

An Analysis of the Sectoral Employment Structure of the Korean Economy*

Hongshik Bae**

Abstracts

This paper presents a modified model of a shift and share analysis which has four components. The analysis applies the model to the employment of sixteen major OECD economies by ISIC Revision 2 major divisions, and to the employment of "All OECD" and Korean economy by ISIC Revision 3 sectors during 1994~2004.

With this analysis, this paper has derived the following results: (i) The sectoral structure of United States is most advanced, followed by "Other Developed"; and that EU and Japan are intermediate, while "Other Developing" is less advanced, in which Korea is most advanced. (ii) The OECD economies have experienced a rapid expansion of the service sector employment but a rapid contraction of the goods-producing sector employment. And the Korean economy has shown a more striking expansion of the service sector employment than average OECD economies. (iii) Among the sectors where the Korean economy reveals its competitive advantage and creates most of jobs, the service sectors of health and social work, business services, other services, and education are most impressive.

Keywords : Location Quotient Analysis, Shift and Share Analysis,
Sectoral Employment, OECD, Korea

* Old versions of this paper were presented to *The 4th Inha-Le Havre International Conference on Regional Cooperation and Economic Integration: European and East Asian Experiences* on Oct. 9, 2003 and to the meeting of *The Korean Labor Economic Association* on Feb. 13, 2004.

** Professor, Department of Economics, College of Government and Business, Yonsei University. Maeji 234, Hungup, Wonju, Gangwon 220-710.

I . Introduction

This research aims to analyze changes of the sectoral employment structure of sixteen major OECD economies including Korea during 1994~2003. For this aim, this research introduces a new model of a shift and share analysis with four components in Section II. And it applies this model to analyzing employment of OECD economies by “major divisions” of ISIC (International Standard Industrial Classification) Revision 2 (which divides economic activities into ten sectors) in Section III. Also, it analyses employment of two OECD economies — “All OECD” and Korea — by “sectors” of ISIC Revision 3 (which classifies economic activities into 18 sectors as in <Table 3>) in Section IV.

This paper mainly analyzes, among others, (i) which economies are more advanced among major OECD economies in sectoral structure by comparing the mix ratio which is a relative size of mix component; (ii) in what sectors All OECD shows its competitiveness by comparing the mix ratio among the sectors; and (iii) in what sectors Korea shows its competitiveness and creates jobs from most to least by comparing the net competitive ratio, which is a measure of revealed competitive advantage, among the sectors. Summaries and implications of the findings are discussed in the final section.

II . On Models of Analysis

This section discusses a location quotient analysis and a shift and share analysis (See Blair, 1996, pp. 106~107 and pp. 145~146 for each of these analyses.), and discusses their relationship.

A location quotient analysis is a technique for assessing a region’s specialization of sectors. The sectoral composition of a regional

economy may be better understood by comparing its structure with others than by examining it in isolation. The location quotient (LQ) of employment is the ratio of the regional employment in a particular sector to the comparable employment of a benchmark area. Accordingly, the location quotient for sector i of a regional economy to total OECD is expressed as

$$LQ_i = (e_i/E_R)/(E_i/E) \times 100 \quad (1)$$

where

LQ_i = regional location quotient for sector i

e_i = regional employment in sector i

E_R = total regional employment

E_i = OECD employment in sector i

E = total OECD employment.

The term $LQ = 100$ for a sector means that the economy has the same percentage of employment in the sector as found in total OECD.

The location quotient may be interpreted as a "revealed competitive advantage", which shows the sectors where most of jobs are being created. A higher LQ for a particular sector implies higher competitiveness than lower ones, and its rise during a period also implies an improvement in competitiveness.

On the other hand, a shift and share analysis provides causes of growth during a period. The original analysis is a technique for dividing a region's growth of a sector into three components. First, part of a region's growth of a sector can be attributed to OECD-wide economic growth, as shown at the first term of Equation (2). If a sector grows at the OECD average rate, it maintains its "share" of OECD employment. Second, a region may grow faster (or slower) than the OECD average rate if it has higher (or lower) portions of

employment in sectors that grow fast OECD-wide. Growth resulted from the initial employment composition of a region is the structural “mix” component, as shown at the second term of Equation (2). Third, a region may have higher competitiveness in a sector than other regions, because its environment is conducive to growth of a sector. Growth differential as residual due to the nature of the regional environment is the “competitive” component, for which a shift and share analysis is usually conducted. The mix and competitive components account for regional growth that differs from the total OECD.

