

# **Intangible Investment in Japan, the US and the Major EU Economies: New Estimates and Contribution to Economic Growth**

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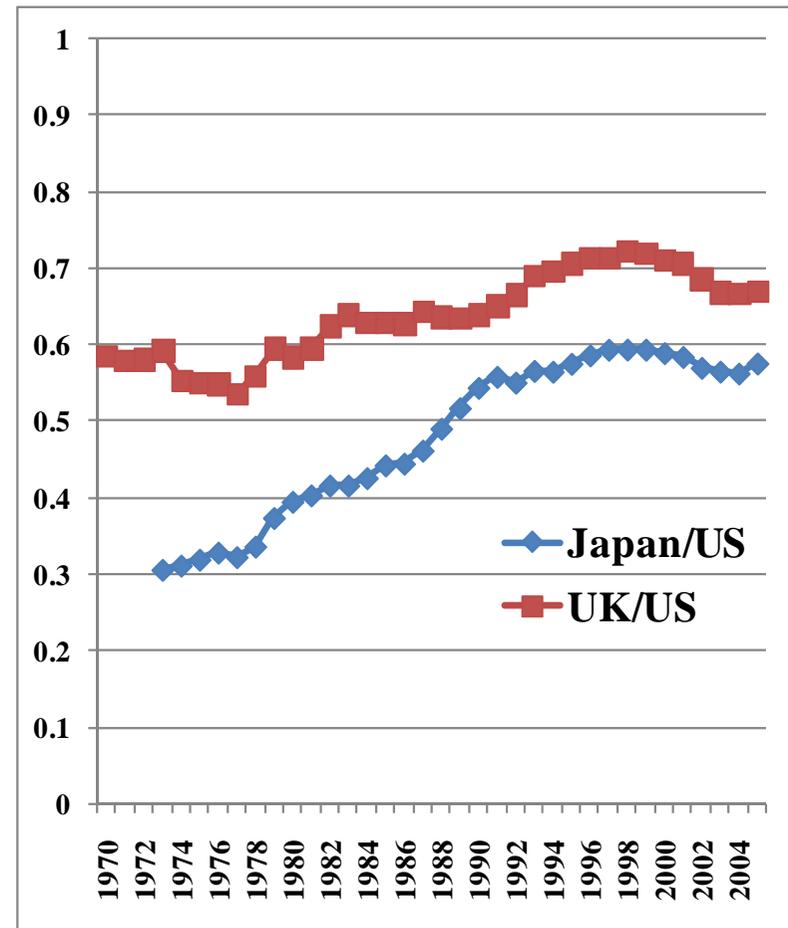
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# 1. Motivation

- **Convergence of labor productivity in Japan to the US level came to a halt in the mid-1990s.**
- **Growth accounting shows that the cause of this phenomenon is a slowdown in capital deepening and TFP growth in Japan and an acceleration of TFP growth in the US.**

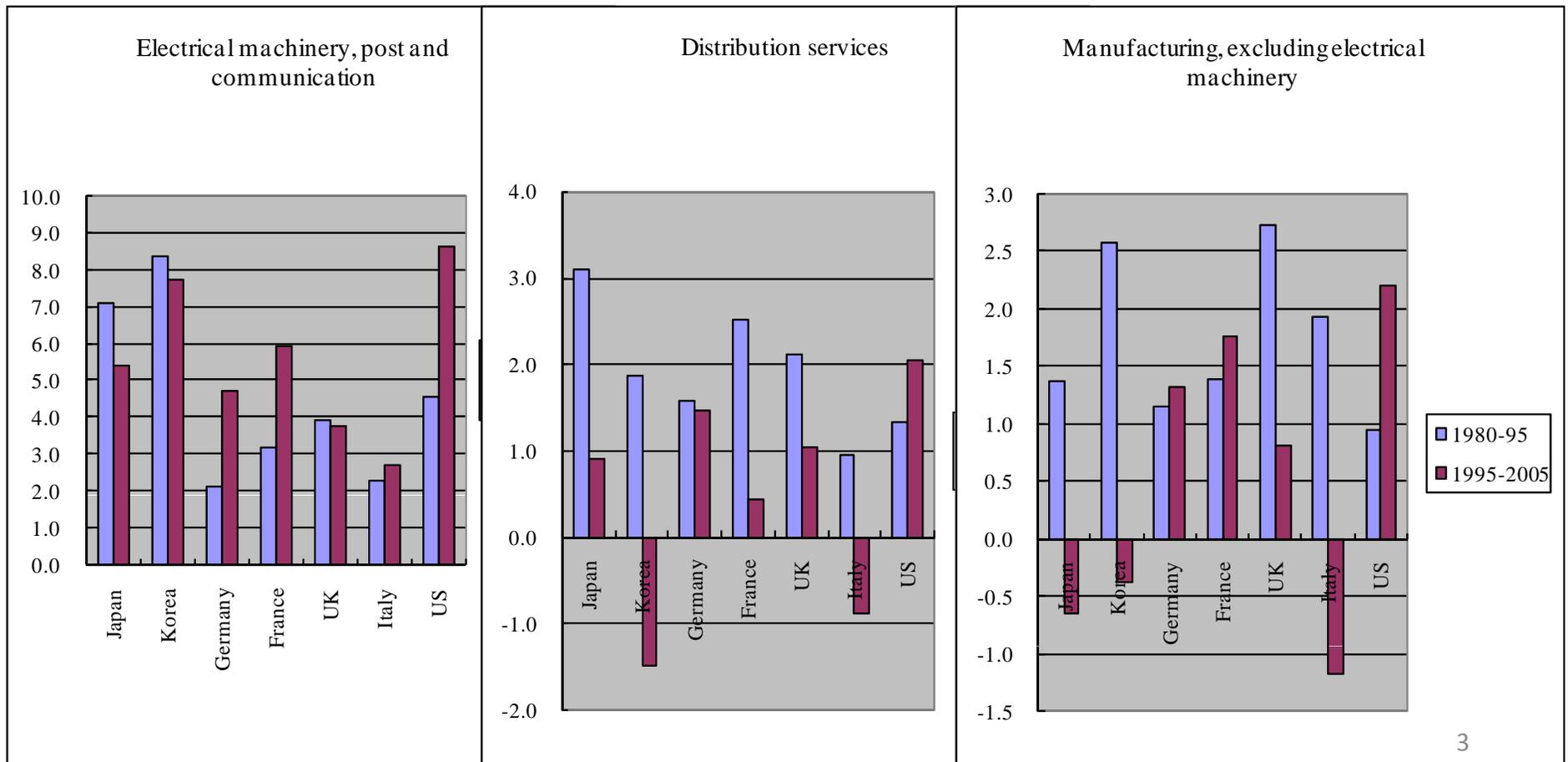
**GDP per man-hour input in Japan and the UK in comparison with the US: 1975-2005, based on gross output PPP of 1997**



