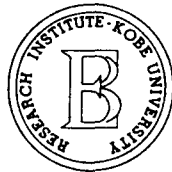


**KOBE  
ECONOMIC & BUSINESS  
REVIEW**

**37th**

**ANNUAL REPORT**



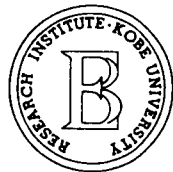
**RESEARCH INSTITUTE FOR ECONOMICS  
AND BUSINESS ADMINISTRATION  
KOBE UNIVERSITY**

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CORPORATE BEHAVIORS ON DISCLOSURE OF SOCIAL  
RESPONSIBILITY INFORMATION AND DISTRUST  
DISSOLUTION ACCOUNTING  
..... A SURVEY OF RESEARCHES NOT BASED  
ON RIGOROUS MODELS .....

Isao NAKANO

1. Introduction

Currently, we are suffering from almost global environmental risks. Enlarging ozone holes, increasing carbon dioxide in the air and its resulting raise in temperature, disappearing tropical forests engendered by rash attempts at economic progress of developing countries, the environmental pollutions by industrial entry of developed countries are some of the examples of the dangers. No one could deny social responsibility of corporate activities because they are largely attributable to accumulated effects of their behaviors.

In such a threatening situation, how are the corporations making efforts to overcome those environmental risks and disclosing this line of activities in their social reports? This theme interests us from the scientific aspect of studying the firms' disclosure phenomenon as well as from the social policy viewpoint of considering the best disclosure rules of the corporate social responsibility activities. The latter point we wish to stress since policy making must start from accurate recognition of reality.

This theme is very significant as accounting research, too. In my opinion, one of major aims of financial accounting lies in controlling and subduing egoistic, anti-social behaviors of the firm by forcing appropriate social disclosure<sup>1)</sup>. For example, extant periodic

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1) Systematic studies from the agency theory point-of-view of some problems in the external accounting system were made in the following book; Isao Nakano, *Kaikei Sokuteiron --- Hushin Kaishou Kaikei no Kouchiku* (Accounting Measurement Theory --- Towards Constructing Distrust Dissolution Accounting), Doubunkan Shuppan, Co., Tokyo 1987.

income measurement system which is based on capital maintenance tends to prevent managers from deceptive actions, excessive negligence or selecting of investment projects which will lead to their own utility maximization, not to the investors'. That is, a lowered income figure would signal investigation of managerial responsibility<sup>2)</sup>. By this controlling and dissolving of the distrust, it is expected that the economic relationship between the investors and managers can be maintained to a tolerable degree. In this sense, 'distrust dissolution' may be said to be the basic accounting purpose. (A few words for the prevalent accounting aim of 'usefulness to decision makings'. Unless such distrust dissolution has been made, no decision-makers would prefer to use the information. So, this purpose may be said to be the deeper, basic purpose of accounting than the 'decision usefulness').

However, there is a limitation to this widely accepted view which reflects agency theory. It is the narrowness of the scope of responsibility. Only to the external investors are the firms considered responsible. In reality, not only the investors but also the community, employees, government and in the last analysis the earth will have to be regarded as the objects of corporate responsibility. In this view of the firm's enlarged responsibility area, dissolution of the distrust towards the firm of those enlarged human groups may be said to serve assuring the survival of the corporation. A business information system for this purpose we may call 'enlarged external accounting reporting system' which is based on the enlarged social responsibility concept. In this sense, social responsibility information and classical accounting information are homogeneous and oriented towards the same (i.e. distrust dissolution) purpose.

But we have thus far gone in a too pragmatic and futuristic way. In the near future, we are more modestly planning to research empirically in what situation and to what degree Japanese corporations are reporting social responsibility information (as

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2) It is a great contribution of agency theory that the traditional view of managers as loyal agents of the shareholders has been replaced with a new concept of managers as more real human beings as maximizers of their own expected utilities. Cf. M. C. Jensen and W. H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*, *Journal of Financial Economics*, 3, 1976; E. F. Fama, *Agency Problems and the Theory of the Firm*, *the Journal of Political Economy*, April 1980.

defined below) to find out, if any, regularities or tendencies in the disclosure behaviors. As a prerequisite for this study, we wish to survey in this paper some Japanese and foreign literature relating to this subject, so as to see what are there to learn and also what are there to modify and improve in our future research. The research articles we will take up here happen not to be based on any rigorous firm model. So is the subtitle of this paper, 'A survey of researches not based on rigorous models'.

## 2. Researches on (especially social responsibility) information disclosure by Japanese corporations

Professor H. Yamaji studied 121 Japanese corporations' annual reports to quantify, by applying some content analysis approach, the extent of each of their information disclosure<sup>3)</sup>. In this context, the whole information, not solely the social responsibility information, was investigated. His method of quantification involved 'deriving special aggregate disclosure score. Raw data were classified into number of words (description score), trend tables (trend table score), graphs and photographs (visual score), number of items in the income statement (I/S score) and number of items in the balance sheet (B/S score). Then, for each category, the firm with the highest score was given a 100 points, and the other firms were evaluated relative to that level. But exceptionally, some corporations got a higher than 100 points, because two years' comparisons or yearly variations were given 10 points. Accordingly, our formula goes as follows; description score + trend table score + visual score + I/S score + B/S score = aggregate disclosure score.'<sup>4)</sup> Applying this, he got the result that each corporation group belonging to the Mitui Bank group, the Mitubishi, the Sumitomo, the Sanwa, the Huyou or the Ichikan respectively achieved mean aggregate values of 232.4, 220.3, 205.9, 214.2, 228.8, 227.7. The sample size in each group were 18, 19, 14, 23, 23, 24.'<sup>5)</sup>

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3) H. Yamaji, *Kaikei Joho no Kokai Teido no Sokutei Mondai nituite* (On Measurement Problems of the Degree of Accounting Information Disclosure), *Kokumin Keizai Zasshi*, Vol.144 No.6, Dec. 1981, pp.48-65.

4) *Ibid.*, pp.57-59.

5) *Ibid.*, p.59.

Based on these sample data, Yamaji attempted to discover any relationships between those reporting firms' characteristics and the degrees of their information disclosures. American prior researches applied regression analysis. But Yamaji stated, 'The disclosure points as the dependent variable are considerably subjective, has some character of ordinal number and are limited from above. Therefore, regression analysis cannot be used here to a great advantage.'<sup>6)</sup> So, he chose variance analysis in place.

His result showed that only two factors were significantly related to the different degrees of disclosure; industry category and firm size. The latter was measured by capital stock, number of the stockholders, asset size or number of employees, all of which proved significant. In contrast, earning rates could not explain differing extents of disclosure<sup>7)</sup>.

Then, why did different industries relate to different degrees of disclosure? And also why did different sizes do it, too? On the former, Yamaji said different industries wished to stress different points to appeal to the society. Overwhelmingly great scores were attained by banking and insurance companies. 'Banks' high scores mainly came from descriptive points on relations to their community, while trading firms detailed on their own activity areas to achieve the great scores. In addition, both corporations used considerably many trend tables to summarize multiperiod results. Machinery and appliance firms produced in-depth presentations on their products. In the biggest key industries, social responsibility information were published more than product or activity-related descriptions. We also note the banks preferred to show off their social powers like trend tables on deposit balances, but were very reluctant to publish stockholder data broken down by local area, numbers of stocks they owned or by main owners.'<sup>8)</sup>

In interpreting the difference in information disclosure by firm size, Yamaji stated that 'greater corporations own a larger number of interested people, so they cannot be ignored even in the annual reports which formally are directed to the stockholders alone. Stated

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6) Ibid., p.55.

7) Ibid., pp.59-63.

8) Ibid., p.60

differently, those greater firms are forced to consider general investors not only as investors per se but also as consumers, laborers and community members, too. Business reports, therefore, are being utilized by the big firms as a means of communication to the public in general, not narrowly focusing on stockholder - or investor - directed information.<sup>9)</sup>

This Yamaji paper, though not focusing on social responsibility disclosure, interests us in that the two factors of 'category of industries' and 'firm size' discovered by him happen to be significant in social disclosure literature cited below.

We will next survey Professor T. Yamagami's study on social disclosure in Japan<sup>10)</sup>. He selected 49 of the largest Japanese manufacturing companies in reference to the Fortune 500 industrial companies outside US<sup>11)</sup>. And a very straightforward description was made on their social disclosure. He concluded no sufficient disclosure rules are made with respect to social information in our accounting laws (i.e., in our commercial law or in our security and exchange law). And the actual content of the disclosure is very limited. On the other hand, our corporations are reporting some social data via other media than the formal accounting statements. Among others, the 'business reports (Jigyō Houkokusho)' (voluntary corporate reports reflecting the annual reports which are prepared and sent to stockholders etc., after the stockholders' meeting), the English reports (issued when US or other foreign funds have been invested in the firm) and the unofficial PR reports sometimes include social information. Especially, most active disclosure is being seen in PR reports<sup>12)</sup>. These three kinds of unofficial corporate reports --- which

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9) Ibid., p.63.

10) T. Yamagami, *Wagakuni no Kaikei Disukurohjaa to Shakai Kanren Joho* (Japanese Accounting Disclosure and Social Information, in: T. Yamagami (ed.), *Kaikei Joho to Disukurohjaa --- Shakai Kanren Joho no Kaiji o Chushin to site* (Accounting Information and Disclosure --- with Special Reference to the Disclosure of Social Information), Hakutoh Shoboh, Tokyo 1988, Chapter 5. Approximately same description was published in: T. Yamagami, *Gendai Kigyo no Keiei Bunseki --- Shakai Kanren Kaikei to Shakai Kanren Bunseki* (Business Analysis of Modern Corporations --- Social Accounting and Social Analysis of the Business), Hakutoh Shoboh, 1988, The 20th Lecture.

11) *Directory of the Largest Non-US Industrial Corporations*, Fortune, August 4, 1986; *The Largest US Corporations*, ditto, April 28, 1986.

12) T. Yamagami, *Wagakuni no ---*, ditto, p.190.



he calls 'corporation reports' --- were investigated by Yamagami. He checked in a dichotomous way if social disclosure was made or not by the total 49 firms and he also disaggregated the result by each major industry. Dividing the social information into several items, he carefully counted how many companies reported each category of social information in each of the three types of reports.

The first problem which concerns us is, 'what is social information?'. Yamagami determined the five categories to be social information; corporation's research and developments, environment protection, community relations, corporate international activities and employee relations. My frank impression is that it is not clear on what basis Yamagami included those items and excluded others. (Ex., how about government relations?). Yamagami broadly says, 'Social information has been established as broadly as possible. And the classification and summation were made in a rather relative way.' (His expression 'relative' seems to mean 'tentative'). It is so because 'Defining social information is very difficult in relation to corporate purpose of income achievement and so a relative classification is inevitable. It is in a sense desirable to define it broadly to ease future development of social disclosure.'<sup>13)</sup> He also states disclosure of social items 'all tends to converge on the corporate purpose of income attainment. In that sense, what precisely are true social items is rather relative (tentative --- in Nakano's interpretation).'<sup>14)</sup> By this remark, he may be said to be admitting that those social information items, even though they all capture some relationship between the firm and society, will result in, and will aim at, the firm's income achievement purpose.

To this point do I heartily agree. All voluntary unofficial information disclosure seems to me to be dictated by the corporate aim of long-range profit maximization. A corporate behavioral model of information disclosure based on this view-point is in preparation by this author.

The second point to note in Yamagami's research is his finding that unofficial PR reports do include most active disclosure of social information. To see this, we will cite his conclusion<sup>15)</sup>;

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13) T. Yamagami (ed.), *Kaikei Joho to Disukurohjaa* ---, ditto, p.5.

14) *Ibid.*, p.199.

15) *Ibid.*, p.199-200.

'(1) Not much reporting of social information are found in the official accounting reports (according to the commercial code and also to the Securities and Exchange Law);

(2) In contrast, unofficial reports (corporation reports) include considerable amount of the disclosure but not comparable to some foreign countries'.

(3) Of those corporation reports, both business reports and English reports are being restricted by commercial law and the US SEC regulations, so that social reporting is not being made to a great extent.

(4) But in the PR reports, each firm can disclose any information, with rather active disclosure of social information.

(5) Looking at specific items, 'research and developments' and 'international activities' are actively being described.

(6) On the other hand, 'community relations'. 'environment protection' and 'employee relations' are the fields, though some examples of reports are found, not often communicated as yet.

(7) In particular, labor union relations and employee relations are not being reported in a formal external way like some other countries, but are being published in other media such as each corporation's internal journal or its internal newspaper. It is due to our different (family-member like --- Nakano) view of employees.'

Table 1: Disclosure of Social Information by Japanese 49 Firms

Total firms 49	R & D	Environ. protect.	Community relation	Inter'l activity	Employee relation
Business reports	38	0	6	23	21
49 firms 100.0%	77.6%	0.0%	12.2%	46.9%	42.9%
English reports	41	3	9	35	12
47 firms 95.9%	87.2%	6.4%	19.1%	74.5%	25.5%
PR reports	41	13	25	39	17
49 firms 100.0%	83.7%	26.5%	51.0%	79.6%	34.7%

(The first line of each cell shows the number of relevant firms).

This finding seems to suggest it will just be enough to take up the PR reports ('kaisha gaiyou' --- Corporation Summary), in studying Japanese corporate social disclosures, because they include those data most extensively. My another impression is that Yamagami's definition of 'social information' is, though rather fuzzy, different from our conception of 'social responsibility information' as those information related with controlling of the egoistic evils which are being secreted by the business enterprise. We will have to make our own definition later.

Lastly, we will republish his table<sup>16)</sup>, as Table 1, on the state of disclosure of social information by the total 49 corporations.

### 3. Some researches on relationships between social responsibility information disclosure and characteristics of the firms.

We will next survey three foreign articles which investigated relationships between the extent of social responsibility information and the firm's characteristics (such as its size, earnings rate, its industry affiliation, etc.) This kind of research may be hoped to reveal some clues to finding the firm's intention for which it is publishing social disclosure. This survey we are going to do as a prerequisite for our own future study on such disclosure behaviors of Japanese firms.

The first research is that by Cowen, Ferreri and Parker (1987)<sup>17)</sup>, which we will abridge as CFP in the following. Data used were from those in Ernst and Ernst 1978 which dealt with corporate social responsibility disclosure in annual reports of 134 US corporations in Fortune 500. They belonged to (1) food, (2) textile and vinyl flooring, (3) paper, fiber and wood products, (4) chemicals, (5) petroleum refining, (6) glass, concrete etc., (7) metal manufacturing, (8) metal products, (9) electronics and appliances, (10) measuring scientific photographic equipment. What interests us most is that the following seven areas were identified as social

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16) Ibid., p.192.

17) Scotts S. Cowen, Linda Ferreri and Lee D. Parker, The Impact of Corporate Characteristics on Social Responsibility Disclosure: A Typology and Frequency Based Analysis, Accounting, Organizations and Society, Vol.12 No.2, 1987, pp.111-122.

disclosure by CFP<sup>18)</sup>. (This relied on Ernst and Ernst, 1978, pp.22-28).

- (1) Environment
- (2) Energy
- (3) Fair business
- (4) Human resources
- (5) Community involvement
- (6) Products
- (7) Others

To what extent did the firms report information on each category and also on the total of social responsibility information? (Here, the 'extent' of disclosure in each category was to be measured by the number of subcategory items disclosed). And to what degree did the disclosure of each category relate to various factors? This relation was investigated by CFP applying regression analysis. The explanatory factors (independent variables) used were, considering former studies, determined as the following four.

- (A) Firm size as measured by sales
- (B) Industry
- (C) Return on equity
- (D) If the firm had established the social responsibility committee.

Why were these variables chosen? As to the firm's size, CFP stated that larger companies tend to receive more attention from the general public and therefore to be under greater pressure to exhibit social responsibility. Furthermore, they added that larger companies have more shareholders who might also be concerned with social programs undertaken by the company<sup>19)</sup>.

Next, the reason for including the industry classification involves existence of consumer-oriented industries. These industries can be expected to exhibit greater concern with demonstrating their interest in social responsibility since corporate image among the mass market consumers is likely to have an influence over the amount of sales generated. Also, --- some industries are believed to feel greater governmental pressures in certain areas of corporate social

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(18) Ernst & Ernst 1978, *Social Responsibility Disclosure: 1978 Survey*, Cleveland: Ernst & Ernst, 1978.

(19) Cowen, Ferreri and Parker, *op. cit.*, p.113.

responsibility and are, therefore, more likely to attempt to enhance their image through social responsibility disclosures. For example, --- companies whose economic activities modify the environment such as the extractive industries are more likely to disclose information about their environmental impactd than are companies in other industries<sup>20)</sup>.

Third, the reason for including corporate profitability is that there are some who cite the profitability as a factor that allows, or perhaps impels, management to undertake and to reveal to shareholders more extensive social responsibility program<sup>21)</sup>. The last variable is concerned about whether the firm has established the social responsibility committee or not. This has not been cited in literature. But CFP states that the existence of such committees could be associated with a greater corporate propensity to make disclosures concerning social involvement. --- (A) high priority may be placed upon social responsibility by a corporation which has a social responsibility committee.

Summarizing all of the above considerations, CFP has formulated the following regression equation, testing it by the US corporation data explained above.

$$T = B_0 + B_1(N_1) + B_2(N_2) + \dots + B_9(N_9) + B_{10}(Sr) + B_{11}(Si) + B_{12}(ROE)$$

----- (1)

Here, T=number of total disclosures and Ns are dummy variables for the following industries: N<sub>1</sub>=food, N<sub>2</sub>=textiles etc., N<sub>3</sub>=paper etc., N<sub>4</sub>=chemicals, N<sub>5</sub>=petroleum refining, N<sub>6</sub>=glass, etc., N<sub>7</sub>=metal manufacturing, N<sub>8</sub>=metal products, N<sub>9</sub>=electronics etc., Sr=social responsibility committee, Si=size, ROE=return on equity.

Very many variables were used in equation (1). But no greater correlations than 0.30 were extant, CFP stated, between the independent variables so the possibility of multi-colinearity was low<sup>23)</sup>. In dealing with the industries, the base was the 10th, i.e., the measuring, scientific and photographic equipment, whose effect was

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20) Ibid., p.113.

21) Ibid., p.113.

22) Ibid., p.113-114.

23) Ibid., p.117.

reflected in the value of the constant  $B_0$ .

The result of testing the regression (1) produced the adjusted  $R^2$  of 0.28121. This means 28 percent of total variations between companies of the extent of social disclosures was explained by the regression variables. It also showed that size and industry were significant variables but ROE was not. (See Table 2)<sup>24)</sup>.

Table 2: Summary statistics of the regression variables in the regression by Cowen, Ferreri and Parker

The variables	Bi	Beta	Probability
adjusted $R^2 = 0.28121$			
$N_4$	4.621684	0.30715	0.01118
$N_1-N_3, N_5-N_9$	<2.1	<0.12	>0.26
Committee	1.374978	0.10910	0.25164
Size	0.013382	-0.42156	0.00041
ROE	-0.0755507	-0.05979	0.55142
(Constant)	8.981836		

In this Table 2, the size was negatively correlated with the disclosure. This simply is the result of Fortune numbering the companies in the order of decreasing size. So, that statistic do signify the greater firms tend to make more social disclosure. This was the most significant variable. The second was the variable  $N_4$  which indicates whether the firm belonged to chemicals or not. Considering this is also positive, we know the chemical companies tend to make greater disclosure<sup>25)</sup>.

Next, CFP proceeds with testing how far each of the seven type social responsibility disclosures could be explained by the regression (1). To do this, they had to replace the left-hand side variable in (1) with each of the seven social disclosure variables for regression.

24) Ibid., p.117.

25) Ibid., p.117.

This is (2) below.

$$D = B_0 + B_1(N_1) + B_2(N_2) + \dots + B_9(N_9) + B_{10}(Sr) + B_{11}(Si) + B_{12}(ROE)$$

----- (2)

D=the extent of disclosure of each social responsibility information

According to the results of these regressions for each social disclosure, the variable 'size' still could explain the variations with higher than five percent significance (except for 'human resources' and 'products'). And some of 'industry' variables were significantly related with some social items. That is, energy, community involvement and environment showed higher relations to some specific industry dummies respectively. (But the other social items were not correlated with any of the industry variables). CFP also noted that disclosure on 'human resources' was significantly related to the factor of whether the company had the social responsibility committee. Its meaning, they said, is that such disclosures which include employee safety, health and training may be a major concern of social responsibility committee<sup>26)</sup>.

Based on their whole research, CFP has pointed out the following important thing. They noted that what were researched here was number of disclosures, not necessarily corporate activity levels. This is an important distinction. A company may be highly involved in social responsibility actions but may not choose to disclose such actions in the annual report. Conversely, some companies may have little concern with societal welfare but may make numerous disclosures of relatively trivial activities to enhance their corporate image<sup>27)</sup>. This (and most of other) articles only dealt with disclosure.

What was most interesting to us is that they cited the seven items as the social responsibility items. CFP does not clarify any reasons for adopting this view. In my opinion, these seven items all concern some evils (ill effects) which result from business activities and the necessity of tackling them.

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26) Ibid., p.120.

27) Ibid., p.121.

- (1) Environmental problems. Pollution in air, water and soil generated by business activities and the necessity of taking steps to overcome them and of disclosing about them.
- (2) Energy. Mass consumption of resources and fuels by the firms which is endangering their sustainability, necessitating their saving and reporting about it.
- (3) Fair business practice. Possible unfair treatment and racial discrimination of human beings and possible bribery transactions with other companies.
- (4) Human resources. Promotion of employee health and safety (including disclosure of accident statistics). Improvement of working conditions. Employee training. Programs for retaining and placing displaced workers. Problems about annuities and pension plans.
- (5) Community involvement. Worsening environment mentioned above. Possible disadvantages to consumers deriving from insufficient competitions by oligopolistic big firms. What are being done to compensate for them?
- (6) Products. Early troubles and breakdowns of products. Safty of drugs. How are the scrapping and disposing of products being done? Necessity of disclosing about them.
- (7) Others. Accumulating wealth into corporations means preventing its alternative use (e.g., for cultural aims), which potentially may be an evil from the social point of view.

The second study we will take up is that by Patten (1991)<sup>28)</sup>. In the former research by CFP, the significance and functions of social responsibility disclosure were said to lie in attempting to subdue the increasing distrust towards firms which did not satisfactorily perform the social roles imposed upon them. The second aim was said to be the firm's using of the disclosure as a strategic planning for the firm's survival by making the reporting<sup>29)</sup>. Patten seems to be aggregating those two lines of arguments for explaining the firm's motives for social disclosure. In his theory, the firm has been established by an implicit social contact. It must therefore be

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28) Dennis M. Patten, Exposure, Legitimacy, and Social Disclosure, *Journal of Accounting and Public Policy*, 10, 1991, pp.297-308.

29) Cowen and Ferreri, *op. cit.*, p.112.



constantly being checked whether the human groups benefitting from its rewards have society's approval and whether society really needs its services. The social background for such urge for demonstration of the firm's social legitimacy is that such legitimacy has become impossible to prove itself by the classical belief that egoistic economic motive and the profit seeking will result in the social good. Among others, various harms deriving from the firms' growth have been required of them to stop and rectify. Environmental pollution has forced the public to press the companies and the government to repair it and pay the necessary money. Ensuring health and safety of consumers, employees, and those who reside in the communities where the products are manufactured and wastes are dumped have become urgent needs. In cases of technological unemployments and plant closings, the firms must be considered to be responsible to take care of them. In all these cases, the companies' responses were unsatisfactory, so reliability of society towards the corporations has dropped down. Social pressures have been exerted on the firms to properly deal with those problems which were the results of their own activities. Those matters, when noted by society, become laws after due consideration. Because business can be constrained by the formal legal environment, firms have an incentive to be involved in the policy process<sup>30)</sup>. In this way, in order to exert influence on this legal policy making process and to create an corporate image that the firm is responding to the social responsibility, the social disclosure is said to be made.

Based on this consideration, Patten made the following hypotheses, utilizing a sample of 156 firms from the 1985 Fortune 500 US company lists. He investigated their annual reports to examine the extent of social information disclosure.

(1) Following to the above CFP theory, Patten also assumed that since larger companies are drawing greater attention from the public and the public and governmental pressures towards disclosure of social responsibility information are greater in case of big firms. So, their first hypothesis is that the 'size' variable, which Patten represents by the natural log converted amount of sale in 1985, is

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30) Dennis M. Patten, *op. cit.*, p.299.

positively correlated with the degree of social disclosure.

(2) As stated above, the social pressure facing the company differs depending on its industry affiliation. Dummy variables were introduced to identify such noticed industries as petroleum, chemicals, lumber, and paper products.

(3) Is the profitability related to the social disclosure? Patten used (1) return on assets (ROA), (2) return on equity (ROE), (3) five year average ROE, (4) one year lagged ROA, (5) a dummy variable indicating firms reporting a decrease in net income from the previous period. According to his hypothesis, the firm's social justifiability is being monitored in a different field from its economic justifiability, so that it was assumed that the association between profitability and social disclosure would be rather low<sup>31)</sup>.

In sum, Patten formulated the following regression equation, and tested it by the sample of 156 companies.

$$\text{Disclosure} = a_1 + b_1 \text{ Log Rev} + b_2 \text{ Industry} + b_3 \text{ ROA} \quad (3)$$

The left-hand side of (3) was measured as follows. After the number of pages showing social disclosure in each firm's annual report were counted, he classified as 'high disclosure' those firms which reported a quarter page or more on social information and as 'low disclosure' those whose pages were less than one tenth of a page. Firms with an 'in between' amount of disclosure were excluded. As a result, he got a net sample of 47 firms as 'high disclosure' and 81 as the 'low'. Reflecting this dichotomy, Patten used as the dependent variable a dichotomous variable indicating if each company belonged to the high or low. But he concluded that the logit/probit model for such dichotomous model usually requires a greater sample size. So, he decided to apply the usual regression (OLS)<sup>32)</sup>.

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31) Ibid., p.300.

32) Ibid., p.304.

Table 3: Statistical results of Patten's research

Variables	Regression Coef.	Beta	t value	Significance
Adjusted R <sup>2</sup>	0.25694			
Log Revenue	0.39632	0.40588	5.180	0.0000
Industry	0.24250	0.25335	3.236	0.0016
ROA	0.38340	0.05142	0.672	0.5029
Constant	-3.45780		-4.892	0.0000

The result is summarized in Table 3. The 'size' (as measured by revenue) and 'industry classification' did show highly significant association with social disclosure, but the variables showing profitability resulted in the probability of the first kind error being more than 50 percent. Hence, he concluded that social disclosure is related to public pressure as opposed to profitability<sup>33)</sup>.

We admit this conclusion is consistent with that of CFP.

This research by Patten was very carefully designed and his statistical procedures applied were so refined, which suggests us valuable lessons. And the significance of 'size' and 'industry classification' as explanatory variables may also be said to have been reconfirmed. But at the same time, some problems are still left to be solved.

(1) Like the study of CFP, the adjusted determination coefficient is no more than about 0.25, which shows about three-fourth of the total variation in the degree of the firms' social disclosure remains unexplained. We must discover new relevant explanatory variables. But we feel no success will be possible by any intuitive, common-sense-based research like those we have surveyed. We must rather build a new rigorous mathematical model of the business behavior and develop it in an attempt to discover a completely new view and new relevant variables.

(2) Patten emphasized the 'social or public pressure' factor to determine the companies' extents of social information disclosure. I think the firm's taking this factor into account does imply some profit-

33) Ibid., pp.304-305.

seeking, or survival-pursuing motive on the part of the company. This interrelationship between social and private motives were not built into the Patten's research, which I believe does signify a defect of his approach. Since the social responsibility information disclosure is voluntary, the degree of the reporting must be determined at a point optimal to the firm, i.e., at its profit-maximizing or survival-possibility-maximizing point. Any model ignoring this point seems to be eliminating important relevant variables determining the extent of social information disclosure.

Thirdly, we will introduce a research study by Ness and Mirza (1991) (which we will abridge as NM) which they claim to have applied agency theory<sup>34</sup>. According to NM, managers will disclose social information only if it increases their welfare, that is, when the benefits from disclosure outweigh the associated costs. Agency costs are incurred when the manager (agent), by acting in his/her self-interest, acts to the financial detriment of the principal (shareholder). Because managers bear agency costs, they wish to be seen to be acting in shareholders' interests. Company annual reports offer managers the opportunity to be seen to be acting in such a manner, as accounting reports are a primary means by which managers provide relevant information to shareholders. What kind of social reporting will result, if we apply agency theory thinking? Does it mean that managers will decide the scope of social information and its extent of disclosure by considering what would be the opinions of the shareholders? What will be the precise theory of this behavior?

Without studying this problem in depth, NM simply stated that the social information that shareholders consider to be relevant is likely to differ among companies. So, they assumed one of the contingency variables was expected to be industry classification. Shareholders and other users of annual reports, they explain, tend to associate a particular industry with specific areas of social performance, due to the nature of an industry's operations. For example, the activities of oil companies are generally viewed as affecting the physical environment. Therefore, they said, it is plausible to assume that companies operating in the oil industry

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34) Karen E. Ness and A. M. Mirza, Corporate Social Disclosure: A Note on A Test of Agency Theory, *British Accounting Review* (1991), pp.211-217.

would emphasize environment-related social performance in their annual reports<sup>35)</sup>.

What NM was going to examine was this single point --- the association between the oil industry and environmental disclosure. The top 150 companies operating in Britain (according to Times 1000 Largest UK Industrial Companies 1984-1985) were considered. As annual reports of 19 companies could not be obtained, the social disclosure of 131 companies were analyzed.

Their industry classifications were: (1) capital goods, (2) consumer goods (durable), (3) consumer goods (non-durable), (4) commodity group, (5) oil, and (6) miscellaneous. And four areas of social disclosure were identified as product-related, employee-related, environment-related, and community-related<sup>36)</sup>.

In short, NM prepared a two-way table of the companies according to those two dimensions and investigated if there were any significant bias at the intersection cell of 'oil' and 'environment'. That is, they tested the following two hypotheses<sup>37)</sup>.

