

The Structural Causes of Japan's Low TFP Growth

**Prepared for the Conference at the Peterson Institute for
International Economics, Washington, DC**

Making Sense of the Productivity Slowdown

Monday, November 16, 2015

Kyoji Fukao

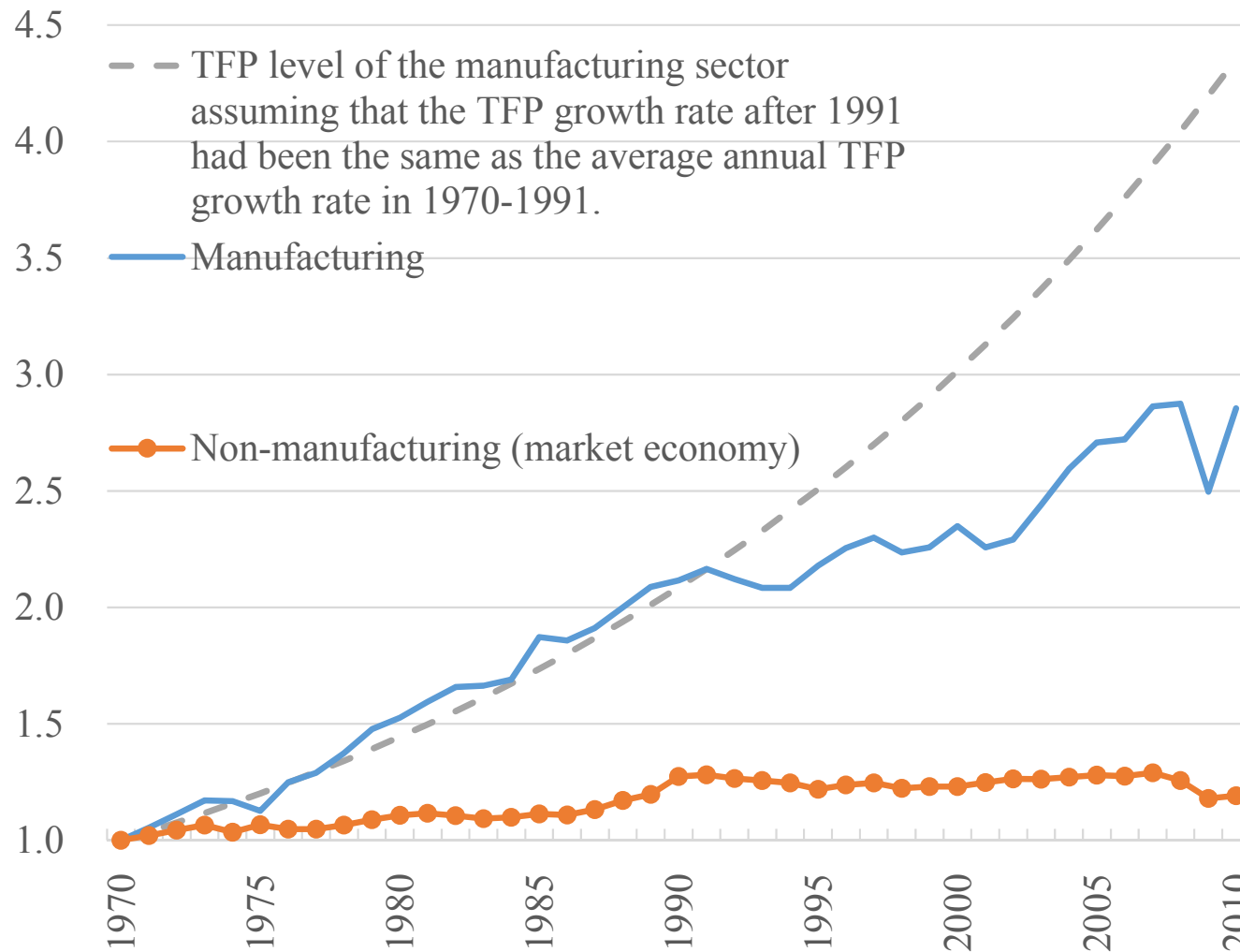
(Hitotsubashi University and RIETI)

Motivation

- Although Japan had largely resolved the problem of banks' non-performing loans and firms' damaged balance sheets by the early 2000s, productivity growth hardly accelerated, resulting in what now are “two lost decades.”
- This presentation examines the underlying reasons of Japan's low TFP growth from a long-term and structural perspective using a industry-level database and micro-level data.

Motivation (Contd.)

Both the manufacturing and the non-manufacturing sector are responsible for the decline in macro TFP growth after 1991.



Notes: TFP values are on a value-added basis. The non-manufacturing sector (market economy) does not include imputed rent for owner-occupied dwellings.
Source: JIP Database 2013.

Structure of the Presentation

- 1. Slowdown of TFP Growth in the Manufacturing Sector**
- 2. Why Was Japan Left Behind in the ICT Revolution**
- 3. Increase of Part-Time Workers**
- 4. Policies Needed for Productivity Growth**

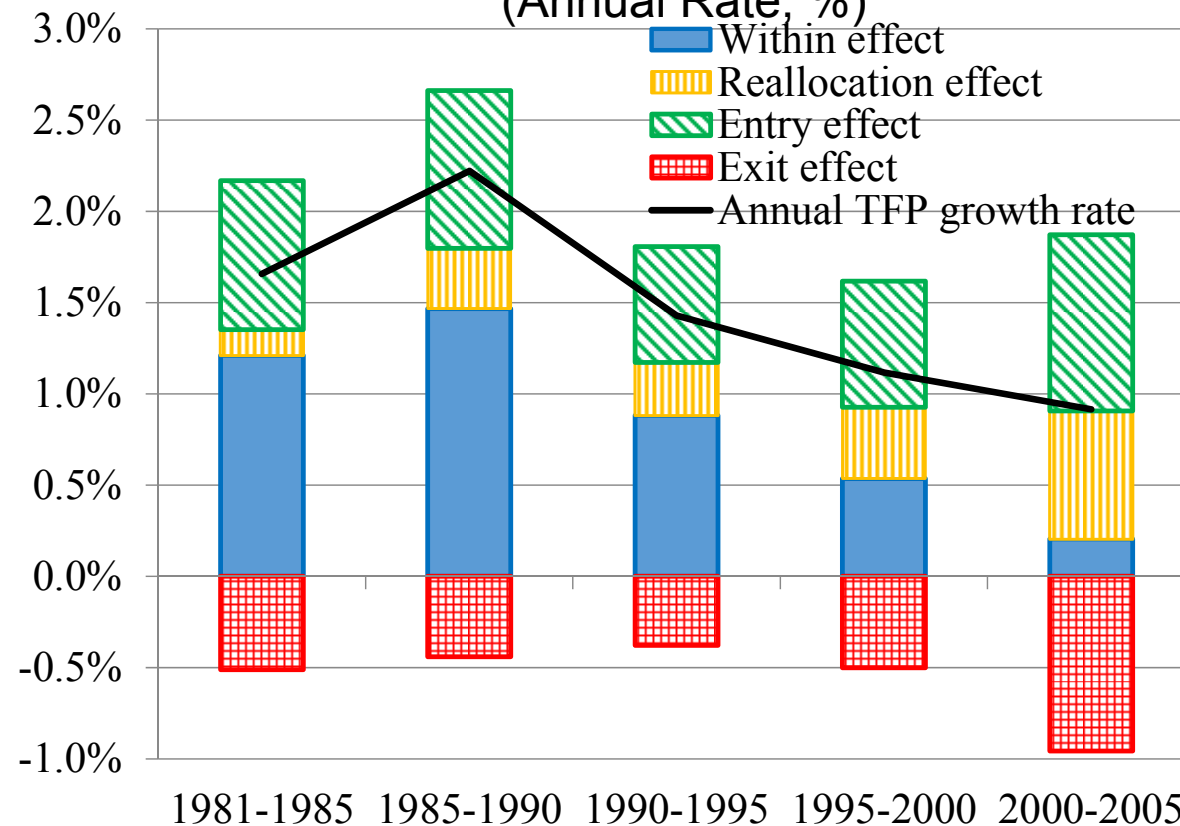
1. Slowdown of TFP Growth in the Manufacturing Sector

Productivity Dynamics in the Manufacturing Sector

From 1990 onward, the within effect steadily declined and the negative exit effect expanded (that is, productive factories were shut down, while less productive factories remained).

