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TARIFF PROTECTION AND JAPANESE INDUSTRY*

PATRICIA KUWAYAMA

I. INTRODUCTION

Japanese tariffs have received relatively little attention until recently, because of the predominance of other kinds of import barriers, particularly quotas. In the past few years, however, most quota restrictions on importing to Japan have been removed, greatly increasing the importance of tariffs as an effective constraint on the majority of imports.¹

Tariffs have also been lowered in Japan since the late 1960's, and are now on a level roughly comparable with those of other major industrial countries. Full implementation of the Japanese concessions in the Kennedy Round was completed in April 1971, bringing the average of its industrial tariffs down to about 10%. International comparisons are difficult because of strong sensitivity to the method of averaging used; nevertheless Table I shows that the overall level of Japan's tariffs is close to that of the United States, while both are somewhat higher than that of the European Community. The range of tariffs applied to different commodities has also been narrowed by recent tariff reductions. Only 3.6% of the commodities listed in the Japanese tariff schedule are subject to duties of more than 20%, and almost 90% are within the 0-15% range.^{2,3}

In spite of this considerable liberalization, however, tariffs still exert a strong and highly varied influence on individual Japanese industries. Table I shows clearly that Japanese tariffs (like those of other countries) are "escalated"—i.e., duties on processed manufactures are much higher than those on raw materials and semi-processed commodities. Since domestic manufacturers are affected by tariffs on their purchased inputs as well as those on their own products, one consequence of this tariff escalation is that production of final consumer goods, representing the end of a long chain of processing activities, is much more strongly

* This is a revised version of a paper circulated earlier, incorporating some suggestions by Professor W. M. Corden and by members of the Japan Economic Seminar. All opinions are the author's, and are not to be attributed to the Federal Reserve Bank of New York.

¹ The number of BTN categories affected by residual import quotas (i.e. those Japan is obliged to remove eventually under GATT) has been reduced from 118 at the beginning of 1970 to 33 in April 1972. Only 9 of the remaining quotas apply to industrial products, as compared with 50 early in 1970.

² The proportion of Post-Kennedy-Round duties over 20% in the United States is 12.5% and that in the EC is 0.3%.

³ The 20% across-the-board tariff cut which became effective in January 1973 brings the average for all industrial products down to 8.5%, definitely less than the comparable figure for the United States.

TABLE I. INTERNATIONAL COMPARISON OF POST-KENNEDY-ROUND TARIFFS⁴
(percent of value, simple average for all dutiable industrial commodities)

	Japan	United States	European Community
Raw Materials	2.5	4.5	1.6
Semi-manufactured Products	9.5	9.5	6.7
Manufactured Products	11.4	12.8	7.8
All Industrial Products	10.1	10.9	6.9

encouraged in general than production of intermediate producer goods. Certain specific intermediate processes are also highly protected, however, as the discussion below will show. Cases can be pointed out in the steel, chemicals and textile industries (to name only three) where the tariff structure encourages domestic processing using imported raw materials, as opposed to the importation of intermediate products processed at the foreign materials source. On the other hand, some domestic activities are actually discouraged by the tariff structure, which may induce more of an increase in the cost of their purchased inputs than in the prices they receive for their own products. In sum, the effects of tariffs on specific industries is both more important and more varied than appears from the tariff averages cited above. These protective effects can only be appreciated by considering the structure of tariffs on different goods, and also the interindustry structure of production.

The following is an attempt to evaluate tariff protection as it affects specific industries in Japan, mainly by the measurement of "effective protective rates" (EPR). The EPR is a measure of the combined effect which the entire tariff structure has, by its influence on both output prices and input prices, on value-added earnings by each industry. The second section of this paper describes the effective protective rate measurement in detail, and discusses some of its limitations as well as its usefulness. Nominal and effective tariff rates for 215 Japanese manufacturing industries, which are presented in detail in an Appendix, are the basis for a discussion in the third section of this paper of the characteristics of protection in broad groups of Japanese industries. This section offers some hypotheses about how tariff policy may have contributed to growth policy in Postwar Japan. To test these hypotheses, the level of protection afforded Japanese manufacturers is related to such factors as international competitiveness, growth potential, labor-intensiveness, and end-use destination of products. The analysis shows tariff protection of consumer goods to be stronger than that of either intermediate or capital goods. The hypothesis that tariff protection has been used to encourage "infant" industries, i.e. those with great potential as competitive suppliers of

⁴ From GATT, *Basic Documentation for Tariff Study* (Geneva, 1970), quoted in European Community Information Service, *Background Information*, No. 3 (February 15, 1972), Table I, following page 8.

both domestic and export markets, is supported by the results. However, a tendency to protect certain relatively declining, traditional industries (such as food, leather and textile production) is also found to be important.

The fourth section of this paper deals with recent changes in the effective protection of Japanese industries. By examining the impact of tariff changes in certain representative industries, an indication is obtained of what effect tariff liberalization has had on the pattern depicted by 1965 protective rates. From these estimations it seems that effective liberalization has been substantial in many industries, although there is still a great deal of room for further tariff reductions. Generally the reductions were proportionate to past levels of protection, so that the structure of relative effects of tariffs in different industries remains similar to what it was in 1965. An important exception to this is that highly protected industries in the food, leather and textile areas seem to have been more shielded from effective liberalization than more dynamic industries (steel and automobiles, for instance), which may have been highly protected in the past for "infant-industry" reasons. Tariff-liberalization in Japan thus seems to be diminishing the relative importance of "growth-oriented" tariff protection, which is phased out as the economy matures. If this tendency continues, it may turn out that tariff protection in the future will be more and more exclusively devoted to stemming employment losses in "senile" Japanese industries, thus eliminating what has been regarded as a striking difference between protective policy in Japan and other major industrial countries.

II. METHODOLOGY: THE INTER-INDUSTRY ANALYSIS OF TARIFF PROTECTION⁵

A. Measures of Tariff Protection

This section discusses the nominal and effective protective rates on which the analysis of this study is based. The rates described below have been computed for 215 individual Japanese manufacturing industries on the basis of the detailed Japanese input-output table for 1965. The results of these computations are presented in detail in an Appendix to this paper.

The tariff rate, or "nominal protective rate", gives the percentage increase in domestic output price which under certain simplifying assumptions can be attributed to tariffs. This rate measures the effect of tariff protection on Japanese consumers, as opposed to the "effective protective rate" explained below, which measures the effect on Japanese producers. The assumptions are that both the imports and the product of a particular domestic industry are homogeneous, and that the supply of imports is infinitely elastic, so that the prices of both the imported and the domestic goods are allowed to rise by the amount of any duties

⁵ See W. M. Corden, *The Theory of Protection* (London: Oxford University Press, 1971).

imposed on the import.⁶

The “effective protective rate” shows the proportionate increase in value added by domestic producers which is attributable to tariff protection. In addition to the assumptions already mentioned, these computations assume that the structure of production in each industry—i.e., of unit physical requirements for inputs purchased from all other industries—is homogeneous and fixed. The effective protective rate may be either higher or lower than the nominal protective rate, depending on whether the average tariff rate on inputs is lower or higher than that on the output.

The formula for the effective protective rates is

$$f_j = \frac{t_j - \sum_i t_i a_{ij}}{1 - \sum_i a_{ij}}$$

where a_{ij} represents the free-trade value of inputs purchased by the j th industry from the i th industry, for each unit of output of the j th industry. t_j and t_i are the tariff rates for each output and input good, respectively.

The denominator, $1 - \sum_i a_{ij}$, represents the value that would be added by domestic industries, per unit of output of j , in the absence of tariff protection. It is found by deflating the value of each input and output, as observed in the actual, protected, situation, by the amount of the tariff levied on competing imports. The numerator of f_j is the increase in this unit value added—equal to the difference between the increase in output price and the increase in average input price—that is attributable to tariffs. The concept of value added used here is a special one suggested by W. M. Corden for measuring effective tariff protection.⁷ It differs from the conventional value added concept in including the value of inputs purchased by the j th industry from those domestic industries—service industries, *et cetera*—which are not in competition with internationally traded goods, in addition to the value added by primary factors in the j th industry itself. Using this basis, the effective protective rate allows for the possibility that non-trading intermediate industries may raise their prices in response to increased demand from tariff-protected using industries, thus receiving part of the benefit of tariffs on the latter.⁸

⁶ The EPR is taken here to be a measure of the potential increase in value added which the tariff structure makes possible. It therefore indicates what could happen if all domestic producers priced up to the domestic cost of imports. For the protection to necessarily be utilized fully an additional assumption is required that there is no competition among individual producers in the domestic industry. If there is such competition, domestic prices may not rise all the way to the limit imposed by foreign competition, and part of the protection may be redundant.

