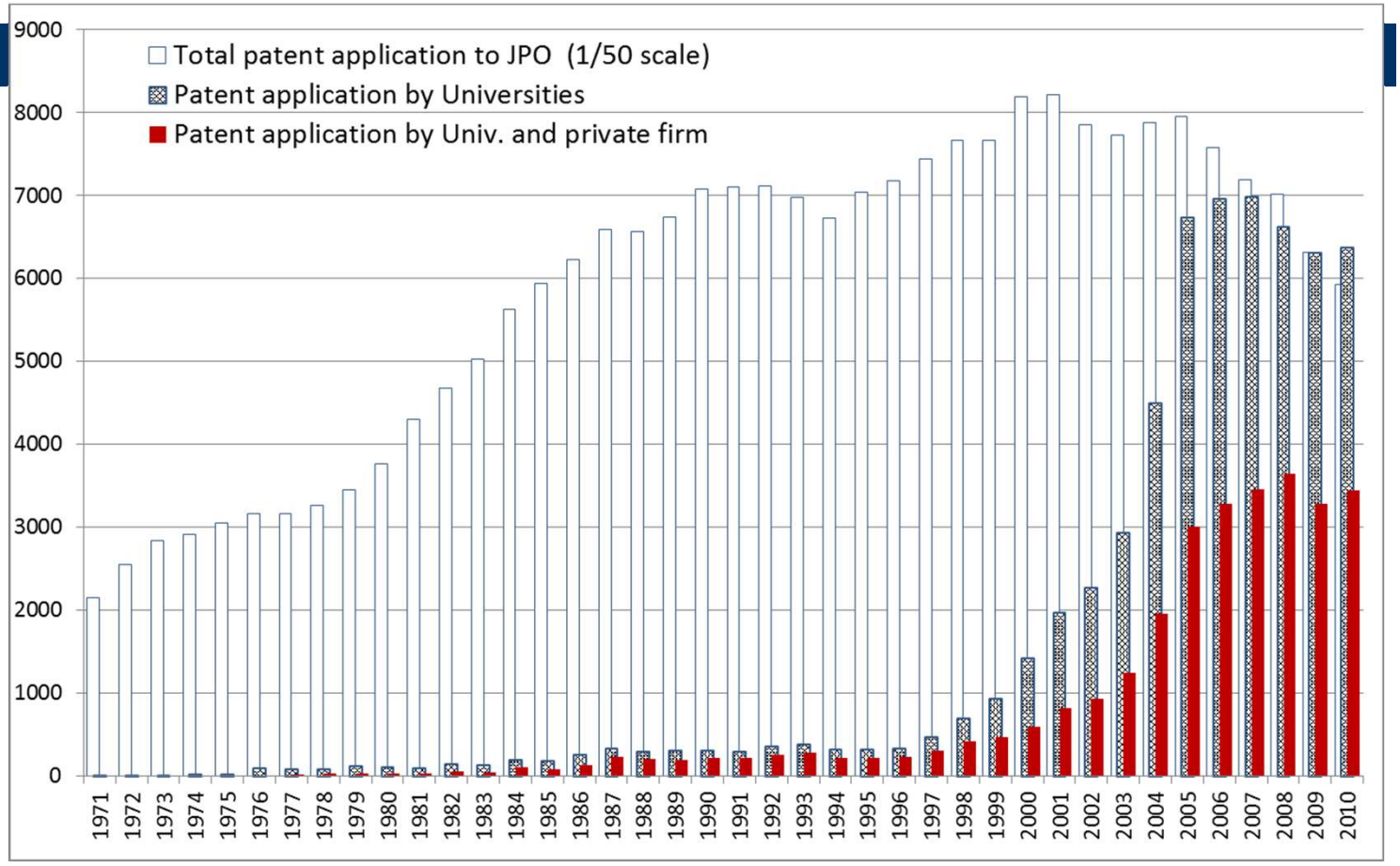


> the public support for collaborations with external organizations should be the priority

Increasing Science Linkages (e.g. number of scientific paper quotation per patent)

- Citation of scientific papers by patents has increased globally, but much more in the US than in Japan
- Particularly conspicuous in science-based industries, e.g., biotechnologies based on life sciences, Environmental sciences, Nano-technology and materials
- It requires stronger relations between industries and universities