H<sub>1</sub>: In the annual reports of UK companies for 1984, a greater proportion of companies in the oil industry included environment-related disclosure relative to the proportion of companies in all other industries.

and

H<sub>2</sub>: Oil companies included a greater proportion of environment-related disclosure in relation to the overall social disclosure in their 1984 annual reports than did other companies.

For the former hypothesis testing, NM assigned 1 to a firm disclosing social information and 0 to a non-disclosing firm. And comparing their distribution in the oil industry and that in the other industries, they applied the non-parametric test (the chi square test) to the nominal scale data. In testing the latter hypothesis, they took up the total social disclosure in the oil and then in the other industries to count how many environment-related disclosures were found in each of the industry group, applying the same chi square test for the inter-industry comparison and for determination of its

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35) Ibid., p.212.

36) Ibid., pp.212-213.

37) Ibid., p.213.

significance.

See Table 4 and 5 for their conclusions<sup>38)</sup>.

Table 4: Disclosure of environment-related information by oil and other companies

Environment-related disclosure	Oil companies	Other companies
Yes	7	18
No	5	101
Total	12	119

Pearson's chi-square: 13.18; Probability (Pearson's): 0.0003;  
Yates' corrected chi-square: 10.53; Probability (Yates'): 0.0012;  
Cross-product ratio: 7.856

Table 5: The ratio of environment-related disclosure to other social disclosure

Social disclosure	Oil companies	Other companies
Environment-related disclosure	10	24
Other social disclosure	144	1343
Total disclosure	154	1367

Pearson's chi-square: 14.22; Probability (Pearson's): 0.0002;  
Yates' corrected chi-square: 12.13; Probability (Yates'): 0.0005  
Cross product ratio: 3.886.

As seen from Table 4, there is support for rejecting the hypothesis  $H_1$  that environment-related disclosure and industry classification are independent. Table 5 shows that the second null hypothesis  $H_2$  of independence between industry classification and area of social disclosure is rejected. From these results, we see there is a positive association between environmental disclosure and

38) Ibid., p.215.

petroleum industry. NM states that as oil companies are perceived to be prone to damaging the environment, their managements place a heavy emphasis on environment-related disclosure in annual reports. According to agency theory, such actions of management indicated that social information is disclosed to increase the welfare of management<sup>39)</sup>.

Furthermore, the environment-related disclosure tended to be concerned with favourable social performance rather than with activities detrimental to the environment. In addition, 91% of environment-related disclosure was descriptive and 9% was nonfinancially quantified. --- (D) escriptive information is monitored less closely than financial information, indicating that management has considerable choice as to the social information they wish to disclose and this is consistent with agency theory<sup>40)</sup>.

The above two researches by CFP and Patten had no clear theory to show what factor is motivating the corporate behavior on social information disclosure. In contrast, this study by NM explicitly assumed managers disclosed the information in an attempt to maximize their own welfares. We feel this view on managerial behavior would come closer to reality than the image of manager as the maximizer of shareholders' wealth.

But we regret no clear management behavior model were constructed at the starting point, resulting in the almost obvious meagre conclusion that the oil industry tend to make more social information disclosure than the others. No new discoveries could be attained unless we make a clear managerial behavior model on information disclosure first of all and after logically developing the model we try to look for variables possibly relevant to the social responsibility information disclosure. Then, we will have to make a statistical model incorporating those variables to test their empirical validity.

#### 4. Conclusion

- (1) Possible relationships between the conventional business

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39) Ibid., p.215.

40) Ibid., p.215.

accounting structure and the social responsibility information system must be made clear. Our view is that a common factor and the major purpose in both information systems is 'dissolution of distrust' which the interested parties to the corporation could have relating to its activity-related egoism or 'evils'.

(2) Before making any normative policy statements about a specific social responsibility information system, we will have to make an extensive empirical research about the actual companies' disclosure policies: 'what information' are being reported to 'what extent' for 'what purposes'. On these problems, the above studies suggested companies' response to social pressures and/or firms' wish to influence the public policy processes by making the disclosure. We think they are true. But we believe that the ultimate aim of the firm in making such response will lie in its attempt to assure survival or maximizing profit in the current environment of increasing distrusts towards the firm.

(3) 'Size' of the firm and 'industry classification' have proven to be the most influential factors. This is a very important discovery. But, as stated above, the result of the regressions suggests that only 25-28 percent of the total variation of the degrees of social disclosure among the companies was explained by the two variables and the remaining 72-75 percent is not still explained. To increase the fit of the regression model will require finding additional relevant variables. But I am afraid it will be difficult by the intuitive, groping method which has been used so far. Perhaps, some rigorous model of management behavior or of managerial information disclosure behavior with the aim of maximizing the firm's (or the managers') profit would have to be constructed. It will have to be logically developed to find some conclusion. This conclusion, then, would have to be examined to see if any new explanatory variables could be discovered. This line of research could also lead to a clearer and more logical understanding of the structure of the company's information disclosure behavior.

#### Appendix

(4) I recently read a paper by Cooke (1991). It studied which factors determined the degree of total voluntary information



disclosure by Japanese companies in their annual reports. He found that (1) firm size (especially the number of shareholders), (2) listing (or not) of the firm's stocks, (3) belonging to manufacturing industry (or not) were significantly related to the extent of disclosure<sup>41)</sup>. That is, when its size is greater, when it is being listed on a stock exchange, and when it belongs to manufacture, the company tends to publish more total voluntary information according to his study.

It seems self-evident that the listed companies disclose more information. And the non-manufacturing firms seem to be relatively small in size. So, I suspect this variable might have a high correlation with size. In conclusion, I do not think it appropriate to include the two variables of size and manufacturing in a model.

(5) According to Brudbury's article which I acquired recently, the disclosure of segment information had been voluntary until a specific date in New Zealand. And to this voluntary information disclosure were the following variables statistically relevant: (1) firm size (current value of its outstanding stocks and its book value of liabilities) and (2) debt ratio (book value of its debt / firm size). On the contrary, the fixed asset ratio (over the total assets), profit variation (variation ratio of a series of 5 years), or the ratio of its debt from abroad over total liabilities were all irrelevant<sup>42)</sup>.

(6) Though a rather old paper, I recently read the paper by Trotman and Bradley (1981). This studied the relationship between disclosure of social responsibility information and the company's characteristics. They chose company size (total assets or total sales), systematic risk, social pressure and management's decision horizon (i.e., whether the managers placed a greater emphasis on the long term rather than on the short term). Their research results showed that (1) all these four factors were significantly different between the disclosing firms and the non-disclosing firms (except for the social pressure factor); (2) among the disclosing companies their degrees of disclosure of social responsibility information were

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41) T. E. Cooke, An Assessment of Voluntary Disclosure in the Annual Reports of Japanese Corporations, *International Journal of Accounting*, Vol.26 (1991), pp.174-189.

42) Michael E. Bradbury, Voluntary Disclosure of Financial Segment Data: New Zealand Evidence, *Accounting and Finance*, Vol.32, No.1, (1992), pp.15-26.

positively correlated with the strength of each of the four factors (except for the systematic risk)<sup>43)</sup>. But the lack of a rigorous logical model prevents a strict interpretation of, say, the effect of systematic risk. Namely, does it mean (1) a firm with a higher risk attempted to decrease it by means of social information disclosure (where a positive association is to be expected), or; (2) making more active social disclosure has lowered its systematic risk (where a negative correlation is to be expected)? They admitted that this point is not clear without a strict model. (The consequence was that it was not significant).

I added this survey of the articles which I read recently. I wish to test the interesting variables which appeared here in my own future research.

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43) Ken T. Trotman and Graham W. Bradley, Associations between Social Responsibility Disclosure and Characteristics of Companies, Accounting Organizations and Society, Vol.6, No.4, (1981), pp.355-362.

LOCAL ENTREPRENEURSHIP AND REVERSE TECHNOLOGY TRANSFER  
— MESSAGES FROM FOREIGN COMPANIES IN JAPAN —

Hideki YOSHIHARA

**1. Features of Successful Foreign Companies in Japan**

This paper has three objectives. The first one is to present the features of successful foreign companies in Japan. The second objective is to think about the implications of these features for Japanese multinational firms. The last objective is to consider new developments in the theory of multinational enterprises based on the features of successful foreign firms in Japan.

What are, then, the features of successful foreign companies in Japan<sup>(1)</sup> ?

The first feature is that their parent companies possess superior technological capabilities.

One of the basic reasons for the success of Instron Japan is that its parent company in the U.S. maintains a world-wide technological leadership in the field of materials testing. The success of Microsoft Japan is based on its strong development capabilities of the American parent company in the field of computer software. The U.S. Microsoft is a world leader in the field.

Fuji Xerox is a well-known excellent company among many foreign firms operating in Japan. One of the basic reasons for its success is the high quality of its products and technology. Its plain paper copier (PPC), based on the Xerography technology developed by the U.S. Xerox, was clearly superior to other machines offered by the company's Japanese competitors, which used the Diazo and the Electrofax methods.

Generally speaking, foreign companies are in a position of

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(1) Hideki Yoshihara, Mitsuo Wada, Hideo Ishida, Kosei Furukawa, Haruo Takagi and Sadahiko Suzuki, *Gurobaru Kigyo no Nihon Senryaku* (Japanese Strategy of Global Companies), Kodansha, Tokyo, 1990. Hideki Yoshihara, *Fuji-Xerox no Kiseki* (Miracle of Fuji-Xerox), Toyo Keizai Shinposha, Tokyo, 1992.

disadvantage to compete with Japanese firms. They do not know well the Japanese users' needs. It is likely that they have to create new sales networks and procurement systems for their parts and raw materials. It is also likely that they are at a disadvantage when dealing with industrial associations and the government. The Japanese language might also be a barrier, and communication between the parent company and the subsidiary in Japan is costly and there are efficiency problems due to the distance. Foreign companies have also disadvantages when trying to employ high-potential Japanese human resources.

In order to overcome these unfavorable conditions and succeed in Japan, foreign companies must have, as a basic condition, excellent products and technology, with which they compete with Japanese firms.

The second feature of successful foreign firms in Japan is that the foreign firm, that is, the Japanese subsidiary, has capabilities for innovation.

Foreign firms entering Japan with excellent products and technology of their parent companies are advantageous over their Japanese competitors at the time of entry. However, the products and technology of the parent company lose their competitiveness before long. Japanese competitors start imitation and launch substitute products. Therefore, if the foreign firm is to maintain its competitiveness, it has to create new products, technologies, software, etc.

In the early 1970's, Ricoh, Canon, and other Japanese copiers manufacturers entered the field of plain paper copier. Competition became fierce and Fuji Xerox's market share reduced. Fuji Xerox urged the U.S. parent company to develop products suited to the Japanese market, but it did not get a satisfactory response. Fuji Xerox overcame this difficult situation by developing a new product (model 3500) on its own.

Texas Instruments Japan started to manufacture semiconductors in Japan in 1968. During the 1970's this company enjoyed technological superiority over Japanese semiconductor manufacturers. However, in the 1980's, Japanese firms improved their technological capabilities and started to surpass Texas Instruments. It became clear that for some products the Japanese manufacturers offered

better quality. Japanese users became unsatisfied with the quality of Texas Instruments products. Texas Instruments Japan took this problem seriously and, in 1982, started TQC (Total Quality Control) movement. Before long, production technology of Texas Instruments Japan surpassed that of the American parent company, and the Japanese subsidiary became an innovation center in the field of production technology.

The third feature of successful foreign firms in Japan is its entrepreneurial spirit and autonomous management.

It is difficult for a foreign firm to succeed in Japan if it brings to this country products developed by the parent company without local modification and markets them in Japan following the same marketing methods of the parent company. It is also difficult for the subsidiary to succeed when the parent company exercises such a detailed and strict control that only a narrow discretionary power is left to the subsidiary.

Procter and Gamble (P&G) entered Japan in December, 1972, and started its operations the following year. The first 10 years approximately were a period of poor results, with losses every year and stagnant sales. The first cause for P&G's failure during this period was that P&G applied in Japan without modification the same marketing that allowed P&G to succeed in the U.S.. The second cause was that, due to an excessive control from the parent company, Japanese executives and managers, as well as employees in general, had low motivation and, as a consequence, did not display their capabilities sufficiently. However, thanks to its 3 year plan (Ichidai Hiyaku Plan), which started in July, 1985, P&G was able to change course and improve performance (profitability and growth) that continues to the present.

The success of BMW Japan cannot be explained without referring to the entrepreneurial spirit of Mr. Yoji Hamawaki, the firm's president during its early days and its present chairman. While Mr. Hamawaki sympathized with the managerial philosophy of the German parent company and understood well its niche strategy, he did not implement that philosophy and strategy passively and without modification in Japan. He rather persuaded the parent company to develop a car suited to the Japanese market. In addition, the selected dealers from a broad spectrum of businesses, stressed store sales

using show-rooms and started a low interest auto-loan, among other revolutionary marketing methods that he devised and implemented.

The fourth characteristic of successful foreign companies is that they have technological capabilities required to develop products, technologies, software, systems, etc., with their own means.

Japan Microsoft has 91 employees (as of Oct. 31, 1989), 20 of which are engineers working at the R&D department. Among other products, they developed MS-DOS and OS/2 Version 1.0 (Japanese version). This is one of the key success factors of this company in Japan.

Fuji Xerox was a sales and service company until 1971. However, from the start the company had technicians and engineers in its staff, and a few years after the company's establishment these engineers succeeded in the development of model 2200, the smallest desktop copier in the world. During the latter half of the 1970's, the company faced for a while a difficult situation due to severe competition with Japanese copier makers, but R&D people overcame this difficulty by developing a new product, model 3500.

On October 24, 1990, P&G started the construction of its Japanese Head Office/Technical Center Building, a 30-story, 1-basement building, located in Kobe's Rokko Island. The technical center is the first endeavor of its class in Asia; in addition to basic research, the center will carry out development of new products and packaging for the Pacific Region, including Japan. Completion of the new building is scheduled for the Spring of 1993.

Parent companies of successful foreign companies attach great importance to Japan. This is the fifth feature.

P&G business performances are progressing. Behind this improvement is the change of its Japanese strategy and reconsideration of the Japanese market. When Mr. E. L. Artzt, the current Chairman and CEO of the U.S. P&G, was the president of Procter and Gamble International, he emphasized the importance of the Japanese market by giving four reasons. The first one is the size of the Japanese market. Japan has become the largest market outside the U.S.. The second one is that Japanese consumers are particularly sensitive to product quality. The third reason is that nowadays Japan can be regarded as a test market for the entire world. Japan attracts information and products from all-over the

world, and has become the most intense competitive environment in the world. The fourth reason is that Japan is the key to penetrate other Asian markets.

The basic reason why foreign firms enter Japan is the attractiveness of the Japanese market. The Japanese market is too important to be overlooked.

But we must not forget another objective that brings foreign firms to Japan. It is the acquisition of technology and know-how. Japanese consumers and corporate users may be the most demanding in the world regarding price, quality, service, delivery time, etc. In addition, the number of competitive firms is large and fierce competition develops, not only in price but also in the type and quality of the services and products offered, as well as in new product development. Demanding customers and tough competitors act as stimulus and pressure, and consequently, new technologies and know-how are born in Japan, one after another. By entering Japan, foreign companies are able to participate in a market where new technologies and know-how are being developed.

One important element of the know-how that these firms acquire in Japan is Japanese management.

We mentioned earlier Fuji Xerox's development of the 3500. It turned out that, when compared with a machine of the same class developed in the U.S. by Xerox, Fuji Xerox took 50% less time to develop and manufacturing cost is 50% less. The reason for this success was that Fuji Xerox used Japanese-style product development.

Production efficiency at Texas Instruments' Miura Plant (Ibaragi Prefecture, Japan) exceeds that of all other plants the company has around the world. When in 1985 Texas Instruments built its Dallas factory to mass-produce 256K DRAMs, a large number of Japanese engineers from Miura Plant moved to Texas to lead initial operations.

By having a plant in Japan, Texas Instrument was able to learn and acquire the Japanese production system and know-how. It is used at the parent company's plants in the U.S. and other plants in foreign countries.

The sixth characteristic that can be seen in successful foreign companies in Japan is that the parent company learns from the

Japanese subsidiary.

At Texas Instruments, QC circle activities are being carried out in plants all-over the world, including the U.S. parent's plants.

The U.S. Xerox studied the TQC movement of Fuji Xerox, and, since 1983, has been carrying forward the "Leadership through Quality" movement. The U.S. Xerox received a shock, and started to study Fuji Xerox's product development, when the parent company knew that Fuji Xerox was developing new products with double capabilities at half the production cost and in half the development time. And, the parent company has been trying to adopt the Japanese product development method.

When Mr. Richard Dyck became president (of the fourth generation) of Teradyne, the company was going through deteriorating business results due to various difficulties such as quality problems in their IC testers. Immediately after being inaugurated as president, Mr. Dyck visited customer firms. At first, the customers' reception was cold, but, as the number of repeated visits increased, customers started to voice their demands. Regarding why Teradyne's testers breakdown, he heard from the users an analysis of problems and possible causes, as well as methods to solve these problems. Dyck sent that information to the parent company in the U.S., which in turn paid close attention to it and solved the problems indicated by Japanese users one after another. As a result, product quality at the Japanese subsidiary increased and business performance recovered.

It is difficult for a parent to listen to what his or her child says, as it is difficult for a teacher to learn from students. Similarly, it is difficult for a parent company to learn from its subsidiaries. Pride and sense of superiority of the parent company are obstacles that prevent the parent company from listening to the subsidiary. Nonetheless, among successful foreign companies in Japan, there are cases in which the parent company listens to the opinions of the Japanese subsidiary, recognizes the merits of innovative products and technologies developed by it, and adopts them.

The seventh characteristic of successful foreign firms in Japan is that they are managed with autonomy, within limits. Executives and managers at the Japanese subsidiary display entrepreneurial spirit and produce innovations. But, autonomous management and



innovation are carried out within the global, world-wide strategic framework of the parent company. It is not an autonomous management that ignores the parent's management philosophy or runs against its basic corporate strategy.

Since the development of model 3500 in 1978, Fuji Xerox gained confidence in development capabilities of its own. Nowadays, Fuji Xerox stands side by side with the U.S. Xerox, but it keeps its position as a member of the Xerox Group, a group led at the world level by the U.S. Xerox. Although Fuji Xerox has reached a position comparable to that of the U.S. Xerox, and has even been able to provide assistance to this company, it does not betray its parent company nor thinks of separating itself from the parent.

Both Instron's Japanese subsidiary and Teradyne's Japanese subsidiary experienced at some point in the past a very difficult period due to a breach of confidence on the part of their Japanese presidents. They acted as if the company were their private property, diverted capital to private purposes, and for their own convenience founded an independent firm using funds obtained by illegal accounting manipulation. Moreover, they decided to start production in Japan, and implemented this decision without notifying their parent companies.

Generally speaking, the relationship between the parent company and its overseas subsidiaries in a multinational firm should be such that the parent company provides overall corporate policies and strategy, leaving concrete operation to the overseas subsidiary's managers. Trusting the managers of a subsidiary and leaving to them the conduct of important businesses produces good results only when the subsidiary possesses managerial abilities and their managers prove worthy of trust. Conducts that betray the parent's trust are inadmissible. What is expected from the overseas subsidiary is autonomous management with self-discipline, or autonomous management within a framework of restrictions.

## **2. Implications for Japanese Multinationals**

One of the characteristics of Japanese multinationals is what can be called Japanese centralism<sup>(2)</sup>.

In a global management system the Japanese parent company

occupies the center, and leaves the overseas subsidiaries at the periphery. Managerial resources such as people, materials, money, and information flow unidirectionally from the center to the periphery. Corporate strategy is decided at the center, and the periphery implements it. The center exercises control and the periphery carries out its activities under this control. In order to secure a proper execution of its strategy, the center dispatches Japanese employees to the overseas subsidiaries.

Regarding this last observation, we may point out another feature of Japanese multinational companies, "management by Japanese."

In most cases, the top executive of foreign subsidiary is a Japanese national. Overseas subsidiaries whose president is not a Japanese are just a few exceptions. And it is not only the top executive position which is occupied by a Japanese; in many cases the heads of important departments such as finance and engineering are also Japanese. Moreover, many Japanese employees are dispatched by the parent company to work for short periods at the overseas subsidiary. Important decisions at the foreign subsidiary are made by Japanese, and then implemented under Japanese leadership.

The features of "Japanese centralism" and "management by the Japanese," which are observed in many Japanese multinationals, are sources of various problems<sup>(3)</sup>.

The first problem concerns local middle managers and executives. While there are many local workers and first-line managers working with high morale at foreign factories of Japanese multinationals, there are many middle managers and executives working at the office that express dissatisfaction and voice diverse complaints. Promotion opportunities are limited. Access to important information is difficult. Opportunities for participation are scarce, because, while routine operating decisions are made by local personnel, important decisions are in most cases handed down by the Japanese employees.

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(2) Hideki Yoshihara, Kichiro Hayashi and Kenichi Yasumuro, *Nihon Kigyo no Gurobaru Keiei* (Global Management of Japanese companies), Toyo Keizai Shinposha, Tokyo, 1988, pp. 40-43,

(3) *Ibid.*, pp. 45-47.

Due to these complaints and dissatisfaction, many local managers and executives experience frustration in greater or lesser degree, and, as a result, they do not display their capabilities to the fullest. An additional problem is that, up to the present, there are few first-rate managers and engineers working for Japanese companies in foreign countries. Moreover, even if they join a Japanese company, many of them quit after a while. It can be said that Japanese companies are not very attractive to capable local managerial talents.

Another problem is the high degree of dependence of the overseas subsidiary on the parent firm in Japan. This dependence includes almost all kinds of managerial resources such as materials, people, money, and information. The entrepreneurial spirit of local executives and middle managers is weak. There are few instances in which local managers and engineers develop new technologies, products, or marketing know-how on their own. Innovation at the foreign subsidiary is almost non-existent.

Regarding the realization of the essential strengths of multinational firms, Japanese multinationals can learn a great deal from the experience of foreign firms in Japan.

Based on the earlier presentation of the features of successful foreign firms in Japan, the following points can be mentioned as things that Japanese multinationals should do.

1. Appoint capable local executives as president of foreign subsidiaries.
2. Motivate local middle managers working in overseas subsidiaries in such a way that they can display their capabilities.
3. Strengthen the foreign subsidiary's R&D capabilities so that the subsidiary can develop its own product and technology.
4. Make efforts at the subsidiary to take advantage of environmental features, such as market needs, competitive conditions, technologies that are being developed, etc.
5. The parent company should take an open and fair attitude vis-a-vis the subsidiary. In particular, it should recognize good products and technologies originated in the subsidiary, and should make efforts to transfer them to the parent company and to other foreign subsidiaries.

### 3. New Factors in Theories of Multinational Enterprises

Studies of successful foreign firms in Japan reveal a number of inadequacies associated with existing theories of multinational enterprises and call for new theoretical developments. In this section, let me try to examine theoretical implications emerging from the studies of foreign firms in Japan.

Analysis of multinational enterprises based on industrial organization theory is one of the approaches that have contributed to the development of the theory of the multinational firm. A representative figure in this field is Stephen H. Hymer<sup>(4)</sup>, who claimed that control is one of the essential characteristics of direct foreign investment. Control means not only whole or majority ownership of the subsidiary by the parent company. It is rather a broad concept that includes the utilization of technology and other managerial resources at the foreign subsidiary.

Hymer's theory of multinational enterprises does not have room for autonomous management at the foreign subsidiary. The foreign subsidiary is regarded as an entity to be controlled by the parent company. The organization is such that the parent company exercises control and the subsidiary is subordinated to the parent.

Large-scale research on American multinationals was conducted at the Harvard Business School under Raymond Vernon's leadership. The product cycle model was a common theoretical basis in this research<sup>(5)</sup>.

According to the product cycle model, the process of multinationalization of American firms is explained as follows. American firms develop products that meet the needs of the American market and sell them in the domestic market. In due time, demand for the products appears in Europe, Japan, and other advanced countries. At first, the American firm responds to this foreign demand by exporting its products. Later, competing firms appear in advanced countries. Frequently, protective actions are taken, such as import restrictions. The American firm meets this

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(4) Stephen H. Hymer, *The International Operations of National Firms: A Study of Direct Foreign Investment*, the MIT Press, 1976.

(5) Raymond Vernon, *Sovereignty at Bay: The Multinational Spread of U.S. Enterprises*, Basic Books, New York, 1971, pp. 65-77.

situation by starting production in Europe, Japan, and other advanced countries. Again, with time, the firm starts exports to developing countries in Central and South America, Asia, etc., and then it moves production activities to these areas.

According to the product cycle model, the American parent firm's managerial resources such as technology and know-how are first transferred to foreign subsidiaries in Europe, Japan, and other foreign countries. Later, they are transferred to foreign subsidiaries in developing countries in Central and South America, Asia, etc. It is hypothesized that, just like water flows from upper to lower levels, the parent company's technology and other managerial resources flow in a hierarchy from the subsidiaries in advanced countries to those in developing countries. Moreover, it is hypothesized that new products, technology and know-how, etc., are developed at the American parent company.

As we already saw, some successful foreign firms in Japan create new products, technology, systems, etc. In addition, a number of innovations made by Japanese subsidiaries flow back to the parent company. The product cycle model cannot explain this kind of features of foreign firms in Japan.

Research on technology transfer is also important contributing to research in the field of multinational firms<sup>(6)</sup>. Two features can be pointed out.

The first one is that technology is regarded as flowing from the parent company to the foreign subsidiary. The foreign subsidiary uses it as weapon to compete against local firms. The case in which technology and know-how are born at the foreign subsidiary and then transferred from this subsidiary to the parent is ignored. Horizontal transfer from a particular subsidiary to other foreign subsidiaries is also not taken into consideration.

The second feature is that technology transfer is realized under the parent company's technological leadership. Engineers and managers at the parent play a central role in the technology transfer. They provide guidance and advice to the foreign subsidiary's local engineers and managers.

Some features of successful foreign firms in Japan contradict

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(6) N. Mohan Reddy and Liming Zhao, "International Technology Transfer: A Review," *Research Policy*, 19, 1990, pp. 285-307.

the two features of technology transfer mentioned above. The Japanese subsidiary, using its own resources, creates new technology and know-how, which are then transferred to the parent company. In addition, there are examples of horizontal technology transfer to other foreign subsidiaries. These reverse technology transfer and horizontal transfer seen in Japanese subsidiaries are not satisfactorily treated by existing literatures of technology transfer.

Among Japanese foreign firms, there are examples in which Japanese managers and technicians go to the parent company, learn its technology, and transfer it to Japan. Fuji Xerox can be mentioned as an example<sup>(7)</sup>.

Fuji Xerox's product is the plain paper copier developed by the U.S. Xerox. Japanese technicians, engineers and managers played a central role at the time of starting production of that copier in Japan. They went to the parent company in the U.S. and England, visited factories, met engineers, learned the technology and, with their own efforts, were then able to produce the copier in Japan<sup>(8)</sup>. Fuji Xerox's marketing was new in Japan. The company sold its product through a new marketing characterized by direct sales and a rental system. At the time of transferring to Japan the rental-marketing know-how, Japanese managers played a central role. They travelled to the U.S. and England and received detailed explanations on the rental system at the parent companies; in addition, they saw with their own eyes actual operations of rental-marketing, experienced it, and brought back the rental-marketing system to Japan.

In the case of Fuji Xerox, rather than considering that the technology and know-how were transferred under the technical guidance of the parent company, it is better to think that it was absorbed by the Japanese subsidiary.

We have examined three approaches to the study of multinational firms: the research based on industrial organization theory, the product cycle model and the research on technology transfer. It has become clear that a number of features of successful foreign firms in Japan cannot be dealt with successfully using existing theories of multinational enterprises. According to existing

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(7) Based on the author's case study.

(8) Fuji Xerox is a joint venture company between Fuji Film and Rank Xerox. Rank Xerox is a British joint venture company of U.S. Xerox.

theories of multinational enterprises, these foreign firms are just deviations or abnormal cases.

In general, new theories are born when existing theories reach their limits. When phenomena appear that cannot be successfully explained by existing theories, efforts start to explain the new phenomena. Out of those efforts, new theories are born. We should make efforts to explain the features of foreign firms, without simply disposing them as deviations or abnormal cases. Out of that effort, it is expected that new developments in the theory of multinational firms will emerge.

# THE FORMS OF ENTERPRISES AND TRANSACTIONS IN GENERAL EQUILIBRIUM:

## A NOTE ON ANALYTICAL FRAMEWORK\*

Kazuhiro IGAWA

### 1. Introduction

When enterprises extend their business to foreign countries, they will choose a particular form among several possible alternatives. They might establish joint ventures with local firms in host countries or they might choose to form 100 percent wholly-owned subsidiaries overseas. They may choose to use their own capital funds or to borrow funds for the investment abroad. The form must be different in the degree of usage of their production and distribution networks. Among alternatives, i.e., among all sorts of possible forms, one enterprise takes a particular form in extending its business to foreign countries.

In this paper we discuss the problems which exist for enterprises in choosing one form among various alternatives. In particular we are concerned with how to minimize transactions cost by employing a market mechanism on the one hand and an organizational mechanism on the other.

Business activities consist of various types of transactions. In this sense it becomes important for any business firm or household, to reduce transactions cost. Transactions cost varies in accordance with the transactions situation, i.e., under what type of market and under what type of organization business is being done. One extreme situation is the business relationship of *arms-length*, which is in line with competitive market. The other extreme is the one of *hand-*

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\* Occasionally the author had chances to talk about it informally with colleagues at the Research Institute for Economics and Business Administration, Kobe University. The author extends his gratitude to his colleagues for stimulating discussion. In particular, Dr. William E. James, then a Visiting Professor, and Professor S. Abe helped me in finalizing the idea and the presentation of it.



*to-hand*, which is popular within the same organization.

A suitable form of market and organization is thus chosen on the basis of transactions cost. Among various factors affecting transactions cost we will be concerned with such factors that have effects over the economic development of the world. Economic development naturally deals with new technologies and their transfer. The technology transfer increases transactions cost for *arms-length* relations and decreases the cost for *hand-to-hand* relations. In the real world, therefore, we observe a trend for enterprises to employ a mixed form of many different types of market and organization at various stages of economic development.

