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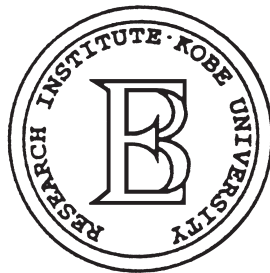
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## **A NOTE ON EAST ASIAN COMMUNITY: ASEAN+3 OR ASEAN+3+3**

**KAZUHIRO IGAWA** *Kobe University*

### **Abstract**

Japanese strategies for East Asian Economic Community are discussed focused on ASEAN+3 and ASEAN+3+3. High-risk high-return in ASEAN+3 and low-risk low-return in ASEAN+3+3 might be compared alternatives. Benefits of Japan depend on benefits of ASEAN, because FDI to ASEAN from Japan is large. For Japan, extending bilateral FTA net is a basic requirement and promoting WTO liberalization is an eternal target, and regional FTA in between, especially East Asian Economic Community, is a present issue for international economic policy.

*JEL Classification:* F42

*Keywords:* ASEAN+3, ASEAN+3+3, East Asian Community, Trade policy of Japan

### **1. Introduction**

East Asian economic policy of Japan is at the crossroads. Japan should be a hegemony member of ASEAN+3 (Japan, China, and Korea) or should be one of members of ASEAN+3+3 (plus Australia, New Zealand and India). It is also the important question whether to choose one of the two policies. In this paper, some discussions on the above policy choice of Japan will be made.

Foreign economic policy of Japan, after World War Second, has based on maintaining good relationships with US. Economic recovery of Japan after the War depended on US assistances and Japan followed the US-lead Breton Woods and GATT systems.

International monetary system of IMF adjustable peg was US Dollar system of Western world and Japan accumulated US dollar as reserves. After shifted to flexible exchange rates, in 1970s, Japanese Yen appreciated three times in 20 years but Japan maintained US dollar

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as its reserve-currency. Japan is not earnest to increase international use of Yen, even in East Asia. Dominance of US dollar as an international currency has been outstanding in East Asia, even after the Asian Currency Crisis of 1997. After European countries started Euro system, Japan was not active to change US dollar system in East Asia. However Japan now is in the position to reconsider its situation of over dependence on US dollar.

International trade system of GATT multilaterals and liberalization, was reinforced by GATT-Rounds (Kennedy, Tokyo, Uruguay) and Japan made joint efforts with US for success of the Rounds. After WTO started, issues are trade liberalization including agricultural products and service trade, setting rules for intellectual property right and foreign investments. All of these issues are difficult to make multilateral agreements and thus bilateral negotiations of FTA have been increased. Formation of EU and NAFTA is another factor to hurry bilateral and regional FTA negotiations and to hinder the liberalization through WTO negotiation. Japan and East Asian countries have lagged behind for the movements of FTA.

East Asian countries are different in economic and political systems and have different cultures and historical experiences. However geese flying patterns of economic developments in East Asia has cultivated economic environments of East Asian economic integration or community. A development strategy of export promotion in Japan is followed by Asia NIEs (Korea, Taiwan, Hong Kong and Singapore), and the followed geese are ASEAN 4 of Thailand, Malaysia, Indonesia, Philippines. The next goose of China has big potentials both of production and consumption. The last geese are New-ASEAN4 of Vietnam, Laos, Cambodia, and Myanmar. Before recent emergence of China, East Asian countries of Japan, Asia NIEs and ASEAN4 had heavily depended on US and European economies and thus could not strengthen movements for East Asian economic integration. They could enjoy a member position of weak integrations of APEC (Asia-Pacific Economic Cooperation) and ASEM (Asia-Europe Meeting). However, recent development of China and Asian Currency Crisis had changed the situation of East Asian dependences on US and EU. As a natural economic movement, intra-regional dependency has increased within East Asian countries. East Asian countries could now move toward East Asian Community.

## **2. East Asian Economic Community**

There exist many types of economic integration and cooperation in East Asia and in neighbors of East Asia. APEC is the largest and ASEM is widest. ASEAN-FTA and Australia-New Zealand FTA are geographically, historically and politically natural integrations. There are many bilateral FTA nets in East Asian countries. East Asian Economic Community imagined by each East Asian country is different in member of countries and in degree of liberalization. There are so many variations in integration process. Therefore these discussions for East Asian Economic Community have different focuses. However among those

discussions, the most important and basic point now for Japan is about choice between ASEAN+3 and ASEAN+3+3.

In case of ASEAN+3, Japan should have tight cooperation with China and Korea than with Australia, New Zealand and India. In the case of ASEAN+3+3, Japan has same degree of cooperation with those 5 members. Australia is an important partner for Japan in multilateralism of trade liberalization and in actual international trade, especially of natural resources and foods. A stance of foreign trade policy of Japan is basically multilateral and Australia is an important partner in this point. India will be an important partner for Japan in cope with supreme power of China and for international trade in IT (Information Technology) relates.

Economic relations between ASEAN and Japan might be different between the case of ASEAN+3 and ASEAN+3+3. Japan has made large FDI (Foreign Direct Investment) to ASEAN as final export bases of Japanese intermediate products, and an important role of ASEAN as the bases will increase with ASEAN+3+3. This is because of geographical location of ASEAN in the case of one of the members of ASEAN+3+3. Japanese FDI might shift more to China from ASEAN in the case of ASEAN+3. This is because Japan should have advantageous position in China, especially in production and distribution activities. If Japan has closer partnership with China, Japan's FDI flows will shift more to China for deeper international division of labor between the two. This means less FDI flows from Japan to ASEAN and a position of ASEAN will be more periphery in East Asian Economic Community in the case of ASEAN+3.

### **3. Globalism and/or Regionalism**

Both movements of globalization and localization are fined in the world trend of economic activities. In economic systems where some efficiency or benefit is pursued, behaviors of economic agencies make those movements of globalization and localization to attain their targets. If their activities are movements within some local area, then this is localization and if they are movements beyond border then this is globalization. In a stable economic environment where inventions and innovations are less and small in number and in scale, then both movements of globalization and regionalization will be small. Historically technology inventions and innovations in some area, especially in transportation and telecommunication, had produced large changes in economic environments. A market size had become larger and larger with those transportation and telecommunication technology changes. When changes of economic environments are large the movements will be large and will have trends.

1990s is a historical period of political stumbling blocks between the Eastern and the Western camps are removed, of IT revolution are widely utilized, and of multilateral trade liberalizations in Uruguay-Round are accepted. With these new economic environments,

economic agents, especially business firms, have focused on constructing new systems of more efficient and more profitable. These activities made movements of both globalization and regionalization in 1990s and 2000s.

Now world market size has been widened to include the Eastern socialist countries and many developing countries, and has been expanded through IT systems. All economic agents search for new systems of international division of labor. These movements are global and regional. Typical efficient systems of division of labor contain economies of scale and scope and use economies of network. The movement for economies of scale and scope is regional if it requires regional concentration of industries and firms, and the movement for network is global if international transportation costs and telecommunication costs for transactions become light. If region of the concentration is beyond national borders, and this is common for recent large business firms, an international regional economic integration comes into existence. Both economic globalization and regional economic integration come from the behavior of firms seeking for efficiency and profits. In this sense, both globalism and regionalism are different aspects of the same economic behavior.

Efficient choice of network system and efficient way of economic integration depend on economic environment such as technologies of transportation and telecommunication and as social institutions related to economic transactions. Different countries have different social and economic institutions. International institutional frameworks among countries, cover different institutional frameworks of relevant member countries. FTA, WTO, APEC, ASEM, ASEAN+3, ASEAN+3+3, are international institutional frameworks in East Asia. Depending on situations of institutional frameworks of member countries, use of networks and form of economic integrations are different, and thus distribution of economic benefits among member countries is different. Here is a reason for countries to compete in making international institutional frameworks.

#### **4. ASEAN+3 or ASEAN+3+3**

Before discussing differences of economic benefits between ASEAN+3 and ASEAN+3+3, forming ASEAN+3 or not (that is, bilateral FTA nets between ASEAN members and Japan) must be discussed. This is a discussion similar to be a member of FTA of ASEAN+3 or not for Japan (but not same with conclusion of respective bilateral FTA of Japan). Therefore we must count static benefits of trade creation and diversion effects and dynamic benefits of the economic integration. It is important to discuss about distribution of benefits between member countries, however we neglect this problem by assuming member's benefits are basically increasing function of group total benefits.

Trade-diversion effects of shifts in imports from US, EU and other outside countries of ASEAN+3 into ASEAN+3 might not be small, because there are many natural resources,



capital goods and technology service which are more efficient in outside world of ASEAN+3. Trade creation effects might be large because there are more possibilities to increase international division of labor within ASEAN+3. However economic development pattern of depending on export promotion policy is similar and thus export competition among ASEAN+3 will be severe. This means benefits from trade of complements (inter-industry trade) might be small in ASEAN+3. Dynamic benefits will dominate those static effects. If a type of economic development in ASEAN+3 depends largely on export promotion of manufacturing products to the outside countries, the dynamic effects might be small. However if the dynamic effects come from market expansion within ASEAN+3, especially expansion of China market, benefits will be large. China and ASEAN have large potentials of economic developments. Their developments largely depend on FDI from Japan and US and EU. If ASEAN+3 continue to be competitive in manufacturing products in the world, FDI inflows will be continued. However risks of environment pollution, of political stability and of technology transfer might put limits to their developments. To avoid these risks, FDI might go to outside of ASEAN+3 and the dynamic benefits might not be large. Therefore cost-benefit of ASEAN+3 depends on how the risks are evaluated from outside countries.

Now we are in the position to discuss which economic benefits will be larger between ASEAN+3 and ASEAN+3+3. Japan is one of members of ASEAN+3 and ASEAN+3+3. Thus if institutional framework is the same both in case of ASEAN+3 and of ASEAN+3+3, economic benefit of Japan will depend on trade-creation and trade-diversion static effects and also depend on dynamic benefits from economic integration of ASEAN+3 with Other-three (Australia, New Zealand, and India). Trade-diversion effects of shifts of imports from US and EU to import from ASEAN+3+3 might not be large, because agricultural products, natural resources and IT service products of Other-three are competitive products in the world. Technology transfer from US and EU will be crucial to ASEAN+3+3 but might not change much with formation of ASEAN+3+3.

Trade creation effects will be large because there are many possibilities to increase international division of labor within ASEAN+3+3. Inter-industry trade will be increased by the formation of ASEAN+3+3. Furthermore dynamic benefits will dominate those static effects. China and ASEAN have large potentials of economic developments, depending on FDI from Japan and US and EU. If ASEAN+3 gets position of production center of manufactures in the world, and if India develops with growth of IT industry, and if natural resources become more important as inputs, then FDI inflows will be continued into ASEAN+3+3. Even if funds from US and EU become scares, ASEAN+3+3 will have its own funds, which are accumulations from international trade surpluses. India in Other-three also has large potentials for economic developments and might give benefits to ASEAN+3+3, because its development style is more domestic market oriented. This style is different from export oriented style in ASEAN+3.

Therefore, as usual arguments for FTA or Customs Union, an international economic integration will have net positive effects, and ASEAN+3+3 is better than ASEAN+3 for Japan. We must keep in mind that this is true in case of institutional frameworks in ASEAN+3 is the same as in ASEAN+3+3. It is possible or more realistic to be the case that ASEAN+3 and ASEAN+3+3 have different institutional frameworks.

## 5. Cost-Benefit of Economic Integration

The discussion about cost-benefit of ASEAN+3 and ASEAN+3+3 in the above section 4, depends on the assumption of an integration process of forming ASEAN+3 first and then forming ASEAN+3+3. It also depends on the assumption of similar level of institutional frameworks in those economic integrations. However there are no time schedules and no enforcement of similar levels of liberalization in forming those economic integrations. There exist possibilities of follows (1)-(4).

- (1) only ASEAN+3
- (2) only ASEAN+3+3
- (3) first ASEAN+3 then later ASEAN+3+3
- (4) first ASEAN+3+3 then later ASEAN+3.

Institutional frameworks of economic integration will be different in the four cases, especially in cases between first (or only) ASEAN+3 and first (and only) ASEAN+3+3. Here we discuss about institutional differences of the cases between first ASEAN+3 and first ASEAN+3+3.

WTO negotiation is difficult if level of liberalization is high and conflicts among member countries are in many points. A possibility of the conflicts will increase when number of member countries increases. Therefore comparing ASEAN+3 and ASEAN+3+3, number of members is more in ASEAN+3+3 and conflicts will be more, relative to ASEAN+3. Therefore agreeable frameworks of institution for economic integration will be less restrictive and less liberalized ones in ASEAN+3+3 than ones in ASEAN+3.