Trends in Patent Applications by Universities in Japan



Patent applications from university has grown quickly from the 1990s

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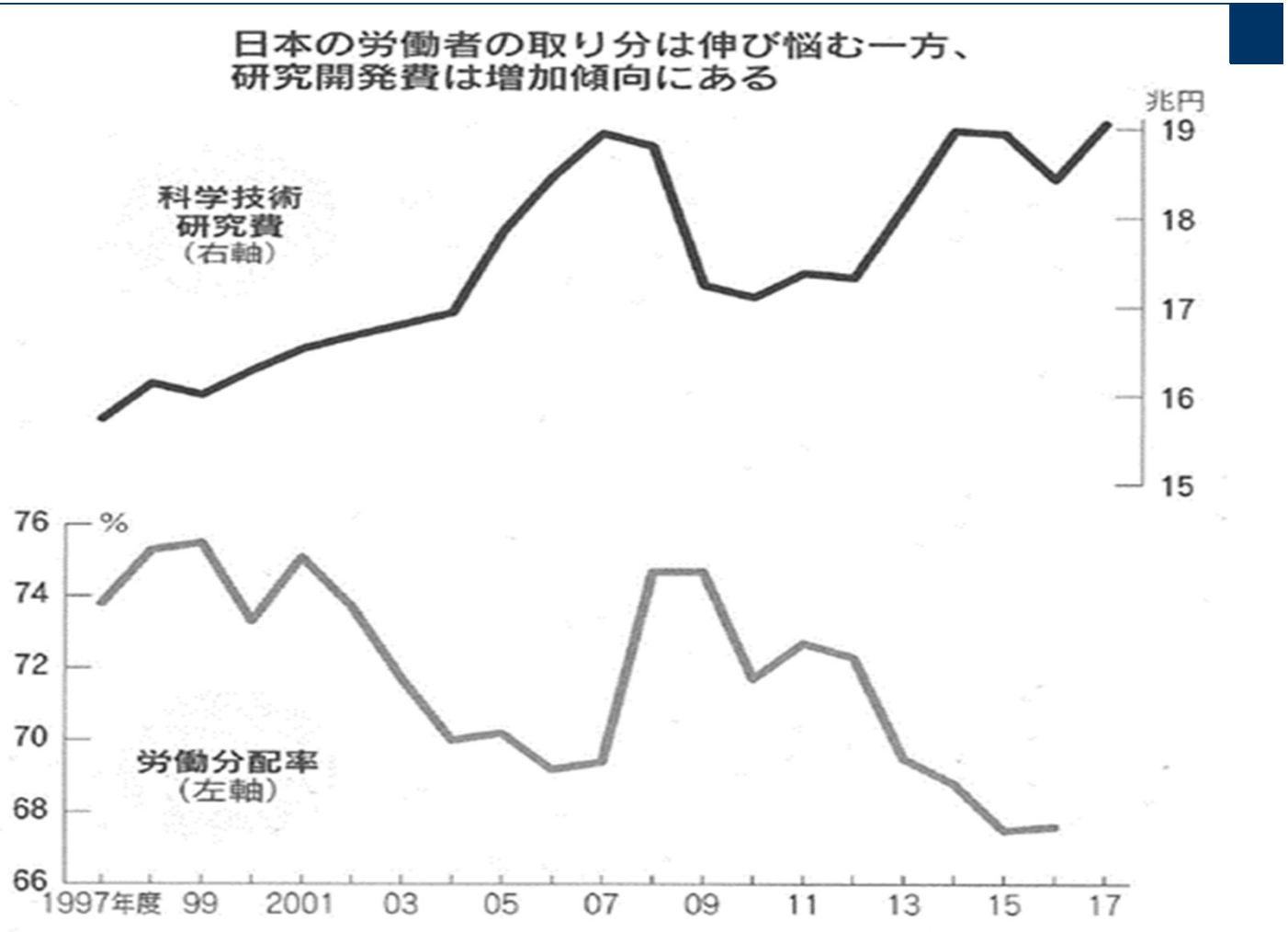
Rediscovering industrial and innovation policies and their benefits: Innovation Union strategy and EIC

- Innovation Union strategy:
  - Overall EU wide strategy
  - Integrating research and innovation policies, all forms of innovation (including social, public sector)
  - Setting direction based on societal challenges; European Innovation Partnerships to include all ecosystem
- European Innovation Council:
  - Creating of a first dedicated EU innovation programme
  - Focus on “deep tech”, startups and scale ups
  - Pro-active role: taking investments, Programme Managers to direct funding

No one best way: the true meaning of Toyotism (Lechevalier, Nikkei, 2019.11.21)

- **The success of Japanese firms did mainly rest on a model of organizational innovation**, rather than technological innovation. "Toyotism" is a model based on corporate investment in training workers and fostering their commitment to the firm; its core is not robotics or mechanization or automation.
- Japanese firms appeared to forget the lessons from their past success, and even more so during the 1990s when the concept of New Economy.
- They have committed to a **technological race**, with massive investments in R&D, and a **HRM race-to-the-bottom**, including wage reductions.
- **Disappointing results**: Over-investment in R&D has led to poor returns (OECD, 2005); some Japanese companies have discovered that having the best technology is not a guarantee of gaining market shares, if consumer needs or tastes are not well taken into consideration.

