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Discussion Paper No. 633

“Comparative Advantage Structure of
U.S. International Services”

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June 2007



KYOTO UNIVERSITY
KYOTO, JAPAN

Comparative Advantage Structure of U.S. International Services*

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Abstract

This paper is an investigation of the comparative advantage structure of United States (U.S.) international trade in services. It appears conclusively that the U.S. has a strong comparative advantage in knowledge-based services. For this study, the author adopts the Revealed Comparative Advantage (RCA) index to analyze the structure, and demonstrates that the variances in the RCA deviations indicate a similarity in the export structure between the U.S. and the world. The focus of this study is also on the role of the multinational companies. This view links microeconomic entities and the macroeconomic surroundings.

Keywords: Trade in Services, Intellectual Property Rights, Comparative Advantage, Competitive Advantage, Revealed Comparative Advantage (RCA), Multinational Companies, Offshoring

JEL Classification Numbers: C02, F01, F23

* I would like to thank Akihisa SHIBATA and Satoru NAKAMOTO for their advice on theoretical and empirical research. Thanks are also due to Masahiko ITAKI for his useful suggestions.

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1. Introduction

This study is an investigation of the comparative advantage structure of United States (U.S.) international trade in services. International services began to increase in the mid-1980s and continued to grow rapidly. Trade growth in services is widely recognized as one of the most important trends in the international economy. The U.S. is the leading country worldwide for trade in services, and the U.S., as found in this study, has a strong comparative advantage in knowledge-based services. This study also presents an improved version of the method for RCA analyses. This study also contains a viewpoint of multinational companies in following discussions, and the viewpoint leads into the relationships between the microeconomic entities and the macroeconomic surroundings.

The Revealed Comparative Advantage (RCA) index was used for the analysis of the comparative advantage structure. The original RCA index was developed for measuring the degree of a country's specialization in individual industries through data on international trade in goods. Liesner (1958), who conducted the original analysis of the RCA, examined the extent of specialization in the European Economic Community. After the index was refined and popularized, it became known as the Balassa index.¹

Porter used a similar index, which he called a "Cluster Chart," in his well-known work, *The Competitive Advantage of Nations*.² He employed it for indicating the competitiveness of industries worldwide. Because competitiveness contains various concepts such as establishing a global standard, developing new technology, products, or a comprehensive business environment, it is ambiguous, and a narrower interpretation is needed. In this context, the terminology applies to the degree of export competitiveness within a sector. In this study, the competitiveness of a sector is interpreted as the degree of comparative advantage within a sector, and the RCA is also used as the index of competitiveness. Recently, the RCA index has been used for examining patterns of international trade (e.g., Proudman and Redding (2000), Hinloopen and Marrewijk (2001)).

Most of the analyses using the RCA in examinations of international trade have focused on goods. The focus in this study, however, is on trade in services. A fundamental element of the RCA is the law of comparative advantage, which assumes

¹ Balassa (1965).

² Porter (1990).

trade in goods. Some existing studies, however, have indicated that the law of comparative advantage is applicable to international trade in services as well as in goods. Both Hindley and Smith (1984) and Deardorff (1985) examined the applicability of the law of comparative advantage to trade in services, and they confirmed the applicability of the theory in each examination. Sazanami and Urata (1990), pioneers in the study of trade in services, used an econometric method to show the significance of comparative advantage of trade in services. Their work also supported the applicability of the theory.

Igawa (1997) examines the trade of the world's leading industrialized nations by the RCA, which is calculated based on the *Balance of Payments Statistics 1995*. While the sample size for the analysis is not sufficiently large to obtain convincing results, the paper indicates that the RCA on trade in services can be calculated. Recently, Langhammer (2004) examines the trade in services of the U.S., the European Union (E.U.), and Japan. Whereas the study also applies the RCA index to trade in services, it adopts a different definitional equation of the RCA from that used in this paper. The definitional equation used in that paper is not an ordinary one. Langhammer (2004), however, points out a suggestive fact: service provisions are currently closely related to a commercial presence. That type of international service provisions would be important as well as cross-border exports. Some of these studies suggest that the law of comparative advantage and the index of RCA can be applied to trade in services.

The remainder of this paper is organized as follows. Section 2 is a brief presentation of the outlook of the world trade in services. In addition, the section lists other viewpoints for following examinations. In Section 3, an analytical framework on comparative advantage structure and the dataset is established. An improvement of analytical framework on the RCA yields the new findings reported here. Section 4 provides the RCA distribution on the U.S. and examines the related analytical outcomes in detail. Section 5 concludes with a list of the findings and their analytical consequences.

2. Growth of Trade in Services

This section contains the outlook and features of international trade in services. Trade in services is currently a popular topic of studies on international trade and the world economy. The negotiations of trade liberalization of services started during the General

Agreement on Tariffs and Trade (GATT) conferences in Uruguay (1986-1994), and they have continued under the auspices of the World Trade Organization (WTO). The discussions dealt primarily with the so-called New Trade in Services, such as telecommunications, financial services,³ and professional services including computing, accounting, and legal services. The growth of trade in services has also been promoted by international policymaking.

