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## 安藤光代君学位授与報告

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Distribution Networks in East  
Asia: Theories, Empirics, and  
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通ネットワーク：理論・実証・政策)

### 内容の要旨

The East Asian region has continued to serve as the world's growth center for decades. The region includes countries at different income levels, and each of the East Asian countries did attain high economic growth; annual growth rates of per capita GDP in the period between 1985 and 2000, for instance, are four percent up to eight percent. At the same time, they significantly enhanced manufacturing competitiveness. In other regions such as Latin America and Central and Eastern Europe, on the other hand, their annual growth rates are less than two percent, and their manufacturing competitiveness also stagnated or deteriorated in the same period. Why has East Asia successfully continued to achieve high performance and improved the manufacturing competitiveness so rapidly, and why not other regions such as Latin America? One of the key elements for East Asia's performance in the last 10 to 15 years is the effective development and utilization of international production and distribution networks, with extensive promotion of foreign direct investment(FDI).

The international production and distribution networks consist of vertical production chains extended the region as well as distribution networks throughout the world. The

major players in East Asia are corporate firms belonging to machinery industries including general machinery, electric machinery, transport equipment, and precision machinery. Although the international production networks have been formed in other regions as well in the globalizing era, the networks in East Asia are distinctive in the following characteristics: first, the production networks have already become a substantial component of each country's economy in the region. Second, the production networks are of the region-wide, involving a large number of countries at different income levels, rather than those between specific countries or between developed and developing countries within geographically a close distance. Third, the networks include efficient intra-firm and arm's-length relationships, including different firm nationalities.

While they may have already been intuitively taken for granted, international production/distribution networks in East Asia have not been formally analyzed yet in either theoretical or empirical literature of economics, particularly considering policies behind. The purpose of this paper is to analyze the nature and mechanism of the formation of the international production/distribution networks in East Asia from viewpoints of three dimensions, i.e., theories, empirics, and policies. This paper provides possible theoretical discussion beyond the traditional international trade theories, demonstrates various empirical evidences that reflect aspects explained by new theoretical logics at aggregated and disaggregated levels and at the firm level, and investigates policies behind fundamental changes in location and trade patterns in East Asia. Through the whole analysis in the paper, we attempt to reveal the mechanism of new international division of labor to have a better understanding of important phenomena observed in East Asia as well as to contribute to research.

As emphasized in Chapter 2, new economic logics, i.e., fragmentation theory, agglomeration theory, and internalization of “firm” in addition to the traditional comparative advantage theory are important to understand what’s going on in East Asia. Location decisions are now made at the intra-product level with physically fragmented production blocks connected by service link costs such as transport cost, telecommunication cost, and various coordination costs, rather than at the final good or industry level as the traditional trade theory does. In particular, elements such as trade barriers including tariffs and non-tariff measures (NTMs), regulatory barriers, and imperfect information become additional service link costs for production blocs located across national borders. Globalization with development in the world trading system and technological advances has reduced such service link costs and enabled firms to further fragment their production blocs beyond national borders. Since service link costs often exhibit economies of scale, fragmented production blocs tend to concentrate in focal point, creating agglomeration or industrial clusters. Such geographic concentration of economic activities may improve efficiency or reduce production costs, and agglomeration can attract potential investors and create further agglomeration. Globalization and the development of industrial clusters also has lowered service link costs for arm’s length transactions such as searching costs to find firms that can provide satisfactory goods and imperfect information on their activities. Firms now make an optimal choice of ownership and internalization decision as well as the location decision and effectively organize the intra-firm and arm’s length relationships. At that time, they consider not only their own firm specific assets but also various location advantages in technology, wage levels, the development of infrastructure, the

existence of industrial clusters, and trade and FDI facilitation policies.

Chapter 3 provided an overall picture of international trade and FDI by descriptively analyzing trade and FDI patterns throughout the 1990s to capture fundamental changes in East Asia. The chapter addressed an explosive expansion of trade and the strengthened intra-regional trade relationships during the period. At present, intra-regional trade reaches half of the total East Asian trade. In the process of intensifying intra-regional trade relationships, interestingly, each country’s trade activities involved various countries in the region, with heavier weights than before on countries having had weaker trade relationships. The chapter also emphasized a significance of machinery trade, particularly machinery parts and components trade, in each East Asian economy and a substantial change in commodity composition of exports and imports, according to the intensive promotion of export-oriented FDI. The machinery production activities did become significant in each East Asian economy in the 1990s. Now that more than half of trade in terms of both exports and imports is composed of machinery goods including machinery parts and components. Considering that trade in intermediate goods enormously increased for both exports and imports and that commodity composition of exports rapidly got similar to that of imports, active back-and-forth transactions in vertical production chains seen to exist, and machinery trade in East Asia may not be simple inter-industry trade along the traditional comparative advantage per se anymore.