These two trends reduced TFP growth in the manufacturing sector substantially.

Decomposition of TFP Growth in the Manufacturing Sector
(Annual Rate, %)



Why Did the Within Effect Decline?

- In the manufacturing sector, the TFP growth of large firms has actually accelerated. Small and medium-sized firms (SMEs) have been left behind (Fukao and Kwon 2006).

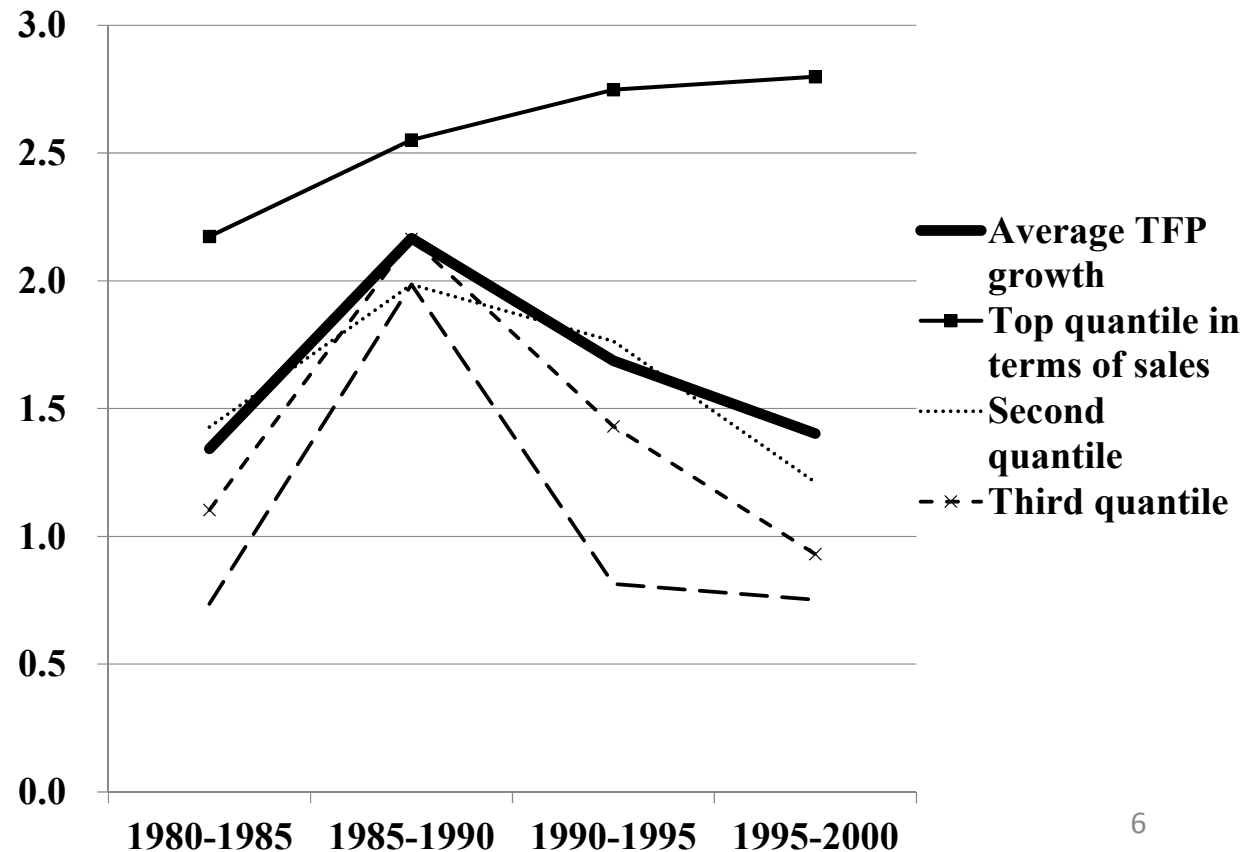
→ Possible reasons:

(a) SMEs left behind in R&D and internationalization

(in Japan, the R&D intensity of SMEs is much lower than that of larger firms)

(b) decrease in technology spillovers from large firms.

TFP Growth by Factory Size (Annual Growth Rate, %)

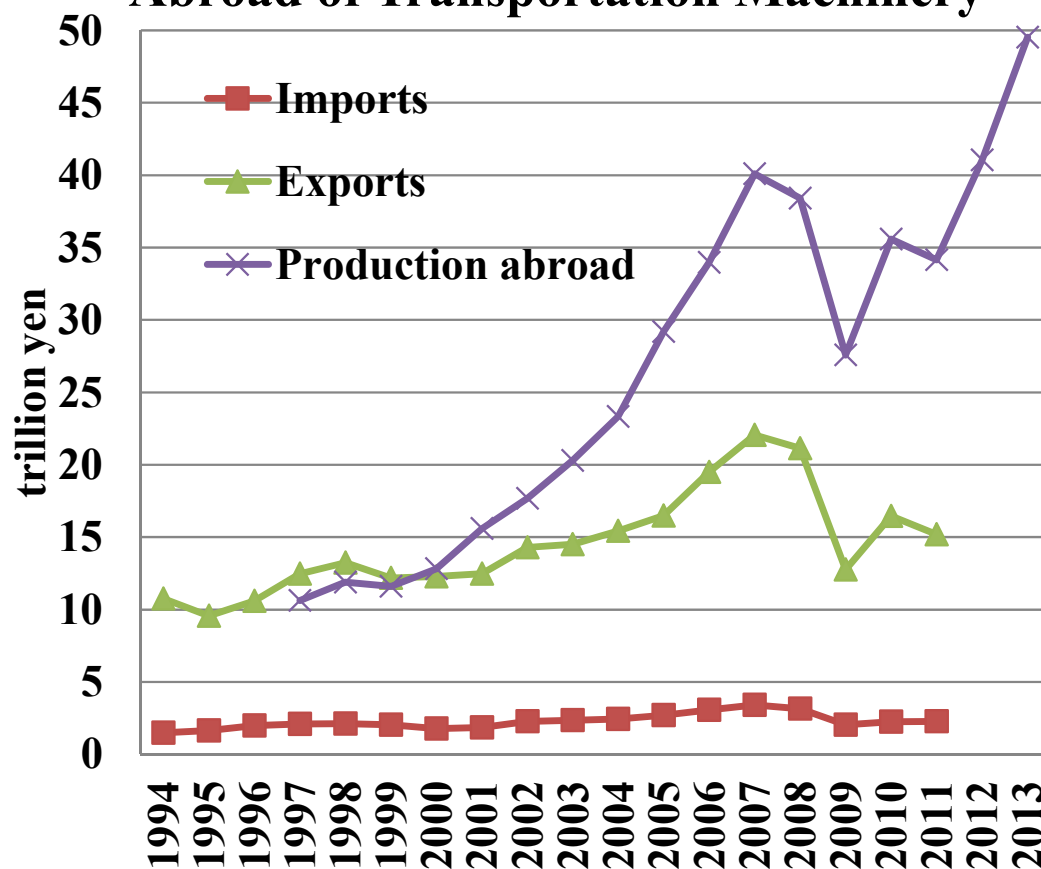


Hollowing-Out Problem

Japan's leading export industries, such as automobiles, have relocated production abroad.

