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Foreign Exchange Allocation and Productivity Growth in Postwar Japan: A Case of the Wool Industry

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by

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Abstract

Until early 1960's, the Japanese government controlled import by means of foreign exchange allocation system. Rents generated and allocated by the foreign exchange allocation system provided the government with a powerful tool for industrial policy, although there also existed a possibility that this system brought about unproductive rent-seeking.

In this paper, we examined the functions of the foreign exchange allocation system, focusing on the case of the wool industry. Through analysis of historical documents, we made clear that MITI utilized the foreign exchange allocation system for such policy goals as export promotion, management of investment and production capacity etc.. Also, using panel data analysis, we could reconfirm and improve the results of Okazaki and Korenaga[1997] that the foreign exchange allocation system actually promoted export and investment. This is because through the foreign exchange allocation system rents were distributed to each firm in an objective performance-based manner.

Also, the export-link system had an implication to stimulate efficient use of foreign currency. By regressing foreign exchange allocation to the foreign exchange acquisition rate (FEAR) in the previous term, we found that export-link allocation correlated positively with FEAR. This result implies that the export-link system promoted those firms which used foreign exchange efficiently, through intensively distributing rent to them. On the other hand, the export-link system brought about large difference of capacity utilization rates across the wool firms, especially between large firms with great international competitiveness and small and medium-sized firms which was domestic market-oriented. The production capacity-link system played a role to mitigate that difference of capacity utilization rates, which was complementary to the role of export-link system.

1. Introduction

From 1949 to early 1960's, the Japanese government controlled import by means of foreign exchange allocation system. In accordance with the Foreign Exchange and Foreign Trade Administration Law (*Gaikoku Kawase oyobi Gaikoku Boeki Kanri Ho*), all of the foreign exchange was concentrated to the government, and then was allocated to private sector according to the foreign exchange budget, which was drawn up quarterly or every half year by the government. Import goods were classified into the foreign exchange allocation system goods (FA goods) and the automatic approval system goods (AA goods). For the former, the foreign exchange budget was crucial, because budget allocation to each FA goods *de facto* determined limit of its import amount. Therefore, the government could protect a certain industry from international competition through restricting foreign exchange budget for its products.

Furthermore, the budget for each FA goods was allocated to each firm, which imported or used it, by the government. Because *de facto* import quota by the foreign exchange budget generated certain amount of rent, foreign exchange allocation to individual companies implied allocation of rent. This creation and allocation of rent provided the government with a powerful tool for industrial policy. On the other hand, it was possible that unproductive rent seeking activities occurred in order to acquire foreign exchange allocation. The official history of the Ministry of International Trade and Industry (MITI) states as follows.

> Acquiring the right to import those raw materials almost all of whose supply depended upon foreign countries or the goods whose domestic prices were higher than those in foreign countries, directly influenced on market shares or profitability of individual firms. Therefore, it is natural that firms frequently made approach to MITI's sections in charge to acquire foreign exchange allocation for some reasons (MITI[1994], pp.154-156).

Okazaki and Korenaga [1997] examined the schemes to allocate foreign exchange to each firm, and found that, in general, foreign exchange allocation to individual companies was based on objective criteria such as production, production capacity, export etc., and that these schemes were intentionally designed by MITI to avoid unproductive rent seeking activities. This can be considered as a typical case of "contest-based" policies (World Bank[1993]) and "contingent rents" (Aoki, Murdock and Okuno-Fujiwara[1996]). Okazaki and Korenaga [1997] also analyzed the data of the wool industry to find that the scheme which linked foreign exchange allocation with

export and production capacity stimulated export and investment.

In this paper we will extend our previous paper in the following three directions. First, we describe institutional and quantitative changes of foreign exchange allocation to the wool industry more in detail against a background of its historical development. Second, we re-examine effects of foreign exchange allocation on export and investment of the wool industry. In stead of time series analyses in our previous paper, panel data analyses will be executed. Third, we will examine efficiency implication of the foreign exchange allocation policy, focusing on whether the allocation scheme was designed to enhance efficiency or not.

2. History of Foreign Exchange Allocation to the Wool Industry

Although Japan lacked sheep farming, wool spinning and wool weaving industries developed by imported raw wool since prewar period. In 1934-1936, the wool industry occupied 5.5 % of manufacturing production and 2.0 % of total export of Japan (Ito[1957], p.213). However, the Second World War gave a serious damage to the Japanese wool industry. Because it was basically a civilian industry and also depended heavily on import of raw materials, the wartime Japanese government took the policy to cut its production capacity as well as production. Furthermore, just after the war, the occupation authority (the General Head Quarter, GHQ) rigidly restricted Japanese import including raw wool. In 1946 import of raw wool came to be almost zero, and wool yarn production fell to only 3.2% of the prewar level (Table 1, 2).

In January 1946 the Japanese government drew up the "Three Years Plan to Reconstruct Textile Industry." Based on this, GHQ allowed the Japanese government to reconstruct production capacity of wool spinning to almost the same level as the prewar period. GHQ intended to make the Japanese wool industry meet domestic demand of 1930-34 level as well as earn foreign currency enough to pay raw wool import. Raw wool import restarted in 1947 and increased rapidly (Table 3). In this period import of wool was carried out by the Agency of International Trade (*Boeki-cho*) and GHQ.

In January 1950, import of wool was privatized, as a part of general transition to private trade from state-controlled trade. Afterwards, import of wool, which was classified as FA goods, was managed by the above mentioned foreign exchange allocation system[1]. The scheme to allocate foreign exchange to individual firms from July 1950 to

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[1] As to more detailed explanation of the foreign exchange allocation system, see Okazaki and Korenaga[1997].