Given these empirical investigations, Chapter 4 more precisely investigated how the patterns of international division of labor has developed in East Asia in the 1990s in rigorous connection with theoretical logics. It decomposed the whole machinery trade of each East Asian country at finely disaggregated level into

three types of trade, i.e., one-way trade, vertical intra-industry trade(IIT), and horizontal IIT, employing the decomposition type threshold method, rather than the G-L type with a popularity. Moreover, it applied the method to each country's trade to/from the world, not to bilateral trade, to capture the overall trade structure at the country level reflecting not only back-and-forth transactions between two countries but also those involving various countries. Furthermore, we conducted careful treatment of some commodities, which were classified into intra-industry trade but were not identified whether vertical IIT or horizontal IIT, to utilize information as much as possible and to avoid overestimating relative significance of one-way trade because of unclassified IIT. In addition to the above consideration and extensions, the chapter, the most essentially, extended the analytical framework of prior empirical works by explicitly incorporating the fragmentation theory and examined the hypothesis of "quality ladder" to clarify the nature of vertical IIT.

Our analysis at the disaggregated level emphasized that vertical international production sharing did become an essential part of each East Asian economy in the 1990s, particularly with an explosive increase in vertical IIT in trade in machinery parts and components. Although a certain amount of East Asian machinery trade has been stably one-way trade, it rapidly lost the relative importance. While the theoretical literature of intra-industry trade has often focused on horizontal IIT in final products, horizontal IIT holds only a small portion of machinery trade in East Asia, if any, in machinery parts and components. Rather vertical IIT, particularly vertical IIT at the intra-product level, is the significant pattern of trade in current East Asia in absolute and relative terms. In East Asia, vertical international production sharing has been devel-

oped partially with the rapid increase in vertical IIT based on quality differences along vertical product differentiation in the theoretical analysis of vertical IIT. More importantly, the vertical international production sharing has been developed partially with the enormous expansion in vertical back-and-forth transactions with value added embodied at different steps of the vertically fragmented production processes across borders in the context of the fragmentation theory.

Chapter 5 in turn shed light on the activities of "firm" and provided empirical evidences of MNE's behavior to have a closer look at features of networking in East Asia, mainly in terms of activities of Japanese corporate firms. The analysis on characteristics of Japanese firms going to East Asia demonstrated that they tend to more flexibly deinternalize their production processes to fragment them than those going to other regions. This is particularly true for Japanese SMEs investing in East Asia, who have contributed to the development of industrial clusters in the region, and such a trend has strengthened. The analysis on the activities of Japanese (and U.S.) affiliates in East Asia in terms of by-destination sales/by-origin purchases did present the existence of the region-wide networks in East Asia. In addition, the analysis revealed that Japanese affiliates in East Asia intensified intra-regional relationships in developing vertical international production sharing in the region by further involving cross-border transactions with intra-regional countries through intra-firm and/or arm's length fragmentation. The study also demonstrated that Japanese affiliates in East Asia gradually substituted arm's-length transactions for intra-firm transactions in the process of developing production networking in the region. In particular, the purchases from Japan, especially the intra-firm purchases from Japan, were replaced by the local arm's length

purchases and/or the purchases from other East Asian countries through intra-firm and/or arm's length fragmentation.

The analysis based on the firm nationality approach in value added framework also confirmed that activities of Japanese firms did gradually shifted from Japan to East Asia other than Japan and emphasized that the relative importance of value added embodied in the production activities in East Asia enhanced, compared to input from Japan. More interestingly, the analysis addressed that activities of Japanese firms in East Asia do exhibit production networks with affiliates of MNEs of other nationalities and indigenous firms in addition to Japanese affiliates in East Asia. The international production/distribution networks in East Asia do include efficient intra-firm and arm's-length relationships, including different firm nationalities.

