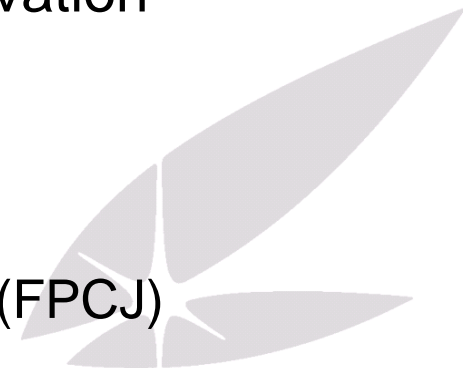# 600 Trillion Yen GDP Target STI Policies for Moving Toward Society 5.0!

Yuko Harayama

Executive Member

Council for Science, Technology and Innovation (CSTI)

Cabinet Office

Translation by Foreign Press Center Japan (FPCJ)

Japan's Growth Strategy

- Comprehensive Strategy on Science, Technology and Innovation 2016 (May)
  - Council for Science, Technology and Innovation

- Japan Revitalization Strategy 2016 (June)
  - Council for Industrial Competitiveness

- "Basic Policy on Economic and Fiscal Management and Reform (June)
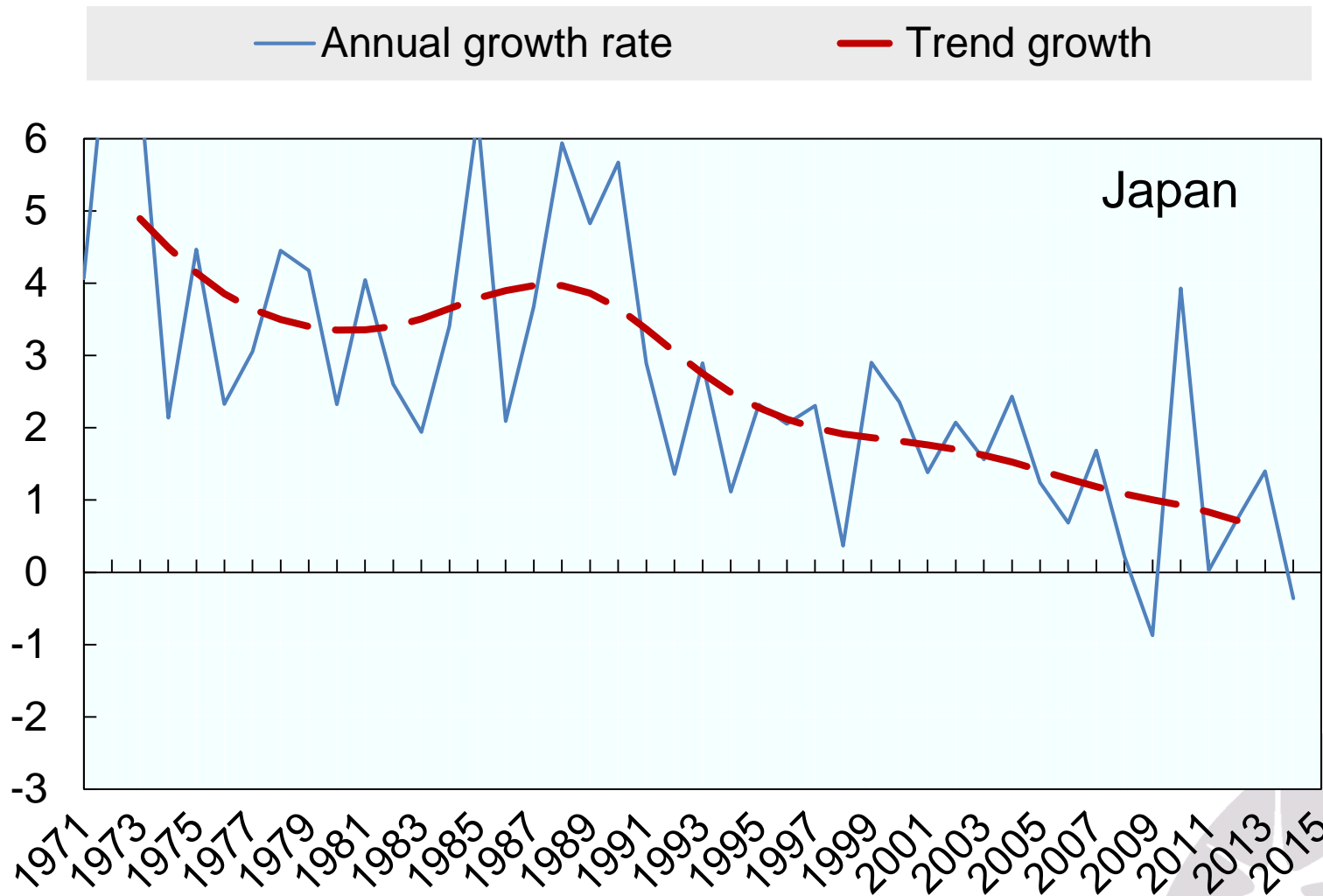 - Council on Economic and Fiscal Policy