ASEAN+3 has been taken initiatives by China. First movement of China's FTA approach to ASEAN has pushed ASEAN members to call for inclusion of Japan and Korea. This is because China is so big in ASEAN-China FTA and will take leaderships of the FTA, and this China problem for ASEAN might be mitigated by including Japan and Korea. However there are many Japanese firms whose business field is not restricted in ASEAN+3, but is global. Australia is important partner for Japan, importing natural resources and agricultural products and promoting APEC cooperation. For Japan, China is tough competitor of leadership in ASEAN+3, and has many competitive sectors in manufacturing industries. This problem will be mitigated by including another big country of India. India is an emerging economy and will be competitive in IT industry and India-Japan could have division of labor

in a way of complement. Japan has taken initiatives for ASEAN+3+3 as one of other options.

It is a point for Japan to compare merits of economic integrations between ASEAN+3 with higher level of liberalization and ASEAN+3+3 with lower level of liberalization. With higher level of liberalization of ASEAN+3, economic integration will be deeper and international division of labor will be deeper in horizontal (inter-industry) ways and vertical (intra-industry) ways. Japan can share the deeper division of labor and will get more benefits from higher growth rate of China and ASEAN. However there are many risk factors concerning to higher growth rate of China and ASEAN. If export competition among ASEAN+3 creates efficient production-distribution systems and market size of exports expands, then ASEAN+3 can enjoy higher growth rates. For forming efficient systems in ASEAN+3, FDI inflows from US and EU should be continued, and for expanding export market size US and EU markets should be widened. ASEAN+3 depends on US and EU until intra-regional investment fund become large and technology level become high. However, if ASEAN+3 is evaluated as a strategically competitive group for US and EU firms, FDI and technology transfer from US and EU firms might be regulated, and higher growth rates in ASEAN+3 might be limited. Benefits of ASEAN+3 thus depend on expected relations with US and EU. If China dominate ASEAN+3 or if competition between China and Japan for hegemony increase risks, then gains from ASEAN+3 will be limited, and thus benefits for Japan will be limited.

With lower level of liberalization in ASEAN+3+3, economic integration will be soft and division of labor will be less specialized in horizontal ways and vertical ways. Japan can share the geographically wider division of labor and will get more benefits from wider safety net of global interdependences. ASEAN+3+3 includes big economic potential country of India, in addition to China and ASEAN. The benefits for Japan to join it come from trade-creation effects and dynamic effects of the integration. As already discussed, international trade of Japan with Australia, New Zealand and India is horizontal (inter-industry) in the sense that export items are products of mutually different industries. Therefore trade-creation effects will be large. More important benefits of dynamic effects will come from growth of China, ASEAN, and India. With lower level of liberalization in ASEAN+3+3, economic growth rate of China might be decreased relative to the case of ASEAN+3. This is because some FDI flows will be diversified, more FDI will flow in India instead of China, and number of center in economic concentration will be increased in outside of China. Therefore net dynamic benefits for Japan in the case of ASEAN+3+3 relative to ASEAN+3 mostly depend on minus effects of China and on plus effects of India, in addition to the gains from developments of Australia and New Zealand.

In the case that Japan can get larger benefits in ASEAN+3+3 of lower level of liberalization than in ASEAN+3 of higher level of liberalization, Japan will prefer ASEAN+3+3 if negotiation costs (including time cost) and risks (such as increase of complains from outside members) of more members are small. In the opposite case, Japan will prefer ASEAN+3 if

risk factors in ASEAN+3, already mentioned, are not serious. Difficult cases are choices between high-risk high-return in ASEAN+3 and low-risk low-return in ASEAN+3+3.

When ASEAN+3 and ASEAN+3+3 both are formed, Japan can enjoy combination of both benefits. If first agreement is less liberalized one for easy agreement, then ASEAN+3+3 should be first. This is because if ASEAN+3 is low level of liberalization, the less liberalized ASEAN+3+3 is not interesting to form. First ASEAN+3+3 then ASEAN+3 of higher level of liberalization will be better choice for Japan.

## 6. Strategic Position of ASEAN+3+3

For Japan, the widest negotiation net of trade (and investment) liberalization is WTO, although there are many countries which are not members of WTO. The narrowest unit is bilateral negotiation of FTA (or EPA). In between, ASEAN+3, ASEAN+3+3, ASEM, and APEC exist. As WTO negotiation of Doha-round taking time, and NAFTA and EU of large economic integration blocks have embarked, many countries started to negotiate bilateral FTA, and regional economic block of neighbor countries. East Asian countries depend largely on their export markets to NAFTA and EU, and are late comers for FTA and East Asian regional integration. ASEAN is an exception and has strengthened unification, increasing member countries, with assistance of Western developed countries and Japan. ASEAN6 (Singapore, ASEAN4, Brunei) was more interested in strengthening partnerships with Japan, US and European countries. Japanese investment into ASEAN6 was large and development of ASEAN returns benefits to Japan. Inclusion of New-ASEAN4 and development of China increased connection of ASEAN with China.

Japan has been supporting multilateral trade-investment liberalization of WTO, as a first priority. As a second best, Japan will choose ASEAN+3, ASEAN+3+3, ASEM, and APEC liberalization, and bilateral FTA (EPA) might be a third best. ASEM includes many European countries and APEC includes Russia, and pacific-American countries (including NAFTA members) and thus FTA of ASEM or APEC looks take time. ASEAN+3+3 is the largest Asian group at the moment, and thus is best, for Japan to discuss FTA (EPA) of East Asia, focusing WTO liberalization. Leadership of Japan for ASEAN+3+3 might have stimulated proposal for FTA of APEC by US. US wants to avoid and care about East Asian community of China-Japan hegemony. APEC and ASEM are wider in the number of members than ASEAN+3+3 and might be better liberalization area for Japan in moving toward WTO liberalization.

ASEM and APEC are increasing their importance in political presence rather than trade liberalization areas. However, if trade liberalization of ASEM and APEC is a necessary step for WTO liberalization, ASEAN+3 and/or ASEAN+3+3 could be an important core of those liberalizations.

Japan has made large FDI into ASEAN and development of ASEAN will bring large benefits to Japan. ASEAN is also an important partner when Japan competes hegemony with China. Therefore Japan must also count benefits of ASEAN in a strategy of international trade policy. ASEAN preferred ASEAN+3 FTA to ASEAN-China FTA in avoiding over-presence of China, but might more prefer ASEAN+3+3, because ASEAN become a locational center of the region. In this point, interests of ASEAN for East Asian regional integration will coincide with those of Japan. Here exist suggestions of international trade strategy for Japan. That is, strategically Japan must support benefits and get sympathy of ASEAN. With this strategy of Japan, ASEAN+3+3 will become more possible with supports of ASEAN. Even if ASEAN+3 become actual realization, ASEAN would support hegemony of Japan. ASEAN is interested in wider partnerships with and supports from not only East Asian countries but US and EU. The rolls of ASEAN will increase its importance in trade liberalization negotiations in APEC or in ASEM, and will be a good partner of Japan. Another suggestion for priority in international trade strategy of Japan is, firstly promotion of liberalization in WTO, secondly leading ASEAN+3+3 as East Asian Community. Expanding nets of bilateral FTA (especially in East Asia) is basic policies now for all countries to have good relations with partner countries.

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**CORPORATE GROUPS AND STOCK PRICING IN JAPAN  
— INFORMATION TRANSFER EFFECTS OF  
EARNINGS FORECAST REVISION —**

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**Abstract**

In this study we empirically examine whether the earnings forecast revisions released by the membership firms within Japanese corporate groups have information transfer effects over other membership firms in order to analyze the extent to which the horizontal and vertical corporate groups are functioning effectively in the Japanese economy.

We find evidence confirming the existence information transfer effects for both horizontal and vertical corporate groups. In the case of horizontal groups, we also show that earnings forecast revisions involving bad news have information transfer effects, while those involving good news do not.

*JEL Classification:* M41

*Keywords:* Japanese corporate groups, main bank system, earnings forecast revision, information transfer effects

**1. Introduction**

As many studies on the Japanese style of management have already shown, several legally isolated Japanese corporations formed financial corporate groups<sup>1</sup> (*Kinyuu Keiretsu*)

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<sup>1</sup> As we already know, leading Japanese companies have formed financial corporate groups centered around the big city banks. Up until very recently there were six such groups, known as the “Big Six Corporate Groups.” Now they have been reorganized into four groups.

and capital-based corporate groups (*Shihon Keiretsu*). These corporate groups continued to wield real economic power and to succeed in the Japanese economy even after the burst of the bubble economy in 1989. The indubitable economic and organizational relationship among the member firms within these corporate groups is sometimes characterized as “invisible handshaking.” Yet we can also recognize a gradual waning of the centripetal forces of these financial and capital-based corporate groupings in the nineties, after the bubble economy. The first concern of this paper is therefore to clarify the extent to which these financial- and capital-based firm groupings are effectively functioning in the Japanese economy even now. This research takes a unique approach to this problem by adopting the empirical accounting research method discussed in the latter part of this section.

As Japanese corporations are formally and legally isolated from each other, they have not traditionally faced the economic need to issue consolidated financial statements of the type issued in the United States. In recent years, however, financial corporate groups and capital-based corporate groups have been increasingly persuaded to issue consolidated financial statements in accordance with a dominant power criterion previously uncommon in Japanese accounting practice. Japanese investors have by degrees realized the usefulness of consolidated statements for stock trading and have demanded corporations to disclose them. Yet the Japanese firms forming corporate groups have fewer and far less extensive stock-holding relationships than American corporate groups, particularly in financial sectors. As things stand, we cannot expect consolidated statements to yield much information on the stock pricing of membership firms from the viewpoint of ownership relationship. Further, we cannot expect every piece of accounting information disclosed by a membership firm to have the same information transfer effect as a similar disclosure by a firm within an American corporate group. If financial corporate grouping has effects not specifically based on ownership, we can anticipate the information content of consolidated statements and the information transfer effects. For example, the insurance function and risk sharing function of corporate grouping constitute other bases of information transfer effects.

In this paper we empirically examine whether isolated accounting information issued by membership firms within Japanese corporate groups has information transfer effects over other membership firms. Our purpose is to analyze the extent to which the financial- and capital-based corporate groupings are effectively functioning in the Japanese economy even now, after the burst of the bubble economy.

The remainder of this paper is divided into four more sections. Section 2 briefly surveys earlier studies on the Japanese style of business management and information transfer effects of accounting information. Section 3 explains our empirical model, sample, and data. Section 4 presents the empirical results, and Section 5 concludes the paper.



## 2. Previous Studies

As pointed in the previous section, our analysis extends into both institutional economics and empirical accounting research. Our institutional economics research will seek to clarify how the corporate groupings of Japanese firms function. Our empirical accounting research will address the information transfer problem. First we will review the results of previous studies in two areas to assert the originality of our research.

### 2-1. Japanese Corporate Grouping

Tables 1 and 2<sup>2</sup> show recent trends in the interlock stockholding among Japanese firms and banks. Judging from the Tables, we observe slight decreasing trends in the banks' stockholdings of shares issued by firms and the firms' stockholdings of shares issued by banks. We therefore would like to empirically test whether centripetal power still remains among any of the Japanese corporate groups, or, whether the corporate grouping still functions in the Japanese economy. If the answer is affirmative, what real functions does this corporate grouping structure provide in the contemporary Japanese economy?

According to earlier studies on Japanese corporate grouping, Japanese firms originally allied themselves into groups to fortify their financial defenses against takeovers by foreign corporations during the tight fiscal years just after World War II.

Recent studies have pointed out two other functions of corporate grouping. The first is the function proposed under the insurance or risk sharing hypothesis. Sheard (1986) enumerated many cases in which the main banks financially rescued member firms struggling under

**Table 1 : Stockholding Ratio of Banks Holding Shares Issued by Industrial Firms**

Year	Number of Stocks	Amounts of Stocks
1988	16.5	16.3
1989	16.6	16.2
1990	16.5	16.3
1991	16.4	16.3
1992	16.3	16.3
1993	16.1	16.2
1994	16.0	16.3
1995	15.7	16.1
1996	15.5	16.2
1997	15.1	16.0
1998	14.5	15.3

Source: see footnote 2.

**Table 2 : Stockholding Ratio of Firms Holding Shares Issued by Banks**

Year	Number of Stocks	Amounts of Stocks
1988	45.0	51.8
1989	44.9	49.6
1990	45.4	50.7
1991	44.9	49.4
1992	44.5	49.8
1993	43.3	48.8
1994	42.7	47.6
1995	41.8	47.2
1996	41.4	44.7
1997	40.9	43.1
1998	40.3	42.0

Source: see footnote 2.