⁷ “The Structure of a Tariff System and the Effective Protection Rate,” *Journal of Political Economy*, LXXIV (June, 1966), 221–37.

⁸ The alternative is to assume that all of these non-trading industries are characterized by infinitely elastic supply. The effective protective rate described here is only one of several possible measures representing the effect of a tariff structure on value added in individual industries. The characteristics of these different measures are discussed at length in my doctoral dissertation and alternative calculations are also included there. See Patricia Kuwayama, *The Effective Protection of Japanese Manufacturing Industries*, Unpublished Ph.D. Dissertation (City University of New York, 1970).

B. Problems of Measuring Effective Protection

A number of assumptions have been mentioned in the preceding paragraphs, which are of fundamental importance. Summarized, these assumptions involve treating each industry as if it produced a single, homogeneous commodity in competition with a single, perfectly substitutable imported product, and with a homogeneous, inalterable production structure. It is also assumed that the supply by foreigners of imports to Japan is infinitely elastic—i.e. that Japanese importers are not large enough for variations in the tariffs they pay to affect the world prices of commodities. The latter assumption is probably reasonable in most cases, with a few exceptions—mainly raw materials imports—where Japanese imports are extremely prominent.

The assumptions of homogeneity are more questionable: they may apply reasonably well to some industries, but in others they seem quite inappropriate. Yet all of the measurements depend on these assumptions. The tariff rate (or nominal protective rate) in each industry is measured as the value of tariff collections divided by imports, as reported in 1965 input-output table. If the industry in fact comprises a heterogeneous mix of products paying different rates of duty, then this procedure—which amounts to weighting individual tariff rates by imports—may seriously underestimate the protective effect of tariffs because the importation of those commodities with the highest rates is relatively most discouraged.⁹

An industry, j , may produce intermediate goods which are sold to other industries for use in production, and these may have a different commodity mix than j 's total output. In this case the use of a single tariff rate, t_j , to represent both the effect on producers in that industry and the effect on other industries using j 's products, may be inaccurate. Similarly, certain commodities within an industry may compete with foreign products while others do not, and these may not have the same production structure: in this case the "average" structure represented by the input-output statistics would not accurately measure the effect of tariff protection. Because these homogeneity assumptions are so important, the present study is based on the most disaggregate available input-output statistics, thus minimizing the heterogeneity found in individual industries studied. It must nevertheless be recognized that even the 465-sector classification of the detailed input-output table for 1965 incorporates considerable heterogeneity within some of the industries included.

In spite of these qualifications, the effective protective rate provide an important addition to our information about the effect of tariffs. Examination of nominal tariff rates alone takes no account of the fact that intermediate goods may be internationally traded, and that domestic industries are affected by tariffs on their inputs as well as by the tariffs on their own products. The fact

⁹ An extreme case occurs when there are no imports because of a high tariff: the nominal protective rate is then counted as zero. This phenomenon, unfortunately, occurs in a number of the industries treated below.

that most countries' tariffs are "escalated"—i.e., rise with the level of processing involved in each commodity's production—means that many final processing activities may be strongly encouraged even when the tariffs levied on their products appear fairly moderate. Consideration of the role of intermediate products also reveals much more variation in the degree of protection afforded different industries, than appears from the nominal tariff rates on their products. These measurements are therefore valuable, in spite of their crudity, because they treat the entire constellation of tariffs as a structure, rather than focusing on individual tariffs in isolation as all conventional tariff measurements do. Their limitations are the inevitable limitations of any single measure of tariff "height" that attempts to be meaningful for all industries. There is no "ideal" measure which will answer all our questions about the effects of tariffs. These effects can only be fully explained in a general equilibrium context, in which detailed technical and market conditions affecting supply and demand in each industry are considered.

III. RESULTS: THE DISTRIBUTION OF PROTECTION AMONG JAPANESE MANUFACTURING INDUSTRIES

A. General Observations

The distribution of effective tariff rates among industries is, as expected, quite different from that of nominal protective rates. Whereas only 9 of the 215 manufacturing industries studied have nominal rates of more than 35%, 53 of the EPR's fall in this category. On the other hand, 46 industries have negative EPR's, meaning that their unit costs are increased by tariffs more than their own output prices are. There are, of course, no nominal tariff rates which are less than zero.

Almost four-fifths of the nominal rates are clustered between 0 and 20%, whereas only slightly over one-third of the EPR's are in this central range. The variance of the EPR's is more than three times that of the tariff rates: 2.5%, as compared with 0.7%. The greater variability of effective protective levels is thus at least as impressive as their greater height: about 19% on average, as compared with 12% for nominal protective rates.¹⁰ The comments in the Appendix focus on some of the reasons for, and implications of, this variation in individual effective protective rates. The purpose of the present section is to examine some more general patterns in the way protection is allocated among all Japanese industries.

¹⁰ All tariff and EPR averages (and also the variances cited above) in this paper are weighted by the size of each industry in the hypothetical free-trade situation: specifically, by value of output in the case of tariffs, and by value added in the case of EPR's. This means that the average for all industries, or for any subgroup of industries, can be interpreted as "the" nominal or effective protective rate for that group of industries as a whole. A warning should perhaps be noted against comparing the 12% average tariff rate given here for 1965 with the 11.4% Post-Kennedy Round average for manufactures cited above in Table I. The averages in Table I are unweighted averages of Individual BTN items, and cover dutiable commodities only.

B. Effective Protection of Consumer vs. Producer Goods

Table II below examines effective protective rates for industries grouped according to whether their products are used mainly for: (a) intermediate consumption in the production of other goods, (b) capital formation by businesses and government, or (c) final consumption (including that of durable consumer goods) by households, enterprises or government. Classification is based on actual end-use destination of products as reported in the 1965 Japanese input-output table. The results indicate stronger encouragement of domestic production of consumer goods—whose average EPR is 25%—than is granted manufacturers of either intermediate products or producer-capital goods. The proportion of consumer industries whose EPR's exceed 14.5%—the median rate for all industries—is 64%, and the proportion with very high rates of protection (over 35%) is also considerably larger than in either capital or intermediate-goods production.

Nearly half of the “consumer-goods” industries in Table II are food, beverage and tobacco producers whose main inputs are primary agricultural and fishery products. It thus seems appropriate to ask whether the higher average protection found in this group reflects mainly the special situation of food-producers using raw agricultural inputs with low or zero tariffs, or whether it also applies to consumer-oriented industrial manufacturers. For this purpose Table II includes as a

TABLE II. EFFECTIVE PROTECTION FOR INDUSTRIES CLASSIFIED BY
PRIMARY DESTINATION OF PRODUCT

Largest Share of Product Used for:	Number of Industries	Effective Protective Rates		
		Average	Percent higher than:	
			14%	35%
Intermediate Consumption in Production	141	0.16	45	22
Capital Formation (including autos ¹)	21	0.23	43	14
Capital Formation (excluding autos ¹)	20	0.09	45	15
Final Consumption*	53	0.25	64	36
All Industries	215	0.19	50	25
* Memorandum:				
Food and Other Agricultural Industries Producing Mainly Consumer Goods	24	0.19	58	38
Non-Agricultural Industries Producing Mainly Consumer Goods	29	0.35	69	34

¹ The motor-vehicle industry, which as noted in the text is a special case from the point of view of tariff protection, strongly affects the averages for all capital-goods industries because it represents almost one-third of their value added.

Source: Patricia Kuwayama, *Effective Protection of Japanese Manufacturing Industries*, and Japan Administrative Management Agency, *1965 Interindustry Relations Table for Japan*.

memorandum item separate EPR averages and percentages for agricultural and non-agricultural consumer-goods industries. Since these show the latter to receive even more protection than the former, it appears that the pattern of particularly encouraging consumer-goods production is not confined to agricultural processing activities.

The higher EPR found in consumer-goods industries is not merely a reflection of the fact that these are final, processed goods, because the industries producing mainly capital goods—which are also highly processed final goods—do not (with the notable exception of automobile producers) share this high protection. The average EPR in capital-goods sectors other than motor vehicle production is only 9%—less than the 16% average for intermediate-producing industries, and much less than the 19% average for all industries. The automatic tendency for an escalated tariff structure to result in greater protection of final-goods production thus seems to be mitigated in cases where the final goods are purchased mainly by producers, rather than by consumers. This low effective protection level in capital goods industries is due to a combination of (1) slightly less-than-average tariffs for goods competing with the output of machinery industries, and (2) a production structure in these industries which involves heavy use of highly processed intermediate inputs, inputs which are themselves protected by tariffs.