In the following section 2 we define and explain transactions cost in detail first. We discuss efficiency of transactions and cost in section 3. We introduce the concept of equilibrium in terms of transactions and cost in section 4. We further specify a form of transactions situation, i.e., the form of market and organization, in section 5. The relation between those forms and the transactions cost will be discussed and the adjustment cost of the transactions state is explicitly treated in section 6. While the long-term contract is the topic of section 7, a short discussion of internationalization follows in section 8. The final section concludes the paper.

## 2. Transactions cost

An actual transaction can be decomposed into phases of matching, contracting, and completing. In each phase of a transaction the corresponding cost is incurred. To sell (supply) or to buy (demand) goods and services, a supplier must find a demander or vice versa. The matching incurs cost; networking saves this type of cost. Efficiency of networking results in a cost difference even for the same kind of transaction. Markets as well as organizations have their own institutions for networks.

The next step to take after securing transactions partners is to negotiate and to make contracts. This phase incurs contracting cost. This cost depends upon in part the power structure between the partners. The power structure in the market and in the organization is determined by institutions.

To complete one transaction the contract should be enforced and

should be realized. The contractors may bear other costs such as transportation. We define this third phase cost as completion cost, the size of which might depend again on the form of market and organization selected. We, however, do not pay much attention to this type of cost in this paper. We assume away such costs as transportation, or at best consider such costs independent from the first two types of cost and from the form of market and organization selected.

To put it more precisely market and organization imply a certain system of network and power structure. In other words, network and power structure can be used alternatively in place for market and organization. We will discuss some more about the nature of these parallel concepts in the following.

### 3. Efficient Transactions

It is not efficient if there exists some room to reduce transactions cost for the given state of transaction, i.e., the given profit in the case of firms and utility in the case of households. Efficiency means that all economic units maximize their objectives neither with adjustment constraints nor with costs involved with changing transactions institutions. An efficient transaction is the one that minimizes transactions cost. Let us call this efficient transactions cost simply by efficient cost. It should be noted that there may exist lower transactions cost for non-efficient state of transactions than this efficient cost. Efficient transactions is determined simultaneously in minimizing transactions cost and in maximizing its objectives. We will come back to this topic more formally in the next section.

Once we achieve the efficient cost, match as well as contract costs become the minimum as long as transactions processes are separable and as long as one can choose a transactions situation, i.e., a mix of network and power structure, separately for each process. If the separability is not assured, it becomes difficult for one to choose match and contract costs at the minimum. Under this circumstance what should be minimized becomes the total of the two costs. It is a simple technical matter whether one can choose separately a network and a power structure for each transactions process. The completion cost might depend upon the separability;

we, however, assume it to be independent. In other words we assume that completion cost remains the same for any network and power structure as long as actual transactions remain the same.

For illustration purpose a simple model is devised to show an equilibrium at the efficient transactions and efficient transactions cost. Suppose that firms maximize profit by purchasing labor services and selling products while households maximize utility by supplying labor services and buying products. This transactions involves cost; the cost should be shared either by firms or households or both. The sharing scheme must be dependent upon the transactions situation of network and power structure. We assume that transactions cost also depends upon the kinds of goods and services and upon types of traders for a given transactions situation.

Let us now treat the role of transactions cost more explicitly in choosing one form of the transactions state, i.e., a mix of network and power structure. We can draw a schedule on the production frontier, which corresponds with a utility maximum point, for a given transactions state. For a different transactions state we can draw a different production frontier with a different maximum utility level. By checking all possible production frontiers and utility levels for all the forms of transactions state we can conceptually find the efficient transaction.

In face of economies of scale and economies of scope the efficient transactions must be chosen among transactions processes, which include all possible combined transactions processes. For a certain combined process one transactions state will be selected to minimize transactions cost. With the existence of scale or scope economies the efficient transactions may not be attained in a competitive market.

#### 4. The Equilibrium Transaction

Adjustment cost is incurred when a transactions state is altered. The efficient transactions may not be obtainable because of this cost. Once trading partners are incorporated into the same organization, it is difficult to use different transactions states for different transactions processes. There exists a rigidity in the choice of transactions states. Therefore, once a certain type of market with

certain institutions is introduced, it is difficult to move to another network system and power structure. Changing to a different transactions state is in some cases prohibited by law.

The efficient transactions state can be only attained when the above mentioned adjustment cost becomes nil. In the real world, however, the assumption of no adjustment cost cannot be fulfilled. Another important issue here is the issue of indivisibility. The degree of indivisibility of adjustment cost should depend upon the transactions state. Once one particular type of organization is chosen among some partners of some transactions process, it is painful to alter to other organization even in case that organization should be efficient for other processes among business partners. Adjustment cost is incurred sometimes by institutional constraints such as law, but it is most of the time economic cost. We will emphasize the importance of this adjustment cost in the determination of the transactions state in the following.

The equilibrium in transactions is the one where all economic units maximize their objectives subject to the adjustment costs and constraints. Adjustment costs depend on the length of time interval, and thus the equilibrium transactions also depend on the time interval. With the innovation of technology for network and power structure the equilibrium transactions may vary. In this exposition, however, we do not deal with this possibility by assuming the technology remains constant.

Each equilibrium transaction induces an exact transactions cost, which we call the equilibrium transactions cost. The process of reaching the equilibrium transactions from a non-equilibrium point is a question beyond the scope of this paper. We assume in the following that there exists a stable equilibrium.

## 5. The Form of Market and Organization

We will specify more in detail what we mean by network and power structure. The concept of market and organization involves the two dimensional ideas of network and power structure. Pure market is where each entity of transactions has the same right to use network and has an equal partnership. Pure organization, on the other hand, is the place where each unit of transactions behaves under a

hierarchical power structure and uses the network specific to the hierarchy. Between these two extreme situations we can find many types of transactions state. They may be called markets, organizations, or some kind of mixed situations.

The transactions state can be expressed by two modes. One is the strength of partner connections, while the other is the power structure. The first deals with how often partners contact each other and the latter is the degree of leader/follower relationship. These two modes can be expressed by number. The strength of connection can be expressed from zero (no connection) to one (perfect connection). The degree of leader/follower relationship can also be expressed from zero (equal partnership) to one (perfect leader/follower). It is possible to express the actual transactions state by any combination of these two numbers. In reality, however, some combination might not be available. Traders in general face a finite number of alternatives imposed by laws and technologies.

By the above definition competitive market is where the degree of leader/follower relationship is zero. Market is called thin (thick) if the strength of connection is close to zero (one). Organization is called a strong hierarchal organization when the degree of leader/follower relationship is close to one. On the other hand organization is called a loose (tight) organization if the strength of connection is close to zero (one).

## 6. Goods and Services and Adjustment Costs

Transactions cost depends upon the transactions state, the strength of connection and the degree of leader/follower relationship, and upon which economic entities are involved in an actual transaction. The cost depends upon the transactions state as a whole, i.e., the presence of scale and scope economies.

The cost may be different by the type of goods and services being traded. When standardized goods are traded, it becomes more important to reduce matching cost since contracting cost does not matter much. By contrast in case of high tech goods contracting cost is crucial while matching cost is negligible. This is because negotiation for price and quality check are much more complicated than for standardized goods.

Thus, the best or minimum cost transactions state is different for different goods. The best state should be different for different composition of goods. The efficient transactions and efficient cost mean the best transactions state where no adjustment cost is involved. Changing the transactions state, however, incurs cost. Once one particular transactions state is introduced, it takes both time and cost to move to a different transactions state. As was discussed earlier, legal restriction possibly restricts the change.

In real economy the transactions are restricted by various factors. The equilibrium transactions and cost, therefore, should be redefined for this restricted case. The second best efficient transactions (cost) is defined as the equilibrium transactions (cost) under these circumstances.

## 7. Long Term Contracts

Efficient cost is attained by using many types of transactions state for the efficient transaction. In reality, however, we can reach an equilibrium with much less number of transaction state. In case that some goods become dominant one can deal with mostly the dominant goods only for the equilibrium. That is, to attain the equilibrium transactions with smaller number of the transactions states some goods must be dominant; it all depends, however, upon what kind of goods are being traded. This aspect of transactions cost reduction sometimes becomes very substantial. The transactions state, which reduces transactions cost of dominant goods, will determine the transactions state of the equilibrium transaction.

Service sector is growing most rapidly in the developed countries. Research and development investment is crucial to competitiveness and the competitive goods are most of the cases exportable high tech goods. These goods become dominant in determining the transactions state; this is because there prevails an increasing contracting cost for such goods. In reducing the transactions cost it is vital to select the ideal transactions state, which depends crucially on these dominant goods for contracting cost. Existence of asymmetry of information on the quality of goods traded among trading partners makes the contract very difficult to agree upon. The economic unit with more information might intend

to go ahead with the contract and monopolize the advantageous information to keep its position. The economic unit with less information might look at the contract with skepticism and might avoid it not to be cheated. The negotiation to reach the contract might become very complicated. As the argument for 'Lemon' and the following analysis suggest, it may not be possible to find methods to overcome the inefficiency due to the presence of informational asymmetries.

We can think of many ways to contract to overcome this difficulty; among them the long term contract seems to be the most promising candidate for actual application. The spot contract, which is a once-and-for-all contract, makes incentive compatible contract more difficult because a number of instruments to lead to an appropriate contract is small. The long-term contract, on the other hand, can give more instruments to make incentive compatible contract although it might be more complicated than the spot contract. Thus, long-term contracts are considered to be employed more often in developed countries. The long-term contract requires smaller degree of network connection and larger degree of power structure. In the long-term contract the economic units remain to be in strong relationship for a long period of time. By doing so they can reduce the cost of negotiation and make repetitive contracts. The selected long-term contract cannot be the one which only one of the trade partners finds beneficial all the time. This situation cannot be maintained. Thus the selected long-term contract could be the appropriate one. It is also true that the long-term contract does not change the transactions state over the short period of time and, thus, reduces or eliminates the adjustment cost of changing the transactions state.

## 8. Internationalization of Enterprises

'The Borderless Economy' is one of the key concepts to deepen our understanding of the current trend in the world economy. This trend has been augmented by technological progress. The costs of communication and transportation have been reduced substantially and the location factor in production and distribution becomes less important in minimizing the cost. Furthermore, it becomes more

important for enterprises to use many locations from the viewpoint of gaining locational advantages by dividing their economic activities. These days what is important for large enterprises is the international network of production, distribution, and information gathering and dissemination. The international network of these is equally important for small and medium enterprises; in fact they tend to be integrated into the network of large enterprises.

The increasing importance of international business leads the advantageous factors of these enterprises to spill over to other enterprises, those in foreign countries in particular. There may be slight differences between domestic and foreign country economic activities; there may exist a difficulty in the business in foreign countries due to uncertainties over legal problems and other issues. Under this circumstance it becomes more appropriate to choose the transactions state which reduces the contracting cost.

### 9. Concluding Remarks

The form of an enterprise is determined simultaneously with the transactions state, which minimizes the transactions cost. As the adjustment cost of the transactions state is not small, one transactions state might be used for various transactions. The equilibrium transactions state, therefore, can be influenced more dominantly by leading ones among all the transactions. The contracting cost may be the most important one in recent years when trade has been increasingly made for high tech goods and information intensive services. To reduce the contracting cost for these goods and services, the selected transactions state is closer to an organization where the power structure is hierarchical than it is to a market. Since enterprises face uncertainties and large contracting costs with internationalization, the transactions state of the large organization is more efficient for international enterprises.

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# A NOTE ON THE FLATNESS OF THE TRANSFORMATION SURFACE\*

KAZUO SHIMOMURA

## Abstract

Consider a production possibility set constructed by any number of primary factors of production and any number of first-degree-homogeneous production functions, the inputs of which include produced commodities. Let  $y$  be a point on the upper boundary of the set with  $n$  industries active. Then, the transformation surface contains the intersection of an  $(n-r)$ -dimensional hyperplane embracing  $y$  and the set if and only if at  $y$  there are exactly  $r$  linearly independent vectors of primary-factor inputs.

## I. Introduction

This paper considers a global property of the transformation surface. Khang and Uekawa (1973) have proved that it is necessary and sufficient for the existence of a linear segment on the transformation surface that there is a point on the surface such that the vectors of primary factors are linearly dependent. Kemp, Khang and Uekawa (1978) have considered the degree of local flatness on the surface and showed that the rank of the linearly independent vectors of primary factors is uniquely and negatively related to the dimension of the flat. However, neither of the papers has made clear how "widely" the flat be extended on the transformation surface. This paper is concerned with this point.

Section 2 presents assumptions, which are weaker than those of Kemp et al.. Section 3 proves the main propositions in this paper.

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\*I am indebted to Prof. M.C.Kemp for helpful comments on an earlier version of this note.

Section 4 gives an implication of our results for the standard theory of international trade.

## II. Assumptions

Let us quote Section 2 of Kemp et al. (p.538, 1978): Our assumptions and notation follow theirs, although we assume away (A2) below. Thus, ours are weaker.

“Let there be  $n$  produced commodities and  $m$  primary factors,  $n < m$ . A produced commodity may be a pure intermediate good, or it may be both a final good and an intermediate good — such distinctions play no role in what follows. The non-negative  $n$ -vector of gross outputs is denoted by  $x \equiv (x_1, \dots, x_n)$ . The amounts of the  $j$ th good and  $k$ th primary factor employed in the  $i$ th industry are denoted by  $x_{ji}$  and  $v_{ki}$ , respectively. Thus, the  $i$ th production function defined on  $E_+^{n+m}$ , the non-negative orthant of  $(n+m)$ -dimensional Euclidian space, is written as

$$x_i = f^i(z^i) \equiv f^i(x_{\cdot i}, v_{\cdot i})$$

where  $x_{\cdot i} \equiv (x_{1i}, \dots, x_{ni})$  and  $v_{\cdot i} \equiv (v_{1i}, \dots, v_{mi})$ . The following restrictions are imposed on  $f^i$ :

- (A1)  $f^i$  is continuous, homogeneous of degree one and quasi-concave.  
 (A2) Either (i) the economy is non-decomposable so that each proper subset of industries makes use of the output of at least one excluded industry, or (ii) each industry makes use of all primary factors.

The net output of the  $i$ th commodity is  $y_i \equiv f^i - \sum_j x_{ji}$ . If (as we suppose) all commodities are traded internationally,  $y_i$  may be of either sign. The net production set is

$$Y \equiv \{y \equiv (y_1, \dots, y_n) \in E^n : y_i < f^i(x_{\cdot i}, v_{\cdot i}) - \sum_j x_{ji} \text{ for some } x_{\cdot i} > 0 \text{ and } v_{\cdot i} > 0, i=1, \dots, n, \text{ such that } \sum_i v_{\cdot i} < v\}$$

where  $v \equiv (v_1, \dots, v_m)$  is the constant vector of primary endowments. The transformation surface is the upper boundary of  $Y$ ."

### III. Analysis

Let us prove our main results.

*PROPOSITION 1. Let  $y^*$  be a point on the transformation surface with  $n^0$  industries active. Then there is a  $(n^0 - r)$ -dimensional hyperplane embracing  $y^*$ , say  $M_{n^0-r}$ , such that the transformation surface contains  $M_{n^0-r} \cap Y$  if and only if at  $y^*$  there are exactly  $r$  ( $< \min(m, n^0)$ ) linearly independent vectors of primary-factor inputs.*

Proof. Sufficiency: We have  $y^* = (y_1^*, \dots, y_{n^0}^* ; y_{n^0+1}^*, \dots, y_n^*) \equiv (y_i^*, y_{i1}^*)$ , where  $y_i^* = f^i(x^*_{\cdot i}, v^*_{\cdot i}) - \sum_{j=1}^{n^0} x^*_{ij} q_j$  and  $f^i(x^*_{\cdot i}, v^*_{\cdot i})$  is positive for  $1 < i < n$ . Let  $V^* \equiv (v_1^{*T}, \dots, v_{n^0}^{*T})$  have rank  $r$  and  $Q_{n^0-r} \equiv \{(q^T, 0_{11}) : V^* q = v\}$  where  $q$  is a  $n^0 \times 1$  vector and  $0_{11}$  the  $1 \times (n - n^0)$  zero vector, and  $T$  indicates the transpose of a vector. Obviously,  $Q_{n^0-r}$  is a  $(n^0 - r)$ -dimensional hyperplane and so is  $M_{n^0-r} \equiv \{(y_1(q), \dots, y_{n^0}(q), 0_{11}) :$

$(q^T, 0_{11}) \in Q_{n^0-r}\}$ , defining  $y_i(q) \equiv f^i(q_i x^*_{\cdot i}, q_i v^*_{\cdot i}) - \sum_{j=1}^{n^0} x^*_{ij} q_j = (f^i(x^*_{\cdot i}, v^*_{\cdot i}) - x_i^*) q_i - \sum_{j=1}^{n^0} x^*_{ij} q_j, i=1, \dots, n^0$ . Now, notice

that if  $(x^*_{\cdot i}, v^*_{\cdot i}), i=1, \dots, n^0$ , is a solution to the optimal problem generating the transformation surface and if  $q$  is such that  $(y_1(q), \dots, y_{n^0}(q), 0_{11})$  is in  $M_{n^0-r} \cap Y$ , then so is  $(q_i x^*_{\cdot i}, q_i v^*_{\cdot i}), i=1, \dots, n^0$ . For, considering the homogeneity of  $f^i$ , the latter also satisfies the Kuhn-Tucker conditions.

Necessity: See Kemp et al. (p.541, 1978).

Q.E.D.

*COLLORARY. If  $r=1$  at  $y^*$ ,  $M_{n^0-r} \cap Y$  completely coincides with the transformation surface.*

*PROPOSITION 2. Suppose that  $r < \min(n^0, m)$  at  $y^*$ . Then there are*

at least two points on  $M_{n^0} \cap Y$  at which the gross outputs of two different industries among the  $(n^0)$  industries which were active at  $y^*$  are zero.

**REMARK.** Consider a special case in which at a point on the transformation surface three final goods are produced with the aid of  $m$  primary factors alone. PROPOSITION 2 assures us that if  $r < 3$  at the point then the transformation surface contains a linear segment connecting two of the coordinate planes such as  $AB$  in FIGURE 1.

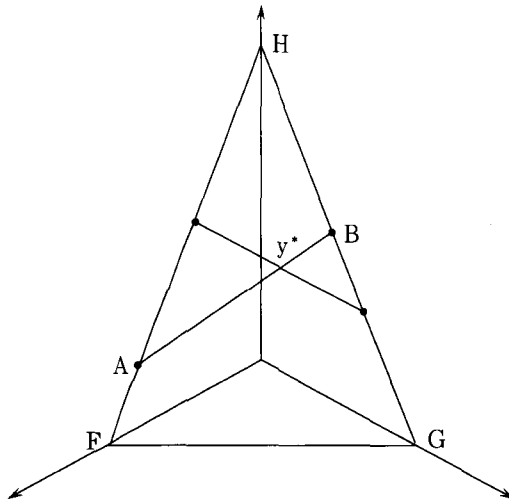


Figure 1

If  $r = 1$  then there must be two such segments such that the transformation surface completely coincides with the plane which is spanned by the segments in the non-negative orthant like  $HFG$  in FIGURE 1.

Proof. Since  $r < \min(n^0, m)$ ,  $V^*k = 0$  has a non-zero solution, say  $k^{*T} \equiv (k_1^*, \dots, k_{n^0}^*)$ . Then, without loss, we can assume that  $0 < |k_i^*| > |k_j^*|$ ,  $i = 2, \dots, n^0$ . Therefore, letting  $t_j \equiv k_j^* / k_1^*$ ,  $j = 2, \dots, n^0$ , and considering that  $\Sigma v_i^* = v$ , there is a vector  $q \equiv (q_1, \dots, q_{n^0})^T$  which satisfies  $v = V^*q$  and

$$q_j - q_1 t_j = 1 - t_j > 0, \quad j = 2, \dots, n^0$$

Therefore, it may be obvious that  $(y(q)^T, 0_{11})$  is on the transformation surface when  $q = (0, 1-t_2, \dots, 1-t_{n^0}) > 0$  and that at the point the gross output of the first industry is zero. Now if  $n^0 = 2$ , then  $r = 1$ . Considering COLLORARY, the present proposition is obviously established in such a case. Thus, in what follows, we shall assume that  $n^0 > 2$ . Without loss it can be assumed that  $t_2 < 0$  and  $|t_2| > |t_i|$ ,  $i=3, \dots, n^0$ . Then, from (1), we see that  $q^* \equiv (-(1-t_2)/t_2, 0, -(t_3-t_2)/t_2, \dots, -(t_{n^0}-t_2)/t_2) > 0$ . Therefore,  $(y(q^*), 0_{11})$  must be on the transformation surface and there the gross output of the second industry is zero.

Q.E.D.

#### IV. A Concluding Remark

Consider the standard two-(final)-good by two-(primary)-factor Heckscher-Ohlin model. PROPOSITION 1 means that the transformation curve never be drawn like Figure 2: It is either strictly concave or a straight line connecting the two axes of coordinates.

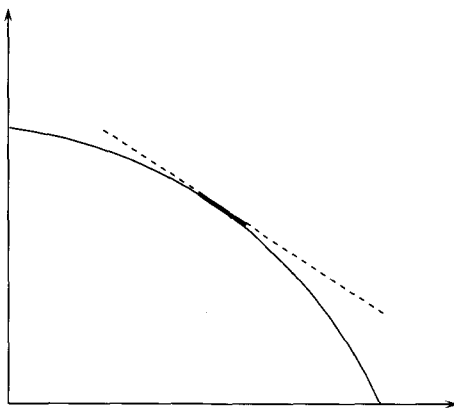


Figure 2

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# THE LONG-TERM RELATIONSHIP IN THE JAPANESE DISTRIBUTION SYSTEM : GAME-THEORETIC VIEWPOINTS\*

Kenji KOJIMA

## Abstract

The long-term relationship is one of the most distinctive features in the Japanese distribution system. The reason why it has been sustaining is often referred to the Japanese unique culture. This paper provides the game-theoretic viewpoints to explain why it sustains; referring to repeated games and reputation models. Furthermore, it shows how the social norms work under the circumstances in which the rational economic agents seek their self-interests. There need be nothing mysterious about how Japanese trade practices work, nor need be explained by reference to only unique social and cultural characteristics in Japan. The trade practices in Japanese distribution system can be understood as having attained, as the result of long historical process, a complex system in which firms behave rationally.

## Introduction

The Japanese distribution system is characterized by close and extensive links between manufacturers and their distributors. It has several distinctive features of trade practices: (1) emphasis on personal ties in the trade relationship; (2) long-term trade relationship; (3) dealing without explicit written contracts; (4)

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returning unsold goods. Among them, long-term trade relationship is one of the most distinctive features in the Japanese distribution system. It is often said that the Japanese distributors, especially those of industrial goods rarely change the trade partners from whom they have been purchasing products. This is one of the most controversial issues in the chronic U.S.-Japan trade disputes, for it is viewed as a significant trade barrier. The long-term relationship seems to foreign firms very peculiar to Japan. Hence, the Japanese unique culture, specifically distinctive social norms, may be often cited to be a major reason why the long-term relationship sustains in Japan. Is it the case that the long-term relationship can be inherent in the uniqueness of Japanese culture? Is it possible to explain why it works with the view from the economic theory? Is it possible to understand how the social norms work under the circumstances in which the rational economic agents seek their self-interests?

The purpose of this paper is twofold. One is to present theoretical explanation why the long-term relationship has been sustaining in the Japanese distribution system based upon the non-cooperative game theory. The other is to show the social norms play a complementary role to explain behaviors of the economic agents in the long-term relationship. This paper is organized as follows. First, we show some evidence on the long-term relationship in the Japanese distribution system and its deterring effect to foreign entrants. Next, we consider the long-term relationship in Japan from social and cultural viewpoints. Then we present the two kinds of views from the non-cooperative game theory; repeated games and reputation models. We show that it is possible to explain why the long-term relationship works with the view from the economic theory. Furthermore, it is shown how the social norms work under the circumstances in which the rational economic agents seek their self-interests. Finally, conclusion is offered.

### **Long-term relationship as a major trade practice in the Japanese distribution system**

In 1986, the Fair Trade Commission (FTC) surveyed the user-supplier relationship at 200 large non-financial firms, of which 94 firms responded (FTC 1987). In regard to production goods as well as



capital goods, the overwhelming response was that they had a long-term relationship with all or the majority of their suppliers with maintaining over more than five years. 63% of respondents had the trade relationships with their 30 largest suppliers over more than ten years. The prevalence of those long-term relationships was explained in the FTC report as follows: a close, long-term relationship with a few suppliers affords substantial reductions in purchasing management costs as suppliers can be increasingly relied on to perform product inspections and inventory control, to protect technical secrets, and to settle transactions smoothly; in a long-term relationship, communication becomes simpler and mutual understanding develops; this is seen as a major advantage in maintaining existing purchasing relationship with trading off raising switching cost.

Economic Planning Agency in Japan did the mail-survey on the trade practices in 1990 (Economic Planning Agency 1991). It shows that the long-term relationship seems to both foreigners and the Japanese peculiar to Japan. Moreover, it shows it works against newly entering foreign firms. Respondents were foreign businessmen in Japan and the Japanese in that survey. 82% of respondents among foreign businessmen agreed that the long-term relationship was peculiar to Japan; 72% of Japanese respondents agree with that. 70% of foreign respondents agreed that the long-term relationship were working as an entry barrier. On the other hand, 35% of the Japanese agreed with that. That survey supports the claim of foreign manufacturers trying to enter the Japanese market. It is claimed that they are unfairly excluded because the Japanese distributors purchase only from their accustomed manufacturers.

### **Social and cultural viewpoints**

We define the long-term relationship in distribution system first before we argue it from social and cultural viewpoints. The long-term relationship in distribution system is said to be that a specific trade relationship between suppliers and manufacturers, or between manufacturers and distributors, or between wholesalers and retailers sustains over time. It involves mutual dependency, where each trade partner's actions influence each other. The situation by its nature

requires members in the long-term relationship to cooperate each other and spend efforts in establishing and maintaining trade relationship over time. The long-term relationship encourages trade partners to make a relation-specific investment. The relation-specific investment can enhance the efficiency of trade. On the other hand, it induces trade partners to do opportunistic behavior and it raises switching cost.

The long-term relationship works well in Japan, because the Japanese are inherently cooperative. Alston (1986) points out that *wa* can be a key concept to explain why cooperative behavior is dominant in the social relationship in Japan. The Japanese term for group harmony and consensus is *wa*. *Wa*, that is one of the major social norms in Japan, refers to a balance or limitation of individual needs and desires in favor of the good of the group. The Japanese hold the view that conflict and disagreement are harmful if they result in lessened harmony and consensus in their personal relation. The maintenance of personal relation is more important than allowing conflicting parties the chance to compete directly against each other. The Japanese are inhibited by the fact that their society is group-oriented. Their cultural idea is based on persons helping the group through individual sacrifices. *Wa* encourages members of a group to emphasize what they have in common and search for ways to eliminate any differences. They must try to convince each other that one favorite policy or another is the best. The process of agreement involves compromise, promises of future agreement in exchange for present acquiescence. Maintaining *wa* can only be done through a strong belief in team spirit. Member must identify with the group and be loyal to its goals. Team spirit is beneficial when close supervision is not possible or becomes too expensive. The result is that supervising cost decreases with the enhancement of team spirit. There are also drawbacks to having too strong a team spirit. Loyalty to one group may mean exclusion of others and in a lack of coordination with non-members. It may also make members difficult to switch to the other opportunities. *Wa* encourages members of a specific trade relationship in the distribution system to emphasize what they have in common and search for ways to cooperate each other.

The human bond between business partners traditionally plays a

crucial role in Japan. Personal and emotional ties are regarded more important than not only legal rules but also a short-term gain. Maintaining the long-term relationship is equivalent to keeping personal ties. Batzer and Laumer (1989) have another view from social and cultural standpoint. A business partnership is seen by Japanese firms as a kind of marriage, that is to say a long-term alliance. This means that a tight-knit network of personal relationships between partners makes it very difficult for a firm to change its partners. It is particularly difficult for newly entering firms to break into the existing web of relationships in the distribution system. Between the partners in the distribution system these personal relationships find expression in regular visits, the giving of assistance, the frequent exchange of gifts and so forth. The methods of payment practices such as credit periods must be understood in this light. Accounts are usually closed on the 20th of each month and settled on the 5th of the following month. Payment by bill of exchange, usually with a term of from 90 to 150 days is still the dominant method. This means that the manufacturers or wholesalers usually have to finance their deliveries for a lengthy period, on average more than six months. This approach to payment, which demands a high degree of trust, encourages traders to do business with the trusted partner. The result is that they tend to maintain long-term relationship.

The social norm in Japan restrains the trade partners from doing opportunistic behavior, so that the long-term relationship works well as self-enforcing contract. A strong sense of maintaining goodwill and trust is one of the most prevalent norms in Japan. Ballon (1988) characterizes the contract in Japan based upon the distinctive social norm. The contract clearly determines a time frame, but even within the period circumstances are not static. The Japanese remain intimately convinced that the future is unpredictable, and that therefore the circumstances surrounding the contractual performance are unforeseeable. Flexibility in performance is then taken for granted. Circumstances are interpreted in the broader context of their relationship, rather than in the narrow context of the contract. This outlook on changing circumstances is nothing more than a very practical appreciation of the time dimension of the relationship that encompasses more than the specified transaction.

The relationship stretches time well beyond performance. While the contract is signed, negotiations have not only determined the details of the performance, but have also revealed the personality of each party. And after the contract has been implemented, the sense of obligation often persists practically as long as the contact is substantially in effect. Reality, at least as the Japanese see it, is always more than whatever is spelled out in writing. It is often because of supervening events that the contract induces opportunistic behavior. The Westerner may turn to litigation, because this is part of his culture. The Japanese is much less likely to do so, not necessarily because he would be less litigious by nature, but because his culture provides him with other forms of social control based on personal ties and trust. To control opportunistic conduct readily awakened by changing circumstances is one more reason why Japanese firms nurture a privileged group of distributors. Dore (1987) shares the similar view with Ballon. He characterizes the society in Japan as close and extensive link among people based on goodwill and debt-and-favor. Opportunistic behavior may be a lesser danger in Japan because the Japanese moralize trading relationship of mutual goodwill. The stability of the relationship is the most important. Both sides recognize an obligation to try to maintain it.