Society 5.0

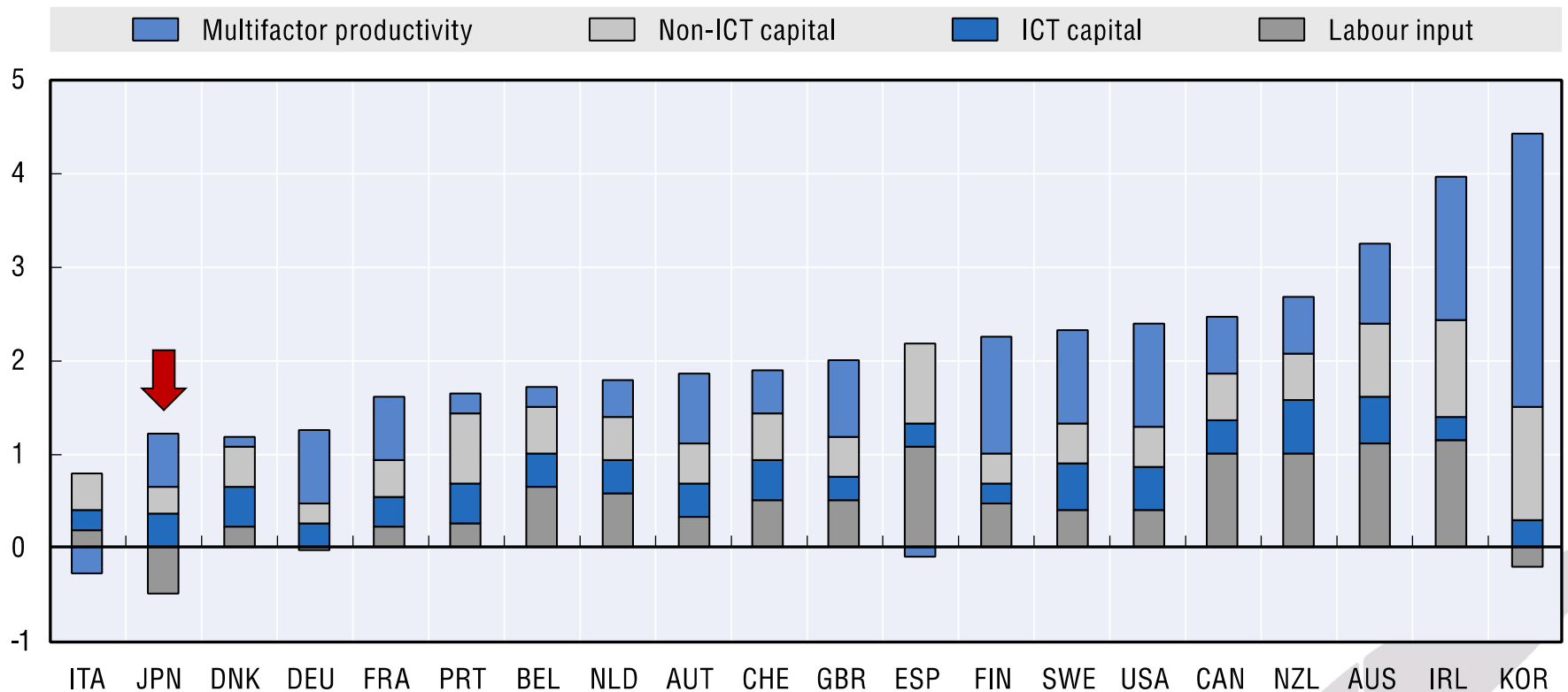**Fourth Industrial Revolution**

600 Trillion Yen GDP

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A Brief Overview of the Current Situation in Japan

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Labor Productivity Trends

Japan

OECD *Compendium of Productivity Indicators 2016*

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Contribution to GDP Growth

Total economy, annual percentage point contribution, 1995-2013
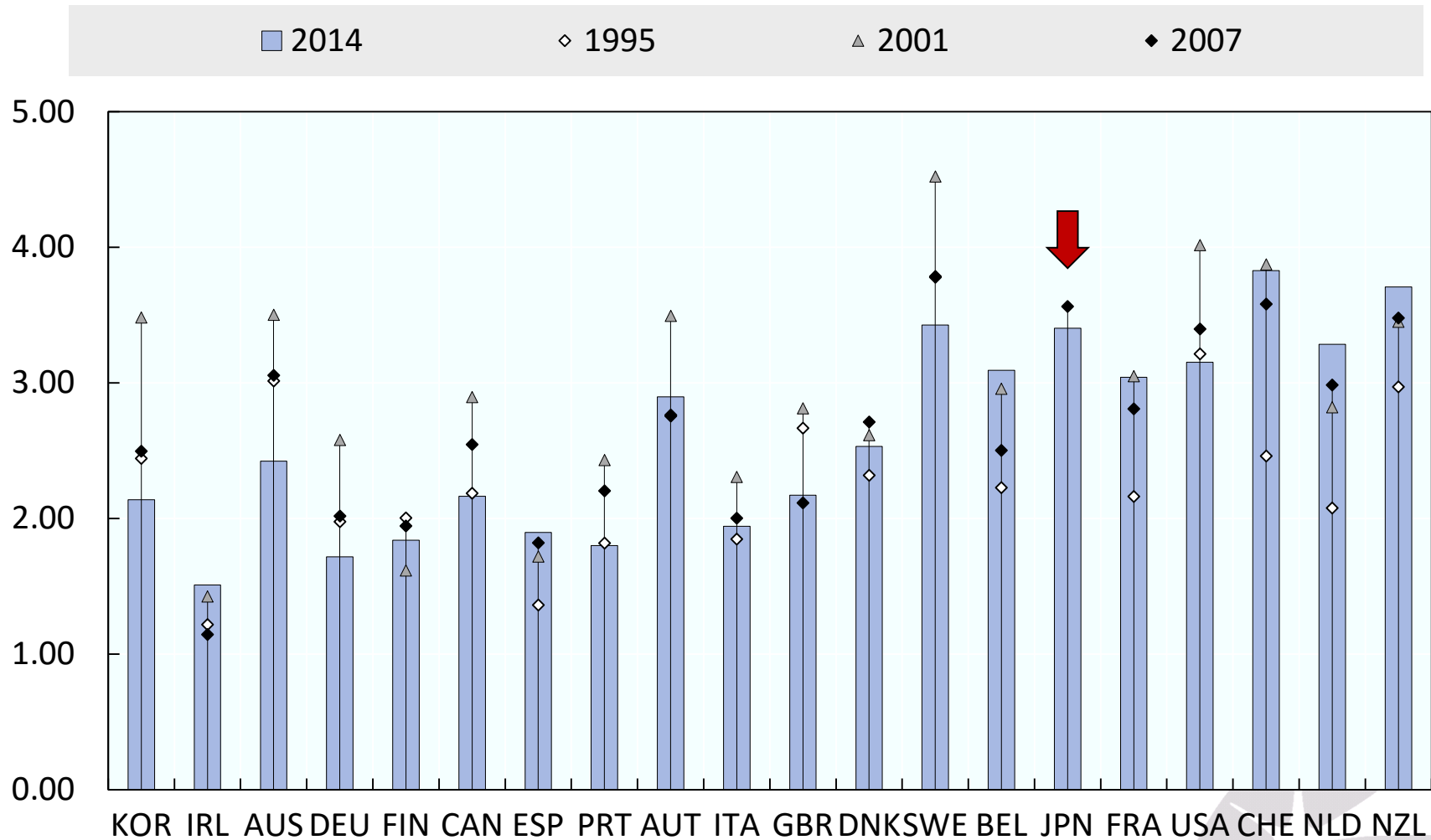