**Source: EU KLEMS, March 2008**

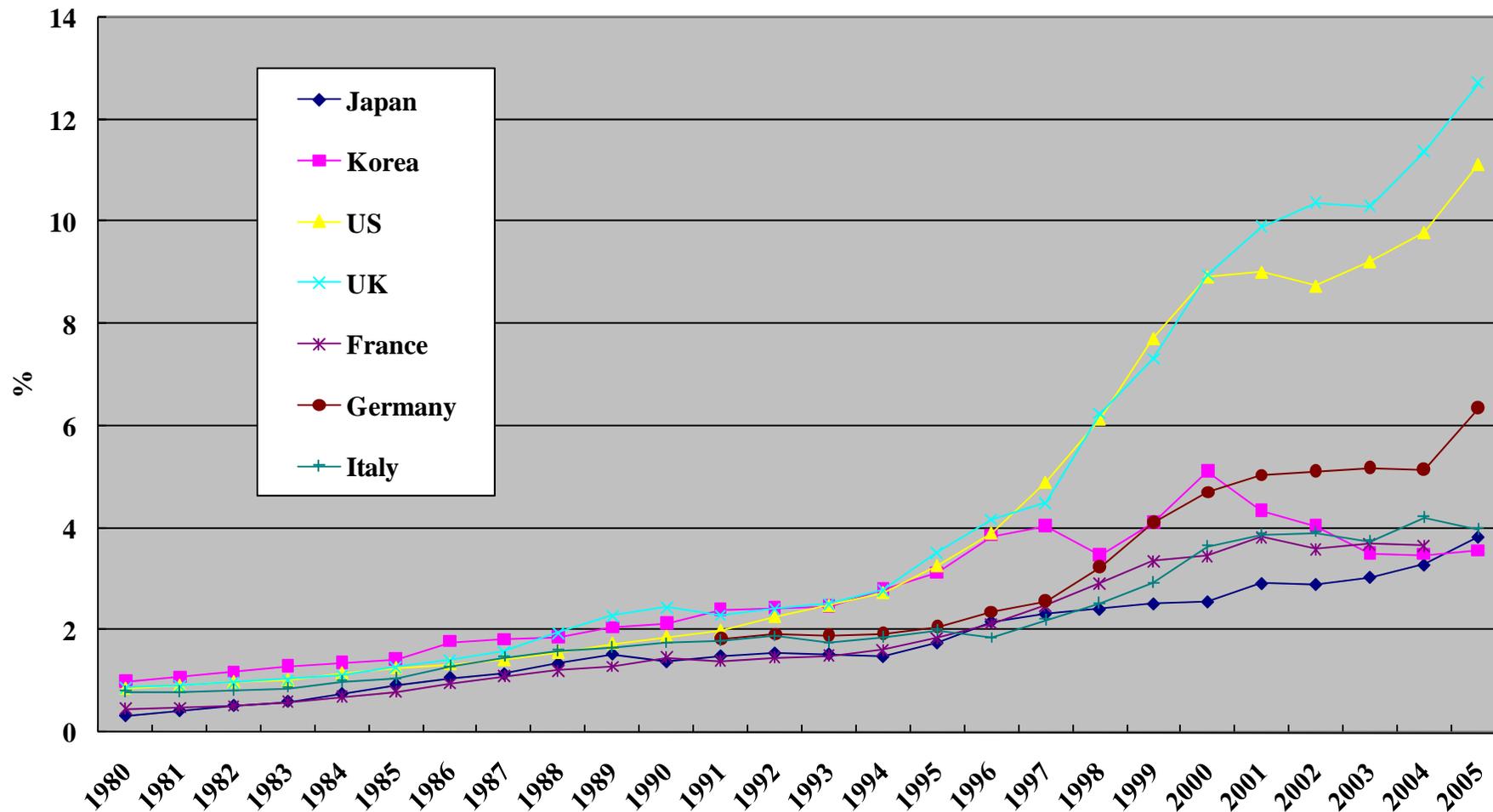
# 1. Motivation (contd.)

- Japan's TFP growth was high in the **ICT-producing sector**. But TFP growth stagnated in **ICT-using sectors**, such as distribution services and non-ICT manufacturing, which have much larger output shares in the economy than the ICT-producing sector.