And probably because of this and other factors such as restructuring at large assemblers, buyer-supplier relationships in the automobile industry in Japan have become more open (Ikeuchi et al. 2015).

Imports, Exports and Production Abroad of Transportation Machinery



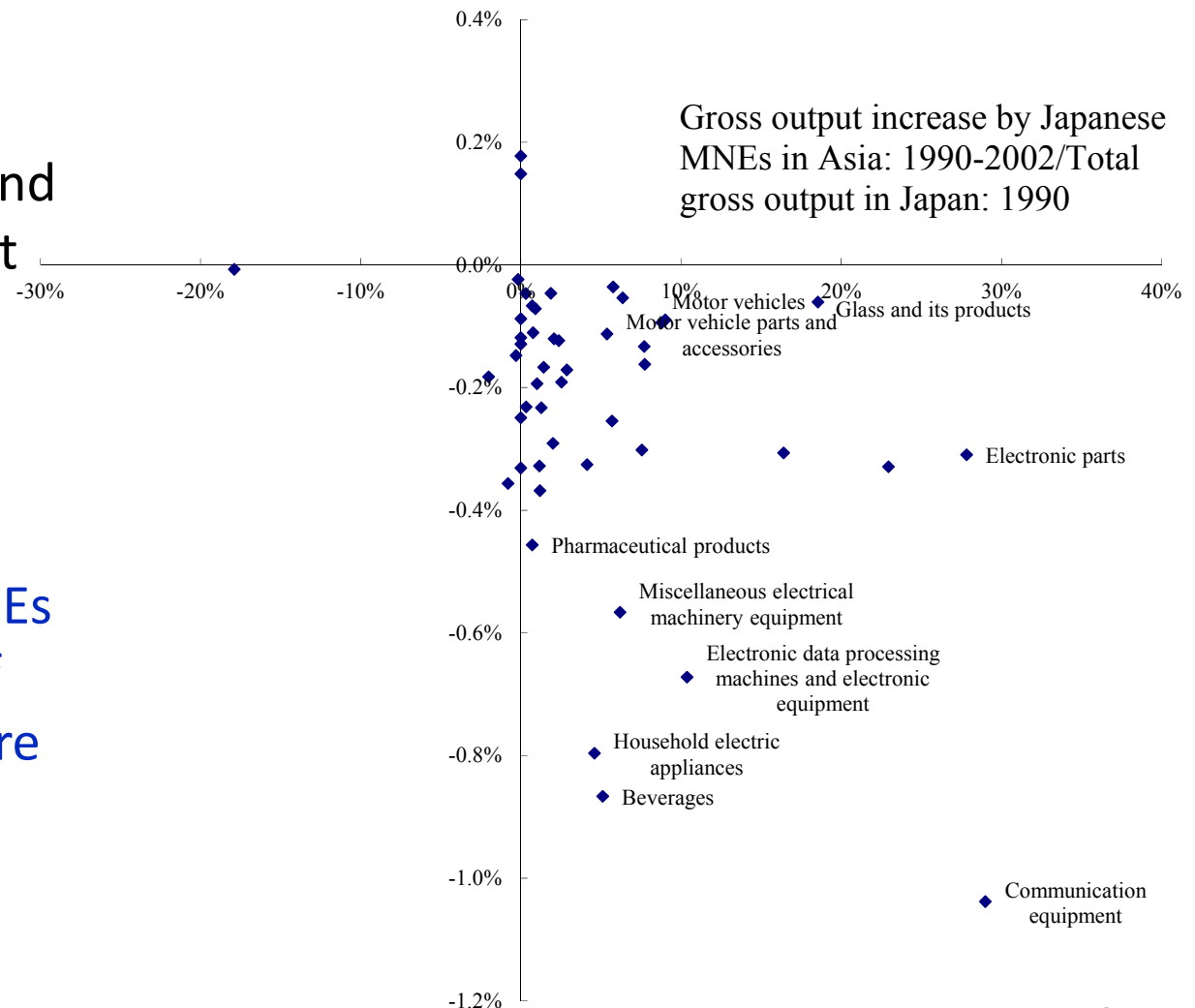
Why Was the Exit Effect Negative?

There is a statistically significant negative correlation between the industry-level exit effect and industry-level gross output growth by Japanese multinational enterprises (MNEs) in Asia.

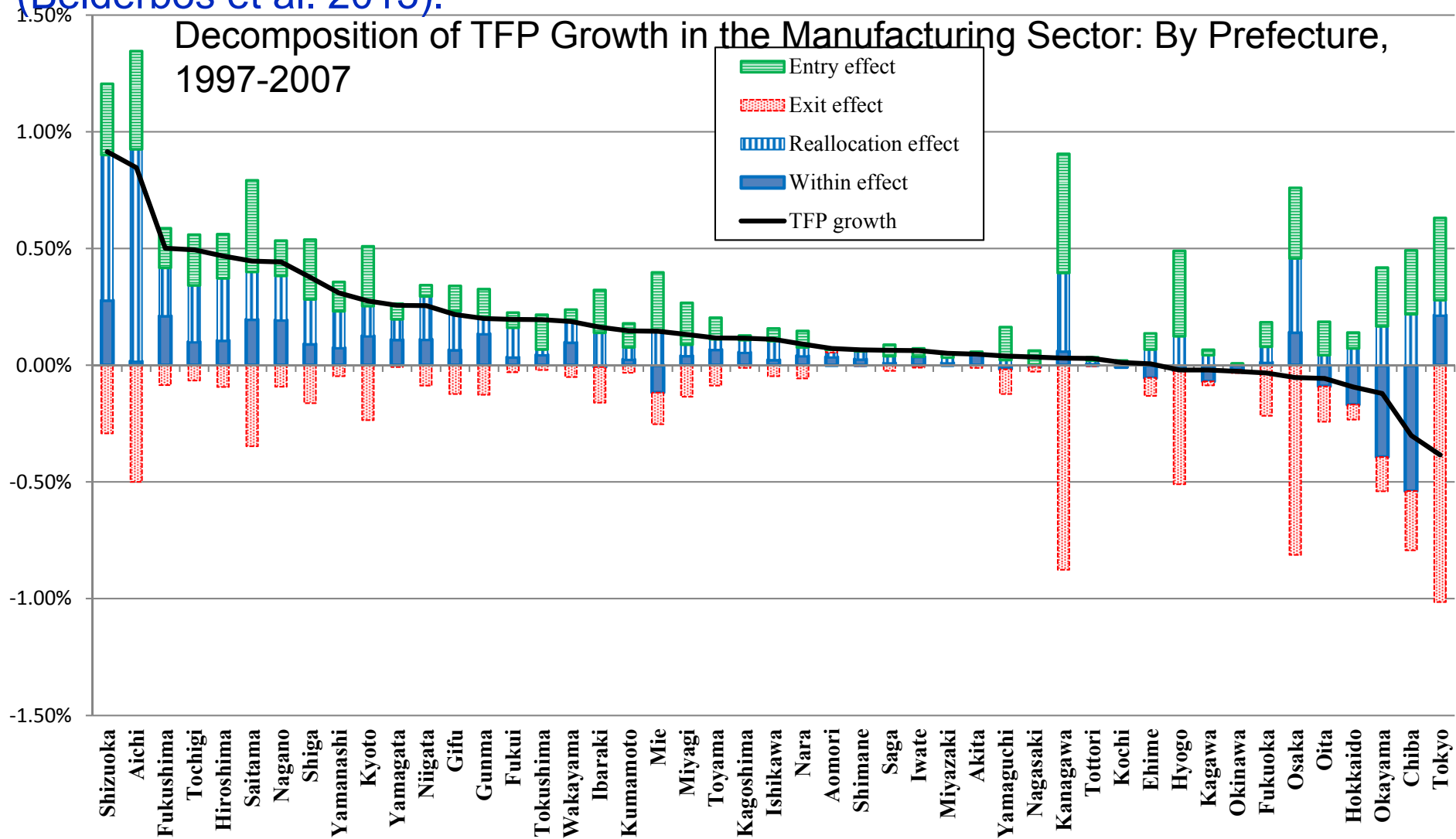
MNEs have higher productivity than non-MNEs (Fukao 2012) and many of them have relocated, or are relocating, production activities abroad.