OECD *Innovation Imperative* (2016)

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Trends in Working−Age Population, the Limiting Factor

Working-age population (15-74) in relation to total population 1990-2060

OECD *Innovation Imperative* (2016)

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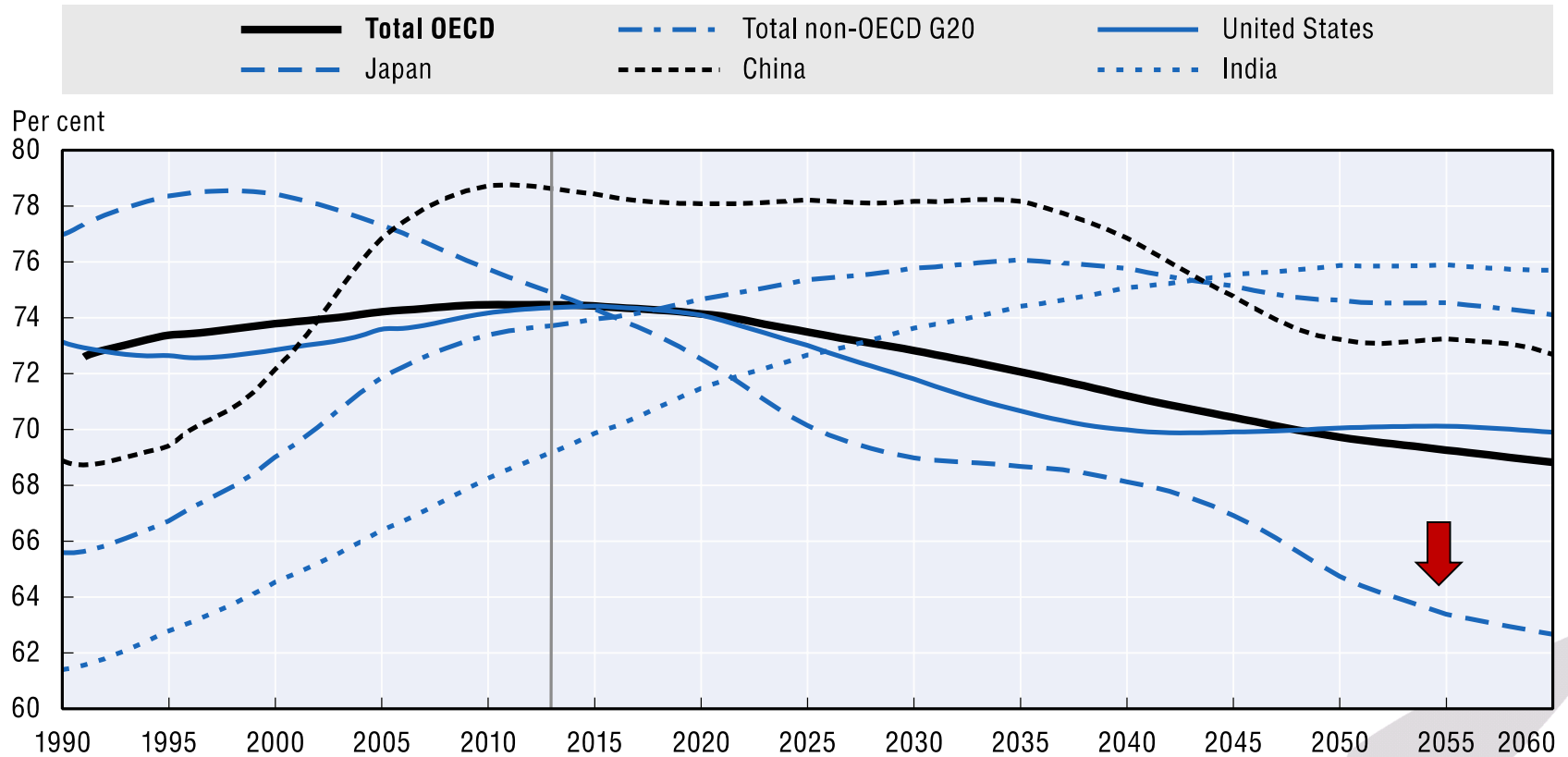
Share of ICT Investment in GDP