2 Cited from the following paper. Tarou Terasawa, "Recent Development of Cross Holding of Stock in Japan," downloaded from the Bank of Japan website.



bad business conditions by exempting them from interest payments, providing additional financing, offering management consulting, and even sending in officers in person. The main banks accepted insurance premiums from member firms under ordinary business conditions in the form of Ryoudate-Yokin, Kessai-torihiki and Kisaihikiuke, and in return they accepted residual risks by “taking care of member firms struggling under bad business conditions.”<sup>3</sup> In a direct comparison of business stability between member and non-member firms, Nakatani (1984) proved that the main banks provided this insurance function to stabilize the business conditions of member firms even when business was going well.

The other recently discussed function of corporate grouping was proposed by Takeda and Schaeholts (1985) and Horiuchi and Fukuda (1987) in their informational asymmetry hypothesis of financial corporate grouping. This hypothesis asserts, firstly, that firms renting money and banks lending money do not have access to the same intelligence on the honesty of the money renters and the ability of the money renters to pay (i.e., there is an informational asymmetric gap between the firms renting money and the banks lending money), and secondly, that the firms which extend long-term trading contracts accept officers from the banks to help them minimize trading costs by erasing the informational asymmetry. If the firms renting money go bankrupt, the main banks serving as lenders lose the benefit of their accumulated information (in other words, the information loses value), as well as their reputation as reliable “screeners” of loan applicants. Thus, the main banks monitor firms as renters and commit themselves to the assistance of renter firms that fall into financial distress. These hypotheses may also apply to capital-based corporate groupings in which big businesses (e.g., Toyota and Matsushita) are surrounded by subcontract suppliers and subsidiary retailers.<sup>4</sup>

We examine these hypotheses in the next subsection using empirical accounting research.

## 2-2. Earnings Forecast Revision and Information Transfer Effects

Japanese corporations have been required to disclose their earnings forecast revisions since 1989, when the anti-trust law was revised to prohibit insider trading. Managers are prohibited from trading shares of their own corporations until they disclose important accounting differences between their previous earnings forecasts and newly adjusted ones. The law requires the disclosure of the following information:

Sales amounts: when newly adjusted forecast amount is 10 percent larger or smaller than previous forecast amount.

Recurred income before extraordinary items: (1) when the newly adjusted forecast

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3 Miwa (1985) and Horiuchi and Fukuda (1987) denied the insurance hypothesis concerning financial corporate grouping in Japan, asserting that “The main banks hold an umbrella over firms as renters in sunny days but draw in the umbrella when it starts to rain.”

4 This paper sometimes refers to financial corporate groups as “horizontal corporate groups” and capital-based corporate groups as “vertical corporate groups.”

amount is 30 percent larger or smaller than the previous amount; and (2) when the newly adjusted forecast amount is 5 percent larger or smaller than the net assets of the enterprise.

Net income: (1) when the newly adjusted forecast amount is 30 percent larger or smaller than the previous forecast amount; and (2) when the newly adjusted forecast amount is 2.5 percent larger or smaller than the net assets of the enterprise.

As you can see, the earnings forecast revisions should be disclosed when the newly forecasted numbers drastically differ from the old ones. This disclosure provides valuable information to the investors reading over the forecast revisions issued just after the end of the financial period (Kessan-Tanshin<sup>5</sup>). As such, it often can stimulate stock trading.

Many previous studies have already examined the impacts of earnings forecast revisions in Japan with the use of Japanese stock price data. In empirical research focused on capital markets, Sakurai and Gotoh (1992) and Gotoh and Sakurai (1993) reported important stock price reactions to earnings forecast revisions around the disclosure dates in newspapers. Similarly, Ha (1998) reported significant reactions in stock trading volumes to earnings forecast revisions. Ha (1994, 1998) also showed that market reactions to earnings forecast revisions had functional relationships with variables such as the market section of the enterprise listing (first section or second section), disclosure period (first or second half of the accounting year) and filing period (intensive or not intensive<sup>6</sup>). Gotoh (1996) presented empirical evidence that two factors characterizing the Japanese style of management, that is, the financial influences of the main bank system and the lower rate of floating investors, have confirmable impacts on the market reactions to earnings forecast revisions. Yet all of these previous studies can be categorized as accounting research focused on the impacts of information content. In other words, they focus on cases in which the accounting information disclosed by firm  $i$  influences the stock price of firm  $i$ . In contrast, this paper attempts to empirically analyze the information transfer effects of earnings forecast revisions.

The information transfer effect is generally defined as the phenomenon by which the accounting information disclosed by firm  $i$  influences the stock pricing of firm  $j$ , another firm that did not disclose its accounting information at the same time (see Schipper 1990, 97).<sup>7</sup> An

5 Kessan-Tanshin is a disclosure system for the reporting of important information just after the end of the financial period. Reported items include the actual sales amounts, business income, recurred income, and net income, as well as the forecasts for the same in the following year. As the reports are issued quickly, the information has yet to be audited at the time of disclosure.

6 The fiscal year closes on March 31 for almost Japanese companies. Many companies therefore report their Kessan-Tanshin information just a few weeks after that date.

7 Detailed discussion on information transfer effects can be found in Schipper (1990) and Brown (1994, ch.7). Hill and Schneeweis (1983), Eckbo (1983), and Stillman (1983) studied the information transfer effects of information other than accounting disclosures. Hill and Schneeweis (1983) looked at the effects of news on accidents in atomic electric power generation facilities. Eckbo (1983) and Stillman (1983) discussed news of mergers.

empirical study by Ball and Brown (1968) demonstrated instances in which the information content of accounting information was factored into stock prices more than twelve months before the release of the accounting information. This pre-information pricing phenomenon, a kind of information transfer effect, is a function of information from sources other than the accounting disclosure system. The most likely sources are the company statistics released monthly. Other sources may include the timely accounting report systems such as the quarterly and semi-annual reporting systems. Firth (1976) conjectured that information transfer effects may stem from accounting disclosures by rival firms that belong within the same industry and have similar technologies, but that have no diversified business operations. In an empirical study of the reactions of stock prices of same-industry rivals which did not disclose their own accounting information, Firth (1976) concluded that the stock prices of rival firm  $j$  could be expected to rise when firm  $i$  released good news and fall when firm  $i$  released bad news. Foster (1981) and Clinch and Sinclair (1987) performed similar studies on cases in the U.S. and Australia, respectively.

The early studies mentioned above examined the cumulative abnormal returns of both information-disclosing firms and their rivals. More recently, Baginski (1987) and Han and Wild (1990) used unexpected earnings data of information-disclosing firms. Pownall and Waymire (1989), Pyo and Lustgarten (1990), and Freeman and Tse (1992) proved that information transfer effects could be recognized over industries and over firms in different directions and different sizes.

All of the foregoing studies focused exclusively on statistical relationships between accounting disclosures and stock price reactions based on rival relationships between information-disclosing firms and stock-price reacting firms. In contrast, Olsen and Dietrich (1985) used data on firms based on the distribution relationships between retailers and suppliers, and Graham and Lefanowicz (1997) used data on firms based on parent-subsidiary relationships.

In this paper we use only cumulative data on abnormal returns and earnings forecast revisions to ascertain if there are any information transfer effects between pairs of firms within one of the same corporate groups that have emerged under Japanese style of business management (i.e., between pairs of firms in one of the big six financial corporate groups or in one of the capital-based corporate groups).

### **3. Research Design**

#### **3-1. Empirical Model**

This paper employs a simple regression model similar to equation (1) to statistically test whether any information transfer effects can be identified within financial corporate groups or capital-related corporate groups (e.g., Pyo and Lustgarten, 1990):

$$CAR_j = a + bCAR_i + e. \quad (1)$$

$CAR_i$  indicates the cumulative abnormal return of firm  $i$  around the date of the disclosure of its earnings forecast revision (the “announcement date”). Hereafter we call firm  $i$  the ID (information disclosure) firm. Needless to say, we do not take the unexpected earnings as an independent variable. As in the papers by Firth (1976) and Foster (1981), we use the  $CAR$  (cumulative abnormal return) of the ID firm as an independent variable on the assumption that the earnings forecast revision is a unique factor affecting the stock price of the ID firm around the announcement date. The abnormal return is calculated as the market-adjusted return, which we can obtain by deducting the daily market index (Nikkei Index) from the daily rate of return of the ID firm (not adjusted for dividends), thereby erasing the effects of the whole market. We prepared four types of periods (windows) for cumulating daily abnormal returns:  $[0:0]$ ,  $[-1:0]$ ,  $[-1:+1]$ , and  $[-2:+2]$ , where day 0 is defined as the date when the earnings forecast revised by the ID firm is reported in the newspaper. Thus, the first through fourth windows are a one-day cumulative period, two-day period, three-day period, and five-day period, respectively.

$CAR_j$  is the cumulative abnormal return of firm  $j$ , a firm that had a financial or capital relationship with the ID firm but did not disclose its own information. Hereafter we call this kind of firm an IA (informationally affected firm). The procedure for calculating the abnormal returns and setting windows for the IA firm is completely same as that used for the ID firm.

The Coefficients  $a$  and  $b$  are Coefficients regression. If there are any information transfer effects between the ID firms and IA firms, the Coefficient  $b$  should be significantly different from zero. The variable  $e$  is an error term.

### 3-2. Sample

This paper analyzes information transfer effects moving in three directions. In our analysis of the first type, the effects of information transfers between firms within a financial group, we try to recognize the impact on the stock prices of the main banks when the ID firms (firms in the same group as the bank) disclose their earnings forecast revisions.<sup>8</sup> In analyzing the second, the effects of information transfers between firms in a capital-based corporate group, we try to recognize the impact on the stock prices of parent companies when the ID firms (their subsidiaries and affiliates) revise their previous earnings forecasts. The third type of effect is the second type in the reverse direction. In this case we try recognize

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8 Of course we notice the information transfer effects working in the reverse direction between the main banks and firms in financial corporate groups. That is, the stock prices of member firms may change in response to the information disclosures of the main banks. The main banks only revised their earlier earnings forecasts in a few cases, however, so we decided to abandon the analysis of this type of effect.

the effects on the stock prices of subsidiaries and affiliates when the ID firms (in this case their parent companies) disclose their earnings forecast revisions.

The ID firms included in our analysis of these three types of information transfer effects satisfied the following conditions:

- (1) Firms which disclosed an earnings forecast revisions of an annual sales amount, earnings before extraordinary items and taxes, or net income during the period from April 1, 1989 to December 31, 1997, and whose adjustment information was reported in the *Nihon Keizai Shimbun* (Japan's equivalent of the *Wall Street Journal* in the U.S.).
- (2) Firms whose stock price data were available around the announcement date. The stock price data were acquired from the *Stock Prices CD-ROM 1999* edited by the Toyo Keizai Shimpousya.
- (3) Firms that belonged to horizontal (financial) corporate groups or vertical (capital based) corporate groups. First, we define firms headed by presidents affiliated with the private associations for the presidents of the big six financial corporate groups (Mitsui, Mitsubishi, Sumitomo, Fuji, Daiichi-Kangin and Sanwa) as members of the horizontal corporate groups.<sup>9</sup> Second, we define the vertical corporate relationship as a relationship in which one firm holds more than 20 percent of the stocks issued by each of the other firms in the group.<sup>10</sup> These firm data are principally obtained from the 1996 edition of the *Survey of Corporate Groups in Japan (Kigyuu Keiretsu Souran)* issued annually by Toyo Keizai Shimpousya.
- (4) Firms that remain unapprised of the earnings forecasts of other member firms in the same corporate group from day  $-2$  to  $+2$ . This data restriction eliminates the disruptive effects of similar information disclosed by fellow member firms.
- (5) Firms listed on the First Section of the Tokyo Stock Exchange when they disclosed their earnings forecast revisions.

The IA firms sampled for our analyses met a different set of criteria:

- (1) Firms whose stock price data were available around the time when the newspapers published earnings forecast revisions of other firms.
- (2) Firms in the same corporate groups as the firms that disclosed information.
- (3) Firms with stocks listed on the First Section of the Tokyo Stock Exchange when the ID firms disclosed their earnings forecast revisions in the newspapers.

Using the above-mentioned sampling process, we obtained 297 observations (firms headed by presidents affiliated with the private associations for the presidents of the big six financial corporate groups as ID firms; city banks as IA firms), 807 observations (subsidiaries and

<sup>9</sup> Firms headed by presidents with memberships in two private associations for presidents are treated as firms unaffiliated with corporate groups in this paper (e.g., Hitachi, Ishikawajima-Harima, and Nissyou-Iwai).

<sup>10</sup> Hereinafter, firms holding a majority of issued stocks are referred to as "parent firms" and firms whose issued stocks are mostly held by other firms are referred to as "subsidiaries and affiliates."