In this research the above model of a shift and share analysis will be modified, and one more component will be introduced by separating the competitive component into the “macroeconomic” component and the “net competitive” component. An economy may have a substantial difference in macroeconomic performances in employment over a long period of time because an international mobility of workers is far more restrictive than a domestic mobility, and a higher (or lower) growth rate than the OECD average rate may come from various reasons. The difference between a region’s growth rate and OECD’s average growth rate, as the third term of Equation (2) shows, contributes to the macroeconomic component. Finally, as the last term of Equation (2) shows, an economy may have a “net competitiveness”, net of the macroeconomic component, because its environment is favorable to growth of a sector. Growth differentials due to the regional environment of both the macroeconomic component and the net competitive component are termed the “gross competitive” component.

$$\begin{aligned}
 \Delta e_i &= (e_i^* - e_i) = e_i(e_i^*/e_i - 1) \\
 &= e_i[E^*/E - 1] + e_i[E_i^*/E_i - E^*/E] + e_i[E_R^*/E_R - E^*/E] \\
 &\quad + e_i[(e_i^*/e_i - E_R^*/E_R) - (E_i^*/E_i - E^*/E)] \quad (2)
 \end{aligned}$$

or

$$\begin{aligned} \Delta e_i/e_i &= (e_i^* - e_i)/e_i = (e_i^*/e_i - 1) \\ &= [E^*/E - 1] + [E_i^*/E_i - E^*/E] + [E_R^*/E_R - E^*/E] \\ &\quad + [(e_i^*/e_i - E_R^*/E_R) - (E_i^*/E_i - E^*/E)] \quad (2)' \end{aligned}$$

where

Δe_i = change in regional employment in sector i from the beginning to the end of the period

e_i^*, e_i = regional employment in sector i at the end, and at the beginning

E^*, E = total OECD employment at the end, and at the beginning

E_i^*, E_i = OECD employment in sector i at the end, and at the beginning

E_R^*, E_R = total regional employment at the end, and at the beginning

i as a subscript indicates reference to sector i , and R as a subscript indicates reference to a regional economy.

This new model has at least two advantages over the original model. First, the net competitive component of a sector is a more precise measure of regional competitiveness of a sector than the gross competitive, because it compares the net growth rates of a sector, $(e_i^*/e_i - E_R^*/E_R) - (E_i^*/E_i - E^*/E)$, between a regional economy and total OECD.

Second, the new model has more consistency with a location quotient analysis. Suppose a ratio of location quotients between two dates, $LQ_i^*/LQ_i = (e_i^*/e_i \times E^*/E) / (E_R^*/E_R \times E_i^*/E_i)$, and find that this ratio contains all of four ratios, $(e_i^*/e_i + E^*/E) - (E_R^*/E_R + E_i^*/E_i)$, in the net competitive component of Equation (2). Their relationship is

as follows.

Consider two rectangles with two sides of $(e_i^*/e_i$ and $E^*/E)$ and two sides of $(E_R^*/E_R$ and $E_i^*/E_i)$. A ratio of location quotients between two dates, $LQ_i^*/LQ_i = (e_i^*/e_i \times E^*/E)/(E_R^*/E_R \times E_i^*/E_i)$, is a ratio between areas of the two rectangles, while the net competitive ratio during the dates, $(e_i^*/e_i + E^*/E) - (E_R^*/E_R + E_i^*/E_i)$, is half of the difference between circumferences of the two rectangles. Since all the sides of the two rectangles are close to one and thus the two rectangles have similar figures, the larger area a rectangle has, the larger circumference it has, and vice versa. Therefore, the change in LQ between two dates is almost equivalent to the net competitive ratio during the dates.

Accordingly, in order to discuss competitiveness of a sector in more detail, one may use this modified model and the location quotient model in a complimentary manner by examining a rise or fall of LQ and by examining the net competitive ratio which is a relative size of the net competitive component.