Legend: 2014 · 1995 · 2001 · 2007

OECD *Compendium of Productivity Indicators 2016*

7
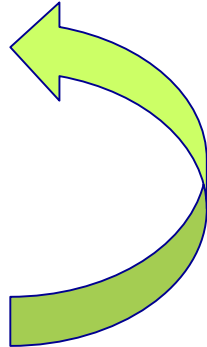
06/07/2016

Contribution of ICT capital to labour productivity growth

Legend: ■ 1990-1995 ▢ 1995-2000 ▢ 2000-2005 ▢ 2005-2009 □ 2009-2014

OECD *Compendium of Productivity Indicators 2016*

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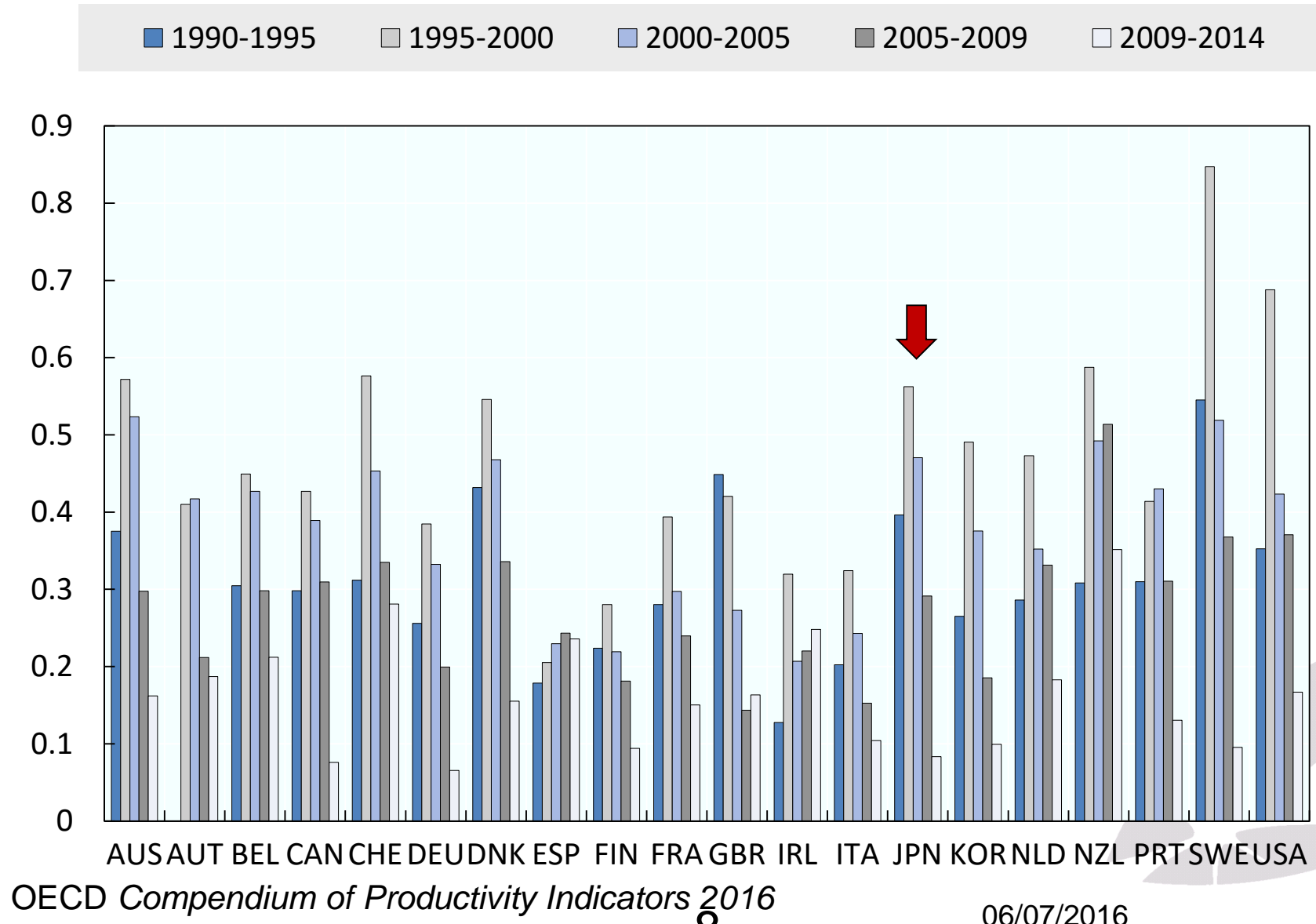
Why the Interest in STI?