The one very large exception is the motor-vehicle industry, whose EPR was 69% in 1965. It seems probable that this high level of protection was a matter of conscious policy, since it results from unusually high automobile tariffs rather than from any major difference in production structure. The high level of effective tariff protection of Japanese automobile production is only one of several import barriers which were used to promote the growth of this “infant” industry into an international giant during the 1960's.

The tendency for consumer industries to be more protected than others is also evident within main industry groups in Japan. Food products, for instance, are highly protected but intermediate agricultural products such as feed and inedible oils are not. A similar tendency is noted for consumer-oriented chemical products such as detergents and cosmetics, for final wood and paper products, and for consumer durables within the machinery sector (household appliances, bicycles, motorcycles, cameras and clocks), relative to producer goods in the same categories.

An important exception to this pattern is found in the metals industries: here very high effective protection levels are found for certain highly processed intermediate products, such as hot-rolled steel and rolled aluminum. These enjoy significant tariff protection with respect to their outputs, and also benefit from very low rates of duty affecting their major inputs, which are primary metal products. The outcome may not be accidental, since these highly sophisticated metal-processing industries have had a prominent place in post-war Japanese industrial growth strategy. Another noteworthy set of exceptions is found in textile-related industries, where similar production characteristics—i.e. the use of high proportions of

raw material inputs which bear low duties—have resulted in very high EPR's for certain yarn and chemical fiber producers.

C. Tariff Policy and Growth Policy

The observation has been made that tariff policy in Japan is tied to national policies for fostering industrial growth more than is true in other major developed countries.¹¹ According to this view, protection in Japan has been concentrated mainly on capital-intensive, high-technology industries of the modern sector, industries which were considered by the government to have the greatest potential in terms of overall growth and export-competitiveness. In contrast, the more traditional, labor-intensive industries are said to have been relatively slighted on the basis of the policy-makers' view that Japan's long-range comparative advantage was shifting away from such activities. This policy is contrasted with that of other industrial countries, particularly the United States, in which declining, and particularly labor-intensive, industries of long-range comparative disadvantage are said to be the ones on which most protection is lavished.¹²

Even a cursory examination of the effective protective rates in the Appendix reveals conspicuous and important exceptions to this generalization about Japanese tariff policy. The high effective tariff rates reported for wool and cotton textile production, and the leather industries, to mention only a few instances, clearly reflect the desirability of protecting employment in politically sensitive areas in spite of the fact that Japan's comparative advantage no longer lies in domestic production of these goods. However there are also many cases of protection afforded industries which by now are well known as dynamic and highly competitive in international markets: automobiles and camera production are two good illustrations of this. While no universal rule can be found, therefore, it seems

¹¹ James C. Abegglen of the Boston Consulting Group is a prominent advocate of this view, which has received wide attention recently. See, for instance, his paper "Dynamics of Japanese Competition", submitted to the Williamson Commission's report, *United States International Economic Policy in an Interdependent World*, (U.S. Government Printing Office, 1971) Volume II, pp. 153-181, especially pp. 163 ff.). John C. Renner, Director of the Office of International Trade, U.S. State Department, has developed the closely related thesis that Japanese protection is concentrated on high-technology industries (Speech before the American Management Association. New York City, March 23, 1971.)

¹² Giorgio Basevi attempted to test this proposition in his study of effective protection in American manufacturing industries, and Beatrice Vaccara did so in an earlier study based on nominal tariff rates. Both studies found some tendency for nominal tariffs to be higher in labor-intensive sectors, but Basevi's study did not succeed in demonstrating such a tendency for effective protection rates. The earlier, Vaccara, study also found a tendency for industries which were more highly protected to be relatively declining ones in the sense of growth rates, although Basevi's study did not provide strong confirmation of this. (Giorgio Basevi, "The United States Tariff Structure: Estimates of Effective Rates of Protection of United States Industries and Industrial Labor," *Review of Economics and Statistics*, Volume XLVIII (May, 1966) pp. 147-160; and Beatrice N. Vaccara, *Employment and Output in Protected Manufacturing Industries* (Washington: The Brookings Institution, 1960).)

worthwhile to ask which, if either, of these tendencies predominates in the distribution of Japanese tariffs as they actually affect domestic industries.

The following is an attempt to answer this question by examining the cross-section of 215 manufacturing sectors and seeing how effective protection is related to (a) international competitiveness, (b) growth and (c) labor-intensity in different industries. The results, which are described below, do not disprove the existence of a tendency toward protecting more dynamic industries; in fact in some ways they confirm it. On the other hand, they also show that the pattern often found in other industrial countries, of protecting relatively declining, and particularly labor-intensive, industries, is important in Japan also. Neither of these tendencies can be said to dominate the other. They exist side by side, and result in two sets of protected industries with rather distinct characteristics.

Although the patterns which emerge from this cross-sectional analysis do seem to be important, one of the most striking characteristics of every observation made below is the very high variability of tariff effects on different industries, no matter how these are grouped. This may mean that the most important lessons of effective-tariff analysis are to be found in the rates given in the Appendix for individual industries, rather than in generalizations like those sought in this section.

1. *Export Ratios and Effective Protection*

Table III below presents information about effective protective rates in industries grouped by the proportion of output which they export to foreign countries. This export ratio is taken as a very rough measure of "international competitiveness" of different industries. These results show that one-half of all industries export less than 5% of output, and their protection (14% on average) is lower than the 19% average for all industries. At the same time, the most export-oriented classes of industries have the highest proportions of above-median EPR. If it is presumed that 1965 tariff levels reflect tariff decisions made in previous years, and the government's identification of industries with potential for international competition tends to be correct, then this supports the hypothesis that Japanese tariff protection favors industries which can "use" it to become exporters as much as those which need it to avoid extinction. If the latter alone motivated tariff protection, the opposite tendency would have been found, since industries which cannot survive import competition would hardly be expected to be large exporters.

The tendency for exporting industries to be protected appears to extend only to moderately high levels of EPR, however. The highest effective tariffs—those over 35%—are found least commonly in the industries which export more than 30% of their products, and about equally commonly in all other classes. When examined industry-by-industry, these very high EPR's appear to be concentrated almost entirely in food products, leather, textiles and chemicals. With some exceptions in the chemicals area, these are all industries from which Japan has seen its comparative advantage moving away for some years. Table III thus seems

TABLE III. EFFECTIVE PROTECTION OF INDUSTRIES
CLASSED BY EXPORT RATIO

1965 Exports as a Percent of Total Output	Number of Industries	Effective Protective Rates		
		Average	Percent higher than:	
			14%	35%
0 to 5	107	0.14	45	27
5 to 10	41	0.22	41	22
10 to 20	37	0.35	54	24
20 to 30	14	0.27	79	29
Over 30	16	0.12	69	13
All Industries	215	0.19	50	25

Sources: Same as Table II.

to indicate the effective expression of both "infant" and "senile" industry motivations for tariff protection, with the highest EPR's being mainly confined to the latter.

2. Growth Rates and Effective Protection

Table IV shows protective rates for industries grouped by the percentage output growth they experienced between 1960 and 1965. The proportion of above-median EPR's rises regularly with the growth rate in each group, except that the fastest-growing class of industries—those which more than tripled in output in the five-year period—includes a smaller proportion above this level than all the others except industries which actually declined. The positive association between protection and growth may result in part from the success of protection in encouraging domestic production. However it does not seem likely that the differences in Table IV could be entirely due to the influence of tariffs on growth.

TABLE IV. EFFECTIVE PROTECTION OF INDUSTRIES
CLASSED BY OUTPUT GROWTH

Percentage Increase in Output, 1960 to 1965	Number of Industries	Effective Protective Rates		
		Average	Percent higher than:	
			14%	35%
Less than 0	11	0.77	27	27
0 to 50	50	0.42	44	26
50 to 100	73	0.22	51	22
100 to 200	55	0.22	64	31
Over 200	20	0.34	35	15
All Industries ¹	209	0.26	50	25

¹ 6 of the 215 industries of the study were excluded because no output figure was available for 1960.

Sources: Same as Table II.