III. An Analysis of Employment Structure of Major OECD Economies

1. OECD Economies

This research analyzes statistics, adapted from OECD (2004), of civilian employment of 1994 and 2003. However, as discussed at Note (2) of <Table 1>, some statistics (that are necessary in order to get the total OECD employment of each sector) of the years were unavailable and in this case those of the nearest year were used instead. Furthermore, statistics on civilian employees instead of employment are used for France. Statistics by ISIC Revision 3 sectors are properly

reclassified for all OECD economies except United States and Japan whose statistics by ISIC Revision 2 major divisions only are available.

During the period of 1994~2003, the civilian employment has changed remarkably among OECD economies. The changes are summarized in <Table 1>. "All OECD" of thirty economies has increased by 8.6 percent during the period. "United States" shows an increase rate of 10.9 percent, but Japan shows a decrease of 2.1 percent. EU of fifteen economies shows an increase of 10.6 percent, and "Other Developed" of five economies shows the highest increase rate of 16.3 percent, while "Other Developing" of eight economies shows 7.7 percent and in which Korea shows an increase rate of 11.6 percent. One must keep in mind that there are many important non-OECD economies in the world.

2. A Shift and Share Analysis by Major Divisions

1) Share Component

As <Table 1> shows, All OECD of 30 countries has increased its civilian employment by 39,786 thousands or 8.6 percent. This growth rate of employment contributes to the share component of each sector of an economy, $e_i[E^*/E - 1]$. The sum of share components of each economy is as follows (not shown in the tables): A total of 10,608 thousands for United States, 5,562 thousands for Japan, 12,530 thousands for EU, and 2,478 thousands for Other Developed, and 8,607 thousands for Other Developing including 1,711 thousands for Korea.

2) Mix Component

The structural mix component, $e_i[E_i^*/E_i - E^*/E]$, explains why an economy grows faster than OECD average if it has higher portions of employment in OECD-wide fast-growing sectors. That is, if a sector of All OECD grows faster (or slower) than OECD average, it gives a

positive (or negative) value in the mix component to the sector of each economy.

The sum of structural mix components of an economy seems a good indicator showing how advanced the sectoral structure of the economy is, since it indicates how much the economy has taken advantage of fast-growing sectors during the period. The percentage of mix component of a sector to sectoral employment of 1994 is termed as a "mix ratio" of the sector. As column 6 of <Table 1> shows, the mix ratios of all activities are as follows: zero percent (as average) for All OECD, 2.4 percent for United States, -0.3 percent for Japan, 0.7 percent for EU, 2.1 percent for Other Developed, and -4.3 percent for Other Developing including -2.7 percent for Korea. In other words, the sectoral structure of United States is most advanced, indicating that it has enjoyed a 2.4 percent more increase in employment than All OECD due to the structural advance; Other Developed on average (2.1%) has also enjoyed the structural advance; EU (0.7%) and Japan (-0.3%) are intermediate; and Other Developing (-4.3%) is less advanced, and in which Korea is most advanced.

Suppose that the Korean economy had the 2003 employment structure in 1994 and calculate the mix ratio getting 0.0 percent instead of -2.7 percent. This result shows that the Korean economy was behind All OECD by nine years, and it shows that the Korean economy improved its employment structure most rapidly among OECD economies during 1994~2003. For Ireland, as another extreme example, its mix ratio would be 1.58 percent instead of -0.98 percent.

Let us consider the relative size of sectoral mix component of All OECD. The percentage of sectoral mix component to sectoral OECD employment in 1994, $E_i[E_i^*/E_i - E^*/E]/E_i \times 100$, may be termed as "OECD-wide revealed competitive advantage". This mix ratio indicates how fast a sector is growing or declining OECD-wide, with an average of zero. (However, it should be noted that a decline in employment may be caused by technological progress rather than

**【Table 1】 Change in Civilian Employment and Summary Result
of a Shiftand Share Analysis of Major OECD Economies**
(unit : %)

