

How Will We Revise the JIP Database?
**- Harmonization with the Japanese SNA and Estimation
of Intangible Assets**

**Prepared for the 2nd World KLEMS Conference at Harvard
University on August 9 and 10, 2012**

Kyoji Fukao (Hitotsubashi University and RIETI)

Shoichi Hisa (Yokohama City University)

Tsutomu Miyagawa (Gakushuin University and RIETI)

Main Topics of This Presentation

The JIP (Japan Industrial Productivity) Database Project of RIETI (Research Institute of Economy, Trade and Industry), Hitotsubashi Univ., and Gakushuin Univ. has continued to revise and publish a KLEMS-type database annually for the last 6 years. We think that the database is detailed and disaggregated enough to meet the needs of the World KLEMS Project (as we explained at the 1st World KLEMS Conference in 2010).

Our present agenda for the project includes the following:

- 1. To provide technical assistance to Asia KLEMS Project members.**
- 2. To harmonize the JIP Database with the Japanese System of National Accounts (JSNA).**
- 3. To estimate intangible asset service inputs.**
- 4. To compile a prefecture-level KLEMS-type database on Japan**

In this presentation, we would like to report on items 2 and 3.

1. Harmonization of the JIP Database with the JSNA

- **In some developed countries, the national statistical office in charge of the national accounts compiles a sectoral productivity database. For example, in the US, the BEA and the BLS collaborate in constructing such a database (BEA/BLS Integrated Aggregate Production Account).**
- **ESRI, which compiles the JSNA, plans to estimate labor productivity and capital service input by sector. However, the target date is still a long time away (around 2016-2017).**

1. Harmonization of the JIP Database with the JSNA

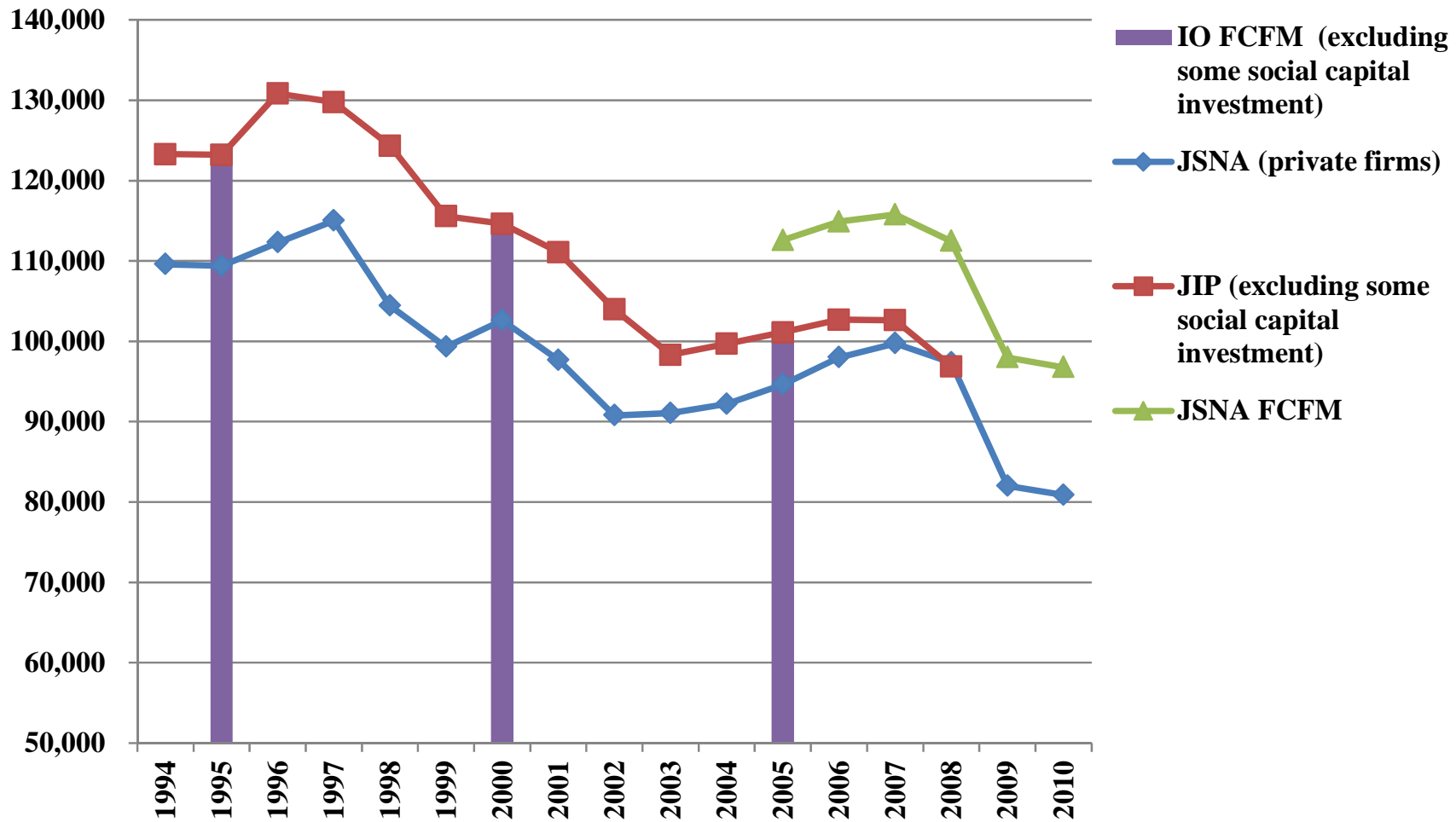
- **ESRI recently conducted an annual survey on capital depreciation rates and estimated capital stock by sector (23 sectors).**
- **If we could use the fixed capital formation matrix (FCFM) of the JSNA for our JIP project, this would allow us to make the JIP database more consistent with the JSNA. It would also accelerate our work of updating the database and allow us to release the data earlier. However, at this moment, we cannot do this because:**
 - 1) The FCFM of the JSNA is only available from 2005 and**
 - 2) There is a gap in the industry classification between 2004 and 2005 in the JSNA.**
- **The capital depreciation data of the JSNA would also be very useful for us.**

Comparison of Capital Accounts between the JIP Database and the JSNA

	JIP2011	JSNA
Industry classification	108	23
Asset classification (excluding residential houses)	39	11
IT investment (hardware)	Computer and communication equipment is estimated separately	Information and communication equipment is estimated.
Software investment	Custom software and packaged software, and own account software investment are estimated separately.	Total software investment is officially published, although own account software is estimated by ESRI for the whole economy. The estimation period for own account software is 1989 to 2010.
R&D investment	R&D investment is not included in the JIP Database, although it is published in the JIP Appendix table.	The estimation of R&D investment is in progress.
Capital formation matrix	The estimation period is 1970 to 2008.	The estimation period is 2005 to 2010.
Capital stock matrix	The estimation period is 1970 to 2008. Capital stock is evaluated at 2000 prices.	The estimation period is 2005 to 2010. Capital stock is evaluated in nominal terms.
Capital service	Capital service is estimated and published.	Not estimated.
Depreciation rate	The depreciation rate is based on the table in BEA.	The depreciation rate is based on the Survey on Business Investment and Depreciation.
Coverage	Private and public sectors are covered. A part of social infrastructure is estimated.	Private and public sectors are covered. Investment in the private sector and public investment are separated.
Website	http://www.rieti.go.jp/en/database/JIP2011/index.html	http://www.esri.cao.go.jp/en/sna/data/kakuhou/files/2010/24annual_report_e.html