- To reach the target of 600 trillion yen GDP・・・
  - Investment in STI ➡ Economic growth
  - Also・・・
    - Addressing social and global challenges
    - As a source of industrial competitiveness
    - Driver of regional development
    - …

- Mainstreaming of STI policies (in public policy, particularly economic policy)

  OECD, *The Innovation Imperative* (2015)

  ➡New challenges:
    - "Science and technology policies" AND "innovation policies" AND "economic policies"
    - Participation by diverse stakeholders➡Role of the government?
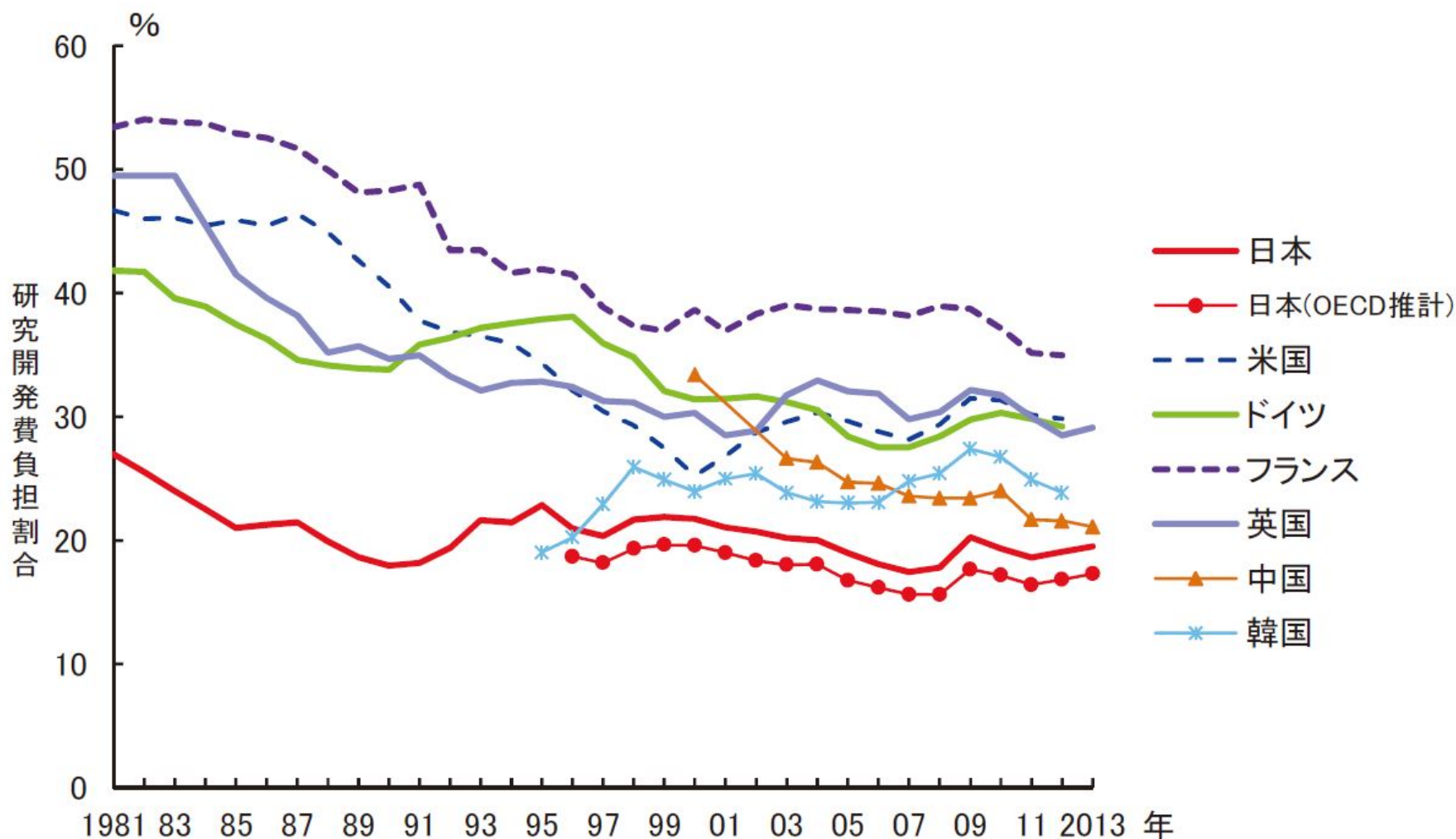
9