- It seems that Japan and continental EU countries did not experience an “ICT revolution,” partly because of the **stagnation of ICT investment.**

Figure 3-2 ICT Investment/GDP Ratio in the Major Developed Countries



Source: EU KLEMS Database March 2008, JIP Database 2008, KIP Database

# 1. Motivation (contd.)

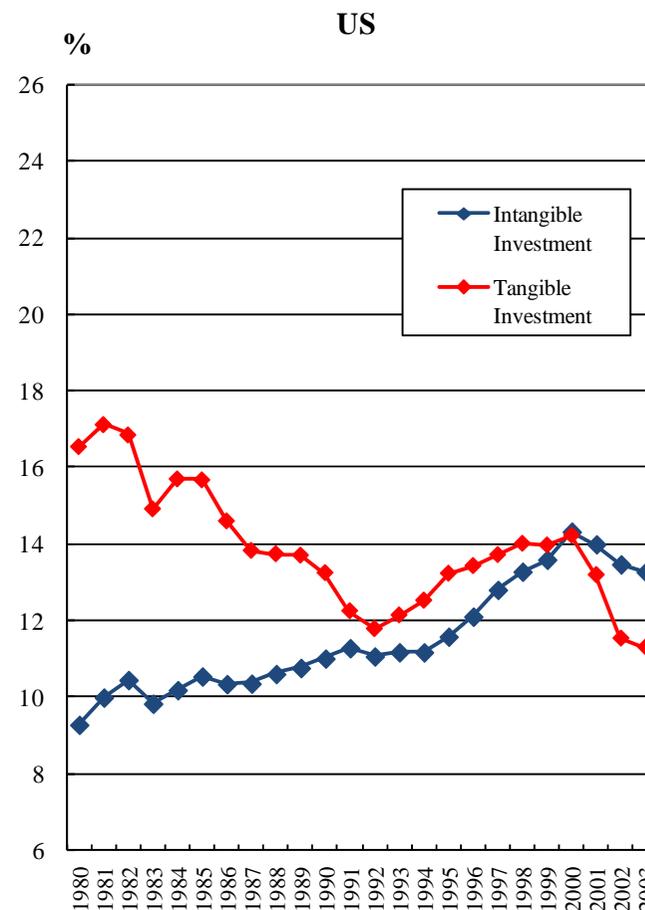
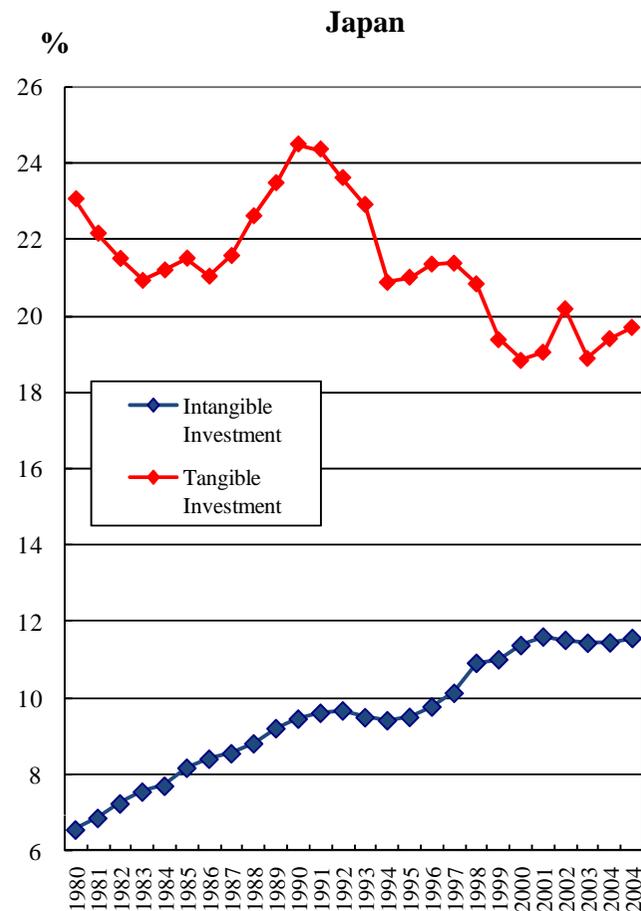
- **Empirical studies and interviews show that the productivity pay-off from ICT investment depends on successful reorganization and training of workers (intangible investment).**