Overseas Production and the Exit Effect at Home

Exit effect: 1990-2003



The large negative exit effect appears to be mainly concentrated in industrial districts in prefectures such as Kanagawa, Tokyo, and Osaka. The closure of productive factories, most of which are owned by R&D-intensive firms, potentially reduced geographical spillovers to SMEs in these districts (Belderbos et al. 2013).



Structure of the Presentation

1. Slowdown of TFP Growth in the Manufacturing Sector
2. Why Was Japan Left Behind in the ICT Revolution
3. Increase of Part-Time Workers
4. Policies Needed for Productivity Growth

2. Why Was Japan Left Behind in the ICT Revolution

Comparison of the sources of labor productivity growth in Japan and the United States after 1990 shows that Japan's labor productivity growth was lower than that of the US because of Japan's slow ICT capital deepening and lower TFP growth. (Jorgenson, Nomura, and Samuels 2015 report similar results for the period 1991-2012.) On the other hand, non-ICT capital deepening and labor quality improvements were swifter in Japan than the US.

Japan-US Comparison of Sources of Labor Productivity Growth (annual rate, %)

	Japan: 1990-2010	US: 1990-2007
Labor productivity growth	1.8	2.4
Contribution of ICT capital deepening	0.4	0.8
Contribution of non-ICT capital deepening	0.5	0.3
Contribution of labor quality improvement	0.5	0.3
Contribution of TFP growth	0.4	1.1

Sources: JIP Database 2014 and EU KLEMS ISIC Rev. 3, March 2011 Update.

2. Why Was Japan Left Behind in the ICT Revolution (Contd.)

ICT-capital deepening in Japan was much slower than in the US in all sectors. The slower ICT-capital deepening in distribution and total manufacturing, excluding electrical machinery, probably is an especially serious problem. The reason is that these are ICT-intensive sectors and the main engine of the ICT revolution in the US. In the US, the TFP growth rates of these sectors accelerated from the mid-1990s.

Japan-US Comparison of Contribution of ICT-Capital Deepening to Labor Productivity Growth by Sector (annual rate, %)

	Japan: 1990-2010	US: 1990-2007
ICT goods and services	1.0	1.7
Total manufacturing, excluding electrical	0.4	0.6
Production of other goods	0.1	0.3
Distribution	0.2	0.7
Finance and business, excluding real estate	0.9	1.4
Personal services	0.1	0.2
Market economy	0.4	0.8

Sources: JIP Database 2014 and EU KLEMS ISIC Rev. 3, March 2011 Update.

2. Why Was Japan Left Behind in the ICT Revolution (Contd.)

In distribution and total manufacturing, excluding electrical machinery, TFP growth in the US after 1990 was much higher than in Japan.

Japan-US Comparison of TFP Growth by Sector (annual rate, %)

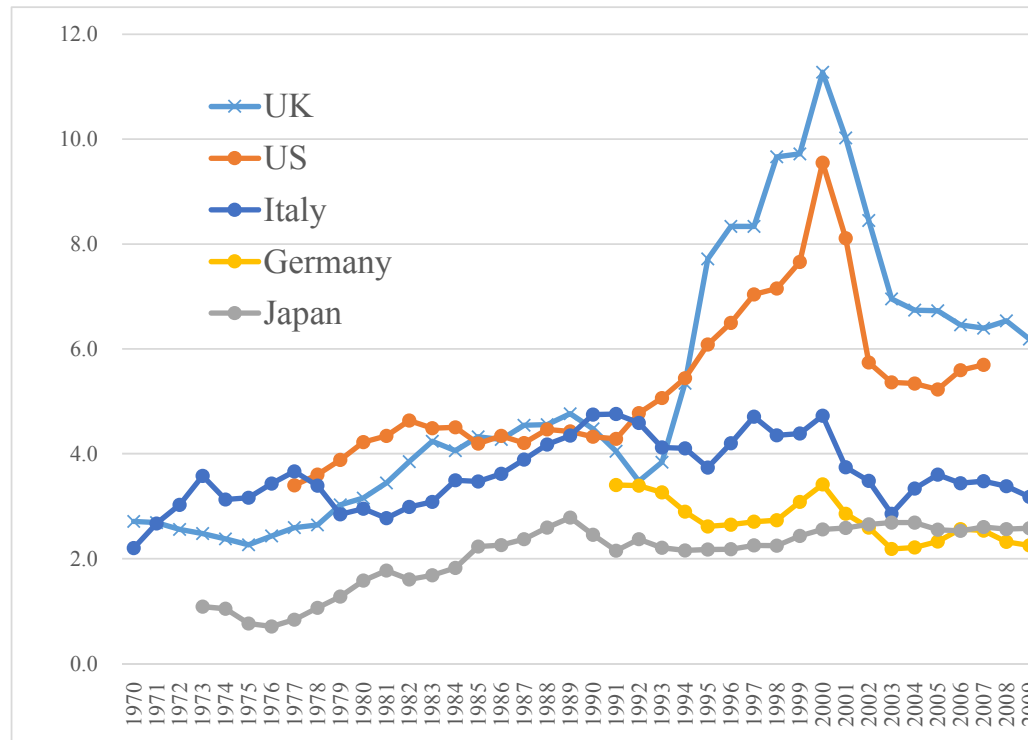
	Japan: 1990-2010	US: 1990-2007	Each sector's labor input share in the total market economy in Japan (1990-2010 average, %)
ICT goods and services	6.4	6.5	5.0
Total manufacturing, excluding electrical	0.3	1.1	21.0
Production of other goods	-1.2	-1.1	18.8
Distribution	0.7	2.4	25.8
Finance and business, excluding real estate	-0.3	-0.4	13.9
Personal services	-0.6	0.5	15.6
Market economy	0.4	1.1	100.0

Sources: JIP Database 2014 and EU KLEMS ISIC Rev. 3, March 2011 Update.

2. Why Was Japan Left Behind in the ICT Revolution (Contd.)

It appears that the ICT revolution did not happen in Japan simply because Japan has not accumulated sufficient ICT capital (Fukao 2013).