One of the crucial factors behind the region-wide production networks is a set of policies implemented by the East Asian developing economies from the mid-1980s or the early 1990s as discussed in Chapter 6. Although most of East Asian economies have traditionally applied the so-called "dual track approach," they have changed the weights between import-substituting industries and export-oriented industries by shifting from import substitution to export orientation and from selective acceptance of FDI to basically "accept everybody" policy. Various trade and FDI facilitation measures implemented by each East Asian country helped to lower service link costs for intra-firm and arm's length fragmentation even beyond national borders and to promote agglomeration. Such policies did have significantly encouraged the formation of region-wide production networks, rather than the networks between specific countries. The chapter also considered another important issue, i.e., the links of FTAs/RTAs with FDI.

In summary, the formation of production networks accompanied by drastic changes in patterns of location of production and international trade in East Asia did occur beyond the theory of traditional comparative advantage. Although a certain amount of trade in East Asia can be explained by the traditional comparative advantage, such trade pattern rapidly lost the relative importance. In East Asia, there exist large differences in various components of location advantages such as static and dynamic service link costs and agglomeration effects other than wages and technology transferability. These location advantages in addition to various trade and FDI facilitation measures have significantly influenced the patterns of fragmentation of production and international trade, resulting in the development of the region-wide vertical international division of labor in East Asia.

The efficient intra-firm and arm's length relationships became more crucial when further fragmentation across borders at the detailed product process level was possible. Behind the production networks with efficient intra-firm and arm's length relationships, there exists lowering service link costs for arm's length transactions even among different firm nationalities, critical mass of agglomeration extended the region along export-oriented "accept everybody" policy, and further developed industrial clusters by MNEs and indigenous firms becoming more competitive than before partially due to direct and indirect spillover of technology and export-oriented competitive environment.

What we have challenged to analyze is a frontier area in international trade, and has contributed to new theoretical thoughts including the literature of fragmentation, agglomeration, and internalization of "firm" from the empirical side by moving ahead to shed light on the mechanism of vertical international production networks. More importantly, we have success-

fully demonstrated that the international production/distribution networks, which are indeed significant in the region, exhibit the features discussed above. The existence of such production networks does make East Asia more competitive as suppliers in manufacturing sectors in the global markets. Even the purchases from East Asia by firms located in other regions are increasing in manufacturing sectors. The role of government is obviously important in reducing service link costs and promoting agglomeration particularly for developing countries to utilize the force of globalizing corporate activities, though there is no easy policy to reach the goal.

#### 論文審査の要旨

安藤光代君の学位請求論文「International Production and Distribution Networks in East Asia: Theories, Empirics, and Policies (東アジアにおける国際的な生産・流通ネットワーク：理論・実証・政策)」は、東アジアにおいて過去10年の間に形成されてきた国際的な生産・流通ネットワークについて、理論、実証研究、政策論の三面から分析を加えることにより、国際貿易における新たなファインディングスを提示し、そのメカニズムの解明を行なおうとするものである。

論文の分析対象である国際的な生産・流通ネットワークとは、複数の国にまたがる垂直的な生産チェーンおよび製品の流通網のことである。このようなネットワークはさまざまな産業において見られるが、特に一般機械、電気機械、輸送機器、精密機械を含む機械産業において顕著に見られる。一般に、国境を越えた工程間分業は、世界の他の地域、たとえばアメリカとメキシコの間、あるいはドイツ・西欧諸国と中東欧諸国の間でもある程度見られるが、東アジアの生産・流通ネットワークは、各国経済に占める比重の大きさ、所得水準の異なる多数の国にまたがって展開されているという広域性、企業内・企業間取引を精緻に組み合わせて展開されているという複雑性において、他の地域に類を見ないものと言える。

こうした東アジアで展開されている国際的な生産・流

通ネットワークに関しては、その重要性にもかかわらず、これまで必ずしも十分に経済的分析が行われてこなかった。理論面に関しては、比較優位に基づく産業間貿易を説明する伝統的な国際貿易理論、あるいは、水平的・垂直的な製品差別化に基づく産業内貿易を説明する理論では必ずしも十分に説明のつかない現象が東アジアで見られており、そのメカニズムを解明するための新しい理論的アプローチが求められている。実証研究の面では、生産・流通ネットワークの実態を統計的に把握することが容易でないことが研究上の障害となっている。国際貿易データは細かい商品分類に基づいて比較的よく整備されているが、国境を越える各商品の金額・数量を把握するのみであり、取引主体に関する情報は含まれていない。どのような取引主体の間で国境を越える取引が行われているかの検証は、直接投資関連の企業データにより検出することが必要であるが、現在の統計は必ずしも質が確保されているわけではなく、検出には根強い作業が必要とされている。本論文は、以上のような理論・実証研究の現状を踏まえながら、利用可能な統計情報を注意深く選り分け、膨大な時間と労力を投入することによって分析を行い、国際的な生産・流通ネットワークの実態にせまろうとした野心的な実証研究である。