It is much more likely that a large part of the association is due to causation in the other direction, i.e. the selection by Japanese policy-makers of the most promising growth areas as "infant-industries" to protect.

The positive relationship between growth and protection seems to apply less to very high rates of EPR than to moderately high ones. The 11 declining industries, for example, include only 3 which had above-median EPR's, a much lower proportion than in all industries. However, all three of these EPR's are over 60%, a much higher than average proportion. Similarly, in the 0-to-50% growth class, the average EPR is higher than in any other group even though the proportions over 14% and over 35% are about average. This indicates that some of the extremely high EPR's are concentrated in the least dynamic industries, similarly to the pattern that was found with respect to export-competitiveness. Again, therefore, the evidence points to the importance of both "infant-industry" and "senile-industry" tariff protection in Japan.

3. *Labor Shares and Effective Protection*

In Table V industries are grouped according to the proportion of value added representing employee compensation. This ratio is taken as a rough indication of the labor-intensity of each industry's productive technology, although the latter would ideally be measured as a physical ratio of labor to capital inputs. It appears from Table V that the most labor-intensive group of industries—whose with labor shares higher than 60%—is relatively highly protected. Eighteen of the 30 industries in this group have EPR's over 14%, and 10 of them over 35%; and the average for the group is about 32% as compared with 25% overall. The least labor-intensive group also has quite a low (16%) average EPR. The tendency toward protection of labor-intensive industries is not unmitigated, however: within industries with labor shares below 60%, the proportion of above-35% EPR's is quite a bit higher in the less labor-intensive groups than in the large

TABLE V. EFFECTIVE PROTECTION OF INDUSTRIES
CLASSED BY LABOR SHARE

Employee Compensation as Percent of Value Added in 1965	Number of Industries	Effective Protective Rates		
		Average	Percent higher than:	
			14%	35%
Less than 20	13	0.16	46	31
20 to 40	68	0.34	47	28
40 to 60	104	0.23	49	19
Over 60	30	0.32	60	33
All Industries	215	0.25	50	25

Sources: Same as Table II.

¹³ The total value of Japanese overall manufacturing output grew slightly more than 70% between 1960 and 1965. The median for the industries included in Table IV is about 65%.

group whose labor rates fall between 40% and 60%. Thus, it cannot be said that a single tendency to protect either labor-intensive or capital-intensive manufacturing dominates the tariff structure as it affects Japanese manufacturing industries.

IV. CHANGES IN EFFECTIVE PROTECTION SINCE 1965

The effective protective rates which provide the basis for the preceding analysis have been changed somewhat by tariff-liberalizations carried out in the past several years. Because it is not possible to make new EPR computations for all industries, the present section assesses these changes by examining a subset of 31 representative industries from among the 215 treated above.

For each of the selected cases, the impact of tariff changes affecting both input and output prices has been estimated, using the same assumptions which underlie the original EPR computations. The industries have been selected so as to cover all the main sectors of the manufacturing economy. Attention has been confined for the most part to industries which received positive tariff protection in 1965, because these are considered to be of greatest interest for the present study. With this exception, they include the entire range from very low to very high protective levels.

A. Methodology: Measures of "Effective Liberalization"

The major difficulty in updating the EPR computations is obtaining the new tariff rates to correspond to each industry-category. The original EPR estimates were based on tariff-collections data reported in the input-output table itself, but such information is not available for a recent date. Instead, the detailed *Customs Tariff Schedule of Japan*¹⁴ for April 1971 (in which all Kennedy-Round concessions are incorporated) was compared with the same schedule for April 1965, to obtain estimates of the changes in tariffs affecting each of the 31 industries in the sample. The tariff-average used in each case was a simple average of all scheduled tariffs identified as relevant to each industry category. Estimates of tariff-change have been attempted for all inputs which amounted to more than 1% of an industry's output value in 1965, which means that in most cases at least 85% of tradable inputs are covered. Where it seemed appropriate, tariff rates on certain relevant items within an industry have been used rather than an average for the entire industry: for example, tariffs on "leather products" used in camera production were approximated using the rate applied to leather cases, omitting other leather products.

The analysis is based on estimates of the "nominal" and "effective" tariff-liberalization which, under the assumptions outlined above in Section II, follow from the changes in the tariff structure between 1965 and 1971. These estimates are presented below in Table VI.

¹⁴ Tokyo: Japan Tariff Association (annual).

1. The "nominal liberalization rate"

The "nominal liberalization rate" is the reduction in domestic output price which may result from the tariff-cuts applied to competing imports, under the assumptions of homogeneity and infinite foreign supply-elasticity. As an example, if the tariff on competing goods has been halved from 25% to 12.5%, this would imply a price-reduction, for both the import and the competing domestic product, of 10%, as the price falls from 125% to 112.5% of its world, or free-trade, level. The formula for the nominal-change ratio is:

$$s_j^D = \frac{t_j^1 - t_j^0}{1 + t_j^0},$$

where s_j^D is the percentage change in the price of the output of industry j , and t_j^0 and t_j^1 represent the (conventionally expressed) tariff rates of the first (1965) and second (1971) situations, respectively. s_j^D is negative in the case of a tariff-reduction, and positive in the case of an increase.

2. The "effective liberalization rate"

The "effective liberalization rate" is analogous to the "effective protective rate" explained in Section II. Whereas the EPR showed the effect of existing tariffs on value added by domestic producers, the "effective liberalization rate" show the effect on value added of changing from one tariff structure to another. The formula for the effective-change ratio is thus:

$$u_j^D = \frac{s_j^D - \sum_i s_i^D a_{ij}^0}{1 - \sum_i a_{ij}^0},$$

where u_j^D is the percentage change in value added by domestic industries per unit of industry j 's output, s_j^D and s_i^D are the tariff-liberalization-induced percentage changes in the prices of output and inputs, respectively, a_{ij}^0 is the 1965 input-output ratio (in value terms) for each internationally traded intermediate good, and $1 - \sum_i a_{ij}^0$ is the value added per unit of j by domestic industries in 1965. This computation is based on the same assumptions as the original EPR: i.e., that each industry produces a homogeneous product competing with an infinitely elastic supply of the same product from abroad, and that its structure of production is homogeneous and fixed. This last assumption, of fixed production structure, means that the unit physical requirement for each input purchased from another industry is taken to be the same now as it was in 1965.

B. Results: Changes in Protection for Selected Industries

Like the tariff-structure itself, tariff liberalization can have a variety of effects on different industries depending on the "structure" of reductions affecting different industries. If only the tariff on final-output goods is reduced, and there are no compensating cuts in tariffs affecting an industry's intermediate inputs, the proportionate decrease in value added is always greater than that in the price of final output. This follows simply from the fact that value added accounts for

less than 100% of the value of final output. A good example is the case of Western-paper production (see Table VI below). The only major intermediate input (i.e., the only one accounting for more than 1% of output value,) is paper pulp, whose 5% tariff has not been changed. There is thus no offset to the rather small reduction in paper-tariffs (from an average of slightly more than 12% to about 11%), with the result that a 1% reduction in output price means a 3% decline in value added by domestic industries. In this particular case the "effective liberalization" is still rather small, but in cases where the tariff-reduction for the final output good is substantial, it can be very large indeed.

At the other extreme, an industry may receive more protection as the result of tariff-liberalization, rather than less, if the effect on its input costs outweighs that on its selling price. Table VI includes four examples of this: canned meat, noodles, leather footwear and ammonium fertilizers. These are all cases in which no reduction occurred in the tariff affecting final output, while some inputs were made cheaper by tariff liberalization. (One class of industries in which this result necessarily occurs is those which, like ammonium fertilizer, were protected by no tariffs in the initial situation, and whose "effective protection" was therefore negative. For these industries, overall tariff liberalization can clearly only be beneficial, in the sense that the discrimination imposed on them by the tariff structure is reduced.)

The majority of the cases examined were intermediate between these two patterns: tariff-cuts affecting inputs were significant, but not so large as to reverse the effect of the tariff-reduction for output. The average nominal liberalization—or potential reduction in output price—for the 31 industries is about 5%. The average effective liberalization is larger—about 7.5%, but not as large as it would have been without the widespread input-tariff cuts from which these industries benefited. Almost two-thirds of the effective liberalization rates are between 0 and 10%, indicating a generally moderate effect on value added by most domestic industries. However the exceptions to this are highly significant also. The following reviews some of the important patterns of change which emerged in the main industry groups.

