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Exchange Rate Movements and Tradable Goods Prices in East Asia: An Analysis Based on Japanese Customs Data, 1988-98

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Abstract

The paper uses a dynamic panel data model to estimate the pass-through coefficients of 20 nine-digit industrial commodities that are traded between Japan and its East Asian trading partners to investigate the response of tradable goods prices to exchange rate movements. By using the monthly series of unit export and import values obtained from the Japanese customs data for the period 1988-98, it shows that price pass-through is much larger for exports from Japan than for imports to Japan.

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I. INTRODUCTION

The purpose of this paper is to investigate the response of tradable goods prices to exchange rate movements in selected East Asian countries, with a view to gaining some understanding of the mechanics of external adjustment associated with an exchange rate change. Within the context of East Asian countries, how the prices of tradable goods might respond to exchange rate movements is of particular interest in the light of the recent turmoils in the foreign exchange markets and the associated adjustment policies pursued, often with Fund assistance. The Asian currency turmoils, which began with the floating of the Thai baht on July 2, 1997, spread to other countries in the region, including Indonesia, Malaysia and the Philippines, over the ensuing months (IMF 1998; World Bank 1998).

The pace of external adjustment initiated by an exchange rate movement in part reflects how exports and imports are priced. Undoubtedly, in the final analysis, the current account of an economy is a macroeconomic variable which is determined by the saving and investment decisions of economic agents. Nevertheless, the economics profession has accumulated a large literature on the relationship between exchange rates and prices, which is considered to play some underlying role in the adjustment of external balances when the exchange rate changes. Particularly since the latter part of the 1980s, when the US current account deficit did not show an immediate and marked decline despite the significant fall in the value of the US dollar, the literature has grown considerably (see, for example, Dornbusch 1987; and Hooper and Mann 1989).

The central finding of this literature is that tradable goods prices generally do not change equi-proportionately with a change in the exchange rate. When the currency of an exporting country appreciates, for example, the local currency price of exports in the purchasing country typically does not rise as much as the extent of currency appreciation, such that "pass-through" is said to be incomplete. The popular explanation for such incomplete pass-through, initially attributable to Krugman (1987), is the pricing-to-market (PTM) behavior of exporters designed to maintain or increase market share in the importing country.

Despite the existence of a relatively large literature on pass-through, PTM behavior and other related issues, however, little work has so far been performed on the relationship between exchange rates and tradable goods prices in developing or emerging market economies. The work of Knetter (1989) on the export pricing behavior of US and German exporters did cover a few developing countries as the destination markets in a limited number of industries.[1] Hung, Kim and Ohno (1993) was another limited study to analyse the response of export prices to exchange rate and domestic cost developments in developing or emerging economies on the basis of fairly large industry categories in Korea and Taiwan province of China during the 1970s and 1980s.[2] In neither of these studies, however, pass-through or PTM behavior was explicitly estimated either for an individual developing or emerging economy or for any of its constituent industries. Thus, an important additional contribution of

of the present paper is to extend the existing literature to a sizable sample of developing or emerging market economies.

The remainder of the paper is organized as follows. Section II presents a brief overview of the empirical literature on exchange rates and prices. Section III specifies the empirical model to be estimated, underscoring the importance of the coefficient of the exchange rate variable as the pass-through ratio. Section IV describes the content and sources of the panel data used in the study. Section V presents the estimation results and shows, among other things, that pass-through is generally much larger for Japanese exports and for Japanese imports. It will also discuss the implications of the estimation results for the question of external adjustment in East Asia. Finally, Section VI presents concluding remarks.

II. A Brief Overview of the Empirical Literature on Exchange Rates and Prices

The modern empirical literature on exchange rates and prices can be divided into two broad categories of studies, depending on their underlying emphasis or motivation, although both are united in their recognition that sluggishness in the adjustment of tradable goods prices in response to a change in the exchange rate might somehow limit the extent of external adjustment or the international transmission of inflation. The first category of studies, which dates back at least to Isard (1977) and Kravis and Lipsey (1977, 1978), emphasizes the divergent behavior of domestic and export prices or the violations of the law of one price. On the other hand, the second category of studies found in the literature, including the early works of Dunn (1970) and Magee (1973, 1974), stresses how quickly tradable goods prices respond to a change in the exchange rate; the more recent contributions have increasingly emphasized the industrial organization (as opposed to currency contracting) aspects of pass-through (e.g., Dornbusch 1987).

As an empirical study of Japan in the first genre, Giovannini (1988), for example, showed that Japanese exporters price-discriminated between the domestic and the export (predominantly US) markets during 1973-83, by using the monthly domestic and export prices of three manufactured goods. Similarly, Marston (1990) employed the monthly export and domestic prices of 17 Japanese products for the period from 1980 to 1987 to show that Japanese manufacturing firms varied the ratio of export prices to domestic prices in response to changes in the real effective exchange rate.[3] The work of Sazanami, Kimura and Kawai (1997) was another study to demonstrate deviations between domestic wholesale prices and export/import prices in Japan by using monthly data on a highly disaggregated level during 1985-95.