The contents of trade in services are generally compliant with the definition of *Balance of Payments Manual*⁴ published by the International Monetary Fund (IMF). According to the definition, trade in services may be classified into 11 categories: 1) Transportation; 2) Travel; 3) Communication Services; 4) Construction Services; 5) Insurance Services; 6) Financial Services; 7) Computer and Information Services; 8) Royalties and License Fees; 9) Other Business Services; 10) Personal, Cultural and Recreational Services; and 11) Government Services n.i.e.⁵ Since all countries report their statistics on the balance of payments, the information is useful for international comparison. Newer categories such as Communication Services, Computer and Information Services, and Royalties and License Fees, have rapidly increased in the last decade.

The volume of international services has increased greatly since the mid-1980s. Global exports of trade in services amounted to \$364.3 billion in 1980 and grew to \$1,858.8 billion in 2003.⁶ The volume ratio between goods and services shrank from 5.5 to 4.0 times in this period. In 2003 the countries with the five largest surpluses in trade in services were the U.S., the United Kingdom (U.K.), France, Greece, and Turkey, and the five largest deficit countries were Germany, Japan, Ireland, Russia, and Mainland China (**Table 1**).

Comparing the countries with surpluses to those with the deficits, it is found an interesting fact from the viewpoint of the balance of payments. While countries that reported a surplus in services, such as the U.S. and the U.K., have a deficit in goods, countries that reported a deficit in services such as Japan and Germany, have a surplus in goods. In other words, there is a contrast in the trade balance between goods and services. This observation suggests that it is worthwhile to reconsider the theory of

³ Harms, *et al* (2003) discusses the determinants of international trade policies in international financial services relevant to the GATS by developing a political economy model.

⁴ IMF (1994); *cf.* United Nations, *et al.* (2002).

⁵ Notes: "n.i.e." stands for "not included elsewhere."

⁶ IMF, *Balance of Payments Statistics 2005*, CD-ROM, IMF Publication Services.

development of balance of payments,⁷ since it shows no perspective on the trade in services.

The comparative advantage structure of U.S. trade in services is valuable from the viewpoint of its surplus and the contrast between goods and services. The U.S. had a surplus in services of \$80,420 million and a deficit in goods of \$544,300 million in 2003.⁸ The greatest surplus was in the category of Royalties and License Fees, which amounted to \$28,180 million. The amounts attributed to other categories are as follows: Travel, \$24,460 million; Other Business Services, \$19,890 million; and Financial Services, \$13,400 million (**Table 2**). Transportation is the only category that had a deficit (\$18,200 million). In the following analysis, the strengths and weaknesses of U.S. trade in services are investigated.

3. Analytical Framework

Framework

In this section, an analytical framework is set up in order to investigate the distributions of comparative advantage in each country and to explain the computation process. One means of measuring comparative advantage is the RCA index. The index is defined as:

$$RCA_{ij} := \frac{X_{ij} / \sum_j X_{ij}}{\sum_i X_{ij} / \sum_i \sum_j X_{ij}}, \quad (1)$$

where X_{ij} represents the export value of sector j in country i . This formula represents the ratio of domestic specialization (numerator) against that of world specialization (denominator) and indicates the degree of specialization. When one sector has $RCA > 1$, it has a comparative advantage. When it has $RCA < 1$, on the other hand, it has a comparative disadvantage. If the RCA is equal to one, the ratio of the sector in the country is equal to that of the sector in the world.

Hinloopen and Marrewijk (2001) classify the RCA into four states in response to

⁷ Crowther (1957); Kindleberger (1963); Onitsuka (1974).

⁸ IMF, *Balance of Payments Statistics 2005*, CD-ROM, IMF Publication Services.

the strength of comparative advantage.⁹ They demonstrate the following classification:

- Class *a*: $0 < RCA \leq 1$; without a comparative advantage;
- Class *b*: $1 < RCA \leq 2$; with a weak comparative advantage;
- Class *c*: $2 < RCA \leq 4$; with a medium comparative advantage;
- Class *d*: $4 < RCA$; with a strong comparative advantage;

For the following sections, the Hinloopen-Marrewijk classification is used to explain the state of the comparative advantage.

The RCA has a theoretical foundation. We assume that international services are produced by a production function, which requires capital and labor as factors of production. The production structure of services is the same as that of the standard Heckscher-Ohlin (HO) model, and, hence, the RCA corresponds to the HO model one-to-one. The law of comparative advantage, in other words, holds in the service sectors.

It is noteworthy that the determinants of the RCA are not only domestic exports but also world exports. If a country satisfies the small country assumption, the country's exports would not affect world exports. On the other hand, if the country satisfies the large country assumption, the country's exports would affect world exports. The RCA reflects both the competitiveness in the domestic sector and the world supply capacity.

