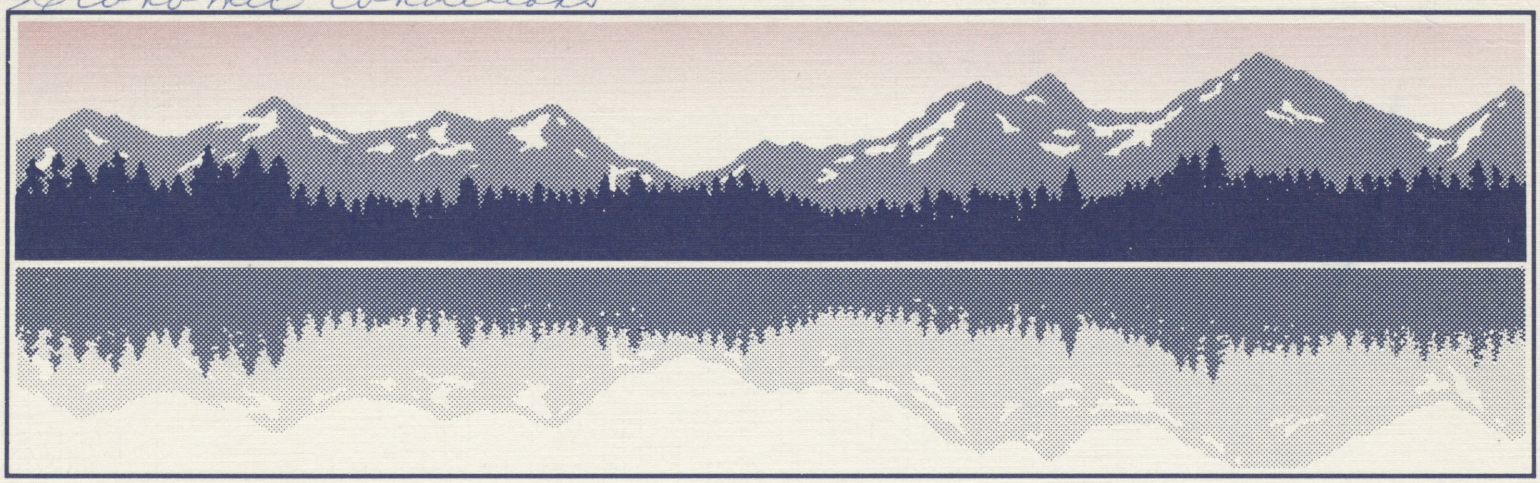
Economic conditions



PROCEEDINGS

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TRADE OF SOFTWOOD LOGS BETWEEN JAPAN AND U.S., AN ECONOMETRIC APPROACH

by

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ABSTRACT

An econometric analysis of trade in regard to imports of softwood logs by Japan from U.S. has been conducted. Two import demands consisting of one linear, and one log-linear relationship have been developed. The results indicate that demand in both cases are inelastic. Suggesting the presence of factors other than economical.

INTRODUCTION

"Japan is the focal point of Pacific-rim trade in timber products and provides the link between the timberlands of the Pacific Northwest and the remainder of the Pacific-rim."[1] For example, during the 1960s and early 1970s, Japan expanded the imports of forest products to beyond half of its domestic softwood consumption. It has intensified the competition within its suppliers of different wood products, especially in the area of softwood logs and softwood lumber. Moreover, "the volume of trade between British Columbia and Japan affects the trade between British Columbia and the United States, the United States and Japan, the Soviet Union and Japan, New Zealand and Japan, etc."[2] Japan's import increase of logs was the result of increasing construction activities, falling domestic production due to a small land base, a dense population, a timber resource that was severely depleted during World War II, and finally because of more favorable terms of trade between the U.S. and Japan. Today, Japan's forests, replanted after World War II, are approaching maturity so Japan probably could provide a greater share of its domestic consumption with domestic forests in the near future. However, Japan is still the primary customer of logs, purchasing on the average, ten million cubic meters of logs from the U.S. and seven million cubic meters from the Soviet Union. There are a number of trade barriers and cultural factors hindering trade in Japan's lumber market which in effect would influence the trade of logs between the U.S. and Japan. For example, the imposition of a ten percent tariff on sawn wood smaller than 160 mm (6.30") in thickness for the major species (fir, spruce, and pine) on the imports from the Soviet Union discourages the trade potentials for such lumber. In contrast, the major North American species are excluded from this tariff (Douglas fir and hemlock). However, all the exported lumber to Japan must be regraded.[3] The cost (of regrading) amounts to up to 13 percent of the value of the lumber. The regrading also could be considered as a rationing device, when lumber imports exceed a desired level. The use of metric lumber size in construction methods in Japan is another hindering factor affecting trade with the U.S. Even the recent introduction of western construction methods (platform/frame), compatible with the North American lumber sizes, did not result in more than 0.1 percent of the new housing featuring this method. The import restrictions on the part of Japanese could influence prices and trade flows, both in log and lumber markets, such that:[4]