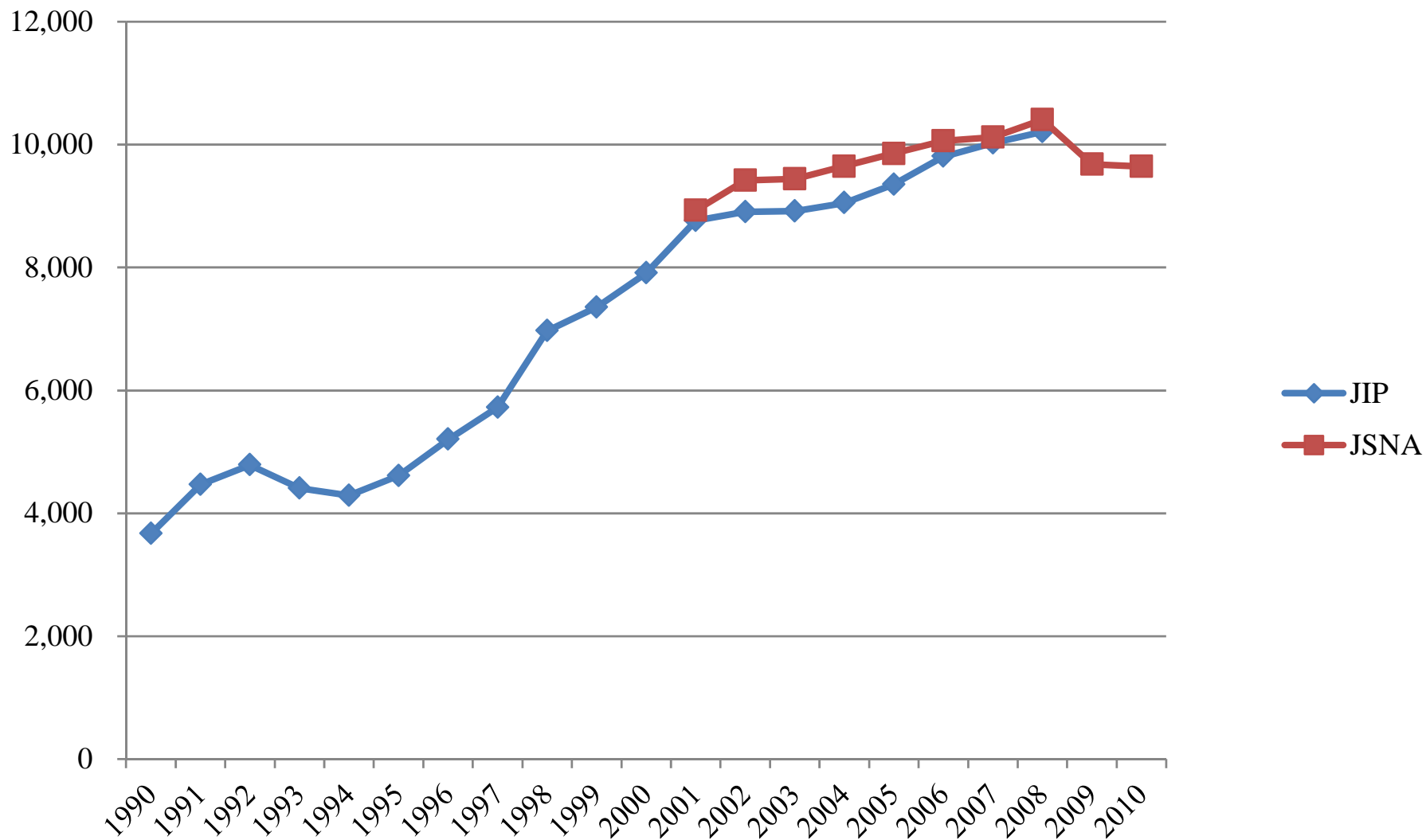
Comparison between JIP Database and JSNA: Fixed Capital Formation (Nominal, Billion yen)

Billion yen

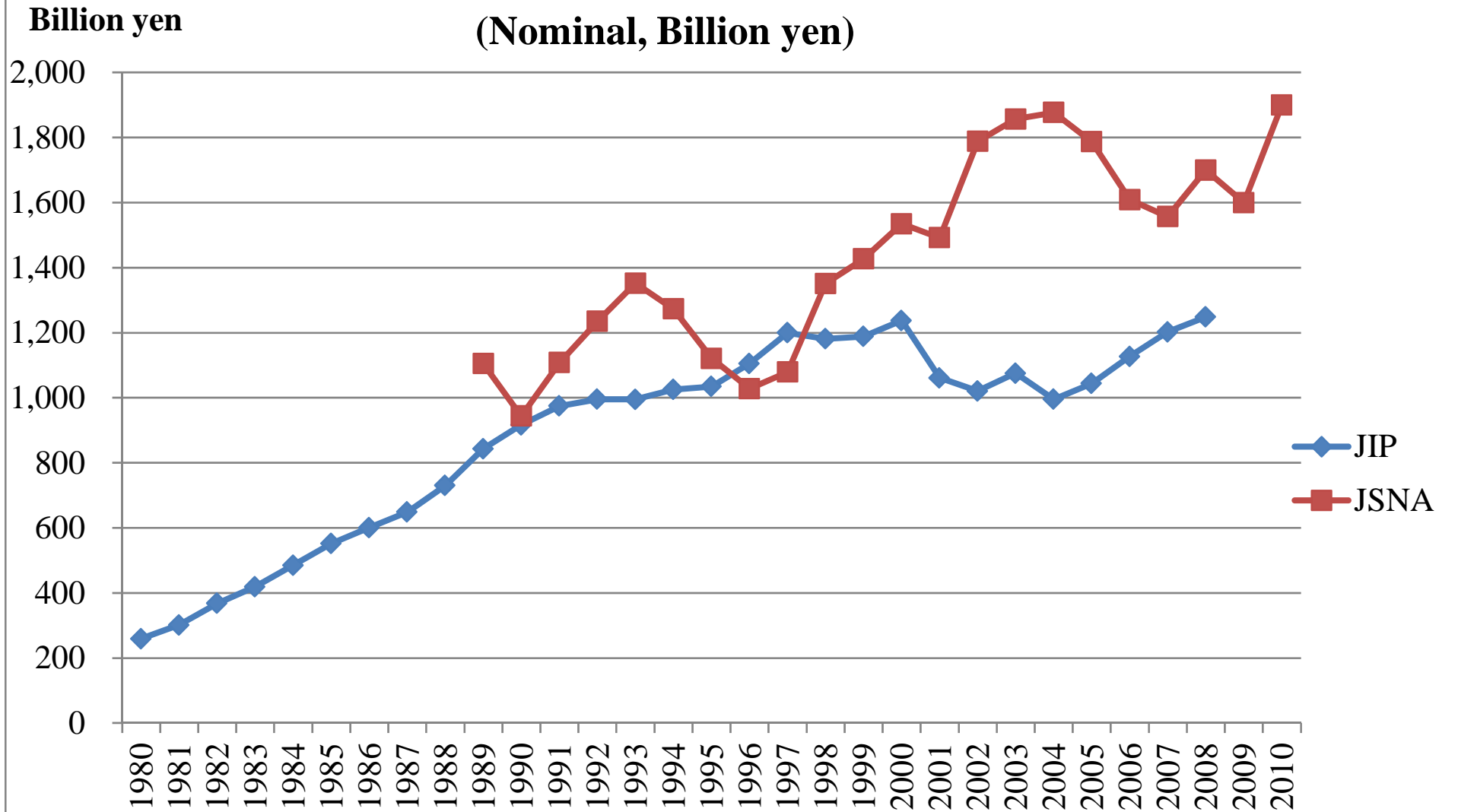


Comparison Between JIP Database and JSNA: Software Investment (Nominal, Billion yen)