June 1951 was as follows (Wool Spinning Society of Japan[1987b], pp.26-27; Wool Spinning Society of Japan[1987a], p.96). Those companies which exported wool products, were allocated foreign exchange proportionally to its export amount. The proportions depended upon kinds of products, such as 100% for wool yarn, 100% for worsted weavings, 90% for woolen weavings etc.. This method was called as an export-link system, which was also applied to import of raw cotton, for instance.

Foreign exchange allocated through the export-link system was subtracted from the budget for raw wool import in advance, and the rest came to be the foreign exchange for raw wool import to make domestic products. This foreign exchange budget for domestic products was divided into some parts according to uses, namely combing, carding, felt making etc. For example, from January 1951 to June 1951, combing and carding occupied about 64% and 27% of the domestic budget respectively, which, in turn, was allocated to each firm according to its production capacity and production. In June 1951, the basis for allocating domestic budget was altered to production capacity only, and since then those two indices, namely export and production capacity, continued to be the bases for foreign exchange allocation for raw wool, until the end of the foreign exchange allocation system in the wool industry.

In 1953 the allocation scheme was revised in two major points. First, incentives for export were increased by revision of the export-link system. According to the new system, wool firms handed export plans to MITI in advance, and acquired "*ex ante* allocation" of foreign exchange in proportion to the planned export amount. The upper limit of each firm's planned export amount was two times of its actual export in previous term. After the plan was executed, the wool firms acquired "*ex post* allocation." "*Ex post* allocation" composed of the following four parts. (a) Difference between the plan and the actual export was adjusted. (b) Foreign exchange equal to a certain proportion of each firm's actual export was allocated to it as "rewards for export." (c) Foreign exchange equal to a certain proportion of each firm's actual export was allocated to the trading company which mediated the export also as "rewards for export." (d) Foreign exchange equal to a certain proportion of each firm's actual export was allocated to it as "rewards for achievement" according to each firm's rate of achieving its export plan. For example, a firm which achieved 100% of its export plan of wool yarn, would get foreign exchange allocation 155% of its export amount and the trading company which mediated the export trade would get 30% of it.

This revision was intended as a measure for export promotion. Since international trade was privatized in 1950, export performance of the wool industry was quite poor (Table 3). In spite of above mentioned GHQ's plan to cover import of raw wool with

export of wool products in 1946, in actuality, export of wool products was only 14% of import of raw in 1950-1952. Under the foreign currency crisis in 1953, MITI decided to revise the export-link system in order to stimulate export of wool products[2]. Because there was substantial difference between domestic and international prices of raw wool (Figure 1), the revision raised rent acquired by wool companies and trading companies substantially to enhance export incentive. The effect of this revision soon reflected in export records. In 1953 export of wool products began to increase, and in 1954 ratio of export to production came close to the prewar level (Table 3). The president of the Wool and Hemp Products Export Association of Japan wrote that "Increase and decrease of wool products export entirely depends upon the export-link system"(Oki[1954], p.5). For the matter of fact, even if export prices undercut the production costs, the wool firms could make profits by selling their products manufactured with the wool acquired through the export-link system in the domestic market[3].

The second revision of the allocation scheme in 1953 was a close of confirming production capacity as a basis for foreign exchange allocation. Foreign exchange allocation according to each firm's production capacity added incentive for investment through the same mechanism as export promotion. MITI's *Annual Report* of 1953 fiscal year stated that "The aim of production capacity expansion (in the wool industry) since the beginning of this year was acquiring foreign exchange allocation" (p.135). Consequently, production capacity of the wool industry proceeded rapidly (Table 1), and as soon as 1953 excess capacity emerged (*Annual Report of MITI*, 1953, p.135).

As a countermeasure, in July 1953, MITI decided that the production capacity which was counted as a basis for foreign exchange allocation was that within 110% of the capacity confirmed on April 15, 1953 or that would be confirmed by the end of November, 1953. MITI intended to cancel the investment incentive generated by foreign exchange allocation linked to the production capacity. However, in 1953 announcement of this policy itself extremely stimulated investment, because companies rushed to construct equipment so as to be in time for the deadline of November 30. Those equipment which was constructed from July 1953 to November 1953, was called "rush in equipment" (Wool Spinning Society of Japan[1987a], pp.103-104).

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[2] As a reason for the revision of the export-link system, MITI wrote that "It is not desirable that export of the wool industry, whose raw materials are mainly imported, is small. It should make more efforts to promote export" (*White Paper of International Trade*, 1953, pp.270-271).

[3] *Yomo* (*The Wool*), September 1953, p.1.

As mentioned above, rapid export expansion caused criticism from foreign countries(Wool Spinning Society of Japan[1987a], p.106). Moreover, the export-link system squeezed foreign exchange allocation according to production capacity, which gave damage to the small and medium-sized firms which did not have enough ability to export[4]. To cope with it, MITI gradually reduced the rate at which foreign exchange allocation was linked to each firm's export amount (export-link rate) since early 1954. In March 1954 the export-link system was revised in the following three points. (a) The upper limit of the each firm's export plan was reduced from 2 times of its previous actual export to 1.2 times of it. (b) The rate of "rewards for export" was reduced by 10%. (c) Those companies which could not achieve its export plan had to pay some penalty through decreasing foreign exchange allocation (*ibid*, p.106). For example, a wool firm which achieved 100% of its export plan of wool yarn and its trading counterpart came to get foreign exchange allocation 148% and 27% of the company's actual export respectively.