In the five *agricultural* industries that were included in the sample, tariff-reductions have been relatively small on both manufactured products and primary inputs. In the cases of canned meat and noodles, no output-tariff reductions were found at all, with the result that moderate tariff-cuts affecting inputs (mainly those on metal and plastic packaging materials) brought about increased protection. For bread and straw products, virtually no input tariff changes occurred, so that the effective liberalizations are double the nominal reductions—but still moderate. Tariff protection of agricultural processing activities thus seems to have been left relatively intact by the Kennedy Round.

The only *liquor* industry which was examined is beer-production. The 35% duty which was previously levied on imported beer has been lowered to 20%, creating a potential reduction in domestic beer prices of 11.5%. Offsetting reduc-

TABLE VI. NOMINAL AND EFFECTIVE TARIFF LIBERALIZATION IN
SELECTED INDUSTRIES, 1965 to 1971

Group	Industry	Percent changes attributable to tariff-reductions in:	
		Domestic Output Price	Value Added by Domestic Industries
<i>Agriculture</i>	Canned meat	0	+10
	Canned seafoods	-4	-5
	Bread and confectionery	-4	-9
	Noodles	0	+1
	Straw products	-1	-2
<i>Liquor</i>	Beer	-11	-15
<i>Textiles</i>	Raw silk and spun silk yarn	-1	-2
	Cotton fabric	-4	-9
	Synthetic fabrics (other than rayon)	-6	-3
	Knitted fabrics	-4	-3
<i>Wood and paper</i>	Wooden furniture and fixtures	-8	-14
	Western-type paper	-1	-3
<i>Leather, etc.</i>	Leather footwear	0	+4
<i>Chemicals</i>	Nylon	-10	-13
	Vinyl chloride	-8	-6
	Ammonium fertilizers	0	+6
	Toilet preparations and dentifrices	-13	-35
<i>Non-metal minerals</i>	Plate and sheet glass	-7	-10
	Cement products	-7	-9
<i>Metal products</i>	Pig iron	-4	-21
	Hot-rolled steel	-7	-21
	Rolled aluminum	-2	0
	Steel-frame structures	-6	-7
	Household metal products	-9	-14
<i>Machinery</i>	Metal-working machinery	-5	-4
	Motors	-5	-4
	Office machinery	-3	-1
	Refrigerators and washing machines	-5	-4
	Motor Vehicles	-10	-15
<i>Miscellaneous consumer products</i>	Cameras	-10	-13
	Writing implements	-6	-7

Sources: Japan, Administrative Management Agency, *1965 Inter-industry Relations Table: Basic Data Volume* (Tokyo, 1969), and Japan Tariff Association, *Customs Tariff Schedules of Japan* (Tokyo, 1965 and 1971).

tions in tariffs on wood products (about 2% of the value of output) and glass products (5.5%) have only a small effect. The implied net reduction in value-added earnings per unit of output thus amounts to about 11%, which as a proportion of unit value-added amounts to over 15%.

All four of the included *textile* industries experienced some tariff-reduction, although in the case of raw silk the nominal liberalization is only about 1%. Raw

silk and cotton fabric producers (whose main inputs come from the sericulture and cotton yarn industries, respectively,) received little benefit from tariff-reductions on their intermediate goods, partly because these were already quite low. Producers of synthetic fabric and knitted fabrics, on the other hand, benefited significantly from tariff-cuts affecting all their synthetic-yarn and chemical-fiber inputs. In both these cases the effective liberalization was actually smaller than the nominal tariff-change.

Because their lumber, plywood and pulp inputs have experienced little tariff-reduction, both the *wood*-furniture and the *Western-paper* industries have few benefits from tariff liberalization to offset the decline in tariffs on their own competitive imports. In the case of furniture, the latter cut is a reasonably substantial one, from 20% to 10%, and the effective-liberalization rate for this industry is consequently quite high: about 14%.

The average tariff on *leather* footwear remains unchanged at about 27%, while that on leather inputs (accounting for 37% of output value) has fallen from about 18.5% in 1965 to under 15% in 1971. Inputs from the wood-products and rubber-footwear industries also benefited from moderate reductions, with the net result that the protection of leather shoe-production actually increased.

Among *chemical* manufacturers, makers of nylon, vinyl chloride and ammonium fertilizers all use substantial amounts of chemical products purchased from other industries. As a result all show significant benefits from across-the-board cuts in chemical tariffs. In the case of ammonium fertilizers, which had no tariffs in 1965, this means a net increase in protection. On the other hand, cosmetics tariffs have been considerably reduced—from an average of 34% in 1965 to about 17% after the Kennedy Round—and this reduction is offset only slightly by changes in duties affecting inputs; as a result this final chemical product had the largest effective-liberalization rate in the entire group: 35%.

Within the *metal* industries, the effects of tariff-liberalization vary markedly with the nature of the inputs used. Pig iron producers rely heavily on iron ore inputs (about 40% of the value of output in 1965), which were already duty-free in 1965. The tariff on another important input, coke (31% of output), is actually higher now than it was in 1965, because the 5% general tariff was at that time temporarily suspended. This therefore compounds the loss of protection for pig-iron making, turning it from a slightly protected activity to one which is taxed by the tariff structure. Hot-rolled steel, 75% of whose unit value is due to purchased steel ingots, is another case of strong effective liberalization due to the lack of input-tariff reductions to offset the cuts in duties on rolled steel products.

Tariffs on rolled aluminum products were dropped only a few percentage points from their 20% average in 1965; the effect of this was almost completely cancelled by reductions in aluminum tariffs, which affect over 50% of the value of output in this industry. Steel-frame construction also benefited significantly from reductions in rolled-steel and other intermediate duties. These changes also benefit the household metal-products industry, but in this case they affect a smaller

proportion of output value, and the effective liberalization is therefore more substantial.

All of the *machinery* and instrument sectors that were included experienced some tariff reduction, although in the case of office machinery it was mitigated by tariff-increases applied to some computer-related items. In every case, these own-tariff reductions were substantially offset by reductions in duties affecting inputs from steel and other metal-processing industries, and from other machinery sectors. The fact that machinery producers are heavy users of these relatively finished types of inputs, which themselves carry significant tariffs, was noted earlier as a main reason for their moderate EPR's in 1965. This same characteristic also tends to moderate the effective liberalization rates for these producers.

C. Changes in the Distribution of Protection Among Industries

The effective liberalization rates presented in Table VI indicate that the tariff cuts enacted since 1965 have definitely reduced the overall level of effective protection¹⁵, and that in a number of industries they have had quite a considerable effect. The question of how this affects the relative position of different industries still remains, and an informal approach to answering this question is presented below in Table VII. The 31 industries already looked at are ranked in order of the protection they enjoyed in 1965, and both the 1965 and the estimated 1971 effective protective rates are shown. The 1971 EPR's have been found by applying the effective liberalization rates of Table VI to the original EPR computations for 1965. Overall, the effect is to reduce the average EPR in the 31 industries from 31% in 1965 to 25% in 1971.

The changes in ranking between the two years seem fairly moderate. The single most striking exception is the cosmetics industry, which was one of the five most-protected industries in the group and now appears 20th in line. No other industry was moved more than six places by the tariff changes, and the correlation between the two sets of rankings is 0.9. The major characteristics of the distribution of protection among industries thus seem likely to remain even after the tariff liberalization of the past 7 years.

This relative constancy in ranking is undoubtedly related to the fact that the largest effective liberalizations tended to fall on the industries with the highest initial protection. Of the 9 cases whose effective changes exceeded 10%, 6 are in the upper half of the distribution with respect to 1965 EPR's, and 5 had initial EPR's over 45%. This also means that the changes have tended to reduce the

¹⁵ This may appear to be an inevitable result, but a similar study of the effect of Kennedy-Round changes in Canada turned out differently: in at least 10 of the 32 industries examined protection was found to have increased after the liberalizations (although in most cases the increases were moderate), and the average change in EPR was less than 3 percentage points, as compared with almost 7% in the 31 Japanese industries (see Table VII below). (James R. Melvin and Bruce W. Wilkinson, *Effective Protection in the Canadian Economy* (Ottawa: the Queen's Printer, 1968), pp. 33ff., including Table 3.)