## **Example:**

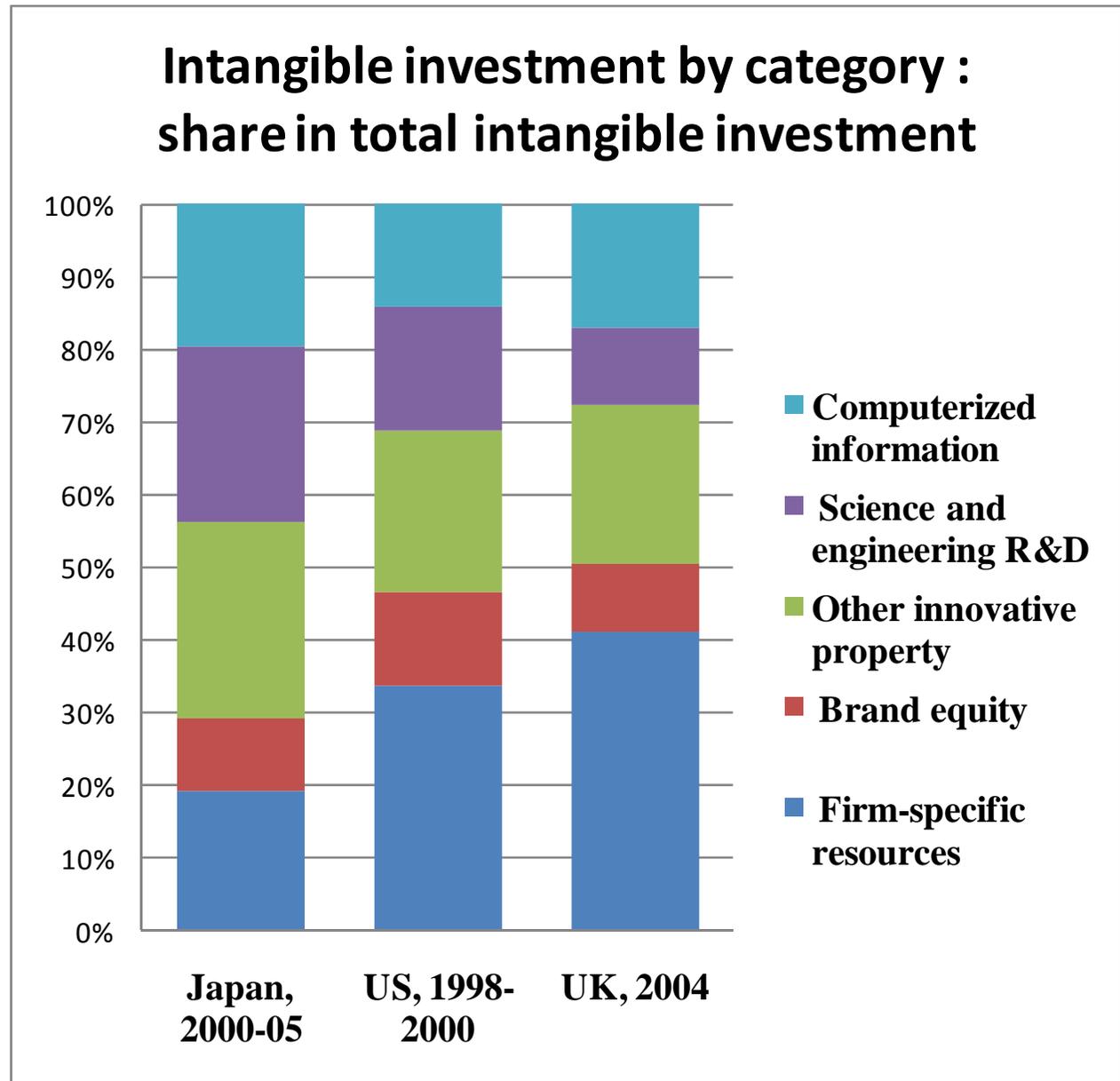
- **The ratio of custom software investment to packaged software investment is much larger in Japan than in the US.**
  - **When Japanese firms introduce ICT technology, such as an ICT system for customer services or the management of information flows within the firm, they prefer custom software in order to get around reorganization and training of workers.**
  - **This results in a smaller productivity improvement from ITC investment.**
- 
- **This suggests that it is important to compare intangible investment in Japan with that in other developed economies.**

## 2. Intangible Investment in Japan

- We measure intangible investment in Japan following the approach of Corrado, Hulten, and Sichel (2005, 2006).
- We found that the intangible investment/output ratio in Japan is much smaller than that in US.



**Japan invests a lot in R&D but very little in economic competencies.**



**Sources: Japan: Authors' calculations, US: Corrado, Hulten and Sichel (2006), UK: Marrano and Haskel (2006).**

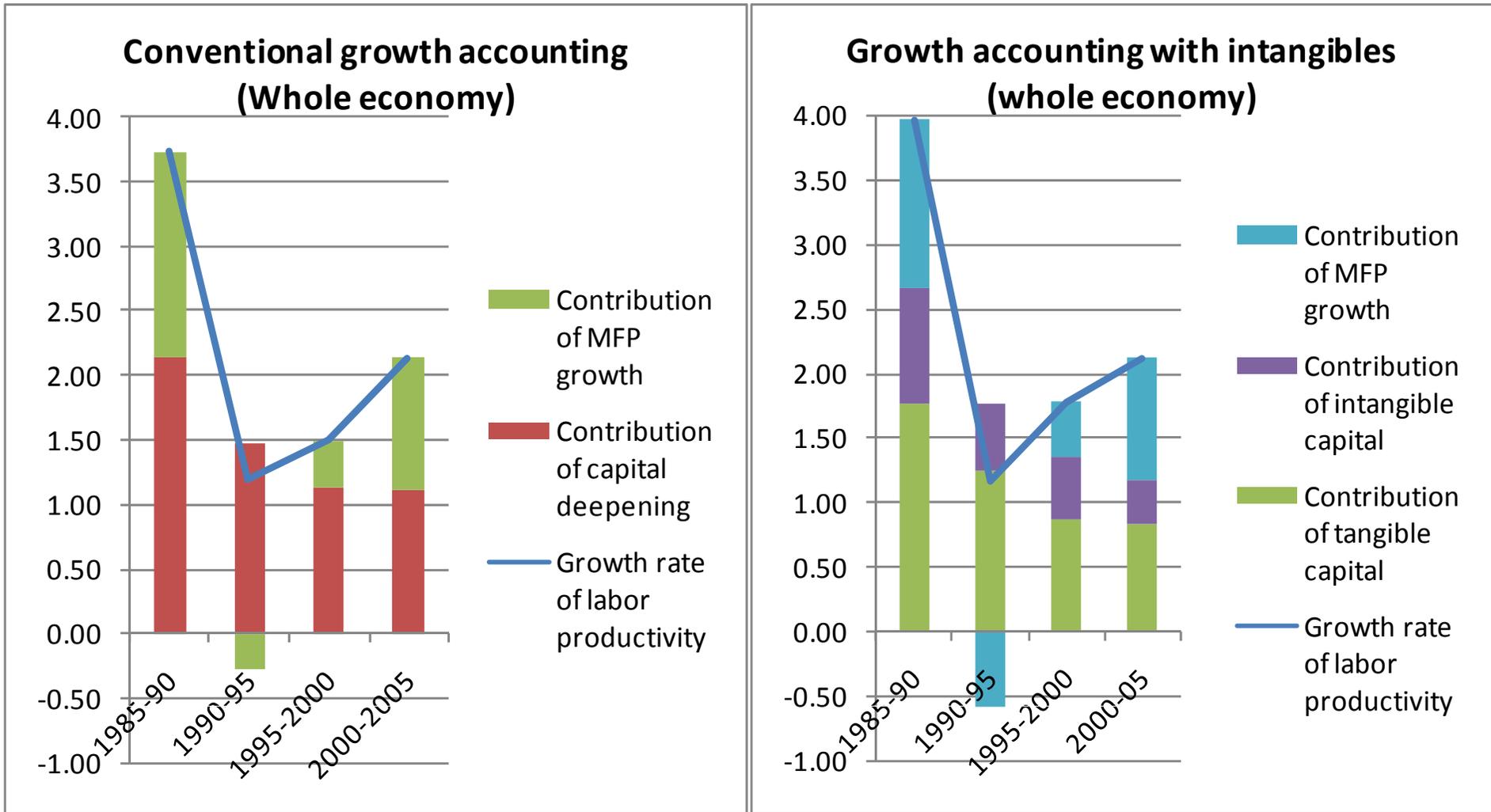
**Private and Public Spending on Intangibles: France, Germany and the Netherlands  
(% of GDP)**