**Table 3 : Descriptive Statistics of the Cumulative Abnormal Returns (CARs) of Sample Firms**

Window	Observations	Mean	Std. Dev.	Minimum	Maximum
Panel A: ID firms are firms headed by presidents affiliated with the private associations for the presidents of the big six financial corporate groups; IA firms are city banks.					
<i>CAR<sub>i</sub></i> of ID firms ( <i>i</i> )					
[0:0]	297	-0.004	0.030	-0.230	0.086
[-1:0]	297	-0.006	0.045	-0.385	0.154
[-1:+1]	297	-0.005	0.051	-0.294	0.195
[-2:+2]	297	-0.005	0.060	-0.376	0.186
<i>CAR<sub>j</sub></i> of IA firms ( <i>j</i> )					
[0:0]	297	-0.000	0.018	-0.094	0.083
[-1:0]	297	-0.001	0.026	-0.170	0.148
[-1:+1]	297	-0.001	0.030	-0.143	0.178
[-2:+2]	297	-0.003	0.034	-0.138	0.155
Panel B: ID firms are subsidiaries and affiliates; IA firms are parent firms.					
<i>CAR<sub>i</sub></i> of ID firms ( <i>i</i> )					
[0:0]	807	-0.001	0.038	-0.246	0.175
[-1:0]	807	-0.001	0.046	-0.247	0.226
[-1:+1]	807	0.000	0.056	-0.256	0.244
[-2:+2]	807	0.002	0.070	-0.322	0.387
<i>CAR<sub>j</sub></i> of IA firms ( <i>j</i> )					
[0:0]	807	0.000	0.016	-0.067	0.065
[-1:0]	807	-0.000	0.022	-0.101	0.082
[-1:+1]	807	0.000	0.027	-0.109	0.149
[-2:+2]	807	0.000	0.035	-0.155	0.160
Panel C: ID firms are parent firms; IA firms are subsidiaries and affiliates. <sup>#</sup>					
<i>CAR<sub>i</sub></i> of ID firms ( <i>i</i> )					
[0:0]	341	-0.002	0.027	-0.162	0.079
[-1:0]	341	-0.004	0.033	-0.149	0.114
[-1:+1]	341	-0.003	0.038	-0.195	0.109
[-2:+2]	341	-0.003	0.045	-0.242	0.179
<i>CAR<sub>j</sub></i> of IA firms ( <i>j</i> )					
[0:0]	705	-0.000	0.025	-0.098	0.176
[-1:0]	705	-0.001	0.032	-0.139	0.180
[-1:+1]	705	0.001	0.046	-0.152	0.400
[-2:+2]	705	0.001	0.053	-0.182	0.372

*CAR<sub>i</sub>* is the cumulative market-adjusted return of the ID firm, that is, the firm revising its previous earnings forecast.

*CAR<sub>j</sub>* is the cumulative market-adjusted return of the IA firm, that is, a firm in the same corporate group as the firm revising its previous earnings forecast.

Day 0 in the window is the date when the earnings forecast revision of the ID firm is reported in the newspaper.

<sup>#</sup>We could list only 341 observations of parent firms satisfying the sample selection criteria as ID firms. When parent firms had more than two subsidiaries and affiliates as ID firms, however, we treated each subsidiary or affiliate as an independent observation. This provided us with 705 IA firms.

affiliates as ID firms; parent firms as IA firms), and 705 observations (parent firms as ID firms; subsidiaries and affiliates as IA firms), respectively.<sup>11</sup>

Table 3 shows basic descriptive statistics of the *CARs* of the sample firms. Here we

11 We could only list 341 observations of parent firms as ID firms that satisfy the above sample selection criteria. When parent ID firms had more than two listed subsidiaries and affiliates, however, we treated each subsidiary ↗

note that the average *CARs* (cumulative abnormal returns) for the ID (*i*) firms and IA (*j*) firms are both nearly zero. This means that the *CARs* are successfully adjusted for the market-wide movements, provided that they are calculated simply by deducting the market rate of return from the rate of return of each firm. We also point out that the standard deviations of the *CARs* of the IA firms are smaller than those of the ID firms, especially in panels A and B. That is, the information transfers of revised earnings forecasts probably have only secondary effects compared with the information contents.

#### 4. Results of Empirical Analysis

##### 4-1. Information Transfer Effects of Earnings Forecast Revision

Table 4 shows the empirically estimated results of equation (1) using our sample data. Panel A indicates the empirically estimated results of equation (1) using the sub-sample made up of firms headed by presidents affiliated with the private associations for the presidents of

**Table 4 : Earnings Forecast Revision and Information Transfer Effects**

Estimation Model: $CAR_j = a + bCAR_i + e$						
Window	<i>a</i>	<i>t(a)</i>	<i>b</i>	<i>t(b)</i>	Observations	<i>R</i> <sup>2</sup>
Panel A: ID firms are firms headed by presidents affiliated with the private associations for the presidents of the big six financial corporate groups; IA firms are city banks.						
[0:0]	-0.000	-0.032	0.100	3.028	297	0.030
[-1:0]	-0.000	-0.016	0.140	4.202	297	0.057
[-1:+1]	-0.001	-0.496	0.134	4.057	297	0.053
[-2:+2]	-0.002	-1.174	0.106	3.195	297	0.033
Panel B: ID firms are subsidiaries and affiliates; IA firms are parent firms.						
[0:0]	0.000	0.385	0.041	2.788	807	0.010
[-1:0]	0.000	0.079	0.062	3.721	807	0.017
[-1:+1]	0.000	0.286	0.038	2.252	807	0.006
[-2:+2]	0.000	0.231	0.031	1.766	807	0.004
Panel C: ID firms are parent firms; IA firms are subsidiaries and affiliates.						
[0:0]	0.000	0.007	0.091	2.324	705	0.008
[-1:0]	-0.000	-0.362	0.149	3.648	705	0.019
[-1:+1]	0.001	0.493	0.212	4.258	705	0.025
[-2:+2]	0.001	0.622	0.263	5.602	705	0.043

*CAR<sub>i</sub>* is the cumulative market-adjusted return of the ID firm, that is, a firm revising its previous earnings forecast.

*CAR<sub>j</sub>* is the cumulative market-adjusted return of the IA firm, that is, a firm in the same corporate group as the firm revising its previous earnings forecast.

*e* is an error term.

Day 0 in the window is the date when the earnings forecast revision of the ID firm is reported in the newspaper.

The Coefficients *a* and *b* are regression coefficients estimated by ordinary least squares (OLS).

*t* is the t statistic of the null hypothesis that the estimated regression coefficient is zero.

\ and affiliate as an independent observation. Thus we obtain a total of 705 IA firms in the analysis.



the big six financial corporate groups as the ID firms, and the big six main banks<sup>12</sup> as the IA firms. The table tells us the extent to which the stock prices of the city banks in a horizontal corporate group are impacted by the information transfer effects brought about by the disclosure of the earnings forecast revisions of the ID firms in the same group. According to the statistical results, regression Coefficients  $b$  are positive and statistically significant. This means that the earnings forecast revisions disclosed by the ID firms headed by presidents affiliated with the private associations for the presidents of the big six financial corporate groups have strong information transfer effects on the stock prices of the city banks in the same horizontal corporate groups. The regression coefficients are especially large under the condition where the big city banks as IA firms are bigger than the ID firms and IA city banks are prohibited from holding more than 5 percent of the issued shares of a specific firm by the anti-trust law.

Panel B of table 4 indicates the extent to which the stock prices of parent firms in a vertical corporate group are impacted by the information transfer effects brought about by the disclosure of earnings forecast revisions of subsidiaries and affiliates in the same group. According to the statistical results, the regression Coefficients  $b$  are also positive and statistically significant in all time frames except that using the daily window  $[-2; +2]$ . This means that the earnings forecast revisions disclosed by the subsidiaries and affiliates in a vertical corporate group have information transfer effects on the stock prices of the parent firms in the same group.

Panel C of table 4 also indicates the extent to which the stock prices of subsidiaries and affiliates in a vertical corporate group are impacted by the information transfer effects brought about by the disclosure of earnings forecast revisions of the parent firms in the same group. According to the statistical results, the regression Coefficients  $b$  are also positive and statistically significant in all cases. This means that the earnings forecast revisions released by the parent firms in a vertical corporate group have strong information transfer effects on the stock prices of the subsidiaries and affiliates in the same group.<sup>13</sup>

Here we must note a few points about the empirical results of the vertical corporate groups. First, the earnings forecast revisions released by the parent firms generally have stronger information transfer effects than the forecast revisions of the subsidiaries and affiliates. This stands to reason, as the business performance of the parent companies is far more important to the subsidiaries and affiliates, compared to the opposite case (i.e., the business

<sup>12</sup> We refer to these big banks as "city banks."

<sup>13</sup> Significant relationships between the *CARs* of ID firms and IA firms might also be recognizable during ordinary periods without information disclosures. We examined this possibility by performing additional tests to estimate equation (1) using abnormal returns on day  $-15$ ,  $-10$ ,  $+10$ , or  $+15$ . In the case of horizontal corporate groups, the  $t$ -statistics of the estimated coefficient  $b$  took a value of less than 2.0 at each four day period. The estimated coefficient  $b$  took a  $t$ -statistic of more than 2.0 on three out of four days in the case of the vertical corporate groups. These results indicate that a significant relationship cannot always be recognized between the *CARs* of the ID firms and IA firms during periods without announcements, especially in the case of the horizontal corporate groups.



performance of the subsidiaries and affiliates is less important to the parent company). Second, the information transfer effects brought about by the information disclosures of the subsidiaries and affiliates are observed within relatively shorter-range windows, such as [0:0] and [-1:0]. In contrast, the information transfer effects brought about by the disclosures of the parent firms are strong in the relatively longer-range windows that include several days after the announcement date, such as [-2:+2]. These findings support the view that the investors in large parent companies are relatively more sophisticated in interpreting accounting information than investors in small subsidiaries and affiliates. The difference between the ranges of information transfer effects produced by two kinds of ID firms (parent versus subsidiary or affiliate) may reflect the difference in the ability of investors to interpret accounting information issued by other firms within the same vertical corporate group.

#### 4-2. Information Transfer Directions of Earnings Forecast Revision

As we have already discussed in the Section 2, one of the economic functions carried by the main bank system may be the insurance or risk sharing function. The city banks at the centers of the big six corporate groups continue to obtain insurance premiums through transactions such as Ryoudate deposit, Kessai Torihiki Gyoumu, security issues, and so on. In times of poor business performance, however, they act as residual risk takers through transactions such as interest reductions, additional financing, abandoning credit, the dispatch of specialists, and so on (Sheard 1986).

If the insurance hypothesis applies to the big six corporate groups, we can hypothesize that the earnings forecasts revisions released by the firms in the big six groups produce different information transfer effects when they involve good news or bad news. If the firms in the big six corporate groups continue to enjoy good business conditions, the main banks can expect nothing more than a continuing influx of insurance premium from these firms. We can therefore anticipate that the stock prices of the main banks do not react to the earnings forecast revisions by the firms in the same groups. However, the main banks must accept additional finances when firms belonging in the same horizontal corporate groups suffer bad economic conditions. In other words, bad news might have a much stronger information transfer effect on the stock prices of the main banks than good news.

In this sub-section we estimate equation (2) to empirically test the above-mentioned insurance hypothesis:

$$CAR_j = a + bGD * CAR_i + cBD * CAR_i + e. \quad (2)$$

Equation (2) has two dummy variables, *GD* and *BD*. *GD* takes a value of 1 if the earnings forecast revision issued by the firm includes good news (that is, if the cumulative abnormal

**Table 5 : Directions of Earnings Forecast Revision and Information Transfer Effects**

Estimation Model: $CAR_j = a + bGD*CAR_i + cBD*CAR_i + e$							
Window	<i>a</i>	<i>t(a)</i>	<i>b</i>	<i>t(b)</i>	<i>c</i>	<i>t(c)</i>	adj. $R^2$
Panel A: ID firms are firms headed by presidents affiliated with the private associations for the presidents of the big six financial corporate groups; IA firms are city banks.							
[0:0]	0.003	1.960	-0.073	-1.079	0.203	4.227	0.051
[-1:0]	0.001	0.649	0.071	0.937	0.171	3.790	0.053
[-1:+1]	0.001	0.665	0.044	0.673	0.189	3.957	0.055
[-2:+2]	-0.001	-0.451	0.069	1.092	0.130	2.676	0.028
Panel B: ID firms are subsidiaries and affiliates; IA firms are parent firms.							
[0:0]	0.001	0.673	0.028	1.081	0.052	2.188	0.008
[-1:0]	-0.000	-0.266	0.073	2.536	0.051	1.819	0.015
[-1:+1]	-0.000	-0.104	0.047	1.723	0.027	0.892	0.004
[-2:+2]	-0.001	-0.647	0.056	2.038	-0.002	-0.066	0.003
Panel C: ID firms are parent firms; IA firms are subsidiaries and affiliates.							
[0:0]	-0.002	-1.485	0.245	2.915	0.000	0.001	0.011
[-1:0]	-0.002	-0.825	0.207	2.424	0.108	1.609	0.017
[-1:+1]	0.001	0.491	0.193	1.914	0.225	2.860	0.022
[-2:+2]	0.002	0.586	0.248	2.896	0.275	3.596	0.040

*CAR<sub>i</sub>* is the cumulative market-adjusted return of the ID firm, that is, the firm revising its previous earnings forecast.