Billion yen



Comparison Between JIP Database and JSNA: Own-Account Software Investment (Nominal, Billion yen)



Comparison of Depreciation Rates Between the JIP Database and the JSNA

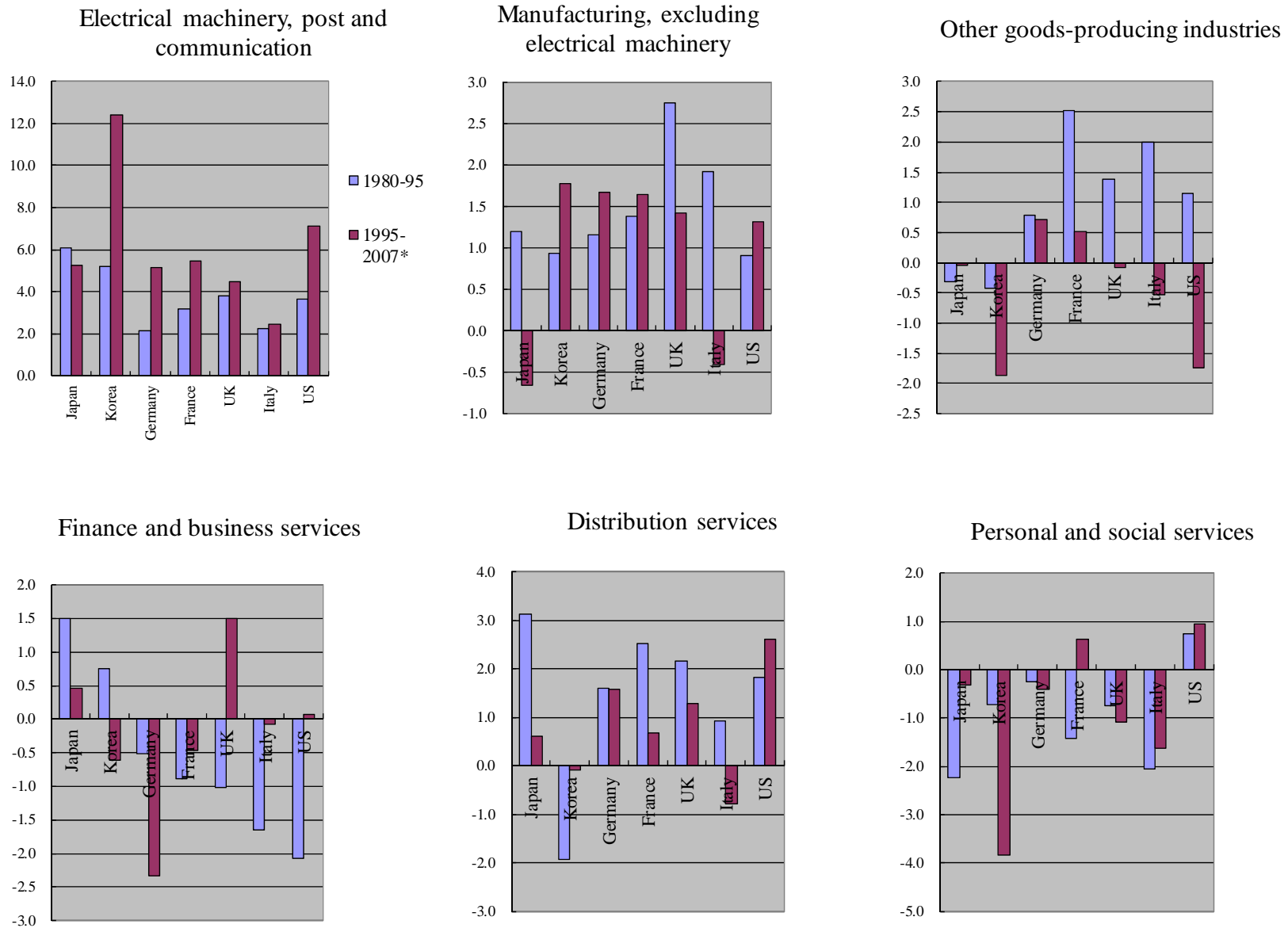
JSNA asset classification		1970	1980	1990	2000	2009	JIP asset classification		Depreciation rate
1	Residential structures	7.00	6.18	5.35	4.73	4.69	32	Residential construction	4.80
2	Non-residential structures	7.85	7.25	6.64	6.03	5.98	33	Non-residential construction	8.60
							35	Railroad replacement track	2.80
							36	Electric light and power	2.10
							37	Telecommunications	2.40
3	Infrastructure	2.95	3.02	2.87	2.69	2.50	34	Other (public non-residential structures)	2.30
4	Transport equipment	30.21	27.02	22.81	20.62	20.77	23	Passenger cars	33.30
							24	Trucks, buses, and truck trailers	12.30
							25	Motorcycles and bicycles	33.30
							26	Other transport equipment	10.70
							27	Ships and boats	6.10
							29	Railroad equipment	5.90
							30	Aircraft	8.30
5	Other machinery and equipment	20.24	20.47	21.38	21.02	20.48	2	Other furniture	11.80
							3	Nuclear fuel	43.80
							4	Household appliances	16.50
							5	Other fabricated metal products	9.20
							6	Steam engines and turbines	5.20
							7	General industrial machinery, including materials handling equipment	10.70
							8	Instruments	13.50
							9	Mining and oil field machinery	20.40
							10	Chemical machinery	10.30
							11	Metalworking machines	12.30
							12	Agricultural machinery, except tractors	11.80
							13	Special industrial machinery	10.30
							14	Photocopiers and related equipment	18.00
							15	Office computing and accounting machinery	31.20
							16	Service industry machinery	15.00
							17	Household electric appliances (excluding VTRs and applied electronic equipment)	18.30
							18	Computers and peripheral equipment	31.20
							19	Communications equipment: Business services	15.00
							20	VTRs and applied electronic equipment	18.30
							21	Electricity transmission and distribution apparatus	5.00
22	Electric lighting fixtures and apparatus	18.30							
28	Internal combustion engines	20.60							
31	Other equipments in the private non-residential assets	14.70							
6	Products of agriculture and forestry	23.32	30.32	26.76	26.72	27.28	1	Farm	2.40
7	Software	33.00	33.00	33.00	33.00	33.00	38	Custom software	32.00
8	Other intangibles						39	Plant engineering	2.30