Trends in Upstream R&D Funding
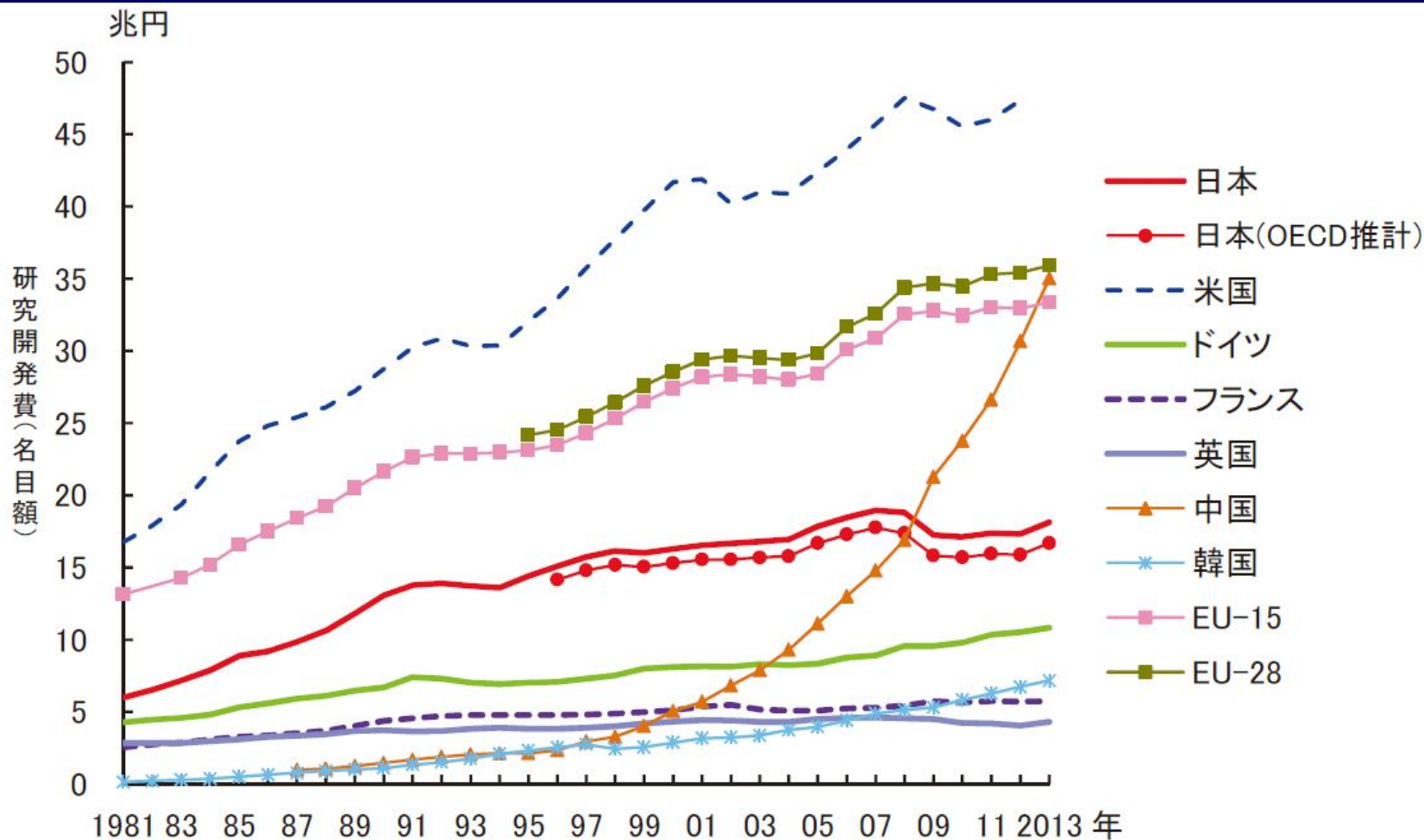
Japanese Science and Technology Indicators 2015
*兆円=trillion yen   *Funding is nominal amount.
*日本:Japan, 米国:U.S., ドイツ:Germany, フランス:France, 英国:U.K,
中国：China, 韓国:ROK

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Proportion of Government Funding for R&D

Japanese Science and Technology Indicators 2015
*日本:Japan, 米国:U.S., ドイツ:Germany, フランス:France, 英国:U.K,
  中国：China, 韓国:ROK

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R&D Funding Used by Field
(All sectors including NPOs/Public Agencies, Universities, Businesses)

角括弧[ ]内の数字には資本金1,000万～1億円の企業の使用研究費を含む
小括弧( )内の数字は非営利団体、公的機関、大学等、企業、の機関数の合計
使用研究費のうち複数の分野にまたがる研究については、重複して計上されている

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*兆円＝trillion yen

06/07/2016 出典：内閣府国民経済計算確報及び
総務省統計局科学技術研究調査
より内閣府作成

Top 10% most cited documents and scientific leading authorship, 2003-12
As a percentage of all documents, whole counts

thor

Led by domestic leading author
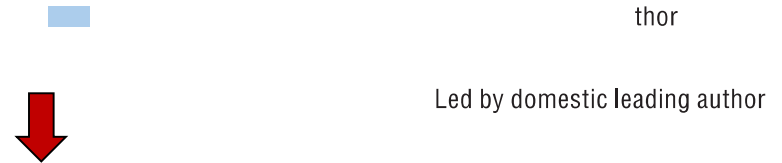
Led by foreign leading author

Source: OECD and SCImago Research Group (CSIC) (2015), *Compendium of Bibliometric Science Indicators 2014, http://oe.cd/scientometrics.* See chapter notes.

StatLink 🔗 *http://dx.doi.org/10.1787/888933273886*

OECD *STI Scoreboard 2015*

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Japan's Potential for Growth (2)

Female scientific authors in selected fields, by country, 2011
As a percentage of corresponding authors, estimated shares
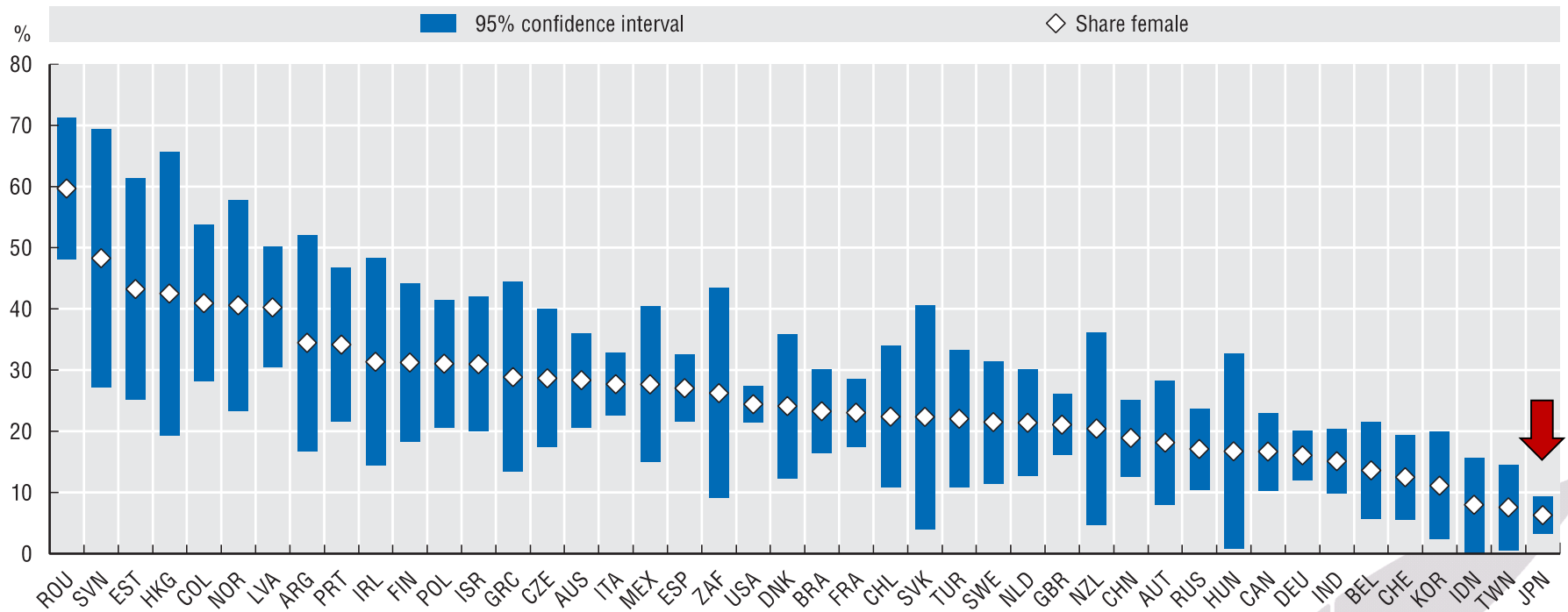