*CAR<sub>j</sub>* is the cumulative market-adjusted return of the IA firm, that is, a firm in the same corporate group as the firm revising its previous earnings forecast.

*GD* is a dummy variable that takes a value of 1 if the earnings forecast revision information includes good news (that is, cumulative abnormal return of the ID firm is positive) and 0 if it does not.

*BD* is a dummy variable that takes a value of 1 if the earnings forecast revision includes bad news (that is, cumulative abnormal return of the ID firm is negative) and 0 if it does not.

*e* is an error term.

Day 0 in the window is the date when the earnings forecast revision of the ID firm is reported in the newspaper.

The Coefficients *a*, *b*, and *c* are regression coefficients estimated by ordinary least squares (OLS).

*t* is the *t* statistic of the null hypothesis that the estimated regression coefficient is zero.

return of the ID firm is positive), and 0 if it does not. *BD* takes a value of 1 if the earnings forecast revision issued by the firm includes bad news (that is, if the cumulative abnormal return of the ID firm is negative), and 0 if it does not. The other variables are the same as those in equation (1). The regression coefficient *b* empirically indicates the information transfer effects in the case where the earnings forecast revision announced by the firms includes good news. The regression Coefficient *c* indicates the information transfer effects when the earnings forecast revision released by the firms includes bad news.

Panel A of table 5 indicates the estimated results of equation (2) using a sub-sample consisting of firms whose presidents are affiliated with the private associations for the presidents of the big six corporate groups as ID firms and city banks as IA firms. According to the empirical test, the regression Coefficients *b* are not significantly different from zero. This tells us that there are no information transfer effects between the ID firms and city banks when the earnings forecast revision includes good news. In contrast, the regression Coefficients *c* are significantly positive in all of the windows. This means that there are

strong information transfer effects between the ID firms and city banks when the earnings forecast revision includes bad news. These results of market-based accounting research empirically support the insurance hypothesis presented earlier in the discussion on the Japanese style of business management.

In addition, we speculate that the insurance hypothesis may also apply to the vertical corporate groups, given that the member firms of the vertical corporate groups share risks with each other independently of the main banks. Panels B and C of table 5 show the results of an empirical test of the insurance hypothesis against vertical corporate groups by estimating equation (2). According to the results, good and bad news do not elicit different information transfer effects.

### 4-3. Centripetal Forces of Six Corporate Financial Groups and Information Transfer Effects

Itou and Hoshi (1992) reported that there were different centripetal forces among the big six corporate financial groups in terms of intra-group debt financing, the rate of reciprocal stockholding, and the dispatch of officers.<sup>14</sup> According to Itou and Hoshi (1992), centripetal forces among Pre-Zaibatsu financial corporate groups (Mitsui, Sumitomo, and Mitsubishi) are recognizably stronger than those among the city bank corporate groups such as Fuji, Daiichi-Kangin, and Sanwa. This difference of centripetal forces among financial corporate groups may influence the empirical results obtained by Nakatani (1984). Nakatani (1984) reported, in effect, that member firms within corporate financial groups with strong centripetal force were content with relatively lower rates of return on assets, whereas member firms within corporate financial groups with weaker centripetal force were not. They also reported that the former firms enjoyed relatively more stable business conditions than the latter firms, measured in terms of variance of rate of return.

In this sub-section we estimate equation (3) to empirically test the degree to which centripetal force hypothesis influences the information transfer effects:

$$CAR_j = a + bZA * CAR_i + cBA * CAR_i + e \quad (3)$$

$ZA$  and  $BA$  are dummy variables.  $ZA$  is 1 if the firms disclosing earnings forecast revisions belong to the Pre-Zaibatsu financial corporate groups, and 0 if they do not.  $BA$  is 1 if the firms disclosing earnings forecast revisions belong to the city bank corporate groups, and 0 if they do not. The regression coefficient  $b$  represents the information transfer effects among

<sup>14</sup> For example, Hokusui-kai (the private president association of the Sumitomo group) was organized in 1951, Kinyou-kai (Mitsubishi group) was organized in 1954, and Niki-kai (Mitsui group) was organized in 1961. On the other hand, Fuyou-kai (Fuji group) was organized in 1966, Sansui-kai (Sanwa group) was organized in 1967, and Sankin-kai (Daiichi-Kangin group) was organized in 1978.

the Pre-Zaibatsu corporate financial groups and the regression Coefficient  $c$  represents the information transfer effects among the city bank corporate groups. Table 6 shows the empirical results.

According to the statistical results, the regression Coefficients  $b$  are not statistically significant, but the Coefficients  $c$  are significantly positive. This indicates that there are information transfer effects among the city bank corporate groups, but not among the Pre-Zaibatsu financial corporate groups. These empirical results of accounting research are contrary to the results of Itou and Hoshi (1992). That is, they indicate that the corporate groups with weaker centripetal forces have stronger information transfer effects than the corporate groups with stronger centripetal forces. These findings are also counterintuitive. However, we cannot cite any possible reasons at present.<sup>15</sup>

#### 4-4. Subsidiary and Affiliated Companies and Information Transfer Effects

When one firm holds more than 20 percent of the shares issued by another firm, we define the case as a vertical corporate relationship. We include both subsidiaries and affiliates in the definition, though in doing so we recognize that the information transfer effects may differ between these two types of firms. We estimated equation (4) to test this possibility:

**Table 6 : Centripetal Forces of Six Corporate Financial Groups and Information Transfer Effects**

Estimation Model: $CAR_j = a + bZA * CAR_i + cBA * CAR_i + e$							
Window	$a$	$t(a)$	$b$	$t(b)$	$c$	$t(c)$	adj. $R^2$
Panel A: ID firms are firms headed by presidents affiliated with the private associations for the presidents of the big six financial corporate groups; IA firms are city banks.							
[0:0]	-0.000	-0.108	0.063	1.134	0.121	2.944	0.026
[-1:0]	-0.000	-0.323	-0.018	-0.309	0.210	5.345	0.083
[-1:+1]	-0.001	-0.654	0.051	0.897	0.177	4.374	0.057
[-2:+2]	-0.003	-1.319	0.031	0.611	0.160	3.702	0.039

$CAR_i$  is the cumulative market-adjusted return of the ID firm, that is, the firm revising its previous earnings forecast.

$CAR_j$  is the cumulative market-adjusted return of the IA firm, that is, a firm in the same corporate group as the firm revising its previous earnings forecast.

$ZA$  is a dummy variable that takes a value of 1 if the ID and IA firms belong to Pre-Zaibatsu corporate groups (Mitsui, Sumitomo, or Mitsubishi) and 0 if they do not.

$BA$  is a dummy variable that takes a value of 1 if the ID and IA firms belong to city bank corporate groups (Fuji, Daiichi-Kangin, or Sanwa) and 0 if they do not.  $e$  is error term.

Day 0 in the window is the date when the earnings forecast revision of the ID firm is reported in the newspaper.

The Coefficients  $a$ ,  $b$ , and  $c$  are regression coefficients estimated by ordinary least squares (OLS).

$t$  is the  $t$  statistic of the null hypothesis that the estimated regression coefficient is zero.

15 The findings in the subsection might be explained by the findings in the previous subsection. That is, the earnings forecast revisions released by firms in the Pre-Zaibatsu financial corporate groups may be clustered on good news, while the information released by firms in the city bank corporate groups may be clustered on bad news. When we tested this possibility by applying the chi-square test (good news or bad news, Pre-Zaibatsu or city bank group), we could not reject the null hypothesis that the contents of the earnings forecast revisions were statistically independent from the centripetal forces of the financial corporate groups.

**Table 7 : Subsidiary and Affiliated Companies and Information Transfer Effects**

Estimation Model: $CAR_j = a + bSC * CAR_i + cAC * CAR_i + e$							
Window	<i>a</i>	<i>t(a)</i>	<i>b</i>	<i>t(b)</i>	<i>c</i>	<i>t(c)</i>	adj. <i>R</i> <sup>2</sup>
Panel A: ID firms are subsidiaries and affiliates; IA firms are parent firms.							
[0:0]	0.000	0.371	0.051	1.551	0.038	2.339	0.007
[-1:0]	0.000	0.063	0.071	1.899	0.061	3.205	0.015
[-1:+1]	0.000	0.249	0.081	2.096	0.028	1.490	0.006
[-2:+2]	0.000	0.263	0.075	1.685	0.023	1.201	0.003
Panel B: ID firms are subsidiaries and affiliates; IA firms are parent firms.							
[0:0]	-0.000	-0.052	0.291	3.314	0.042	0.966	0.014
[-1:0]	-0.001	-0.476	0.390	4.494	0.082	1.778	0.029
[-1:+1]	0.001	0.486	0.223	2.051	0.209	3.727	0.022
[-2:+2]	0.001	0.644	0.229	2.397	0.274	5.072	0.040

*CAR<sub>i</sub>* is the cumulative market-adjusted return of the ID firm, that is, the firm revising its previous earnings forecast.

*CAR<sub>j</sub>* is the cumulative market-adjusted return of the IA firm, that is, the firm in the same corporate group as the firm revising its previous earnings forecast.

*SC* is a dummy variable that takes a value of 1 if the ID (IA) firm is a subsidiary firm, or 0 in panel A (B) if it does not.

*AC* is a dummy variable that takes a value of 1 if the ID (IA) firm is an affiliated firm, or 0 in panel A (B) if it does not.

*e* is an error term.

Day 0 in the window is the date when the earnings forecast revision of the ID firm is reported in the newspaper.

The Coefficients *a*, *b*, and *c* are regression coefficients estimated by ordinary least squares (OLS).

*t* is the *t* statistic of the null hypothesis that the estimated regression coefficient is zero.

$$CAR_j = a + bSC * CAR_i + cAC * CAR_i + e \tag{4}$$

*SC* and *AC* are dummy variables. *SC* takes a value of 1 if the firm disclosing the earnings forecast revision is a subsidiary whose top stockholder holds more than 50 percent of its issued stocks or if the firm affected by the disclosure of the revised forecast is a subsidiary; otherwise, *SC* takes a value of 0. *AC* takes a value of 1 if the firm disclosing the earnings forecast revision is an affiliate whose top stockholder holds less than 50 percent but more than 20 percent of its issued stocks, or if the firm affected by the disclosure of the revised forecast is an affiliate; otherwise, it takes a value of 0. The regression coefficient *b* represents the information transfer between parent and subsidiaries and the regression Coefficient *c* represents the information transfer between parent and affiliates.

Table 7 shows the estimated results of equation (4). The regression Coefficients *b* and *c* are positive, and in most cases they are statistically significant. Nonetheless, we cannot recognize clear differences between subsidiaries and affiliates in information transfer effects.

**4-5. Firm Size and Information Transfer Effects**

In subsection 3-2 we pointed out that the *CARS* of the IA firms had a smaller standard

deviation than the *CARS* of the ID firms. This difference between the standard deviations may be linked to the difference in size between these two types of firms. We conjecture, firstly, that the earnings forecast revisions issued by large firms have a stronger information transfer effect over the stock prices of individual firms, while the earnings forecast revisions released by individual firms have stronger information transfer effects over the stock prices of small firms than they do over the stock prices of large firms.

In this subsection we test the firm-size hypothesis by dividing our samples into two parts relative to the ratio of the market values of the ID and IA firms.<sup>16</sup> Concretely, we estimated equation (5):

**Table 8 : Firm Size and Information Transfer Effects<sup>#</sup>**

Estimation Model: $CAR_j = a + bSD * CAR_i + cLD * CAR_i + e$							
Window	<i>a</i>	<i>t(a)</i>	<i>b</i>	<i>t(b)</i>	<i>c</i>	<i>t(c)</i>	adj. <i>R</i> <sup>2</sup>
Panel A: ID firms are firms headed by presidents affiliated with the private associations for the presidents of the big six financial corporate groups; IA firms are city banks.							
[0:0]	0.000	0.008	0.127	2.138	0.089	2.230	0.025
[-1:0]	0.000	-0.084	0.066	1.042	0.169	4.323	0.056
[-1:+1]	-0.001	-0.424	0.198	3.468	0.102	2.536	0.052
[-2:+2]	-0.002	-1.128	0.206	3.507	0.060	1.524	0.041
Panel B: ID firms are subsidiaries and affiliates; IA firms are parent firms.							
[0:0]	0.000	0.402	0.047	2.367	0.033	1.545	0.007
[-1:0]	0.000	0.131	0.081	3.354	0.045	1.947	0.016
[-1:+1]	0.000	0.336	0.067	2.699	0.013	0.578	0.007
[-2:+2]	0.000	0.246	0.058	2.283	0.006	0.267	0.004
Panel B: ID firms are subsidiaries and affiliates; IA firms are parent firms.							
[0:0]	0.000	0.086	0.174	3.364	-0.018	-0.299	0.013
[-1:0]	0.000	-0.064	0.238	4.379	0.034	0.552	0.024
[-1:+1]	0.001	0.751	0.301	4.907	0.042	0.498	0.031
[-2:+2]	0.001	0.719	0.318	5.237	0.181	2.446	0.043

*CAR<sub>i</sub>* is the cumulative market-adjusted return of the ID firm, that is, a firm revising its previous earnings forecast.