The Deviations of RCA (DOR) is defined as follows:

$$DOR_{ij} := RCA_{ij} - 1. \quad (2)$$

This deviation informs us a positive/negative comparative advantage revealed. The $DOR = 0$ corresponds to the $RCA = 1$. If the DOR has a positive/negative sign, the sector is in a comparative/non-comparative advantage. The measurements of the DOR show the strengths of the RCA. The DOR is additionally useful for visualizing the distributions of the RCA.

The variances of the DOR in several countries indicate the similarity between the

⁹ In their paper, the RCA labels are referred to as Balassa Index. Although different names are used in the two papers, the definitional equation is the same. Therefore, we can apply the classification to this paper.

structures of domestic export and the that of world exports. We can define the variance of the DOR in each country as follows:

$$Var(DOR_i) := \frac{1}{n-1} \sum_{j=1}^n \left(DOR_{ij} - \overline{DOR_i} \right)^2, \quad (3)$$

where $\overline{DOR_i}$ is an average of the DOR in country i . The state in which the variance indicates zero means that all DORs are the same number. The property of the DOR tells that the state is uniquely all zero of the DOR. If the variance of the DOR equals zero, Equation (3) is transformed as follows:

$$\begin{aligned} 0 &= \sum_{j=1}^n DOR_{ij}^2 - n \left(\overline{DOR_i} \right)^2 \\ &\Leftrightarrow \sum_{j=1}^n DOR_{ij}^2 = n \left(\overline{DOR_i} \right)^2 \\ &\Leftrightarrow \sum_{j=1}^n DOR_{ij}^2 = \frac{1}{n} \left(\sum_{j=1}^n DOR_{ij} \right)^2, \end{aligned} \quad (4)$$

where n is a positive integer. No deviations have the same positive or negative deviation, for positive deviations implicitly assume any negative deviations. Equation (1) provides the evidence. Equation (4), thereby, consists of $DOR_{ij} = 0$ for all j . There is the following relationship between the DOR and the RCA:

$$DOR_{ij} = 0 \Leftrightarrow RCA_{ij} = 1. \quad (5)$$

(for all j)

According to Equation (1), $RCA = 1$ means that the ratio of a sector in a country is equal to that of that sector in the world. If the variance of deviations were equal to zero in a country, the domestic export structure would be similar to the world export structure.¹⁰ Variance of the DOR in country i , consequently, indicates similarity between the domestic and world export structure, and we can then define the Exports

¹⁰ The deviation convergence to zero in the long-term indicates whether specialization or imperfect specialization contributes to the growth of exports in a country. The question remains unanswered. Based on empirical analyses, we introduce some speculations about the question in Section 4.

Structure Similarity (ESS) index using the following equation:

$$ESS_i := 1 - Var(DOR_i). \quad (6)$$

As Equation (3) shows that $0 \leq Var(DOR_i)$, we can find $ESS_i \leq 1$. If the ESS in country i gets close to 1, the export structure of country i is more similar to that of the world. We will continue examinations the U.S. trade in services by using a series of analytical methods in the remainder sections.

Dataset

A set of RCA data is calculated by the *Balance of Payments Statistics*,¹¹ which is mentioned in the preceding section. Two categories, i.e., Government Services n.i.e. and Insurance Services, are excluded for the following reasons: 1) while the focus of this study is on the transactions of international private services, the category of Government Services n.i.e. includes transactions related to the military, ambassadorships, or the like; and 2) the category of Insurance Services includes expenditures for commissions, premiums, and losses. The latter suggests that the export value may be a negative number, and the category suggests a capital flow rather than a service transaction. Including both categories in the computations may result in inaccurate calculations.

The analysis focuses on 35 countries that have richer data than other countries. Although, in general, it is difficult to obtain data on trade in services, the 35 countries analyzed accounted for 83.5%¹² over the total of world exports in 2003. Thus, it is reasonable to presume that the countries in the analysis represent global trends in service exports. The observation period is set from 1989 to 2003 due to data constraints. Because the focus of the present study is on the increase after the meetings in Uruguay, this period setting would be natural.

The following points are considered for the computation of the RCA. First, the dataset substitutes 0 for any unavailable or deficit data. Since the RCA indicates the relative number in objective groups, it is allowable to set it at zero. Second, the calculation includes the category of goods as a benchmark in order to contrast the balance in goods with that in services. The details of the material dataset for the RCA

¹¹ See Table 3.

¹² Calculated by the author from IMF, *Balance of Payments Statistics 2005*, CD-ROM.

calculation are shown in **Table 3**. There are 15 (years) $\times$ 35 (countries) $\times$ 10 (items) = 5,250 non-negative observations.

In the following analysis, the focus is on the changes of the RCA in the U.S., which has the highest trade surplus in services and is a representative country with a trade surplus in services and a trade deficit in goods.