After the export-link rate was reduced in May 1954, the scheme itself was revised in December 1954. "Rewards for achievement" was abolished, and wool firms came to get "*ex ante* allocation" and "*ex post* allocation." "*Ex ante* allocation" was similar to allocation according to export plans, and it was adjusted after the actual export amount was revealed. "*Ex post* allocation" was almost the same as "rewards for export." Under the new scheme, a wool firm which exported certain amount of wool yarn and its trading counterpart would get 117% and 12% of the firm's export amount respectively (*ibid*, p.114; Wool Spinning Society of Japan[1987b], pp.87-89). After that, the export-link rate was reduced several times, which is shown in the average link rates for wool products calculated by the Bank of Japan[5] (Table 4).

In 1955, MITI set up the Council for General Countermeasures of Textile (*Sen'i Sogo Taisaku Shingikai*) started to examine the future vision of the textile industry as a whole, against the background that the synthetic fiber industry was rapidly developing substituting for natural fiber including wool. The Council estimated demand and supply of each fiber in 1960 to find that the equipment for natural fiber had already been in

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[4] *Ibid*, March 1954, p.28. Even concerning the foreign exchange budget of the latter half of 1954 fiscal year, the Wool and Hemp Section of MITI wrote that "Allocation to the companies whose export is so small that they will not be able to operate profitably" (Wool and Hemp Section of MITI[1955], p.26).

[5] This rate including foreign exchange allocation for both of the wool company and trading company.

excess. Based on this conclusion, the Temporary Law for Equipment of the Textile Industry (*Sen'i Kogyo Setsubi Rinji Sochi Ho*) was legislated in June 1956. In accordance with this law, those firms which intended to expand equipment should have approval of the government (Inoue[1956]; MITI[1990], pp.655-666). Like the case in 1953, the textile firms including those in the wool industry rush investment until the law was enforced in October 1956. Production capacity of worsted wool in October 1956 came to be 128% as much as that at the end of 1955 (Hanaki[1957], p.43).

On the other hand, at the middle of 1957, a foreign currency crisis occurred again, and foreign exchange budget including the part for the wool industry was cut, which decreased the operation rate of the wool industry's equipment. Especially those small and medium sized firms whose export amount was relatively small and had much "rush in equipment" ran into difficulty because of raw wool shortage and low operation rate of equipment (Bank of Japan[1957], pp.110-111). These firms repeatedly claimed to the government that the equipment confirmed according to the Temporary Law for Equipment of the Textile Industry, should be counted as a basis for foreign exchange allocation, in spite of the rule since 1953. On the other hand, those firms which refrained from rushing investment, opposed to such deviation from the existing rule.

To mediate this conflict, in 1956, MITI decided to allocate 2.5 million dollars in proportion to each firm's production capacity less than 6000 spindles confirmed by the Temporary Law for Equipment of the Textile Industry. This measure was temporary, but in 1958 the rule of 1953 was formally modified. Based on examination and discussion in the Wool Spinning Society of Japan, MITI determined to allocate foreign exchange also to the equipment constructed after November 1953 at the rate almost half of that for the previous equipment (Wool Spinning Society of Japan[1987a], pp.134-135).

Meanwhile, liberalization of wool import was discussed in MITI and the wool industry since early 1956. Because the foreign exchange allocation system played such a substantial role for the wool industry as explained above, liberalization was not an easy task (Shirai[1956], p.12)[6]. However, the situation changed, when major countries in

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[6] In August 1956, President of The Wool Spinning Association of Japan pubished an article in its journal on the liberalization of raw wool import. While he pointed out that liberalization had several merits, at the same time he stressed worry about excess production and decline of export, which the foreign exchange allocation system had prevented (Yoshida[1956], pp.2-3).

Western Europe recovered currency convertibility in late 1950's, which magnified pressure for trade liberalization to Japan. In June 1960, the Japanese government announced "The Liberalization Plan for Trade and Foreign Exchange" (*Boeki Kawase Jiyuka Keikaku Taiko*) to commit that the liberalization ratio would be raised to 80% in three years(MITI[1993], pp.409-411; MITI[1990], pp.206-211). As a part of the general liberalization plan of international trade, classification of raw wool was altered from FA to AA in April 1961, which implied an end of the history of foreign exchange allocation in the wool industry.

3. The Allocation Scheme and Generation of Rent

As mentioned above, foreign exchange allocation to each wool firm was basically according to its export performance and production capacity. This allocation scheme had some important implications. In Okazaki and Korenaga [1997], we have already confirmed objectivity and clearness of firm-level foreign exchange allocation rule and its effects on export and investment by a bit simple quantitative analysis. Hereafter, we re-examine the latter result, namely, the effects of foreign exchange allocation on export and investment using more sophisticated methods and panel data.

Before proceeding, we reproduce here the estimation results of allocation function and of marginal rents. We regressed the amount of foreign exchange (in yen) allocated to each firm against the amount of each firm's actual export (in yen) in the previous term and production capacity (in physical unit) using cross section data, in order to examine how foreign exchange allocation was linked to these variables (Table 6). The sample firms are those the data of which concerning foreign exchange allocation, export and production capacity are available. The data originated from Hemp and Wool Section of the Bureau of Textile (*Mamo-ka*), MITI.

The coefficients of export (α) and of production capacity (β) show how much foreign exchange was additionally allocated in accordance with the increase of export and production capacity, respectively. As indicated in extremely high R^2, the foreign exchange allocation to each firm is explained fully by the two variables, namely its export performance and production capacity. This implies that the rule of foreign exchange allocation to each firm was clear and objective. Furthermore, it is remarkable that the time series of the coefficient α reflects the above-mentioned revision of the allocation scheme, that is, the rise of α from the latter half of 1953 to the first half of 1955 roughly corresponded to the distribution method introduced in August, 1953 (Table 6).