Is the long-term relationship peculiar to Japan? Macaulay (1963) found that personal trust played an important role to sustain long-term trade relationship in the U.S.. The thoughts from social and cultural viewpoints seem to share the similar ideas. The social norms such as maintaining group harmony, personal ties, goodwill, and trust are thought to be more prevalent in Japan than in other countries. These norms can play an important role to encourage trade partners to cooperate each other and restrain them from doing opportunistic behavior. The social and cultural viewpoints could not be sufficient to explain behaviors in the economic setting. Is it possible to explain why cooperative behavior prevails in the Japanese distribution system from the viewpoint of economic theory? Agents are assumed to be rational and seek their self-interests in the economic theory. Is it possible to understand how the social norms work under the circumstances in which the rational economic agents seek their self-interests?

### **Game-theoretic viewpoints (1): repeated games models**

Repeated trade relationship can serve in place of formal contracts in developing incentives for cooperative behavior. It states the game-theoretic idea that infinitely repeated interactions permit cooperation to occur if the players are sufficiently patient (Fudenberg and Tirole 1989). Repetition of a game allows the players to escape the prisoner's dilemma; each player's pursuing immediate gain leads to an outcome that can be improved for all of them. The trade relationships in the distribution system can have the character of a prisoner's dilemma. One way of overcoming this is to write contracts, with each party promising to refrain from the mutually damaging activity and making himself subject to legal sanction if he breaks his promise. However, cooperative outcomes are enforced by the threat that any deviation will trigger switch to an outcome of a prisoner's dilemma in a repeated game. In consequence, patient parties can implicitly cooperate with any deviation triggering punishment. The cooperation is implicit in that the parties would not need to enter into binding contracts to enforce their cooperation. Instead, each party is deterred from breaking the agreement by credible fear of provoking a prisoner's dilemma. If the equilibrium outcomes are suitably focal among the parties, then cooperation might be sustainable without even communication.

In a continuing situation, people cooperate because it is in their interests to do so. The point of the repeated-game argument is that players cooperate now for fear of being cut off from profits in the future. Distributors make efforts to sell products on behalf of the manufacturer. The resulting consequences depend on an environment as well as on the distributors' efforts. The manufacturer cannot directly observe the distributors' efforts. In this situation, the repetition of the game would give the manufacturer an opportunity to observe the results of the distributors' effort over a number of periods, and use the idea like some statistical test to infer whether or not the distributor was making appropriate level of efforts (Radner 1985). The cooperative outcomes can be attained by a review that manufacturer periodically evaluates the cumulative performance of the distributors. If a review results in a satisfactory

evaluation, a new phase is begun in which the outcome is efficient to all of them; otherwise, the players enter a penalty phase in which the outcome is a prisoner's dilemma.<sup>1)</sup> The equilibrium cooperative outcomes are self-enforcing, and thus do not need to rely on any binding contracts or other precommitments. A distributor is given a rating according to her performance and cooperation to sell products for a particular manufacturer in the Japanese distribution system. A distributor that performs well is given a high rating. Then, she is promoted to be higher status in which she is provided with the various menu of rebates being rewarded for sales goal achievement, for cooperation in sales promotion, and for exclusive dealing with a particular manufacturer (Economic Planning Agency 1991). The manufacturer's policy of maintaining long-term relationship with distributors is designed to encourage them in achieving good sales performance and high cooperation.

Although repetition can induce the incentive for players to cooperate, a repeated game has plethora of equilibria involving cooperation outcomes as well as non-cooperative ones; each player rationally pursues either long-term or short-term gains (Fudenberg and Maskin 1986). Hence, repetition offers no guarantee that it will occur. None of the players can be ensured that cooperation occurs as an equilibrium outcome. The cooperation resulting from repeated relationship is not robust, so that it is necessary to have devices to support cooperative relation among players. Repeated relationship in Japanese distribution system is secured by organizing a particular group, so that distributors are identified as members of a particular group which is organized by a manufacturer or a wholesaler: for examples; the National-Panasonic group; the Sony group; the Toyota group; and so on. Those groups work to facilitate members to exchange and disseminate information and to establish personal ties among themselves. Information sharing and close personal ties may ensure every member of the group to establish and maintain group

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1) In this setting power between manufacturer and distributors may be unequally distributed. The manufacturer has power in the sense that he is able to reward the distributors who are evaluated for satisfactory partners and punish those who are not satisfactory. The distributors have power in knowledge. They are likely to be better informed about the details of their selling conditions than the manufacturer (Gaski 1984; Hunt and Nevin 1974).

harmony, goodwill and trust. These dominant social norms encourage members of the group to choose cooperation as one of the focal point equilibria (Schelling 1960).

### **Game-theoretic viewpoints (2): reputation models**

Manufacturer's or distributor's efforts to promote sales of a particular product are especially subject to reputational effects. Reputation is defined here that a trade partner's belief that other trade partner will perform an action that is trustworthy enough to consider engaging in some form of cooperation with him. Both of parties in channel of distribution may not be able to observe the efforts directly. In such situation, the long-term relationship enables better monitoring and permits intertemporal incentives that sustain cooperation (Wilson 1985). The incentives can take the form of remuneration that depends in each period on the history of observation; trade partners in each period take account of the effect of his efforts on his current reward and its effect on his subsequent ones. Reputation plays a key role to provide trade partners with incentives in the market. To the extent that efforts are unobservable, the long-term relationship with remuneration contingent on the history of measured performance provides incentives for the trade partners to invest effort in building a reputation for a qualified partner. The distributor's reputation for cooperative dealing is valuable to him: renegeing on this contract would diminish his ability to make profitable contracts in the future. Therefore, the new entrants are required to spend time and effort to establish reputation to set up new trade relationship. It may burden the newly entering firms as a trade barrier. Once the trade relation starts, the trading cost of each party reduces substantially due to simplified procedures. But each party must make efforts to maintain trustworthy relationship (Economic Planning Agency 1986).

Wilson (1985) expounds the concept of reputation in the game theory. The reputation accounts for strong intertemporal linkages along a sequence of otherwise independent situations. The key idea is that one's reputation is a state variable affecting future opportunities; moreover, the evolution of this state variable depends on the history of one's actions. Hence, current decisions must

optimize the tradeoffs between short-term consequences and the long-term effects on one's reputation. In a game, a player's strategy is a function that assigns the action to be taken in each situation in which he might make a choice. If the player has some private information, then the choices of actions may depend on this information. In this case, other players can interpret his past actions as signals about what his private information might have been. The player's reputation is the history of his previously observed actions. Furthermore, if the information concerns something that persists over time, then these inferences about the private information can be used to improve predictions of his future behavior.

To be optimal, the player's strategy must take into consideration the following chain of reasoning. First, his current reputation affects other's predictions of his current behavior and thereby affects their current actions; so he must take account of his own current reputation to anticipate their current actions and therefore to determine his best response. Second, if he is likely to have choices to make in the future, then he must realize that whatever are the immediate consequences of his current decision on his future reputation, and other's anticipation that he will take these long-term consequences into account affects their current actions as well. The key ingredient is that a player can adopt actions that sustain the assessment made by other parties that yields favorable long-term consequences. Whenever it is feasible to imitate the behavior one would adopt if one's private information were different than it is, and this would affect other's actions favorably, there is potential role for reputational effects. The operative mechanism is the process of inference by which observed actions are taken as signals of private information. Behavior can be considered as designed to affect other's responses by sustaining or altering their beliefs (Wilson 1985).

The long-term relationship with remuneration provides incentives for trade partners to build a reputation for trustworthiness that yields favorable long-term gains. The concept of reputation, however, has technical caveat of practical significance like repeated games. Reputation can explain many behaviors. It is too easy to suppose that an unobserved state variable is called reputation that explain all



that happens. We should circumscribe the observations that an outside observer might make. The dominant social norms such as maintaining group harmony, goodwill, trust in Japan can reinforce the mechanism of reputation building by the rational agents.

In Japan, firms may choose a trade partner within a circumscribed group in which reputation about the other contracting party is readily available and in which public sanctions against opportunistic behavior exist. The Japanese are inclined to introduction. Many Japanese will deal only with parties that can submit introductions from respected third parties. The introduction verifies both that the party has acted in ways considered 'honorable' within the world of 'reputable' firms and that it will be subject to the sanctions of the third party if it tries to act 'dishonorably' in the future (Ramseyer 1986). The trading groups which are mentioned beforehand work in a similar way. When members of a group share the trading information and hold a common code of honorable behavior and subject to the sanctions of others in the group, monitoring cost can be substantially mitigated.

Trade partners do not rely solely on reputation available from outside parties to judge the trustworthiness of other partner in the Japanese distribution system. To ascertain whether other partner is trustworthy they rely additionally on their own experiences. A certain periods of time and a number of personal contacts are required to update the reputation about other partners. During that period they operate in a testing process. Initially small and short-term trades are given and further trade depends upon performances and trade behaviors. Once they are satisfied with the trade, ongoing trade relationship is ensured. The combination of certain types of behavior and personal contracts involving the exchange of information and giving mutual assurances, and a considerable time for the consistency of one's behavior to be observed and tested can enhance and maintain a reputation for trustworthiness.

### Conclusion

The long-term relationship is one of the most distinctive features in the Japanese distribution system. It seems to foreign firms very peculiar to Japan. The reason why it has been sustaining is often

referred to the Japanese unique culture. In this paper, the game-theoretic viewpoints are provided to explain why it sustains. Repetition of trade relationship induces the incentive for members to cooperate and maintain the relationship. The long-term relationship with remuneration provides incentives for trade partners to build a reputation for trustworthiness that yields favorable long-term gains. The dominant social norms can play a complementary role to reinforce the incentive to cooperate and build a reputation in the Japanese distribution system. There need be nothing mysterious about how Japanese trade practices work, nor need be explained by reference to only unique social and cultural characteristics in Japan. Although the trade practices in Japanese distribution system are deeply embedded in the Japanese society, it can be understood as having attained, as the result of long historical process, a complex system in which firms behave rationally.

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# RECENT DEVELOPMENTS IN THE THEORY OF TRADE WITH IMPERFECT COMPETITION\*

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## I. Introduction

Most of the traditional theories of trade have been developed on the assumptions of perfect competition and constant returns to scale. Typical examples are the Ricardian and Heckscher-Ohlin models of trade. In the Ricardian model, trade is due to technological differences between countries. In the Heckscher-Ohlin model, technologies are assumed identical between countries and trade is due to differences in relative factor endowments. Both models succeed in explaining the determinants of inter-industry trade. However, they are not capable of explaining the phenomenon of intra-industry trade which is a major component of world trade. This is chiefly due to the two traditional key assumptions of perfect competition and constant returns to scale.

There has been a major change in the theory of international trade in the past decade. The new trade theory removes the traditional two key assumptions. Instead, it emphasizes two fundamental insights—imperfect competition and increasing returns to scale. There can be many sources for the existence of market imperfection. For example, the presence of increasing returns to scale gives a cost advantage, and therefore more market power, for the larger firm. Market imperfection may also be the result of entry barrier. This may be due to technological features, patent

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protection, uncertainty, the existing firms' strategic behaviors, government's regulation, or the existence of large fixed costs. In addition, the existence of different physical characteristics of goods or differing brand images due to, for example, advertising, may contribute to product differentiation, and therefore some market power of the producers. The key contribution of the new trade theory has been the introduction of imperfect competition and increasing returns to scale into trade models.

As a result of removing the two traditional key assumptions of perfect competition and constant returns to scale, and the breakthrough in modeling imperfect competition, the new theory has been able to incorporate many new features—including differentiated products, strategic behavior of firms, entry and exit of firms, and even endogenous market structure. It has produced many new theoretical conclusions and policy implications. For example, it acknowledges that differences between countries are one basis for trade, but also adds that similarities between them can still generate trade chiefly because of advantageous specialization in the presence of increasing returns to scale. Trade pattern, therefore, can be based on cost, demand, and strategic variables. Moreover, a large country may be lost from trade as a result of, for example, the expansion of the monopolized sector in a small country. The field of trade is now faced with a proliferation of seemingly inconsistent models and diverse policy implications. This should not be a surprise since in the presence of market imperfection, the world is not in the first best situation. From the theory of second best, one can expect that anything can happen. Thus the policy implications of the new trade theory are quite sensitive to different factors such as the market structure (segmented or integrated), industry structure (free entry of firms or not), and firms' behavior (the type of game they play). With a change in firms' behavior, the optimal trade policy may change from an export subsidy to the opposite case of an export tax. There is clearly a need to systematize and integrate the bewildering array of models and results. The purpose of this paper is to fill such a need. It intends to examine the key issues of the new theory of trade and to systematize and integrate the diverse models into a more coherent framework. It is hoped that the bewildering array of policy implications can also be placed in proper

perspective.<sup>1)</sup>

The main part of this paper is organized according to the industry structure. Section II examines the case of monopoly. Section III examines oligopoly, including the special case of duopoly. Section IV examines the large-group case of monopolistic competition. Since quality differential is a major source of market imperfection, we include in Section V the element of quality as an additional variable. Section VI provides some concluding remarks.

## II. Monopoly

### 1. Home monopoly in an export industry

Consider the case where a domestic monopolist serves both the domestic and foreign markets. If the domestic firm can discriminate between home and foreign market, the first-best policy is to effect marginal cost pricing at home and let the firm exploit its monopoly power in the foreign markets. If it does not have the power to exploit the foreign markets, then an export subsidy may be called for (see Katrak (1980)). Auquier and Caves (1979) have examined a similar case in which price discrimination is not possible. They have analyzed the trade-off between profits derived from domestic and foreign operations, and offered the policies such as the use of export taxes and the formation of export cartels to exploit the monopoly power in the export market when there is more than one domestic firm.<sup>2)</sup>

If the home and foreign markets are segmented, there will be separate demand curves facing the home export monopoly. Since the monopolist will equate marginal cost to marginal revenue in each market, the price charged in each market is inversely related to its elasticity of demand. Thus if the foreign demand is more elastic, the price charged there will be lower than in the home market. This rational pricing policy often results in a dumping phenomenon.

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1) Many of these new results have been presented in Helpman and Krugman (1989), Krugman (1990), and Vousden (1990).

2) For further details, see Rieber (1982), and Davies and McGuinness (1982). In addition, Jacquemin (1982) discusses the case in which a reduction in foreign monopoly power results in the reduction in home monopoly power as well.

## 2. Home monopoly in an import-competing industry

### a. The behavior of the monopolist with tariff protection

When there is a domestic monopoly facing competitive foreign firms in the import-competing industry, the monopolist may behave quite differently depending upon the trade policy of the government. Consider the simplest case where foreign firms and the domestic monopolist produce identical goods, and the elasticity of foreign supply is infinitely elastic in the home market. Assume that the marginal cost curve of the monopolist is increasing. If the government has a specific import tariff in place, the monopolist will face the foreign delivered price  $p^* + t$  as the ceiling price for its own product, where  $p^*$  is the export price received by the foreign competitors and  $t$  is the specific import tariff. This is the effective marginal revenue whenever there are imports. Thus if the tariff rate is not high enough to choke off imports, the monopolist will equate its marginal cost to  $p^* + t$  in setting its output for sale in the home market and charge a price not higher than  $p^* + t$ . If the tariff rate is high enough such that the marginal cost curve and foreign delivered price  $p^* + t$  intersect at an output higher than the quantity demanded at that price, the monopolist is constrained by home demand and will produce the constrained output to monopolize the home market. As the tariff rate is continuously raised, the output will be determined by moving up along the demand curve until to the point where it corresponds to the output determined by its marginal revenue and marginal cost curves. A further increase in the tariff rate will not change the monopoly output and pricing decisions. The monopolist therefore has a "supply" curve under the competition of varying foreign prices.

### b. The nonequivalence of tariff and quota under monopoly

One popular issue examined in the literature is the relative restrictiveness of an import tariff and an equivalent quota. Bhagwati (1965) showed that the latter is more restrictive than the former. Thus different types of protection vary in their effects on monopoly power. Fig. 1 illustrates the case.  $D_0D_0$  is the home demand curve, and  $c'$  is the marginal cost curve. If an import quota of  $\bar{M}$  is imposed, the monopolist faces the residual demand curve  $D_1D_1$  which differs horizontally from  $D_0D_0$  curve by the amount  $\bar{M}$ . The

corresponding marginal revenue curve of this residual demand curve is  $mr_1$ . Optimal output is determined by  $mr_1 = c'$ , resulting in the output of  $S_q$  and price of  $p_q$  under quota. If a tariff is set so that the imports are also  $\bar{M}$ , then the consumers must face  $p_t$  which is equal to  $p^* + t$ . Clearly,  $p_t$  is determined by the intersection of the  $c'$  and  $D_1D_1$  curves. The resulting output under  $p_t$  is  $S_t$ , which is seen to be larger than  $S_q$ . Moreover,  $p_t$  is lower than  $p_q$ . Thus quota is more restrictive than an equivalent tariff. It can be shown that in this case the quota causes a higher deadweight loss than the tariff. Similar conclusion with regard to welfare losses carries over to the case where the equivalent criterion is changed to domestic output instead of trade volume. However, if the equivalent criterion is changed to domestic price, quota becomes superior to the tariff (see McCulloch (1973)).

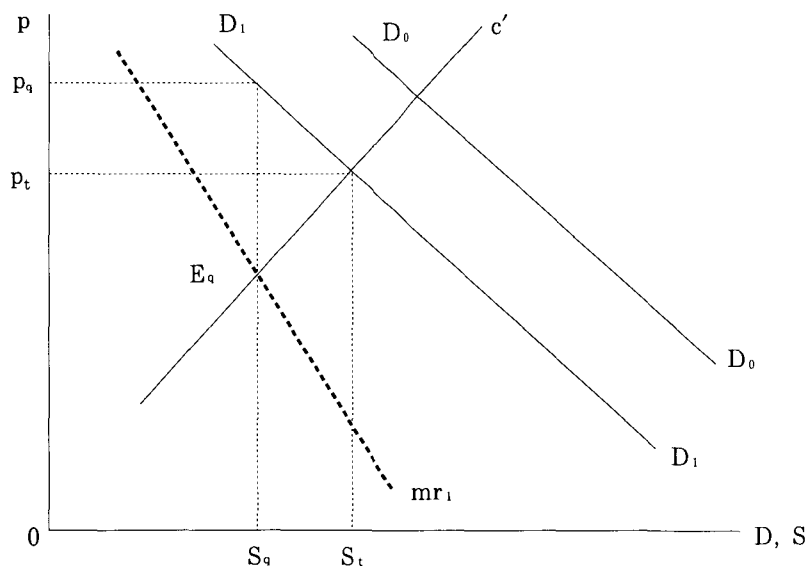


Fig. 1

**c. The case of declining marginal costs**

In the decreasing cost case, if the world price is below the average cost of the monopolist, then without protection, the monopolist cannot exist. The tariff must be at least as high as the "scientific" level such that the firm can earn nonnegative profits. But as soon as the firm enters the market, it will monopolize the whole domestic market and imports will be eliminated. The government has no tariff



revenue to collect and there is bound to have welfare loss in this case (see Corden (1974)).<sup>3)</sup>

Although the use of a tariff to establish a domestic monopoly is worse off for the country in the precedig case, Corden (1967) argues that there is a possibility for the economy to gain by using instead a production subsidy to establish the monopoly so that the consumer price can be equated to marginal cost. The monopolist, however, may misrepresent its cost figures in order to obtain a higher subsidy. This may reduce its incentive to minimize costs.

### 3. Foreign monopoly in a home import market

When there is a foreign monopoly in the home market, the policy implications are quite different from the preceding case of a home monopoly in the import-competing industry. For simplicity, we assume that there is no home production.

#### a. Extracting foreign firm's profits

In the presence of foreign monopoly, various policy measures have been examined by economists. These include the use of profit and consumption taxes (Katrak (1977)), tariffs (Svedberg (1979), Brander and Spencer (1981)), and direct price controls (DeMeza (1979)).

If the home government imposes a price ceiling on the landed price of foreign exports, it will have the effect of forcing the foreign firm to be a price taker. If the foreign firm's marginal cost  $C'$  is constant, then the price ceiling  $\bar{p}^*$  for the landed price of import should be set at  $C'$ . This will extract all foreign profits and is the first-best policy.

If the foreign firm's marginal cost is increasing with its output, then a lump-sum profit tax and a price ceiling will be the best policy. This is illustrated in Fig. 2. The  $M$  curve is the home import demand curve,  $C'$  is the monopolist's marginal cost curve, and  $MIC$  is the marginal import cost curve which is the marginal curve of the  $C'$  curve. Social optimum is determined by point  $E$  which is the

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3) Although there is no justification for using a tariff to protect a decreasing-cost monopolist in the import competing sector, it is possible that a tariff can make exporting profitable if the f.o.b. export price is not too low. In this case, import protection is export promotion (see Wonnacott and Wannacott (1967) and Pursell and Snape (1973)).

intersection of the MIC curve and the import demand curve. The consumer price should then be set at  $\bar{p}$  and the quantity of imports at  $\bar{M}$ . For this level of imports, the monopolist can be forced to accept the ceiling price if it is set at  $\bar{p}^*$ . The wedge between  $\bar{p}$  and  $\bar{p}^*$  can be effected by an import tariff or an auctioned-off quota. A lump-sum profit tax can then be used to extract any remaining profits.

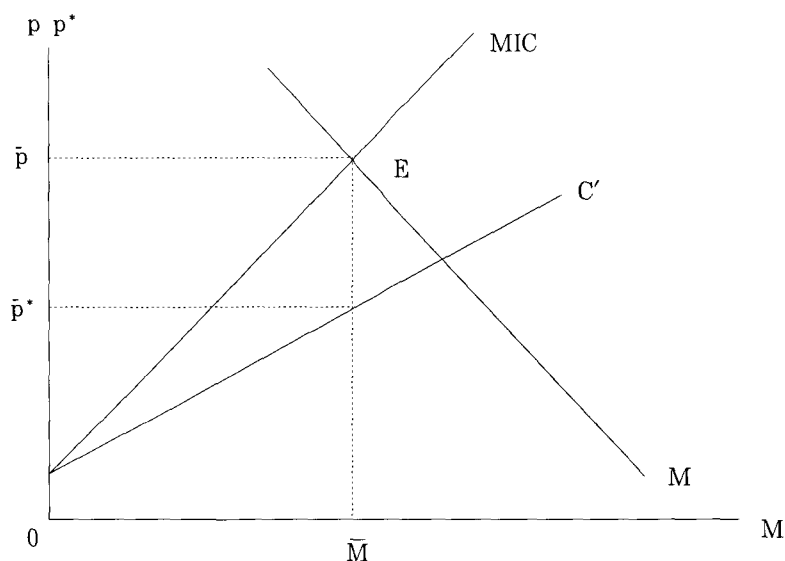


Fig. 2

**b. The second-best trade taxes or subsidies on imports**

A price ceiling, though preferred to a tariff, is seldom used in trade. It is therefore important to examine if there is a case of welfare improving tariffs or subsidies against the foreign monopolist. Katrak (1977) showed that indeed there is a possibility of a welfare-improving tariff. To illustrate, assume that the foreign firm has constant marginal cost,  $C'$ , and that the home country imposes a specific import tariff  $t$ . As shown in Fig. 3,  $M$  is the import demand curve, and  $MR$  is its marginal revenue curve. Under free trade, the monopolist equates  $MR$  to  $C'$ , resulting in exporting  $M_0$  and charging  $p_0$ . After the tariff is imposed, the monopolist faces a higher marginal cost  $C' + t$ , and the new equilibrium occurs at point  $E_1$ . This leads to  $M_1$  amount of exports to the home country at the higher consumer price of  $p_1$ . As a result, the home country gains

tariff revenue but loses some consumer surplus. The change in the social welfare is equal to the change in government tariff revenue (area  $IJKE_t$ ) and the change in consumer surplus (area  $p_t p_0 BA$ ). In this linear case, since the MR line is steeper than the M line, it is easily seen that the price change,  $p_t - p_0$ , is less than the tariff rate. Thus the increase in tariff revenue more than compensates the loss of consumer surplus, and the tariff is welfare improving. There is therefore a case of using tariff to extract foreign rents.

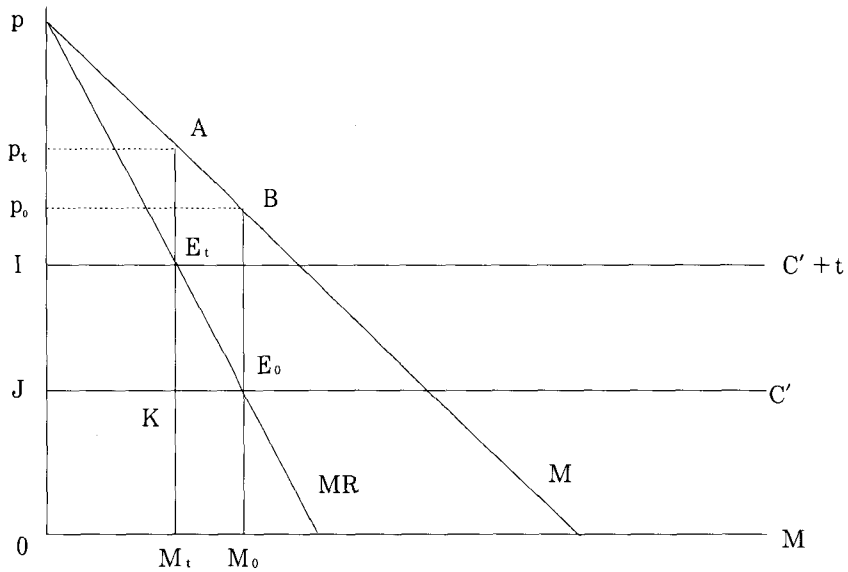


Fig. 3

For the nonlinear case, it is easy to see that for a small tariff, if at the initial equilibrium point  $E_0$ , the MR curve is steeper than the corresponding slope of the import demand curve, then the revenue effect exceeds the loss of consumer surplus and the tariff is welfare improving.<sup>4)</sup> However, if the above relative slope condition is not met, then a tariff is harmful and an import subsidy becomes desirable.

4) Brander and Spencer (1984) have shown that if the import demand curve is not too convex, then a tariff is welfare improving. See also Jones (1987) for examining this problem from a different perspective.

### III. Duopoly and Oligopoly

#### 1. International share rivalry: competition in the third market

Consider first the simple case in which there is no domestic consumption of a product in question. The good produced is solely for exports. Assume further that there is only one home firm and one foreign firm competing in the third market. This is a simple export rivalry model and was considered by Brander and Spencer (1985). They assume that firms play the Cournot game and find that the optimal policy for both governments is export subsidy if the demand curve is not too convex. Dixit (1984) examines a model with more than two firms and finds that the above result is correct so long as the number of domestic firms is not too large. Eaton and Grossman (1986), on the other hand, find that if instead the firms play the Bertrand game, then in general an export tax is indicated. This shows that optimal policy is very sensitive to the behavior of the firm.

To illustrate the main point of this type of international competition, consider the home firm's profit function

$$(3.1) \quad \pi = (1-t)r(x, X) - c(x) = \pi(x, X; t),$$

where  $t$  can be interpreted as an export tax, or a production tax on exportable since there are no sales to the domestic market.  $x$  and  $X$  are the home and foreign firm's output, respectively, and  $r$  and  $c$  are the home firm's revenue and cost function, respectively. Assume that the foreign government does not impose any taxes. Then the foreign firm's profit function is

$$(3.2) \quad \Pi = R(x, X) - C(X),$$

Allowing for quantity conjectures, the first-order conditions are

$$(3.3) \quad \pi_x(x, X, t) = \pi_1 + \pi_2 \gamma = (1-t)[r_1(x, X) + \gamma r_2(x, X)] - c'(x) = 0,$$

and

$$(3.4) \quad \Pi_x(x, X) = R_2(x, X) + \Gamma R_1(x, X) - C'(X) = 0,$$

where  $\pi_x \equiv d\pi/dx$  holding  $t$  constant,  $\pi_1 \equiv \partial \pi(x, X, t)/\partial x$  holding  $X$  and  $t$  constant. Other partial differentiations are similarly defined. Note that  $\gamma \equiv dX/dx$  and  $\Gamma \equiv dx/dX$  are the home and foreign

firm's quantity conjectural variations.

The home welfare can be written as

$$(3.5) \quad w = \pi + tr = r(x, X) - c(x) = w(x, X).$$

$w$  is seen to be equal to gross profits before tax. To determine whether the optimal policy is a tax or a subsidy, we examine the sign of  $dw/dt$  at  $t = 0$ . Assume that the second-order condition is satisfied. From (3.5), we have  $dw/dt|_{t=0} = \pi_1 dx/dt + \pi_2 dX/dt + \pi_1 + r = \pi_1 dx/dt + \pi_2 dX/dt$ .

Using (3.3), we have

$$(3.6) \quad dw/dt|_{t=0} = \pi_2 (dX/dt - \gamma dx/dt).$$

Differentiating (3) and (4), we have  $J \begin{Bmatrix} \frac{dx}{dt} \\ \frac{dX}{dt} \end{Bmatrix} = \begin{Bmatrix} -\pi_{x_1} \\ 0 \end{Bmatrix}$ , where

$$J \equiv \begin{Bmatrix} \partial \pi_x / \partial x, & \partial \pi_x / \partial X \\ \partial \Pi_x / \partial x, & \partial \Pi_x / \partial X \end{Bmatrix} = \begin{Bmatrix} \pi_{x_1} & \pi_{x_2} \\ \Pi_{x_1} & \Pi_{x_2} \end{Bmatrix}. \text{ Solving the above}$$

system to obtain

$$(3.7a) \quad dx/dt = -\pi_{x_1} \Pi_{x_2} / |J|$$

and

$$(3.7b) \quad dX/dt = \pi_{x_1} \Pi_{x_1} / |J|.$$

Substituting (3.7a) and (3.7b) into (3.6), we obtain

$$(3.6') \quad \frac{dw}{dt} \Big|_{t=0} = \frac{\pi_2 \pi_{x_1}}{|J|} (\Pi_{x_1} + \gamma \Pi_{x_2}).$$

If  $\Gamma$  depends on  $x$  and  $X$ , then from (3.4),  $\Pi_{x_1} = R_{21} + \Gamma R_{11} + R_1 \partial \Gamma / \partial x$  and  $\Pi_{x_2} = R_{22} - C'' + \Gamma R_{22} + R_1 \partial \Gamma / \partial X$ . Thus in general the optimal policy can be either a tax or a subsidy.