4. Distribution of the RCA

The comparative advantage structure of U.S. international services is characterized by steady transitions at higher and average levels and rapid declines in a few sectors. The category of Royalties and License Fees provides an example of a steady transition, while the category of Computer and Information Services provides one of a rapid decline. **Figure 1** shows the RCA changes during the observation period (1989-2003).

The category of Royalties and License Fees has the highest comparative advantage, more than 3.0 annually, in the period. According to the classification of Hinlopen-Marrewijk, it is in class c (medium comparative advantage). The category has recently come to the fore as the transactions related to Intellectual Property Rights (IPRs). Because the U.S. has accounted for a major part of the world exports in this sector for decades, the RCA may reflect the domination of the global markets in services¹³ by the U.S.

Multinational Companies (MNCs) drive the higher-level RCA transition in the category of Royalties and License Fees. Other statistics relating to MNC transactions suggested a strong linkage between IPRs and MNCs.¹⁴ According to the *Survey of Current Business*, affiliated transactions occupy, by and large, 70% of exports of the Royalties and License Fees¹⁵ during the observation. The intra-firm exports that is the U.S. parent company to foreign affiliates, in particular, makes up the subtotal of the affiliated transactions. In imports of the category, the intra-firm trade that is the foreign parent company to U.S. affiliates occupies majority as well as the exports. In

¹³ Hisanaga (2006) provides in-depth examination of worldwide transactions involving IPRs and the role of multinational companies.

¹⁴ Nunnenkamp and Spatz (2004) examined the relationship between IPRs and Foreign Direct Investment in detail. Since international transactions of IPRs are majored by MNCs, we can confirm importance of their view. One of the characteristics in international IPRs transactions is increase of international licensing. On the relationship, Yang and Maskus (2001) investigated econometrically.

¹⁵ U.S.D.O.C., various issues; *Balance of Payments Statistics* and those from the *Survey of Current Business* use the same label. While attention must give to differences in the statistics, both sources revealed similar values during the observation period.

both exports and imports of the Royalties and License Fees, MNCs play an important role. The higher-level RCA transition in the category, therefore, explains the competitive advantage of U.S. MNCs as microeconomic entities rather than the comparative advantage in the U.S. as macroeconomic surroundings.

The category of Computer and Information Services has gradually lost its comparative advantage, although the U.S. has a higher value in the category of Royalties and License Fees. The rapid decline of the RCA in the category may be attributed to the expansion of Offshore Outsourcing (Offshoring). Offshoring is defined by the U.S. Department of Commerce as "the relocation of the production of services from the United States to foreign locations"¹⁶ in the *Survey of Current Business*. Domestic companies, in other words, outsource their service-related operations to foreign companies, including foreign affiliates of U.S. MNCs.

The United States seems to have had a great advantage in its IT sectors at the beginning of the 1990s, whereas, in a few of the more recent years, the advantage has decreased. The RCA of the category of Computer and Information Services has decreased from 3.96 to 0.75 from 1989 through 2003. Most offshoring seems to be associated with IT-related services. Information technologies have rapidly spread globally as computer- and information-related services have come to be produced worldwide. Labor-intensive production processes, as a rule, are being moved to developing countries with lower wages. Labor-intensive IT work, in these instances, is assumed to move from the U.S. to the developing countries. The increased offshoring suggests that there is an increase in world exports via the increase of U.S. imports in a relevant category. According to Equation (1), when the domestic ratio (numerator) of one category is constant and the world ratio (denominator) of the category has a larger value, the RCA of the category will be smaller. The domestic ratio of the U.S. Computer and Information Services, in fact, indicates that there is a constant level of transition and that the world ratio is gradually increasing throughout the observation period.

The increase in offshoring suggests that there is a fallacy of composition that is often illustrated in Keynesian macroeconomics. In this context, an individual firm in one country strengthens the competitiveness by offshoring, whereas the country weakens the exports competitiveness from the viewpoint of the RCA. The increase of imports in one country affects the world exports through the intermediary of the

¹⁶ Borga and Mann (2004: 39).

increase of the exports in others. The increase of exports in others pushes up the value of denominator. If the numerator is a constant and the denominator increases in Equation (1), the RCA decreases. Cost reduction by offshoring validates the microeconomic theory because the theory assumes that firms minimize their production costs. The consequence, in which microeconomic entities behave optimally to strengthen their competitive advantage, makes the comparative advantage as the macroeconomic surroundings to deteriorate.

Based on the assumption that labor-intensive work is transferred and knowledge capital-intensive work is retained, the U.S. would essentially retain its advantage. Operations that are offshored are generally labor-intensive. They are referred to as "back office" or "downstream" divisions. The others, referred to as "upstream," include research and development, planning, and designing. A series of the operations is generally considered to be knowledge-capital-intensive (or technology-intensive). Their operations are essentially designed to generate the competitiveness. The category of Computer and Information Services, therefore, would retain the competitive and comparative advantage in IT-related services.