1. As a result of these trade restrictions, the prices of lumber in Japan increase, while they decrease in North America. Also, Canadian lumber trade with the U.S. increases, but Canadian exports to Japan decrease.

2. There will be an increase in trade between the U.S. and Japan in the log market and prices either may increase or decrease.

Before 1985, the Canadian log exports were almost eliminated through a permit system, such that, before a government permit can be considered for log exports, the timber should be refused by domestic millers, then the government must approve the log export.

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1. 1. Gallagher, P. "An Analysis of the Softwood Log Trade Between the United States and Japan." Agricultural Experiment Station, University of Minnesota, 1980.
2. *Ibid.*
3. *Ibid.*, (a process in which the lumber is standardized).
4. *Ibid.*

The verification of existing free trade in some softwood markets is of importance while there are effective restrictions in other markets. The verification could be aided through time series data that spans housing market cycles. According to the results of a study done by Gallagher,[1] the positive correlation of the price fluctuations for similar commodities are apparent in free trade markets, since the origin and destination prices differ only by a transportation margin. However, quotas and embargoes insulate domestic from foreign prices, so correlation of the price fluctuation should be low or even negative. Correlation of the annual price changes over the 1965 to 1975 period complies with the expectation. There is a high correlation between the price changes for U.S. and Canadian lumber (Douglas fir), (r=0.94), whereas the correlation for the U.S. and Canadian sawn logs is low (r=0.58). The correlation is even lower in the case of price differences between the U.S. and Japan.[5] This is due to the quality differences in softwood species and adjustment in the exchange rates between the U.S. and Japan, but the relative magnitude in case of both log and lumber correlations are as expected. This correlation has been considered for log price changes between U.S. sawn log prices for Douglas fir (expressed in Yen) and an index of log wholesale prices for cedar and pine in Japan.

ASSUMPTION OF THE STUDY

The primary assumptions are as follows:

1. Both the U.S. and Japan trade logs in a perfectly competitive market structure.

2. The commodity of concern is assumed to be homogeneous and therefore perfect substitutes for the product produced and supplied by other countries.

3. The estimated import demand and functions in this study are assumed to be derived demands simply because they are derived from the demand for the final product or products that the factors are used to produce.

In this study, demand for logs simply refers to derived demand for logs.

OBJECTIVES AND PROCEDURES

The purpose of this study is to improve understanding of the factors affecting the Japanese import demand for U.S. softwood logs, and to estimate the influence of market forces in Japan on future trade. Specific objectives of this study are to analyze:

1. The effect of variation in Japanese income on the quantity of U.S. softwood sales to Japan;

2. The effect of variation in Japanese domestic production of softwood logs in Japan on imports from the U.S;

3. The effect of variation in imports of petroleum on imports of wood product, as an important factor in Japanese balance of payment;

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5. The following assumption were made by Gallagher in his study of the softwood log trade between the U.S. and Japan:
A) Canada is considered to be the only exporter of softwood lumber to Japan. Also, the trade policies and cultural factors play an important role, functioning as quota on lumber imports to Japan.
B) There exists a free trade in logs between the U.S. and Japan. The supply of logs that the Soviet Union takes on the role of residual supplier for the Japanese market, expanding and contracting exports conditions in the Japanese market change.
C) There exists a free trade in lumber between the U.S. and Canada.
D) The export of Canadian logs is prohibited.
E) There exists a perfect substitution between domestic and foreign softwoods.