2. The IT Revolution and Intangible Assets

Motivation

- **Japan experienced relatively high TFP growth in the IT-producing sector.**
- **The problem for Japan is that TFP growth in IT-using service sectors, such as distribution services (retail, wholesale and transportation) and in the rest of the manufacturing sector (i.e., excluding electrical machinery), declined substantially after 1995.**
- **The US experienced an acceleration in TFP growth in IT-using sectors.**
- **Japan's IT investment-GDP ratio in IT-using service sectors, such as distribution services, and in the rest of the manufacturing sector is very low in comparison with other major developed economies.**

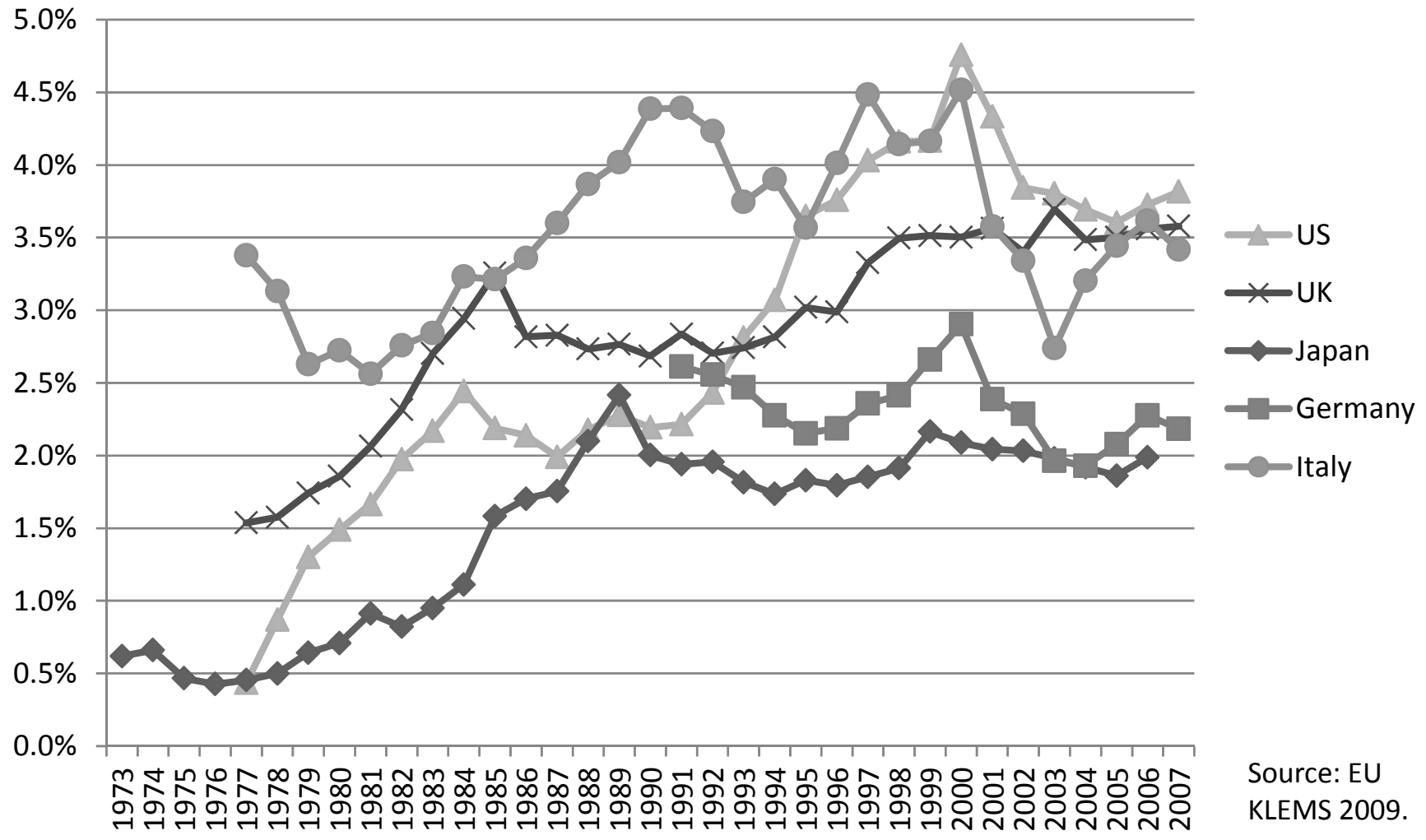
Figure 3. TFP Growth in the Market Sector: by Sector and by Country: 1980-95 and 1995-2007*



Source: EU KLEMS Database, November 2009.

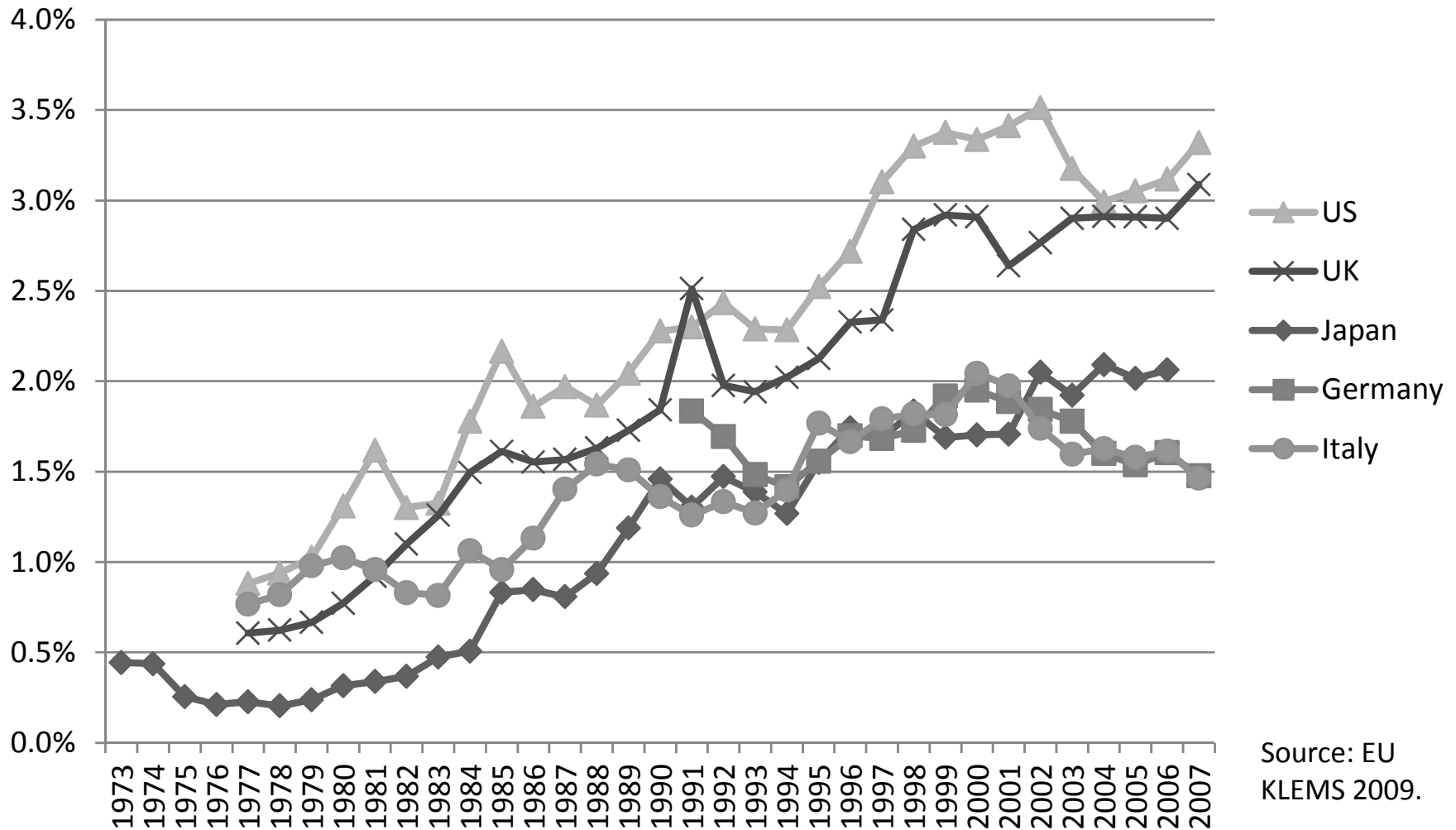
* Growth accounting for Japan is for the period 1995-2006.