The higher-transition of the category of Personal, Cultural and Recreational Services would be an endemic feature of the U.S. because the category includes the movie distribution rights.¹⁷ The fact that Hollywood, the movie-capital of the world, is located in the U.S. is enough evidence. Hollywood movies are distributed worldwide, and the popularity supports in part the higher RCA of the category.

We then observe the distribution of the RCA or the distribution of the comparative advantage. The DOR is defined as gaps between the benchmark ($RCA = 1$) and the RCA observed so that the RCA distributions may be more easily observed. Each DOR presents the degree of comparative advantage. If the DOR in one sector is a positive number, the sector has a comparative advantage. On the contrary, if the DOR in another sector is a negative number, the sector will not have a comparative advantage, or it will be in a comparative disadvantage.

The advantages and disadvantages are sorted in **Figure 2** by DOR in ascending order for 1989, 1994, 1999, and 2003. The distributions make several features quite clear. First, the distributions, except for a category, have become smooth year by year. For instance, while the distribution is biased toward the upper range at the beginning of the period, it is smoother at the end of the period. Secondly, the DOR tends to

¹⁷ IMF (1993).

converge on zero. This suggests that the U.S. export structure is becoming more similar to that of the worldwide export structure. This is reaffirmed in the analysis that follows (**Figure 3**). Thirdly, some sectors are increasing their comparative advantage. The sectors with a negative DOR have become more positive, or others with a positive DOR have increased their comparative advantage. These features are readily evident in **Figure 2**.

First, in 1989, the upper range, which includes classes *c* and *d* (medium and strong comparative advantage, respectively), contains 4 sectors (Personal, Cultural and Recreational Services; Computer and Information Services; Royalties and License Fees; and Communication Services), while, in 2003, the upper range, with the exception of class *d*, contains 3 sectors (Royalties and License Fees; Personal, Cultural and Recreational Services; and Financial Services). The number included in the upper range decreases from 4 to 3 during that period. Additionally, the upper range consisted of class *c* and *d* in 1989, but it only included class *c* in 2003.

Secondly, the DOR convergence means that sectors with a comparative advantage decrease their advantage and sectors without the advantage increase theirs. Although this fact suggests that the U.S. export structure moved toward the average worldwide structure, there is an exception, namely, the category of Royalties and License Fees. The sector has maintained a DOR in excess of 2.0 throughout the period, or the category has maintained a stable advantage.

Thirdly, a few sectors have increased their advantage. The category of Other Business Services moved from the class *a* (without a comparative advantage) to class *b* (with a weak comparative advantage) during 1989 and 2003. Observing the DOR in these periods, the value changes from -0.24 in 1989 to 0.06 in 2001. The value transits annually in the positive sign after 2003. The category includes professional services, such as consulting, marketing, and accounting. These services are included as a part of the so-called New Economy Services.¹⁸ Mann (2004) reports that New Economy Services are of increasing importance in international trade. These services play an important role in increasing the productivity and growth in worldwide economies.¹⁹ Raw export data from this period also supports its position. The category of Financial Services, including a part of the New Economy Services, also increases its comparative

¹⁸ Mann (2004: 265). The concept of New Economy Services in Mann (2004) is different from that of New Trade in Services as referred to in this paper. The latter is a facility for making New Trade in Services to correspond to Traditional Trade in Services, which is Travel and Transportation in the balance of payments. Although the coverage overlaps partially in both concepts, the former is more essential than the latter.

¹⁹ Mann (2004: 271-272).

advantage. The category moved from class *b* to *c* during the period and eventually ranked third among the U.S. export sectors in 2003.

The order fluctuation of the DOR, or the RCA, is not at all active in the period. While the extent of the comparative advantage in several sectors varies, the order is persistent throughout the period. The sectors that demonstrated a wide fluctuation are almost included in New Economy Services. Computer and Information Services, for instance, moved from the 2nd to the 9th; Financial Services moved the 6th to the 3rd; and Other Business Services moved the 9th to the 6th during 1989 and 2003. While the New Economy Services transit actively, the categories included in traditional trade in services transit persistently. Interpreting the RCA as one of the competitiveness indicators, we can conclude that the New Economy Services are exposed to severer international competition.

The final issue addressed in this section is the similarity of the export structure of the U.S. to the world. **Figure 3** contains the transition of the ESS index²⁰ defined in Section 3. The figure demonstrates a trend in which the U.S. exports structure has become similar to the worldwide structure. The trend is evident in the first half of the period. This trend reflects the convergence demonstrated in **Figure 2**. In the middle of the period, the ESS remains stable at a higher level. There are some amount of gap between each value and 1. The gap, which increases in proportion to the variance of the DOR, almost indicates a higher extent of the comparative advantage on Royalties and License Fees. If the comparative advantage structure increases divergence, the gap becomes larger. It is noteworthy, however, that the advantages are overvalued as compared to the disadvantages, for the range of the DOR. In the last of the period, the ESS moves slightly away from the average level. Since the extent of the comparative advantages and disadvantages increases in the positive or negative direction in 1999 and 2003 (**Figure 2**), the fluctuation of the ESS suggests that the distribution and diversification of the comparative advantage structure change in the period.