	Employment(thousands)		Total	Share ratio	Mix ratio	Macro ratio	Gross RCA
	1994	2003					
All OECD	461,541	501,327	8.6	8.6	0.0	0.0	0.0
United States	123,060	136,484	10.9	8.6	2.4	2.3	-0.1
Japan	64,520	63,160	-2.1	8.6	-0.3	-10.7	-10.4
EU	145,360	160,726	10.6	8.6	0.7	2.0	1.3
France	19,298	22,144	14.8	8.6	2.5	6.1	3.6
Germany	35,756	35,616	-0.4	8.6	-0.2	-9.0	-8.8
Italy	19,970	21,820	9.3	8.6	-1.1	0.6	1.7
Spain	12,170	16,608	36.5	8.6	-0.9	27.8	28.7
United Kingdom	25,598	28,624	11.8	8.6	2.4	3.2	0.8
Other Developed	28,752	33,446	16.3	8.6	2.1	7.7	5.6
Canada	13,120	15,754	20.1	8.6	2.5	11.5	9.0
Other Developing	99,850	107,512	7.7	8.6	-4.3	-0.9	3.4
Mexico	32,939	39,710	20.6	8.6	-3.8	11.9	15.7
Korea	19,847	22,139	11.6	8.6	-2.7	2.9	5.7
Poland	14,757	13,618	-7.7	8.6	-4.0	-16.3	-12.3
Turkey	21,581	21,149	-2.0	8.6	-7.8	-10.6	-2.8

- Notes : (1) Major OECD economies indicate those with more than 10,000 thousands of employment. The statistical discrepancy is from rounding.
- (2) Statistics by ISIC Revision 3 sectors are properly reclassified into statistics by ISIC Revision 2 major divisions for all OECD economies except United States and Japan whose statistics by ISIC Revision 2 major divisions only are available. Statistics on civilian employees are used for France. The proper statistics of 1994 and 2003 were available for the fifteen economies among thirty OECD economies. But some statistics were unavailable and, in this case, those of the nearest year were used. That is, the economies for which statistics of other year were used are as follows: United States (1994~2002), Mexico (1995~2003), New Zealand (1997~2003), Austria (1998~2003), Belgium (1994~1999), Denmark (1995~2003), Greece (1994~2002), Hungary (1998~2003), Iceland (1994~2002), Luxemburg (1995~2003), Netherlands (1996~2002), Norway (1996~2003), Poland (1999~2003), Sweden (1998~2003), Turkey (2000~2003).
- (3) Each of the figures is the percentage of sum of components over all activities to total civilian employment in 1994, that is, (sum of components over all activities) / (total civilian employment in 1994) × 100. Total = Share ratio + Mix ratio + Gross RCA, and Gross RCA = Macroeconomic ratio + RCA. RCA (revealed competitive advantage) = net competitive ratio.

Sources : Adapted from OECD (2004). Sources are the same for all other tables.

competitive disadvantage to non-OECD economies.) The sectors where All OECD gained its competitiveness and created jobs from most to least are as follows; (not shown in the tables) activities not adequately defined (21% in the mix ratio), financing, insurance, real estate and business services (18%), community, social and personal services (8%), transport, storage and communication (5%), construction (2%), whole and retail trade, restaurants and hotels (2%), all activities (0%), manufacturing (-15%), electricity, gas and water (-15%), agriculture, hunting, forestry and fishing (-21%), and mining and quarrying (-29%).

3) Macroeconomic Component

An economy may have a substantial difference in macroeconomic performance, $(E_R^*/E_R - E^*/E)$, over a long period of time, and higher (or lower) growth rate than OECD average may come from various reasons. The difference between an economy's growth rate and OECD's average brings in the macroeconomic component.

There may be various reasons for the difference in macroeconomic situations. First, some economies including Spain (27.8% in the macroeconomic ratio) as well as Mexico (11.9%) and Korea (2.9%) may be moving towards more advanced economies by adopting more advanced technology, as the international convergence hypothesis of economic growth suggests. Second, some economies including United States (2.3%), France (6.1%), Spain (27.8), United Kingdom (3.2%) and Canada (11.5%) may be growing faster than other advanced economies by successfully utilizing the trend to a post-industrial era, as the hypothesis of a new economy suggests. Third, some economies including Japan (-10.7%) and Germany (-9.0%) may be growing slower or even declining due to a long stagnation, because they have been less successful in catching on the changing trend.

4) Net Competitive Component

A sectoral net competitive component measures the difference between a sectoral net growth rate of an economy and that of total OECD, or it measures the difference between the gross competitive component and the macroeconomic component, $e_i[(e_i^*/e_i - E_R^*/E_R) - (E_i^*/E_i - E^*/E)]$ or $e_i[(e_i^*/e_i - E_i^*/E_i) - (E_R^*/E_R - E^*/E)]$.

