

# **The Shift to the Service Economy: Causes and Effects**

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## **<Contents>**

<b>I. Introduction</b>	<b>1</b>
<b>II. Characteristics of the Korean Service Sector</b>	<b>5</b>
<b>1. Service Industries in the Korean Economy</b>	<b>5</b>
<b>2. Characteristics of the Korean Service Sector: International Comparison</b>	<b>9</b>
<b>III. Literature Survey on the Causes and Effects of the Shift to Services</b>	<b>8 1</b>
<b>1. Theories on the Causes</b>	<b>18</b>
<b>2. Theories about the Impact on Growth</b>	<b>22</b>
<b>IV. The Causes and Effects of the Shift to Services: an Empirical Analysis</b>	<b>26</b>
<b>1. Analysis on the Causes</b>	<b>26</b>
<b>2. Analysis on the Effects</b>	<b>31</b>
<b>V. Conclusion and Policy Implications</b>	<b>8</b>
<b>&lt;References&gt;</b>	<b>41</b>
<b>&lt;Appendix&gt;</b>	<b>43</b>

# The Shift to the Service Economy: Causes and Effects

## I. Introduction

The more developed an economy is, the higher the share of the service sector. This trend is termed as 'the service economy(OECD 2000)'<sup>1)</sup> or the shift to services. Not only the share of service industries in production, employment, consumption and trade grow to be higher, but also the proportion of services in intermediate inputs for other industries' production goes up.

Although it is commonly observed that an economy tends to shift to services as its per capita income increases, however, the answers to the questions of why such a shift takes place in the first place and what kind of impact such a structural change has, especially on growth, are quite diverse in the literature and they are still moot points. Perhaps, one of the most influential arguments with regard to the issues may be Baumol (1967)'s Cost Disease Hypothesis. According to this theory, the shift towards services takes place mainly due to the service sector's lower productivity, higher costs and thus higher relative prices than those in the manufacturing sector. In other words, the shift to services happens because the service sector is stagnant and less progressive. The theory's forecast of the impact of the shift is as gloomy as its explanations of the causes. Because it expects that an economy's growth rate and productivity gains should decline over time as the share of the service sector increases.

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1) The term, "the service economy", conceptualizes not just a quantitative increase in terms of the the service sector's share in the economy. It also contains a connotation, if implicit, of qualitative change in which the sector should or could become a major driving engine for growth and innovation.

Appealing as it may be, counter-evidences are also plenty. Particularly, the fact that the US having the biggest service sector in the world has shown dynamic growth in the 1990s by being supported by its IT-using and innovative service industries, like finance, retail trade, communications and so on, is one of such evidences.<sup>2)</sup> And we are noticing in daily life some innovative forms of service providing, such as internet banking, highly efficient retail megastores, e-commerce and so on. And it is not rare to encounter with the news reporting that movie-making and exporting is as much, or even more, profitable than car manufacturing. All of these recent developments do not seem to fit so well with a stagnancy view of the service sector.

In Korea, the service sector has been steadily growing to take up 56% of the economy's total value added and 65% of its employment in 2005. Due to the changes in the economic structure, demand for services as intermediate inputs, like that for business services (finance, insurance, legal services, accounting services, and so on), has expanded. At the same time, household expenditure on services, such as travel, education and cultural services, has rapidly increased. Like this, the shift to services is unmistakable in various aspects of the economy. Moreover, in Korea, the importance of the service sector and of its competitiveness began to be shed light on since early this century. This is prompted by the wide recognition that the economy's overall growth remains at the historically unprecedented zone of about 5% for the period longer than expected, and that the increase in employment is quite limited in spite that the country's dynamic and internationally competitive manufacturing sector remains its momentum for growth and exports.

However, it is also evident that the Korean service sector shows many traits of stagnancy in comparison not only with its manufacturing sector, but with that in advanced economies. The supplying capacity of services is not enough to

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2) Jorgenson and Stiroh(1999)

meet the increasing demands both qualitatively and quantitatively. As a result, deficits in the services trade account has rapidly rising in recent years. The sector's weak international competitiveness can be also inferred from the fact that the proportion of the sector in total value added is substantially lower than its share in employment, indicating its overall productivity level being quite low. Related with this, the service sector's employment in Korea is heavily concentrated on the industries where productivity growth is particularly sluggish, like traditional retail trade or eating businesses. All of these facts point not only to the low competitiveness of Korea's service sector, but also to the possibility that the sector can be a drag to the Korean economy in near future, as the Cost Disease Hypothesis forecasts, if current situation does not improve.

The purpose of this paper is three-fold. First, it is to identify the current situation of the Korean service sector in terms of competitiveness in comparison with other countries as well as with the manufacturing sector. In doing this, I try to highlight the aspects or the sub-sectors in which the gap is particularly wide. Secondly, I analyse the causes of the shift to services in Korea and compare the Korean case with other countries. This analysis is required to see exactly what factors are driving the shift towards the service economy, and to be able to anticipate in what way the shift would take place further in the future. Lastly, I try to find out what impact the shift to services should have on economic growth. The result of this analysis can not only provide a rationale for the policies supporting the development of the service sector, but also show the ways through which the service sector can be transformed into a new engine for growth.

The structure of this paper is as follows. In Chapter II, the current position of the service sector in the Korean economy is briefly introduced. In addition, the characteristic features found in the economy's shift to the service economy and in the service sector's structure are presented in comparison with those of

advanced countries. In Chapter III, theoretical hypotheses on the causes of the shift to the service economy and the relationship between the shift and economic growth are examined on the basis of the literature. In Chapter IV, I empirically analyze the causes of the shift towards services and its impact on economic growth using Korean time-series data and international panel data which consists of the data of 9 OECD countries, including Korea, for the period 1981~2003. Lastly, in Chapter V, some policy implications are drawn out to transform the service sector into a new engine for growth.

## II. Characteristics of the Korean Service Sector

### 1. Service Industries in the Korean Economy

Over the past 30 years or so, the service sector<sup>3)</sup> in Korea has continuously raised its share in various economic spheres such as production, employment, consumption and trade. First, the proportion of the service sector in nominal total value added has increased by 11.6 percentage points from 44.7% in 1970 to 56.3% in 2005. However, the picture is quite varied by sub-group. While the share of producer services has increased quite rapidly, those of social and personal services have gone up only a little, and that of distributive services has substantially declined even.

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3) Generally, service activities are known to have several distinctive features such as intangibility, unstorability and inseparability between production and consumption. According to these criteria, the service sector covered in this paper is the economic activities other than agriculture, hunting, forestry and fishing, mining and quarrying, manufacturing, utilities (electricity, gas and water supply) and construction. More specifically, the sector includes wholesale and retail trade, restaurants and hotels, transport and storage, communication, finance, insurance, real estate, business services, community social and personal services.

And in order to investigate the structural changes in the sector, I divide it into the following four sub-groups according to Singelmann's categorization (Schettkat and Yocarini 2005).

- ① Distributive Services : Wholesale and retail trade, transport and storage
- ② Producer Services : Communication, finance, insurance, real estate, business services, renting of machinery and equipment, advertising and broadcasting
- ③ Social Services : Public administration and defence, education, health care and social welfare
- ④ Personal Services : Hotels and restaurants, movie and entertainment, other recreational services, cultural services, repairs, other personal services

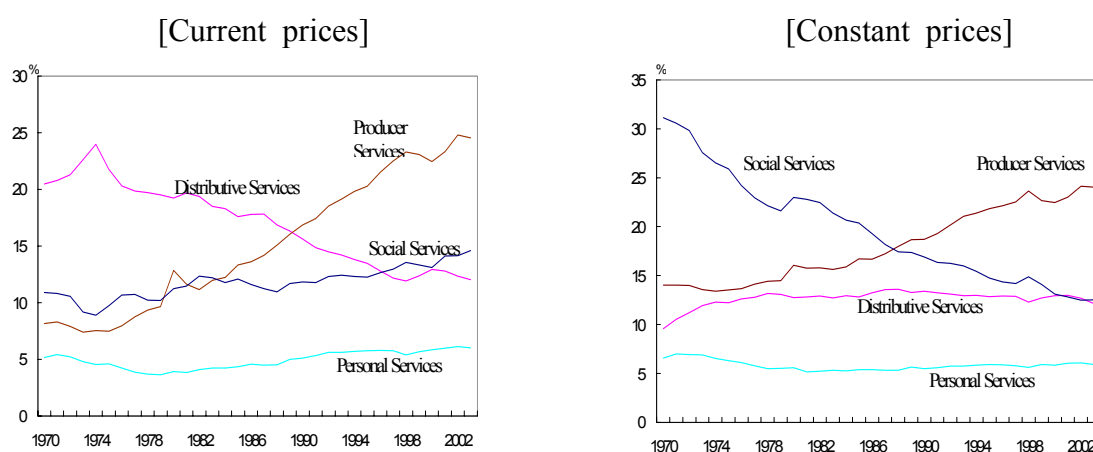
Knowledge-based services are such knowledge-intensive service-providing activities as communication, finance, insurance, real estate, advertising, business services, broadcasting, education, health care and social welfare, movie and entertainment, other recreational services and cultural services (OECD 1999).

<Table 1> Share of the Service Sector in Total Value Added in Korea  
(In current prices)

	(%)							
	1970	1975	1980	1985	1990	1995	2000	2005
Service	44.7	43.6	47.3	47.4	49.5	51.8	54.4	56.3
Manufacturing	17.8	21.6	24.4	27.3	27.3	27.6	29.4	28.4
Other sectors <sup>1)</sup>	37.5	34.8	28.3	25.3	23.2	20.6	16.2	15.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note : 1) Agriculture, hunting, forestry and fishing, mining and quarrying, utilities (electricity, gas and water supply) and construction

<Figure 1> Change in the Shares of Sub-groups of the Service Sector in Korea<sup>1)</sup>



Note : 1) Shares in total value added

However, in terms of real value added, the share of social services has reduced dramatically, while those of distributive and personal services has not shown a dramatic change. It is notable that the share of producer services in real terms has also increased quite fast, as it has in nominal terms.<sup>4)</sup> Therefore, it can be inferred that the expansion of producer services is greatly contributing to the shift to services in Korea.

4) In case of distributive services, the fact that its share in real value added remains roughly the same, while its share in nominal value added decreased dramatically, implicates that the relative price of these services has rapidly declined, perhaps due to technological or managerial innovations helped by IT technology. In contrast, the share of social services in real terms declined drastically, while that in nominal terms has mildly increased, implying that the relative price of these services has increased fast, presumably due to the stagnant productivity enhancing in this sub-sector.



The proportion of the service sector in total number of people employed has also increased from 34.3% in 1970 to 65.2% in 2005. In fact, the shift to services in this respect is much faster than that in total value added. By sub-group, personal and producer services absorbed more than half the increase in total employment for the period 1992~2004, which was about 5 million. New employment of 1.63 million was created in personal services and additional 1.39 million in producer services.