Note: This is an experimental indicator, based on a stratified random sample of scientific authors.
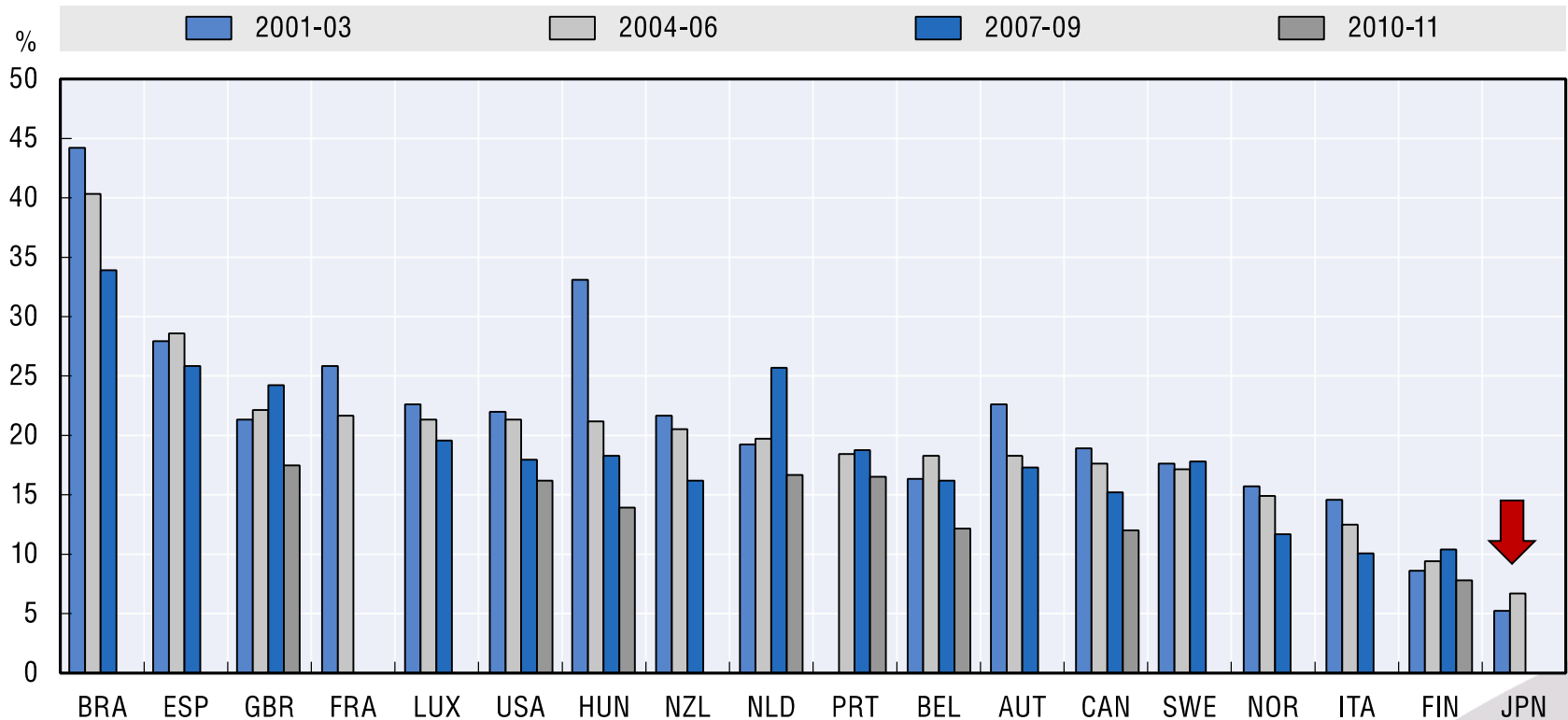*Source:* OECD, based on preliminary analysis of the OECD Pilot Survey of Scientific Authors, July 2015. See chapter notes.