ICT Investment-GDP Ratio in Major Developed Economies: Distribution Services



Source: EU KLEMS 2009.

ICT Investment-GDP Ratio in Major Developed Economies: the Rest of the Manufacturing Sector



International collaboration for the creation of a KLEMS type database made this kind of cross-country comparison possible for the first time.¹³

2. The IT Revolution and Intangible Assets

Motivation (Contd.)

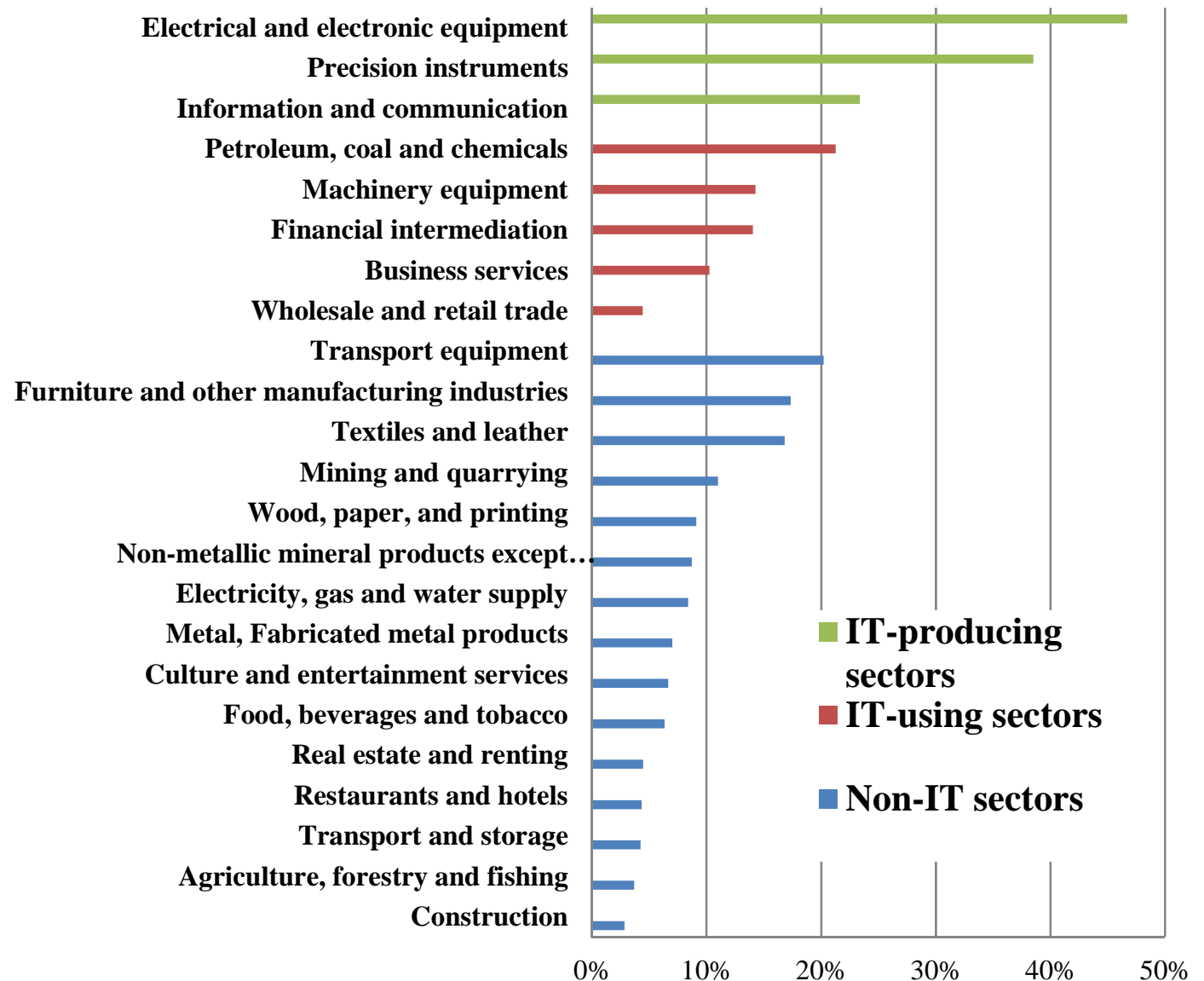
- **IT capital and intangible assets may be close complements, as highlighted in the 2007 Economic Report of the President (“Only when they made intangible investments to complement their IT investments did productivity growth really take off”).**
- **Low TFP growth and stagnation of IT capital investment in IT-using sectors might be caused by a stagnation of intangible investment in such sectors.**

2. The IT Revolution and Intangible Assets

- **Following Corrado, Hulten, and Sichel (2005, 2009), we estimated intangible investment by industry.**
- **We used the JIP 2011 Database (<http://www.rieti.go.jp/en/database/JIP2011/index.html>) and other statistics. The JIP 2011 consists of 108 industries (including 52 manufacturing industries and 33 service industries).**
- **KLEMS type data at such a disaggregated level is very useful for the estimation of sectoral intangible investment.**
- **Using estimates of intangible investment, we conducted growth accounting with intangibles.**

Intangible investment/GVA ratio by sector in Japan: 2008

Intangible investment/GVA ratios differ considerably across sectors. The ratio is relatively low in some IT-using sectors such as wholesale and retail trade.