It was noted in Section II that a rise (or fall) of LQ shows a revealed competitive advantage (or disadvantage) of a sector during a period, and that a positive (or negative) value of the net competitive ratio of a sector also shows an almost equivalent result to a rise (or fall) of LQ . The degree of "revealed competitive advantage" (RCA) may be measured more precisely by the ratio of sectoral net competitive component to sectoral employment of 1994.

Equation (2) shows that the grand sum of mix components over all activities and net competitive components over all activities is zero, and the RCA of "all activities" does not have much meaning. Instead, sectoral RCAs of each economy show its competitiveness.

In the Korean case, for example, the order of sectors where Korea has gained its revealed competitive advantage (RCA) and created jobs from most to least is as follows: (not shown in the tables) Financing, insurance, real estate and business services (34% in RCA), community, social and personal services (33%), transport, storage and communication (14%) and electricity, gas and water (9%) are far more competitive than all activities (2.7%), but whole and retail trade, restaurants and hotels (-2%), manufacturing (-8%), agriculture, hunting, forestry and fishing (-12%), construction (-13%) and mining and quarrying (-39%) are far less competitive than all activities.

Gross RCA of all activities simply reflects macroeconomic ratio unless the mix ratio is not far from zero. As shown at <Table 1>, the gross RCAs of Spain (29%) and Mexico (16%) are very high, and those of Canada (9%) and Korea (6%) are relatively high. And those

of France (4%), Italy (2%), United Kingdom (1%), United States (0%) and Turkey (-3%) are intermediate. But those of Germany (-9%), Japan (-11%) and Poland (-12%) are very low, losing competitiveness greatly.

IV. Analyses of Korean Sectoral Employment

1. Sectoral Performances of OECD Economy

This section combines the sectoral classifications suggested by Miles and Boden (2000, p. 6), Gallouj and Gallouj (2002, pp. 28~29), and Hauknes (2000, p. 45), and this section categorizes the eighteen activities by ISIC Revision 3 into seven sectors - primary, secondary, distribution, financial, business service, public and social service, consumer and personal service. This classification complies well with ISIC Revision 3 sectors.

In the early days there were many who argued that only the primary sector was the source of real wealth, and this view was held until the manufacturing industry had considerably developed. A similar statement holds for the service sector, since it has now become a dominant sector in most advanced economies.

As shown at <Table 1>, twenty-eight All OECD economies (excluding United States and Japan whose statistics by ISIC Revision 3 sectors are not available) has increased its employment by 27,722 thousands or 10.1 percent during the period of 1994~2003. The primary sector employment of All OECD has decreased by 4,004 thousands during the period, and it has lost its mix ratios in agriculture (-22%), fishing (-42%), and mining (-29%), as shown at <Table 2>. World economic environment has not been favorable to the primary sector employment of OECD economies.

The secondary sector employment has increased by 1,321 thousands,

**[Table 2] Sectoral Distribution of Mix Ratios of All OECD
(Excluding United States and Japan)**

Sector	Sectoral Mix Ratio (%)
Primary	Agriculture -22.1, Fishing -42.1, Mining -29.3
Secondary	Manufacturing -11.3, Electricity, Gas & Water -14.8, Construction 0.4
Tertiary Distribution	Trade and repair 0.5, transport and communication 0.9
Financial	Financial intermediation -6.7
Business service	Business activities 41.4
Public & social service	Public administration 0.3, education 7.0, Health and social work 8.8
Consumer & personal service	Hotels and restaurants 15.7, Other CSP services 15.4, Private households 27.8, Extra-territorial 12.3, Not classifiable -15.8

Note: For All OECD, sectoral increase rate of employment = share ratio (10.1%) + sectoral mix ratio.

but it has lost its mix ratios in manufacturing (-11%), electricity, gas and water (-15%) and maintained its ratio in construction (0%).

The tertiary sector employment has increased by 30,406 thousands in total during the period. The distribution sector employment has increased by 6,551 thousands, and it has gained its mix ratio in trade and repair (1%) and in transport and communication (1%). The financial sector employment has increased by 281 thousands but it has lost its ratio (-7%). And the business service sector employment has increased by as many as 8,390 thousands and it has gained its mix ratio by as much as 41 percent. The public and social service sector employment has also increased by 8,312 thousands, and it has maintained its mix ratio in public administration and gained its ratios in education (7%) and health and social work (9%). Finally the consumer and personal service sector (including the last two activities)

employment has increased by 6,872 thousands, and it has gained the mix ratios in hotels and restaurants (16%), other CSP services (15%) and private households (28%).