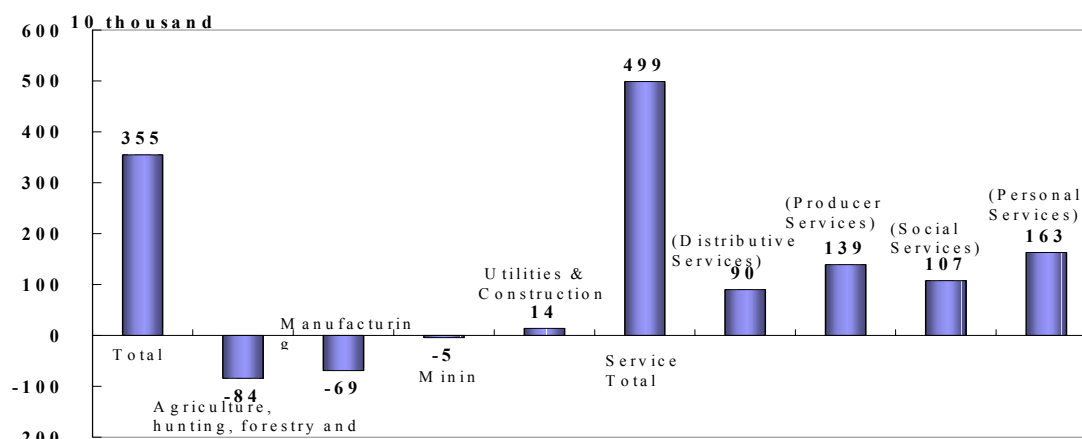
<Table 2> Employment Share of the Service Sector in Korea

	1970	1975	1980	1985	1990	1995	2000	2005
Service	34.3	32.4	38.6	45.6	47.7	54.8	61.2	65.2
Manufacturing	14.2	19.9	22.7	24.3	27.9	23.6	20.3	18.5
Other sectors <sup>1)</sup>	51.5	47.8	38.7	30.1	24.4	21.6	18.5	16.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source : OECD, Korean National Statistical Office (NSO)

Note : 1) Agriculture, hunting, forestry and fishing, mining and quarrying, utilities (electricity, gas and water supply) and construction

<Figure 2> Increase in the Number of Employment by Sector in Korea (1992~2004)



Source : Korean NSO

Note : Communication is included in distributive services instead of producer services here because the employment for the industry began to be separately measured only since 2000.

Moreover, it is remarkable that the shift to services in the domain of production process has also progressed steadily. The share of services in

intermediate inputs for the production in the manufacturing sector has increased from 10.1% in 1980 to 14.2% in 2000. In particular, the share of producer services, such as finance, insurance and business services, has risen from 2.8% to 7.3% during the same period. Like this, the inter-sectoral linkages between manufacturing and services has gradually expanded through producer services' increasing role in manufacturing.

<Table 3> Input Structure in the Korean Manufacturing Sector

	(%)				
	1980	1985	1990	1995	2000
Manufactured goods	56.7	60.6	66.8	69.4	68.9
Services	10.1	10.2	13.2	14.7	14.2
Producer services	2.8	4.1	6.2	7.5	7.3
Others <sup>1)</sup>	33.2	29.2	20.0	15.9	16.9
Total	100.0	100.0	100.0	100.0	100.0
(Intermediate input/total output)	(0.7721)	(0.7525)	(0.7280)	(0.6921)	(0.7264)

Note : 1) Inputs from the sectors of agriculture, hunting, forestry and fishing, mining and quarrying, utilities (electricity, gas and water supply) and construction

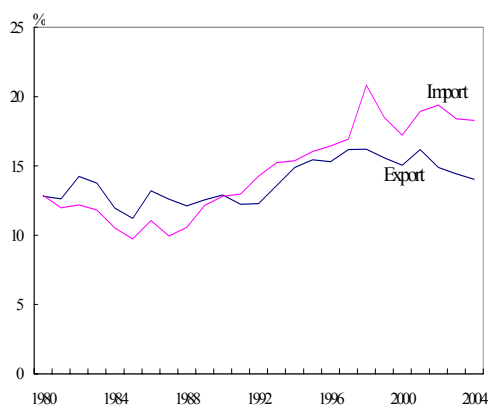
In addition to the supply side, the shift to services has progressed in the demand side, especially in consumption, as well. As a matter of fact, household expenditure on services has rapidly increased in Korea. The ratio of spending on services in total household consumption expenditure increased from 35% in 1980 to 57% in 2005 in nominal terms, and from 48% to 56% in real terms.

<Table 4> Share of Services in Total Household Consumption Expenditure

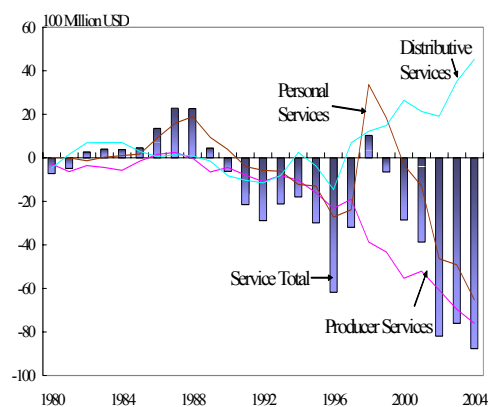
	(%)					
	1980	1985	1990	1995	2000	2005
Current prices	35.1	43.5	46.1	51.8	53.4	56.6
Constant prices	48.3	53.0	50.4	48.2	53.4	56.1

Moreover, the share of services in total trade (goods and services) has increased too. Traditionally, services were regarded as non-tradables. However, because of technological development in IT and transportation industries, trade volume of services are on the rise worldwide. In Korea, the share of services in

<Figure 3> Share of Services in Trade



<Figure 4> Services Account Balance by Sub-group



Source : Korea International Trade Association, IMF

total exports increased modestly from 12.8% in 1980 to 14% in 2004, while its share in total imports rose rather rapidly from 12.9% to 18.3% for the same period. However, as growth rate of imports of services is faster than that of their exports, deficits in the services trade account has been dramatically increasing, particularly in producer and personal services in recent years.

## 2. Characteristics of the Korean Service Sector: International Comparison<sup>5)</sup>

In the above, I have shown that the shift to services in Korea has taken place in various aspects, such as production, employment, production process, consumption and trade. This is also true in advanced countries. Comparing Korea and the advanced economies, however, there are several major differences in the shift and the structure of the service sector. They can be summarised in six aspects as follows.

First, the share of the service sector in total value added in current prices is

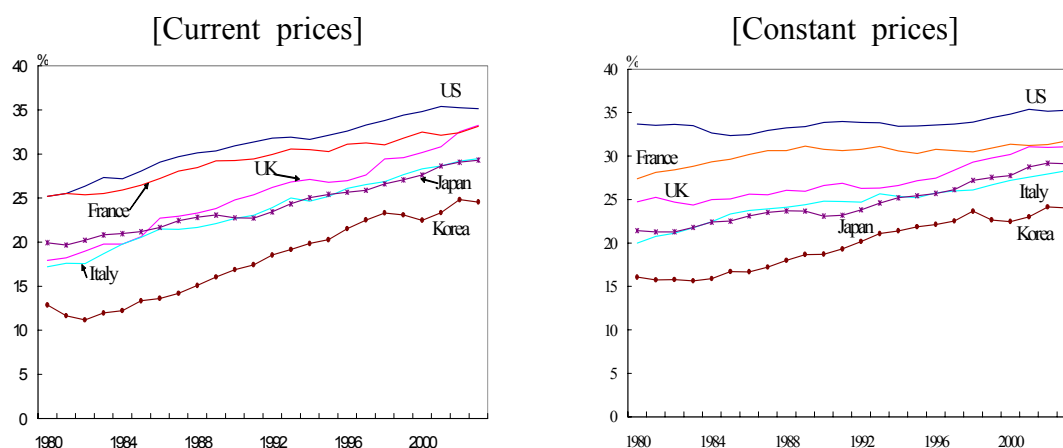
5) The data source for cross-country comparison is the OECD STAN (Structural Analysis) database, if not mentioned otherwise.

much lower in Korea than advanced countries. In addition, the share has increased very slowly in Korea. Except the US, in developed countries such as the UK, France, Italy and Japan, the ratios increased by 18~21 percentage points from 1970 to 2003, whereas they grew only by 12.5 percentage points during the same period in Korea. As a result, the gap in terms of the service sector's share in total value added between Korea and other countries ranges from minimum 11 percentage points (with Japan) to maximum 20 percentage points

<Table 5> Share of the Service Sector in Total Value Added in Major Countries

		(%)					
		1970(A)	1980	1990	2000	2003(B)	B-A(%p)
Current prices	US	65.5	67.0	72.9	75.7	77.4	+11.9
	UK	53.7	56.0	64.2	71.8	75.0	+21.3
	France	54.3	60.8	67.9	72.5	73.6	+19.3
	Italy	51.3	55.6	64.4	69.4	70.8	+19.5
	Japan	49.8	56.9	58.7	66.6	68.5	+18.7
	Korea	44.7	47.3	49.5	54.4	57.2	+12.5
		1978(A)	1980	1990	2000	2003(B)	B-A(%p)
Constant prices	US	75.6	77.5	76.8	75.7	76.8	+1.2
	UK	67.8	68.2	68.2	71.7	73.1	+5.4
	France	64.7	65.7	70.2	70.8	71.4	+6.7
	Italy	61.7	62.8	66.4	68.0	69.1	+7.4
	Japan	59.0	59.8	60.1	65.0	65.8	+6.8
	Korea	55.3	57.4	54.5	54.4	54.6	-0.7

<Figure 5> Share of Producer Services in Total Value Added in Major Countries



(with the US). Moreover, while the proportion of the service sector in total value added in real terms has been growing in advanced countries, it has slightly declined in Korea. In particular, the proportion of producer services which shows high productivity and is the core of knowledge-based services is lower than that of advanced countries by 5~10 percentage points.<sup>6)</sup> Moreover, while the proportion continues to grow until recent years in advanced countries, its growth rate slightly slowed down in Korea after the late 1990s.

Secondly, the service sector's share in total employment in Korea has been growing fast enough to match with the levels in some of the advanced countries, like Italy or Japan. Employment structure, however, is quite different from that in advanced countries. In Korea, the share of the service sector in total number of people employed stood at 64% in 2003 and rapidly grew to be only 10 percentage points away from the average 73.3% of major 5 countries. However, the proportion of producer services registered 11% which was much lower than the developed countries' average (17%) by 6 percentage points. On the other hand, the combined ratio of distributive services and personal services recorded 40%, 7 percentage points higher than the average in developed countries.

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6) Comparing the levels of labor productivity across sub-groups within the service sector, it is common that productivity in finance, insurance, real estate and business services (all are producer services) is the highest. When the productivity of this sub-group measured in local currency is set equal to 1 in each country, productivity of transportation, storage and communication ranges between 0.4~0.9, that of wholesale trade, retail trade, restaurants and accommodations between 0.2~0.5, and that of social and personal services between 0.3~0.5.

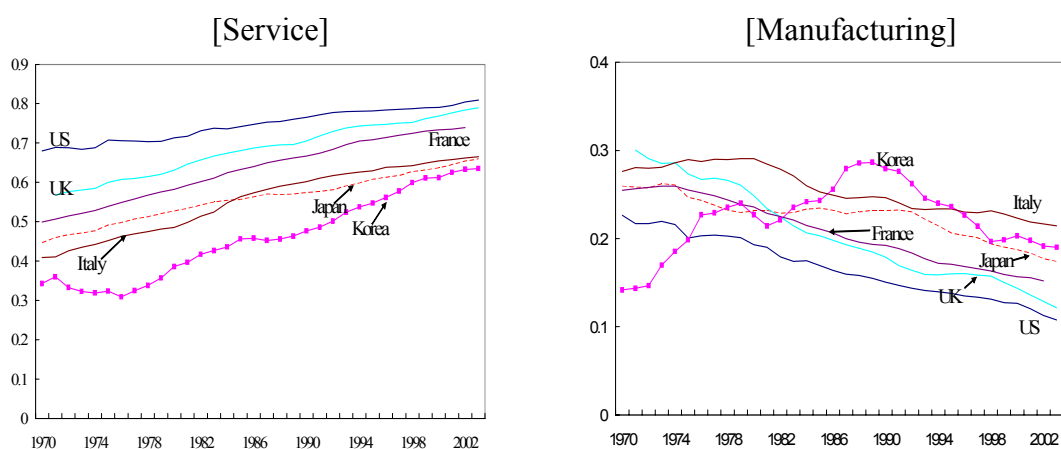
<Labor Productivity<sup>1)</sup> of Sub-groups in the Service Sector (in 2003)>

	Wholesale & retail trade, restaurants and accommodations	Transport, storage and communication	Finance, insurance, real estate and business services	Social and personal services
US	0.42	0.80	1.00	0.36
UK	0.46	0.93	1.00	0.51
France <sup>2)</sup>	0.42	0.58	1.00	0.39
Japan	0.27	0.39	1.00	0.25
Korea	0.22	0.73	1.00	0.43

Note : 1) Real value-added / number of total employment

2) In 2002

<Figure 6> Employment Share of the Service and Manufacturing Sectors in Major Countries



<Table 6> International Comparison of Employment Structure in the Service Sector  
(In 2003)

	(%, %p)				
	Distributive Services	Producer Services	Social Services <sup>2)</sup>	Personal Services <sup>2)</sup>	Service Total
Average of advanced countries <sup>1)</sup> (A)	20.3	16.8	24.1	13.2	73.3
Korea(B)	23.5	11.2	12.6	16.2	63.5
B-A	+3.2	-5.6	-11.5	+3.0	-9.8

Note : 1) The US, the UK, France(2002), Italy and Japan

2) Average of four countries except Japan, where the figures for the sub-divisions are not available.