The convergence of the ESS to 1 would suggest the progress of the globalization. Assuming that data integrity on the RCA is ensured, the convergence, which means the increase of the similarity in the exports structure as mentioned above, suggests homogenizing process by exports structure. The homogenization is one of the features on the globalization. The ESS would be useful for monitoring the progress of the

²⁰ In this study, two sectors, Insurance Services and Government Services, n.i.e., are omitted, and Goods is treated collectively in the complication of the RCA. It may be sufficient for monitoring the general trends in the U.S. export structure, while the ESS in this study appears to be ambiguous.

globalization if the conditions are met.

Combining the **Figures 2 and 3** shows that the comparative advantage structure tends to specialize in the category of Royalties and License Fees. While the category retains the higher-level DOR, the others demonstrate a trend in which several DORs converge toward zero in the period. Since the category persists in a higher DOR and the others show widely fluctuating deviations, we can find a tendency, i.e., the U.S. seems to specialize in the former category.

5. Conclusion

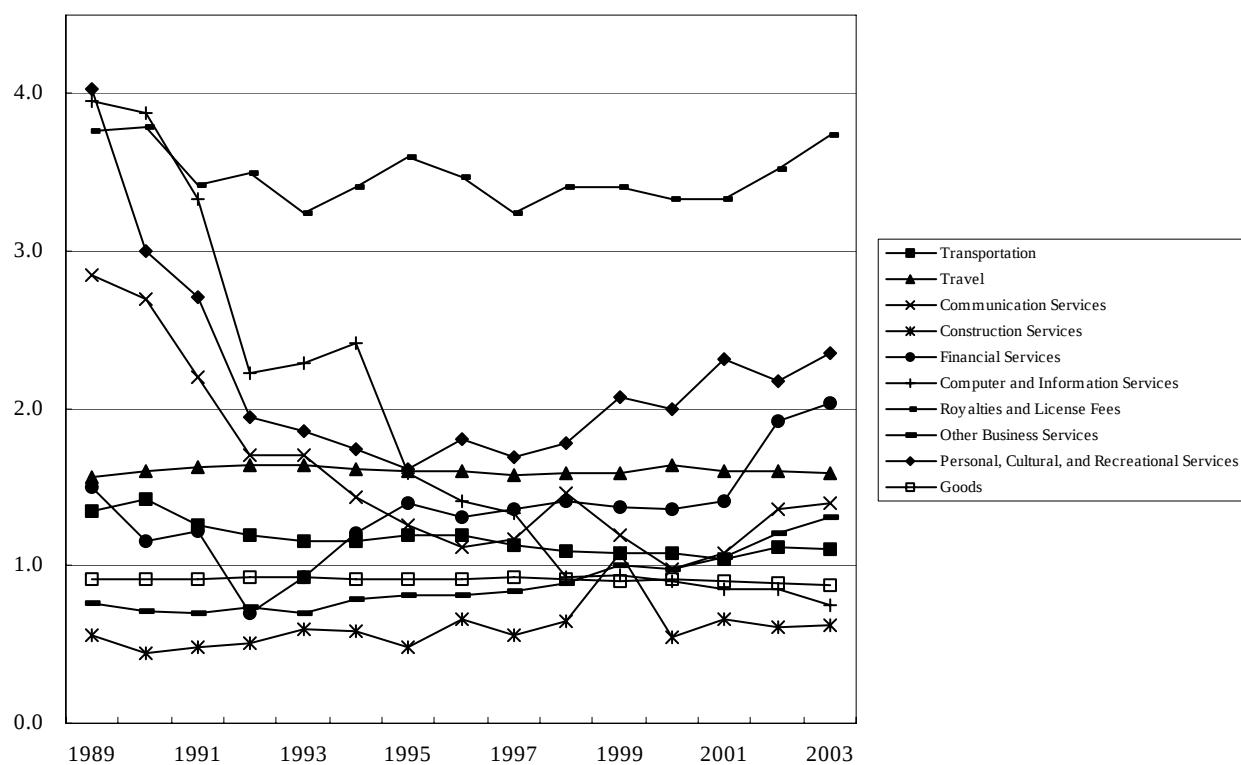
In this paper, the comparative advantage structure of U.S. trade in services by the RCA, which is one of the indices measuring the comparative advantage, is described. The index can be interpreted as an index of export competitiveness. The improvement obtained in the analytical framework is that the variance of the RCA deviations, which is defined as the DOR in Section 3, indicates the domestic extent of the similarity of the export structure with that of the world. No existing studies discuss this point.