2. Analyses of Korean Employment by Sectors

1) Primary Sector

The Korean economy has increased its employment by 2,292 thousands or 11.5 percent during the period of 1994~2003. As <Table 3> and <Table 4> show, the primary sector employment has decreased by 564 thousands and its *LQ* has dropped from 113 to 99 during the period, and it has lost its revealed competitive advantage (RCA) in agriculture (-11%), fishing (-3%), and mining (-39%).

The Korean economy has already moved to the point where the primary sector employment and output constituted a declining share of the economy over time, and so did the secondary sector employment and output like most of the advanced economies.

2) Secondary Sector

The secondary sector employment has decreased by 538 thousands and its *LQ* has dropped from 117 to 105 during the period, and it has lost RCA in manufacturing (-12%) and construction (-11%) but gained in electricity, gas and water (9%). The Korean economy is losing its secondary sector employment and (to a lesser extent) output during the period, and becoming a "service economy" in the sense that growth of the secondary sector has flattened out, while the service sector is continuing to grow rapidly, with the service employment surpassing the manufacturing sector employment.

3) Tertiary Sector

The tertiary sector has become a dominant sector in the Korean economy as well as most advanced economies, as anticipated by

【Table 3】 Results of Analyses of Korean Employment by Sectors

(unit : 1,000)

	<i>LQ</i>		Total	Share	Mix	Gross competitive	
	1994	2003				Macro	Net
Agriculture	115	102	-505	241	-527	34	-253
Fishing	197	190	-37	11	-46	2	-3
Mining	32	17	-22	4	-11	1	-15
Manufacturing	118	104	-553	481	-539	68	-563
Electricity, gas&water	41	45	4	7	-11	1	6
Construction	124	112	11	183	7	26	-205
Trade and repair	116	106	116	380	19	54	-336
Hotels and restaurants	183	189	480	152	235	21	72
Transport and com	86	100	315	103	9	15	188
Financial intermediation	116	120	58	70	-46	10	24
Business activities	70	95	905	83	340	12	470
Public administration	53	56	119	65	2	9	44
Education	78	102	527	97	67	14	350
Health and social work	21	32	246	30	26	4	186
Other CSP services	105	146	613	82	124	12	396
Private households	78	60	13	18	50	3	-57
Extra-territorial	75	66	2	2	2	0	-3
Not classifiable	0	0	0	0	0	0	0

Notes : Civilian employment : breakdown by activities – ISIC Revision 3 sectors

Agriculture = Agriculture, hunting and forestry

Mining = Mining and quarrying

Electricity, gas & water = Electricity, gas and water supply

Trade and repair = Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods

Transport and com = Transport, storage and communication

Business activities = Real estate, renting and business activities

Public administration = Public administration and defence; compulsory social security, excluding armed forces

Other CSP services = Other community, social and personal service activities

Private households = Private households with employed persons

Extra-territorial = Extra-territorial organisations and bodies

Not classifiable = Not classifiable by economic activities

Machlup (1962) in early 1960s. Korea has become a “post-industrial” society in 1993, as Bell (1999) suggested, when the share of service sector employment, 51.7 percent, became over 50 percent and is still increasing thereafter. Similarly a study by the author (May, 2003) shows that, as Porat (1977) suggested, Korea has become an “industrial economy” in 1984 and an “information economy” in 1997 (Unites States in 1906 and in 1954 respectively), when industrial occupations began to exceed those of agriculture and information occupations began to exceed industrial occupations respectively.

(1) Distribution Sector

The tertiary sectors in total have increased its employment by 3,394 thousands and its *LQ* has risen from 89 to 98 during the period. Among them, the distribution sector employment has increased by 431 thousands but its *LQ* has dropped from 108 to 105. The sector has lost RCA in trade and repair (-9%) but gained in transport and communication (19%).

The economic organization of trade and distribution sectors reflects development in the underlying manufacturing production as well as functional divisions of trade, distribution and transport.

(2) Financial Sector

The financial sector employment has increased by 58 thousands and its *LQ* has risen from 116 to 120, and it has gained its RCA (4%). The financial services are less an integral part of the “goods-producing system” than the distribution services, and more closely linked to the monetary system.