ICT Investment-Gross Value Added Ratio in Major Developed Economies: Distribution Services



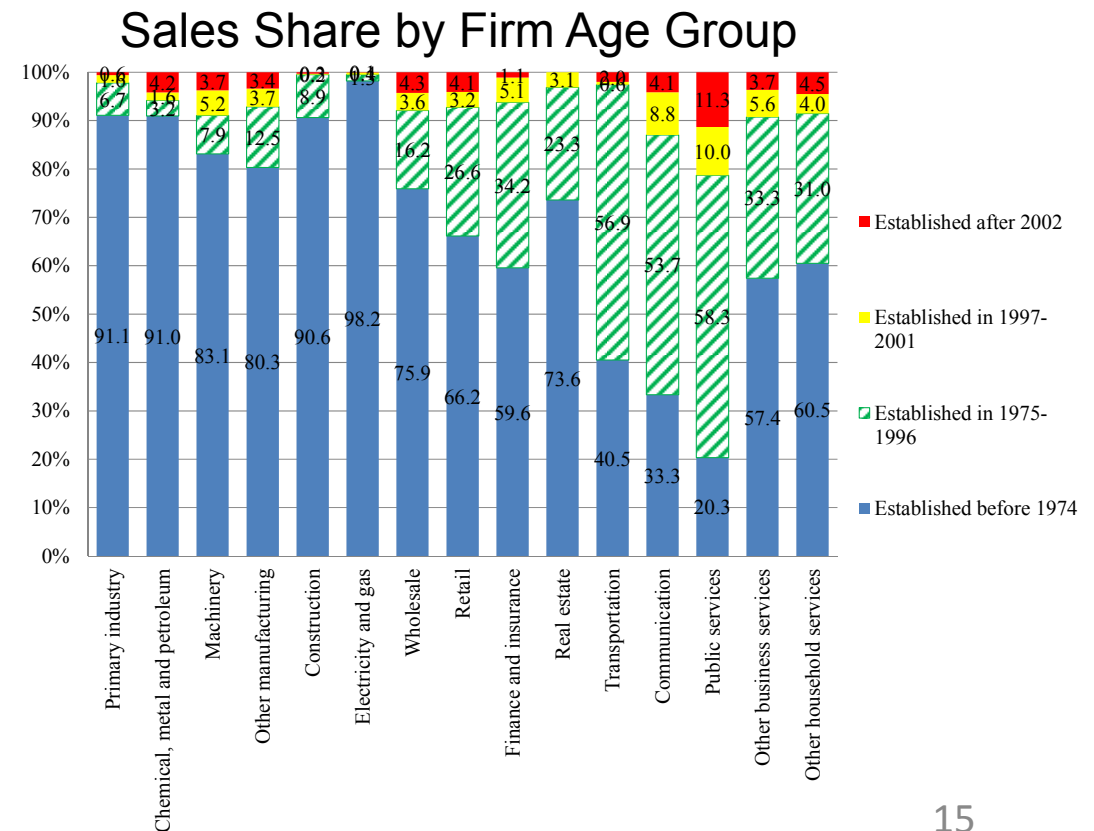
Source: EU KLEMS Database, Rolling Updates.

2. Why Was Japan Left Behind in the ICT Revolution (contd.)

We can point out many important structural impediments to ICT investment in Japan (Fukao, Ikeuchi, Kim, and Kwon 2015).

1. One of the main contributions of the introduction of ICT is that it allows firms to save unskilled labor input. However, **because of the high job security in Japan, it may be difficult for firms to actually cut jobs.**

2. **Young and growing firms tend to be more active in ICT investment.** However, because of the low entry and exit rates in Japan, firms that have been around for 40 years or more have a majority of market share in most industries.



2. Why Was Japan Left Behind in the ICT Revolution (contd.)

3. In Japan, the market for business process outsourcing (BPO), which includes outsourcing of ICT processes, is not well developed (METI 2014). Access to efficient vendors of ICT services is a key factor for smaller firms' procuring ICT input at a reasonable price. Moreover, because of the life-time employment system, ICT experts in Japan tend to prefer working in large firms (NISTEP 1993). These two factors make ICT input more expensive for smaller firms.

Group	Number of employees	ICT input / VA (%)
	Median	Median
Group_EMP1 (largest)	1,783	3.8
Group_EMP2	472	2.8
Group_EMP3	201	2.2
Group_EMP4	89	1.9
Total	307	2.6

Source: Fukao, Ikeuchi, Kim, and Kwon (2015).

The underdevelopment of the BPO market in Japan is closely related with the rigidity of the labor market. Since it is difficult for Japanese firms to lay off workers, Japanese firms hesitate to restructure costly internal business process divisions. Moreover, even when they restructure such divisions, they often relocate workers in such divisions to affiliates or firms in the same business group and procure business process services from the firms to which they transferred former employees. Because of these constraints, Japanese firms cannot procure business services from the most productive vendors, reducing the benefit of BPO and keeping the BPO market underdeveloped (Fukao, Ikeuchi, Kim, and Kwon 2015).

2. Why Was Japan Left Behind in the ICT Revolution (contd.)

4. The supply of ICT software experts in Japan is much smaller than that in the United States (Arora, Branstetter, and Drev 2011).
5. The scarcity of ICT software experts and the less developed market for outsourcing of ICT processes likely make ICT input prices in Japan more expensive for smaller than for larger firms. Moreover, such small firms are much more prevalent in Japan than in the United States in most sectors.

	All industries				Retail			
	Japan		United States		Japan		United States	
Firm size (No. of employees)	2006		2006		2006		2006	
(a) 1 to 4	1,574,110	5%	6,262,490	5%	625,195	11%	1,101,567	4%
(b) 5 to 9	1,993,335	6%	7,274,534	6%	415,987	7%	1,569,985	6%
(c) 10 to 19	2,736,690	9%	8,794,210	7%	628,979	11%	2,064,520	8%
(d) 20 to 49	4,188,269	13%	12,260,057	10%	669,467	12%	2,942,955	12%
(e) 50 to 99	3,166,835	10%	8,868,873	7%	341,953	6%	1,870,352	7%
(f) 100 to 249	4,144,598	13%	10,497,066	9%	422,022	8%	1,638,001	6%
(g) 250 to 499	2,794,966	9%	6,762,233	6%	339,030	6%	929,095	4%
(h) 500 to 999	2,573,958	8%	6,063,319	5%	353,124	6%	794,140	3%
(i) 1000+	8,935,484	28%	52,125,133	44%	1,780,906	32%	12,524,996	49%
Total	32,108,245		118,907,915		5,576,663		25,435,611	

(Note) Japan: Establishment and Enterprise Census for 2001 and 2006, USA: Business Dynamics Statistics

Source: Fukao, Ikeuchi, Kim, and Kwon (2015).

3. Why Was Japan Left Behind in the ICT Revolution (contd.)

6. In addition, ICT input prices in Japan are higher than in the United States.

Japan-US ICT Service Price Comparison for 2012

	Relative price: Japan/US
Telephone call (within city)	1.62
Telephone call (400 km)	3.56
Minimum charge for telephone line (business use)	0.99
Telephone call (international)	9.54
High-speed digital leased line	4.05
International leased line	7.94
Minimum charge for ADSL internet connection	1.09
Cellular phone call charge (one minute)	3.56
Cellular phone monthly fee (packaged plan)	2.92
Packaged software (average cost to purchase 100 sets of Windows Vista, Word 2007, and Excel 2007)	2.27
Outsourcing of payroll accounting	2.56

Source: Fukao, Ikeuchi, Kim, and Kwon (2015). The original data are from METI, *The Survey on Foreign and Domestic Price Differentials for Industrial Intermediate Input 2012*.