4. The effect of variation in the interest rates in Japan, on imports of the wood product, as a primary concern in regards to the construction of new housing; and

5. To evaluate the effect of exchange rates on the price and quantity of U.S. softwood log sales to Japan.

In support of these objectives, the import demand functions of Japan for U.S. softwood logs is specified and empirically estimated. From the estimated coefficients, the reduced form coefficients is derived and used to evaluate the variation of the exchange rate and its effectiveness on the price and quantity of Japanese softwood imports.

MODEL SUMMARY AND ASSUMPTIONS

The proposed models consist of two structural equations for the commodity of concern. These models are estimated in Log-Linear, and Linear functional forms.

The principle differences between a linear regression model as opposed to a log-linear model are as follow:[6]

1. The linear regression model assumes that all the slopes are constant, while such an assumption does not apply to the log-linear model.

2. As a consequence of (1), the elasticities are constant under the log-linear model, but not under the linear regression model.

3. The choice of functional form also depends on the form of demand curve for the final product from which the factor's demand is derived therefore depending on whether the demand for final product is linear or not, we choose an appropriate functional form for the derived demand.

For each case two alternative specifications have been considered. One alternative considers the domestic price as a factor involved in the model, while the other disregards the domestic price as an influencing variable

Table 1 shows the variable definitions, equations, estimation procedure, and expected signs.

Statistical Results

The following table display all the estimated coefficients of the Japanese import demand function for U.S. logs. As illustrated, all the estimated coefficients, except for the U.S. log export price have the expected signs. Only in one case (import demand for logs includes domestic price of logs), GNP per capita does not carry the expected sign. Housing start in all four cases of import demand for logs has a significant coefficient, while the U.S. log export to Japan (deflated by WPI), and exchange rate are significant only in the log linear model. The rest of the coefficients are either not significant or minimally significant under different trials.

The estimated import demand elasticity for logs with respect to one percent increase in the U.S. export price to Japan (deflated by WPI) indicates that, *ceteris paribus*, an increase in demand for logs by, 1.21, 1.26, 0.37, and 0.56 percentage respectively.

As far as the collinearity between the explanatory variables is concerned, the result of the coefficient matrices suggest the existence of a strong linear relationship among most of the independent variables.

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6. Cassidy, H.J. *Using Econometrics*, 1981. Reston Pub. Co. PP. 46-48.

TABLE 1. Variable Definitions

Variable	Expected Sign	Definition
GNP/POP	(+)	GNP per capita
IMFXR	(+)	IMF exchange rate Y/$
JPIP	(-)	Interest rate in Japan
JPPI	(-)	Japan's petroleum imports
STARTS	(+)	Total housing starts
USLOGXJ	N.A	U.S. log export to Japan
USXJGWPI	(-)	U.S. log price to Japan / WPI
JDEFLOGP	(+)	Japanese deflated log price
USLOGXJ1	(+)	U.S. log export price lagged 1 Yr
DLOGP	(-)	Japanese log, domestic production

Equations

$$(1)\quad \log(USLOGXJ_t) = \log(b_0) + b_1\log(USXJGWPI_t) + b_2\log(JDEFLOGP)_t + b_3\log(USLOGXJ1_t) + b_4\log(GNP/POP)_t + b_5\log(STARTS)_t + b_6\log(IMFXR)_t + b_7\log(DLOGP)_t + b_8\log(JPIP)_t + b_9\log(JPPI)_t + U_t$$

$$(2)\quad USLOGXJ_t = b'_0 + b'_1 USXJGWPI + b'_2 JDEFLOGP_t + b'_3 USLOGXJ1_t + b'_4 (GNP/POP)_t + b'_5 STARTS + b'_6 IMFXR_t + b'_7 DLOGP_t + b'_8 IPIP_t + b'_9 JPPI + U_t$$

TABLE 2. Estimated Elasticities (OLS) For Japanese Import of Logs From the U.S., 1961-1985