TABLE VII. RANKING OF SELECTED INDUSTRIES BY EFFECTIVE PROTECTION, 1965 AND 1971

1965 Ranking	Industry	Percent Increase in Domestic Value Added Attributable to Tariffs:		1971 Ranking	Arithmetic Change in Ranking
		1965	1971		
1	Canned meat	309	350	1	0
2	Hot-rolled steel	118	72	2	0
3	Knitted fabrics	71	66	3	0
4.5	Motor vehicles	69	44	8	- 3.5
4.5	Toilet preparations and dentifrices	69	10	20	-15.5
6.5	Beer	55	32	9	- 2.5
6.5	Synthetic fabrics	55	50	5.5	+ 1
8	Noodles	51	53	4	+ 4
9	Nylon	49	30	11	- 2
10	Rolled aluminum	47	47	7	+ 3
11	Leather footwear	44	50	5.5	+ 5.5
12	Cotton fabric	39	26	12	0
13	Wooden furniture and fixtures	37	18	14	- 1
14	Raw silk and spun silk yarn	34	31	10	+ 4
15.5	Bread and confectionery	29	17	15.5	+ 0
15.5	Western-type paper	29	25	13	+ 2.5
17.5	Writing implements	26	17	15.5	+ 2
17.5	Household metal products	26	8	23.5	- 6
19	Cameras	24	8	23.5	- 4.5
20	Vinyl chloride	22	15	18.5	- 1.5
21.5	Canned seafood	21	15	18.5	+ 3
21.5	Plate and sheet glass	21	9	21.5	0
23	Office machinery	17	16	17	+ 6
24	Straw products	11	9	21.5	+ 2.5
25	Metal-working machinery	9	5	25	0
27	Pig iron	6	-16	31	- 4
27	Steel-frame structures	6	- 1	29	- 2
27	Refrigerators and washing machines	6	2	26.5	+ 0.5
29	Motors	4	0	28	+ 1
30	Cement products	- 2	-	30	0
31	Ammonium fertilizers	- 4	2	26.5	+ 4.5
31	Ammonium fertilizers	- 4	2	26.5	+ 4.5

wide variation in EPR's for different industries, a result which is of importance in itself because it means reduced distortion of the incentive-structure which determines domestic resource allocation.¹⁶

When the effective-protective changes are examined by broad industry groups,

¹⁶ This, again, is an expected pattern, because those industries with higher EPR's have more room for tariff-reduction on output and less for cuts affecting their inputs. However the tendency to reduce the variance of EPR was not found in the Canadian case, according to the study cited earlier. (*op. cit.* p. 38)

however, one important pattern is noticeable. A tendency exists for certain industries—namely, those making food, leather and textile products—to be shielded from tariff liberalization much more than others. These three (along with paper production, and probably also rolled aluminum, whose effective liberalizations were also small) are among the areas in which Japan's present comparative advantage is clearly weakest, in comparison with such industries as steel and automobiles which have been highly protected in the past but whose ability to withstand import competition has by now been established.

Of the 15 industries which formed the upper half of the distribution (in this sample of 31) in 1965, 9 were producers of food, leather or textiles. Only one of those—beer—has experienced an effective tariff liberalization of more than 9%, and with the same single exception all have either kept their relative positions or moved up in the ranking of industries by EPR. The other six industries in the top half of the 1965 list (hot-rolled steel, automobiles, cosmetics, nylon, rolled aluminum and wooden furniture) have—with one exception, rolled aluminum—experienced effective liberalizations of at least 13%, and none of them except aluminum increased its ranking between 1965 and 1971.

This contrast in the treatment of different industries is sharp, and if continued in future tariff liberalizations it can be expected to significantly alter the role which tariff protection plays in Japanese economic policy. So far, Japanese willingness to lower effective tariff protection seems to have been confined mainly to dynamic industries which have achieved a high degree of competitive efficiency under the protective umbrella previously afforded them. Relatively inefficient traditional sectors which have been protected in the past to slow down their rate of decline, have tended to keep most of their tariff advantages. Over the long run, the continuation of such a pattern would mean that the effect of the Japanese tariff structure—like those of other major industrial countries—would become almost exclusively one of slowing the reallocation of resources which is required in adjusting to changing comparative advantage. The past role of Japanese tariffs which has received so much comment from foreigners—that of aiding Japan's industrial growth strategy by encouraging such adjustments—would tend to disappear if this were the dominant pattern of future tariff-liberalization in Japan.

Federal Reserve Bank of New York

APPENDIX: NOMINAL AND EFFECTIVE PROTECTIVE RATES, 1965

	Percent increase attributable to tariffs of:	
	Domestic Output Price	Value Added by Domestic Industries
A. Food-Producing Industries		
<i>Meat products</i>		
1. Meat and its by-products	2	24
2. Canned meat products	25	309
3. Other meat products	11	2
4. Lard	13	68
5. <i>Dairy Products</i>	13	39
<i>Fruit and vegetable products</i>		
6. Canned fruits and vegetables	12	4
7. Other fruit and vegetable products	19	60
<i>Fish and Shellfish products</i>		
8. Refrigerated fish and shellfish	7	-18
9. Salted, dried and smoked fish products	16	21
10. Non-storable processed seafoods	0	-13
11. Storable processed seafoods	15	25
12. Canned seafoods	13	21
<i>Grain products</i>		
13. Polished rice and other grains	0	0
14. Flour	7	29
15. Bread and confectionery	16	29
16. Noodles	24	51
<i>Other food products (intermediate)</i>		
17. Sugar	91	214
18. Starches	3	8
19. Potato starch jelly and glucose	25	1,395
<i>Other food products (consumer)</i>		
20. Edible salt	0	-3
21. Tea and coffee	27	60
22. Cooking oils	9	52
23. Condiments	17	29
24. Other processed foods	20	36
25. Soft drinks	9	7
B. Non-food Agricultural, Forestry and Fishery Industries		
<i>Intermediate products</i>		
26. Prepared animal feeds	1	-5
27. Straw products	7	11
28. Vegetable oils and fats	4	-6
29. Animal oils and fats	4	5
30. Fish oils and scrap	0	-18
31. Rush products	0	-11
32. <i>Tobacco products</i>	0	-1
C. Alcohol and Liquor Production		
<i>Intermediate products</i>		
33. Ethyl alcohol (not for liquor manufacturing)	0	-21
34. Ethyl alcohol for liquor manufacturing	0	-26

APPENDIX—Continued

	Percent increase attributable to tariffs of:	
	Domestic Output Price	Value Added by Domestic Industries
<i>Consumer products</i>		
35. Sake (Japanese rice wine)	0	-1
36. Synthetic sake	0	-3
37. Beer	41	55
38. Other liquors	63	92
D. Textile Manufacturing		
<i>Natural-fiber yarns</i>		
39. Raw silk and spun silk yarn	9	34
40. Cotton yarn	1	-1
41. Woolen yarn	1	-1
42. Hemp yarns	50	291
<i>Synthetic-fiber yarns</i>		
43. Rayon yarn	50	273
44. Other synthetic-fiber yarns	25	92
<i>Woven fabrics-natural</i>		
45. Silk fabric	19	65
46. Cotton fabric	10	39
47. Narrow cotton fabric	21	51
48. Woolen fabric	23	138
49. Hemp fabrics	12	-27
<i>Woven fabrics—synthetic</i>		
50. Rayon fabric	19	17
51. Spun rayon fabric	15	-8
52. Other synthetic-fiber fabrics	18	55
53. Knitted fabrics—all fibers	28	71
<i>Finished textile products</i>		
54. Rope and fish net	6	1
55. Cotton and carpeting	30	153
56. Other fiber products	14	13
57. Apparel	27	43
58. Sanitary goods	21	81
59. Ready-made household textile products	23	37
30. Other ready-made textile products	31	61
E. Wood and Paper Industries		
61. Lumber	0	0
62. Plywood	7	10
63. Chips	0	-1
64. Wood products (other than furniture and footwear)	15	33
65. Wooden furniture and fixtures	23	37
66. Wooden footwear	0	-12
<i>Pulp and Paper</i>		
67. Dissolving pulp	2	2
68. Paper pulp	4	7
69. Western-type paper	13	29
70. Japanese-type paper	15	26