	<b>France 2004</b>		<b>Germany 2004</b>		<b>The Netherlands 2001-04</b>		<b>Japan 2000-05</b>
<b>Computerized information</b>	<b>0.90</b>	<b>9%</b>	<b>0.86</b>	<b>10%</b>	<b>1.35</b>	<b>14%</b>	<b>20%</b>
<b>Innovative property</b>	<b>3.76</b>	<b>37%</b>	<b>4.12</b>	<b>48%</b>	<b>3.07</b>	<b>32%</b>	<b>51%</b>
<b>Economic competencies</b>	<b>5.40</b>	<b>54%</b>	<b>3.57</b>	<b>42%</b>	<b>5.15</b>	<b>54%</b>	<b>29%</b>
<b>Total Investment</b>	<b>10.07</b>	<b>100%</b>	<b>8.55</b>	<b>100%</b>	<b>9.57</b>	<b>100%</b>	<b>100%</b>

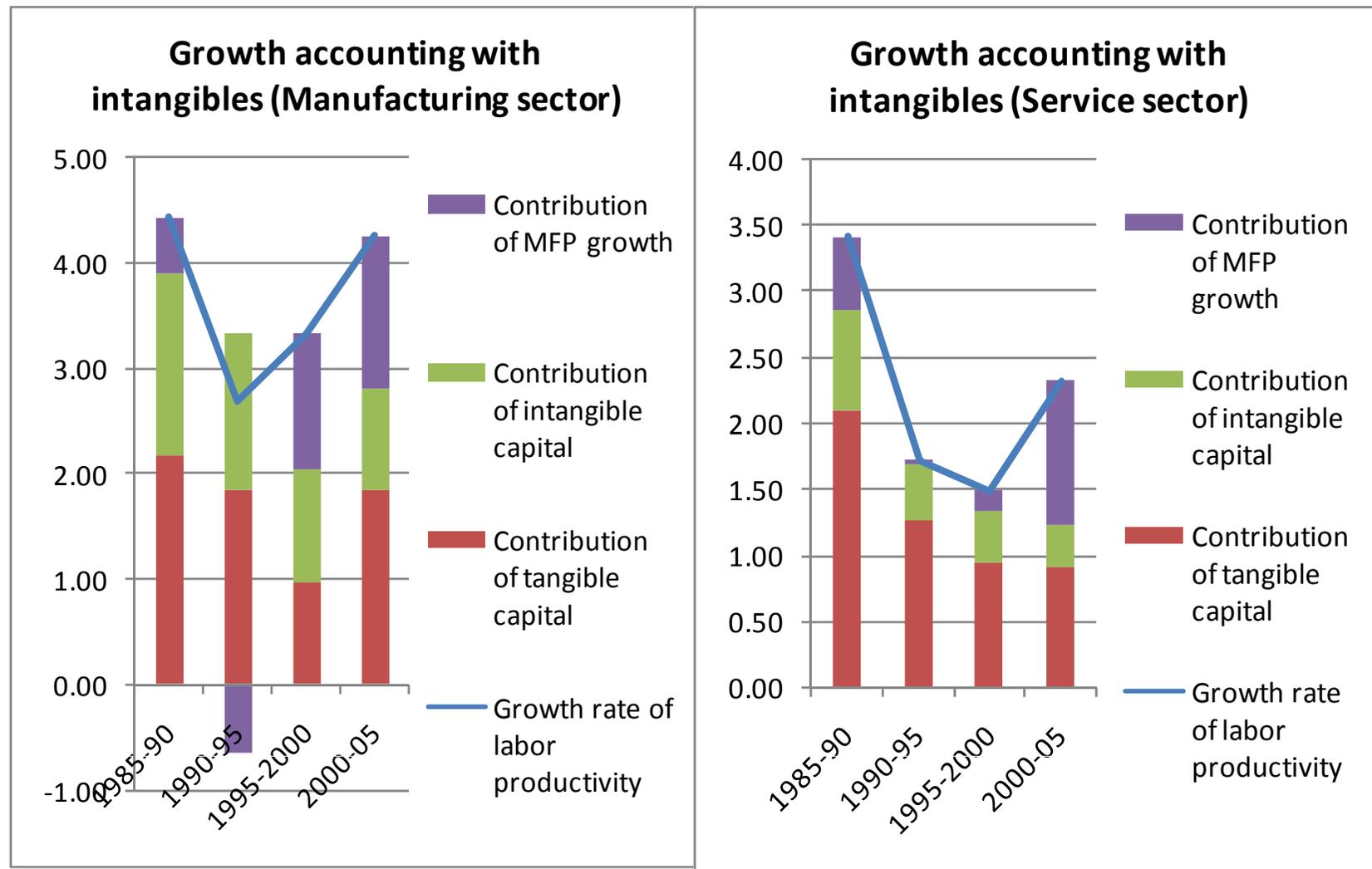
1) Sources: France and Germany: Hao, Manole and van Ark (2008)