No one best way: the true meaning of Toyotism (Lechevalier, Nikkei, 2019.11.21)



No one best way: The intrapreneurial regime of innovation in the case of personal robotics

Table 2
Top 20 NGRT patent applicants (1993–2004, absolute numbers).

Players	Industry	NGRT patents	Total patents	Ratios of NGRT (%)
Sony Corporate	EM	962	1215	79.18
Honda Motor Co. Ltd.	A	405	645	62.79
Matsushita Electric Industrial Co. Ltd.	EM	294	760	38.68
Mitsubishi Heavy Industries Ltd.	M	245	424	57.78
Toshiba Corporation	EM	226	506	44.66
Hitachi Ltd.	EM	176	386	45.60
Denso Corporation	A–EM	163	330	49.39
Toyota Motor Corporation	A	157	321	48.91
NTT Corporation	T	147	276	53.26
Mitsubishi Electric Corporation	EM	146	360	40.56
Fanuc Ltd.	R	128	469	27.29
Fujitsu Ltd.	EM	128	236	54.24
Yaskawa Electric Corporation	R	119	596	19.97
NEC Corporation	EM	114	245	46.53
ATR	T	95	108	87.96
Sharp Corporation	EM	88	153	57.52
Panasonic Corporation	EM	85	141	60.28
Sinfonia Technology Co. Ltd.	M	83	142	58.45
Sanyo Electric Co. Ltd.	EM	81	175	46.29
Nissan Motor Co. Ltd.	A	80	233	34.33
Total		3922	7721	50.80

An alternative framework: National innovation systems (NIS)

- Innovation is not “in the air”… It is deeply conditioned by and embedded in diverse institutions (education system, labor market, finance, etc.)
- To put it differently, innovation is not only a matter of R&D expenses; this is also a matter of organization and eco-system (innovation system) ▸**importance of the relations between science and society**
- This is why one observes **different patterns of innovation and innovative capabilities across countries**
- This is why, when you compare countries, you cannot do it for specific domains. You need to adopt **a systemic approach**

The NIS view on the French and Japanese cases

- The dominant view underestimates the changes that occurred in the French and Japanese innovation systems during the last 20 years
- The right “model” (e.g. Silicon Valley) for innovation does not exist: it depends on the sector, the technology and the overall environment of the economy
- Innovation capabilities in France and Japan have not declined in general
- However, we should recognize that:

1. The global competition is more intense than ever and some countries/firms are rapidly catching up. It requires developing some specific answers
2. There were some problems in these two systems; reforms that have been done should be continued in a coherent manner

Beyond Schumpeter: Innovation beyond technology

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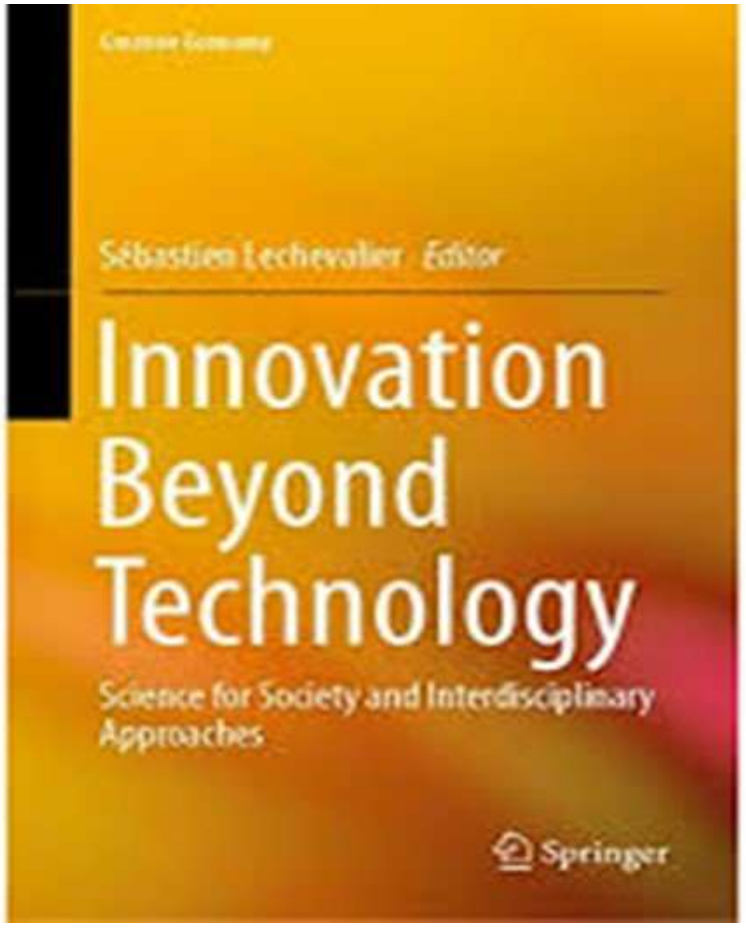
Innovation beyond technology. Science for Society and Interdisciplinary approaches