3. Why Was Japan Left Behind in the ICT Revolution (contd.)

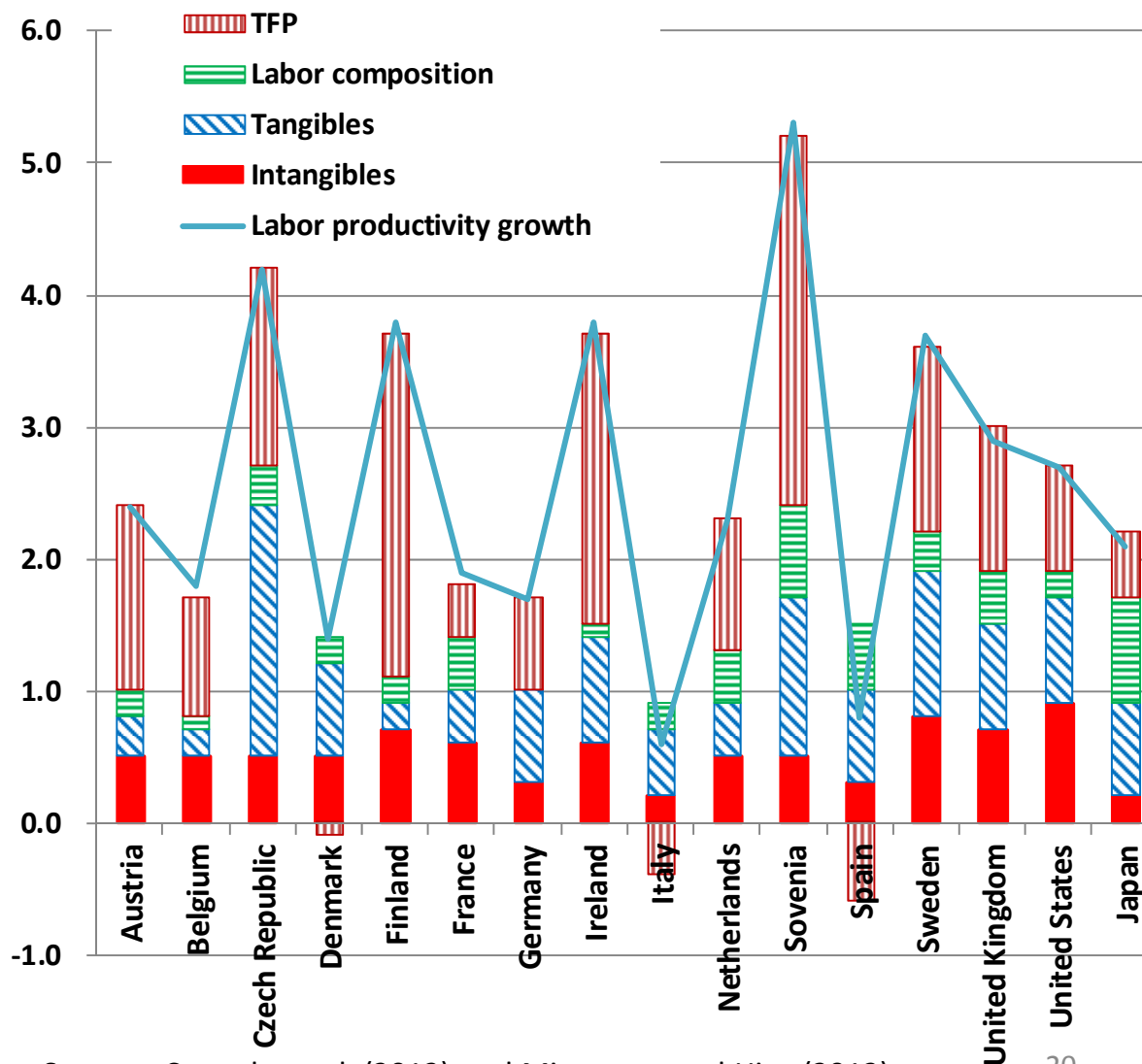
7. In order to avoid changes in corporate structure, employment adjustment, and training of workers, Japanese firms tend to choose **custom software** rather than packaged software, making ICT investment more expensive and network externality effects smaller, because each firm uses different custom software.

3. Why Was Japan Left Behind in the ICT Revolution (contd.)

8. ICT capital and intangible assets are close complements. The contribution of intangible investment to labor productivity growth in Japan is the lowest among the major developed countries.

Japan invests a lot in R&D but very little in non-R&D intangibles.

Contribution to the growth in output per hour: 1995 to 2007
(annual rate, %)



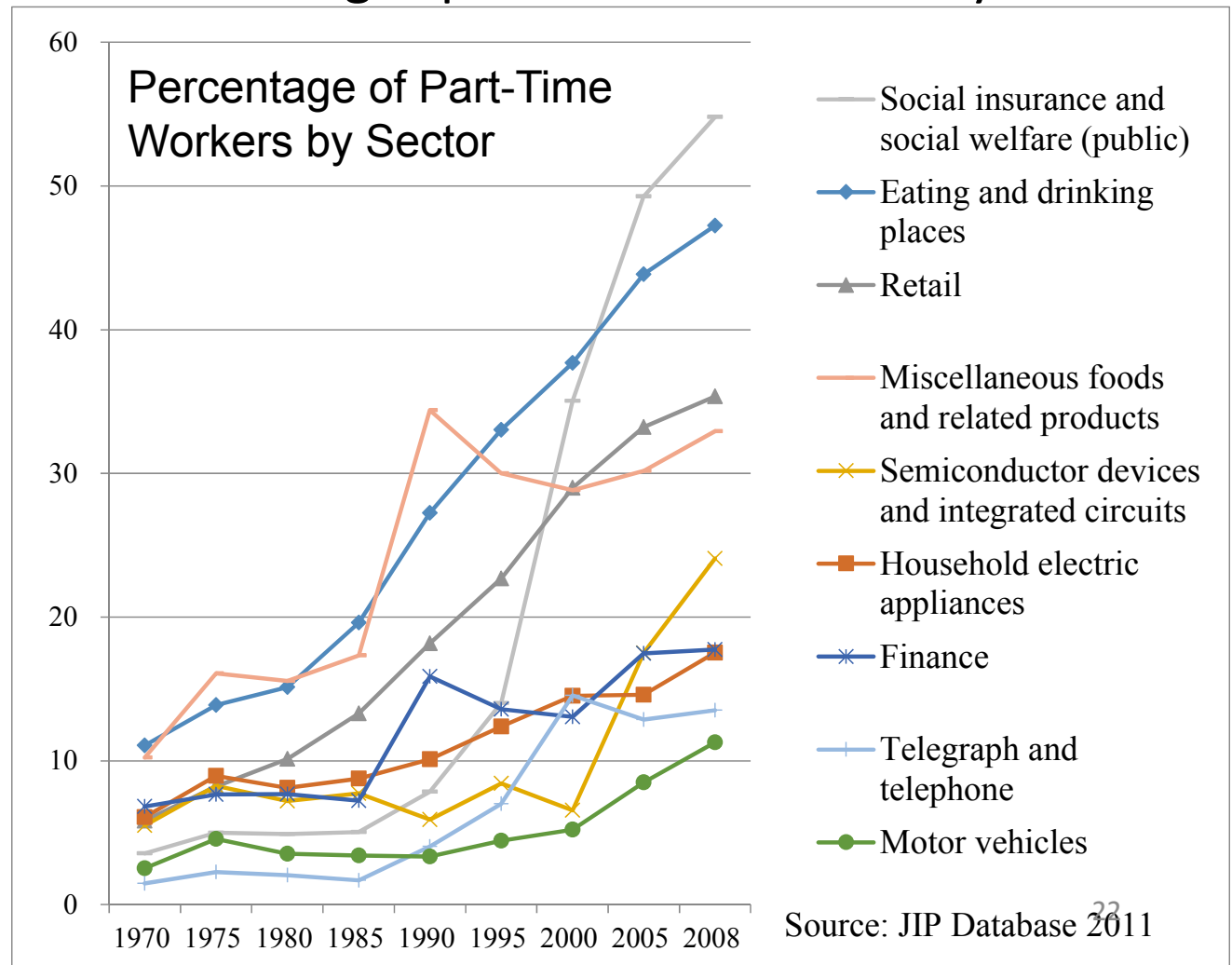
Source: Corrado et al. (2012) and Miyagawa and Hisa (2012).