VARIABLES	LOG LINEAR MODEL		LINEAR MODEL	
	WITH DOMESTIC P	NO DOMESTIC P	WITH DOMESTIC P	NO DOMESTIC
USXJGWPI	1.2153 (1.658) *	1.2655 (2.039) ***	0.3737 (0.885)	0.5660 (1.497) *
JDEFLOGP	5.2277E-04 (0.142)	N.A.	0.3285 (0.349)	N.A.
USLOGXJ1	0.0038 (0.922)	0.0037 (0.944)	0.2298 (1.105)	0.3408 (1.803) **
GNP/POP	0.2077 (0.623)	0.2261 (0.762)	-0.0922 (-0.583)	0.1776 (0.915)
STARTS	0.0068 (1.932) **	0.0067 (2.060) **	0.5078 (3.038) *****	0.3175 (1.816) **
IMFXR	1.6254 (1.446) *	1.6961 (1.741) *	0.1260 (0.147)	0.3909 (0.505)
JPIP	-7.5421E-04 (-0.333)	-6.4501E-04 (-0.314)	-0.0680 (-1.043)	-0.1681 (-0.859)
JPPI	-0.3831 (-0.957)	-0.4002 (-1.083) *	-104.63 (-0.657)	-0.1819 (-2.039) **
DLOGP	-0.0457 (-0.911)	-0.0465 (-0.964)	-0.0680 (-1.043)	-0.0651 (-1.149) *
DF	14	15	15	15
DW	1.78	1.78	2.17	2.61
R^2	0.86	0.86	0.90	0.92

NOTES:

1. The numbers on the first row of each of the variables are the respective elasticities.
2. The numbers in the parenthesis are the t Stat.
3. The level of significance are indicated by * under the values:
   * = %10 Level of significance,
   ** = %5 Level of significance,
   *** = %2.5 Level of significance,
   **** = 1% Level of significance,
   ***** = %0.5 Level of significance.

The presence of multicollinearity in turn may have caused the value of the estimates of the coefficients to be unstable and imprecise, although statistically unbiased. The signs of the parameters could have been affected as the degree of collinearity has increased, i.e., the lagged dependent variable and Japan's petroleum imports which do not carry the expected signs, show a strong linear relationship with most of the other variables. This latter effect may have caused problems regarding the important parameters in the model. On the other hand, multicollinearity could have caused the standard errors of the estimates to be large, which in turn may call for rejection of some important variables from the model. In short, misspecification of the variables may be the outcome of existing multicollinearity.

No attempt for correction of multicollinearity was pursued, due to the nature of this problem, and also, due to the existence of certain limitation on the part of this study, (i.e., availability of additional data and prior information).

Despite the results obtained by Gallagher,[1] this study shows that the overall effect of domestic price of logs produced in Japan is small in response to Japanese import demand. This view is suggested by comparison of the results in modified version of the models applied to the product. Also, this study suggests that the domestic production of logs in Japan has no influence on import demand for logs.

Finally, the inclusion of Japanese petroleum imports, as an influencing factor in the balance of trade, shows no direct effect on demand for concerned commodity and the exchange rate has minimum effect on the demand for logs.

SUMMARY AND CONCLUSIONS

Japan is the largest market for U.S. forest products. Therefore, export of wood products to this country is critical to the economic life of the forest industry in the U.S. and particularly for the Pacific Northwest. Hence, economic conditions and developments in Japan may significantly affect the volume of trade for the product of concern and, in turn, the well-being of the U.S. log production-consumption system. Few studies have addressed forest product trade between the U.S. and Japan.

This study is designed to determine the effect of several selected market factors on the Japanese import demand for U.S. softwood logs and to estimate the influence of these factors on Japan's future trade. A numerical model was developed incorporating these selective factors, thought to be relevant, to determine their effects on the Japanese market for the U.S. forest products. The evaluation considers the effects of variations in: Japanese income, domestic production of softwood logs in Japan, domestic prices of the products of concern, petroleum purchased by Japan, nominal interest rates in Japan, the exchange rates, and finally a weighted average of price of the product from the Pacific Northwest (Oregon and Washington, only). Given the available resources, two empirical time series models for imported logs were estimated by OLS technique using annual data from 1961 through 1985.

The results indicate that the Japanese import demand for both cases are inelastic. This finding, along with other evidence, suggests the distortion of the Japanese import demand for U.S. forest products by factors other than economic, mainly politics involved in trade restraint between the two countries.

The study shows that housing starts is the only significant factor in Japanese import demand for U.S. logs. Also, the exchange rates and log export prices to Japan (deflated by Japan's wholesale price index), are significant only when the log linear model has been applied.

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