The consequences in the series of analyses are explained in the following remarks. First, the United States has consistently had a comparative advantage in knowledge-based services, which are included Royalties and License Fees. Breaking down transactions of the category, it is found that the intra-firm trade of the MNCs wholly occupies the transactions. The comparative advantage in the category is supported by the competitive advantage of MNCs in the U.S. The linkage between the macroeconomic surrounding and the microeconomic entities is evident. Second, the services included in New Economy Services or New Trade in Services face severe international competitions, for the fluctuation of the degree and order of the RCA indicates the extent of the competitions in interpreting the RCA as one of the indices on the competitiveness. The category of Royalties and License Fees, on the contrary, consistently maintains a higher comparative advantage. The consequences that might provide sufficient evidence to supports the case, therefore, suggest that the U.S. tends to specialize in knowledge-based services, such as Royalties and License Fees, which are the source of the international competitiveness.

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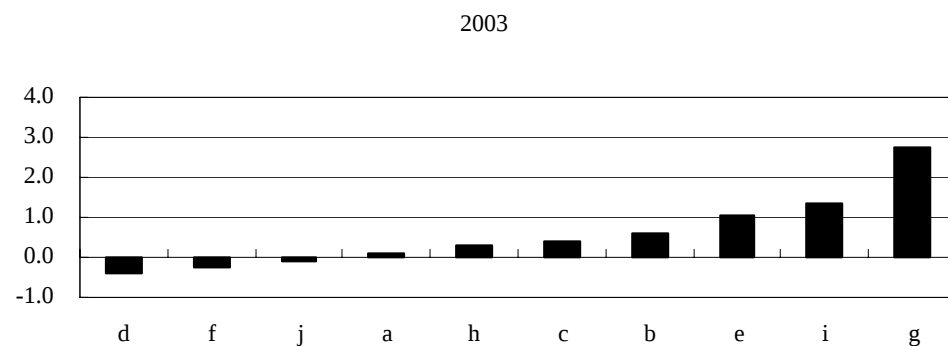
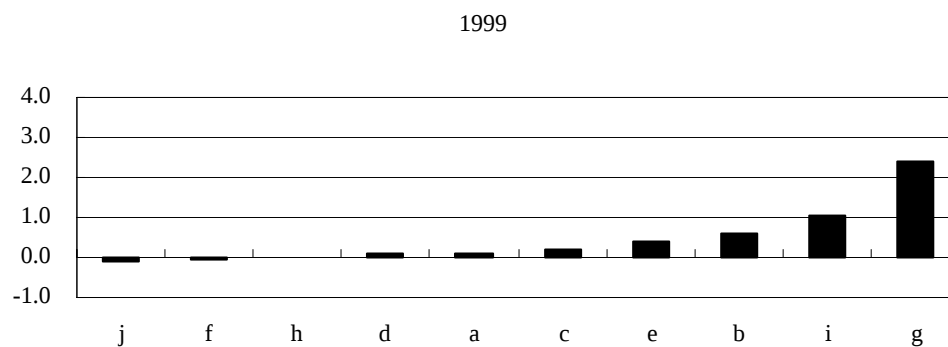
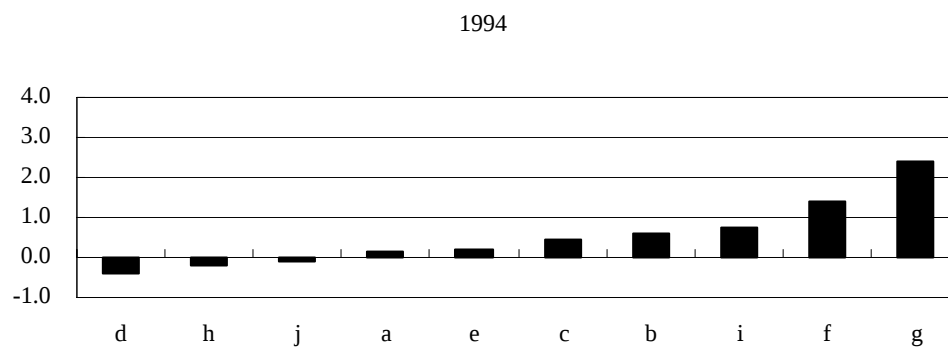
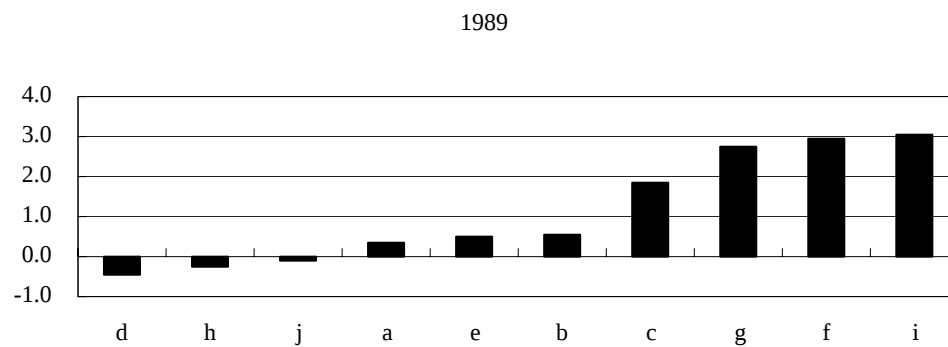
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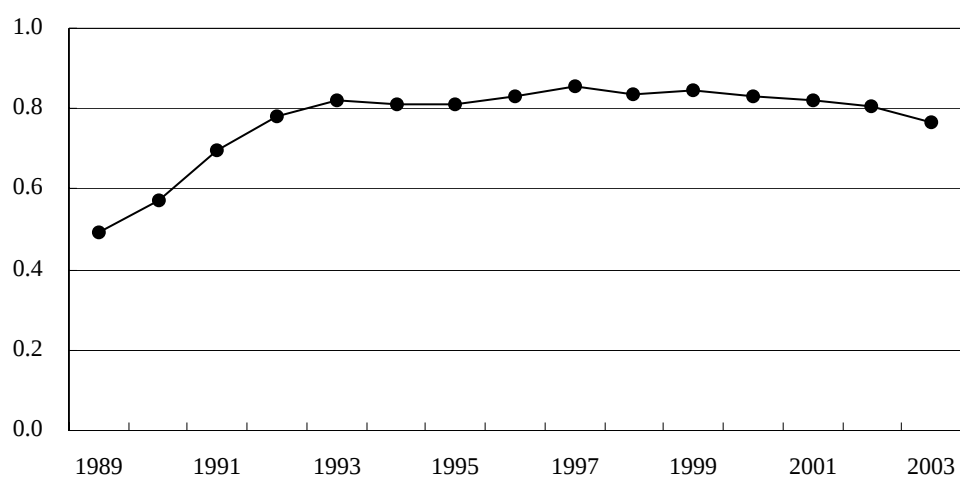
Figure 1: The RCA Changes in the United States