The Netherlands: Van Rooijen-Horsten, van den Bergen, and Tanriseven (2008)

**In Japan, the contribution of intangible capital deepening to labor productivity growth is much smaller than that in US. And it is declining.**



**We also conducted growth accounting with intangibles by sector. The contribution of intangible capital deepening to labor productivity growth is relatively large in manufacturing. But the contribution is small in the service sector.**



# 3. Discussion

- **The differences in intangible investment between Japan and the other countries reflect differences in data sources and the definition of intangible investment.**
- **Here, we focus on the measurement of firm-specific human capital and organizational change because there is a large gap in these expenditures between Japan and the other countries.**

### **3. Discussion: on firm-specific human capital**

- **On-the-job training is not included in the measurement of investment in firm-specific resources employed CHS (2005), but Japanese firms often utilize on-the-job training to accumulate firm-specific human capital.**
- **According to a survey by the Cabinet Office in 2007, Japanese workers spend about 9% (weighted average across all types of workers and all industries) of their time on on-the-job training.**

### **3. Discussion: on firm-specific human capital (Contd.)**

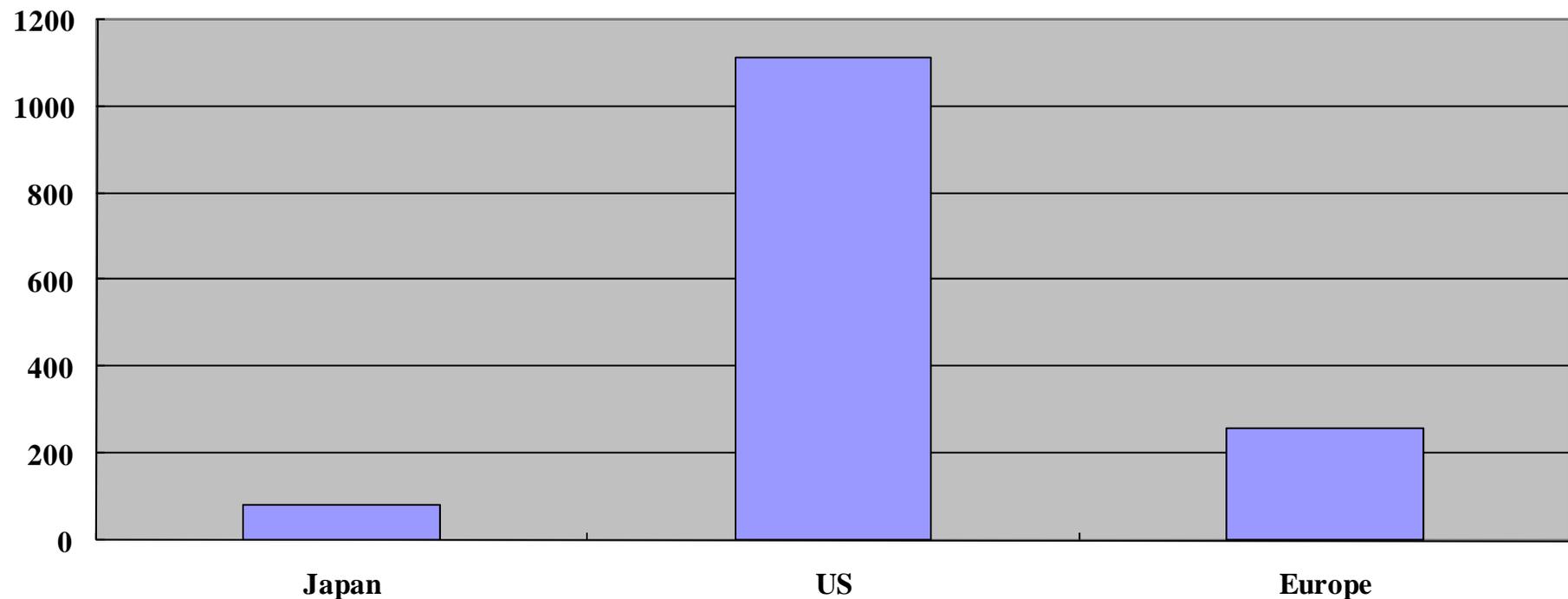
- **Another, but related, issue is double counting.**
- **CHS (2006) use off-the-job training cost data of the BEA survey.**
- **If workers gain non-firm-specific skills from off-the-job training, such accumulation of human capital will be reflected in their wage rates.**
- **Since in standard growth accounting wage increases by age are already taken into account as improvements in labor quality, there is a risk of double counting in the above approach.**
- **According to a survey conducted by Keio University, workers answered that 63% of total skills gained through off-the-job training supported by their employers will be useful even if they change their jobs.**