*CAR<sub>j</sub>* is the cumulative market-adjusted return of the IA firm, that is, a firm in the same corporate group as the firm revising its previous earnings forecast.

*SD* is a dummy variable that takes a value of 1 if the difference between the sizes of the ID firm and IA firm is smaller than the median difference. Otherwise, *SD* takes a value of 0.

*LD* is a dummy variable that takes a value of 1 the difference between the sizes of the ID firm and IA firm is larger than the median difference. Otherwise, *LD* takes a value of 0.

Day 0 in the window is the date when the earnings forecast revision of the ID firm is reported in the newspaper.

*e* is an error term.

The Coefficients *a*, *b*, and *c* are regression coefficients estimated by ordinary least squares (OLS).

*t* is the *t* statistic of the null hypothesis that the estimated regression coefficient is zero.

<sup>#</sup>The firm size is the market value, defined as the number of issued stocks multiplied by the closing stock price at the close of the fiscal year from April 1994 and March 1995.

16 Data on the number of shares issued are acquired from *Kigyō Keiretsu Souran 1996*. The market values is calculated by multiplying the number of issued shares by the closing share price at the closing of the fiscal year between April 1994 and March 1995.

$$CAR_j = a + bSD * CAR_i + cLD * CAR_i + e \quad (5)$$

*SD* and *LD* are dummy variables. *SD* takes a value of 1 if the difference between the market values of the ID firm and IA firm is smaller than the sample median difference, and 0 if it is not. *LD* takes a value of 1 if the difference between the market values of the ID firm and IA firm is larger than the sample median difference, and 0 if it is not. The regression coefficient *b* represents the information transfer effects when there is only a small difference in the size of the ID and IA firms, and the regression Coefficient *c* represents the information transfer effects when the size difference is substantial.

Table 8 reports the estimated results of equation (5). Panel A shows that the regression Coefficients *b* and *c* are significantly positive in the case of the horizontal corporate groups. Information transfer effects can be observed in these horizontal corporate groups regardless of the size relation between the ID and IA firms. Panels B and C indicate the empirical results for the vertical corporate groups. All the regression Coefficients *b* are significantly positive, while the regression Coefficients *c* show no significant difference in almost all cases. Thus, our data indicate that information transfer effects can be observed in the vertical corporate groups when there is no difference between the sizes of the ID and IA firms.

## 5. Concluding Remarks

In this paper we treated two types of problems at the same time. The first problem concerned corporate groups; the second concerned the accounting of information transfer effects. In our statistical analyses we tried to determine whether the earnings forecast revisions of firms within corporate groups (financial corporate groups and capital-based corporate groups) brought about any information transfer effects. We found evidence that there were information transfer effects among both types of corporate groups.

We also tried to determine whether there were any differences in the information transfer effects between corporate groups conforming with different styles of Japanese management:

- (1) In the case of horizontal corporate groups, we observed information transfer effects when the earnings forecast revisions information included bad news, but not when they included good news. This findings fit well with the insurance and risk sharing hypothesis on the Japanese main bank system. The information transfer effects of firms in city bank corporate groups are stronger than those of firms of Pre-Zaibatsu corporate groups-groups with relatively stronger centripetal forces than the city bank corporate groups.
- (2) In the case of vertical corporate groups, information transfer effects can be clearly recognized in the narrow daily windows surrounding the announcement date when subsidiaries and affiliates firms revise their earnings forecasts as ID firms. In contrast,



information transfer effects are recognized in relatively wide daily windows surrounding the announcement date the when parent firms revise their earnings forecasts as ID firms. Even if the parent firms issue earnings forecast revisions, we can hardly recognize information transfer effects over subsidiaries and affiliates which are considerably smaller than the parent firms (that is, when there is a large differences in firm size). These findings might stem from a difference in the ability to interpret accounting information between investors in large parent firms and investors in small subsidiaries and affiliates.

Finally, we must also take account of the failures in the Japanese style of management in recent years, as exemplified by the collapses of main banks and inter-corporate stockholding arrangements. Thus, we should check whether any information transfer effects can be observed even at the turn of the century.

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## AGGLOMERATION ECONOMIES AND FORMATION OF SKILL

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### Abstract

This study pays attention to the role of regional policy in promoting skilled worker formation taking advantage of knowledge spillover. Pro-agglomeration policies to create core-periphery structure might be sustained in early stage of development due to insufficient scale economies. In later stage, excessive concentration diseconomies form congestion may prevail and the growth may be disturbed, leading to pro-dispersion argument. The latter, however, should be combined with policies of interconnection such that knowledge spillover keeps taking effects through interaction of skilled workers across the geographical distance.

*JEL Classification:* R11, R58, O18

*Keywords:* knowledge spillover, agglomeration, core-periphery, human capital

### 1. Introduction

Recent technological progress has reduced dramatically costs related to transactions of goods, information, and finance, enabling firms to take different location patterns than before. Some have already declared the death of distance.<sup>1</sup> This does not mean, however, that the location choice has become irrelevant. To the contrary, the globalization is a contributing factor to localization of industries competing intensely with innovation. Even with today's highly developed telecommunication systems, knowledge exchange among specialists requires face-to-face contacts in some crucial moments, especially when the knowledge is of tacit nature. As partly evidenced by an empirical study by Jaffe et al (1993), the high sensitivity to the distance of the knowledge transfer suggests that the reduction of transport cost has highlighted the relative importance of communication cost, inducing to minimization of costs of important meetings. Development of knowledge-based clusters thus being promoted is not the only in

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1 Cairncross (2001), p.201-203

metropolitan cities in developed countries like Tokyo and New York but it also occurs in developing countries in such big cities as Beijing and Bangalore.

In general, acquisition of specific and specialized knowledge requires substantial individual efforts and time but the environment of learning makes significant difference. Alfred Marshall (1920) explained the existence of externalities such that people in the industrial localization has an advantage of learning locally shared technology more quickly, or even unconsciously, as if there were something in the air.

Studies of endogenous growth classified this kind of knowledge spillover as influential factor of long-run economic growth.<sup>2</sup> In this vein, and also based on observation by Jacobs (1969), Lucas (1988) refers to cities as the core of knowledge creation. Saxenian (1994) documented lucid example of the knowledge spillover in Silicon Valley where talented people benefit from frequent interaction among themselves. More recently, Sonobe and Otsuka (2006) presented an empirical study showing that industrial localization first promote emergence of imitators and then the intensification of internal competition increases the motivation for Schumpeterian innovation.

Following the recent growth of studies on the role of knowledge and technology in creation of unequal spatial distribution of economic activities,<sup>3</sup> this paper tries to present a theoretical model which links the formation of an agglomeration and skill creation. While a great numbers of studies have explored the innovation nurturing role of industrial clusters, the spatial economics, or new economic geography, has been developed to explain the formation of an agglomeration of industries from different viewpoint, i.e., an interaction between scale economies and transport cost.<sup>4</sup> Ktugman (1991) insisted that knowledge spillover based explanation of agglomeration should depend on an ad-hoc ex-ante assumption on the source of externalities. Our study intends to make a contribution to fill this gap.

We consider the following model. The modern industrial sector (manufacturing) employs skilled and unskilled workers for their production. There are wide varieties of skilled workers and each one is endowed with differentiated working knowledge and competes with each other in the monopolistic competition market. The skilled workers receive wage premium. Hence, the higher the proportion of skilled workers at a location is, the greater is the size of local demand, which, in turn, attract more manufactured firms to locate there, increasing even more demand for skilled labor. This circular causation may result in agglomeration. Unlike the Hecksher-Ohlin type model of international trade where the amount of skilled and un-

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2 See, for example, Grossman and Helpman (1991).

3 Baldwin et. al. (2003)'s Chapter 7 and Mori and Turrini (2004). Fujita and Krugman (2004) argues that gathering of large variety of specialized people should enhance interaction and mutual learning, but gains from such interaction is diminishing in time because their knowledge will be assimilated in the long-run, leading to migration in search for the diversity of talent. Berliant et. al (2000) and Berliant and Fujita (2004) are path-breaking theoretical studies in this line of thinking to incorporate such dynamic process.

4 See Fujita, Krugman, and Venables (1999) or Fujita and Thisse (2002)

skilled are exogenously given, we allow unskilled workers to become skilled by paying certain fixed cost corresponding to education or training fee. We also assume that this fixed cost is reduced as a function of the number of skilled workers in the same region, in the spirit of Marshallian knowledge spillover. By this assumption, existence of a large pool of skilled workers enhances unskilled workers' acquisition of skill, but the increase of skilled labor strengthens the competition and reduces their wage premium. Equilibrium will be reached when the excess premium eventually becomes zero as the wage premium is equal to the fixed cost of unskilled becoming skilled and stops the influx of unskilled workers in the skilled labor market.

This model contributes to the analysis of the relationship between the skilled labor formation and the creation of agglomeration. However, our model simply assumes that the existence of the skilled labor pool promotes knowledge spillover but does not discuss how this may happen. Although our model does not go beyond the black-box approach on mechanism of knowledge spillover, it sheds light on the interaction between scale economies of skill formation and the market effect, which enables us to analyze the condition for the functioning of the above mentioned circular causation mechanism of agglomeration. Human capital is a critical issue in development economics and we hope the spatial economics viewpoint may also contribute to that literature.

The remaining part is organized as follows. Next section presents the basic structure of the model. In section 3, we derive the closed economy solution to analyze the general equilibrium solution set. The results will be applied to two regions setting in section 4 where the cases with and without inter-regional knowledge spillover are analyzed separately. The final section concludes our results.

## 2. Model

Our model is based on Fujita and Hamaguchi (2001) which incorporates the intermediate goods variety in the context of the Dixit and Stiglitz (1977) type monopolistic competition. It considers intermediate good sector consisting of firms producing many differentiated inputs. In the previous setting, we can stipulate the interaction in the vertical production linkage that the agglomeration of intermediate goods attracts final good production due to the advantage of higher productivity, which, in turn, will create larger demand for intermediate goods enabling further enlargement of input agglomeration.

In this paper, we reinterpret the input variety in Fujita and Hamaguchi (2001) as the skilled labor service variety. Under this assumption, we consider an economy consisting of two types of labor (i.e. skilled and unskilled) and analyze the interplay between industrial agglomeration and skilled labor formation. We consider this relationship is mutually reinforcing. Namely, industrial agglomeration promotes skilled labor formation, and vice versa.

There are two types of products in this model. One is the modern consumption good ( $Q$ ) and the other is the traditional consumption good ( $T$ ).  $Q$ -sector production requires differentiated skilled labor  $x_i$ , where  $i \in [0, n]$ , and unskilled labor  $L_Q$  by the production technology described by the following production function.

$$(1) \quad Q = \frac{L_Q^{1-\alpha} \left\{ \int_0^n (x_i^\rho)^{\frac{1}{\rho}} di \right\}^\alpha}{\alpha^\alpha (1-\alpha)^{1-\alpha}} \quad 0 < \alpha < 1, 0 < \rho < 1.$$

We assume that one unit of production of  $T$  requires just one unit of unskilled labor described as

$$(2) \quad T = L_T.$$

Unskilled worker is endowed with only one unit of labor service which is supplied inelastically. Thus,  $L_Q$  and  $L_T$  are number of unskilled workers in  $Q$ -sector and  $T$ -sector respectively, and the full employment holds by  $L_Q + L_T = L$ . Skilled workers choose rationally to specialize in one type of specialization due to the fixed cost and supply  $x_i$  units of labor service in response to demand. Therefore the size of skilled labor variety  $n$  corresponds to the number of skilled workers. Thus, for given population size  $N$  we have

$$(3) \quad L + n = N,$$

where  $n$ ,  $L_Q$ ,  $L_T$  are internal solution determined in equilibrium. In other words, the proportion of skilled to unskilled workers is not given ex-ante but it is an endogenous variable.