a) Transportation; b) Travel; c) Communication Services; d) Construction Services; e) Financial Services; f) Computer and Information Services; g) Royalties and License Fees; h) Other Business Services; i) Personal, Cultural and Recreation Services; j) Goods.

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Figure 2: *The RCA Deviations in the United States*



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Figure 3: Exports Structure Similarity index on the United States

Table 1: International Comparison to Trade Balances of Goods and Services 2003

(billions)	Services	Goods	Goods and Services
Surplus Countries of Trade in Services			
United States	59.2	-544.3	-485.2
United Kingdom	25.1	-77.3	-52.2
France	15.2	1.0	16.3
Greece	13.5	-25.6	-12.1
Turkey	11.2	-14.0	-2.8
Deficit Countries of Trade in Services			
Germany	-56.1	151.7	95.5
Japan	-34.3	106.4	72.1
Ireland	-14.5	37.8	23.3
Russia	-10.6	60.5	49.9
China,P.R.: Mainland	-8.5	44.7	36.2

Source: IMF, *Balance of Payments Statistics 2005*, CD-ROM, IMF.

Table 2: Detail of U.S. Trade in Services

Year: 2003; Unit: million dollars	Export	Import	Net
Goods (Total)	716,410.0	1,260,710.0	-544,300.0
Services (Total)	131,650.0	125,390.0	6,260.0
Transportation	47,530.0	65,730.0	-18,200.0
Travel	84,120.0	59,660.0	24,460.0
Communication Services	5,720.0	5,160.0	560.0
Construction Services	2,730.0	930.0	1,800.0
Insurance Services	4,880.0	26,700.0	-21,830.0
Financial Services	17,640.0	4,240.0	13,400.0
Computer and Information Services	5,430.0	1,550.0	3,880.0
Royalties and License Fees	48,230.0	20,050.0	28,180.0
Other Business Services	64,070.0	44,190.0	19,890.0
Personal, Cultural, and Recreational Services	7,350.0	340.0	7,010.0
Government Services n.i.e	16,400.0	27,760.0	-11,370.0

Source: IMF, *Balance of Payments Statistics 2005*, CD-ROM, IMF.

Table 3: Detail of RCA Calculation

Data Source	IMF, <i>Balance of Payments Statistics 2005</i> , CD-ROM, IMF.			
Observation Periods (15 years)	1989 - 2003			
Observation Countries (35 countries)	Argentina	Australia	Austria	Belgium-Luxembourg
	Brazil	Canada	China,P.R.: Mainland	China,P.R.:Hong Kong
	Denmark	Finland	France	Germany
	Greece	Hungary	Iceland	India
	Ireland	Israel	Italy	Japan
	Korea	Malaysia	Mexico	Netherlands
	New Zealand	Norway	Philippines	Poland
	Portugal	Russia	Sweden	Thailand
	Turkey	United Kingdom	United States	
Observation Categories (10 items)	Transportation		Travel	
	Communication Services		Construction Services	
	Financial Services		Computer and Information Services	
	Royalties and License Fees		Other Business Services	
	Personal, Cultural, and Recreational Services			
	Goods			