(3) Business Service Sector

The business service sector employment has increased by 905 thousands and its *LQ* has risen 70 to 95, and it has gained RCA by

as much as 57 percent. The business service sector is a heterogeneous category, a “residual of the residual”, including technical consultancy and engineering design, R&D services, a wide range of ITC and software development services, as well as market-related and administrative services. This sector is mainly characterized to depend on specialized supplies and science-based firms. This service sector has attracted much attention in advanced economies over the last several years.

(4) Public and Social Service Sector

The public and social service sector employment has increased by 892 thousands and its *LQ* has risen from 49 to 62, and it has gained its RCA in public administration (7%), education (37%), and health and social work (64%). Recently, externalization and privatization of public services is in progress in many advanced countries, paralleled by outsourcing of many business services by private firms.

(5) Consumer and Personal Service Sector

Consumer and personal services include a variety of services for primary objects of consumption such as restaurants and hotels, package/guided tours, public transport services, communication, domestic services, personal care, and public entertainment. The consumer and personal service sector (including the last two activities) employment has increased by 1,108 thousands and its *LQ* has risen from 133 to 149, and it has gained RCA in hotels and restaurants (5%) and in other community, social and personal services (49%), but lost in private households (-32%).

**[Table 4] Sectoral Changes of LQs and RCAs
of Korean Employment**

Sector	Sectoral LQs and RCAs (%)
Primary (113 → 99)	Agriculture (115 → 102) -10.6, Fishing (197 → 190) -3.1, Mining (32 → 17) -38.6
Secondary (117 → 105)	Manufacturing (118 → 104) -11.8, Electricity, gas & water (41 → 45) 8.8, Construction (124 → 112) -11.3
Tertiary (89 → 98)	
Distribution (108 → 105)	Trade and repair (116 → 106) -9.0, Transport and communication(86 → 100) 18.5
Financial (116 → 120)	Financial intermediation (116 → 120) 3.5
Business service(70 → 95)	Business activities (70 → 95) 57.3
Public & social service (49 → 62)	Public administration (53 → 56) 6.8, Education (78 → 102) 36.5, Health and social work (21 → 32) 63.6
Consumer & personal service (133 → 149)	Hotels and restaurants (183 → 189) 4.8, Other CSP services (105 → 146) 49.1, Private households (78 → 60) -32.1, Extra-territorial (75 → 66) -13.9

Note: (1) The arrow (→) in parenthesis indicates the change in *LQ* from 1994 to 2003.

- (2) As an example of the shift and share analysis, the business activities sector increased its employment by 905 thousands or 110.2%. The analysis divides the change into four components, as given by Equation (2) or (2)', as follows: $905 = 83 + 340 + 12 + 470$ or $110.2\% = 10.1\% + 41.4\% + 1.4\% + 57.3\%$.

V. Conclusion

This paper has presented a new model of a shift and share analysis with four components, which has more consistency with a location quotient analysis, and which enables a more proper discussion of a revealed competitive advantage. Applying this model to the employment by ISIC Revision 2 major divisions during the period of

1994~2003, this research has analyzed sixteen major OECD economies including Korea; while applying the model to the employment by ISIC Revision 3 sectors, it has analyzed two OECD economies of All OECD and Korea.

Some interesting findings from the first analysis (by major divisions) are as follows: First, as <Table 1> shows, the mix ratio shows that the sectoral structure of United States (2.4%) is most advanced, followed by Other Developed (2.1%), and that EU (0.7%) and Japan (-0.3%) are intermediate, while Other Developing (-4.3%) is less advanced, in which Korea (-2.7) is most advanced.

Secondly, this research has confirmed that OECD economies in general experienced a rapid expansion of the service sector employment but a rapid contraction of the goods-producing sector employment.

Third, this research has shown that the Korean economy experienced a more striking expansion of all the service sector employment (but a more rapid contraction of all the goods-producing sector employment) than average OECD economies.

The second analysis of All OECD and Korean economy by sectors shows similar results in a little more detail. That is, All OECD economy has experienced a rapid expansion of the service sector employment, while the Korean economy has far more rapid expansion of all the service sector employment than average OECD economies, which is summarized at <Table 4>.