This is because, in Korea, distributive and personal services include food and lodging services and retail trade where small self-employed businesses run in traditional way take up a dominant share. On the other hand, the proportion of social services including education, health care and social welfare which is closely related with the development of welfare state stood at only 13%, showing the biggest gap with the average of developed countries (24%).

Thirdly, the importance of services in production process is much lower in Korea compared to advanced countries. The ratio of services as intermediate inputs for production in manufacturing industries has increased steadily over the

<Table 7> Share of Services as Intermediate Inputs in the Manufacturing Sector in Major Countries

US		Japan	
1987	1999	1985	2001
24.3	29.9	24.9	31.4

Source : Shin and Cho (2003)

past 20 years in Korea, but still stood only at 14% as of 2000 which was about half the average of developed countries (30%). This is closely related to the fact that, as of 2000, the proportion of intermediate demand in total demand (output) for producer services is 53% in Korea, much lower than the average 60% in developed countries.<sup>7)</sup> This implicates that inter-sectoral linkage between manufacturing and service industries is relatively weak in Korea compared with developed countries.<sup>8)</sup> However, it also suggests that there are more rooms for Korea to improve productivity further by specialization and division of labor between the two sectors.

Fourthly, the growth rate of productivity in the Korean service sector is much lower than that in the country's manufacturing sector and that in advanced countries. Labor productivity growth in the Korean manufacturing sector accelerated from the annual average of 6.6% in the 1980s to 9.9% in the 1990s. However, that in the service sector slowed down from 2.8% to 1.6% during the same period.

7) According to Wölfl(2003, p.22) where she analyses OECD IO tables of 1995 or 1997, the proportion of intermediate demand in producer services' total output is around 60% in the UK, Italy, Germany, France, Norway and the Netherlands, while the ratio in Japan is roughly the same as in Korea, and that in the US is about 50%.

8) To see this in more detail, I examined the extent of production inducement in service industries in general and knowledge-based services in particular which is triggered by one-unit increase in final demand in each of 28 industries of Korea, and compared it with that in Japan. In most of the manufacturing industries, Korea's production inducement coefficients for services and knowledge-based services are lower than those of Japan, and this is especially so in electrical and electronic equipment manufacturing industry, which is one of the leading and technologically advanced industries in Korea (Refer to Appendix 1).

As a result, the productivity gap between the two sectors widened from 3.8 percentage points in the 1980s to 8.3 percentage points in the 1990s. In contrast with Korea, labor productivity growth of the service sector has accelerated in many advanced countries. Even in these countries, however, productivity gains in the service sector lagged behind those in the manufacturing sector, and thereby productivity growth differentials between the two sectors widened in many countries.

<Table 8> Labor Productivity<sup>1)</sup> Growth Differentials between the Manufacturing and Service Sectors in Major Countries

		(Annual average, %, %p)		
		1980-1990	1990-2000	Change
Belgium	Manufacturing (A)	4.85	3.08	↓
	Service (B)	0.91	0.95	↑
	A-B	3.94	2.13	Narrowed
Canada	Manufacturing (A)	2.44	3.86	↑
	Service (B)	0.59	1.25	↑
	A-B	1.85	2.61	Widened
Denmark	Manufacturing (A)	1.10	2.74	↑
	Service (B)	0.87	1.13	↑
	A-B	0.23	1.61	Widened
Finland	Manufacturing (A)	4.75	5.76	↑
	Service (B)	1.63	1.63	—
	A-B	3.12	4.12	Widened
France	Manufacturing (A)	2.79	3.70	↑
	Service (B)	1.61	0.29	↓
	A-B	1.17	3.41	Widened
Italy	Manufacturing (A)	2.76	2.12	↓
	Service (B)	0.18	0.78	↑
	A-B	2.58	1.34	Narrowed
UK	Manufacturing (A)	4.57	2.90	↓
	Service(B)	0.83	1.97	↑
	A-B	3.74	0.93	Narrowed
US	Manufacturing (A)	3.50	4.88	↑
	Service (B)	0.33	1.09	↑
	A-B	3.17	3.79	Widened
Japan	Manufacturing (A)	3.83	2.97	↓
	Service (B)	2.20	0.99	↓
	A-B	1.64	1.99	Widened
Korea	Manufacturing (A)	6.60	9.85	↑
	Service (B)	2.79	1.56	↓
	A-B	3.81	8.30	Widened

Note : 1) Real value added / total employment



In terms of total factor productivity (TFP) growth rates, the results turn out to be quite similar to those when analysing labor productivity.<sup>9)</sup> In other words, total factor productivity growth rate in the Korean service sector declined from the annual average of 1.7% in the 1980s to 0.4% in the 1990s, while that of the manufacturing sector increased from 3.5% to 5%. Thus, the inter-sectoral differential in terms of total factor productivity growth rates widened from 1.8 to 4.6 percentage points for the period. In developed countries, however, total factor productivity growth in the service sector accelerated in the 1990s compared with the 1980s. In spite of this, it is general that TFP growth differentials between the two sectors widened in most of the countries, as the manufacturing sector's productivity gain is much faster than that of the service sector .

Fifthly, the rise of service sector's share in household consumption expenditure in Korea has been progressing quite rapidly. As a matter of fact, Korea's shift to services in this respect is proven to be much faster than that in the US where the share of consumption and the proportion of the service sector in GDP is the highest in the advanced world. And this seems to be related with the unique socio-economic features of the economy. For example, such factors as high penetration ratio of telecommunication devices or the high propensity to spend on education compared with income level appear to contribute to the increase in the share of services in household consumption in the country.<sup>10)</sup>

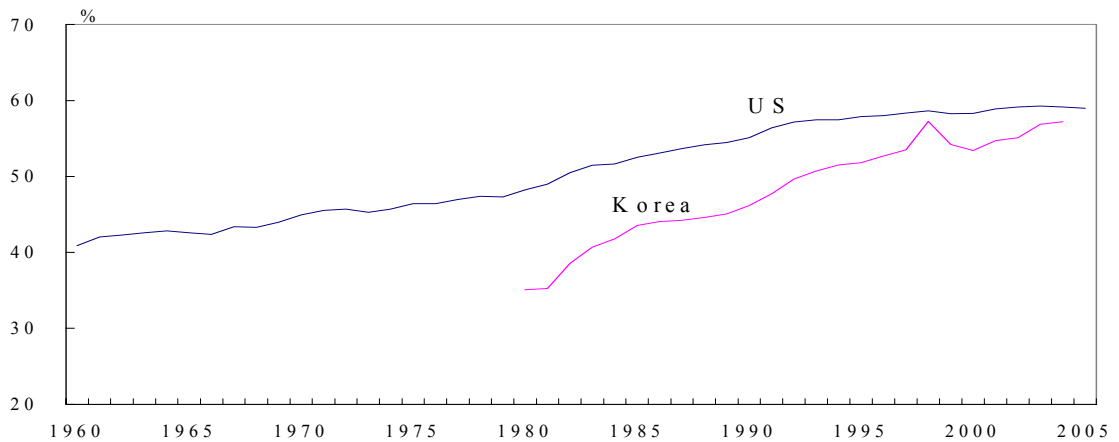
Lastly, as imports of services grew faster than their exports in Korea, the scale of deficits in the services account has been growing rapidly. When the size of services account balance of Korea is compared with that of other countries, the

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9) For TFP growth rates in the manufacturing and service sectors in nine OECD countries and the method for the calculation, refer to Appendix 2 and 3.

10) The share of "expenditure for telecommunication" in household's final consumption expenditure (in current prices) has increased from 0.3% to 5.3% for the period 1970~2005, which is the second biggest increase following "rent and utilities cost" (7.2%p increase), and followed by "recreational or cultural expenditure" (3.9%p), "educational costs" (3.3%p) and "overseas consumption of domestic residents" (3.1%p).

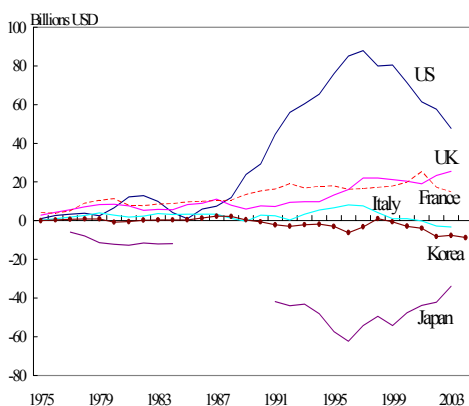
<Figure 7> The Share of Services in Household Consumption Expenditure: Comparison with the US



Source : BOK, US BEA (Bureau of Economic Analysis)

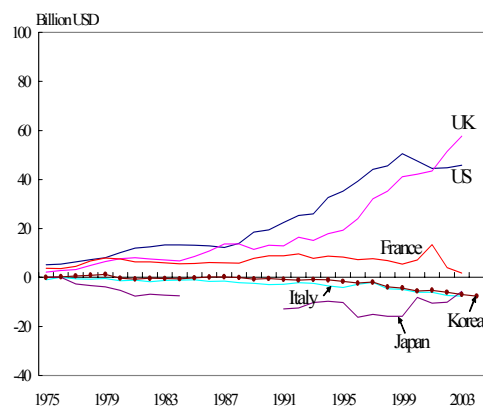
US, the UK and France recorded a large scale of surpluses for a long time, while Korea and Japan had chronic deficits. In Japan, however, the services account deficits have reduced in recent years while the deficits are snowballing in Korea. Furthermore, the countries with a surplus (deficit) in producer services account tend to have a surplus (deficit) in the services account as a whole. The size of deficits in producer services account in Korea turned out to be greater than those in Japan, although total deficits in the services account are much bigger in

<Figure 8> Services Account Balances in Major Countries



Source : IMF

<Figure 9> Producer Services Account Balances of Major Countries



the latter country. This indicates that international competitiveness of Korea's producer services is particularly lower than that of major countries.

When compared with advanced countries, Korea's characteristics in the shift toward services and the structure of the service sector can be summarized as follows.

First, the share of services in total employment has increased even faster than its share in total value added in Korea. Therefore, overall productivity level of the service sector is remarkably low and its productivity growth has been decelerated in contrast with developed countries. Secondly, the share of producer services in the economy has been steadily increasing, but it is still lower than that in advanced countries with a margin of 5~10 percentage points. Thirdly, the share of services which are used as intermediate inputs in the manufacturing sector has been increasing, but it still stands at merely half that of developed countries and this attests low inter-sectoral linkages between manufacturing and services in Korea. Fourthly, in Korea, the shift to services in respect of final consumption has been remarkable to reach near the level of the US with the highest share of the service sector in the world. Lastly, while the share of services in intermediate inputs and in final consumption has increased, services account deficits are growing very fast, especially in producer and personal services, implicating that domestic supplying capacity for those services are particularly weak in Korea.