On the demand side, two types of workers share the same utility function

$$(4) \quad U = \frac{Q^\mu T^{1-\mu}}{\mu^\mu (1-\mu)^{1-\mu}} \quad \text{where } 0 < \mu < 1$$

and decide consumption of  $Q$  and  $T$  so as to maximize (4) under the budget constraint given the price of two goods  $P_Q$  and  $P_T$ . For total expenditure  $E$ , the first order condition gives the demand functions

$$(5) \quad Q = \frac{\mu E}{P_Q}$$

and

$$(6) \quad T = \frac{(1-\mu)E}{P_T}.$$

If we assume the wage of unskilled labor to be one, equation (2) suggests  $P_T = 1$ , and then

from equation (6),  $T = (1-\mu)E$ . Substituting (5) and (6) we have indirect utility

$$(7) \quad V = EP_Q^{-\mu}.$$

Factor demand in  $Q$ -sector is

$$(8) \quad L_Q = (1-\alpha)P_QQ = (1-\alpha)\mu E$$

$$(9) \quad x(i) = \frac{\alpha P_Q Q p_x(i)^{-\sigma}}{P_x^{-(\sigma-1)}} = \frac{\alpha \mu E}{p_x(i)} \times \left[ \frac{p_x(i)}{P_x} \right]^{-(\sigma-1)},$$

where  $P_x$  is a price index of skilled labor  $P_x = \left\{ \int_0^n p_x(i)^{-(\sigma-1)} di \right\}^{-\frac{1}{\sigma-1}}$  with elasticity of substitution  $\sigma \equiv 1/(1-\rho)$ .

For skilled worker, his opportunity cost of not providing unskilled labor service is 1 by normalization. He chooses  $p_x(i)$  so as to maximize the profit  $\pi = p_x(i)x(i) - 1 \times x(i)$  given the demand function (9). The profit maximization gives

$$(10) \quad p_x = \frac{1}{\rho}$$

for any  $i$ . Using (10) we have the price index  $P_x = \rho^{-1} n^{-\frac{1}{\sigma-1}}$  and substituting this into (9) we obtain the demand for individual skilled labor  $x = \rho \alpha \mu E / n$ . Then skilled worker's profit is given as

$$(11) \quad \pi = (p_x x - x) = \frac{\alpha \mu}{n \sigma} E$$

The skilled worker should pay fixed cost  $F$  regardless of  $x$  he provides. I assume  $F$  represents the cost of going to seminars and gathering information to keep his knowledge always updated. If  $\pi > F$ , there exists excess profit which induce more unskilled workers to become skilled, leading to increase of  $n$ . As equation (11) suggests, this should reduce  $\pi$  until the process continue to reach  $\pi = F$  when the entry stops eventually. If we have  $\pi < F$ , a part of skilled workers exit and become unskilled. In this model, the interaction between  $\pi$  and  $F$  determines the equilibrium, where the former is determined by the market size  $E$  and the degree of competition  $n$  and the latter represents the technological environment.

Now we introduce an assumption that the increase of  $n$  will reduce  $F$ . This assumption represents the environment where the larger pool of skilled workers promotes acquisition of specialized knowledge at lower cost due to knowledge spillover. However, if  $n$  gets to become too large, gains from such externalities shrink because difficulties may arise to make contact with all skilled workers. For the simplification, we assume that the relationship

between  $F$  and  $n$  is represented by the following logistic curve.

$$(12) \quad F(n) = f \left( 1 - \frac{1}{a + n^{-2}} \right) \quad f > 0, a > 1$$

With this formulation,  $F(0) = f$  and  $F(\infty) = 1 - 1/a$ , where  $f$  is some fixed parameter and  $a$  represents disturbance for spillover.

Let  $x^*$  denote an equilibrium level of skilled labor supply with  $\pi = F$  and hence no excess profit, then from equation (11) we obtain

$$(13) \quad x^* = F(\sigma - 1)$$

Substitution of (13) into (9) yields

$$(14) \quad n = \frac{\alpha\mu E}{\sigma F}.$$

Since  $L_T = T = (1 - \mu)E$  from equations (2) and (6), substituting this and (8) and (14) into (3) we get

$$N = (\alpha\mu/\sigma F)E + (1 - \alpha)\mu E + (1 - \mu)E = \left[ 1 - \left( 1 - \frac{1}{F\sigma} \right) \alpha\mu \right] E.$$

Solving this equation for  $E$ , the total expenditure is expressed in terms of the population size  $N$  such that

$$(15) \quad E = \frac{N}{1 - \left( 1 - \frac{1}{F\sigma} \right) \alpha\mu}.$$

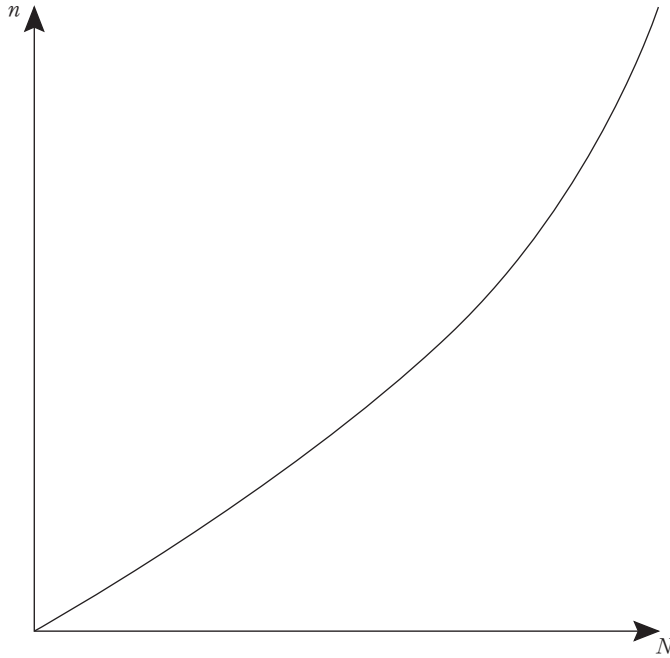
Then, by substituting (12) and (15) into (14), we obtain the relation between the population size and the number of skilled workers as

$$(16) \quad n \left[ 1 + \sigma f \left( 1 - \frac{1}{a + n^{-2}} \right) \left( \frac{1}{\alpha\mu} - 1 \right) \right] = N$$

This relationship is depicted by Figure 1. Increasing the size of population  $N$  will enlarge the total expenditure  $E$  which then increases the demand for skilled labor  $n$ . The upward curve of Figure 1 demonstrates the existence of spillover effect which promotes the number of skilled labor more than proportionally. However, by the assumption of equation (12),  $F$  approaches to a fixed number when  $n$  is sufficiently large, then the relationship between  $N$



Figure 1



and  $n$  may become linear. Equation (16) suggests that the proportion of the skilled worker in this economy  $n/N$  (e.g. the slope of Figure 1) will gradually increase from  $1/[1+\sigma f(1/\alpha\mu-1)]$  to  $1/[1+\sigma f(1-1/a)(1/\alpha\mu-1)]$ . This illustrates the role of knowledge spillover for promoting the formation of skilled workers more than proportional to the growth of the market size.

Next, from equations (5) and (6) we obtain the marginal cost of  $Q$ -sector production

$$(17) \quad P_Q = \left( \rho n^{\frac{1}{\sigma-1}} \right)^{-\alpha}.$$

As being expressed by equation (17), an increase of skilled labor variety  $n$  cause decline of  $P_Q$ . This represents an improvement of productivity in the modern industry. Recalling the utility function (7), this, in turn, implies increase of utility level of unskilled workers whose expenditure is normalized to be one. Impact on utility of skilled workers remains ambiguous because the increase of  $n$  reduces their income  $p_x x^*$  through decline of  $F$  by equations (10) and (13).

### 3. Two-regions economy

In this section we apply the model developed above to an economy consisting of two regions

$A$  and  $B$ . For simplicity, we assume that the two regions have the same population size ( $N^A = N^B = N$ ). We also assume that there is no transportation cost for inter-regional trade of  $T$ -good. Given the same technology of the  $T$ -good production in both regions expressed by equation (2), this assumption makes wage of unskilled workers to be 1 in both regions. We will maintain these assumptions in the remaining part of this paper. Trade of  $Q$ -good, in turn, requires iceberg-type transport cost, i.e.  $P_Q t$ .

We incorporate knowledge spillover between regions. Then equation (12) is rewritten as

$$(18) \quad F^r(n^r, n^s) = f^r \left( 1 - \frac{1}{a + n^{r-2}} - \frac{1}{\theta + n^{s-2}} \right) \quad (r, s) = (A, B) \text{ or } (B, A)$$

where  $\theta > 1$  is a parameter to represent the friction of knowledge spillover across regions.

Consider two symmetric regions where the production of  $T$  and  $Q$  are exactly the same and there is the same number of skilled workers, i.e.  $n^A = n^B = n$ . Then, equation (18) is rewritten as

$$(19) \quad F(n) = f \left( 1 - \frac{1}{a + n^{-2}} - \frac{1}{\theta + n^{-2}} \right)$$

and equation (16) becomes

$$(20) \quad n \left[ 1 + \sigma f \left( 1 - \frac{1}{a + n^{-2}} - \frac{1}{\theta + n^{-2}} \right) \left( \frac{1}{\alpha \mu} - 1 \right) \right] = N.$$

It is straightforward to see that  $n^*(N)$  derived from equation (20) is greater than the one obtained from original equation (16) without considering inter-regional knowledge spillover. Substitution of the solution  $n^*(N)$  into equation (19) to obtain  $F(n^*)$  and we can specify the set of equilibrium solutions from equations (5), (6), (8), (13), (15), and (17) as follows:

$$\begin{aligned} Q &= \mu E(n^*) \left( \rho n^{*\frac{1}{\sigma-1}} \right)^\alpha \\ T = L_T &= (1 - \mu) E(n^*) \\ L_Q &= (1 - \alpha) \mu E(n^*) \\ x &= F(n^*) (\sigma - 1) \\ E &= \frac{N}{1 - \left( 1 - \frac{1}{F(n^*) \sigma} \right) \alpha \mu} \\ P_Q &= \left( \rho n^{*\frac{1}{\sigma-1}} \right)^{-\alpha}. \end{aligned}$$

From equation (7), the indirect utility for unskilled workers is

$$V_L = \left(\rho n^* \frac{1}{\sigma-1}\right)^{\alpha u}$$

And for skilled workers

$$V_X = f(n^*)(\sigma-1) \left(\rho n^* \frac{1}{\sigma-1}\right)^{\alpha u}.$$

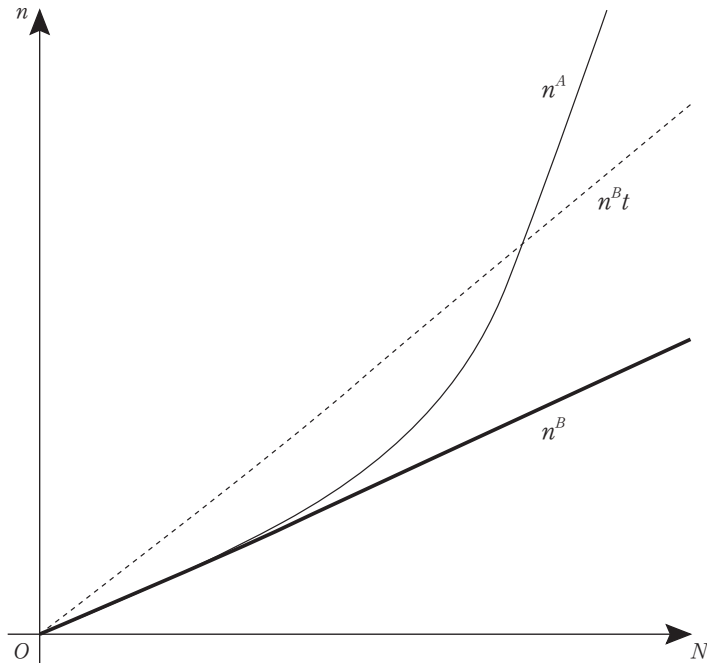
Base on these results, we can analyze the effect of reduction of  $a$  which represents greater easiness in intra-regional interaction with skilled workers and higher knowledge spillover. The direct effect is seen in equations (19) and (20) as a decrease of  $F$  and increase of  $n^*$  (formation of more skilled workers). Indirect effects appear as decrease of  $P_Q$  and  $E$  (because of the relative increase in price of  $T$ -good which is the numeraire in this case), as well as a decrease of unskilled workers. Indirect utility of unskilled workers rise and that of skilled labor remains ambiguous but the welfare gap between them  $V_X/V_L$  will be decreased.

Now, consider the case in which reduction of  $a$  takes place only in region  $A$ , leading to  $n^A > n^B$ . The increase of  $n^A$  results in decline of  $P_Q(n^A)$ . If  $P_Q(n^A)t < P_Q(n^B)$ , then it will be cheaper to import  $Q$ -good in region  $B$  and there will be no production. This condition is obtained using equation (17) as

$$(21) \quad n^A > n^B t^{\frac{\sigma-1}{\alpha}}$$

Figure 2 shows that the above condition more likely holds with larger population size because

Figure 2



the knowledge spillover is bigger. Low transport cost  $t$  also makes this result more probable. Under this condition, region  $B$  is specialized in  $T$ -good and region  $A$  is specialized in  $Q$ -good, hence all skilled workers live in region  $A$ , leading to the core-periphery spatial structure. Notice that unlike other models of spatial economics a la Fujita-Krugman-Venables (1999) we did not introduce scale economy in production but our model suggests that the scale economy in skilled worker formation has the same impact.