The service sector of the Korean economy has grown with very striking speed and become the main sector. Is this a matter to worry or joy? The answer depends on one's view on services whether it is from industrialism/re-industrialism or from post-industrialism. As Miles and Boden (2000) argue, neither of these two classic views of services adequately grasp the role and significance of service activities, and services are increasingly bound up with the activities of all sectors of an economy, which is partly discussed in Section IV.

Davenport and Prusak (2000, pp. 13~14) make a similar argument as follows. "Increasingly, knowledge and related intangibles not only make businesses go but are part or all of the 'products' firms offer. Old distinctions between manufactured objects, services, and ideas are breaking down. Not surprisingly, distinctions between manufacturing and services firms are disappearing too. ... [One] saw that it was no longer meaningful or even possible to decide which firms fit which category."

The Korean economy has joined an industrial economy, which has mainly been based on skilled laborers and mechanical technology, far behind major OECD economies and has been dragged by them. Now, Korea has a chance to join and lead a knowledge-based economy, which is mainly based on educated workers and information & communication technology (See Foray, 2004, p. 247.) on both of which Korea may have its competitiveness. In a knowledge-based economy, the service sector needs to be a strategic sector which itself grows rapidly and enables other sectors to create more values. That is, as Quinn (1999, p. 124) says, "Manufacturing has continued with about the same percentage of employment but produces much better product, and more of it, because of efficiency increases introduced through service activities." A further and more extensive studies on the service sectors will be necessary for the Korean economy, but development of knowledge-based service sectors seems to be a key to open a new kind of industrial economy where service and other sectors are more closely interconnected, in order to expand proper jobs for the young and educated who have a high unemployment rate, and in order to raise the income level of Korean people.

◆ *References* ◆

- Bae, Hongshik (2003), "The Coming of Post-Industrial Era and Its Progress of Korean Society," (Written in Korean) *Journal of Area Studies & Development*, Institute for Area Studies & Development, Yonsei University, vol. 12, pp. 72~94.
- _____ (2003), "A Shift-Share Analysis of Sectoral Employment of Some OECD Economies," Paper presented to *The 4th Inha-Le Havre International Conference on Regional Cooperation and Economic Integration: European and East Asian Experiences*, Oct. 9, pp. 425~434.
- _____ (2004), "An Analysis of Sectoral Employment of OECD Economies," Paper presented to *The Korean Labor Economic Association*, Feb. 13.
- Bell, Daniel (1999), *The Coming of Post-Industrial Society: A Venture in Social Forecast*, 3rd ed, New York: Basic Book.
- Blair, John P. (1996), *Local Economic Development*, Thousand Oaks and London: Sage.
- Boden, Mark and Ian Miles ed. (2000), *Services and Knowledge-Based Economy*, London and New York: Continuum.
- Cortada, James W. ed. (1998), *Rise of the Knowledge Worker*, Boston: Butterworth-Heinemann.
- Davenport, Thomas H. and Laurence Prusak (2000), *Working Knowledge*, Boston, Mass.: Harvard Business School Press.
- Foray, Dominique (2004), *The Economics of Knowledge*, Cambridge, Mass.: MIT Press.
- Gallouj, Camal and Faiz Gallouj (2000), "Neo-Schumpeterian Perspectives on Innovation in Services," Mark Boden and Ian Miles ed. (2000), pp. 21~37.
- Hauknes, Johan (2000), "Dynamic Innovation Systems: What is the Role of Services?" Mark Boden and Ian Miles ed. (2000), pp. 38~63.

- Machlup, Fritz (1962), *The Production and Distribution of Knowledge in the United States*, Princeton University Press; Reprinted as "Knowledge Production and Occupational Structure," in James W. Cortada ed. (1998), pp. 69~90.
- Miles, Ian and Mark Boden (2000), "Introduction: Are Services Special?" Mark Boden and Ian Miles ed. (2000), pp. 1~20.
- OECD (2004), *Labour Force Statistics 1983~2003*, Paris.
- Porat, Marc Uri (1977), *The Information Economy: Definition and Measurement*, OT Special Publication 77-12(1), US Department of Commerce; Reprinted as "The Information Economy: Definition and Measurement," in James W. Cortada ed. (1998), pp. 101~131.
- Quinn, James Brian (1999), "Maximizing Innovation Using Intellect, Science and Technology," in Rudy Ruggles and Dan Holtshouse ed., *The Knowledge Advantage*, Oxford: Capstone, pp. 123~140.