### **III. Literature Survey on the Causes and Effects of the Shift to Services**

#### **1. Theories on the Causes**

What factors cause an economy to shift towards services? The literature on this issue can be largely put into the following four categories.

The first one is the traditional view originated by Fisher (1935) and Clark (1940) who assert that the proportion of the service sector increases as consumption structure changes from goods to services as a consequence of income growth. In other words, the share of services increases along with a rise in the level of income because income elasticity of the demand for goods is less than 1 (Engel's Law), but that of the demand for services, which are high grade goods, is greater than 1.<sup>11)</sup> According to this view, the service share in employment also increases, as more resources should flow into the sector to meet the rising demand for services driven by income growth.

Meanwhile, in order for the view to be supported, there must be a positive correlation, cross-sectionally and time-serially, between the level of income and the proportion of the service sector. Empirically, however, the relationship does not necessarily hold. Summers (1985) and Baumol (1985) have shown through the analysis employing cross-sectional data that income per capita and the proportion of the service sector may be positively correlated on the nominal basis, but that they are not related on the real (PPP) basis. On the other hand, Schettkat and Yocarini (2005) report through the analysis of input-output tables of major OECD countries that as per capita income increases, the proportion of services in final demand, especially that in household consumption expenditure,

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11) Schettkat and Yocarini (2005) have named this view as the Hierarchy of Needs Hypothesis.

has indicated an increase on the constant price basis as well as on the current price basis, supporting the Hierarchy of Needs Hypothesis.

The second theory is the Cost Disease Hypothesis argued by Baumol (1967) and Baumol et al. (1985). This hypothesis argues that an economy's shift towards services is attributable to the transfer of resources from manufacturing to services due to the existence of productivity gap between the two sectors, rather than to the shift in final demand accompanied with income growth as the traditional view argues. That is, if an economy is comprised of a progressive manufacturing sector with high productivity growth and rapid technological advance and a stagnant service sector showing sluggish progress both in productivity and technology, the proportion of the service sector rises on the current price basis. This is because, while the relative price of the manufacturing sector falls fast, the cost and the relative price of the service sector goes up by the magnitude of the productivity differential between the two sectors.<sup>12)</sup> According to this view, if the ratio of services in real value added is more or less constant irrespective of the income level, the proportion of employment in the service sector should rise because more input (labour) is needed due to the low productivity of the sector. A positive correlation between the expansion of productivity gap between manufacturing and service industries and an increase in the proportion of the service sector has been supported empirically by many studies (Fuchs 1980, Rowthorn and Ramaswamy 1997).

The third theory is the Exogenous Demand Shock Hypothesis asserting that the shift to services is brought about by structural changes in an economy that move the demand curve for services outward. First of all, the proportion of service industries rises as service activities that used to be produced within manufacturing firms' boundaries in the past are spun off to and outsourced from

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12) The major proposition here is that the rate of income growth in the service sector is identical to that in the manufacturing sector, which in turn is equal to the growth rate of labour productivity in the latter.

external service-providing specialists (Raa and Wolff 1996, Fixler and Siegel 1999). This view coincides with the observation that producer services, such as finance, insurance, real estate and business services, have rapidly expanded in most of the advanced economies. In addition, it is also argued that the shift to services progresses with an increase in the household expenditures on services. However, the increase, they argue, is not just caused by income growth, but mainly by structural changes, like the increase in female participation in economic activities. With this kind of structural changes, various service activities which used to be produced and consumed within the household should be transformed into marketable services. This may also increase the share of services in the economy (Fuchs 1980, Inman 1985). This view has been empirically supported. According to Inman (1985) in particular, 31% of the increase in the proportion of services in total employment occurred in the U.S. between 1929 and 1965 can be explained by exogenous demand shocks, and the figure rose to 69% for the period 1966~1981.

The last theory is the Deindustrialization Hypothesis which asserts that deindustrialization is brought about in an advanced country, as labour-intensive manufacturing industries is transferred to less developed countries and the trade between them expands (Wood 1995, Freeman 1995). In other words, the service sector's share increases rather passively due to the hollowing out of the manufacturing sector. Rowthorn and Ramaswamy (1997) refute this view, however, by stating that the effect of trade between the advanced and less developed countries on the employment structure of the former is insignificant since the trade volume between them is very small relative to the economic size of the advanced country. However, they also acknowledge that total trade, including trade among advanced countries, and the degree of export dependence in particular, can result in systematically different employment structures among advanced countries, as between the U.S. and Japan (or Germany).

Of the hypotheses examined so far, the Cost Disease Hypothesis and the Deindustrialization Hypothesis share a common view that the shift to services is a sort of negative or passive development. In particular, the former hypothesis argues that an economy's shift towards services is attributable to the stagnation of the service sector; that is, its low productivity and high cost structure. On the other hand, the Hierarchy of Needs Hypothesis and the Exogenous Demand Shock Hypothesis contrast with the previous two theories in that they grasp the shift to services as a progress in which the economic structure fundamentally changes from a goods-production-centered economy to a services-based one.

According to Inman (1985), various factors (excluding trade) causing an economy to shift towards services can be collectively expressed into equation (1), based on the theoretical models of Fuchs and Baumol<sup>13)</sup>:

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13) <Assumption>

- i) Labour is the only factor of production.
- ii) Labour, goods, and service markets are all competitive.

<Production function>

( $L_m$  is labour input in the manufacturing sector, and  $r_m$  is the growth rate of labour productivity in the sector)

( $L_s$  is labour input in the service sector, and  $r_s$  is the growth rate of labour productivity in the sector)

<Demand function for services> : The demand for services per labour is determined by the relative price of services, wages and exogenous demand shocks.

$$Q_s/L = c(p_s/p_m)^\beta W^\alpha e^{\Delta t} \quad \textcircled{1}$$

( $p_m$  is the price of a numeraire good produced in the manufacturing sector,  $p_s$  is the price of services,  $W$  is wage,  $\alpha$  is the income elasticity of service demand,  $\beta$  is the price elasticity of service demand,  $\Delta$  is the rate of exogenous change in the demand for services.)

<Share of employment in services>

$$l_s = L_s/L = (1/b)(Q_s/L)e^{-r_s t} \quad \textcircled{2}$$

<Equilibrium>

We can find the relative price path ( $p_s/p_m = (a/b)e^{(r_m - r_s)t}$ ) and wage path ( $W = p_m MP_m = p_m a e^{r_m t}$ ) from the equilibrium conditions for profit maximization in the

$$\dot{l}_s = (\alpha - 1)r_m + \Delta + (r_m - r_s)(1 + \beta) \quad (1)$$

where  $\dot{l}_s$  is the rate of change in the proportion of employment in services,  $\alpha$  ( $>0$ ) is the income elasticity of the demand for services,  $\Delta$  is the exogenous rate of change in the demand for services,  $r_m$  and  $r_s$  are the growth rates of labour productivity in the manufacturing and service sectors respectively, and  $\beta$  ( $<0$ ) is the price elasticity of the demand for services.

Equation (1) shows that a change in the service share in employment can be decomposed into three factors appearing on the right-hand side. The first term is related to the Hierarchy of Needs Hypothesis. If the income elasticity of the demand for services is greater than 1 as expected by the theory, there must be a positive correlation between the growth rate of the service share in employment and that of per capita income.<sup>14)</sup> The second term represents the impact of exogenous service demand shock on the rate of increase in the share of services in total employment. The last term is connected to the Cost Disease Hypothesis, and implies that if the demand for services is price inelastic ( $-1 < \beta < 0$ ), the greater the productivity gap between manufacturing and service industries, the greater the rate at which the proportion of the service sector in employment increases. Equation (1) provides a theoretical foundation for the empirical study on the causes for the shift to services in Chapter IV.

## 2. Theories about the Impact on Growth

With regard to the effect of the shift to services on growth, there exist both

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competitive markets. And by substituting these paths into Equation ①, and substituting the consequent equation into Equation ② and differentiating it with respect to time, we can finally derive Equation (1).

14) In the model, the growth rate of wage per worker in both sectors is assumed to be equal to the growth rate of labor productivity in the manufacturing sector.



pessimistic and optimistic views. According to the former, as the proportion of the service sector increases, productivity improvement of an economy and thereby its economic growth inevitably slows down (Baumol 1967, Baumol et al. 1985). On the other hand, the latter asserts that the rate of productivity growth in service industries is not always low, and that the increase in the proportion of the service sector does not necessarily give rise to a decline in growth rate (Kendrick 1985, Oulton 1999).

First, according to the pessimistic view, an increase in the proportion of the service sector implies that productivity change in an economy is increasingly limited to that of the service sector. The shift to services, therefore, should negatively impact on total productivity or economic growth (Baumol 1967). In addition, even at an industry level, the same logic can be applied. If an industry, which is considered innovative at a certain point in time, should be provided with intermediate inputs both by stagnant and progressive sectors, the industry's productivity growth declines over time and the innovative feature of the industry eventually disappears (Theory of Asymptotic Stagnancy, Baumol et al. 1985). This is because, while the price of the inputs produced by the progressive sector falls rapidly due to technological progress and productivity improvement, the price of the inputs supplied by the stagnant sector rises steeply. As a result, the cost share of the latter inputs in total production cost of the innovative industry increases to become dominant, while that of the former inputs decreases to be small.<sup>15)</sup>

Next, the optimistic view brings out the point that stagnancy views may not

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15) Baumol explains such asymptotic stagnancy taking broadcasting and data-processing industries as examples. In the case of data-processing industry, the proportion of hardware in the total cost is overwhelmingly large in an early stage, while that of labour-intensive software is small. Over time, however, productivity in the data-processing industry becomes to be limited to the productivity of the labour-intensive software industry, because the purchasing cost from the hardware industry decreases fast due to the rapid technological advancement in the sector and its share in total production cost of data-processing industry diminishes accordingly.

model the reality correctly, and that productivity of the service industries is not necessarily low. Oulton (1999) points out that not all services are demanded for final consumption as presupposed in Baumol's model, and theoretically shows that, as long as some services are demanded as intermediate inputs and productivity growth rate in the industries providing such services is not negative, the shift to services can increase productivity of the overall economy. As Wölfl (2003) shows, when the proportion of the industries producing services for intermediate uses gets higher, economic growth rate or overall productivity of the economy can increase by the following mechanisms. First, if specialized external firms produce and provide with services that used to be produced within a manufacturing firm's boundary, the latter firm's productivity should increase.<sup>16)</sup> Second, as specialized service-providing firms appear and grow, productivity of the overall economy can rise because the economies of scale can be realized in those economic activities. Lastly, if the demand for specialized services rises, productivity increases with more new entry and intensified competition thereby.<sup>17)</sup>

In addition, some argue that one cannot stipulate that productivity of the service sector is low across the board. They point out such progressive services as finance, wholesale trade, retail trade and transportation services, which have been actively adopting information and communication technology and thus are comparable to manufacturing industries in terms of productivity (Kendrick 1985, Bailey and Gordon 1988, Fixler and Siegel 1999, Triplett and Bosworth 2002). Furthermore, there is a possibility that productivity gains in the service sector

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16) For example, accounting services are labour-intensive and thus have low productivity relative to manufacturing industries, but if the services are outsourced by a manufacturing firm, productivity of the latter firm should increase.

17) It is well known that the degree to which such services as communication and business services are exposed to international competition is low in Korea, but that domestic competition is very severe. In some business services like consulting, Korean firms have already been competing intensely with multinational firms in the domestic market since the late 1990s when the country started to pursue the opening-up policies more actively.

are underestimated because the problem of measurement error in the sector is severer than that in the goods producing sectors (Bailey and Gordon 1988, Griliches 1992, Wölfl 2003).<sup>18)</sup> Besides, some researchers argue that the growth potential in the service sector is greater by the magnitude of productivity differential between manufacturing and service industries (Rowthorn and Ramaswamy 1997).