StatLink ⬛ *http://dx.doi.org/10.1787/888933273335*

Start-up rates have declined across countries

Percentage of start-ups in all businesses

OECD *Innovation Imperative* (2016)

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Fifth Science and Technology Basic Plan and Society 5.0

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Where we stand today

- Consider the times
  - Period of Great Change
    - Connectivity, Openness, Inclusiveness
    - Beyond existing frameworks ➡ Co-production, Co-creation, Co-…
    - Data-driven innovation, Social innovation, Platform economy, Shared economy, …
    - ➡ Unpredictable, Unforeseeable, Transformational, Disruptive
    - Global perspective
  - Preparedness is the key
- Keys for Science, Technology, and Innovation?
  - Fundamentals
  - Social experiments ＋learning
  - Creativity
  - Social acceptance of "difference"
  - Co-creation beyond existing frameworks

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- Three Pillars
  - Lead this period of great change
    - ➡ **Preparing the next: Future industry and society**
      - Proposed and implemented by various stakeholders, in particular young leaders of the next generation
  - Preemptive action against economic and social issues
    - ➡ Addressing economic and social challenges
  - Increase potential, which enables efforts to respond to uncertain changes
    - ➡ Development and enhancement of fundamentals
      - People that act based on deep knowledge, observational skills, and leadership
      - Continually create diverse, excellent knowledge assets
- Initiatives
  - More open and dynamic innovation systems
  - More inclusive innovation

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- Exploring game changers
  - ➡Places for debate, discovering ideas
- New approaches
  - System of Systems approach
  - (Global) Value Chains approach
  - ➡By promoting specific projects
- Investing in technologies that provide a common platform
  - ➡Enabling technologies (IoT, AI, Big Data, …)

- **Society 5.0**

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Society 5.0

Hunting & Gathering
In symbiosis with Nature

5.0

1.0

2.0

Agriculture
Organization ➡
Nation states

Information
Intangible assets + network ➡
added value

4.0

Industry
3.0
Mastering of power ➡
Mass production

Learn from History

1. Hunting & Gathering Society
   ➡ **Sustainability**
2. Agricultural Society
   ➡ **Inclusiveness**
3. Industrial Society
   ➡ **Efficiency**
4. Information Society
   ➡ **Power of intellect**

Society 5.0
- Full use of STI
- People as the core
- Participation by all
- Shared values
  - **Sustainability**
  - **Inclusiveness**
  - **Efficiency**
  - **Power of intellect**

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In Other Words···

- Super Smart Society
  - A society where the necessary goods and services are provided to the people who need them at the right time and in the right amounts, regardless of age, gender, location, language or other limitations, for a fulfilling and comfortable lifestyle where everyone can receive high-quality service
    - Coexistence of people and robots/AI
    - Made-to-order services
    - Elimination of service inequality
    - Increased opportunities for game changers

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Improvement of Fundamental Technologies

- Cyberspace
  - Cybersecurity
  - Software base
  - Big data analysis
  - Artificial intelligence
  - Devices to process large-scale data at rapid speeds with low power consumption
  - Networks

- Real World
  - Robotics and actuators
  - Sensors and optical/quantum technology
  - Biotechnology (biointerfaces, etc.)
  - Human interfaces using augmented reality (AR) and haptic engineering
  - Materials and nanotechnology

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Society 5.0 Platform

Smart Production System

Smart Food Chain System

Integrated Material R&D System

New Services

Hospitality System

Regional Inclusive Care System

Disaster Reduction System

Global Environment Data Platform

Intelligent Transport System

Energy Value Chain

Monozukuri System

Infrastructure Maintenance System

Base Technologies
AI, Big Data Processing, etc.

Global Environment Data

Position Data

Improved Data Exchange

3D Map Data

Image Data

Database

○Cybersecurity ○System to Promote Use of Data ○Global IP Standards
○Linked Open Data System ○Unified Data Format
○System/Regulation Reforms ○Training Human Resources

Shared Base Functions

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2016/06/27

Comprehensive Strategy on STI 2016

- Acting to Create New Value for the Development of Future Industry and Social Transformation
  - Database construction
  - Promoting valuable uses of data
  - IP strategy and creation of global standards
  - System and regulation reforms, and fostering social acceptance
  - Skill development, training of human resources
- Enhancing Fundamentals of STI
  - Increasing human resource capabilities
    - Training and opportunities for young researchers, opportunities for women, more flexible movement of human resources
  - Funding reforms
    - Reforms for base costs, reforms for public funding, integrated reforms for national universities and research funding
- Creation of a Virtuous Cycle for Human Resources, Knowledge, and Funding to Create Innovation
  - Improvement of systems to promote open innovation
  - Improve creation of SMEs and start-ups for new business areas
- Improve Capabilities for Promotion of STI

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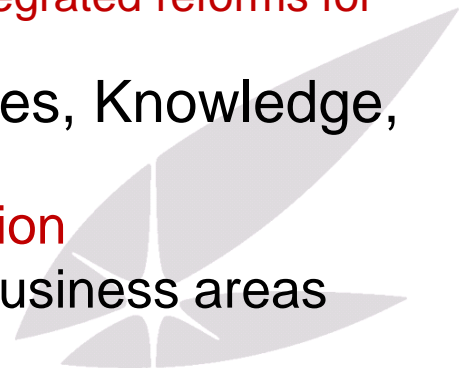
What's next!

- The Advisory Panel on Artificial Intelligence and Human Society (May-)
  - Under Minister of State for Science and Technology Policy
  - Ethics, law, regulations, economy, social impact➡issues and planned direction

- Committee for Promotion of Economic Society and Science, Technology and Innovation (June-)
  - Under Council on Economic and Fiscal Policy and Council for Science, Technology and Innovation
  - Fundamental system reforms (systems for training and exchange of human resources, employment conditions, funding distribution, accounting, etc.)
  - Transparency and evidence for STI policies
  - STI ➡ Economic stimulus policies and increased annual expenditure efficiency, etc.

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