Deconstructing some myths about innovation: Beyond Schumpeter

MYTHS	OBJECTIONS/PROBLEMS
Innovation is always good	There is a possibility of destructive creation (Soete, 2013)
Actors who contest innovation are laggard	Role of controversies and contestations in the innovation process (Callon, 1981)
The solutions will be found in new technology, not improvements to old ones	Frugal innovation, grassroots innovation, reverse innovation or innovation from the bottom of the pyramid (Prahalad 2005)
Focus on technological innovation	In many cases, solutions are to be found in the society (societal changes), not new technologies

“Beyond the science bubble”(*Nature*, 2017)

- For a better alignment between the outputs of scientific research and innovation and the needs and expectations of society
- “The needs of millions of people in the United States are not well enough served by the agendas and interests that drive much of modern science. (…) Research leaders in the United States and elsewhere should address the needs and employment prospects of taxpayers who have seen little benefit from scientific advances”.

> governments, in the name of public good, Should have their say

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The paradox of innovation in troubled times (1/2)

- During the last decade, which can be considered as the Golden Age of innovation, from an ideological viewpoint, there have been **rising doubts about the pertinence of this model**:

1. Gap between the increasing resources dedicated to innovation and decreasing well-being observed in many cases (case of well-being in hospital)
2. Contribution of innovation to rising inequalities
3. Various technology related scandals
4. Some problems related to the use of technologies

The paradox of innovation in troubled times (2/2)

- We started off by embracing (technological) innovation as the solution to the crises of our times, but ended up seeing our model of innovation become yet another problem to solve.
- It should not lead to throw away new technologies but rather to invent a better articulation between societal needs and new technologies

1. New technologies can help envisioning the society of the future
2. But contemporary societies are not always a laggard

The crisis of innovation is the crisis of the relationship between technological innovation and society

- Technology may affect social dynamics and society may influence the direction of technological change
- However social and technological dynamics are largely disconnected
- How to reconnect them?
- **This question is not new: see the** Budapest declaration (1999 World Science Conference) famous pour its motto: **'science in society and science for society'**

Innovation beyond technology

- Technology is a critical source of **differentiation** for companies (i.e. a source of competitiveness). However, it is not enough in the long run, it will be a source of **comparative advantage** only if it affects positively the **well being** of consumers and/or the productivity of processes
- “Technologies are neither neutral instruments not passive objects: they rather do materialize norms and values; they shape the behaviors, the actions, and the perception of human beings” (Dalibert 2016)
- A way to specify well-being: **care-led innovation**
- **A definition of social innovation**: “New social practices that aim to meet social needs in a better way than the existing solutions” (Howaldt & Schwarz, 2010)

Social innovation and innovation beyond technology : some examples

- How to face environmental challenges: the role of behaviors
- How to deal with rising inequalities (and social discontent): building an inclusive society
- Which answers to demographic challenges: robotics can help but is not the ultimate solution
- How to realize fully the potential of AI, while limiting the destructive parts?
- How to develop personalized medicine in dealing properly with personal health data?

The potential role of SSH in a time of crisis – well being as the ultimate criterion

- The questions the SSH ask are **not intended to hinder scientific progress**, nor to criticize the other sciences.

- SSH can be used as a tool to introduce an **ultimate criterion** to help choosing into different directions of research. The ultimate criterion should be **well-being**, which is in fact related to the question of progress

Conclusion: for an active role of all stakeholders in innovation

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Involving all the stakeholders in the process of innovation

- Role of industries
- Role of universities and public research institutes
- Role of governments
- Role of society in its diversity

Thank you for your attention

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