本論文は、最初に近年の国際貿易理論の展開をサーベイし、考慮すべき経済理論について整理、検討を加えている。具体的には、フラグメンテーション理論、集積理論、企業の内部化理論をレビューし、それぞれの理論が部分的にせよ、どのように東アジアの生産・流通ネットワークのメカニズムを説明する上で有効であるかを議論している。特に、工程間分業ではサービス・リンク・コストが重要となること、フラグメンテーション（分散立地）とアグロメレーション（集積）とは一見すると相互に逆方向に作用するかに受け取られるが、現実に同時に進行しうること、特に東アジアでは企業内のみならず、企業間取引が重要であることなど、東アジアの実態を説明する際に理論面で留意すべき点を明らかにしている。

本論文の中心をなすのは実証研究である。貿易データ、直接投資データを精査することにより、東アジアにおける域内貿易、とりわけ機械類の部品・中間財の貿易が顕著に増加していることを明らかにした後、細品目分類に基づく国際貿易データの産業間貿易、垂直的・水平的産業内貿易へのデコンポジション分析、日

本企業に関するマイクロ・データを用いた直接投資パターン分析、東アジアに進出した日経企業の売上・仕入パターン分析を行なっている。これらの実証研究は、商品別貿易データと企業間の国際取引に関するマイクロ・データをもとにした膨大な分析作業に基づくものであるが、論文では精緻なデータ分析作業を巧みに行なうことにより、興味深い発見を提示することに成功している。

貿易データのデコンポジション分析では、東アジアにおいて、産業間貿易の比率が急速に低下し、代わって垂直的産業内貿易の比率が高まっていることが示される。しかもその垂直的産業内貿易は、ヨーロッパの先進地域と途上地域の間で見られるような垂直的製品差別化に基づくものというよりは、活発な工程間分業によって説明される部分がおおきく指摘される。また、日本企業のマイクロ・データ分析からは、日本の中小企業の海外進出が東アジアの生産・流通ネットワークの形成に寄与した可能性が高いこと、現地の日系企業も域内における企業間取引の比率を高める傾向にあることなどが示される。

政策面に関する分析では、国際的生産・流通ネットワークが構築されるに際して政策がどのような影響をもたらすかについて検証が行なわれる。東南アジア諸国および中国は、かつての日本や韓国とは異なり、直接投資を積極的に利用する開発戦略のもとに、輸入代替型直接投資と輸出志向型・ネットワーク構築型直接投資という2種を同時に誘致するという複線型アプローチが採られてきたこと、しかし、1980年代後半から90年代初めに至り、政策体系のウェイトを後者のタイプの直接投資誘致に明確に移すことになり、そのことが集積の形成および生産・流通ネットワークの構築に結びついたことを指摘する。こうした東アジアにおける生産・流通ネットワークの形成と政策との関連性に関する分析は、近年急速に進みつつある東アジア地域経済統合の動機やそうした統合に際して合意すべき内容を考察する上で有益な示唆を与えるものといえる。

以上のように、本論文は、東アジアの国際的生産・流通ネットワークを理論、実証研究、政策論という3つ

の側面から多面的に分析したものとして、この分野における研究を進展させる上で、一定の貢献を成し遂げたものと評価することができる。他方、本論文の野心的研究アプローチと研究のオリジナリティ、実証研究に費やしたであろう膨大な時間と労力を評価しながらも、今後の研究を進展させる上で、残されている課題のあることも事実である。それらは、豊富な統計データを用いながらも統計的・計量経済学的分析を行う際の仮説検定が必ずしも十分ではないこと、全体像をとらえようとするあまり検証に値する統計分析が細部において十分に詰め切れていないこと、Logit分析の意味づけが明確でないこと、既存の研究蓄積との対比で本研究の差異を明確化し、本論文の有する研究成果と特徴を際立たせるための記述上の工夫の余地があることなどに要約される。しかし、これらの指摘は新しい研究分野を切り開こうとする本研究を今後さらに発展させる上での課題として位置づけられるものであり、このような指摘がなされたことを考慮したとしても、東アジアの国際的生産・流通ネットワークを対象として新たな研究領域を開こうとする本論文の意義や成果は決して小さくない。

以上の審査結果から、審査委員会は全員一致で、当論文が博士（経済学）の学位付与にふさわしい研究成果であると判定する。

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