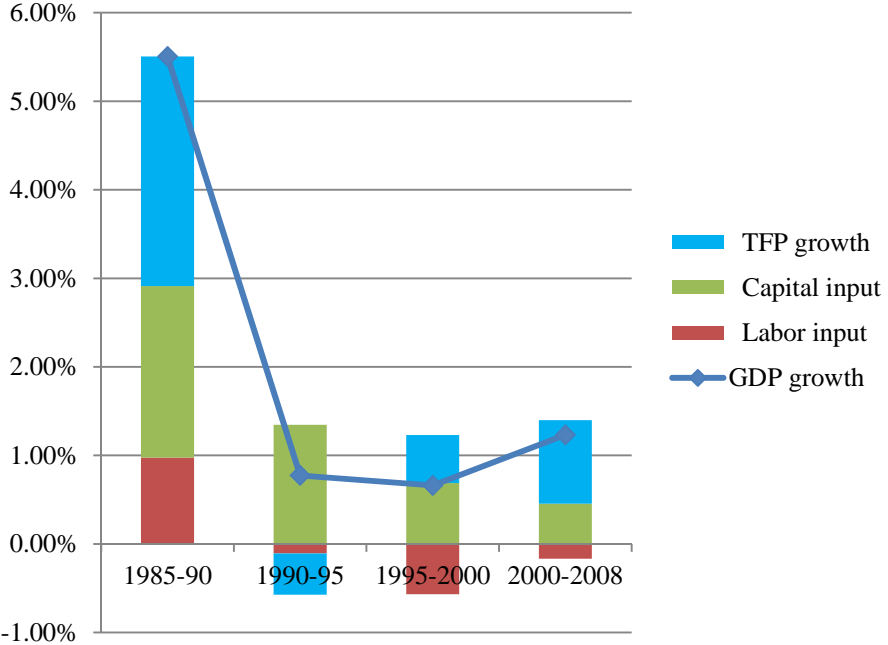


Capital Stock in Intangible Assets in Japan

	2008	1985-1990	1990-1995	1995-2000	2000-2008	1985-2008
	Billion yen	Annual growth rate (%)	Annual growth rate (%)	Annual growth rate (%)	Annual growth rate (%)	Annual growth rate (%)
Market economy						
Computerized information	26,839	15.07%	5.90%	8.72%	4.84%	8.07%
Innovative property	91,351	11.28%	4.40%	2.68%	1.05%	4.29%
Economic competencies	17,493	5.68%	1.49%	1.36%	-1.68%	1.23%
Total	135,600	10.34%	4.00%	3.23%	1.29%	4.22%
Manufacturing						
Computerized information	9,116	12.80%	7.22%	8.95%	6.13%	8.40%
Innovative property	63,232	10.89%	3.98%	1.99%	0.25%	3.68%
Economic competencies	4,757	4.36%	-0.06%	0.76%	-1.57%	0.53%
Total	77,106	10.23%	3.78%	2.34%	0.68%	3.73%
Services						
Computerized information	17,662	16.07%	5.34%	8.58%	4.24%	7.90%
Innovative property	27,957	12.86%	5.90%	4.87%	3.17%	6.18%
Economic competencies	12,265	6.61%	2.17%	1.66%	-1.81%	1.59%
Total	57,801	10.79%	4.43%	4.72%	2.19%	5.05%
IT sector						
Computerized information	18,029	16.33%	5.49%	9.17%	5.08%	8.42%
Innovative property	53,033	12.11%	4.56%	3.59%	1.60%	4.89%
Economic competencies	8,764	5.62%	1.27%	2.39%	-1.40%	1.50%
Total	79,815	11.23%	4.12%	4.27%	1.91%	4.87%
Non-IT sector						
Computerized information	8,810	12.87%	6.67%	7.87%	4.36%	7.43%
Innovative property	38,328	10.39%	4.23%	1.62%	0.33%	3.58%
Economic competencies	8,730	5.74%	1.68%	0.43%	-1.97%	0.98%
Total	55,785	9.39%	3.87%	2.00%	0.46%	3.42%

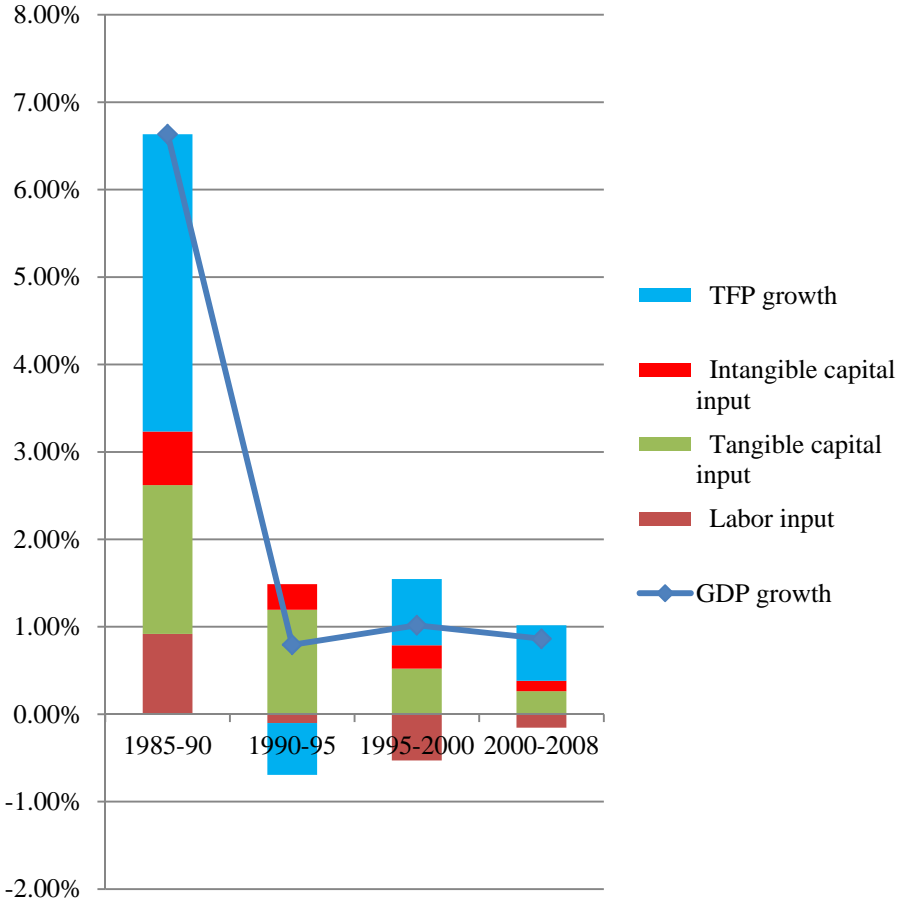
Source: Miyagawa and Hisa (2012).