#### 4. Core-Periphery I: Inter-Regional Specialization

In this section we focus on the analysis of the core-periphery structure with inter-regional specialization like the one which we presented in the final part of the previous section.

The  $Q$ -good production in region  $A$  should satisfy the demand in the both regions. Taking the iceberg transport cost into account, from equation (5) we have

$$(22) \quad Q = \frac{\mu E^A}{P_Q^A} + \frac{\mu E^B}{P_Q^A t} = \frac{\mu(E^A + N)}{P_Q^A}.$$

Notice that the total expenditure in region  $B$  equals to  $N$  because all the population is unskilled earning normalized wage. Next, the equilibrium of  $T$ -good market is given by

$$(23) \quad \mu N = (1 - \mu)E^A - L_T^A.$$

The left hand side represents the exports from region  $B$  which was not consumed locally, while the right hand side expresses the total demand minus local production in region  $A$ . Transport of  $T$ -good is costless by assumption. Labor market equilibrium condition requires

$$(24) \quad N = n + (1 - \alpha)P_Q^A Q + L_T^A,$$

to which equations (22) and (23) are substituted to yield

$$(25) \quad n = (1 + \alpha\mu)N - (1 - \alpha\mu)E^A.$$

Using equations (9), (13) and (22), we obtain

$$(26) \quad n = \frac{\alpha\mu}{F(n)\sigma}(E^A + N).$$

From (25) and (26) we have

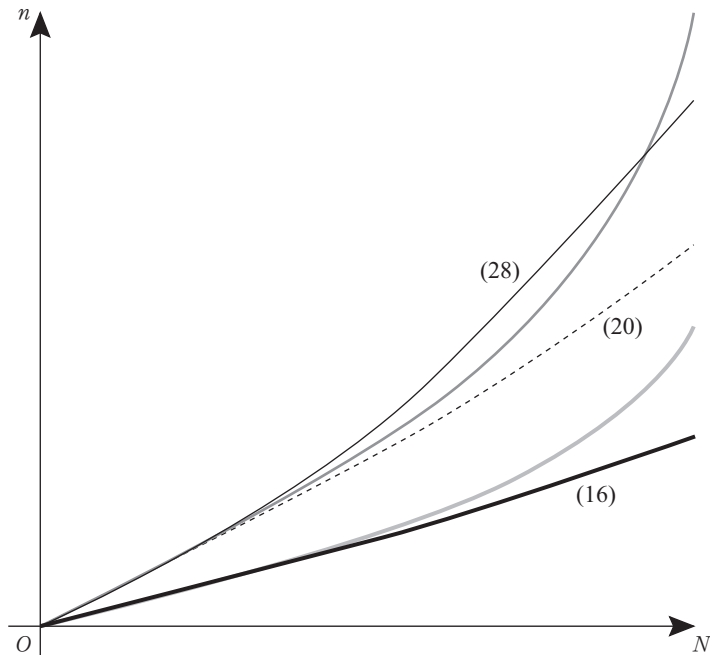
$$(27) \quad E^A = \frac{1 + \alpha\mu \left(1 - \frac{1}{F(n)\sigma}\right)}{1 - \alpha\mu \left(1 - \frac{1}{F(n)\sigma}\right)} N$$

Next, substitute (27) in (26) and use (12) to obtain

$$(28) \quad n \left[ 1 + \sigma f \left(1 - \frac{1}{a + n^{-2}}\right) \left(\frac{1}{\alpha\mu} - 1\right) \right] = 2N.$$

Figure 3 compares equilibrium number of skilled workers obtained by equation (16) - symmetric two regions and only intra-regional knowledge spillover-, equation (20) - symmetric two regions with inter-regional knowledge spillover-, and equation (28) - asymmetric two regions. Dotted lines are some of  $n_s$  in two regions which are twice as large as each solid lines. In this figure, first observe that the difference between (16) and (20) is more significant with larger population size. We can see in this figure that the case of asymmetric space generates larger number of skilled workers. Next, while  $n$  from equation (28) is always greater than  $2n$  from equation (16),  $2n$  from equation (18) can exceed  $n$  from equation (28) with large population. This suggests the negative effect of congestion in the core. We may conclude that at the early stage of development, the core-periphery structure can promote

Figure 3



more skilled worker formation but the balanced two regions structure with developed connection to allow inter-regional knowledge spillover may result in better consequence when the market size reaches to a certain level.

## 5. Core-Periphery II: Imperfect Inter-regional Specialization

This section analyzes alternative core-periphery structure where  $Q$ -good production takes place in both regions but all skilled workers reside in on region and commute to the other region to provide the skilled labor service. Here, we assume that one skilled labor cannot provide his labor to the both regions at the same time. In region  $B$ , which is the periphery, a skilled worker face  $\pi(B) < F^B$  then he cannot be sustained as a skilled worker residing in region  $B$ . However, residing in region  $A$  where he is surrounded by other skilled workers and his fixed cost  $F^A$  is lower, then  $\pi(B) > F^A$  and the difference  $\pi(B) - F^A$  covers the travel cost from  $A$  to  $B$ .

The reason for supplying the skilled labor from  $A$  to  $B$  but not  $Q$ -good itself could be understood by the existence of large trade cost of  $Q$ -good to hold  $P_Q^A t > P_Q^B$ . At the same time, there is a factor requiring higher fixed cost represented by  $f^A < f^B$ . Low level of education in region  $B$  might be concrete example of this difficulty. Under such conditions we have  $F^A < F^B$  and  $\pi^A < \pi^B$ . Some skilled workers enjoying lower fixed cost are motivated to provide services by commuting to region  $B$  where the profit is higher. This activity is viable only if the expected profit is high enough to compensate the traveling cost which we denote  $\tau$ , such that

$$\pi^B - F^A > \tau.$$

In order to hold the core-periphery structure, the non-profitability condition for skilled workers residing in region  $B$ ,  $\pi^B < F^B$ , should be satisfied. Using equation (18), this can be specified as

$$(29) \quad f^B \left( 1 - \frac{1}{a + (n^B)^{-2}} - \frac{1}{\theta + (n^A)^{-2}} \right) - f^A \left( 1 - \frac{1}{a + (n^A)^{-2}} - \frac{1}{\theta + (n^B)^{-2}} \right) > \tau.$$

It is shown that it is more likely that this condition holds when  $f^B$  is sufficiently larger than  $f^A$  and the commuting cost  $\tau$  is sufficiently small.

Finally, we study the effect of taking this spatial configuration on skilled labor formation. The population in region  $A$  consists of skilled workers supplying labor in region  $A$  and those supplying in region  $B$ , denoted respectively by  $n^A$  and  $n^B$ , unskilled workers employed in  $Q$ -good production,  $L_Q^A$ , and other unskilled workers in  $T$ -good sector  $L_T^A$ . All the population in region  $B$  are unskilled employed in either  $Q$ -good sector or  $T$ -good sector, denoted

as  $L_Q^B$  and  $L_T^B$ , respectively. From equation (8) we have  $L_Q^A = (1-\alpha)\mu E^A$  and  $L_T^A = (1-\alpha)\mu E^A = (1-\alpha)\mu N$ . Production of  $T$ -good in region  $A$  fulfills the difference between the total demand and imports from region  $B$ , namely,  $T^A = (1-\mu)E^A - (T^B - (1-\mu)E^B)$ . Since the labor market equilibrium in region  $B$  requires  $T^B = N - L_Q^B = [1 - (1-\alpha)\mu]N$ , by substitution we get  $T^A = (1-\mu)E^A - \alpha\mu N = L_T^A$ . For the labor market equilibrium in region  $A$ ,  $N = n^A + n^B + L_Q^A + L_T^A$ . By substitution we obtain,

$$(30) \quad E^A = \frac{(1+\alpha\mu)N - n^A - n^B}{1-\alpha\mu}.$$

The market clearing condition of skilled labor service is given by equation (14). In region  $B$ , we set  $E^B = N$  and add the commuting cost  $\tau$  to the the fixed cost, then we obtain

$$(31) \quad n^B = \frac{\alpha\mu N}{(F+\tau)\sigma}$$

Both  $n^A$  and  $n^B$  reside in region  $A$  and create knowledge spillover effect on  $F$  together, described as

$$(32) \quad F(n^A, n^B) = f\left(1 - \frac{1}{a + (n^A + n^B)^{-2}}\right)$$

After substituting equation (30) into (31), and using (14) we obtain

$$(32) \quad E^A = \frac{1 + \alpha\mu - \frac{\alpha\mu}{(F+\tau)\sigma}}{1 - \left(\alpha\mu - \frac{\alpha\mu}{F\sigma}\right)} N$$

$$(33) \quad n = \frac{1 + \alpha\mu \left[1 + \frac{1}{(F+\tau)\sigma}\right]}{F\sigma \left(\frac{1}{\alpha\mu} - 1\right) + 1} N$$

$$(34) \quad (n^A + n^B) \left[1 + F\sigma \left(\frac{1}{\alpha\mu} - 1\right)\right] = \left[2 - \frac{\tau(1-\alpha\mu)}{F+\tau}\right] N$$

where  $F$  is given by (32). We are able to calculate  $n^A + n^B$  from equation (34). If  $\tau = 0$ , this is the same as  $n$  of equation (28) but when  $\tau > 0$  this will be smaller.

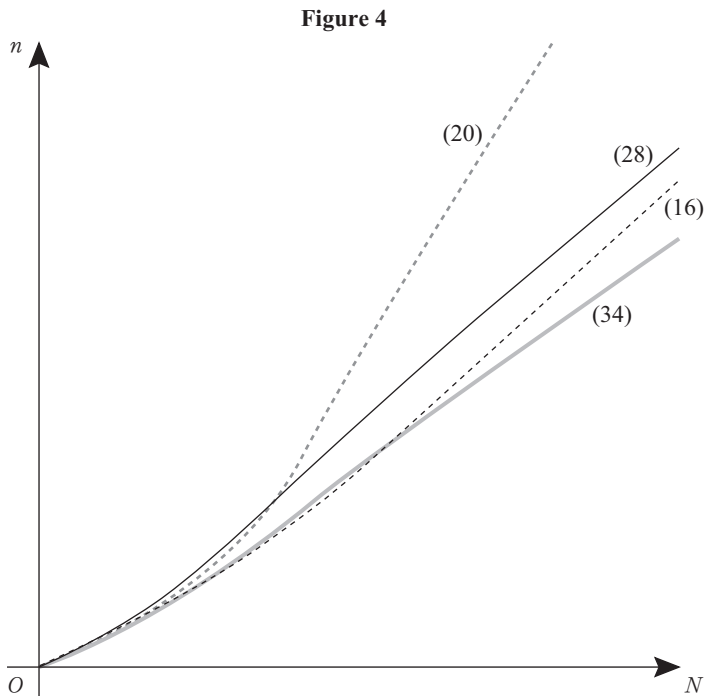


Figure 4 summarized the comparison of the second type core-periphery with others which we have analyzed in the previous section. It should be noted that skilled labor formation derived as equation (34) results in inferior outcome than the core-periphery with specialization in production. This suggests that when the periphery is constrained by the lack of skilled workers it should not insist on local production of modern consumer good. In the long-run, the periphery should benefit from removing such structural problems and promote knowledge spillover from the core to be able to move to the equilibrium depicted by equation (20).

## 6. Concluding remarks

This study pays attention to the role of regional policy in promoting skilled worker formation taking advantage of knowledge spillover. Analysis of Figure 3 reveals that pro-agglomeration policies to create core-periphery structure might be helpful in early stage of development due to insufficient scale economies. It also suggests that in excessive concentration diseconomies form congestion may prevail and the growth may be disturbed, leading to pro-dispersion argument. The latter, however, should be aware of the importance of networking such that knowledge spillover keeps effects through interaction of skilled workers across the geographical distance.

Our findings lead to future research tasks. First, our model depends crucially on the



assumption of ad-hoc functional form of knowledge spillover and did not get into the inside of the “black box” in which the knowledge spillover is generated through the interaction of skilled workers. It is desirable to endogenize such micro behavior explicitly into the model.

Secondly, the process of education for an unskilled to become skilled should be incorporated in the analysis.

Thirdly, further empirical analysis is needed. Especially, the relation between innovation and agglomeration is not fully explored, although the notions of “knowledge-based clusters” or “brain cities” are widely accepted. The question of how to track the knowledge flow between people still remains unanswered.

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