Besides the coefficients α and β, difference between domestic and foreign prices of wool also affected the size of the incentives for export and investment by the foreign exchange allotment system. The incentives added by the foreign exchange allocation system can be represented by marginal rent with respect to export and investment. We quote domestic price of wool (P_d^w) from the wholesale price statistics by the Bank of Japan, and its import price (P_i^w) from the customs clearance statistics by the Ministry of Finance. The difference between them is illustrated in Figure 1, and this price difference ($P_d^w - P_i^w$) denotes the size of rent per pound of wool import. The rent was at least about 17% of the import price of wool. When we assume the export price of wool products to be P_e^y, the marginal rent per pound of wool yarn export then becomes $\alpha \cdot P_e^y \cdot (P_d^w - P_i^w)/P_i^w$ ($=R_1$). Similarly, the marginal rent per unit of spinning equipment becomes $\beta \cdot (P_d^w - P_i^w)/P_i^w$ ($=R_2$) with the physical unit adjusted.

4. The Effects of Foreign Exchange Allocation I : Promotion of Export and Investment

Using R_1 and R_2, we will re-examine the results about the effects of foreign exchange allocation on export and investment in Okazaki and Korenaga [1997] more rigorously. To test the effect on export, export supply function of wool yarn is estimated. In addition to R_1, other factors affecting the export, namely, price and income, must be taken into account. Here we use two methods, the ordinary least square (OLS) and the instrumental variable (IV) method in order to remove simultaneous-equation bias. The price variable, which are usually incorporated in export supply function, is the ratio of export price to domestic one. We take Japan's and foreign country's income as instrumental variables and assume the United States' market to be foreign market. This is because the U.S. had the largest share in Japan's export of wool yarn in most of those periods. We also use the import price of wool yarn of the United States as the third instrumental variable, which affects demands of foreign country.

Eventually, the dependent variable is the export volume of wool yarn, and the independent variables are R_1, the relative export price of wool yarn (P_e^y/P_d^y). The instrumental variables are the real GDP of Japan, that of the United States and the import price of wool yarn in the United States. All the variables but R_1 are transformed to the growth rate to the same periods in the previous year. The export price are available from customs clearance statistics by MOF and the domestic price of wool yarn is taken from the whole sale price statistics by Bank of Japan. Real GDP of the United States is quoted from *The National Income and Product Accounts of the United States, 1929-82*

by U.S Department of Commerce and converted to yen unit by the official exchange rate (1$=¥360). Real GDP of Japan is quoted from *White Paper on National Income* (*Kokumin Shotoku Hakusho*) by the Economic Planning Agency. Finally, the import price of wool yarn in the United States are available in *Quarterly Summary of Foreign Commerce of the United States* by U.S Department of Commerce.

The result is displayed in Table 7. In OLS results, the coefficient of R_1 is positive and statistically significant as expected, but that of the relative price are not significant. This result, however, changes when we adopt IV method. While R_1 is still positive and statistically significant, the relative price becomes positive significantly. This result implies that the movement of the wool yarn export was affected to some extent by the fundamental variable but largely determined by the size of allotted rent.

Next, we will identify the effect on investment, which has already been confirm by using more aggregated time series data in Okazaki and Korenaga [1997], by using more micro-level, firm panel data on wool spinning firms. It is remarkable that this hypothesis cannot be tested simply by adding R_2 to usual independent variables of the investment function, the profit rate and the user cost of capital, since the size of rent affected the profit rate itself. Therefore, we first adjust profit rate by extracting total values of rent due to R_2 from each firm's profit itself, and then regress the investment ratio to the adjusted profit rates, user cost and R_2. In addition to these variable, we incorporate the growth rate of real GDP as a macro-economic variable in regression. This is because the simultaneous increase of investment may occur, when the overall economic environment surrounding this industry changes.

The sufficient data of the income account and the balance sheet are available on only five major firms in this industry, namely, Daido Keori, Daito Boshoku, Nankai Keito Boseki, Nihon Keori and Toa Boshoku. We use the data of each firm's business profit and the total. When we assume K^y to be the production capacity of each firm, the amount of rent attributed to R_2 which the firm acquired, comes to be $R_2 \cdot K^y$. The adjusted profit rate is obtained by extracting $R_2 \cdot K^y$ from the profit and dividing it by the total asset. The user cost of capital of each firm is calculated by dividing the financial costs over the total liability with interests of each firm, which we denote i, and multiplying it by the wholesale price of spinning machine, which is obtained from the wholesale price statistics by BOJ. π and uc denotes the adjusted profit rate and the user cost of capital respectively. We also try to use the financial interest rate, i, as cost variable. The above all variables are deflated by GDP deflator. Finally, the dependent variable is the ratio of the increase of the wool spinning equipment to equipment itself, which is also available in the balance sheet. Also, firm dummies are incorporated in the

regression.

The results are shown in Table 7. The coefficients of π and R_2 are positive and statistically significant at 1 % significance level, while that of other variables are less significant statistically. As for cost variable, i is more statistically significant than uc. It is notable that the significance of R_2 is greater than that of π in the decision in investment in statistical sense. Furthermore, this results is robust, when some macro-economic environment change is considered. This suggests that the effect of the investment promotion became larger since the allotment of the rent was linked to the production capacity.

5. The Effects of Foreign Exchange Allocation II : Productivity Growth and Efficient Use of Foreign Currency

First we decompose total factor productivity (TFP) growth of the wool industry into several factors, including export and capacity utilization by estimating cost function using major five firms' panel data. This helps us to understand how important export and capacity utilization rate were as sources of the productivity change. Following basically the method suggested by Fuss and Waverman [1992], we estimate the translog-type cost function, which includes factor prices, capacity output variable, product mix (the share of wool yarn in total output), capacity utilization ratio and, just for our concern, export experience (the sum of export up to the previous period) as sources of productivity growth. We assume wage, user cost of capital and wool price as factor prices.