### **3. Discussion: on organizational structure**

- Referring to Nakamura (2001), CHS (2006) assume that executives spend 20% of their working time on managing organizational structure and therefore calculate investment in organizational structure by multiplying the remuneration of executives in Bureau of Labor Statistics by 0.2.
- **The gap in expenditure on organizational structure between the US and Japan may reflect the difference in remuneration of executives in both countries.**
- According to Robinson and Shimizu (2006) who surveyed the time spent by Japanese CEOs, **Japanese CEOs spent only 9% of their working time on strategy development, developing new business, and re-organization.**
- This survey shows that if we follow CHS (2005; 2006), we even overestimate investment in organizational structure.

### 3. Discussions: on organizational structure

Average Remunerations of CEOs in major companies in Japan, the US, and Europe (2003)  
million yen



Source: The Guideline for the Remuneration of CEOs published by Japan Executives Association

Note: Japanese data is taken from the list of high tax payers who worked for the 100 highest firm value companies as a CEO. In the US and Europe, we took the data from remunerations of CEOs in firms whose sales were over 1trillion yen.

### **3. Discussion: on organizational structure (Contd.)**

- **According to interviews we conducted, in many Japanese firms, **divisions specialized in corporate strategy and organizational restructuring, such as planning divisions, create plans and conduct restructuring.** But there is no data about expenditures for these tasks in such divisions.**
- **Probably, we need a new survey.**

## 4. Sensitivity Analysis

- In order to examine the robustness of our results, we also conducted a sensitivity analysis.
- We studied the following four cases.

**Case 1:** We assumed that the depreciation rate of firm-specific human capital is 20 percent rather than the 40 percent assumed by CHS (2006) .

**Case 2:** On-JT cost +0.37\* Off-JT cost+0.09\*the remuneration of executives.

We also examined

- On-JT cost
- On-JT cost +0.37\* Off-JT cost

**Table 7: Depreciation rates for intangible assets**

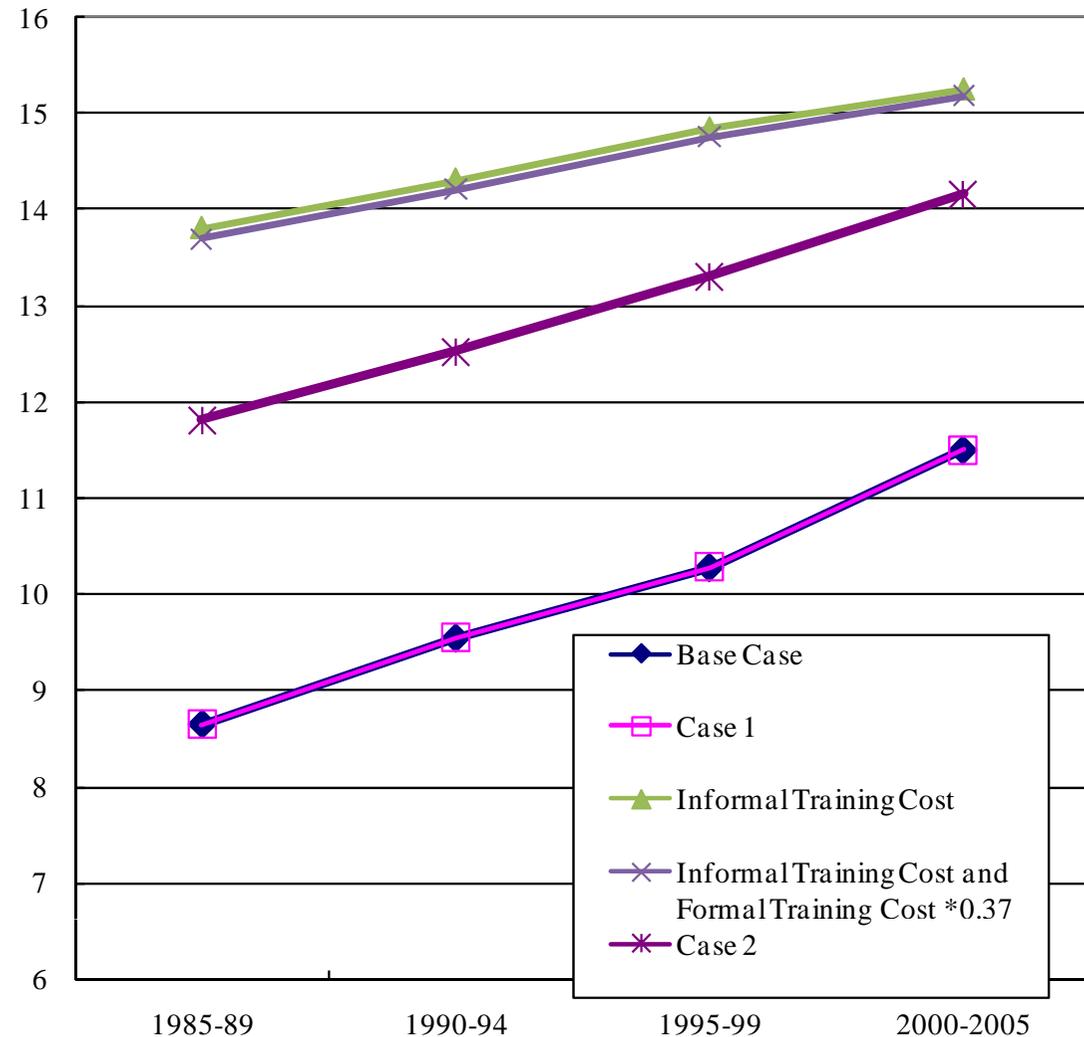
Category	Depreciation rate (%)
Computerized information	33
Innovative property	20
Brand equity	60
Firm-specific human capit	40

Source: Corrado et al. (2006).