Standard Growth Accounting for the Market Economy

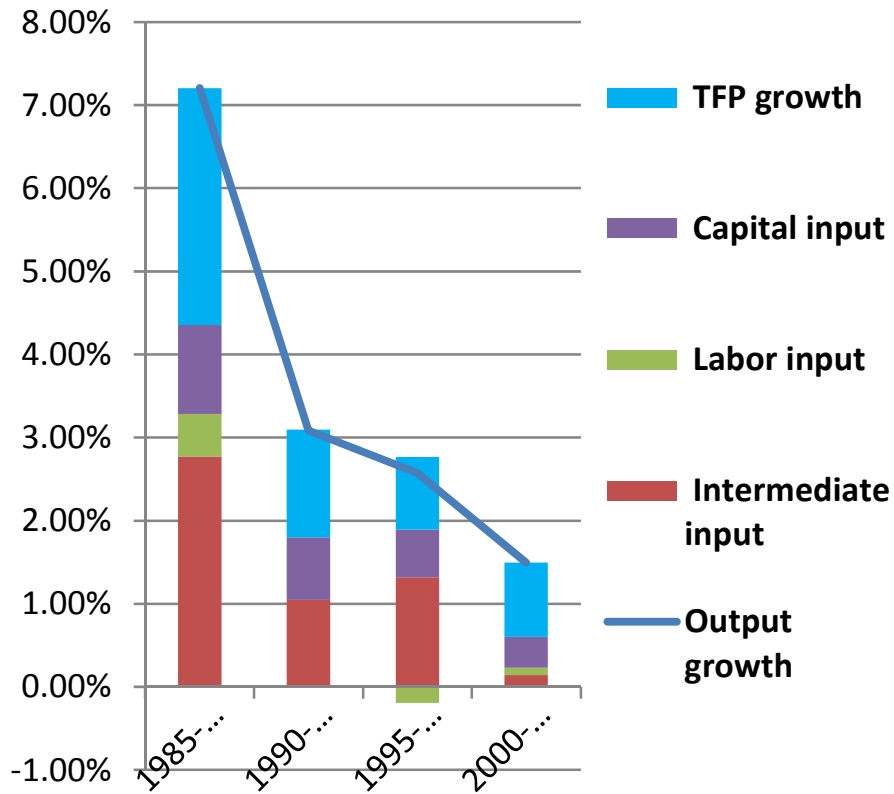


Source: JIP 2011.

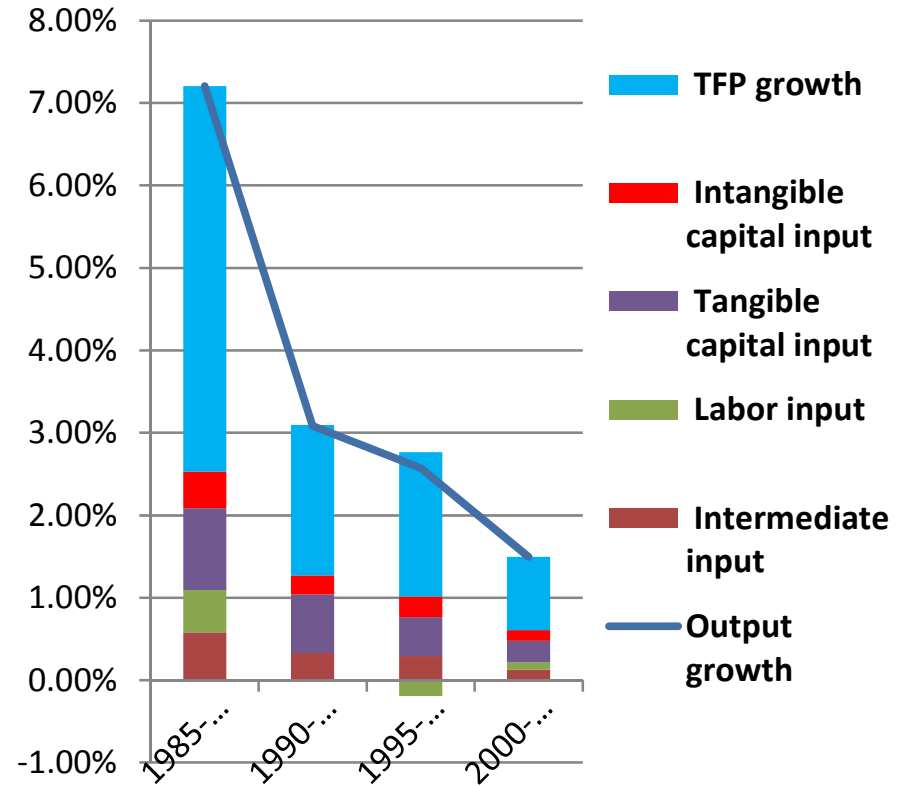
Growth Accounting with Intangibles for the Market Economy



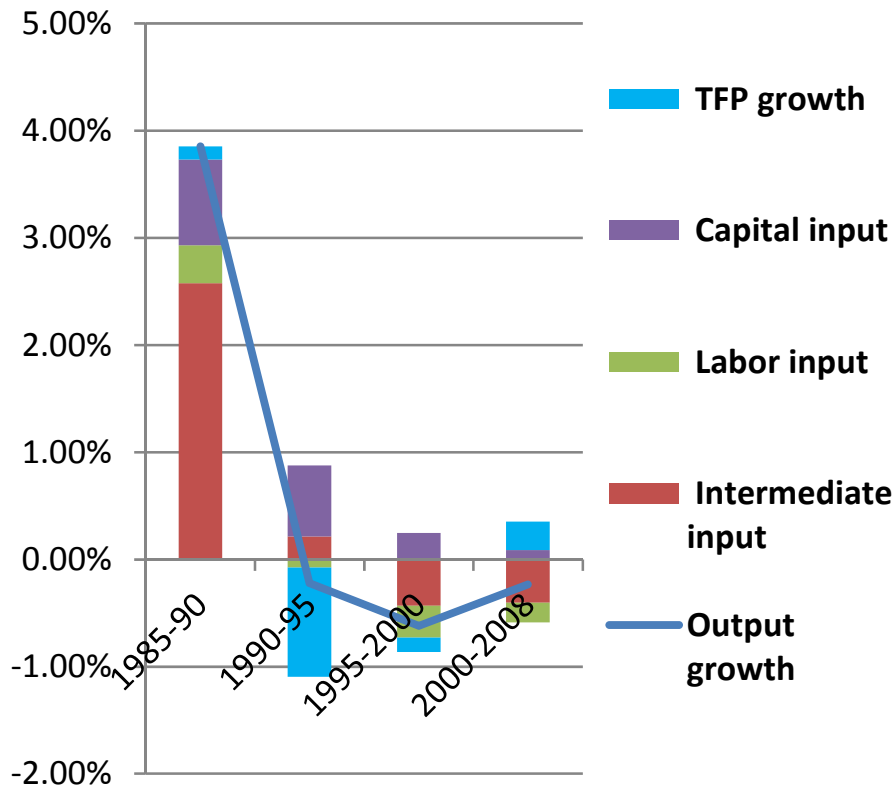
Standard growth accounting for the IT Sector