Consider the special case of Cournot conjecture. In this case, we have  $\gamma = \Gamma = 0$ . (3.6') is now reduced to

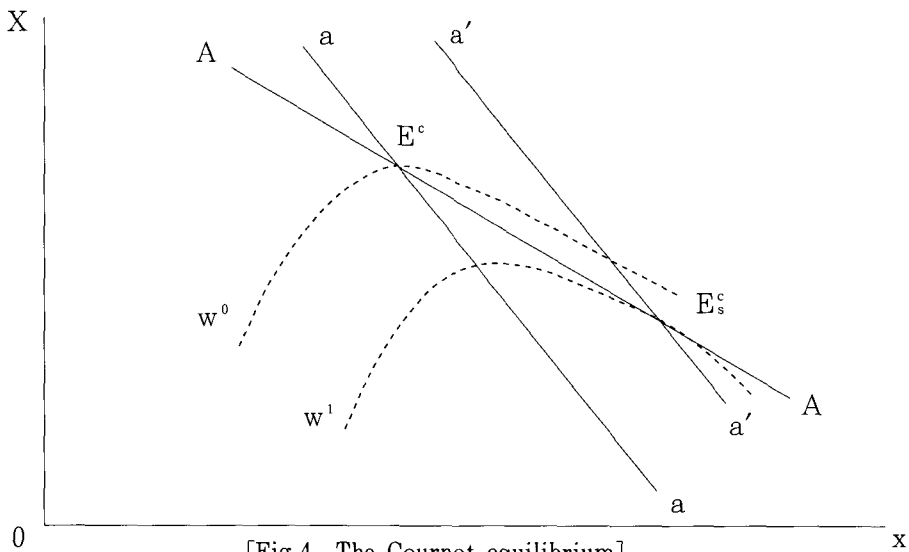
$$(3.6'') \quad \frac{dw}{dt} \Big|_{t=0} = \frac{\pi_2 \pi_{x_1}}{|J|} R_{21}.$$

$|J|$  is positive for the following dynamic system to be stable:  $\dot{x} = k \pi_x$  and  $\dot{X} = K \Pi_x$ , where  $k$  and  $K$  are the speeds of adjustment, and

a dot over a variable is its time derivative. Since  $\pi_2 = (1-t)xp_2$ , where  $p_2 = \partial p / \partial X$ , we have  $\pi_2 < 0$  if the two goods are substitutes, and  $\pi_2 > 0$  if they are complements. Also  $\pi_{xt} |_{\tau=0} = -r_1$  which must be negative in view of (3.3). Let the optimal tax or subsidy rate under Cournot conjecture be  $t^c$ . The following proposition was obtained by Eaton and Grossman (1986).

Proposition 1. In the Cournot case with no home consumption,  $\text{sign } t^c = \text{sign } R_{21}$  if the two goods are substitutes, and  $\text{sign } t^c = -\text{sign } R_{21}$  if they are complements.

To illustrate the Cournot case with a diagram, consider the slope of the foreign reaction function  $dX/dx |_{\pi_1=0} = -\Pi_{x_1} / \Pi_{x_2}$ . In general both slopes can be of any sign. Fig. 4 illustrates the case where both reaction curves are downward sloping. This is the case if the two goods are substitutes with linear demands and with nondecreasing marginal costs. The  $aa$  and  $AA$  curves are the home and foreign firm's reaction curves, respectively. For stability, the  $aa$  curve must be steeper than the  $AA$  curve. Point  $E^c$  is the Cournot equilibrium. Two welfare contours are drawn in Fig. 4. In this case, a subsidy will shift the home reaction curve to the right. The optimal  $t^c$  is determined by point  $E_s^c$  where  $w^1$  is tangent to the foreign reaction curve.



[Fig.4 The Cournot equilibrium]

Consider next the case where the conjectural variation is based on prices. Let the direct demand functions facing the home and foreign

firms be  $d(p, P)$  and  $D(p, P)$ . The profit functions are

$$(3.1') \quad \tilde{\pi}(p, P, t) = (1-t)\tilde{r}(p, P) - c(d(p, P))$$

$$(3.2') \quad \tilde{\Pi}(p, P) = PD(p, P) - C(D(p, P)),$$

where a tilde over a variable signifies a function with prices, not quantities, as arguments. Allowing for price conjectures, the first-order conditions are

$$(3.8a) \quad \tilde{\pi}_p = \tilde{\pi}_1 + \tilde{\pi}_2 \tilde{\gamma} = (1-t)(\tilde{r}_1 + \tilde{r}_2 \tilde{\gamma}) - c'(d_1 + d_2 \tilde{\gamma}) = 0$$

$$(3.8b) \quad \tilde{\Pi}_p = \tilde{\Pi}_1 \tilde{\Gamma} + \tilde{\Pi}_2 = \tilde{R}_1 \tilde{\Gamma} + \tilde{R}_2 - C'(D_1 \tilde{\Gamma} + D_2) = 0,$$

where  $\tilde{\gamma} \equiv dP/dp$  and  $\tilde{\Gamma} \equiv dp/dP$  are the price conjectures of the home and foreign firms, respectively. The welfare function can be written as

$$(3.5') \quad \tilde{w} = \tilde{\pi}(p, P, t) + tr = \tilde{r}(p, P) - c(d(p, P)) = \tilde{w}(p, P).$$

Thus  $d\tilde{w}/dt|_{t=0} = \tilde{\pi}_1 dp/dt + \tilde{\pi}_2 dP/dt + \tilde{\pi}_t + r = \tilde{\pi}_1 dp/dt + \tilde{\pi}_2 dP/dt$ . Using (3.8a), we have

$$(3.9) \quad d\tilde{w}/dt|_{t=0} = \tilde{\pi}_2 (dP/dt - \tilde{\gamma} dp/dt).$$

Totally differentiating (3.8a) and (3.8b), and solving to obtain  $dp/dt = -\tilde{\pi}_{p1} \tilde{\Pi}_{p2} / |J|$  and  $dP/dt = \tilde{\pi}_{p1} \tilde{\Pi}_{p1} / |\tilde{J}|$ , where  $\tilde{J}$  is the Jacobian of (3.8a) and (3.8b). It follows that (3.9) can be written as

$$(3.9') \quad \left. \frac{d\tilde{w}}{dt} \right|_{t=0} = \frac{\tilde{\pi}_2 \tilde{\pi}_{pt}}{|\tilde{J}|} (\tilde{\Pi}_{p1} + \tilde{\gamma} \tilde{\Pi}_{p2}).$$

In general the sign of  $d\tilde{w}/dt|_{t=0}$  is indeterminate.

Consider the special case of Bertrand conjecture,  $\tilde{\gamma} = \tilde{\Gamma} = 0$ . We have  $\tilde{\Pi}_{p1} = \tilde{\Pi}_{21}$ , and (3.9') can be rewritten as

$$(3.9'') \quad \left. \frac{d\tilde{w}}{dt} \right|_{t=0} = \frac{\tilde{\pi}_2 \tilde{\pi}_{pt}}{|\tilde{J}|} \tilde{\Pi}_{21}.$$

To determine the sign of  $\tilde{\pi}_2$ , we have  $\tilde{\pi}_2 = [(1-t)p - c'] d_2$ . From  $\tilde{\pi}_p|_{\tilde{\gamma}=0} = \tilde{\pi}_1 = (1-t)d + [(1-t)p - c'] d_1 = 0$ , we obtain  $[(1-t)p - c'] > 0$  since  $d_1 < 0$ . Thus  $\tilde{\pi}_2$  is positive or negative depending upon whether the two goods are substitutes ( $d_2 > 0$ ) or complements ( $d_2 < 0$ ). Note that  $\tilde{\pi}_{p1}|_{\tilde{\gamma}=0} = \tilde{\pi}_{11} = -\tilde{r}_1 > 0$  by (3.8a), and

$|\tilde{J}| > 0$  by stability requirement.<sup>5)</sup> Let  $t^b$  be the optimal tax or subsidy rate under Bertrand competition. We have the following proposition:

Proposition 2. In the Bertrand competition with no domestic consumption,  $\text{sign } t^b = \text{sign } \tilde{\Pi}_{21}$  if the two goods are substitutes, and  $\text{sign } t^b = -\text{sign } \tilde{\Pi}_{21}$  if they are complements.<sup>6)</sup>

Note that  $\tilde{\Pi}_{21} = \tilde{R}_{21} - D_1 D_2 C'' - D_{21} C'$ . If the demand for the foreign good is linear, then  $\tilde{\Pi}_{21} = D_1(1 - D_2 C'')$ . Thus if in addition  $C'' > 0$ , the sign of  $\tilde{\Pi}_{21} = \text{sign } D_1$ . The above proposition then implies that (i) if the two goods are substitutes,  $D_1 > 0$  and  $t^b > 0$ ; and (ii) if they are complements,  $D_1 < 0$  and  $t^b > 0$  also. In this case, the optimal policy calls for an export tax irrespective of whether the two goods are substitutes or complements. On the other hand, in the case of Cournot competition with linear demand,  $\Pi_{21} = R_{21} = P_1$ , and the optimal policy requires an export subsidy.

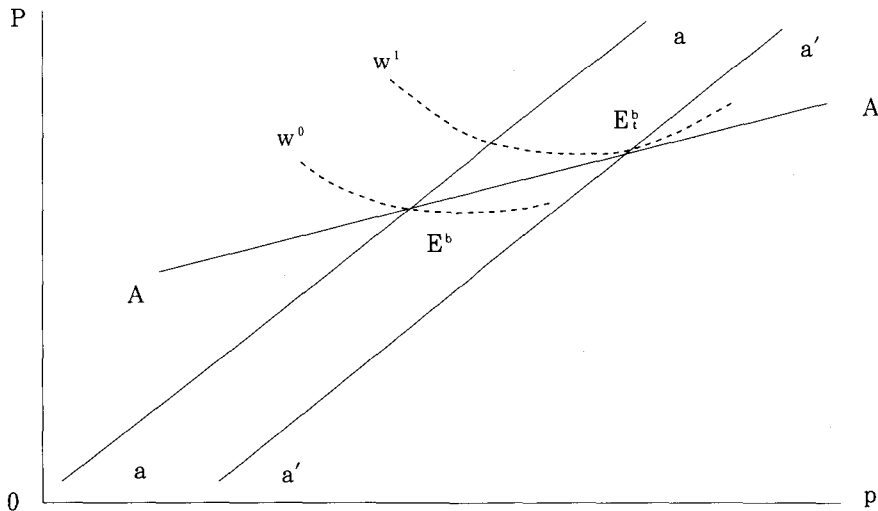


Fig. 5

- 5) The dynamic system can be written as  $\dot{p} = \tilde{k}\tilde{\pi}_p$  and  $\dot{P} = \tilde{K}\tilde{\Pi}_P$ , where  $\tilde{k}$  and  $\tilde{K}$  are the constant speeds of adjustment.
- 6) Kemp and Okuguchi (1989) pointed out that the treatment Bertrand equilibrium by Eaton and Grossman (1986) is inappropriate since they implicitly relied on optimality conditions which are valid only for quantity conjectures. Our analysis shows that Eaton and Grossman's conclusion (their Proposition 2), however, remains valid even though their method of derivation is incorrect.



Figure 5 illustrates the Bertrand case. The home and foreign reaction functions are  $aa$  and  $AA$  curves, respectively, which are assumed to be positively sloped. The point  $E^b$  is the Bertrand equilibrium point under free trade. When the home government imposes an export tax, the home firm's reaction curve shifts to the right. With  $w$  contours drawn, it is seen that the optimum occurs at  $E^b$ , which is the Bertrand equilibrium with export tax.

Consider next the case of consistent conjectural equilibrium, CCE. In the sense of Bresnahan (1981), a CCE is such that  $\Gamma = -\pi_{x_2} / \pi_{x_1}$  which is the slope of home reaction curve for a given  $t$ , and  $\gamma = -\Pi_{x_1} / \Pi_{x_2}$  which is the slope of the foreign reaction curve. Eaton and Grossman (1986) asserted that in the CCE, free trade policy is the optimum. This has been corrected by Csaplar and Tower (1988). Although  $\gamma$  and  $\Gamma$  are assumed to be constant in the sense of being independent of  $x$  and  $X$ , Csaplar and Tower showed that in order for the CCE to be feasible,  $\gamma$  and  $\Gamma$  must be a function of  $t$ . They gave an example of linear demand, homogeneous product, and quadratic cost function, and showed that the optimum tariff is positive under CCE. This kind of result has also been shown by Turnovsky (1986) in the two-country general equilibrium setting. Eaton and Grossman (1988) extend it further by showing that if the demand is linear and if the cost function is quadratic, then the optimal trade tax is positive under an *ad valorem* tax, but free trade is the optimal policy under a specific tax scheme.

## 2. Strategic Entry allowance or deterrence by a foreign firm

Consider the case where a foreign firm is a Stackelberg leader in its export market. The home country imports the good from the foreign firm. Brander and Spencer (1981) have examined the condition under which the foreign firm will allow or deter the entry of a home firm. Strategic behavior thus determines the outcome of the market structure.

Assume that the home and foreign markets are segregated, and that the home firm, if entering the market, will serve only the home market. Let  $Y$  be the foreign firm's sales to its own domestic market, and  $y$  be its export to the home country. Let  $c'$  and  $C'$  be the constant marginal costs at home and abroad,  $t$  be the unit transport costs, and  $f$  and  $F$  be the fixed costs at home and abroad,

respectively. The home firm's profit is

$$(3.10) \quad \pi = xp(x+y) - c'x - f = \pi(x, y),$$

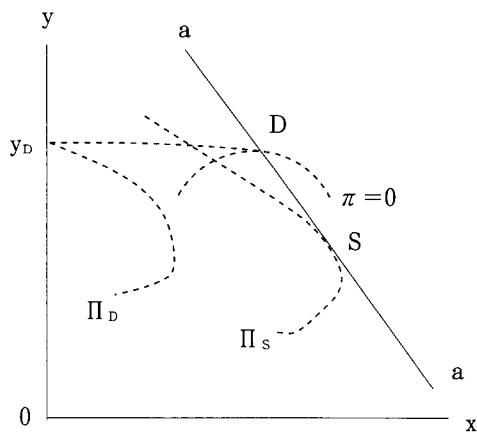
where  $x$  is the output of the home firm which is assumed to be supplied only to the home market. The foreign firm's profit is

$$(3.11) \quad \Pi = yp(x+y) + YP(Y) - (C' + t)y - C'Y - F = \Pi(x, y, Y).$$

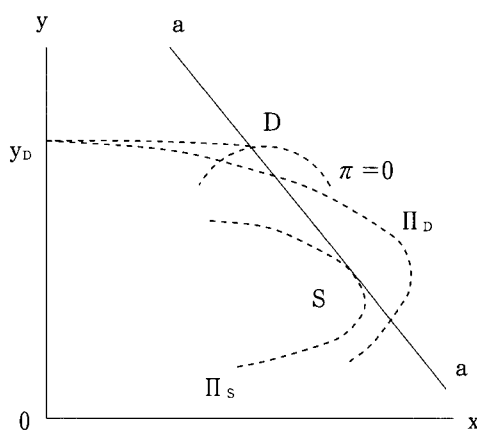
Assume that the home firm is a Stackelberg follower, and each firm uses output as the strategic variable. Then by setting  $\pi_1 = 0$ , we can obtain the home firm's reaction function which is plotted as the  $aa$  curve in Figs. 6a and 6b. Because of the assumptions that the two markets are segregated and that the marginal costs are constant,  $Y$  is independently determined irrespective of the level of  $y$ .

The iso-profit curves are shown in both diagrams. If the home firm enters the market, then the latter will choose the Stackelberg equilibrium point  $S$ . Let  $y_D$  be the level of foreign firm's output at which the domestic firm's profits are zero. If the foreign firm's output is no less than  $y_D$ , then the home firm will not enter the market. However, if it is less than  $y_D$ , then entry will occur. The foreign firm's choices are to compare the two equilibrium profits with or without entry. Fig. 6a shows the case of entry deterrence. By prohibiting entry the foreign firm's profits are  $\Pi_D$  whose level curve goes through  $y_D$ . If entry is allowed, the equilibrium profits would be  $\Pi_S$ . Since  $\Pi_D > \Pi_S$ , entry deterrence is optimal. On the other hand, in the case of Fig. 6b,  $\Pi_D < \Pi_S$ , and entry allowance is optimal.

In the case of entry deterrence, the home country can gain by



[Fig. 6a Deterrence]



[Fig. 6b Free Entry]

imposing an import tariff to extract profits from the foreign firm. This is because tariff does not shift the home reaction curve, and therefore the entry-detering output  $y_D$  is unchanged. There is therefore no domestic distortion. However, a sufficiently high tariff may force the foreign firm to opt for a lower export to the home country and charge a higher price, which may then affect its decision on entry deterrence. In such a case, a further increase in tariff may not be welfare improving for the home country.

### 3. Intra-industry trade in identical products

Intra-industry trade is a two-way trade in similar (but not necessarily identical) products. It has become increasingly important in international trade (see, for example, Balassa (1967), Grubel (1970), and Grubel and Lloyd (1975)). Within the same industry, goods are traded internationally among different varieties. Traditional trade theories which explain inter-industry trade cannot adequately explain the phenomenon of intra-industry trade. The new trade theory can explain not only the phenomenon of the general intra-industry trade, but also the possibility of intra-industry trade in *identical* products.

A model of trade in identical products was developed by Brander (1981), and further elaborated by Brander and Krugman (1983) to show the possibility of reciprocal dumping. The model consists of two firms, each locating in one country, facing segmented markets. There are demands for the product in both countries. For simplicity, assume that both markets have the identical linear demands:

$$(3.12) \quad p = a - bz$$

$$(3.13) \quad P = a - bZ,$$

where  $p$  and  $P$  are the price in the home and foreign markets, and  $z$  and  $Z$  are the total supplies to both markets.

Let  $X$  be home firm's export to the foreign market. Then using the same notations in defining eqs. (3.10) and (3.11), and considering only the symmetric case where  $c' = C' = m$ , the cost functions of both firms are:

$$(3.14) \quad c = mx + (m + t)X + f$$

$$(3.15) \quad C = mY + (m + t)y + F.$$

If there is no trade, each firm would be a monopolist, and  $z = x$ ,  $Z = Y$ . The monopolist price in each market would be

$$(3.16) \quad p = P = m + (a-m)/2.$$

If the transport costs  $t$  are less than the markup  $(a-m)/2$ , each firm will find it profitable to sell in the other firm's market. We then have  $z = x + y$  and  $Z = X + Y$ . Assume that each firm plays the Cournot game, choosing its deliveries to each market to maximize profits by regarding the other firm's deliveries to both markets as given. It is then easy to obtain the following Cournot solutions:

$$(3.17) \quad x = Y = (a-m+t)/3b$$

$$(3.18) \quad y = X = (a-m-2t)/3b.$$

Clearly, if the monopoly markup in the no trade case,  $(a-m)/2$ , is greater than the transport costs,  $t$ , then  $y$  and  $X$  are positive and intra-industry trade in identical product occurs. Also if the transport costs are increased, each firm delivers more to its domestic market and less to the other market. In the extreme case where there are no transport costs, each firm will have half the market share in each market.

The equilibrium price is

$$(3.19) \quad p = P = (a + 2m + t)/3.$$

Trade unambiguously lowers the price in both markets. As expected, the higher the transport costs, the higher is the equilibrium price. Since both markets have the same price, both firms receive a lower net price (net of transport costs) than the sales in their own domestic markets. In this sense the sale abroad is a dumping, and reciprocal dumping takes place in this case. With positive transport costs, each firm will have a larger share of its domestic market than its export market. It will therefore perceive a lower elasticity of demand at home than abroad. This is precisely the reason why the firm is charging different net prices between the two markets.

Trade results in lower profits for both firms because the price falls and firms incur transport costs. The welfare effect, however, is ambiguous. The lowering of price reduces the monopoly distortion. On the other hand, cross-hauling of an identical product is a waste of resources. In this linear model, it can be shown that trade is beneficial if  $t$  is close to zero, but is harmful if  $t$  is close to the monopoly markup in the absence of trade.

Brander and Krugman's model has been further extended by Weinstein (1992) to the case of many firms in each country. He shows that intra-industry trade in identical products is not possible

without dumping. Moreover, firms in a country with a large number of domestic competitors are more likely to dump unilaterally than firms in less competitive markets. The dumping, though not predatory, may result in selling below average cost.

#### 4. Protection, tacit collusion, and noncooperation

We have discussed the nonequivalence of tariffs and quotas in the presence of a domestic monopoly. According to Bhagwati (1965), an import quota tends to give a domestic monopolist more power to raise price and reduce output than an equivalent tariff. This result has been the subject of considerable debates in recent years. Eastman and Stykolt (1960) first argued that protection could change the strategic relations between the firms in an industry. Itoh and Ono (1982) later showed that an import quota could change the strategic relationship favorable to both a domestic and foreign firm, but a tariff does not offer such a relationship. The result was further extended to the case of VERs by Ono (1984). In the context of a Bertrand duopoly, the change in the strategic relationships as a result of an import quota have been rigorously analyzed by Harris (1985) and Krishna (1989).

Consider a domestic market supplied by a foreign firm and an import-competing domestic firm. They produce close, but not perfect, substitute goods. Under Bertrand-Nash competition, the reaction functions in terms of the price of home firm's good ( $p$ ) and the price of foreign firm's good ( $P$ ) are shown in Fig. 7. Under reasonable conditions as already shown in the export-rivalry model of Section 3.1, both the home reaction curve ( $aa$ ) and the foreign reaction curve ( $AA$ ) slope upward with the former being steeper than the latter.  $E^b$  is the pre-quota equilibrium. Following the approach of Harris, we assume that an import quota in the amount of *free trade imports* is imposed. One might think that this will have no effect at all on both firms. However, the strategic relationships will be altered by the quota and the domestic firm will have the incentive to take the price leadership.

To illustrate how the strategic relationships will change, let us begin with a hypothetical free trade point  $E^b$  with the price pair  $(p_0, P_0)$ . If the home firm raises its price, there will be an increase in the demand for foreign good. But because of the quota restriction,

foreign good will have an excess demand at the original  $P_0$ . In order to meet the quota requirement,  $P$  will have to be raised higher. An interesting case is where the quota-ridden reaction curve looks like  $E^b \tilde{A}$  which is steeper than the  $AA$  curve and lies between the two original reaction curves. By acting as a price leader, the home firm can now choose point  $Q$  as the new equilibrium. The resulting profits are  $\pi^a$  which is higher than the free trade profits  $\pi^b$ . The foreign firm also benefits from the quota, since it is still selling the quantity at the free trade level but at a higher price. Thus an import quota has changed the strategic relationships between the firms and has facilitated tacit collusion between them.

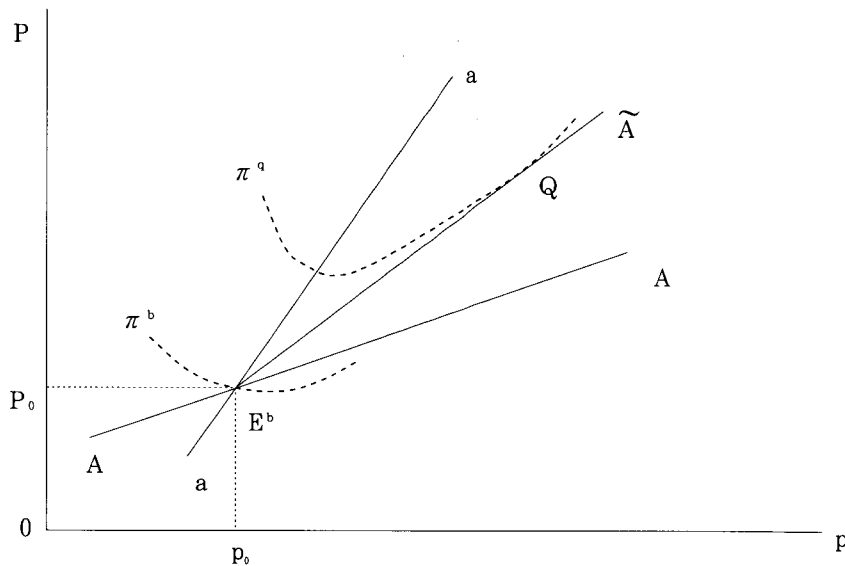


Fig. 7

The case of voluntary export restraints presented by Harris (1985) has been extended in various ways. Mai and Hwang (1988) use a conjectural variation approach and show that the value of the conjectural variation is crucial in determining the effects of a VER. In particular, they show that if the free trade equilibrium is more collusive than Cournot, a VER set at the free trade level of imports lowers the profits of the foreign firm. Thus a VER becomes involuntary. This result, however, does not carry over to the dynamic case. Dockner and Haug (1991) show that a VER at the free trade level of imports increases the market price and profits of all firms in

the industry if free trade is the closed-loop (subgame-perfect) Cournot equilibrium of the game. Thus a VER is again voluntary.

The effects of a VER are further shown by Tanaka (1991) to be sensitive to consumers' preference in integrated markets. If the home consumers prefer the imported good to the home good, then a VER at the level of free trade imports increases foreign firm's profits, lowers home firm's profits, and raises consumers' welfare. On the other hand, if the home consumers prefer the home good to the foreign good, then home firm's profits will increase, consumers' welfare will decrease, and foreign firm's profits may or may not decrease. If the two goods are strong substitutes, then foreign firm's profits will decrease. Thus a VER may be voluntary or involuntary depending on the consumers' preference and the degree of substitution between the home good and the imported good.

The strategic behavior of the firms in the long run is an important element in studying the effects of trade protection. It has been argued that collusive behavior may be individually rational in an indefinitely repeated game.<sup>7)</sup> This is because if a firm does not act cooperatively today, it may be penalized by noncooperative behavior by others in the future. Davidson (1984) and Rotemberg and Saloner (1989) have argued that since protection tends to raise profitability in the absence of collusion, the penalty for cheating on a collusive agreement is reduced compared to the no protection case. Thus trade protection may actually promote competition by reducing the prospects for collusion among firms. An import quota thus may lead to more competition and lower prices than free trade!

### 5. The case of free entry

Venables (1985) examines a model in which the home and foreign firms play the Cournot game and compete in an identical product. The markets are assumed to be segregated and transport costs are assumed positive. He shows the gains from intra-industry trade with free entry and exit. Moreover, if the price elasticity of demand is a nondecreasing function of price, then trade will increase the number

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7) For the case of producers colluding to curtail output in order to increase joint profits, a cartel is formed. For the analysis of cartel, see Caves (1979) and Dixit and Stern (1982).

of firms. In addition, if the number of firms in the home country is increased, the foreign country's welfare is decreased.

Venables also shows that in his model an import tariff imposed by the home country is unambiguously welfare improving. The tariff actually lowers the consumer price and improves the terms of trade. Similarly, a small export subsidy is also welfare improving. However, if the assumption of perfect substitutes is dropped, then domestic consumer price will increase and the usual trade-off between the cost of domestic distortion and the terms-of-trade gain applies.

The case of a single integrated world market has been considered by Horstmann and Markusen (1986). They examine a model with increasing returns and free entry in the imperfectly competitive sector. The home firms' and foreign firms' products in this sector are imperfect substitutes. The firms play Cournot games and profits are driven to zero in the long run because of free entry. They show that an export subsidy will lead to inefficient entry and that each firm's scale is smaller as a result. The average cost is therefore higher. The subsidy has no effect on home firms' profits because they are driven to zero by free entry. They also find that the optimal policy is exactly the opposite conclusion reached by Brander and Spencer (1985): An export tax which improves the terms of trade is the best policy in this case.

#### **6. The sensitivity of policy implications on model assumptions**

The above two models, both assuming free entry, have quite different implications for trade policy. This highlights the extreme sensitivity of policy implications on the assumptions of a model. In a world of imperfect competition, the policy markers are not in the "first-best" situation. Thus theoretically at least, one can sometime expect quite different implications for models with even a slight change in assumptions.

Markusen and Venables (1988) have provided a unified framework to analyze the various combinations between market structure (integrated or segregated) and industry structure (free or restricted entry). They assume that (i) demand curves are linear and symmetrical between products; (ii) conjectures are Cournot; (iii) marginal costs are constant; and (iv) only specific taxes or subsidies are considered. The demand by an average consumer for product  $i$  is



$$(3.20) \quad d_i = a - p_i - b(p_i - p_j),$$

where  $b$  measures the closeness of substitution between the two products  $i$  and  $j$ . When  $b$  approaches infinity, they are perfect substitutes.

The welfare of a country is measured by the aggregate indirect utility function of consumers  $W(p_i, p_j, Y)$ , where  $Y$  is the national income consisting of the wage income, profit income generated, if any, by the sector with increasing returns to scale, and the tax revenue distributed to the consumers by the government.

Let  $t_x$  be the home country's export tax,  $t_m$  home import tax, and  $T_x$  and  $T_m$  the corresponding variables for the foreign country. Let I denote the integrated market, S, the segregated market, F, free entry, and N, no free entry. Markusen and Venables examine the effect of a small increase in the policy parameters from the initial free trade position on the home country's welfare. These effects are summarized in Table 1:

Table 1

	I, N	I, F	S, N	S, F1	S, F2
$t_x$	?	+	?	+	-
$t_m$	+	0	+	+	+
$T_x$	?	-	?	-	+
$T_m$	-	0	-	-	+

(S, F1) represents the regime of S, F and symmetric economies (in the sense of identical costs, identical sizes, and identical tastes), zero transport costs and differentiated products. (S, F2) represents the regime of S, F, symmetric economies, positive transport costs and perfect substitutes.