APPENDIX—Continued

	Percent increase attributable to tariffs of:	
	Domestic Output Price	Value Added by Domestic Industries
71. Paperboard	9	17
72. Fiberboard	20	38
73. Converted paper	18	37
74. Paper containers	13	14
75. Other paper products	15	25
F. Leather, Fur and Rubber Industries		
<i>Leather and Fur</i>		
76. Leather, and fur products other than apparel	19	76
77. Leather products other than apparel and footwear	25	41
78. Leather footwear	28	44
<i>Rubber</i>		
79. Rubber products other than footwear	11	15
80. Rubber footwear	17	23
G. Chemicals Industries		
<i>Basic Industrial Chemicals</i>		
81. Ammonia	0	-2
82. Sulphuric acid	0	-1
83. Carbide	17	26
84. Soda industrial chemicals	35	56
85. Tar chemicals (except petrochemicals)	8	11
86. Cyclic intermediates (except petrochemicals)	16	25
87. Methanol derivatives	20	47
88. Acetylene derivatives	20	53
89. Plasticizers	0	-16
90. Fermentation chemicals (except petrochemicals)	0	-47
91. Oil and fat industrial chemicals	18	53
92. Petrochemicals (except synthetic resin)	3	-2
93. Synthetic dyestuffs	21	9
94. Powders	5	3
95. Explosives	0	-3
96. Artificial silk	28	95
97. Rayon	14	42
98. Synthetic resins for fiber	4	-4
99. Vinylon	0	-13
100. Nylon	23	49
101. Acrylonitril	0	-5
102. Ester	50	92
103. Other synthetic fiber materials	16	20
104. Thermo-setting plastic	20	38
105. Vinyl chloride	17	22
106. Petroleum plastic	20	31
107. Other plastics	20	31
108. Ammonium fertilizers	0	-4

APPENDIX—Continued

	Percent increase attributable to tariffs of:	
	Domestic Output Price	Value Added by Domestic Industries
109. Phosphate fertilizers	0	- 3
110. Calcium cyanamide	0	-20
111. Other chemical fertilizers	0	- 4
112. Inorganic industrial chemicals	9	11
113. High-pressure gas	11	11
114. Pyroxylin and celluloid	20	31
115. Cellophane	20	44
116. Other basic industrial chemicals	5	- 1
<i>Finished chemical products</i>		
117. Paints, varnishes and lacquers	6	- 2
118. Medicinal preparations	18	21
119. Agricultural chemicals	20	33
120. Printing ink	20	36
121. Matches	0	- 3
122. Photographic sensitive materials	28	39
123. Plastic products	27	41
124. Soap and surface-active agents	20	34
125. Toilet preparations and dentifrices	41	69
126. Other finished chemical products	14	20
H. Non-metal Minerals Industries		
127. Petroleum refinery products	9	6
128. Coal dry distillation products	1	3
129. Briquettes	0	- 2
130. Miscellaneous anti-septicized materials	5	10
131. Fire-clay goods	12	14
132. Other structural clay products	9	9
133. Plate and sheet glass	19	21
134. Other glass and glass products	16	18
135. Pottery, china and earthenware	13	16
136. Cement	10	12
137. Carbon products	11	12
138. Abrasives	18	22
139. Asbestos products	10	15
140. Cement products	2	- 2
141. Other non-metal mineral products	10	13
I. Metals Industries		
<i>Ferrous metals</i>		
142. Pig iron	2	6
143. Ferro-alloys	6	7
144. Cast iron pipe and tubing	0	- 1
145. Steel ingots	1	- 2
146. Hot-rolled steel	13	118
147. Steel pipe and tubing	12	24
148. Cold-finished and plated steel	14	36
149. Forged steel	0	- 2

APPENDIX—Continued

	Percent increase attributable to tariffs of:	
	Domestic Output Price	Value Added by Domestic Industries
150. Cast steel	0	- 1
151. Cast and forged iron and steel for machinery <i>Nonferrous metals</i>	8	12
152. Copper	7	35
153. Lead	0	- 3
154. Zinc	0	0
155. Aluminum	4	4
156. Other nonferrous metals	0	0
157. Rolled copper	7	10
158. Rolled aluminum	17	47
159. Cast and forged nonferrous metals for machinery	9	14
160. Other basic nonferrous metal products <i>Metal manufactures</i>	10	35
161. Steel-frame structures	8	6
162. Other structural metal products	12	12
163. Metal tools	17	20
164. Firearms	0	- 9
165. Metal furniture and fixtures	14	14
166. Household metal products (other than furniture)	17	26
167. Other metal manufactures	13	14
J. Machinery Industries		
<i>Industrial machinery—nonelectrical</i>		
168. Prime movers	6	3
169. Machine tools	8	8
170. Metal-working machinery	8	9
171. Agricultural machinery	18	34
172. Mining and construction machinery	12	13
173. Chemical equipment	10	11
174. Textile machinery	13	15
175. Other machinery for specific industries	14	18
176. General industrial machinery	7	7
177. Industrial vehicles	22	54
178. Other industrial non-electrical machinery	10	12
179. General machine parts	11	11
<i>Industrial machinery—electrical</i>		
180. Generators	10	14
181. Transmission and distribution apparatus	8	5
182. Motors	5	4
183. Other industrial electrical machinery	11	8
<i>Non-industrial machinery</i>		
184. Office machinery	14	17
185. Sewing machines	15	15

APPENDIX—Continued

	Percent increase attributable to tariffs of:	
	Domestic Output Price	Value Added by Domestic Industries
186. Electric light bulbs	13	14
187. Refrigerators and washing machines	9	6
188. Other household electrical appliances	19	28
189. Miscellaneous light electrical appliances	10	11
<i>Transportation—Equipment Industries</i>		
190. Aircraft	0	— 4
191. Ships—steel	0	— 9
192. Ships—wooden	1	0
193. Railroad equipment for industrial use	0	—10
194. Other railroad equipment	9	8
195. Motor vehicles	36	69
196. Three-wheeled cycles	36	89
197. Motor cycles	14	16
198. Bicycles and rear cars	19	28
199. Other transport equipment	12	14
<i>Electronics and Precision—Instruments Industries</i>		
200. Electronic tubes and apparatus	12	13
201. Telecommunications equipment and related products	3	1
202. Electric measuring instruments	9	8
203. Electric wire and cable	4	— 1
204. Scientific instruments	7	5
205. Measuring instruments	9	8
206. Medical instruments	15	16
207. Cameras	21	24
208. Other photographic and optical instruments	17	19
209. Watches and clocks	23	27
K. Consumer Products not Classified by Material		
210. Footwear, not made of wood, leather or rubber	15	14
	19	26
211. Writing implements	17	24
212. Musical instruments	20	27
213. Toys and sporting goods (except rubber)	15	27
214. Other small consumer items		
215. Miscellaneous final products, not elsewhere classified	11	9

Source: Patricia Kuwayama, *The Effective Protection of Japanese Manufacturing Industries*, Unpublished Ph.D. Dissertation (City University of New York, 1970), Table 2-1, pp. 94 ff.

APPENDIX-continued

Notes:

Food-Producing Industries

Effective tariff rates for the food industries must be interpreted with special care because of the large number of import quotas and other non-tariff barriers which affect the producers. In 1965, nearly every one of these sectors was affected by quotas, either on its output or on major inputs. Now, after the substantial quota liberalizations of 1970 and 1971, the number of these barriers is more limited. The main items which are still involved are milk and cheese, beef, flour, certain fruits and juices, starches and a few sea foods. Still, when the role of these quota-protected items as both intermediate and final goods is considered, they are seen to affect a substantial number of food industries. In addition, prices of a number of basic commodities are regulated through state-trading: these include rice, other major grains, some dairy products, and salt. The presence of nontariff barriers—assuming that these are effective—means that tariffs become superfluous as a constraint on imports, and that they do not have the effect on prices of competing domestic goods which the EPR model assumes. The effective tariff rate, therefore, only measures what the effect of the existing tariffs might be, if they were not supplemented by other kinds of import barriers. It is not even possible to generalize as to whether actual total protection is greater, or less, than the potential protection offered by the tariff structure alone, because nontariff barriers to primary agricultural imports may increase the costs of many food-producing industries, as well as allowing some of them to charge higher prices.

Effective protection is quite high in the food-producing industries—33% on average, as compared with the 19% average EPR for all manufacturing—in spite of somewhat lower-than-average tariffs (10%, as compared with 12% for all industries).¹ Effective protection is more than three times as high as indicated by nominal tariff rates on food products, in contrast with an escalation rate (EPR divided by nominal tariff rate) for all manufacturing of about 1.6.

Food-producers receive such high effective protection mainly because many of them depend very much on raw agricultural inputs which have low or zero tariffs. A good example is the first industry in the list: 80% of the value of “meat and its by-products” represents the cost of hogs, cattle and chickens purchased from livestock growers, and these products are all imported duty-free.

However, several industries receive lower effective than nominal protection: a leading example is fruit-canners, who face very high tariffs on certain fruit imports. Others are meat products, fresh fish and salt producers, and soft-drink manufactures.