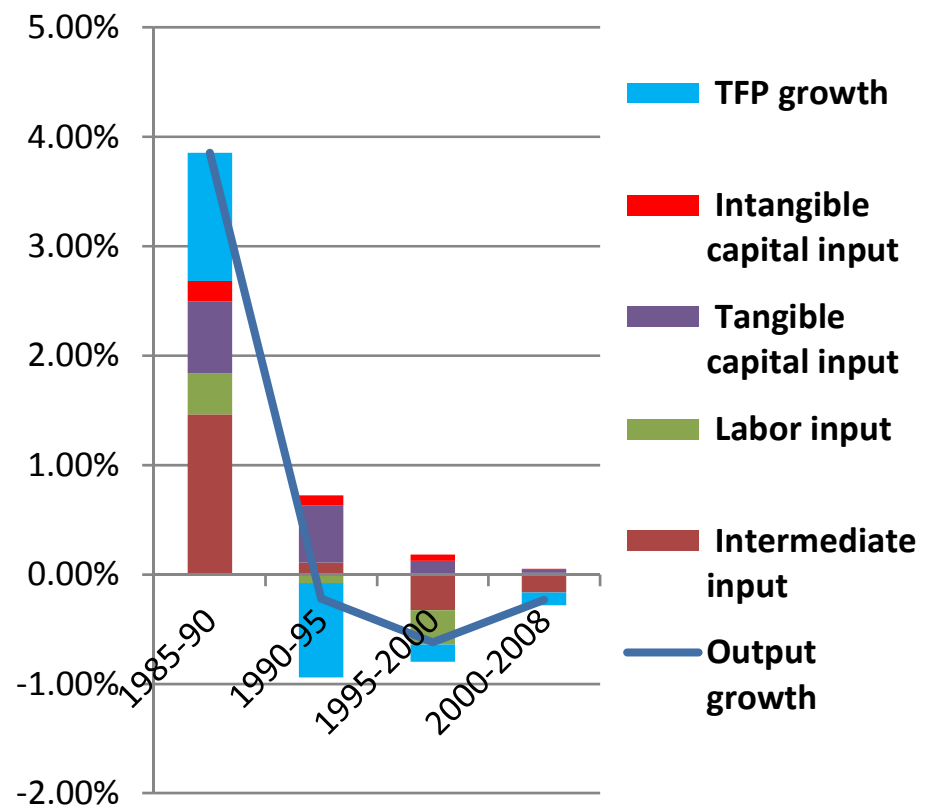
Growth accounting with intangibles for the IT Sector



Standard growth accounting for the non-IT Sector



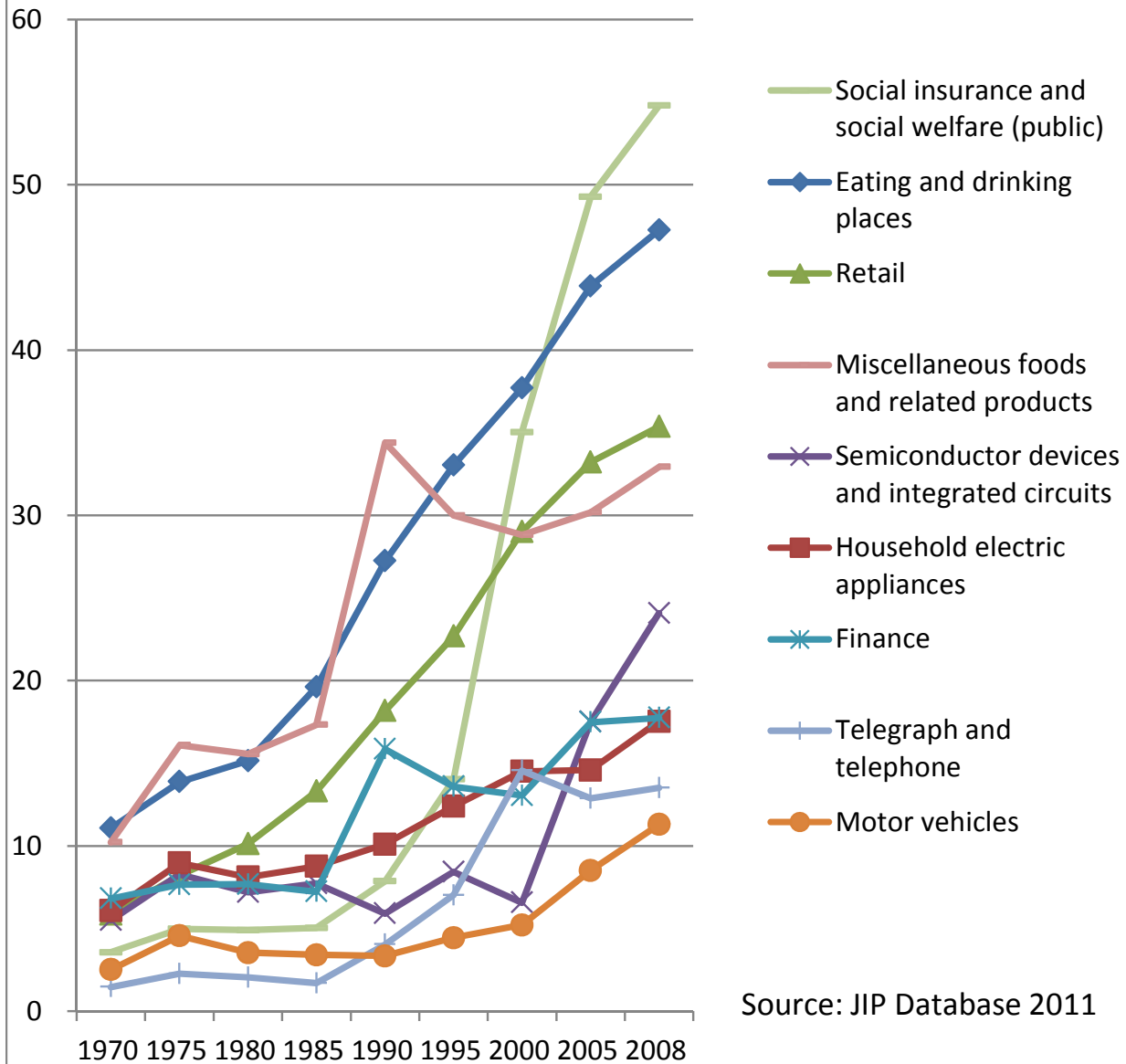
Growth accounting with intangibles for the non-IT Sector



2. The IT Revolution and Intangible Assets

- **Even in the 1980s, the contribution of intangible investment to economic growth was not large, and the growth rate of intangible assets slowed down in the 1990s and 2000s.**
- **The slow growth of intangible assets in the 2000s is due to the decline in the accumulation of economic competencies in many industries.**
- **It seems that the decline in the accumulation of economic competencies was caused by the harsh restructuring resulting from the long-term economic stagnation.**
- **For example, 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.**

Share of part-time workers in total workers by sector: 1970-2008 (in %)



Source: JIP Database 2011

2. IT Revolution and Intangible Assets

Next Steps

- **We would like to harmonize our estimation procedures of intangible assets with other countries. We have already conducted Japan-Korea comparison.**

3. Summary of Our Presentation

- **Recently, the JSNA revised its capital account.**
- **If we could use the fixed capital formation matrix (FCFM) of the JSNA for our JIP project, this would allow us to make the JIP Database more consistent with the JSNA. It would also accelerate our work of updating the database and allow us to release the data earlier.**

3. Summary of Our Presentation (cont'd)

- **Intangible investment/GVA ratios differ considerably across sectors. The ratio is relatively low in some IT-using sectors, such as wholesale and retail trade.**
- **The growth rate of intangible assets and its contribution to GDP growth continued to decline in the 1990s and 2000s.**

Thank you for your attention!

**We are very glad that we are able to contribute
to the World KLEMS and Asia KLEMS
projects.**