Structure of the Presentation

1. Slowdown of TFP Growth in the Manufacturing Sector
2. Why Was Japan Left Behind in the ICT Revolution
3. Increase of Part-Time Workers
4. Policies Needed for Productivity Growth

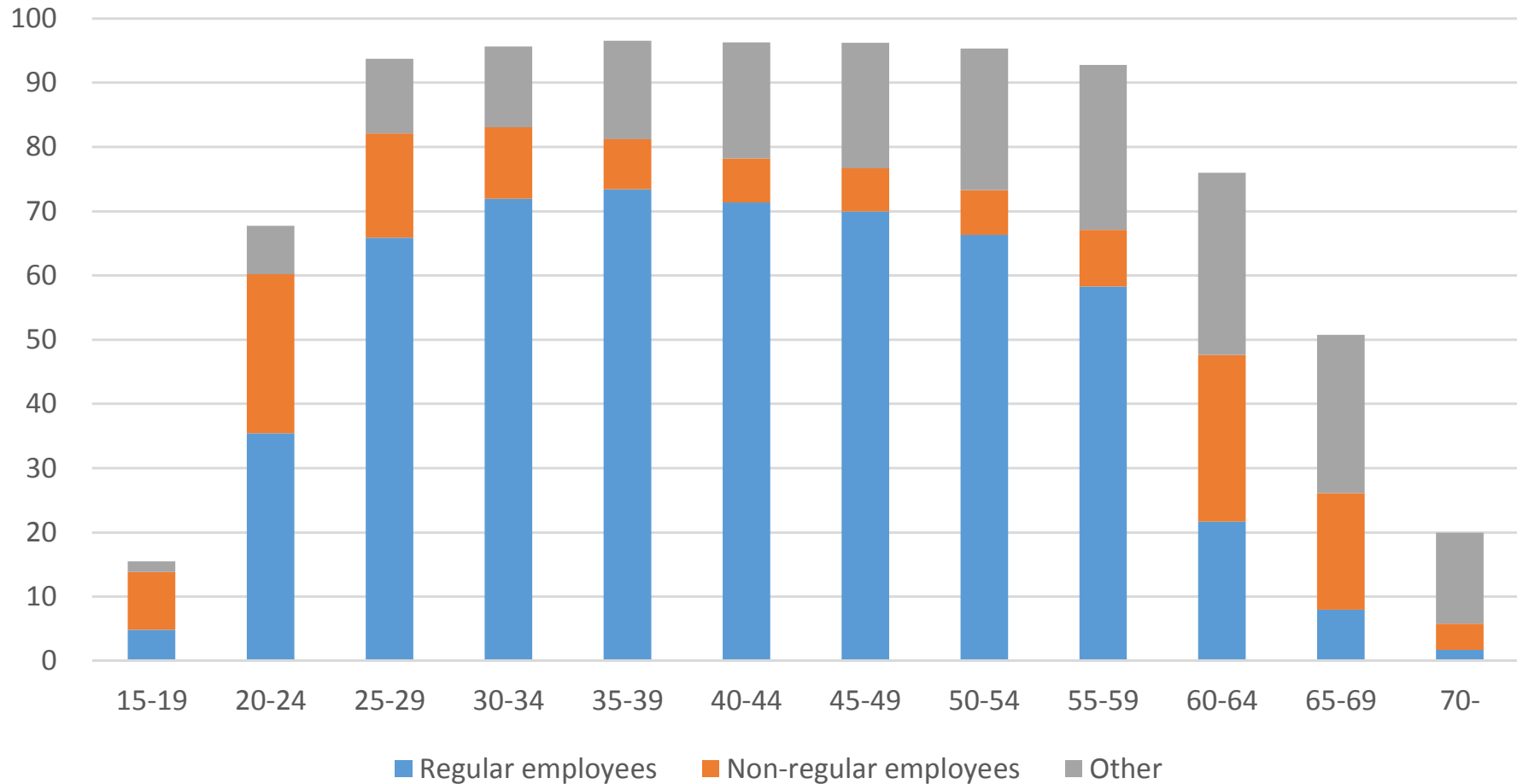
3. Increase of Part-Time Workers

Many firms increased the percentage of part-time workers in total workers and did not provide intensive training in the case of part-time workers. This change reduced training expenditure substantially.



The percentage of non-regular employees is increasing among young male workers. Most aged male workers are not regular employees.