Despite of such optimistic views, however, increase in labour productivity has essentially been led by manufacturing industries in many countries, and the growth rate of productivity in some important service industries has been either very low or even negative.<sup>19)</sup> Hence, the rest of this paper empirically examines the causes and effects of the shift to services to see if the service sector could play a progressive role in an economy.<sup>20)</sup>

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18) Bailey and Gordon (1988) point out that the objective of such services as social welfare, medical care, education and retail trade is mostly the provision of convenience, and therefore convenience or the quality of services should be taken into account in measuring the output of these industries. For example, although productivity per hour of 24-hour convenience stores is lower than that of stores with closing time, convenience of consumers using the former stores increases by much. On the one hand, Griliches (1992) points out that the measurement problem may not be that serious in some services like communication in which output is as homogeneous as in manufacturing industries, whereas the measurement of output from such services as government, education, finance and business services is particularly difficult.

19) Good examples are such service industries as finance, insurance, and business services. Although productivity should have increased by much due to the development and utilization of IT technology, it is not unusual for the growth rate of total factor productivity in these activities to record a negative growth. According to some recent studies (Lee and Song 2004, Kim 2004), Korea has also shown such pattern.

20) The analysis is conducted under the presumption that measurement problem regarding output of services is more or less common across time and space.

## IV. The Causes and Effects of the Shift to Services: an Empirical Analysis

### 1. Analysis on the Causes

In this section, I examine the factors which drive the shift to services in the Korean economy. For this purpose, I estimate equation (2), which is a modified expression of equation (1) in Chapter III, using annual data over the period 1971~2003.

$$\tilde{l}_s = \lambda_1 PCrgdp + \lambda_2 (r_m - r_s) + \sum_i \gamma_i \Delta_i \quad (2)$$

In the equation, dependent variable ( $\tilde{l}_s$ ) is either the change rate in the service share in total employment (Model 1) or that in total value added (Model 2). Explanatory variables are growth rate of per capita real value added (PCrgdp), labor productivity growth differential between the manufacturing and service sectors ( $r_m - r_s$ ), and external demand shocks ( $\Delta$ ). Each component represents one of the aforementioned hypotheses accounting for the causes for the increase in the share of the service sector, except the Deindustrialization Hypothesis.

In particular, the last component is related with structural changes of the economy and required to be more specified. Therefore, I divide it further into three sub-components matching with the sources of the changes, as suggested in the Exogenous Demand Shock Hypothesis. The first one is the change in the input structure for production, which means the increased demand for services as intermediate inputs. As the proxy for this change, I include the change rate in the share of producer services in total value added (PRODS) in the estimation. The second component is the change in the structure of the final demand, especially of consumption. For its proxy, the change rate in the share of services

in household consumption expenditure (CONS) is included in the estimation.

And finally, the extent of female economic participation ratio (FMPART) can be considered as a factor influencing the service sector's share in an economy. The upward change in female economic participation ratio can increase the share of services in the economy through increased household consumption on services. However, if this last factor is the main cause for the change in household consumption structure, one of the two variables, CONS and FMPART, will be redundant and insignificant when included in the estimation together. On the other hand, if FMPART is also statistically significant along with the second component, we can infer that the latter should be caused by the factors other than the change in female economic participation ratio, and see more clearly the independent impact of the last variable on the increase of the service sector's share in the economy.<sup>21)</sup>

The result of the estimation is shown in <Table 9>.<sup>22)</sup> When the dependent variable is the change rate in the share of the service sector in employment (Model 1), the most significant factors are inter-sectoral productivity differential and the share of producer services. It is noticeable that the share of services in household consumption expenditure and female economic participation ratio also became significant when we focus on the more recent period of 1981~2003.

On the other hand, the share of producer services is the most significant factor accounting for the rise in the share of the service sector in total value

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21) Female participation in economic activities may also influence the service sector's share in employment on a supply side, since women can be more easily employed in service providing businesses.

22) According to unit root tests, change rate in the service sector's share in employment is stationary at 5% significance level, while all the other variables are stationary at 1% significance level. Appendix 4 shows the levels, not the change rates, of the variables except for labor productivity.

<Table 9> Regression Results on the Factors Causing the Shift to Services<sup>1)</sup>

	Model 1 : Dependent Var. = Service share in employment					
	1971~2003(n=33)		1971~1997(n=27)		1981~2003(n=23)	
PCrgdp	-0.061	(-0.680)	-0.078	(-0.764)	-0.093*	(-1.723)
$r_m - r_s$	0.276***	(3.744)	0.309***	(3.340)	0.252***	(6.257)
CONS	0.203	(1.533)	0.241	(1.331)	0.426***	(6.640)
PRODS	0.156***	(2.656)	0.143**	(2.153)	0.090*	(1.843)
FMPART	-0.116	(-0.645)	-0.144	(-0.715)	0.264**	(2.371)
Adjusted $R^2$	0.506		0.506		0.632	
D-W stat.	2.167		2.243		1.899	
	Model 2 : Dependent Var. = Service share in total value added					
	1971~2003(n=33)		1971~1997(n=27)		1981~2003(n=23)	
PCrgdp	-0.157***	(-2.848)	-0.175***	(-3.050)	-0.168***	(-3.033)
$r_m - r_s$	0.078*	(1.720)	0.056	(1.086)	0.113**	(2.758)
CONS	0.094	(1.148)	0.173*	(1.710)	0.118*	(1.809)
PRODS	0.224***	(6.164)	0.214***	(5.776)	0.209***	(4.189)
FMPART	0.212*	(1.907)	0.168	(1.503)	0.404***	(3.563)
Adjusted $R^2$	0.641		0.692		0.486	
D-W stat.	1.719		1.905		2.083	

Note : 1) t values are in parentheses. And \*\*\*, \*\* and \* mean 1%, 5% and 10% significance level, respectively.

added (Model 2). And this result maintains even if the estimation period is changed. It is notable that inter-sectoral productivity differential began to be significant only in recent years, which is different from Model 1, and that the significance of female economic participation ratio strengthened for the period 1981~2003, as in Model 1.

There is a possibility that the above result is influenced by the structural break in the time series caused by the 1997 currency crisis. Therefore, to find out if this is the case, as an robust check, I estimated Model 1 and Model 2 for the pre-crisis period. The result is qualitatively same as that for the whole period. It means that the difference in the estimation results depends more on whether we include the data of the 1970s or not, than on the structural break caused by the financial crisis. In other words, when we focus on more recent data, more factors become to contribute to the shift to services, and the significance of the share of services in household consumption expenditure and

female economic participation ratio becomes stronger.

On the other hand, per capita real value added is either insignificant or shows negative sign which is in contrast to the argument of the Hierarchy of Needs Hypothesis, but in concordance with that of the Cost Disease Hypothesis. We can find a similar result in Summers (1985) and Baumol et al. (1985) in which they analysed international cross-sectional data and concluded that correlation between per capita real value added on a PPP basis and the share of the service sector does not exist.

As we have seen in Chapter II, in Korea, the increase in service share is much more remarkable in terms of employment than in terms of total value added. I examine the issue further and try to see how different the weight of each factor causing the shift to services in employment across countries, using annual data for the period 1981~2003.<sup>23)</sup> The result is shown in <Table 10>. From this, we can find that the contribution of inter-sectoral productivity differential is over 60% in Korea, which is much higher than the average figure of other advanced countries, which is around 40%. This means that, in Korea, the rapid rise of service sector's share in employment has been resulted mainly by the inter-sectoral productivity differential rather than external demand shocks. This is coherent with the fact that inter-sectoral productivity gap

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23) Using equation (1),  $\tilde{l}_s = (\alpha - 1)r_m + \Delta + (r_m - r_s)(1 + \beta)$ , and by assuming  $\alpha = 1$ , we can calculate how much inter-sectoral productivity differential and external demand shocks contribute to the changes in  $l_s$  in each country. To do this, we have to know  $\beta$ , price elasticities of service demand in each economy. Inman (1985) provided the results from previous studies showing that price elasticity of service demand is (-0.2, -0.8) in case of public sector services, and (-0.4, -1.6) in case of private sector ones (See note 5 in Introduction in the book). Using the mean elasticities of the two sub-sectors, which are -0.5 and -1.0 respectively, we can calculate  $\beta$  by averaging these mean values with the weight of each sub-sector in terms of its share in the service sector's total value-added. In case of Korea, we can use the estimated result of  $\beta$  which is -0.75 since the coefficient of  $(r_m - r_s)$  in Model 1 is 0.25.

<Table 10> Decomposing the Rise of the Service Sector's Share in Employment:  
International Comparison (1981~2003)

(Annual average, %, %p)

	Change rates in the service sector's share in employment	Inter-sectoral differential in labor productivity growth rates ( $r_m - r_s$ )	Contribution by factor	
			( $r_m - r_s$ )	External Demand Shocks( $\Delta$ )
Belgium	0.79	2.89	64.0	36.0
Canada	0.54	1.76	56.7	43.3
Denmark	0.65	0.99	29.6	70.4
Finland	1.13	3.39	56.0	44.0
France	1.09	2.23	33.6	66.4
Italy	1.38	1.61	16.8	83.2
UK	0.98	2.31	39.3	60.7
US	0.55	3.59	112.8	-12.8
Japan	0.98	2.01	35.2	64.7
Mean for 9 advanced countries	0.90	2.31	41.4	58.6
Korea	2.19	5.36	61.2	38.8

enlarged more rapidly in Korea than in advanced countries, as found in Chapter II.

To sum up, over the last 30 years or so, many factors have contributed to the increase of the share of the service sector in the Korean economy, such as enlarged inter-sectoral productivity gap, and external demand shocks like increased female economic activity participation ratio and changes in the structure of final consumption or in input structure for production. Compared with advanced countries, however, the increase of the service sector's share in the economy, especially in employment, has been caused mainly by the productivity gap between the manufacturing and service sectors.



## 2. Analysis on the Effects

In order to pursue the question regarding the effect of the rising service sector's proportion in an economy, I also try to do some empirical analysis on the relationship between the shift to services and economic growth, hiring international panel data and Korean time series data.

The international panel data consists of annual time series data of 9 countries, including Korea, Belgium, Canada, Denmark, Finland, France, Italy, the UK, and the US, for the period 1981~2003. The Korean data is annual time series for the period 1971~2003.<sup>24)</sup> The analysis using the international panel data makes us to find more general relationship between the increasing service sector's share and economic growth, while that using the Korean data allows us to see if the general relationship applies to Korea as well.

For this purpose, I set the equation as follows.

$$RGDP = f(\text{Macro, R\&D, Share of service sector, Structural changes within the service sector}) \quad (3)$$

The dependent variable is growth rate of total value added in real terms and the main explanatory variables are the share of the service sector in the economy's total value added on the one hand, and the variables showing structural changes within the sector on the other. The structural variables are the shares of four sub-sectors (distributive services, producer services, social services, or personal services) in the service sector's real value added. As control variables, I also include macro variables such as changes in broad money stock and real interest rate, and R&D variables (R&D expenditure or number of patent

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24) Data on total value added and employment used in the analysis come from OECD STAN (Structural Analysis) dataset, unless specified otherwise.

applied to the USPTO (US Patent Office)).<sup>25)</sup> These two additional variables can also influence growth rate, while they do not have particular relationships with the two key explanatory variables. All the variables, except real interest rates, are expressed in growth rates.