The above table shows, for example, that an import tax imposed by the home country will increase home welfare in the segregated markets. If the markets are integrated, then the import tariff has no effect on home welfare if there is free entry, but will raise home welfare if there is no entry. The (S, F2) case was the focus of

Venables (1985). Markusen and Venables (1988) also find that policies are more effective when the market is segmented and also when the number of firms is fixed (and if transport costs are small).

### 7. Further issues in trade and industrial policy

The subject of research and development (R&D) policy is essential for the study of trade and industrial policy. Spencer and Brander (1983) examine a model in which the government announces its R&D and trade policies before the firm makes its decisions on the R&D expenditures and output level. In the case of the Cournot game, they find that the government should tax R&D but subsidize exports. However, Cheng (1988) points out that in the case of Bertrand game, the optimal policy mix should be an R&D subsidy and export tax.

The subject of countervailing and anti-dumping duties have also been studied in the context of trade and industrial policy. Dixit (1988) examines a model in which there are many producers in each country in the same industry. He proves the case of countervailing duties and not the case of anti-dumping duties.<sup>8)</sup> He also considers the use of an import tariff and a production subsidy on importable with linear demand, and finds that if foreign dumping is increased, the home country's import tariff and production subsidy should both be reduced. This is contrary to the conventional result on anti-dumping. He also finds that if the foreign production subsidy is increased, the home's production subsidy should be lowered.

The ranking of the magnitudes of some policy variables has been studied by Cheng (1988). He analyzes a duopoly model in which firms marginal costs are constant and two policy instruments are used together: an import tariff and a production subsidy on the import-competing sector. He shows that if both firms survive in the home market, then the magnitudes of both instruments are in general higher with Cournot firms than with Bertrand firms. However, if only one producer survives in the home market, the ranking on subsidy may not hold.

The timing of a policy instrument is crucial for its effects. For example, in Spencer and Brander (1983), Brander and Spencer (1985), and Eaton and Grossman (1986), the government is the first mover,

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8) On other issues of dumping, see Ethier (1982).

setting the optimal tax or subsidy rate and the firms then respond with optimal pricing policy. However, Gruenspecht (1988) shows that if instead the firm sets its prices before the government sets its tax or subsidy levels, positive subsidies can be optimal in the case of Bertrand firms. Moreover, a subsidy by the home government does not necessarily harm the foreign firms because it may facilitate collusion among firms.

Most of the models on trade and industrial policy are partial equilibrium models. They focus on a particular industry with special emphasis on market and industry structure. This neglects the repercussions of other sectors. When the full general equilibrium model is considered, the policy implications may be quite different.

Markusen (1981) examines a general equilibrium model in which each country has a standard sector and a monopolized sector which produces an identical good in both countries. He shows that the large country will import the monopolized good when trade is opened up. If this causes a large reduction in that sector's output in the large country, then its welfare may be reduced.

Another example of the need to consider the general equilibrium framework was shown by Dixit and Grossman (1986). Consider the case where the government intends to promote a particular industry with an export subsidy. If this industry competes with others on some particular resources, such a policy will drive up the prices of these resources and will harm the other sectors. A general equilibrium calculation of the benefits and costs of such a policy is needed. It is not enough to just weigh the increased profits of the protected industry against the subsidy costs.

#### IV. The "Large Group" Case: Monopolistic Competition

In this section, we consider a monopolistically competitive industry that produces differentiated products. If there are increasing returns to scale and if fixed costs are not particularly high, such an industry is characterized by a large number of firms, each having some market power with respect to its own product. The firms, however, do not perceive any strategic interactions among them. This is the main difference between monopolistic competition and oligopoly. When entry and exit are allowed in the long run, profits tend to be zero.

The monopolistic competition is typically characterized by the existence of a variety of goods. Product differentiation is therefore the main feature of this industry. The differentiation may be horizontal or vertical. The former refers to differences in specification or in brand-name but no differences in quality, while the latter emphasizes differences in quality. In this section, we examine models of monopolistic competition with horizontal differentiation. In the next section, quality differentiation will be examined.

There are two major approaches in modeling monopolistic competition. One emphasizes the fact that consumers often get higher utilities by consuming more varieties. This approach is termed the 'love-of-variety' approach, which was originally developed by Spence (1976) and Dixit and Stiglitz (1977). The other approach, developed by Lancaster (1979, 1980), emphasizes the fact that consumers obtain utility by consuming certain characteristics embodied in the good. Since only a finite number of goods are actually produced, a consumer is forced to choose the one with most preferred set of characteristics or attributes. This approach is termed the 'love-of-characteristic' approach.

### 1. The love-of-variety approach: Krugman's model

A number of authors have used the love-of-variety approach to model intra-industry trade with monopolistic competition (see, for example, Dixit and Norman (1980), Krugman (1979, 1980, 1981), and Lawrence and Spiller (1983)). Here we follow Krugman's approach and assume that each country has a monopolistically competitive industry which produces a variety of differentiated products. There is only one factor of production, labor. Countries are identical in technologies so that economies of scale are the only reason for trade.

A firm's demand for labor is a linear function of its output:

$$(4.1) \quad L_i = \alpha + \beta X_i,$$

where  $X_i$  is the output of the  $i$ th firm, and  $L_i$  is its labor demand. As output is increased, the labor input requirement per unit of output is reduced. This clearly exhibits increasing returns to scale.

Consumers are assumed to maximize  $\sum_{i=1}^n U(c_i)$ , subject to the budget constraint

$$(4.2) \quad \sum_{i=1}^n p_i c_i = w + \sum_{i=1}^n \pi_i / L,$$

where  $n$  is the number of varieties,  $\pi_i$  is the  $i$ th firm's profits, and  $L$  is the labor endowment. The first-order conditions are

$$(4.3) \quad U'(c_i) = \lambda p_i,$$

where  $\lambda$  is the marginal utility of income and is assumed to be constant. The consumption of the  $i$ th variety therefore is only a function of its own price:  $c_i = c_i(p_i)$ .

Let  $D_i$  be the aggregate demand for the  $i$ th variety. Its market-clearing condition is

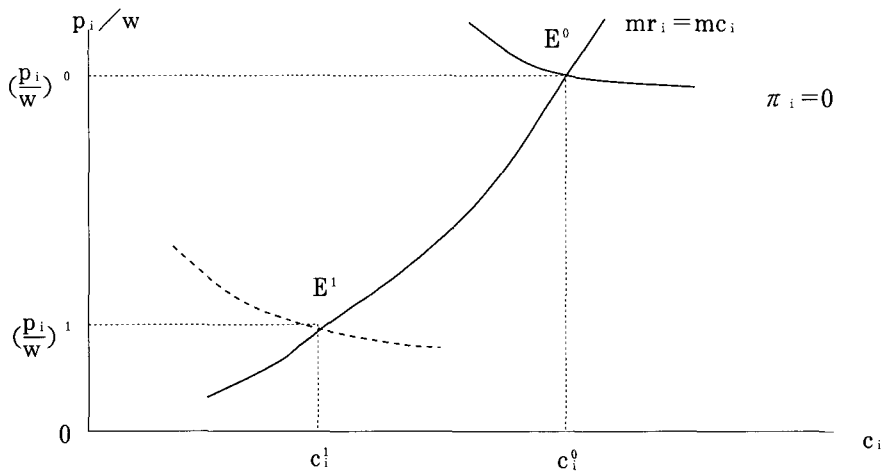
$$(4.4) \quad D_i = Lc_i.$$

The  $i$ th firm is assumed to maximize profits  $\pi_i = p_i(D_i)X_i - w(\alpha + \beta X_i)$  by choosing  $X_i$ . This implies that marginal revenue  $mr_i$  and marginal costs  $mc_i$  are equal and are related to the average revenue  $ar_i$  by  $mr_i = mc_i = ar_i(1 - 1/\epsilon_i)$ , where  $\epsilon_i \equiv -(p_i/D_i)(\partial D_i/\partial p_i) = -(p_i/c_i)(\partial c_i/\partial p_i) = -u'/c_i u'' = \epsilon_i(c_i)$ . But  $mc_i$  is  $\beta w$ , so that  $p_i [1 + (X_i/p_i)(\partial p_i/\partial X_i)] = \beta w$ .

Therefore, the maximum profit condition implies

$$(4.5) \quad p_i/w = \beta \epsilon_i / (\epsilon_i - 1).$$

Krugman assumes that  $d\epsilon_i/dc_i < 0$ . This implies that  $\epsilon_i$  is an increasing function of  $p_i$ . Therefore, the locus of (4.5) is upward sloping as shown in Fig. 8. It is labelled  $mr_i = mc_i$ .



[Fig. 8]

Free entry in the long-run equilibrium results in  $\pi_i = 0$ , which is equivalent to  $p_i X_i = w(\alpha + \beta X_i)$ , or

$$(4.6) \quad P_i/w = \beta + \alpha/Lc_i,$$

This is shown in Fig. 8 as the  $\pi_i = 0$  curve.

The equilibrium point for the closed economy is  $E^0$  in Fig. 8. Thus the output (consumption) and the price (in terms of labor) of every variety are determined. Since  $c_i$  is the same for all varieties, there is a symmetric equilibrium. The equilibrium number of varieties can be readily obtained from the full employment condition:  $L = \sum_{i=1}^n L_i = n\alpha + \beta \sum_{i=1}^n Lc_i = n\alpha + \beta Lnc_i = n(\alpha + \beta Lc_i)$ , i.e.,

$$(4.7) \quad n = L/(\alpha + \beta c_i L).$$

Suppose that  $L$  is increased due to population growth. The  $\pi_i = 0$  curve shifts down and  $E^0$  moves to  $E^1$ .  $w/p_i$  therefore increases, reaping the benefit of increasing returns to scale. The following comparative-statics results can be obtained:

$$(4.8) \quad \partial c_i / \partial L < 0, \quad \partial (w/p_i) / \partial L > 0, \quad \partial n / \partial L > 0, \\ \text{and } \partial (Lc_i) / \partial L > 0.$$

The last result is equivalent to  $\partial X_i / \partial L > 0$ . These results can be used to analyze the opening of trade.

Consider now the opening of trade between two identical economies—they are identical in population sizes ( $L=L^*$ ) and taste patterns. Assume that there are no transport costs. After trade, a firm faces  $2L$  consumers in the world economy. The above conclusions in (4.8) shows that although each person's consumption of a single good will decrease, the total consumption of each variety will be higher. Thus there are gains from trade due to the realization of increasing returns to scale. In addition, the number of varieties is increased after trade. This is the second source of gains from trade in this love-of-variety approach.

In his 1980 paper, Krugman considers a more general model in which the country sizes may be different, transports costs are positive, and preferences may be dissimilar between countries. The last assumption stems from the Linder home market hypothesis. Krugman concludes that in the presence of increasing returns to scale, a country will tend to export the goods which have large domestic markets. Moreover, the larger is a country, the higher is its real wage rate.

In his 1981 paper, Krugman further extends his model by assuming that there are two industries, each employing a specific factor. Goods are better substitutes within an industry. As trade occurs among different varieties of goods within the same industry, the specific factor will be reallocated to produce the varieties with larger scales due to the existence of increasing returns to scale. However, inter-industry trade will not have this effect. If endowments are more similar, then it is easier to capture increasing returns to scale through intra-industry trade.

## **2. The love-of-characteristic approach: the Lancaster Model**

Lancaster's model (1979, 1980) assumes that each consumer has her own preference over the characteristics of a good. With a finite number of varieties produced in the economy, a consumer must choose the variety that is closest to her ideal. Thus a consumer's demand for a variety depends upon its price and the prices of neighboring varieties. It also depends upon how far (measured in the characteristic space) the neighboring varieties are from her ideal variety.

With increasing returns to scale, a firm's average cost is downward sloping. With free entry, each firm can only specialize in one variety, and profits are zero in the long run. Equilibrium is characterized by the Chamberlinian type of monopolistic competition model.

When trade is opened up, each producer will be forced to specialize in only one variety due to the assumption of increasing returns. The total number of available varieties will increase, although fewer varieties are produced in each country. Proliferation of varieties as a result of trade places consumers closer to their ideals. Consumers clearly benefit from this. In addition, each firm produces a larger output at a lower price (due to increasing returns to scale) and the consumers further gain from this.

Both Lancaster's and Krugman's models predict that intra-industry trade can arise between two identical economies and that consumers gain from having access to a greater number of varieties after trade. Both models share the common drawback that the direction of trade of a variety is indeterminate. The imposition of a tariff will affect both domestic output and product variety in the

Lancaster model but not in the Krugman model.

Helpman (1981) incorporates Lancaster's model into a two-sector, Heckscher-Ohlin-Samuelson model of trade and shows the possibility of both intra- and inter-industry trade. He uses the unit circle to describe the characteristic space. Consumers are located evenly over the circle. Each firm has a domain serving a segment of the market. The intra- and inter-industry trade are shown to exist. As countries become more similar in factor endowments, intra-industry becomes more important among them. However, if their endowments are farther apart, then inter-industry trade will be more prominent. The general equilibrium model is essential to determine the composition of trade.

There is an interesting question of whether or not a collusive intra-industry trade can take place. This has been answered by Fung (1991). He shows that with homogeneous goods, no collusive intra-industry trade can take place, but it can take place with differentiated goods. He also shows that a collusive two-way trade is still welfare superior to no trade for the world.

## V. Quality as a New Dimension

Recent literature has also studied differentiated goods through the introduction of quality as a new dimension. The main focus of this literature has been on the so-called vertically differentiated goods (see Lancaster (1979)). Firms in this new setting have a new variable, quality, to choose, in addition to the price and quantity variables.

It has often been asserted that quality is the fundamental element in international competition, and that it is affected by trade and commercial policies. For example, a recent empirical study by Feenstra (1988) finds that the imposition of voluntary export restraints by Japanese automobile makers have resulted in a significant quality upgrading, contributing to the additional price increase above that caused by the small quantity of imports.

### 1. Perfect competition

Under perfect competition, the demand curve for a firm's product is a price-quality schedule  $p = p(q)$  (see Rosen (1974)). Let  $c(q, x)$  be



the total cost function of the firm. The profits are therefore

$$(5.1) \quad \pi(q, x) = p(q)x - c(q, x).$$

The first-order conditions are

$$(5.2) \quad \pi_q = xp_q - c_q = 0$$

and

$$(5.3) \quad \pi_x = p - c_x = 0.$$

Suppose that  $x$  is subject to a quota. If a quota is binding, then relaxing it will have an effect on the quality choice. To examine this condition, totally differentiate (5.2) to obtain

$$(5.4) \quad q_x = -\pi_{qx} / \pi_{qq} = (c_{qx} - p_q) / (xp_{qq} - c_{qq}).$$

Although  $\pi_{qq}$  is negative, the sign of  $q_x$  is determined by the sign of  $c_{qx} - p_q$  which is indeterminate. This difficulty can be removed if one considers, as Rodriguez (1979) and Feenstra (1988) did, the special case in which  $c = c(qx)$ . The two first-order conditions reduce to

$$(5.2') \quad p_q(q) = c'(qx)$$

$$(5.3') \quad p(q) = qc'(qx).$$

In this case, it can be shown that (5.4) becomes

$$(5.4') \quad q_x = qc'' / (p_{qq} - xc'').$$

If  $c'' > 0$ , then a reduction in output due to a quota will increase the quality of the good.

What is the effect of tariff on the quality of a good? Consider first the case of a specific tariff. The profit function is  $\pi = p(q)x - c(qx) - tx$ . The first-order conditions are (5.2') and

$$(5.3'') \quad p - qc'(qx) - t = 0.$$

Combining (5.2') and (5.3''), one can obtain

$$(5.5) \quad q_t = -1 / qp_{qq}.$$

If  $p_{qq} < 0$ , then  $q_t > 0$ .

In the case of an *ad valorem* tariff, the profit function becomes  $\pi = (1-t)p(q)x - c(qx)$ . The first-order conditions are  $(1-t)p_q(q) = c'(qx)$  and  $(1-t)p(q) = qc'(qx)$ . These two conditions imply  $p_q(q)q = p(q)$ . Thus  $q$  is independent of  $t$  and the ad-valorem tariff has no effect on the level of quality.

Consider now the effect of imposing a minimum quality standard. Using (5.3'), we have  $x_q = (p_{qq} - c' - qxc'') / q^2 c''$ , which is negative if  $p_{qq}$  is negative. Thus tariff and minimum quality standards are equivalent protective devices in terms of reducing the quantity of output of a competitive firm. This was discussed in detail by Mayer (1982).

## 2. Monopoly and Oligopoly

The effect of trade policies on a monopoly has been examined by Krishna (1987) and Das and Donnenfeld (1987). The general demand function used by the former is  $p(q, x)$ . Assume constant marginal cost  $c'(q)$ . The variable profit function is

$$(19) \quad \pi = [p(q, x) - c'(q)]x.$$

One can proceed to analyze the effect of a tariff on output and quality or the effect of a minimum quality standard on output. In the present framework, the  $p_{qx}$  term becomes important. Using the first-order conditions, one can obtain  $q_x = -p_{xq} / (p_{qq} - c'')$ . Since the denominator is negative by the second-order conditions the sign of  $q_x$  is the same as that of  $p_{xq}$ . This kind of result follows the work of Spence (1975) and Sheshinski (1976), which examines the effect of regulation on the quality of monopolist's product. When a specific tariff is imposed, it reduces output, and its effect on quality is qualitatively the same as the effect of a quota. In the case of an *ad valorem* tariff, output and quality will both decrease if  $p_{xq} > 0$ . But if  $p_{xq} < 0$ ,  $x$  and  $q$  may respond in any direction. In the case of a minimum quality standard, it can be shown that output is either increased or decreased depending on whether  $p_{xq}$  is greater or less than zero.

Donnenfeld (1988) examines the effects of commercial policy on the behavior of foreign monopolist that produces multiple products. The monopolist discriminates against domestic consumers by offering different quality products to different groups of consumers. A quota will upgrade the quality of imports, while specific tariffs have no effect on quality and *ad valorem* tariffs downgrade the overall quality.

The effects of quantity and quality restrictions in a duopoly setting have been studied by Das and Donnenfeld (1989). In their model, consumers differ in income or taste so that there are demands for different quality goods. They show that the effects of quantity and quality restrictions on imports hinge on the quality spectrum chosen by the firms. A quota leads to positive protection but a minimum quality standards yields negative protection. In addition, the former had an ambiguous effect on national welfare and the latter lowers it.

Chang and Kim (1989) and Chang and Chen (1992) consider vertically related models in which a downstream firm relies on an upstream firm located in a foreign country to supply an intermediate input for the production of a final good. The upstream firm can produce a finished product of higher quality for competition in the world market. Each consumer buys at most one unit of the good by choosing from the two quality-differentiated varieties. Quality is shown to be an important element in determining the equilibrium pattern of trade. It is also important in determining the degree of government intervention.<sup>9)</sup>

### 3. Imperfect information on quality

When consumers have imperfect information, an adverse selection problem may arise. Donnenfeld and Mayer (1987) consider a small country which produces a good solely for export. Consumers in the importing country use the average quality of all varieties of the good as the indicator of the quality produced by each and every firm. This kind of problem has also been considered by Chiang and Masson (1988) in a partial equilibrium setting. The average quality,  $q$ , perceived by the consumers is  $(\sum_{i=1}^n q_i x_i) / x$ , where  $x$  is the total output of the goods,  $x = \sum_{i=1}^n x_i$ . In general, a firm will under-produce output and quality, the latter being due to the phenomenon of adverse selection.

The government of the exporting country can use various policy tools such as limiting the number of firms, restricting the output of each firm, or levying an export tax. These will all have a positive effect on quality.

Donnenfeld and Weber (1984) examine the case of a sole domestic producer facing foreign firms' competition in the domestic market. If consumers are imperfectly informed about the quality of foreign varieties, the foreign firms will tend to under-produce quality. They

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9) Chang and Kim (1991) examined a three-good model of competition between an upstream firm located in a developed country and a downstream firm located in a newly industrializing country. The downstream firm can produce two goods: a medium-quality good which requires the use of an imported intermediate input from the upstream firm and a low-quality good which requires only domestically produced inputs. The upstream firm can produce a high-quality good. Both firms compete in the world market with their quality-differentiated goods. Again the quality element is shown to be an important factor in determining the pattern of trade and the optimal trade policy.

show that less price regulation is optimal in this case.

It is possible that foreign varieties sold in the domestic market are of lower quality but the consumers have no information about the origin of the varieties. The consumers may have to use the average quality of domestic and foreign varieties as the indicator. This is the case examined by Bond (1984). He shows that if the labeling of the country of origin is required, the consumers' welfare will be enhanced.

## VI. Concluding Remarks

In this paper, we have examined the key issues of the new theory of trade. The fundamental insights that markets are not often perfectly competitive and returns to scale are not often constant have brought a remarkable change in trade theory in the past decade. As a result, researchers in international economics are now in a richer, and more exciting, environment. With the breakthrough in modeling imperfect competition in trade, numerous models with diverse structures have come into existence. This is in sharp contrast with the traditional trade models which are mainly dominated by a powerful monolithic structure of the Heckscher-Ohlin type. The relevance and usefulness of many of the policy implications derived out of that monolithic structure are now challenged by the new theory.

As we have discussed in this paper, many policy implications of the new theory are extremely sensitive to the assumptions of a model. There is now even a greater challenge for trade theorists to examine models of more realistic assumptions. For example, the behavior of the firm has been seen to be crucial for some policy implications. Further applications of advanced results in game theory to trade models, especially the dynamic games, could shed new lights on policy implications. Moreover, almost all the literature on trade with imperfect competition assumes exogenous market structures. Relaxation of this assumption is particularly relevant in view of the rapid integration currently underway in the world economy.<sup>10)</sup>

In models with market imperfection, the traditional first-best

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10) Horstmann and Markusen (1992) have initiated a research in this direction. They have developed a simple model that generates alternative market structures as Nash equilibria for different parameter values of the model.

situation is lost. As expected from the theory of second best, it will be difficult to discern a systematic or particular pattern for policy implications. The bewildering array of models and results, though not surprising from the perspective of the theory of second best, can be narrowed with the help of empirical work. The quantification of the new theoretical models have been developed along various lines in recent literature. They have ranged from industry studies to general equilibrium formulation.<sup>11)</sup>

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11) See Helpman and Krugman (1989, chapter 8) for a survey of recent prominent empirical work and for a discussion of the difficulties in quantification under imperfect competition.

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# LONG-TERM EXPECTATIONS AND ECONOMIC GROWTH — A POST-KEYNESIAN THEORY OF LONG-TERM GROWTH —

Hideyuki ADACHI

This paper attempts to develop a long-term growth model of a Post-Keynesian character to analyze the possible disequilibria in the growth process. The most distinctive feature of the model lies in that it explicitly takes into account the expected rate of growth in the corporate investment behavior. This concept together with the Harrod's concepts of the warranted rate of growth and the natural rate of growth plays an important role in determining the tendency of long-term growth. The model presented here may be characterized as an attempt to synthesize Harrod's theory of growth with Joan Robinson's theory of capital accumulation.

## I. Introduction

The most interesting feature of Harrod's growth theory compared with the neoclassical growth theory lies in that it can analyze the practical consequences of disequilibrium in the growth process. Harrod depicted the dynamics of the economy as an interaction between three growth rates: the actual growth rate, the warranted growth rate and the natural growth rate. Inconsistencies between these growth rates give rise to the cumulative process of the business cycle or the long-term tendency of the economy towards stagnation or inflation. Disequilibrium process like this cannot be analyzed by the neoclassical growth theory in which the distinction between these growth rates are removed by assuming the continuous full-employment of resources.

In this paper we reappraise the disequilibrium aspect of Harrod's dynamic theory, and make an attempt to construct a long-term

growth model which can comprehensively analyze the possible disequilibria in the growth process. Specifically, we stress the importance of introducing the concept of the expected rate of growth in the corporate investment behavior in addition to the above-mentioned three concepts of growth. Harrod himself was aware of the importance of this concept, but did not take it into account explicitly in his analysis.<sup>1)</sup> It represents what Keynes called the state of the 'animal spirits' of the firm, or what Joan Robinson calls the 'desired rate of growth'.<sup>2)</sup>

The concept of the expected rate of growth adds another dimension to Harrod's key concepts of growth (the warranted rate and the natural rate) in analyzing disequilibrium in the growth process. It will be shown that unless these three growth rates coincide, disequilibrium of some kind or another will arise in the growth process, its nature being different depending on the relationship between the three growth rates. As is well-known, it is Joan Robinson who emphasizes the importance of the 'animal spirits' of entrepreneurs in the determination of the rate of accumulation. Therefore, the model presented in this paper might be regarded as an attempt to synthesize Harrod's theory of growth with Joan Robinson's theory of accumulation.

The paper is organized as follows. Section I discusses the relation between capacity output and actual output, and derives the short-term production function which is used in the following analysis. Section II introduces the concept of the expected growth rate, and discusses its relation to the warranted growth rate. Section III examines how the actual rate of growth and the utilization of capacity are determined, and what causes their changes through time. Section IV analyzes the dynamics of our model to see the nature of long-term growth. In Section V, we introduce the concept of the natural rate of growth in addition to the expected rate and the warranted rate. It will be shown how long-term patterns of growth and employment differ depending on the relationship between these three growth rates. Section VI gives a brief summary.

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1) See Harrod (1972, pp.19-20).

2) See Robinson (1962, Chap.2).

## II. Capital, Capacity and Output

Let us denote the ratio of capacity output ( $\bar{Y}$ ) to capital ( $K$ ) by  $\bar{y}$ :

$$\bar{y} = \bar{Y}/K. \quad (1)$$

We assume this ratio to be constant, which reflects the state of technology. Let  $\bar{N}$  be the normal employment of labor to produce capacity output,  $\bar{Y}$ . We denote the productivity of labor at capacity output by  $A$ :

$$A = \bar{Y}/\bar{N}. \quad (2)$$

This ratio remains constant through time unless there is technological progress, since we assume there is only one possible method of production corresponding to each state of technological knowledge. If there is technological progress, however, it will increase through time.

Given the capacity output,  $\bar{Y}$ , and the corresponding normal employment,  $\bar{N}$ , the relation between actual output,  $Y$ , and actual employment,  $N$ , is assumed to be represented by the following function:<sup>3)</sup>

$$Y/\bar{Y} = u(N/\bar{N}). \quad (3)$$

This function is assumed to have the following properties,

$$u(0) = 0, \quad u(1) = 1, \quad u(\infty) = \bar{u} > 1, \quad u' > 0, \quad u'(0) = 1, \quad (4)$$

the shape of which is described as Fig 1. Substituting (1) and (2) into (3), we can rewrite (3) as

$$Y/K = \bar{y} u (AN/\bar{y}K) \quad (5)$$

or, since  $\bar{y}$  is assumed to be constant, as

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<sup>3)</sup> This function may be called "utilization function", the idea of which owes to Okishio (1984).

$$Y/K = f(AN/K) \quad (6)$$

where

$$f(0) = 0, f' > 0. \quad (7)$$

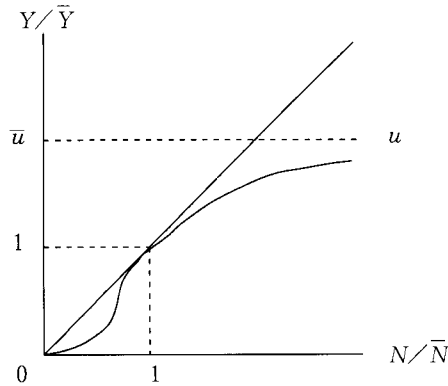


Fig.1 The utilization function

This relation might look nothing but the neoclassical type production function with the labor-augmenting factor of technological progress ( $A$ ), but in fact it is not. As is obvious from the derivation of (6), it does not represent the spectrum of available techniques, but the actual production possibilities of the existing capacities. It may rather be called a short-run production function.<sup>4)</sup>

Let us denote the output-capital ratio by  $y$  and the ratio of employment in efficiency unit to capital by  $x$ :

$$y \equiv Y/K, \quad x \equiv AN/K. \quad (8)$$

Then the short-run production function is written as

$$y = f(x), \quad (9)$$

4) Concerning the different concepts of production functions and their interconnections, Johansen (1972, Chap.1) is very clear-cut. As he points out there, the long-term production function of the neoclassical type may be characterized as a "steady state production function". The actual production possibilities at given moment of time are not determined by this long-term production function, but rather by the short-term production function defined above.

and its shape is depicted as Fig 2. At point  $P$  where the short-run production function is tangential to the straight line through the origin with gradient  $\bar{y}/\bar{x}$ , the degree of utilization of capacity is at its normal level, and the productivity of labor,  $y/x$ , is the greatest. Here,  $\bar{y}$  represents the capacity-capital ratio as is defined above, and  $\bar{x}$  represents the ratio of normal employment in efficiency unit to capital corresponding to  $\bar{y}$ . The value of  $x$  (or  $y$ ) reflects the utilization of capacity; the existing capacity is under-utilized if  $x < \bar{x}$  (or  $y < \bar{y}$ ), and it is over-utilized if  $x > \bar{x}$  (or  $y > \bar{y}$ ). The shape of the short-run production function is invariable as long as the capacity-capital ratio  $\bar{y}$  remains constant.

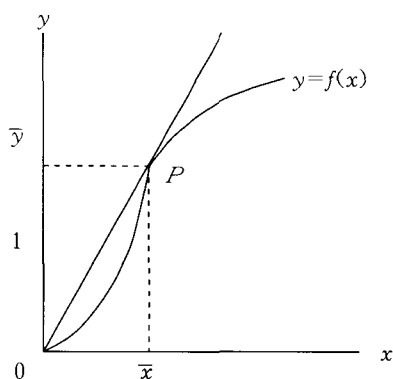


Fig.2 The short-run production function

### III. The Warranted Rate of Growth and the Expected Rate of Growth

The warranted rate of growth in Harrod's sense will be achieved if planned investment equals planned savings at normal-capacity working. In order to ascertain the conditions necessary for the warranted rate of growth, therefore, the factors which influence investment and savings decisions will need to be analyzed.