The data of cost structure, capacity output, composition of total output, number of employees, capacity utilization ratio and export sale are all available in the same sources of firm data used in the previous section. The wool price is domestic wholesale price quoted from the wholesale price statistics by BOJ. Wage is obtained by dividing labor cost by the number of employee. The user cost of capital is constructed in the same manner at the previous section. Total cost and price are deflated by GDP deflator. Output, capacity output and export sale are measured with each price in the benchmark year (1952). Sample periods is from the first half of 1951 to the latter half of 1960, that is, 20 periods. Finally, the estimation method adopted is Zellner estimation, that is, Seemingly Unrelated Regression with labor and capital cost share functions.

Figure 2 shows decomposition of the TFP growth. The growth rate is evaluated with the mean value of five firms and calculated to the same periods in the year before. TFP growth rate fluctuate wildly around 0 % level. This is partly due to the fact that we measure TFP growth in the short term, and partly due to the existence of quasi fixed input

of production. It is understandable that, in the short run, capacity utilization is most dominant factor of TFP growth. The sharp decrease of productivity due to the capacity utilization from the latter half of 1953 and the first half of 1954 roughly correspond to "rush in equipment," which enlarged excess capacity, and the productivity decrease due to this factor from the latter half of 1957 to the latter half of 1958 corresponds to the foreign currency crisis which resulted in the contraction of foreign exchange budget and low operation rate of equipment.

On the other hand, export experience played a relatively small role in productivity growth, though it has a positive effect especially in the former part of 1950's. This is partly because our measurement is based on short term data and cannot capture the long run effects like learning-by-doing effect. Also it is partly because wool spinning firms usually did not deal in export activity themselves. Therefore we can say that though export experience is one of the sources of productivity growth, export is more important as the determinant of the efficiency of use of foreign exchange at least in the short run.

As an index of efficiency of use of foreign exchange, we define the foreign exchange acquisition rate (FEAR) as each firm's export amount over foreign exchange allocated to it. In order to check whether foreign exchange allocation system functioned as an incentive to stimulate efficient use of foreign exchange, we regressed foreign exchange allocation according to export (Qx), that according to production capacity (Qc), and total foreign exchange allocation (Qt) respectively to FEAR in the previous term, using panel data from 1953 to 1960. Firm dummies are also incorporated in the regression.

As shown in Table 8, the coefficient of Qx was positive and statistically significant, while the coefficient of Qc was negative and statistically insignificant. And the coefficient of Qt was positive, although its statistical significance is low. These results suggest that export-link system intensively allotted rents to those firms which used foreign currency efficiently, stimulating efficient use of foreign exchange, and that owing to it the foreign exchange allocation system as a whole had the same function.

The above weak correlation between Q_c and FEAR is not surprising, because the primary purpose of foreign exchange allocation according to production capacity was leveling of the capacity utilization ratio across firms. We calculate each firm's capacity utilization ratio by dividing Q_x, Q_x and Q_t by production equipment (K) respectively. Figure 5 shows coefficient of variation (CV) of capacity utilization ratios. The CV of Q_t was stable at low level in the former part of 1950's, and after that increased gradually. The CV of Q_C, however, stayed at relatively lower level than that of Q_x in almost all periods and this eventually lowered CV of Q_t. This implies that the allocation according

to production capacity contributed to leveling the utilization rate of equipment, which in turn, contributed to leveling productivity of the wool firms.

Concluding Remarks

In the postwar recovery and growth of the Japanese wool industry, the foreign exchange allocation system played substantial roles. Through analysis of historical documents, we made clear that MITI utilized the foreign exchange allocation system for such policy goals as export promotion, management of investment and production capacity etc. The reason why the foreign exchange allocation system could be an effective policy tool was that by this system large amount of rent was generated and distributed to each firm in an objective performance-based manner. Using panel data analysis, we could reconfirm and improve the results of Okazaki and Korenaga[1997] that the foreign exchange allocation system actually stimulated export and investment of the wool industry.

Also, the export-link system had an implication to stimulate efficient use of foreign currency. By regressing foreign exchange allocation to the foreign exchange acquisition rate (FEAR) in the previous term, we found that export-link allocation correlated positively with FEAR. This result implies that the export-link system promoted those firms which used foreign exchange efficiently, through intensively distributing rent to them. On the other hand, the export-link system brought about large difference of capacity utilization rates across the wool firms, especially between large firms with great international competitiveness and small and medium-sized firms which was domestic market-oriented. The production capacity-link system played a role to mitigate that difference of capacity utilization rates, which was complementary to the role of export-link system.

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Table 1 Recovery and Growth of the Wool Industry

	Equipment			Production		
	Worsted Spindle 1000 units	Woollen Card unit	Power Loom unit	Worsted Yarn ton	Woollen Yarn ton	Wool Fabrics 1000sqm
1934-36	879	637	28,471	41,537	19,505	263,295
1945	240	425	10,400	1,995	4,323	4,836
1946	266	391	9,998	n.a.	n.a.	n.a.
1947	282	457	11,837	2,787	9,110	17,137
1948	355	702	14,007	1,983	9,047	20,720
1949	431	789	14,168	5,917	10,542	28,312
1950	488	936	16,618	15,121	17,352	65,197
1951	610	1,147	19,600	22,498	28,707	95,186
1952	652	1,155	20,418	32,720	35,765	123,342
1953	1,136	1,239	20,910	41,789	42,855	138,328
1954	1,175	1,271	22,182	42,823	33,760	127,519
1955	1,235	1,297	25,585	46,631	37,165	153,220
1956	1,487	1,337	26,172	61,152	44,195	181,608
1957	1,569	1,371	26,923	76,523	39,494	202,316
1958	1,558	1,395	28,217	58,467	34,323	220,782
1959	1,568	1,384	32,994	75,523	40,440	266,804
1960	1,575	1,183	34,712	94,417	39,328	316,384

Source:Council of Wool Industry[1959,1967].