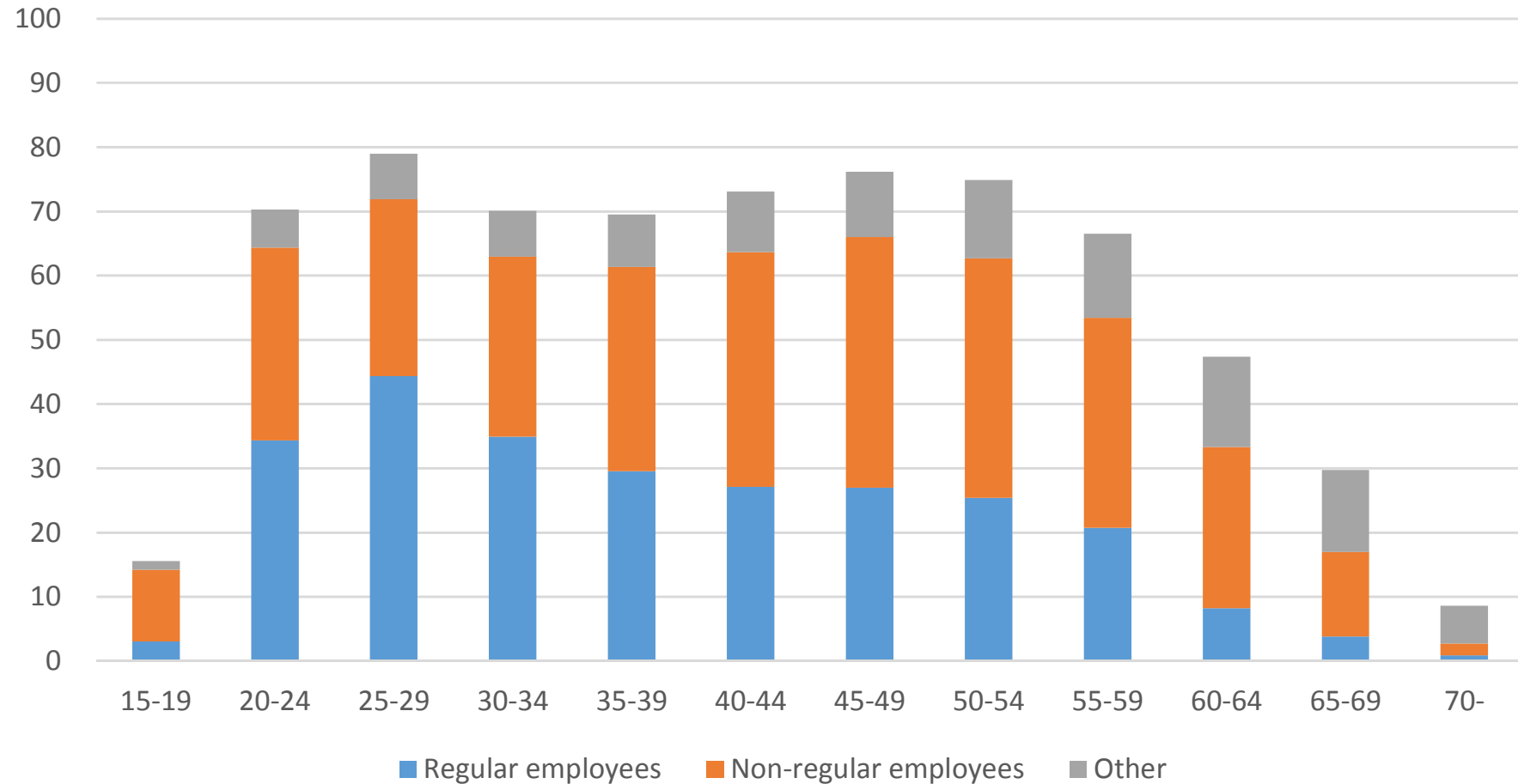
Labor Force Participation Rate by Age and Status in Employment: Male
(%, 2013)



Source: *Labour Force Survey*.

Most female workers work as non-regular employees.

Labor Force Participation Rate by Age and Status in Employment: Female
(%, 2013)



Source: *Labour Force Survey*.

Why is the percentage of part-time workers increasing so rapidly in many industries in Japan?

- It seems that firms are increasing the number of part-time workers in order to maintain the flexibility of employment levels.
- Given the decline of the working age population and economic stagnation, most firms cannot expect their need for employees to steadily increase, as was the case during the high-speed growth era. At the same time, areas in which individual firms have a competitive advantage over their rivals are changing quickly and Japan's comparative advantage as whole is also changing over time.
- Given the high job security provided under traditional employment practices, increasing the reliance on part-time workers is almost the only way for firms to keep both the level and the mix of employment flexible.

Increase of Part-Time Workers and Accumulation of Human Capital

- In order to examine whether firms employ part-time workers simply to take advantage of lower wage rates or to gain more flexibility in their workforce, Fukao et al. (2006) estimated both the marginal productivity of part-time workers in comparison with that of regular workers and the compensation of part-time workers in comparison with that of regular workers, using employer-employee matched data at the factory level.
- They found that the productivity gap between part-time workers and regular workers is larger than the wage gap. This means that firms pay a premium to part-time workers in order to obtain flexibility of employment.
- Such behavior by firms is quite rational in the context of slow economic growth and Japan's system of high job security. However, at the same time it may also be creating a huge economic loss by reducing human capital accumulation.

Structure of the Presentation

1. Slowdown of TFP Growth in the Manufacturing Sector
2. Why Was Japan Left Behind in the ICT Revolution
3. Increase of Part-Time Workers
4. Policies Needed for Productivity Growth

4. Policies Needed for Productivity Growth

Since the 1990s, some core characteristics of Japanese firms, such as tight customer-supplier relationships and the life-time employment system, have become obstacles to their TFP growth in an environment shaped by globalization and slow/negative growth in the working age population.

4. Policies Needed for Productivity Growth (Contd.)

- More rapid restructuring of firms left behind in innovation and internationalization, through M&A and other measures.
- Promotion of entrepreneurs and startups.
- Promotion of startup of domestic establishments by Japanese multinationals through improvement of regional logistics, FTAs, reduction of corporate taxes, etc.)
 - ← Hollowing-out problem also hampers real wage increases in Japan.
- Promotion of ICT and intangible investment.
 - ← It seems that this problem is closely related to the rigidity of Japan's labor market.
- Restructuring of the labor market (improvement of social safety net, enhancement of labor market liquidity, reduction of unfair gaps between regular and part-time workers).

References

- Arora, A., L. G. Branstetter, and M. Drev (2011) "Going Soft: How the Rise of Software Based Innovation Led to the Decline of Japan's IT Industry and the Resurgence of Silicon Valley," Global COE Hi-Stat Discussion Paper Series, No. 199, Hitotsubashi University.
- Belderbos, Rene, Kenta Ikeuchi, Kyoji Fukao, Young Gak Kim, and Hyeog Ug Kwon (2013) "Plant Productivity Dynamics and Private and Public R&D Spillovers: Technological, Geographic and Relational Proximity," CEI Working Paper Series 2013-05, Center for Economic Institutions, Institute of Economic Research, Hitotsubashi University.
- Fukao, Kyoji (2012) *The Structural Causes of Japan's "Two Lost Decades": Forging a New Growth Strategy*, Nikkei Publishing Inc., Tokyo (in Japanese).
- Fukao, Kyoji (2013) "Explaining Japan's Unproductive Two Decades," *Asian Economic Policy Review*, vol. 8(2), pp. 193-213.
- Fukao, Kyoji, Ryo Kambayashi, Daiji Kawaguchi, Hyeog Ug Kwon, Young Gak Kim, and Izumi Yokoyama (2006) "Deferred Compensation: Evidence from Employer-Employee Matched Data from Japan," Hi-Stat Discussion Paper Series, no. 187, Institute of Economic Research, Hitotsubashi University.
- Fukao, Kyoji, Ikeuchi Kenta, Young Gak Kim, and Hyeog Ug Kwon (2015) "Why Was Japan Left Behind in the ICT Revolution?" RIETI Discussion Paper Series 15-E-043.

Fukao Kyoji and Hyeog Ug Kwon (2006) “Why Did Japan’s TFP Growth Slow Down in the Lost Decade? An Empirical Analysis Based on Firm-Level Data of Manufacturing Firms,” Japanese Economic Review, vol.57(2), pp.195-228.

Ikeuchi Kenta, Kyoji Fukao, Hiromichi Goko, Young Gak Kim, and Hyeog Ug Kwon (2015) “Empirical Analysis on the Openness of Buyer-Supplier Relationships and Productivity in the Japanese Automobile Parts Industry,” RIETI Discussion Paper Series 15-J-017 (in Japanese).

Jorgenson, Dale W., Koji Nomura, and Jon D. Samuels (2015) “A Half Century of Trans-Pacific Competition: Price Level Indices and Productivity Gaps for Japanese and U.S. Industries, 1955-2012,” RIETI Discussion Paper Series RIETI Discussion Paper Series 15-E-054.

Appendix

Decomposition of Japan's Man-Hour Growth

The most important factor is the shrinking of the working age population.

In the 1990s and 2000s, man-hour input declined mainly as a result of the reduction of working hours per worker.

From the 2010s, the working age population is projected to decline rapidly.