The expected sign for the coefficients of money stocks and R&D variables is positive, while that of real interest rate is negative. This is because increase in

<Table 11> Variables and Sources

	Variables		Sources
Dependent variable	Growth	Growth rate of total value added in real terms (RGDP)	OECD STAN DB
	Macro	Growth rate of real broad money (M) <sup>1)</sup>	IFS
		Real interest rate (rint) <sup>2)</sup>	IFS
Explanatory variables	R&D	Growth rate of the number of patent applied (USPTO)	OECD
		Growth rate in R&D expenditure (R&D) <sup>3)</sup>	Korean Ministry of Science and Technology
	Share of the service sector	Growth rate of the service sector's share in real value added (s)	OECD STAN DB
	Change in the structure of the service sector <sup>4)</sup>	<ul style="list-style-type: none"> <li>• Growth rate of the share of distributive services (ds)</li> <li>• Growth rate of the share of producer services (pds)</li> <li>• Growth rate of the share of social services (scs)</li> <li>• Growth rate of the share of personal services (prs)</li> </ul>	OECD STAN DB

Note : 1) Money and quasi money in IFS. For the countries where this data is not available (Belgium, Finland, France and Italy), I use "currency in circulation plus demand deposits plus other deposits," instead. The data is changed into real values by being denominated with GDP deflator.

2) Government bond (3 years or longer) yields which are converted into real terms by subtracting GDP deflators' growth rates. For the countries where government bond yields are not available, like Finland and Korea, I use either average bank lending rates (Finland) or corporate bond rates (Korea).

3) Real expenditure converted by GDP deflator

4) Share of each sub-sector in the service sector's total value added

25) R&D activity is included because it can affect economic growth through technological progress and productivity changes. R&D expenditure is a variable measuring the extent of R&D activity on the input side, while patenting measures that on the output side.

money stocks or decrease in real interest rates is related with the rise of total demand and thus should positively affect economic growth. Acceleration in R&D activities should boost total productivity and thereby positively influence growth rate. On the other hand, the increase in the service sector's share should be negatively related with growth rate, as the enlarged share of the sector with lower productivity should have a negative effect on overall productivity and thereby on growth. The enlargement of sub-sectors with high productivity, however, such as distributive or producer services, should be positively related with growth rate, while the increase of sub-sectors with low productivity, such as social or personal services, should be negatively associated with growth rate.

The results are shown in <Table 12> and <Table 13>. From the estimation using international panel data,<sup>26)</sup> the share of service sector is proven to affect growth rate negatively, as expected. However, by sub-sector, the shares of distributive and producer services are positively related with economic growth, while the share of social services is negatively associated with it. On the other hand, personal services' share is not significant. This result can be interpreted as indicating that the enlargement of the service sector with much lower productivity as a whole than the manufacturing sector tends to negatively affect growth rate, but that the increase in the shares of the sub-sectors with higher productivity within the service sector can accelerate growth and as a result mitigate the negative impact of the shift to services.

The estimation using Korean time series comes up with a similar result.<sup>27)</sup>

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26) Generally, in panel regression, we use random effect models when the cross-sectional effect representing heterogeneity is assumed not to be correlated with other explanatory variables, otherwise we should use fixed effect models. According to Hausman test, there is no mis-specification in random effect model, so that I report the result of the estimation of this model hereafter.

27) In this case, I use total liquidity (M3) instead of broad money (M2). In Korea, until 1998 when its monetary policy regime changed to inflation targeting, M is relatively closely related with the real economy, and M3 tends to have a higher correlation with growth rate than M2.

<Table 12> The Effect of the Increasing Share of the Service Sector and Its Structural Change on Economic Growth<sup>1)</sup>  
(International Panel Data; 1981 ~ 2003)

	(1) n=167	(2) n=167	(3) <sup>2)</sup> n=146	(4) <sup>2)</sup> n=146
Constant term	0.031*** (7.409)	0.028*** (5.842)	0.023*** (5.727)	0.032*** (6.019)
Broad money (M)	0.020 (1.339)	0.025 (1.665)	-0.006 (-0.472)	0.022 (1.331)
Real interest rate (rint)	-0.113*** (-3.118)	-0.118*** (-3.123)	-0.069*** (-2.338)	-0.114*** (-2.805)
R&D expenditure <sup>3)</sup>	0.048*** (4.765)	0.063*** (6.188)	0.040*** (5.041)	0.059*** (5.445)
The share of the service sector in total value added (s)	-1.096*** (-7.268)	-1.429*** (-9.892)	-0.878*** (-6.899)	-1.387*** (-8.278)
The share of distributive services in the service sector (ds)	0.310*** (4.954)			
The share of producer services in the service sector (pds)		0.312*** (3.429)		
The share of social services in the service sector (scs)			-0.775*** (-11.682)	
The share of personal services in the service sector (prs)				0.078 (1.278)
Adjusted $R^2$	0.520	0.488	0.716	0.446

Note : 1) t values are in parentheses. And \*\*\*, \*\* and \* mean 1%, 5% and 10% significance level, respectively.

2) The US is excluded since the sub-division of social and personal services is not possible.

3) If patent number, instead of R&D expenditure, is included, the result is qualitatively similar.

The share of the service sector affects negatively on economic growth. By sub-sector, however, the share of the producer services in the service sector positively affect growth, while that of social services is negatively associated with economic growth. In Korea, the share of distributive services is insignificant as well as that of personal services, which is in contrast with the result of the estimation of the panel data. In advanced countries, it is common that distributive services is leading the productivity enhancing in the service sector. In Korea, however, the sector includes lots of micro firms or self-employed businesses which are usually run in traditional or outmoded ways and thereby

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Unit root tests signify that all the variables except real interest rate are proven as stationary. Therefore, I exclude interest rate from the estimation.

<Table 13> The Effect of the Increasing Share of the Service Sector and Its Structural Change on Economic Growth<sup>1)</sup>

(Korean Time Series)

[Whole period : 1971-2003]

	(1): n=32	(2): n=32	(3): n=32	(4): n=32
Constant term	0.041 <sup>***</sup> (6.992)	0.034 <sup>***</sup> (5.671)	0.034 <sup>***</sup> (8.297)	0.042 <sup>***</sup> (7.288)
Total liquidity (M3)	0.194 <sup>***</sup> (4.954)	0.179 <sup>***</sup> (5.236)	0.127 <sup>***</sup> (4.582)	0.181 <sup>***</sup> (4.631)
R&D expenditure	0.011 (0.746)	0.004 (0.302)	0.010 (0.962)	0.014 (0.932)
The share of the service sector in total value added (s)	-1.206 <sup>***</sup> (-4.257)	-1.468 <sup>***</sup> (-7.612)	-0.921 <sup>***</sup> (-7.286)	-1.158 <sup>***</sup> (-6.638)
The share of distributive services in the service sector (ds)	-0.012 (-0.098)			
The share of producer services in the service sector (pds)		0.426 <sup>**</sup> (2.544)		
The share of social services in the service sector (scs)			-0.675 <sup>***</sup> (-5.653)	
The share of personal services in the service sector (prs)				0.094 (0.967)
Adjusted $R^2$	0.709	0.767	0.869	0.719
D-W statistics	1.652	1.547	1.445 <sup>2)</sup>	1.783

[Before the crisis : 1971-1997]

	(1): n=26	(2): n=26	(3): n=26	(4): n=26
Constant term	0.045 <sup>***</sup> (7.445)	0.034 <sup>***</sup> (5.421)	0.037 <sup>***</sup> (8.453)	0.048 <sup>***</sup> (7.144)
Total liquidity (M3)	0.176 <sup>***</sup> (4.773)	0.159 <sup>***</sup> (5.127)	0.095 <sup>***</sup> (3.292)	0.148 <sup>***</sup> (3.563)
R&D expenditure	0.009 (0.663)	0.003 (0.278)	0.007 (0.786)	0.011 (0.773)
The share of the service sector in total value added (s)	-1.596 <sup>***</sup> (-5.522)	-1.557 <sup>***</sup> (-9.142)	-0.898 <sup>***</sup> (-6.664)	-1.238 <sup>***</sup> (-7.188)
The share of distributive services in the service sector (ds)	-0.187 (-1.472)			
The share of producer services in the service sector (pds)		0.535 <sup>***</sup> (3.308)		
The share of social services in the service sector (scs)			-0.779 <sup>***</sup> (-5.188)	
The share of personal services in the service sector (prs)				0.114 (1.034)
Adjusted $R^2$	0.775	0.837	0.891	0.764
D-W statistics <sup>2)</sup>	1.375	1.245	1.097	1.242

Note: 1) t values are in parentheses. And \*\*\*, \*\* and \* mean 1%, 5% and 10% significance level, respectively.

2) Even though D-W statistics lie in indeterminate area, according to Ljung-Box Q test and Breusch-Godfrey Lagrange Multiplier test, there are no serial correlations in the error terms.

with low productivity. This tendency became much more intensified since the 1997 financial crisis, as the sacked employees in the wave of financial and non-financial enterprise restructuring sought to set up their own businesses mostly in retail trade as well as in eating businesses.

To find out whether the financial crisis in the late 1990s affect the above estimation result, I also estimate the same equation for the period before the crisis. The result, however, is qualitatively same with that of the whole period, with the significance of the share of producer services increasing.

In addition, I also investigate the impact of the increase of the share of the knowledge-based services<sup>28)</sup> on growth rate. The share of knowledge-based services has positive sign, but with no significance for the whole period. However, its significance improves to 10% level when we focus on the period 1981~2003. From this, we can conclude that the knowledge-based services began to influence growth in a positive way in Korea after the 1980s.

To sum up, the empirical analysis using both international panel data and Korean time series data confirms that the enlargement of the service sector with lower productivity as a whole can affect negatively on economic growth. This seems to support Baumol's Cost Disease Hypothesis. However, the analysis also shows that, if the share of sub-sectors with higher productivity like producer services or knowledge-based services increases, this general tendency can be alleviated to a significant extent.

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28) The share of the knowledge-based services in the service sector's real value added is calculated using Korea's National Account in which data for 77 industries is available. The share has increased from 25.9% in 1970 to 46.3% in 2004.

<The Share of the Knowledge-Based Services in the Service Sector: in Real Value Added>  
(%)

1970	1980	1990	1995	2000	2004
25.9	30.2	37.8	41.7	41.9	46.3

<Table 14> The Effect of the Increasing Share of the Knowledge-Based Services<sup>1)</sup> in the Service Sector on Economic Growth<sup>2)</sup>  
(Korean Time Series)

	1971~2003 n=32	1981~2003 n=23
Constant terms	0.039*** (5.57)	0.012(1.02)
Total liquidity (M3)	0.175*** (4.61)	0.298*** (3.04)
R&D expenditure	0.015 (0.99)	-0.001 (-0.02)
The share of the service sector in total value added (s)	-1.136*** (-4.54)	-2.035*** (-4.18)
The share of the knowledge-based services in the service sector (kbs)	0.233(1.14)	0.655*(1.83)
Adjusted $R^2$	0.583	0.619
D-W statistics	1.663	1.709

Note : 1) Including communications, finance, insurance, real estate, advertising, business services, broadcasting, education, health care, social welfare, movie and entertainment, and cultural services  
2) t values are in parentheses. And \*\*\*, \*\* and \* mean 1%, 5% and 10% significance level, respectively.

## V. Conclusion and Policy Implications

Korea's service sector has grown to be the nation's key economic area accounting for 56% of total value-added and 65% of total employment in 2005. However, it is revealed that the overall level of productivity in Korea's service industries is very low compared to that in advanced countries. In addition, productivity growth in the Korean service sector has been much slower than that in the country's manufacturing sector. This is closely related with the fact that the sector's proportion in value-added has risen only very moderately, while its proportion in employment has increased rapidly.

In addition, the proportion of producer services which can accelerate economic growth and make a significant contribution to improvement in services trade accounts turns out to be 5~10% point lower than that in the advanced countries. Since the producer services sector which is highly related with production activities has been underdeveloped, the degree of inter-sectoral linkages between manufacturing and service industries is also low in Korea compared to the developed countries.