Table 2 Import of Raw Wool by Country

	Total 1000bale	Australia %	New Zeala %	Argentina %
1934-36	718.7	n.a	n.a	18.2
1946	0.0	...	...	...
1947	9.2	88.2	0.0	11.8
1948	69.6	38.1	0.3	25.3
1949	92.1	77.8	10.9	0.0
1950	242.4	80.4	5.7	2.7
1951	355.1	77.4	6.1	8.8
1952	465.3	86.5	3.2	1.4
1953	631.8	64.3	2.9	15.7
1954	488.1	66.1	1.6	18.1
1955	657.3	79.5	2.6	7.4
1956	938.5	72.6	1.9	15.3
1957	915.5	83.5	3.7	3.1
1958	908.7	81.7	5.9	6.5
1959	1217.0	82.8	5.1	5.0

Source: see Table 1.

Table 3 Export of Wool Products

	Wool Yarn		Wool Fabrics	
	ton	%	1000sqm	%
1934-36	2,779	4.6	25,789	9.8
1945	0	0.0	0	0.0
1946	0	0.0	384	0.0
1947	91	0.8	1,582	9.2
1948	177	1.6	2,934	14.2
1949	881	5.4	3,046	10.8
1950	345	1.1	2,512	3.9
1951	485	0.9	1,603	1.7
1952	60	0.1	955	0.8
1953	1,608	1.9	4,166	3.0
1954	5,381	7.0	10,075	7.9
1955	3,574	4.3	14,842	9.7
1956	3,300	3.1	18,669	10.3
1957	4,930	4.2	24,258	12.0
1958	3,532	3.8	19,609	8.9
1959	3,648	3.1	28,118	10.5
1960	3,807	2.8	32,729	10.3

Source: See Table 1.

Table 4 Foreign Exchange Allocation to the Wool Industry by Methods

1000 dollars, %

	Total	Export-Link	Allocation for Production	Allocation for Trading Companies	Reserve	Others
1951 Apr.-Sept.	49,410	13,271 (26.9)	34,140 (69.1)	0	0	1,999
Oct.-Mar.	101,340	23,714 (23.4)	74,679 (73.7)	0	0	2,947
1952 Apr.-Sept.	46,010	8,062 (17.5)	37,948 (82.5)	0	0	0
Oct.-Mar.	114,461	14,061 (12.3)	96,996 (84.7)	0	0	3,404
1953 Apr.-Sept.	56,114	18,961 (33.8)	35,367 (63.0)	0	0	1,787
Oct.-Mar.	95,118	30,222 (31.8)	62,439 (65.6)	0	0	2,457
1954 Apr.-Sept.	39,188	30,316 (77.4)	8,312 (21.2)	0	0	560
Oct.-Mar.	78,761	56,411 (71.6)	19,603 (24.9)	0	0	2,747
1955 Apr.-Sept.	50,000	29,691 (59.4)	18,861 (37.7)	0	0	1,448
Oct.-Mar.	103,529	42,922 (41.5)	57,201 (55.3)	0	0	3,406
1956 Apr.-Sept.	90,200	52,635 (58.4)	35,451 (39.3)	0	0	2,114
Oct.-Mar.	187,000	44,431 (23.8)	137,497 (73.5)	2,150	0	2,923
1957 Apr.-Sept.	87,891	49,346 (56.1)	29,653 (33.7)	2,600	0	6,292
Oct.-Mar.	139,062	67,429 (48.5)	56,119 (40.4)	2,500	750	12,264
1958 Apr.-Sept.	73,500	18,995 (25.8)	32,518 (44.2)	2,100	15,540	4,347
Oct.-Mar.	76,511	30,795 (40.2)	37,550 (49.1)	1,700	1,710	4,755
1959 Apr.-Sept.	56,000	14,842 (26.5)	22,617 (40.4)	1,750	13,158	3,633
Oct.-Mar.	180,457	85,241 (47.2)	84,655 (46.9)	2,000	0	8,561
1960 Apr.-Sept.	114,000	37,029 (32.5)	68,691 (60.3)	1,900	0	6,380
Oct.-Mar.	70,525	24,618 (34.9)	36,602 (51.9)	1,750	0	7,555

Source: The Section of Hemp and Wool, MITI.
Note: Ratios to the total amount in parentheses.

Table 5 Average Export-Link Rates for the Wool Products

(%)

	Average	Worsted Weavings
1953. 8-54. 5	170	180
1954. 6-54. 7	160	173
1954. 8-54. 9	140	159
1954.10-55. 3	130	140
1955. 4-55. 9	120	136
1955.10-56. 3	110	125
1956. 4-57 .9	100	114
1957.10-58. 3	90	100

Source: Bank of Japan[1958], p.102.