Planned investment as a ratio of existing capital is assumed to depend on two factors: (1) the degree of utilization of capacity and (2) the expected growth rate of the representative firm. The first factor is considered to have the short-run influence on investment. We assume that planned investment as the ratio of capital is higher where the degree of utilization is higher. This assumption allows the

effect of the acceleration principle as a special case, but it also includes the case where investment is less sensitive to the degree of capacity working. The expected rate of growth of the firm is considered to be another factor influencing on planned investment. If two economies enjoying the same degree of utilization are compared, the one in which its entrepreneurs expect a faster rate of growth will have a higher ratio of planned investment to capital than the other.<sup>5)</sup>

Thus, using employment-capital ratio,  $x$ , as a proxy for the degree of utilization and denoting the expected rate of the representative firm by  $g_e$ , we may write our investment function as

$$I/K = i(x, g_e) \quad (10)$$

where its partial derivatives with respect to  $x$  and  $g_e$  are positive:

$$i_x \equiv \frac{\partial i}{\partial x} > 0, \quad i_{g_e} \equiv \frac{\partial i}{\partial g_e} > 0. \quad (11)$$

When the representative firm is operating at  $x = \bar{x}$ , it has what it judges to be the ideal capacity to produce current output. The planned investment undertaken in these circumstances may be attributed to the expected growth rate of the representative firm. We may therefore assume without loss of generality that

$$i(\bar{x}, g_e) = g_e \quad (12)$$

We assume in addition that for any  $x$ ,

$$i_{g_e} = 1. \quad (13)$$

This assumption implies that the investment function  $i(x, g_e)$  is of the following form:

$$i(x, g_e) = h(x) + g_e \quad (14)$$

where

$$h(\bar{x}) = 0, \quad h' > 0. \quad (15)$$

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5) The idea of introducing the expected rate of growth explicitly into the investment function owes to Phillips (1961) and Eltis (1973, Chap.12). Kaldor(1951)(1954) has also stressed the importance of the role of entrepreneurial expectations in the dynamics of the capitalist economy.



We shall next examine the determinants of planned savings. The simplest saving assumption may be Harrod's one which says that a constant proportion of income,  $s$ , is saved. With this assumption, planned saving,  $S$ , as a ratio of existing capital,  $K$ , becomes as

$$S/K = sY/K = sf(x), \tag{16}$$

which may easily be seen to be an increasing function of employment-capital ratio,  $x$ .

The more general saving hypothesis may be that of Kaldor(1956) in which the ratio of saving to income depends on the share of profits in the national income. Underlying this hypothesis is the assumption that the proportion of profits saved,  $s_p$ , is greater than the proportion of wages and salaries saved,  $s_w$ . In this case planned saving as a ratio of existing capital becomes as

$$\frac{S}{K} = s_p \left( \frac{Y}{K} - \frac{w}{p} \frac{N}{K} \right) + s_w \frac{w}{p} \frac{N}{K}. \tag{17}$$

Suppose that producers set prices with a constant mark-up over primary costs calculated at normal capacity.<sup>6)</sup> Then we have

$$p = (1+m) \frac{w\bar{N}}{\bar{y}}, \tag{18}$$

where  $m$  is the constant mark-up calculated to cover fixed costs and desired profits at normal capacity. In view of (2), equation (18) is written as

$$p = (1+m) \frac{W}{A}. \tag{19}$$

Substituting (8), (9) and (19) into (17), we have the following saving function:

$$\frac{S}{K} = s_p f(x) - \frac{s_p - s_w}{1+m} x. \tag{20}$$

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6) Most of the Post-Keynesian theorists support the hypothesis of mark-up pricing over normal costs as the most plausible. For example, see Kalecki (1954, Chap.1), Robinson (1956, Chap.19), Eichner (1976, Chap.2 and 3). Empirical support for this hypothesis has been given by Godley and Nordhaus (1972).

Thus this saving function, too, is a function of employment-capital ratio,  $x$ . It is also shown to be an increasing function for relevant range of  $x$  around  $\bar{x}$ .<sup>7)</sup> We may therefore conclude that planned saving as a ratio to existing capital can generally be assumed to be an increasing function of employment-capital ratio. From now on the saving function will be represented by the following general form:

$$S/K = s(x) \text{ where } s' > 0. \quad (21)$$

With the investment and saving functions so far obtained, we can clarify the relation between the warranted rate of growth and the expected rate of growth. In the following argument we measure 'the rate of growth' in terms of the stock of capital, and denote it by  $g$ . Then, the warranted rate of growth,  $g_w$ , is defined as

$$g_w = s(\bar{x}). \quad (22)$$

It means that if the rate of growth equals  $g_w$ , the level and the distribution of income at the normal utilization of capital is such as to induce the households and firms to wish to make saving per unit of capital equal to the rate of capital accumulation. At this rate of growth, therefore, effective demand for goods becomes just equal to normal-capacity output of the economy.

The warranted rate of growth thus defined must be distinguished from the expected rate of growth; the former reflects saving behavior of households and firms, while the latter is an explanatory variable underlying investment behavior of firms. The expected rate of growth depends on the entrepreneurial estimation of the future trend in the growth of industry sales. We will later discuss in detail how the entrepreneurial growth expectation is formed. Anyhow it is

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7) It may safely be assumed that profits are non-negative at normal-capacity working, i.e.  $f(\bar{x})/\bar{x} > 1/(1+m)$ . But, since  $f'(\bar{x}) = f(\bar{x})/\bar{x}$ , we must have  $f'(\bar{x}) > 1/(1+m)$ , and *a fortiori*,  $f'(\bar{x}) > (s_p - s_w)/s_p(1+m)$ . This inequality proves that  $S/K$  is an increasing function of  $x$  in the neighborhood of  $\bar{x}$ . The domain of  $x$  in which  $S/K$  becomes an increasing function of  $x$  can be specified more exactly. When  $f(x)$  is s-shaped as is shown in Fig.2, equation  $f'(x) = (s_p - s_w)/s_p(1+m)$  has two roots:  $x_1$  and  $x_2$ , with  $x_1 < \bar{x} < x_2$ . Then, for any  $x$  satisfying  $x_1 < x < x_2$ , we must have  $f'(x) > (s_p - s_w)/s_p(1+m)$ . This means that  $S/K$  is an increasing function as long as  $x$  stays within this domain.

enough here to make a clear distinction between the warranted rate of growth and the expected rate of growth.

Given the investment and saving functions by (10) and (21), and given the expected rate of growth  $g_e$ , the utilization of capital,  $x$ , and the actual rate of growth,  $g$ , are determined to satisfy

$$i(x, g_e) = s(x) = g, \quad (23)$$

or

$$h(x) + g_e = s(x) = g. \quad (23')$$

In view of (12) and (22), it follows that if the expected rate of growth is not equal to the warranted rate of growth, the capacity working is not normal, and the actual rate of growth differs either from the expected rate of growth or from the warranted rate of growth. Only if the expected rate of growth happens to coincide with the warranted rate of growth, will the warranted rate of growth be realized and the capacity working be normal. In this case, we have

$$g_e = i(\bar{x}, g_e) = s(\bar{x}) = g_w = g \quad (24)$$

But it does not necessarily follow that the warranted rate of growth will continue once it is realized. It does so follow if the representative entrepreneur expects the demand to expand at the same rate when the expected rate of expansion in the preceding period turned out all right. It is not certain, however, whether the representative entrepreneur always makes such expectation formation. If he were an optimist, he might expect the rate of expansion to speed up: conversely, if he were a pessimist, he might expect it to

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8) In his early writing on economic dynamics (1948), Harrod took it for granted that the warranted rate of growth is an equilibrium rate of growth. This idea was criticized by Sidney Alexander (1950), and he admitted Alexander's criticism in his latest book by stating as follows: "The idea that  $G_w$  is an equilibrium rate of expansion implies a certain behavioral parameter in the representative entrepreneur. Will he, all having turned out well, continue in his previous growth rate? Or will he stay put at the same absolute level of orders? Or, if he were an optimist, he might decide to speed up his rate of increase. There is the question of what Keynes called the 'animal spirits' of the representative entrepreneur." See Harrod (1972, pp.18-19)

I believe that what Harrod intends to say in this paragraph becomes clear in our model by the introduction of  $g_e$ .

slow down. It depends on the 'animal spirits' of the representative entrepreneur.<sup>8)</sup> We will discuss on the determination of the expected rate of growth,  $g_e$ , later.

#### IV. The Determination of the Actual Rate of Growth and the Utilization of Capacity

To assume the equality of planned investment and planned saving as shown by equation (23) or (23') above means to assume that the short-term equilibrium in the product market is continuously maintained. In other words, we are neglecting the possibility of the short-term inconsistency between supply and demand in the product market. This assumption may be justified in the present context, since we are here concerned with the problems of the long-term growth.<sup>9)</sup>

Employment-capital ratio,  $x$ , and the rate of growth of capital,  $g$ , are now determined by equation (23) or (23') for a given expected growth rate,  $g_e$ . It is to be noted here that in order for the short-run equilibrium to be maintained, it must be stable. The stability condition is to have

$$i_x < s' \quad \text{or} \quad h' < s' \quad (25)$$

in the neighborhood of equilibrium for given  $g_e$ , i.e., the investment function must be less sensitive to changes in the utilization of capital than the saving function.

The determination of  $x$  and  $g$  by equation (23) or (23') is depicted by Fig.3 (a) through (c). In these diagram, we measure planned investment and planned saving per unit of capital along the vertical axis, and employment-capital ratio along the horizontal axis. Curve  $ii$  is the investment demand schedule, indicating the effect that

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9) The works of Clower (1965) and Leijonhufvud (1968) have stimulated a re-interpretation of Keynes' analysis within a Walrasian framework. In their view involuntary unemployment represents unsatisfied short-term expectation and thus disequilibrium in the commodity market. As Kregel (1976) points out, however, Keynes explained involuntary unemployment as an equilibrium phenomenon with given short-term expectations of producers realized. The task left for Post Keynesian theory was to analyze shifting equilibrium in a monetary-production economy. The model of this paper may be characterized as a sort of *shifting model* in Kregel's term.

an increase in the employment-capital ratio will have on the planned investment per unit of capital, holding the expected rate of growth,  $g_e$ , constant. Curve  $ss$  is the saving schedule, indicating the effect that an increase in the employment-capital ratio will have on the planned saving per unit of capital. Both curves slope upward, reflecting the fact that an increase in employment-capital ratio will lead to an increase in both investment and saving. If the stability condition for the short-term equilibrium is satisfied,  $ss$  curve is steeper than  $ii$  curve. In what follows we assume this condition to be satisfied.

The vertical line  $\bar{x}$  indicates the normal employment-capital ratio, at which the existing capacity is normally utilized. The abscissa of the intersection point between  $\bar{x}$  and investment schedule  $ii$  is equal to the expected rate of growth,  $g_e$ , whereas the one between  $\bar{x}$  and saving schedule  $ss$  is equal to the warranted rate of growth,  $g_w$ .

Three different situations are shown in Fig.3(a) through (c): Fig.3(a) is case where  $g_e < g_w$ , Fig.3(b) is the case where  $g_e = g_w$ , and Fig.3(c) is the case where  $g_e > g_w$ . Given the levels of  $g_e$  and  $g_w$ , the short-term equilibrium values of employment-capital ratio,  $x$ , and the rate of growth of capital,  $g$ , are determined at the intersection point of  $ii$  curve and  $ss$  curve. The comparison of the three diagrams indicates that the nature of the short-term equilibrium will crucially depend on the relative magnitude of  $g_e$  and  $g_w$ .

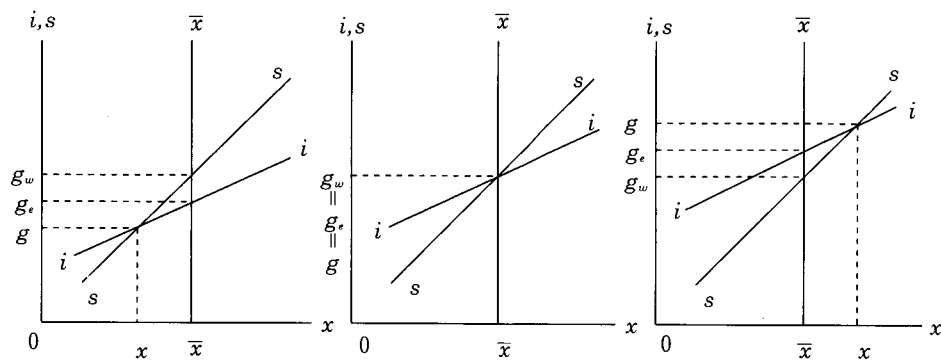


Fig.3(a) ( $g < g_e < g_w$ ) Fig.3(b) ( $g = g_e = g_w$ ) Fig.3(c) ( $g > g_e > g_w$ )  
 Fig.3 The determination of the rate of growth and the rate of utilization

**Proposition 1.** *The actual rate of growth,  $g$ , and employment-capital ratio,  $x$ , depend on the expected rate of growth,  $g_e$ , and the*

warranted rate of growth,  $g_w$ , as follows:

- (i) if  $g_e < g_w$ , then  $x < \bar{x}$  and  $g < g_e < g_w$ ;
- (ii) if  $g_e = g_w$ , then  $x = \bar{x}$  and  $g = g_e = g_w$ ;
- (iii) if  $g_e > g_w$ , then  $x > \bar{x}$  and  $g > g_e > g_w$ .

In other words, if the expected rate of growth is lower than the warranted rate of growth, employment-capital ratio is less than its normal level and the actual rate of growth is lower than the expected rate as well as the warranted rate; the opposite result holds if the expected rate of growth exceeds the warranted rate of growth. Employment-capital ratio is at its normal level and the actual rate of growth coincides with both the expected rate and the warranted rate if and only if these two rates of growth are equal.

As we noted before, the expected rate of growth reflects the desire of firms for investment, while the warranted rate of growth reflects the propensity to save of the economy as a whole. Thus, the result obtained above implies that the stronger the desire for investment in relation to the propensity to save, the higher will be employment-capital ratio and the rate of growth of capital. Interpreted in this way, we find that the determination of employment-capital ratio and the rate of growth of capital in our model is quite similar to the determination of employment by investment and saving in the simple Keynes' model. Our model may be characterized as a straightforward extension of the static Keynes' theory in the dynamic context.

It is obvious from the above argument that the short-term equilibrium position depends on the level of the expected growth rate,  $g_e$ , in relation to the warranted growth rate,  $g_w$ . If  $g_e$  changes, the short-term equilibrium position will shift correspondingly. In order to examine the movement of the equilibrium position through time, we have to consider how growth expectations of entrepreneurs develop over time.

We suppose that growth expectations are formed on the basis of the past experience of entrepreneurs, but at the same time influenced by the state of confidence with which they form their expectations. In the formation of our expectations, it is our usual practice to take the past experience into consideration, and project it into future. The expected growth rate will, therefore, depend on the rate of

growth which entrepreneurs have actually experienced in the recent past. However, the way in which the experiences are interpreted depends very much on what Keynes called the state of ‘animal spirits’. The same situation may lead to different expected rates of growth according as entrepreneurs hold optimistic or pessimistic view on the present situation; the expected rate of growth will be higher, the more optimistic are entrepreneurs.

As a parameter that represents intensity of ‘animal spirits’, we will introduce the concept of the ‘long-term’ expected rate of growth. The long-term expected rate of growth, denoted by  $\bar{g}_e$ , is defined as the secular trend in the rate of growth which is expected to predominate over short-term cyclical fluctuations. It reflects the influence of population, technological progress and similar long-term factors, as long as they affect the desired rate of growth for the firms over the long-term. But it must be distinguished from the natural rate of growth which depends solely on physical conditions (resulting from the growth of population and technological progress). We suppose that the long-term expected rate of growth,  $\bar{g}_e$ , will hold steady for considerably long period, subject only to occasional revisions due to substantial changes in economic environment. On the contrary, the expected growth rate at each moment,  $g_e$ , is subject to constant revisions based on changes in the actual rate of growth, so that it will fluctuate around the long-term expected rate of growth,  $\bar{g}_e$ .

With these considerations, we assume that the expected rate of growth at each moment is revised according to the following formula:<sup>10)</sup>

$$\dot{g}_e = H(g - g_e, \bar{g}_e - g_e) \quad (26)$$

where

$$H_1 \equiv \frac{\partial H}{\partial (g - g_e)} > 0, \quad H_2 \equiv \frac{\partial H}{\partial (\bar{g}_e - g_e)} > 0, \quad H(0, 0) = 0. \quad (27)$$

The first term in this function indicates that growth expectations are based on a simple projection of the actual growth in the recent past, while the second term indicates that the long-term expected rate of growth,  $\bar{g}_e$ , representing the state of ‘animal spirits’, exerts another influence on the formation of growth expectations. The larger the magnitude of  $H_1$  (the partial derivative with respect to the first

term), the more sensitive the expectation will be to the actual situation in the recent past. On the contrary, the larger the magnitude of  $H_2$  (the partial derivative with respect to the second term), the more dominant will be the secular trend of the long-term expected growth. If  $g_e = g = \bar{g}_e$ , there will be no motive for the firms to revise the expected growth rate which is just prevailing.

With these assumption, the behavior of the utilization of capacity and the rate of growth can be summarized by the following system of equations:

$$i(x, g_e) = s(x) = g \quad (28.a)$$

$$\dot{g}_e = H(g - g_e, \bar{g}_e - g_e) \quad (28.b)$$

Equation (28.a) determines  $x$  and  $g$  for given  $g_e$ , and equation (28.b) determines the behavior of  $g_e$ , where  $\bar{g}_e$  is assumed to be given.

### V. The Nature of Secular Growth

In this section, we will analyze the dynamics of the above system. As we have already seen in the last section, an upward shift of  $g_e$  causes  $x$  and  $g$  to increase, and *vice versa*. The behavior of  $g_e$ , in turn, depends on its relation to  $g$  and  $\bar{g}_e$ . If  $g_e$  is below both  $g$  and  $\bar{g}_e$ , it is rising: if, conversely,  $g_e$  exceeds both  $g$  and  $\bar{g}_e$ , it is falling. But, if  $g < g_e < \bar{g}_e$  or  $\bar{g}_e < g_e < g$ ,  $g_e$  may change in either direction since the influences of  $g$  and  $\bar{g}_e$  on  $g_e$  work in opposite direction.

In order to examine the behavior of the system more closely, we will focus our attention on its steady state solutions. Let us denote the steady state solution to (28.a) and (28.b) by  $x^*$ ,  $g^*$ ,  $g_e^*$ . They are determined by the following equations:

$$i(x^*, g_e^*) = s(x^*) = g^* \quad (29.a)$$

$$H(g^* - g_e^*, \bar{g}_e - g_e^*) = 0 \quad (29.b)$$

The steady growth achieved in this case will be called hereafter

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10) Both Phillips and Eltis (1973) assume that the expected rate of growth depends only on the actual rate of growth. Their expectation hypothesis may be considered as a special case of ours.



‘secular growth’, so that  $g^*$  is referred to as the ‘secular growth rate’. We can prove the following:

**Proposition 2.** *Steady growth (i.e., secular growth) of the system (28.a) and (28.b) is stable if the following condition is satisfied:<sup>11)</sup>*

$$(H_1 + H_2)i_x < H_2 s' \quad \text{or} \quad \frac{i_x}{s'} < \frac{H_2}{H_1 + H_2}. \quad (30)$$

The economic implication of this condition is as follows:

- (i) The secular growth is more stable, the smaller the sensitivity of investment to the utilization of capacity ( $i_x$ ), and/or the larger the sensitivity of saving to the utilization of capacity ( $s'$ ), other thing being equal.
- (ii) The secular growth is more stable, the smaller the sensitivity of the expected growth rate to the actual growth rate ( $H_1$ ), and/or the larger the sensitivity of the expected growth rate to the long-term expected growth rate ( $H_2$ ), other thing being equal.

In short, the secular growth will be stable if entrepreneurs’ short-term experience is dominated by their long-term expectations. It will be unstable in the opposite case.

It cannot be *a priori* determined which of these two cases is more plausible. Some economies will enjoy stable growth with only slight fluctuations. Such case can happen when investment plans are predominantly based on the long-term expected rate of growth, and are slightly affected by changes in the actual rate of growth. Other economies will suffer substantial fluctuations without a tendency to settle down to equilibrium growth path. In this case, investment plans are sensitive to the utilization of capacity as well as to the actual rate of growth. It may be summarized that the case of stable growth has relevance to mature economies where investment decisions are made predominantly by big corporations with long-term considerations. On the contrary, in less mature economies where dynamic industries with free entry of new firms are prevalent, the sensitivity of entrepreneurial plans to current conditions may be of decisive importance, so that the possibility of unstable growth will be

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11) For proof see appendix I.

larger.<sup>12)</sup> In the following argument, we will focus our attention on the case of stable growth, since we are interested in long-term growth of mature economy.

We should notice here that the secular growth rate ( $g^*$ ) is not necessarily equal either to the warranted rate of growth ( $g_w$ ), or to the expected rate of growth ( $g_e^*$ ). As a matter of fact, we have  $g^* = g_e^* = g_w$  only if it happens that  $\bar{g}_e = g_w$ , but not otherwise. More precisely, we have the following results.

**Proposition 3.** *If the steady state of the system (28) is stable, the secular growth rate,  $g^*$ , and capacity utilization,  $x^*$ , depend on  $g_e$  and  $g_w$  as follows:<sup>13)</sup>*

- (i) if  $\bar{g}_e = g_w$ , then  $g^* = g_e^* = \bar{g}_e = g_w$  and  $x^* = \bar{x}$ ;
- (ii) if  $\bar{g}_e < g_w$ , then  $g^* < g_e^* < \bar{g}_e < g_w$  and  $x^* < \bar{x}$ ;
- (iii) if  $\bar{g}_e > g_w$ , then  $g^* > g_e^* > \bar{g}_e > g_w$  and  $x^* > \bar{x}$ .

Case (i) is the situation where the long-term expected growth rate happens to coincide with the warranted growth rate. In this case, the secular growth rate tends to equal the expected growth rate as well as the warranted growth rate, and the capacity working tends to its normal degree. This secular growth may be characterized as 'equilibrium growth' from the view point of entrepreneurs. However, it may not be so for the economy as a whole, since this secular growth rate may not agree with the natural rate of growth. We will come back to this point later.

In case (ii) where the long-term expected growth rate happens to be lower than the warranted growth rate, planned investment tends to be below planned saving at the normal degree of capacity working, which will produce long-term excess saving. The capacity working will fall below the normal degree, and the secular growth rate will stay lower than the expected rate as well as the warranted rate. Such an economy will undergo a stagnant state. Case (iii) is just opposite to case (ii). In that case, the economy is lacking for saving to realize planned investment to be undertaken at the normal

12) The similar point is made by Eichner (1976, Chap.6), though his investment function differs from ours in several respects.

13) For proof see appendix II.

degree of capacity working. The capacity working will rise above normal, and the secular growth rate will become higher than the expected rate as well as the warranted rate. Such an economy has an inflationary tendency due to capital shortage. In both of these two cases, the secular growth rate agrees neither with the expected rate nor with the warranted rate, and besides the degree of capacity working is not normal. Such secular growth is not equilibrium growth, since entrepreneurs' expectations on the rate of growth and the degree of capacity working are not realized. In our model, therefore, disequilibrium growth is the ordinary state, and equilibrium growth is rather exceptional.

So far, we have assumed that the long-term expected growth rate,  $\bar{g}_e$ , remains constant through time. If, however,  $\bar{g}_e$  continues to be different from the secular growth rate,  $g^*$ , for a considerable period of time, entrepreneurs may revise  $\bar{g}_e$  towards  $g^*$ . Let us next consider what will happen to the secular growth rate if  $\bar{g}_e$  is revised in view of  $g^*$ . We assume that  $\bar{g}_e$  adjusts adaptively to  $g^*$ :

$$\dot{\bar{g}}_e = G(g^* - \bar{g}_e), \quad G(0) = 0, \quad G' > 0 \quad (31)$$

We also assume that the adjustment speed of  $\bar{g}_e$  is quite sluggish compared with that of  $g_e$  represented by equation (26). Then, as  $\bar{g}_e$  changes according to (31), so does  $g^*$ , which is determined by (29.a) and (29.b) corresponding to each given  $\bar{g}_e$ .

The problem in which we are particularly interested in is whether the equilibrium growth path is approached when the adjustment process of  $\bar{g}_e$  as formulated above is taken into account. In other words, our problem is whether the system consisting of (29.a), (29.b) and (31) is stable or unstable. Examination of the stability of this system proves the following proposition.

**Proposition 4.** *Consider the following system of equation*

$$i(x^*, g_e^*) = s(x^*) = g^* \quad (32.a)$$

$$H(g^* - g_e^*, \bar{g}_e - g_e^*) = 0, \quad (32.b)$$

$$\dot{\bar{g}}_e = G(g^* - \bar{g}_e). \quad (32.c)$$

*The steady state solution of this system satisfies the conditions of equilibrium growth ( $g^* = g_e^* = \bar{g}_e = g_w$  and  $x^* = \bar{x}$ ), but it is unstable.<sup>14)</sup>*

This result implies that if  $\bar{g}_e \neq g_w$  initially, the secular growth rate,  $g^*$ , will not approach the warranted rate,  $g_w$ , but rather move away from it. For example, if  $\bar{g}_e < g_w$  initially, we get  $g^* < \bar{g}_e$  and  $x^* < \bar{x}$  as we have seen before. But, if such a stagnant situation continues for long time, entrepreneurs will gradually revise the long-term expected growth rate,  $\bar{g}_e$ , downward. Then, the secular growth rate,  $g^*$ , will gradually decline, which will in turn induce a further downward revision of  $\bar{g}_e$ . Thus,  $g^*$  and  $\bar{g}_e$  will move further away from the warranted rate,  $g_w$ , which remains constant through time as long as saving function (21) and the normal employment-capital ratio,  $\bar{x}$ , are invariable. Similarly, if  $\bar{g}_e > g_w$  initially,  $g^*$  and  $\bar{g}_e$  will diverge upward from  $g_w$ .

The result obtained above bears resemblance to Harrod's instability principle which states that any deviation of the actual growth rate from the warranted growth rate tends to be magnified with time. It should be noted, however, that our result refers to a movement of the secular growth rate, while Harrod's instability principle refers to a cumulative process in the upward or downward phases of the business cycle. What we have shown above means that there is no tendency for the secular growth to agree with the warranted growth rate.<sup>15)</sup>

## VI. Growth and Employment in the Long-run

We have so far said nothing about the availability of labor. In order to take it into consideration in our model, we have to introduce Harrod's concept of the 'natural rate of growth'.

The natural rate of growth,  $g_n$ , is defined as the sum of the rate of increase of the working population and the rate of increase of output per worker at normal-capacity working. Let us assume that the supply of labor,  $N_n$ , increases at constant rate  $\lambda$ , and output per worker at normal capacity working,  $A \equiv \bar{Y}/\bar{N}$ , at constant rate  $\alpha$ . Under this assumption, the natural rate of growth,  $g_n = \lambda + \alpha$ ,

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14) For proof see appendix III.

remains constant through time.

Let us denote the ratio of labor supply in efficiency unit to capital by  $v$ , and the rate of employment by  $z$ :

$$v = AN_s/K, \quad z = N/N_s \quad (33)$$

Then, we have

$$z = x/v, \quad (34)$$

and hence, the rate of change in  $z$  through time is given by

$$\frac{\dot{z}}{z} = \frac{\dot{x}}{x} + g - g_n \quad (35)$$

As we have seen in the last section, the motions of  $x$  and  $g$  are determined by the system of equations (28.a) and (28.b), and they will converge to the steady state solutions  $x^*$  and  $g^*$  that satisfy (29.a) and (29.b). Let  $z$  tends to  $z^*$ , as  $x$  and  $g$  tend to  $x^*$  and  $g^*$ , respectively. Then  $z^*$  must satisfy the following equation:

$$\frac{\dot{z}^*}{z^*} = g^* - g_n \quad (36)$$

It follows from this relation that the long-term employment rate,  $z^*$ , is kept constant if  $g^* = g_n$ ; it is increasing if  $g^* > g_n$ , and decreasing if  $g^* < g_n$ . Notice, however, that  $z^*$  cannot exceed unity, since  $N \leq N_s$ . This means that  $g^*$  can exceed  $g_n$  insofar as there exists surplus labor ( $z^* < 1$ ). But, once full-employment ( $z^* = 1$ ) is attained, the natural growth rate sets a limit to the secular growth rate. Thus, the situation where  $g^* > g_n$  cannot last indefinitely, and we must have  $g^* \leq g_n$  in the longer-run. This restraint imposed on the secular growth rate plays an important role in determining long-term trends of growth and employment.

We now proceed to confront the warranted rate of growth,  $g_w$ , with the natural rate of growth,  $g_n$ , and examine various possible phases of growth arising from the relations between the two. They

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15) As Harrod used his 'instability principle' for the explanation of the business cycle, our 'long-term instability principle' may be applied to the explanation of the long-term cycle.

are classified into three cases: (i)  $g_w = g_n$ , (ii)  $g_w > g_n$  and (iii)  $g_w < g_n$ ; and for each of these cases the relations between  $g^*$  and  $g_n$  are also taken into consideration.

(i) Case:  $g_w = g_n$ .

The equality between  $g_w$  and  $g_n$  implies that the rate of accumulation which maintains the normal utilization of capital is consistent with rate of accumulation which maintains full employment of labor. It thus satisfies one of the conditions required for harmonious development of the economy. Even if that is the case, however, the secular growth rate,  $g^*$ , itself will not be the equilibrium growth rate unless the long-term expected growth rate,  $\bar{g}_e$ , coincides with  $g_w$  and  $g_n$ . As a matter of fact, we have  $g^* = g_w = g_n$  according as  $\bar{g}_e = g_w = g_n$ . Patterns of growth will be different depending on whether  $g^* = g_w = g_n$  or  $g^* < g_w = g_n$  or  $g^* > g_w = g_n$ . We will see these cases in turn.