Accordingly, to transform the service sector into a new source of growth, it is essential to increase the share of producer services in the economy further and to improve its productivity and competitiveness. In fact, while domestic demand for producer services in Korea has been rapidly expanding, the supplying capacity is still very weak in terms of quality as well as of quantity. As a result, the degree of import inducement coefficient for producer services in the manufacturing industries has been drastically increasing since 1990 on the one hand,<sup>29)</sup> and the size of producer services account deficits has been rapidly

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29) The import inducement coefficient for producer services in manufacturing industries has increased on average by 3.7 times between 1990 and 2000. The magnitude of the increase was large in order of precision equipment (8.6 times), general machinery (5.7 times), and electric and electronic equipment (4.4 times) (Refer to Appendix 5).



increasing on the other. Hence, it is required to increase its proportion in the economy and to increase its competitiveness through scale enlargement and further specialization of domestic firms that are markedly small relative to multinational corporations. In addition, it is also required to make an active use of external opening-up, like the Korea-US FTA, as an opportunity to enhance international competitiveness of producer services one step further.

At the same time, it is also highly needed to increase productivity in the sectors of distributive and personal services. In Korea, too many small and self-employed businesses are operating in retail trade and eating businesses. Therefore, to enhance the productivity in the sectors, restructuring through M&A is strongly needed and adopting modern ways of doing businesses like franchising is also required.

In addition, to mitigate further aggravation in service account deficits, it is necessary to enhance competitiveness of the domestic personal services industries. It may not only help restrain excessively rapid expansion of overseas consumption by the Korean, but also induce more foreign consumption within the country. The competitiveness of the industries has been rapidly deteriorated in recent years, as manifest in soaring volume of personal services account deficits centering around travel services. To take a balance between domestic and overseas consumptions of personal services, therefore, it is necessary to improve related infrastructures. At the same time, innovations should be promoted in the service industries creating cultural contents such as movies, music, dramas and computer games. Those industries not only show strong export potentials by themselves, but also are proven quite effective for boosting tourism in conjunction with the exported cultural contents.

Moreover, it is also important to expand and strengthen social services sector such as education, medical care and social welfare. The proportion of this sector

is particularly low in Korea, even though they are closely related with a welfare state. Although it turned out from the empirical analysis that this sector tend to have a negative effect on growth, it has a strategic importance for long-term growth as well as for welfare state. Because the sector is not only linked directly with the accumulation of human capital, but has high employment absorbing power, which can contribute to mitigating polarization problem facing the Korean economy nowadays. Moreover, this sector by itself has great potential to develop into another source for creating value-added in the long run. To develop the sector further, therefore, it is important to introduce market principle into the sector where the public goods property has been unilaterally stressed, and to open up the domestic market gradually to increase its competitiveness.

## <References>

[In Korean]

- Kim, Dong-Seok, "Industrial Analysis of Growth Factors and International Comparison," Korea Development Institute, 2004
- Shin, Chang-Sik and Cho Han-Sang, "Analysis of Inter-sectoral Linkage Structure and Competitiveness of the Korean Service Sector," *Monthly Bulletin*, Bank of Korea, June 2003.
- Lee, Keun-Hee, "Measurement of Labour Productivity in the Service Industry," Korea Productivity Center, 1997.
- Lee, Sang-Woo and Lim, Hyung-Seok, "Current Status of an Economy's Shift towards Services and Cause of an Increase in Service Prices," *Monthly Bulletin*, Bank of Korea, August 1994.
- Lee, Jong-Hwa and Song, Chul-Jong, "Industrial Analysis of Growth Factors in the Korean Economy," *Economic Studies*, Vol.53, No.2, 2005.
- Cho, Seung-Hyung and Bae, Young-Soo, "Analysis of Productivity Variation Factors of the Korean Industries," *Monthly Bulletin*, Bank of Korea, February 2000.
- Pyo, Hak-Gil, "Estimation of Capital Stocks by Industry and Asset in Korea (1953-2000)," 2003.
- Pyo, Hak-Gil, Lee, Keun-Hee and Ha, Bong-Chan, "Industrial Analysis of Growth Factors and Estimation of Productivity in the Korean Economy," *Analysis of the Korean Economy*, Vol.11, No.1, Korea Institute of Finance, 2005.

[In English]

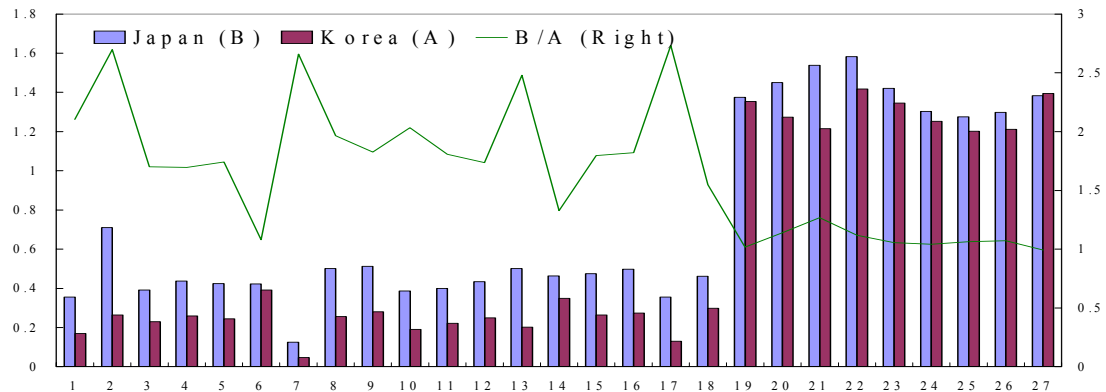
- Bailey, M. N. and R. Gordon, "The Productivity Slowdown, Measurement Issues and the Explosion of Computer Power," *Brookings Papers on Economic Activity*, Vol. 1988, Issue 2, 1988, pp.347-420.
- Baumol, William J., "Macroeconomics of Unbalanced Growth: the Anatomy of Urban Crisis," *American Economic Review*, Vol. 57, Issue 3, 1967, pp.415-426.
- Baumol, William J., B. Blackman and Edward N. Wolff, "Unbalanced Growth Revisited: Asymptotic Stagnancy and New Evidence," *American Economic Review*, Vol. 75, Issue 4, 1985, pp.806-817.
- Clark, Colin, *The Conditions of Economic Progress*, Macmillan, London, 1940.
- Fisher, Allan G. B., *The Clash of Progress and Security*, London, 1935.
- Fixler, Dennis J. and D. Siegel, "Outsourcing and Productivity Growth in

- Services," *Structural Change and Economic Dynamics*, No. 10, 1999, pp.177-194.
- Freeman, R. B., "Are Your Wages Set in Beijing?", *The Journal of Economic Perspectives*, Vol.9, No.3, 1995, pp.15-32.
- Fuchs, Victor R., "Economic Growth and the Rise of Service Employment," *NBER Working Paper*, No. 486, 1980.
- Grilliches, Z.(ed.), *Output Measurement in the Service Sectors*, NBER, Chicago: University of Chicago Press, 1992.
- Inman, R. P.(ed.), *Managing the Service Economy: Prospects and Problems*, Cambridge University Press, Cambridge: MA, 1985.
- Jorgenson, Dale W. and Kevin J. Stiroh, "Information Technology and Growth, " *American Economic Review*, Vol. 89, No. 2, pp. 109-115.
- Kendrick, J. W., "Measurement of Output and Productivity in the Service Sector," in R. P. Inman(ed.), *Managing the Service Economy: Prospects and Problems*, CUP, Cambridge: MA, 1985, pp.111-133.
- OECD, "The Knowledge Economy: a Set of Facts and Figures," 1999.
- OECD, "The Service Economy," 2000.
- Oulton, Nick, "Must the Growth Rate Decline: Baumol's Unbalanced Growth Revisited," Working Paper 107, the Bank of England, 1999.
- ten Raa, Thijs and Edward N. Wolff, "Outsourcing of Services and the Productivity Recovery in US Manufacturing in the 1980s and 1990s", *Center for Economic Research Discussion Paper*, No. 2000-32, Tilburg University, 2000.
- Rowthorn, R. and R. Ramaswamy, "Deindustrialization – Its Causes and Implications," *IMF Working Paper*, 97-42, 1997.
- Schettkat, R. and L. Yocarini, "The Shift to Services Employment: A Review of the Literature, *Structural Change and Economic Dynamics*, 2005.
- Siegel, D. and Zvi Griliches, "Purchased Services, Outsourcing, Computers, and Productivity in Manufacturing," *NBER working paper*, no. 3678, 1991.
- Summers, R., "Services in the International Economy," in R. P. Inman(ed.), *Managing the Service Economy: Prospects and Problems*, CUP, Cambridge: MA, 1985, pp. 27~48.
- Triplet, J. and B. Bosworth, "What's New About the New Economy?: IT, Economic Growth and Productivity," *International Productivity Monitor*, No. 2, 2001, pp.19-30.
- Wölfl, A., "Productivity Growth in Service Industries: An Assessment of Recent Patterns and the Role of Measurement," *STI Working Paper Series*, 2003/7, OECD, 2003.
- Wölfl, A., "The Service Economy in OECD Countries," *STI Working Paper Series*, 2005/3, OECD, 2005.
- Wood, A., "How Trade Hurt Unskilled Workers," *The Journal of Economic Perspectives*, Vol.9, No.3, 1995, pp.57-80.

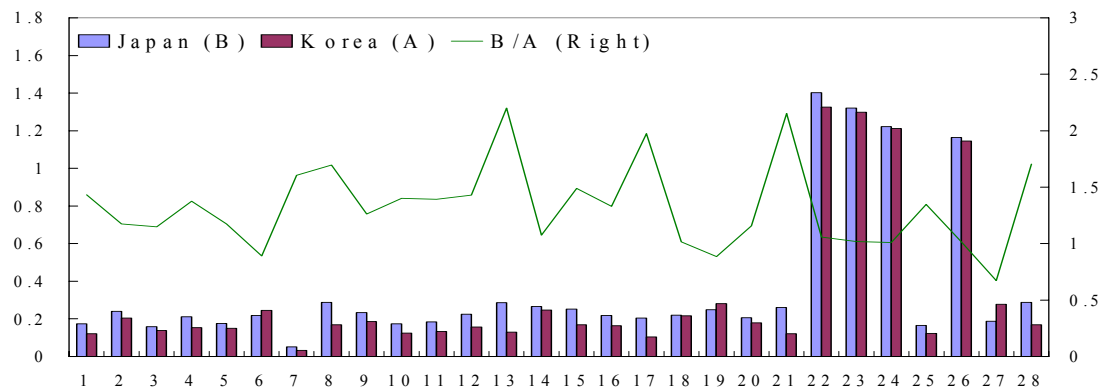
## <Appendix>

### <Appendix 1> Comparison of Production Inducement Coefficients for Services and Knowledge-based Services by Industry between Korea and Japan(In 2000)

(Services)



(Knowledge-based services)

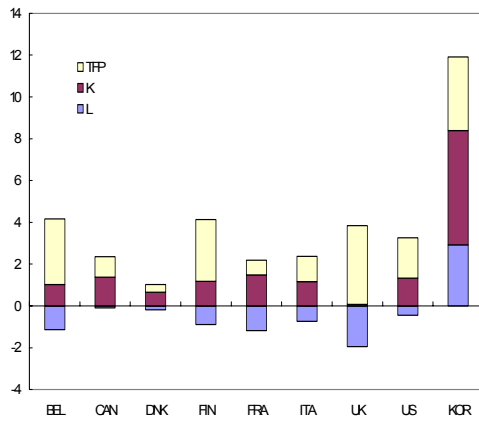


1	Agricultural, fishery and forestry product	8	Chemical product	15	Transportation equipment	22	Communication and broadcasting
2	Mineral product	9	Non-metal mineral product	16	Furniture and other	23	Finance and insurance
3	Beverage and grocery	10	Primary metal	17	Power, gas and water supply	24	Real estate and business service
4	Textile and leather product	11	Metal product	18	Construction	25	Public administration and national defense
5	Lumber and paper product	12	General machinery	19	Wholesale & retail trade	26	Education & health care
6	Printing, publication and reprinting	13	Electric and electronic equipment	20	Restaurant and accommodation	27	Social and other services
7	Petroleum and coal product	14	Precision equipment	21	Transportation and storage	28	Other

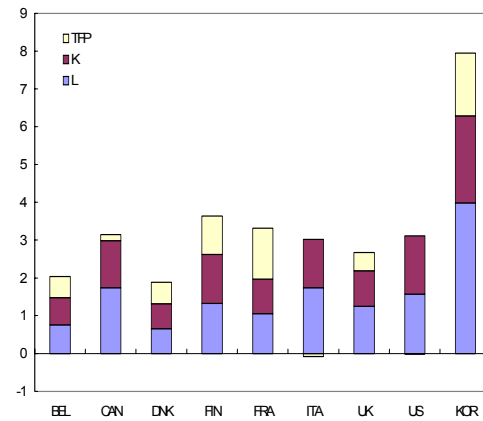
<Appendix 2> Trend of the Growth Rate of Total Factor Productivity in the Manufacturing and Service Industries in Major Countries\*

\* Countries under study are limited to the U.S., Korea and 7 countries (Belgium, Canada, Denmark, Finland, France, Italy, England) for which data on capital stocks exist in OECD STAN. Capital stocks of the U.S. and Korea are generated using different data (Refer to Appendix 3 for detailed method of the calculation and data creation).