Table 6 Determination of Foreign Exchange Allocation for Wool Import by Firm

Fiscal Year	Export performance (α)	Production capacity (β)	ad-R2	Number of samples (Number of firms)
1953 Oct.-Mar.	2.017 (8.814)	11,603 (16.045)	0.997	21
1954 Apr.-Sept.	0.954 (8.986)	5,165 (4.807)	0.987	45
Oct.-Mar.	1.324 (4.175)	4,997 (1.388)	0.947	47
1955 Apr.-Sept.	1.732 (28.481)	4,484 (10.860)	0.998	47
Oct.-Mar.	1.275 (15.543)	13,533 (13.958)	0.996	55
1956 Apr.-Sept.	0.319 (2.119)	23,449 (13.182)	0.967	50
Oct.-Mar.	1.487 (12.585)	28,759 (18.522)	0.993	54
1957 Apr.-Sept.	1.186 (17.297)	5,208 (5.658)	0.988	54
Oct.-Mar.	1.066 (10.352)	16,702 (11.691)	0.984	51
1958 Apr.-Sept.	0.989 (16.461)	8,043 (13.237)	0.985	44
Oct.-Mar.	0.738 (29.118)	9,078 (35.950)	0.991	64
1959 Apr.-Sept.	1.134 (25.606)	381 (4.777)	0.933	63
Oct.-Mar.	0.914 (16.456)	18,039 (28.553)	0.989	50
1960 Apr.-Sept.	0.561 (14.034)	15,148 (24.350)	0.977	45
Oct.-Mar.	0.691 (21.758)	7,904 (29.200)	0.985	59

Note: t-values are in parentheses.

Figure1 Difference between domestic and import prices of wool

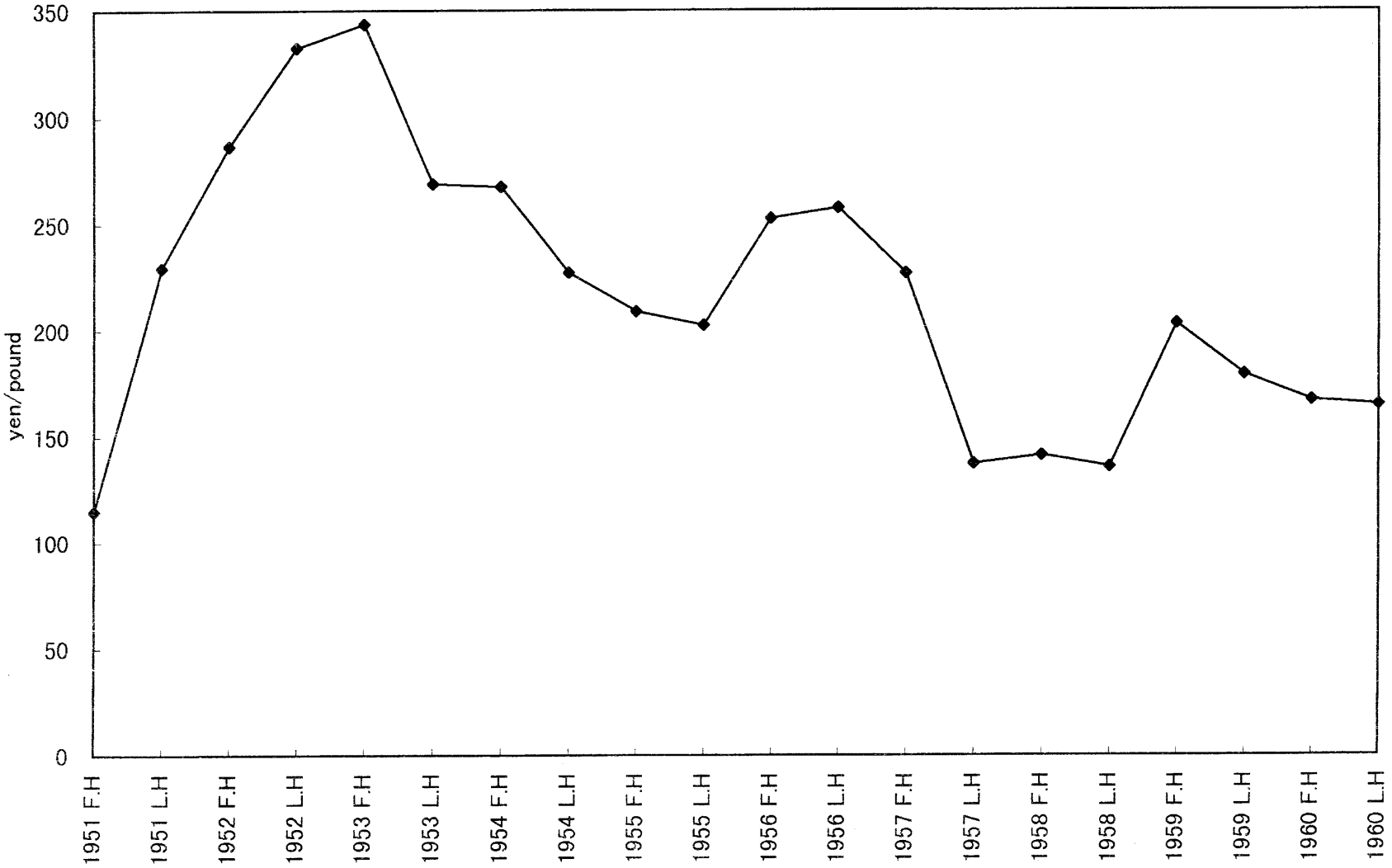

Table 7 Estimation of the Export and Investment Function

Export Function

method	R1	Pye/Pyd	constant	ad-R2	DW
OLS	1.203	3.988	-529.6	0.437	1.298
	(3.387)	(0.745)	(-2.259)		
	***		**		
IV	1.360	16.287	-743.6	0.141	2.049
	(3.062)	(1.393)	(-2.262)		
	***	*	**		

Investment Function
method : Fixed Effect Panel

	π	uc	I	R2	GGDP	ad-R2	D.F
	1.695	-7E-06		2.82E-05		0.238	67
(1)	(4.093)	(-0.147)		(5.192)			
	***			***			
	1.581		-1.762	2.63E-05		0.264	67
(2)	(3.851)		(-1.553)	(4.812)			
	***		*	***			
	1.734	6.8E-06		2.87E-05	0.066	0.230	66
(3)	(4.115)	(0.136)		(5.193)	(0.587)		
	***			***			
	1.614		-1.697	2.67E-05	0.037	0.255	66
(4)	(3.817)		(-1.469)	(4.773)	(0.370)		
	***		*	***			