(i.a) Case:  $g^* = g_w = g_n$ . Fig.4(a) depicts this case. The vertical line  $\bar{x}$  indicates the normal employment-capital ratio, and the horizontal line  $g_n g_n$  indicates the natural rate of growth. Now,  $g^* = g_w$  implies that investment schedule  $i\bar{i}$  and saving schedule  $s\bar{s}$  must intersect on  $\bar{x}$ , while  $g_w = g_n$  implies that  $s\bar{s}$  must pass through the intersection point between  $\bar{x}$  and  $g_n g_n$ , which is denoted by  $E$ . Hence, both  $i\bar{i}$  and  $s\bar{s}$  pass through  $E$ . In this case, equilibrium may be said to prevail from the point of view of the firms as well as the overall demand and supply of labor, since the expected rate of growth is being realized and full employment is maintained provided that the initial conditions are appropriate. This equilibrium growth is nothing but what Joan Robinson calls 'a golden age'.<sup>16)</sup> It should

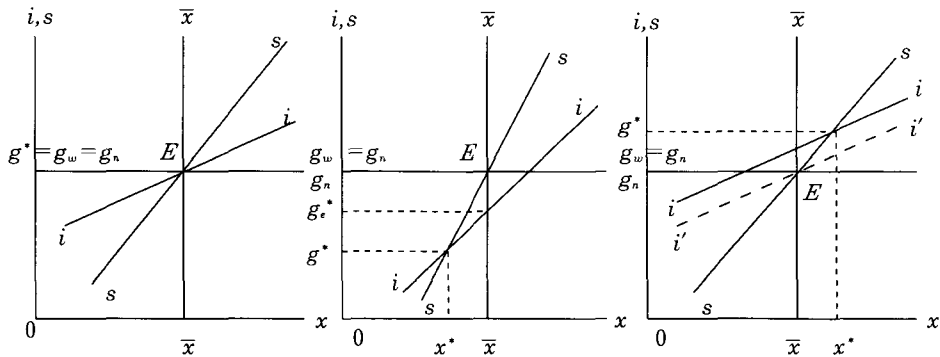


Fig.4(a) ( $g^* = g_w = g_n$ ) Fig.4(b) ( $g^* < g_w = g_n$ ) Fig.4(c) ( $g^* > g_w = g_n$ )  
 Fig.4 The determination of long-run growth and employment: Case  $g_w = g_n$ .

be noted that a golden age is realized in our model only if the normal expected rate of growth ( $\bar{g}_e$ ), the warranted rate of growth ( $g_w$ ), and the natural rate of growth ( $g_n$ ) happen to be equal. In this respect, the above result is quite different from the one obtained in the neoclassical growth model which asserts that the system tends to a golden age starting from any initial conditions.

(i.b) *Case:  $g^* < g_w = g_n$ .* This is the case where the 'animal spirits' of the firms are too low to attain a golden age. As is shown in Fig.4(b),  $ss$  passes through  $E$  since  $g_w = g_n$ , but  $\bar{ii}$  cuts  $\bar{x}\bar{x}$  below  $E$  since  $g^* < g_w$ . The secular growth rate,  $g^*$ , is lower than the natural growth rate,  $g_n$ , and the secular employment-capital ratio,  $x^*$ , is below its normal level,  $\bar{x}$ . Therefore, the rate of unemployment is increasing, and productive capacity is under-utilized. Such a state of stagnation is caused by lack of desires of the firms to accumulate---i.e., too low  $\bar{g}_e$ . In view of Proposition 2 in the last section, we have  $g^* < \bar{g}_e$  in this case, which may induce entrepreneurs to revise  $\bar{g}_e$  gradually according to equation (31). But even if this process is taken into account,  $g^*$  does not tend towards  $g_n$ , but rather moves away from it to downward direction. The state of stagnation may become more serious. The economy will not automatically recover from such a state unless some policy measures are taken by the government, or some favorable shocks (e.g. entrepreneurial innovations) occur.<sup>17)</sup>

(i.c) *Case:  $g^* > g_w = g_n$ .* This is the case where the 'animal spirits' of the firms are so high in comparison with the natural rate of growth that it is impossible to maintain as high a rate of growth as firms are willing to carry out. In Fig.4(c),  $\bar{ii}$  is located at so high a level that it intersects  $ss$  above the natural growth rate line,  $g_n g_n$ . Thus, the secular growth rate,  $g^*$ , exceeds  $g_n$ , and the secular employment-capital ratio,  $x^*$ , is above its normal level. Such steady growth may be realized as long as there exists unemployment, but it will be interrupted by reaching full-employment because of the scarcity of labor.

When the firms compete each other to employ more labor than exists, money-wage rates will rise and consequently prices will rise, too. This will lead to a rise in the demand for credit to finance

16) See Joan Robinson (1956, pp.99-100)

17) Robinson(1962,pp.53-54) nicknamed this phase of growth 'limping golden age'.

production. If the monetary authority control the supply of credit so as to prevent inflation, the rate of interest will be pushed up to the point at which the rate of accumulation is kept down to the natural rate of growth. Thus, as is shown in Fig.4(c), investment schedule  $ii$  will shift down to  $i' i'$  which intersect  $ss$  at  $E$ . At the same time, the demand for labor is held down to the level which leaves sufficient margin of unemployment to prevent wages from rising.

The steady growth thus attained differs from a golden age in that it is not in a state of internal equilibrium. The normal expected rate of growth is so high that the firms are always willing to do more investment than they are actually doing. If the financial control happens to be relaxed, investment schedule  $i' i'$  will shift back to  $ii$ . The firms would increase the rate of accumulation and the demand for labor, which would start an inflation again. The system is thus liable to run into short-term instability in upward direction. The steady growth could only be achieved by pushing down the desired growth rate of the firms to the natural rate of growth by credit control. Joan Robinson called the steady growth of this type 'a restrained golden age'.<sup>18)</sup>

(ii) Case:  $g_w > g_n$ .

We shall next turn to the case where  $g_w > g_n$ . In this case, the rate of accumulation that realizes the planned saving at normal capacity working ( $g_w$ ) exceeds the rate of accumulation made possible by physical conditions ( $g_n$ ). Since the actual rate of growth cannot exceed  $g_n$  over a long period of time,  $g_w > g_n$  implies that a state of over-saving prevails in the long-run. It will be shown that whatever the long-term expected rate of growth,  $\bar{g}_e$ , may be in this case, there is a tendency for the economy to drift into a state of stagnation due to lack of effective demand.

(ii.a) Case:  $g^* \leq g_n < g_w$ . This is the case where there is oversaving and the firms are lacking of 'animal spirits'. Fig.5(a) depicts this case. Saving schedule  $ss$  intersects  $\bar{x} \bar{x}$  above  $g_n g_n$  since  $g_w > g_n$ , while investment schedule intersects  $ss$  at or below  $g_n g_n$  since  $g^* \leq g_n$ . If the investment function is located at  $i_1 i_1$ , the corresponding secular growth rate,  $g_1^*$ , is equal to the natural rate of growth,  $g_n$ . In this case, if the economy starts with full

18) See Robinson (1962, pp.54-55).



employment, it is maintained. The secular employment-capital ratio,  $x_1^*$ , however, is below its normal ratio,  $\bar{x}$ , so that productive capacity is under-utilized. The reason of this is that saving is excessive at normal capacity working when the warranted rate of growth exceeds the natural rate of growth. It is also to be noted that the secular growth rate,  $g_1^*$ , is below the long-term expected growth rate,  $\bar{g}_e$ , in this case. This secular growth is not a golden age equilibrium growth, even though full employment is maintained.

If the situation where the secular growth rate is lower than the long-term expected growth rate continues for considerable period of time, the firms will gradually revise the expectation to the downward direction. As  $\bar{g}_e$  declines, the investment function will shift from  $i_1 i_1$  down to  $i_2 i_2$ . The secular growth rate will fall to  $g_2^*$  which is lower than  $g_n$ , and the secular employment-capital ratio will decrease to  $x_2^*$  which is further below its normal ratio,  $\bar{x}$ . As a result, the rate of unemployment is increasing, and the degree of capacity working gets lower than before. The system will thus drift into a state of stagnation with unemployment and excess capacity coexisting.

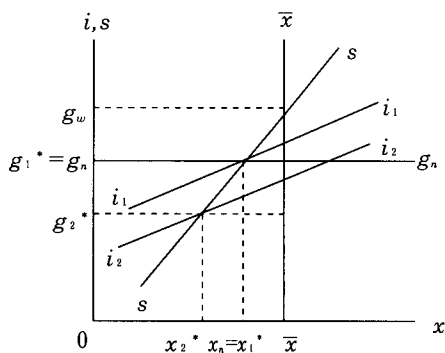


Fig. 5(a) ( $g^* \leq g_n < g_w$ )

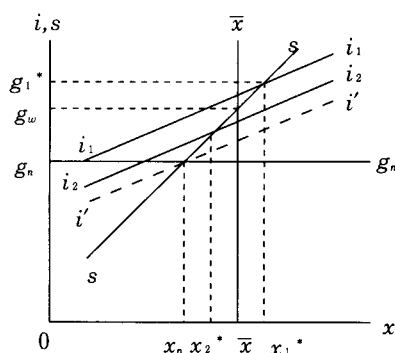


Fig. 5(b) ( $g_w > g_n$  and  $g^* > g_n$ )

Fig. 5 The determination of long-run growth and employment: Case  $g_w > g_n$ .

(ii.b) Case:  $g_w > g_n$  and  $g^* > g_n$ , This is the case where there is long-term over-saving, but 'animal spirits' of the firms are quite high. As is shown in Fig. 5(b), the investment function is located so high as to intersect saving schedule  $ss$  above the natural growth rate line,  $g_n g_n$ . More specifically,  $i_1 i_1$  depicts the case where the long-term expected growth rate,  $\bar{g}_e$ , is higher than the warranted growth rate,  $g_w$ , and  $i_2 i_2$  depicts the case where  $g_e$  is lower than  $g_w$ . In the former case

we have  $g_1^* > g_w$  and  $x_1^* > \bar{x}$ , while in the latter case we have  $g_2^* < g_w$  and  $x_2^* < \bar{x}$ . In either case the secular growth rate exceeds the natural growth rate, but such a high rate of growth can be maintained only if there exists a reserve of non-employed labor. Once the system reaches full employment, the desired rate of accumulation cannot be realized. The investment function will shift downward to  $i' i'$  by the same mechanism as described in *case (i.c)*, so that growth will be kept down to the natural rate. High 'animal spirits' are restrained due to the scarcity of labor.

This case closely resembles *case (i.c)*. However, there is an important difference between the two. When the rate of accumulation is kept down to the natural rate of growth, productive capacity is normally utilized in *case (i.c)* where  $g_w = g_n$  (see Fig.4(c)), while it is under-utilized in the present case where  $g_w > g_n$  (see Fig.5(b)). The under-utilization of capacity reduces the rate of profit on capital below the normal level. In addition, the realized rate of growth is kept down below the long-term expected rate of growth.

If such a restrained state continues for a considerable period of time, 'animal spirits' of the firms may be dampened. The long-term expected rate of growth will be revised to fit the realized rate of growth. As a result, the investment function will fall below  $i' i'$ , and the secular growth rate,  $g^*$ , will also fall below the natural rate,  $g_n$ .

Thus, as far as the warranted rate of growth exceeds the natural rate of growth, the system has a tendency to drift into a state of stagnation in which unemployment and excess capacity coexist, whatever the initial conditions may be. To get out of this state, the overall saving propensity has to be reduced so as to bring the warranted rate down to the natural rate. This can be done, for example, by altering tax system in such a way as to reduce the share of profits in national income.

**(iii) Case:  $g_w < g_n$ .**

Finally, we examine the case where  $g_w < g_n$ . In this case, the rate of accumulation that maintains full employment cannot be realized at normal capacity working because saving is insufficient for the natural rate of growth. This is a situation of long-term undersaving.

*(iii.a) Case:  $g_w < g_n$  and  $g^* < g_n$ .* This is the case where there is long-term undersaving and the firms are lacking of 'animal spirits'. Fig.6(a) depicts such a case. Saving schedule  $ss$  intersects the normal-

capacity working axis  $\bar{x}$  as well as investment schedule  $i$  below the natural growth rate line  $g_n g_n$ .

This case may further be divided into two different types of situations. If 'animal spirits' of the firms are comparatively high so that the secular growth rate exceeds the warranted rate, productive capacity is over-utilized. If, on the contrary, 'animal spirits' are so low as to bring down the secular growth rate below the warranted rate, productive capacity is under-utilized. In Fig.6(a),  $i_1 i_1$  and  $i_2 i_2$  illustrate each of these two cases.

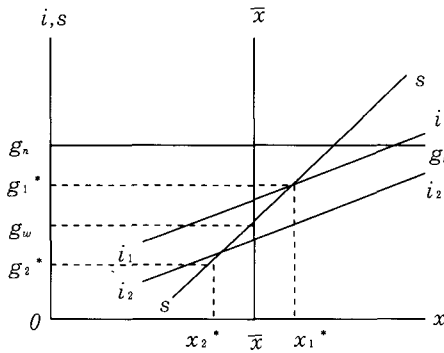


Fig.6(a) ( $g_w < g_n$  and  $g^* < g_n$ )

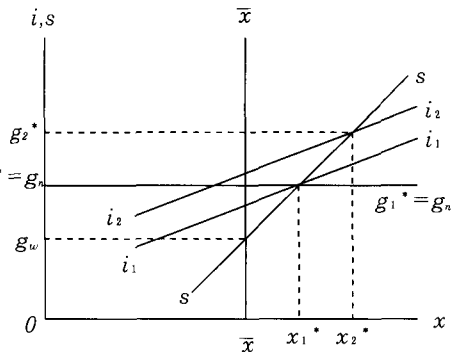


Fig.6(b) ( $g^* \geq g_n > g_w$ )

Fig.6 The determination of long-run growth and employment: Case  $g_w < g_n$ .

In the case where the investment function is located at  $i_1 i_1$ , the corresponding secular growth rate,  $g_1^*$ , is higher than  $g_w$  but lower than  $g_n$ , and employment-capital ratio,  $x_1^*$ , is above its normal level,  $\bar{x}$ . Therefore, the rate of unemployment is increasing, though productive capacity is over-utilized. Thus, the system falls into a situation in which unemployment and capital shortage coexist. The stock of capital in existence in such a situation is less than sufficient to employ the whole labor force. This type of unemployment is commonly called *technological unemployment*. It is caused by a failure of accumulation to keep pace with the growth of population and technological knowledge. The rate of accumulation itself is limited by too low saving propensity.

It is to be noted that the secular growth rate,  $g_1^*$ , exceeds the normal expected rate,  $\bar{g}_e$ , in the present case. In such a situation  $\bar{g}_e$  may gradually be revised upwards, as we have discussed before. Investment schedule  $i_1i_1$  will then shift upwards, so that  $g_1^*$  will rise towards  $g_n$  or even above  $g_n$ . What happens when the secular growth rate tends to equal or exceed the natural rate will be discussed later.

If 'animal spirits' of the firms are so low that the investment function is located at  $i_2i_2$ , the corresponding secular growth rate,  $g_2^*$ , is lower than both  $g_n$  and  $g_w$ . Thus, the rate of unemployment is increasing, and at the same time productive capacity is under-utilized. The rate of accumulation is limited to such a low level, because of the thriftiness of the economy as a whole as well as the desire of the firms for investment is too low. Unemployment existing in such a situation is attributed both to a shortage of capital (which causes *technological unemployment*) and to lack of demand (which causes *Keynesian unemployment*). Moreover, since the secular growth rate,  $g_2^*$ , is below the long-term expected growth rate,  $\bar{g}_e$ , the firms may gradually revise  $\bar{g}_e$  downwards. As a result, there may be a tendency for the system to drift into a more serious state of stagnation.

Demand management policies to cope with this situation are required to stimulate investment on the one hand and to raise the propensity to save on the other. Such policies, however, may involve difficulties, because raising the propensity to save will exert an unfavorable demand effect on investment. It is really a difficult situation to carry out appropriate policies.

(iii. b) *Case:  $g_w < g_n \leq g^*$ .* This is the case where there is long-term undersaving, but 'animal spirits' of the firms are so high that the secular growth rate tends to exceed the natural rate. Fig.6(b) depicts such a situation. Saving schedule  $ss$  cuts the normal-capacity working axis  $\bar{x}\bar{x}$  below the natural growth rate line  $g_n g_n$ . The investment function is located at  $i_1i_1$  or  $i_2i_2$ , intersecting  $ss$  at or above  $g_n g_n$ . The secular growth rate is equal to or higher than the natural rate, and the corresponding employment-capital ratio exceeds its normal level,  $\bar{x}$ .

Suppose that the investment function is located at  $i_1i_1$  initially, the corresponding secular growth rate,  $g_1^*$ , being equal to the natural rate,  $g_n$ . Employment offered by the growing stock of capital is increasing at the same rate as the labor force, so that the rate of

unemployment at the start will be kept constant. If full employment happens to be attained initially, it will be maintained. In this case, equilibrium may be said to prevail in the labor market. However, employment-capital ratio,  $x_1^*$ , exceeds its normal level,  $\bar{x}$ , so that productive capacity is over-utilized. The secular growth rate,  $g_1^*$ , exceeds the long-term expected rate,  $\bar{g}_e$ . The firms will then revise  $\bar{g}_e$  upwards, which causes the investment function to rise gradually towards  $i_2 i_2$ . As a result, the secular growth rate tends to  $g_2^*$ , exceeding  $g_n$ .

This process, however, works only in so far as there exists a reserve of non-employed labor. Once full employment is attained, the secular growth rate is prevented from exceeding the natural rate because of the scarcity of labor. This situation is similar to *case (i.c)*, but in the present case there is a shortage of capital in addition to the scarcity of labor. In such a situation, inflationary pressure will arise to push up the rate of interest to the point at which the actual rate of accumulation is checked to fit the natural rate. Thus, investment schedule  $i_2 i_2$  will shift back to  $i_1 i_1$ , and the demand for labor is held down to the level which leaves sufficient margin of unemployment to prevent wages from rising. However, since productive capacity is over-utilized and 'animal spirits' of the firms are high, the firms are always straining to do more investment than they can. Any relaxation of financial control would induce the firms to increase the rate of accumulation, and thus start inflation. To solve this long-term problem, the authorities have to take some measure to increase the private saving propensity, or supplement the supply of private saving by doing saving themselves.<sup>19)</sup>

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19) Throughout the present paper, we have assumed that both  $g_w$  and  $g_n$  are fixed. In reality they may change more or less flexibly in the process of growth. The warranted rate of growth,  $g_w$ , becomes flexible, if autonomous growth of consumption due to population growth of technological progress is taken into account. In this case, we may write the saving function as  $S/K=s(x,v)$ , and the warranted rate of growth as  $g_w=s(\bar{x},v)$ . Then, it is obvious that  $g_w$  changes with  $v$ . Similarly, the natural rate of growth,  $g_n$ , changes flexibly towards the secular growth rate,  $g^*$ , if, as Joan Robinson (1962, pp.51-52) pointed out, technical progress tends to be speeded up or slowed down depending on whether there is a labor shortage or a labor surplus. The flexibilities in  $g_w$  and  $g_n$  may act as equilibrating factors on long-term growth. But it goes too far to assume that they offset disequilibrium tendencies completely. The simplifying assumption of the fixities of  $g_w$  and  $g_n$  serves to clarify the disequilibrium aspect of long-term growth.

## VII. Summary and Conclusions

I have presented here a long-term growth model which can analyze the possible disequilibria in the growth process. The special feature of the model lies in that it explicitly takes into account the expected rate of growth in the corporate investment behavior. The concept of the expected rate of growth which reflects entrepreneurs, 'animal spirits', together with the Harrod's concepts of the warranted rate of growth and the natural rate of growth, plays an important role in determining the long-term tendency of growth. We have assumed that the expected rate of growth at each moment of time depends on the actual rate of growth in the recent past and the long-term expected rate of growth, the latter being the secular trend of growth which is expected to predominate over short-run cyclical fluctuation. The main conclusions from our analysis are the following:

(1) The rate of capacity utilization is above its normal level and the actual rate of growth is above the warranted rate of growth, if the expected rate of growth exceeds the warranted rate of growth; and *vice versa*.

(2) The steady growth in our model is stable, if entrepreneurs, long-term expectations dominate their short-term experience in investment decisions; more precisely, if entrepreneurial investment is more sensitive to the long-term growth expectation than to the short-term factors, such as the degree of capacity utilization or the actual rate of growth.

(3) This steady growth, which we call "secular growth", is equilibrium growth only if the long-term expected rate of growth,  $\bar{g}_e$ , agree with both the warranted rate of growth,  $g_w$ , and the natural rate of growth,  $g_n$ . Inconsistencies between these growth rates give rise to some sort of disequilibrium, such as excess capacity, unemployment or inflation, in the growth process.

(4) Below the full-employment ceiling, the secular growth rate,  $g^*$ , is above or below  $g_w$ , and the long-term average utilization of capacity,  $x^*$ , is above or below its normal rate,  $x$ , depending on whether  $\bar{g}_e$  is higher or lower than  $g_w$ .

(5) Once the full-employment ceiling is reached, the secular growth rate is restrained by  $g_n$ . Therefore, if  $g_w$  exceeds  $g_n$ , the economy has a tendency to drift into a state of stagnation in which

unemployment and excess capacity coexist. The result follows however high  $\bar{g}_e$  initially is.

(6) If  $g_n$  exceeds  $g_w$ , an upward tendency of  $\bar{g}_e$  at the full-employment ceiling causes an inflationary bias. In addition, insufficiency of saving may cause technological unemployment. If  $\bar{g}_e$  is lower than  $g_w$ , technological unemployment and Keynesian unemployment will coexist.

It is the popular practice in economic theory to regard the long-term as synonymous with an equilibrium state. In this paper we have developed a long-term growth model *a la* Harrod in which the long-term growth is compatible with disequilibrium. I believe that the disequilibrium approach to long-term growth theory will give a helpful framework to consider macroeconomic policy from a long-term view point. The paper is, nontheless, only a fragment of a more complete model. Especially, it is important to introduce government activities and monetary aspects explicitly into our model.

## APPENDIX

### I. Proof of Proposition 2.

Substituting  $g=s(x)$  of (28.a) into (28.b), we get

$$\dot{g}_e = H(s(x) - g_e, \bar{g}_e - g_e) \tag{A.1}$$

The differentiation of this equation with respect to  $g_e$  gives

$$\frac{d\dot{g}_e}{dg_e} = H_1 s' \frac{dx}{dg_e} - (H_1 + H_2) \tag{A.2}$$

where

$$\frac{dx}{dg_e} = \frac{1}{s' - i_x} \tag{A.3}$$

in view of (28.a) and (13). Substituting (A.3) into (A.2), we have

$$\frac{d\dot{g}_e}{dg_e} = \frac{(H_1 + H_2)i_x - H_2 s'}{s' - i_x} \tag{A.4}$$

Equilibrium point,  $(x^*, g^*, g_e^*)$ , of the system (28.a) and (28.b) is

locally stable, if (A.4) is negative at  $(x^*, g^*, g_e^*)$ . This condition together with (25) reduces to (30).

## II. Proof of Proposition 3.

Linearizing the investment function  $g^* = i(x^*, g_e^*)$  and the saving function  $g^* = s(x^*)$  in (29.a) at the equilibrium point where  $g^* = g_e^* = \bar{g}_e = g_w$  and  $g^* = \bar{x}$ , and taking notice of (13), we have

$$g^* - \bar{g}_e = i_x(x^* - \bar{x}) + g_e^* - \bar{g}_e \quad (\text{A.5})$$

and

$$g^* - g_w = s'(x^* - \bar{x}) \quad (\text{A.6})$$

Similarly, the linearization of the function  $H$  in (29.b) gives

$$H_1(g^* - g_e^*) + H_2(\bar{g}_e - g_e^*) = 0. \quad (\text{A.7})$$

From (A.5) and (A.6), we have

$$\frac{i_x}{s'}(g^* - g_w) = g^* - g_e^*, \quad (\text{A.8})$$

and from (A.7) and (A.8), we have

$$\frac{i_x}{s'}(g^* - g_w) = \frac{H_1}{H_1 + H_2}(g^* - \bar{g}_e) \quad (\text{A.9})$$

But, in view of the stability condition (30) and the positivity of  $i_x$ ,  $s'$ ,  $H_1$  and  $H_2$ , we must have

$$\frac{H_2}{H_1 + H_2} > \frac{i_x}{s'} > 0. \quad (\text{A.10})$$

It follows from (A.9) and (A.10) that

$$g^* > \bar{g}_e \text{ according as } \bar{g}_e > g_w, \quad (\text{A.11})$$

and from (A.7) that

$$g^* > g_e^* \text{ according as } g_e^* > \bar{g}_e. \quad (\text{A.12})$$

This proves Proposition 3.



### III. Proof of Proposition 4

In equation (32.c)  $\dot{\bar{g}}_e = 0$  implies that  $g^* = \bar{g}_e$ . In this case, equation (32.b) holds if and only if  $g^* = g_e^* = \bar{g}_e$ . Then, in view of the assumptions (12) and (13) on the investment function and the definition of  $g_w$  in equation (22), equation (32.a) implies that  $g^* = g_e^* = \bar{g}_e = g_w$  and  $x^* = \bar{x}$ . This proves that the steady state solution of the system (32) satisfies the conditions of equilibrium growth.

Next, we prove the instability of the steady state. Differentiating (32.c) with respect to  $\bar{g}_e$ , we have

$$\frac{d\dot{\bar{g}}_e}{d\bar{g}_e} = G' \left( \frac{dg^*}{d\bar{g}_e} - 1 \right). \quad (A.13)$$

But, from (32.a) and (32.b) together with the condition (13), we have

$$\frac{dg^*}{d\bar{g}_e} = \frac{H_2 s'}{H_2 s' - (H_1 + H_2) i_x}. \quad (A.14)$$

Substituting (A.14) into (A.13), we have

$$\frac{d\dot{\bar{g}}_e}{d\bar{g}_e} = G' \frac{(H_1 + H_2) i_x}{H_2 s' - (H_1 + H_2) i_x} \quad (A.15)$$

The sign of this expression is positive, if the stability condition (30) is satisfied. This proves the instability of the equilibrium growth of the system (32).

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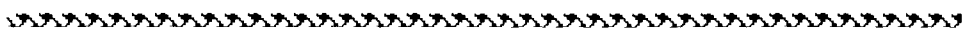


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HISTORICAL SKETCH

In 1919, a research organization named the Institute for Commerce was founded in Kobe Higher Commercial School, one of the chief predecessors of Kobe University, with a gift made by F. Kanematsu & Company, a leading mercantile firm in Kobe. The organization was designed to carry on and facilitate integrated research on business and commerce and to formulate and publish the results of these studies and investigations in such form as to make them available to the business community.

With the founding of Kobe University of Commerce, successor of Kobe Higher Commercial School, in 1929, the Institute extended its research activities by adding several divisions. One was the famous Latin-American Library, which soon became the center of research in this field in Japan. A room for statistics equipped with various computing machines was established and began publication of *Jūyo Keizai Tōkei* and *Sekai Bōeki Tōkei* annually. A filing room was prepared to deposit press clipping files systematically arranged by topics and dates. Another room was designed to become the center of all possible original records and data having to do with the beginning and progress of Japanese business.

On the campus of Kobe University of Commerce, another organization named the Institute for Business Mechanization was founded in 1941 utilizing business machines donated by the IBM Corporation and others. With Professor Yasutaro Hirai as its head a broad and forward-looking plan for business mechanization in Japan was developed.

In 1944, Kobe University of Commerce changed its name to Kobe University of Economics. After the War, however, the University was consolidated with three other colleges in Hyogo Prefecture to become Kobe University. With this development, the two Institutes were also amalgamated into the Research Institute for Economics and Business Administration, Kobe University. At present, the Institute, with its twenty-three full-time professional staff members, carries on studies and investigations in international economics, international environment, international comparative economics, international business, management information systems and international cooperation.

## ORGANIZATION

The Institute consists of six sections. Each section and its research subjects are as follows:

**1. International Economic Studies**

International Economics, International Monetary Economics, Maritime Economics, International Labor Relations

**2. International Environmental Studies**

Resource Development, International Organizations, International Industrial Adjustment

**3. International Comparative Economic Studies**

Pacific Basin I (Oceanian Economy),  
Pacific Basin II (Latin American Economy),  
Pacific Basin III (North American Economy)

**4. International Business Studies**

Comparative Business, Multinational Enterprise,  
International Business Finance

**5. Management Information Systems**

Business and Accounting Information, Information Processing System, International Comparative Statistics

## **6. International Cooperation**

In addition to the ordinary work of each section, several research committees, whose members are not limited to the Institute staffs, are regularly held to carry on joint studies. At present, there are ten standing research committees, as follows: Committee of International Economics, Committee of Maritime Economics, Committee of Labor Market, Committee of International Studies on Economic and Industrial Structure, Committee of World Link Model, Committee of International Comparative Economics, Committee of International Comparative Monetary Systems, Committee of International Business Finance, Committee of Management and Accounting Information Systems, and Committee of International Comparative Statistics.

For convenience and greater efficiency in carrying out its research activities, the Institute has a general office which is responsible for 1) the collection and preservation of a comprehensive collection of books, periodicals, pamphlets, and original records and data of finance, trade, commerce, industry and business generally; 2) the classification, cataloguing, indexing, arranging, annotation and compilation of these research materials; and 3) the formulation and publication of the results of the investigations and studies accomplished by the professional staff members of the Institute.

As an affiliated institute, the Documentation Center for Business Analysis has been established in 1964. It is the first systematic information facilities in the field of business administration in Japan that has been recognized and authorized by the Ministry of Education. The purpose is to collect and to make intensive control of all kinds of materials on business administration and to make them available to scholars, universities, governments, and business world with the aid of modern documentation techniques.



**RESEARCH INSTITUTE FOR  
ECONOMICS & BUSINESS ADMINISTRATION  
KOBE UNIVERSITY**

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Secretary: Syozo SAITO

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International Monetary Economics	Prof. Kazuhiro IGAWA
	Assoc. Prof. Hideki IZAWA
Maritime Economics	Prof. Hiromasa YAMAMOTO
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