Nonfood Agricultural, Forestry and Fishery Industries

In contrast with food products, these non-food manufacturers receive very little effective protection. Most of the EPR's, in fact, are negative. With the exception of tobacco products, these are intermediate industries whose products are important inputs for the livestock, chemicals and construction industries, among others.

Alcohol and Liquor Production

Alcohol and *sake* producers appear to be taxed, rather than protected, by the tariff structure. Only producers of beer and Western liquors receive substantial tariff protection. (The latter also benefited until recently from quotas).

Textile manufacturing

Textile manufacturing receives a high degree of tariff protection according to these measure-

¹ As in the text, all tariff and EPR averages are weighted by free-trade output and value-added, respectively.

ments: the average EPR is 44%. This is due in part to unusually high tariffs—the average rate is 18%—and in part to more-than-average escalation. Most of these industries have much higher effective than nominal protective rates because they use large amounts of raw materials bearing very low duties. Of the five exceptions to this, the two most prominent are fabric industries which use hemp and rayon yarn, both of which recorded very high duty-collection rates in 1965. The negative protection of those fabric industries was thus a side-effect of very high protection afforded two other textile industries.

Wood and Paper Industries

Taken as a group, wood and paper producers have slightly lower-than-average tariff protection rates, both nominally (9%) and effectively (18%). However, these industries embrace a wide range from relatively unprocessed to highly processed manufactures, and the effect of tariff escalation within the wood-based sectors shows itself very clearly in much higher EPR's for the latter than for the former. Thus relatively low tariff rates on lumber, chips and plywood favorably affect furniture-makers and other wood-producers which use these inputs in large quantities, and low rates for wood chips and pulp are beneficial to the producers of paper, paperboard and fiberboard.

All of these industries, except for wooden footwear, supply mainly intermediate goods for other producers. However, several also make substantial quantities of consumer goods, and these are all relatively highly protected: the proportions of consumer goods output for miscellaneous wood products and for paper products are both about 20%, that for Japanese paper is almost 30%, and that for wooden furniture about 40%. However others with high EPR's are purely intermediate: Western paper, for instance, is sold mainly to the printing industry, fiberboard to the construction sectors, and converted paper to paper-container manufacturers (whose EPR, shown here, is correspondingly moderate).

Leather, Fur and Rubber Industries

Leather and its products show relatively high EPR's, reflecting the fact that virtually no tariffs are levied on hides, the main input for leather and fur processors, and the fact that tariffs on leather products, in turn, are somewhat higher than those on leather. Both leather and leather products have long been subject to import quotas also, and these account for 4 of the 9 industrial BTN items which still retain quota barriers in 1972.² The EPR's are therefore only hypothetical measures of the protection that the tariff structure might offer if other import barriers were not present. All of these protective policies presumably result at least partly from a political factor: leather-related occupations (along with slaughtering and meat-preparation, which have also been observed to be highly protected) are a traditional province of the former outcaste, or *eta*, class. The trade barriers thus protect the livelihood of those members of this small but influential interest group who are still engaged in the traditionally "unclean" occupations.

The effective protection of rubber-products manufacture is somewhat higher than its nominal protection, mainly because duties on both natural and synthetic rubber are negligibly small. The EPR for rubber footwear is above average—23%—but that for other rubber products is only 15%. The latter are very predominantly (over 90%) intermediate products, with the largest users being the motor vehicle and vehicle-repair industries.

Chemicals Industries

The chemicals industries show about an average degree of tariff escalation, with an average tariff rate of 15% and an average EPR of 23%—both somewhat higher than average. Within the group, the 36 industries manufacturing basic chemicals (accounting for slightly more than

² The others are 4 computer-related categories, and coal.

half the value added) have lower protection both nominally (11% as opposed to 20%) and effectively (18% as compared with 30%), than the 10 industries which produce finished chemical products. Among those which are highly protected are the two industries which produce mainly consumer goods: soap and detergent producers and the manufacturers of toilet-preparations. Matches and photographic sensitive materials are also sold in substantial proportions (45% and 30% respectively) to final consumers. The latter, but not the former, are highly protected by tariff barriers.

The chemicals industries are highly interrelated within themselves, each using large amounts of inputs from other manufacturers with the group. Some also depend heavily on intermediate products made in other industries, and the variety of sources for different types of chemical inputs is one reason, in addition to differences in their own tariff rates, for the tremendous variation in effective protective levels within the basic-chemicals group. Fermentation chemicals, for example, make heavy use of sugar by-products (such inputs amounting to 60% of the value of output), which are a heavily dutied category of imports, and this is one reason for the very low negative EPR for this industry. In contrast, dissolving pulp is a major input in the production of rayon, artificial silk, and cellophane (among others), and the fact that imports in this category have very low tariff rates contributes to the high EPR's found in these three industries.

The EPR for domestic production of explosives is negative. Imports of these products are restricted by quota, however—being in the group exempted from liberalization under GATT because they are controlled for reasons of security—and it therefore cannot be assumed from the tariff rates alone that domestic production is actually being discouraged relative to foreign. Some pharmaceutical chemicals—mainly vaccines and narcotics—are also under quotas, which are similarly not on the list of “residual” restrictions slated for removal under Japan's GATT obligations.

Non-metal Minerals Industries

The 15 non-metal minerals industries, taken as a whole, show no effect from tariff escalation. The average effective protection rate is the same as the average tariff rate, which is a relatively low 7.5%.

The only industry in this group which produces mainly (60%) for consumers is coal briquettes. Domestic producers of briquettes receive no effective tariff protection, although they may benefit from the coal-import quotas which include such products. Some of the processed goods in this group are relatively protected, due mainly to high tariffs on their final products rather than to tariff-escalation. Of these, glass products and china include significant proportions of consumption goods (27% and 10% respectively), as do the less-protected petroleum refinery products (13%).

Metals Industries

The average level of protection in metals industries is close to average: the EPR average is 20%, compared with average nominal protection of 9%. It is an interesting exception to the general rule that final manufactures in this group do not receive notably more protection, and are actually less affected by tariff escalation, than basic metal products: nominal and effective protection averages are 12% and 13%, respectively, for the 7 final products industries taken alone. Instead, Table A shows the greatest effective tariff protection going to certain highly processed intermediate products, such as hot-rolled steel and rolled aluminum. These enjoy significant tariffs on their outputs, and also benefit from very low rates of duty affecting their major inputs, which are primary metal products. (75% of the value of hot-rolled steel output represents that industry's purchases of steel ingots; in rolled aluminum production, the input ratio for aluminum is slightly over 50%).

All of the metal industries supply mainly intermediate products, with the exceptions of metal furniture and fixtures, used predominantly (about 60%) for capital formation, and household

metal products and firearms, most of which go into final consumption. The latter, which are publically consumed, are not protected by the tariff structure. However, since quotas are applied to imports of firearms, and the purchaser is the government itself, it is possible that nontariff advantages are granted domestic producers.

Machinery and Instrument Industries

Nominal and effective protective rates in the machinery sectors average about 19% and 18% respectively. The lack of tariff escalation seems to be due to their dependence on highly processed intermediate inputs which are themselves protected by tariffs: the principal inputs for most of these producers are finished metal products and products of other machinery manufacturers. Some important exceptions to this lack of protection are found in vehicle production, the most important being the 69% EPR for automobile producers. Vehicle production, and also some other important types of machinery production, was in addition protected until recently by quantitative import quotas. These have all now been removed, with the notable exception of computer-related imports.

Most of the industries in this group supply mainly capital goods, although much of their output is also classed as for intermediate consumption. Only four sell most of their output to households: (1) the makers of refrigerators and washing machines (2) producers of other household appliances, (3) bicycle-manufacturers and (4) camera-producers. Substantial proportions of output go into household consumption in the case of (5) light bulbs (29%) (6) motorcycles (28%) and (7) watches and clocks (37%). These seven industries have higher-than-usual EPR's—about 22% on average.

Consumer Products Not Classified by Material

This last group of six products receives a relatively high degree of effective tariff protection: about 21% on average. This results in part from higher-than-usual nominal protection (6% on average), and in part from a moderate degree of tariff escalation. These industries are mainly, but not overwhelmingly, consumer-oriented: all supply at least one-quarter of their output to other industries for use in production. Synthetic footwear, in fact, is not properly described as a "consumer good" by this criterion, because over 60% of it goes into intermediate use (the largest single purchaser being the sector providing "miscellaneous personal services").