Note: t-value are in parentheses.
*** : 1 % significance level
** : 5 % significance level
* : 10 % significance level

Figure 2 Decomposition of TFP growth

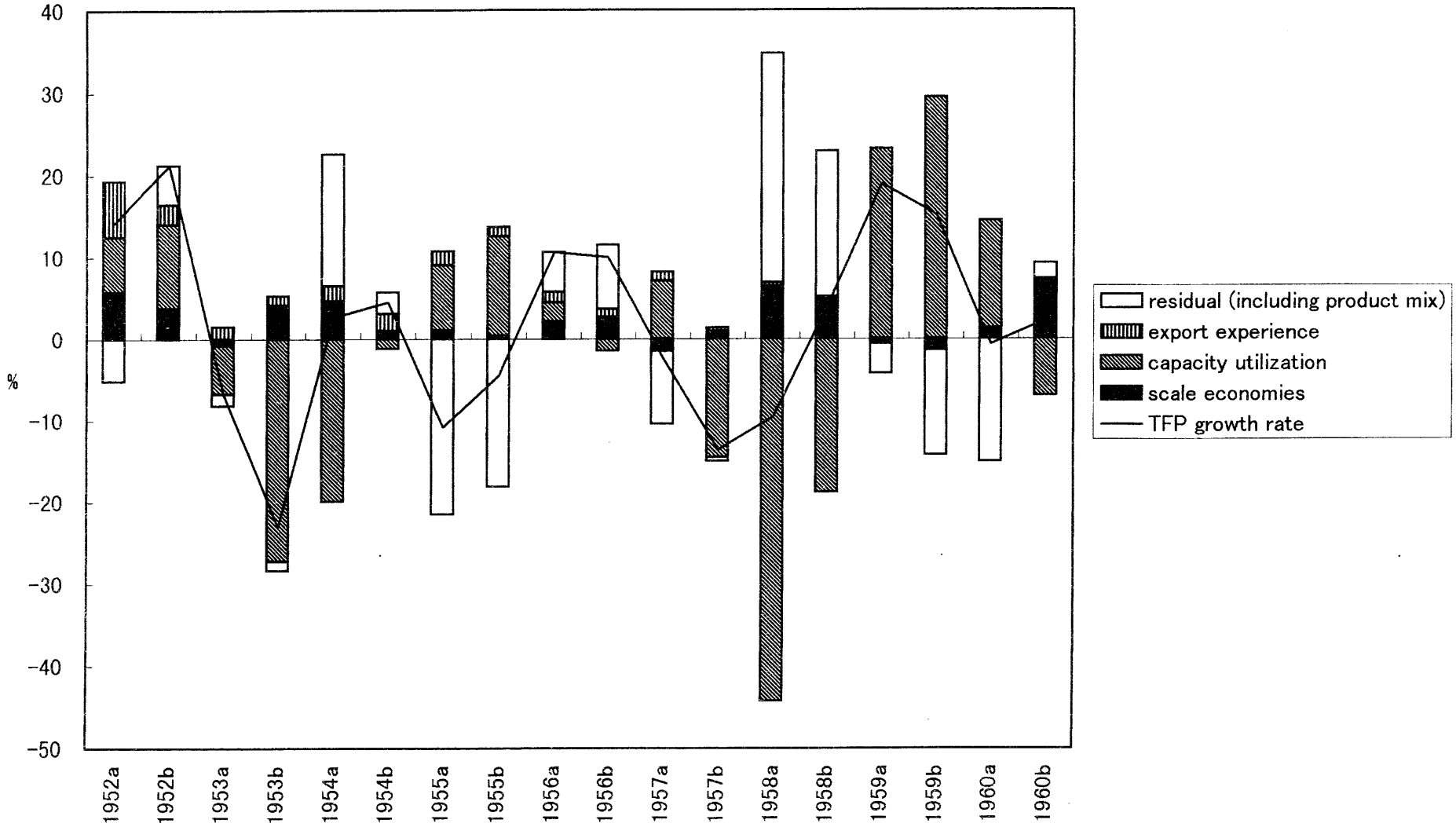

Table 8 Foreign exchange allocation and FEAR

	X(t−1)/Qt(t−1)	adj−R2	D.F
Qx(t)	619,925	0.655	215
	(2.759)		
Qc(t)	−82,787	0.545	215
	(−0.247)		
Qt(t)	537,138	0.713	215
	(1.263)		

Note: t−values in parentheses.

Table 9 Foreign exchange allocation and capacity utilization ratio (18 firms)

Fiscal Year	Coefficient of Variation		
	Qx/K	Qc/K	Qt/K
1953 Oct.-Mar.	–	–	–
1954 Apr.-Sept.	0.644	0.204	0.520
Oct.-Mar.	0.351	0.571	0.250
1955 Apr.-Sept.	0.442	0.150	0.322
Oct.-Mar.	0.603	0.182	0.324
1956 Apr.-Sept.	0.493	0.237	0.377
Oct.-Mar.	0.497	0.342	0.341
1957 Apr.-Sept.	0.715	0.148	0.565
Oct.-Mar.	1.039	0.150	0.785
1958 Apr.-Sept.	1.282	0.323	0.925
Oct.-Mar.	1.223	0.371	0.924
1959 Apr.-Sept.	1.543	0.536	1.389
Oct.-Mar.	1.032	0.500	0.758
1960 Apr.-Sept.	0.741	0.107	0.374
Oct.-Mar.	1.269	0.122	0.748