## 4. Sensitivity Analysis (contd.)

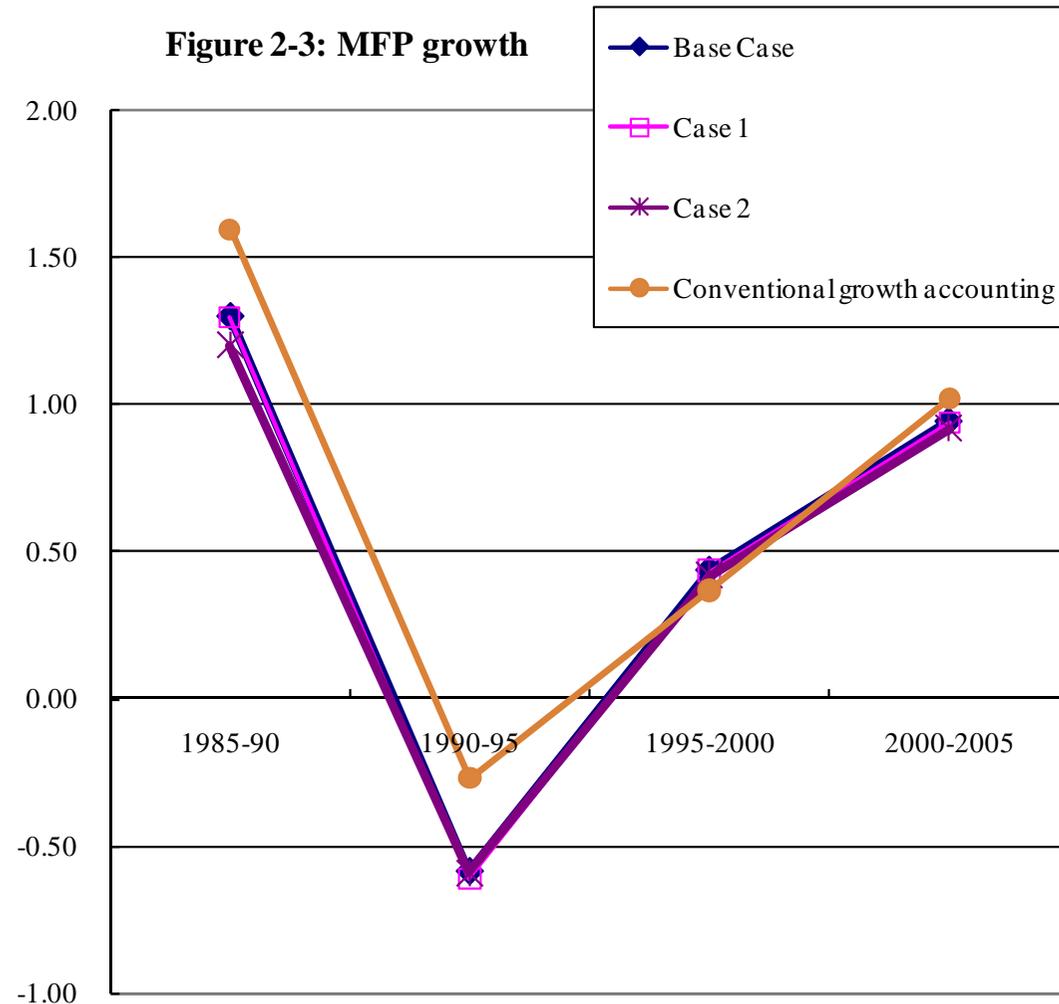
- Our sensitivity analysis shows that if on-the-job training costs are taken into account, the ratio of intangible investment to GDP in Japan is actually higher than that in the US or the UK.

Figure 2-1: Share of intangible investment in Japan's GDP  
(%, nominal)



## 4. Sensitivity Analysis (contd.)

- **But the results on TFP growth remain unchanged because of the stagnation of estimated firm-specific human capital in Japan.**



## 5. Conclusions

- **Like continental EU countries, Japan's economic growth from the mid-1990s is characterized by**
  - 1) **slow TFP growth in ICT-using sectors, and**
  - 2) **relatively stagnant ICT investment**
- **We measure intangible investment in Japan following the approach of Corrado, Hulten, and Sichel (2005, 2006).**
- **We found that in comparison with the US, Japan invests a lot in tangible assets but less in intangible assets.**
- **Japan's intangible investment is also characterized by**
  - 1) **a lot of investment in R&D but very little in economic competencies.**
  - 2) **The contribution of intangible capital deepening to labor productivity growth is relatively large in manufacturing but small in the service sector.**

## 5. Conclusions (contd.)

- **We think that our estimation of intangible investment is relatively weak in the case of investment in firm-specific human capital and investment in organizational structure.**
  - 1) **We do not have good official statistics on On-JT costs.**
  - 2) **Double counting problem in the case of Off-JT costs.**
  - 3) **We do not know anything about the expenditures on organizational restructuring by firm divisions specialized in such task.**
- **As for the estimation of investment in broad categories of intangible assets at the firm level, we started a new survey in Japan. Based on this result, we will reexamine our estimates in the near future.**