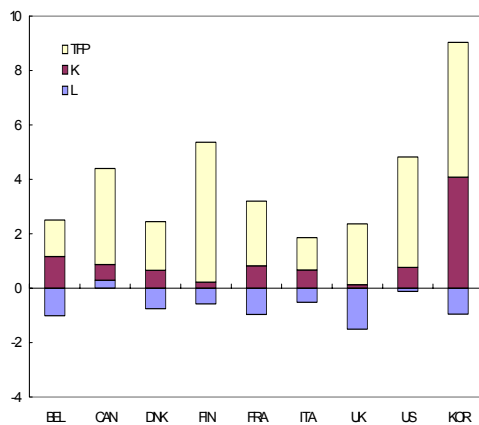
(1980-90: Manufacturing Sector)



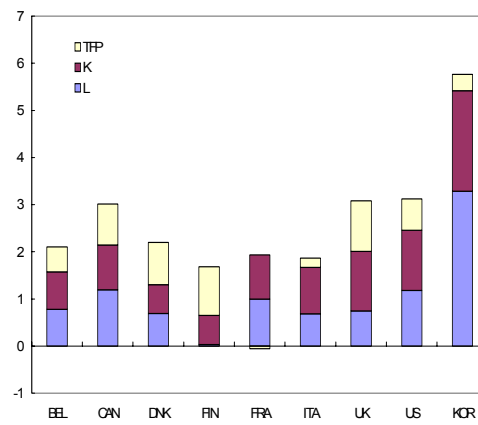
(1980-90: Service Sector)



(1990-2000: Manufacturing Sector)



(1990-2000: Service Sector)



### <Appendix 3> Methods for Deriving the Growth Rate of Total Factor Productivity and Estimating Capital Stocks

- The growth rate of total factor productivity is computed using the following growth accounting equation, assuming the first-order homogeneous Cobb-Douglas production function:

$$\frac{\dot{TFP}}{TFP} = \frac{\dot{Y}}{Y} - \theta \frac{\dot{L}}{L} - (1 - \theta) \frac{\dot{K}}{K} \quad (\text{Y: output, L: labour, K: capital, } \theta \text{ labour income distribution rate})$$

- Definition of Variables

- o Y : Total value-added in real terms
- o L : The total number of persons employed due to the deficiency of labour hours data in many countries.
- o K : Gross fixed asset as it has less missing values than net fixed asset\*

\* Gross fixed asset is computed as the amount of money required to acquire the currently used assets (no matter how old they may be) every year, while net fixed asset is computed by subtracting the amount of depreciation (reduction in asset value due to physical abrasion and normal worn-out) based on the number of elapsed years from gross fixed asset. Therefore the latter is a better measure for capital input.

- o  $\theta$  (the share of labour income) = [(income per employee)  $\times$  (total number of employed)]  $\div$  (total value added)\*

\* By using this method, reserved wages for unpaid workers can be counted in labour income rather than in operating surplus (= capital income).  $\theta$  is average value over the period for which the labor income share can be calculated for each country.

- Calculating capital stocks for the U.S. and Korea

- o For the U.S., the time series of capital stocks for the manufacturing and service industries between 1987 and 2003 are created by using the data on private non-residential fixed asset reported by BEA (Bureau of Economy Analysis), and the data from 1980 to 1986 are created by employing the polynomial-benchmark year method\* that connects 1987 capital stock of BEA with the time series of gross fixed capital formation in the OECD STAN.

- o For Korea, the time series of gross capital stock up to year 2000 reported in Pyo (2003) is utilized. But as this is based on the 1995 constant price, it has to be converted into a time series based on the 2000 constant price. For the series after 2001, net capital stock series is created first by linking net capital stock of 2000 with gross fixed capital formation in the OECD STAN data, and then converted into gross capital stock series by applying the ratio of net fixed asset to gross fixed asset which is calculated from the 1997 survey of national wealth.

- \* The method for creating time series of capital stock assuming the following equation, provided that there exist data on net fixed asset for a particular year and time series of investment.

$$K_{t+1} = (1 - \delta)K_t + I_t$$

(K : capital stock, I : investment,  $\delta$  : depreciation rate)

<Appendix 4> Trend of Variables Employed in the Estimation on the Causes for the Shift to Services

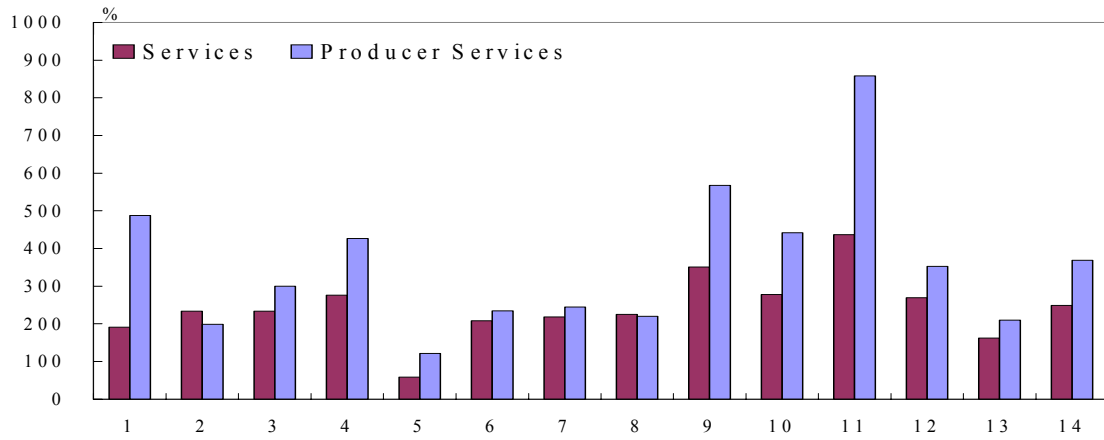
(%, %p, 10,000 Won)

Year	Share of Services in Employment	Share of Services in Total Value Added	Per Capita Real Value Added	$r_s$	$r_m$	$r_m - r_s$	Share of Services in Consumption	Share of Producer Services in Total Value Added	Female Economic Activity Participation Ratio
1970	34.3	44.7	216.3				31.0	8.2	39.3
1971	36.0	45.4	229.2	0.5	12.4	11.9	31.5	8.3	39.5
1972	33.3	45.1	234.5	7.9	8.7	0.8	32.7	7.9	39.6
1973	32.3	44.0	257.4	5.5	8.1	2.7	32.6	7.4	41.5
1974	31.9	45.0	270.7	1.3	2.8	1.4	31.5	7.5	41.5
1975	32.4	43.6	281.6	0.8	3.4	2.6	31.3	7.5	40.4
1976	30.9	43.2	306.0	6.0	3.1	-2.9	31.4	8.0	43.2
1977	32.5	43.2	331.4	-0.8	9.8	10.6	32.0	8.8	41.7
1978	33.8	43.0	356.7	-1.2	12.6	13.8	32.6	9.3	43.3
1979	35.7	43.0	375.3	-1.5	6.0	7.4	32.5	9.7	43.3
1980	38.6	47.3	364.4	-5.0	3.9	8.8	35.1	12.9	42.8
1981	39.7	46.7	381.2	-0.5	14.4	15.0	35.3	11.7	42.3
1982	41.7	47.0	403.3	-0.7	0.6	1.3	38.6	11.2	43.4
1983	42.7	46.9	440.6	4.4	7.8	3.3	40.7	12.0	42.8
1984	43.6	46.6	470.0	5.7	14.7	9.0	41.8	12.2	40.7
1985	45.6	47.4	496.0	-0.6	2.1	2.7	43.5	13.3	41.9
1986	45.8	47.6	542.7	4.8	10.3	5.5	44.1	13.6	43.1
1987	45.2	47.8	597.0	5.7	3.5	-2.2	44.2	14.2	45.0
1988	45.6	47.5	654.2	6.1	6.1	0.0	44.6	15.1	45.0
1989	46.3	49.1	691.9	1.6	-1.0	-2.5	45.1	16.0	46.6
1990	47.7	49.5	748.1	1.7	8.7	7.0	46.1	16.9	47.0
1991	48.6	49.4	810.2	3.1	6.8	3.7	47.7	17.4	47.1
1992	50.2	51.0	849.2	2.1	7.9	5.8	49.7	18.5	47.1
1993	52.4	51.4	892.1	0.9	10.9	10.0	50.7	19.2	47.1
1994	53.8	51.7	958.9	1.7	10.5	8.8	51.5	19.8	47.8
1995	54.8	51.8	1,037.1	3.2	10.3	7.1	51.8	20.3	48.4
1996	56.2	52.8	1,099.9	1.3	8.5	7.2	52.7	21.5	48.9
1997	57.8	53.4	1,141.7	0.4	9.2	8.8	53.5	22.5	49.8
1998	60.0	54.2	1,055.2	-1.5	6.7	8.2	57.2	23.3	47.1
1999	61.1	54.5	1,146.8	2.7	18.5	15.7	54.2	23.1	47.6
2000	61.2	54.4	1,235.4	1.6	9.7	8.1	53.4	22.5	48.6
2001	62.5	56.3	1,274.6	0.6	2.8	2.2	54.7	23.3	49.2
2002	63.3	57.5	1,355.2	3.7	8.3	4.6	55.1	24.8	49.7
2003	63.5	57.2	1,389.2	1.4	6.4	5.1	56.8	24.6	48.9

Note :  $r_s$  and  $r_m$  are the labor productivity growth rates in the manufacturing and service sectors, respectively.



<Appendix 5> Change in Import Inducement Coefficients for Services and Producer Services by Manufacturing Industry (1990-2000)



- |                               |                              |                                      |  |
|-------------------------------|------------------------------|--------------------------------------|--|
| 1 Beverage and grocery        | 5 Petroleum and coal product | 9 General Machinery                  | 13 Furniture and other manufacturing product |
| 2 Textile and leather product | 6 Non-metal mineral product  | 10 Electric and electronic equipment | 14 Average of the manufacturing industry     |
| 3 Lumber and paper product    | 7 Primary metal              | 11 Precision equipment               |  |
| 4 Chemical product            | 8 Metal product              | 12 Transportation equipment          |  |