In the second category of studies, Hooper and Mann (1989) were among the first to estimate the pass-through ratios for US imports of manufactures during the recent period of dollar depreciation following the Plaza Agreement of 1985, obtaining the estimates of around 20 percent in the short run and 50-60 percent in the long run (see also Mann 1986).[4] Such

pricing behavior on the part of non-US exporters, however, may not be reciprocated by US exporters. In an often-quoted study, Knetter (1989) used the seven-digit export unit values of six US and ten German export industries for the period from the late 1970s to the middle of the 1980s[5] to show that US export prices were much less sensitive to exchange rate fluctuations than German export prices. Gagnon and Knetter (1995) likewise analysed the export pricing behavior of Japanese, German and US automobile manufacturers in major industrial country markets based on annual data for the recent floating exchange rate period through 1987 and found that Japanese and (to a lesser extent) German exporters displayed PTM behavior (designed to stabilize the buyer's prices) but that US exporters displayed virtually no such behavior (see also Hung, Kim and Ohno 1993).

In a similar vein, Ohno (1989) showed that pass-through coefficients were higher for US exporters than for Japanese exporters, by defining the coefficients in terms of the real effective exchange rate and using the quarterly US and Japanese export prices of several two-digit and four-digit industries from the late 1970s or early 1980s through 1987, indicating that Japanese firms price-discriminated between the domestic and the export markets to a greater extent than their US counterparts. This asymmetry between US and non-US exporters, however, may to some extent reflect the difference in the types of commodities covered in the sample, as suggested by a later study of Knetter (1993) based on the annual data of US, Japanese, British and German seven-digit exports for the period from the early 1970s through 1987. Although the asymmetry was evident when the overall samples were used, pricing behavior became much more similar across source countries when the sample was limited to the matching industries only. PTM behavior itself may also be asymmetric with respect to depreciation and appreciation. Finding more pronounced PTM behavior for appreciation in the annual data of German and Japanese exporters of manufactured products during the recent floating rate period through 1987, Knetter (1994), for example, surmised that such pricing behavior was driven by the desire of exporting firms to build market share.

Now, we will build on these and other preceding studies by applying the basic methodology of the literature to a sample of developing or emerging market economies in East Asia. Among other things, we would like to know if the pricing behavior of Japanese exporters differs across destination markets in East Asia even for the same category of products; if the pricing behavior of East Asian exporters differs even for the same category of products exported to the same market (i.e., Japan); if there is any systematic difference in pass-through behavior between exports and imports or between different types of commodities; and how these differences and similarities in pricing behavior, if any, might affect the adjustment of trade balances between Japan and East Asian countries, when there is a change in the bilateral exchange rate. An additional insight may be provided into these issues by the inclusion of the United States and Germany in the sample.

III. THE MODEL FOR ESTIMATION

In a world of imperfect competition, the same commodities may be sold in different markets at different prices, and how much of an exchange rate change is passed through to the local import price of a given commodity in a given market reflects the conscious price-setting behavior of the exporting firm. In general, one can show that profit maximization would lead the exporting firm to set the price in the ith market (P_i) on the basis of the price elasticity and other local demand conditions (summarized as D), marginal cost (MC), and the exchange rate (E),

$$P_i = f(D_i, MC, E_i) \tag{1}$$

Linearizing equation (1) and assuming that the exporting country is Japan, we have, for the Japanese exports of a given industrial product to the ith country,

$$p_{it} = \alpha_i + mc_t + \beta_i e_{it} \tag{2}$$

where the lower case letters (mc and e) are the logarithms of the variables concerned (MC and E), the fixed country constant (α) is assumed to reflect the demand conditions, β is the elasticity of the local import price with respect to the exchange rate, i is a country subscript and t is a discrete time subscript. In equation (2), the parameter of central importance is β, which is interpreted as indicating the degree of pass-through.

As noted earlier, pass-through is said to be complete if a change in the exchange rate is fully translated into a one-to-one change in the import price, suggesting that the export price remains stable in the exporting country's currency. On the other hand, pass-through is zero if the import price does not change in response to a change in the exchange rate, such that the export price changes one-to-one in the exporting country's currency. Incomplete pass-through (or PTM behavior) reflects not only monopolistic price discrimination, as we have implicitly assumed so far, but also such factors as adjustment costs, market share-driven intertemporal strategic behavior, market structure and the sunk cost of market entry or exit (see, for example, Dohner 1984, Dornbusch 1987, Baldwin 1988, Froot and Klemperer 1989, Fisher 1989, and Kasa 1992). In many of the existing models of export pricing behavior which emphasize these elements, how export prices may respond to an exchange rate change depends on whether the exchange rate change is perceived as temporary or permanent, as well as whether the change is large or small. In this paper, however, we are concerned only with the numerical values of β irrespective of how such values are generated, because our ultimate purpose here is not to uncover the underlying pricing behavior of the exporting firm, but to understand the mechanism of external adjustment in response to an exchange rate movement, particularly in the context of East Asian countries.

From equation (2), the regression equation is given as,

$$p_{it} = \beta_i e_{it} + \alpha_i + \gamma_t + \varepsilon_{it} \tag{3}$$

where the fixed time effect (γ), identical across destination countries, is assumed to reflect the marginal cost conditions of the exporting country, and ε is a random error term. As we will be utilizing a panel data set (see below for details), we are relieved of the task to estimate a marginal cost function by assuming that marginal cost (in the exporting industry) is identical for all destination countries, although it may well change from period to period. In other words, in a panel data framework, the fixed time effect can be interpreted as reflecting the marginal cost of the exporting industry. As to the β coefficients, though Knetter (1993) presented some evidence to show that, for some industries, the coefficients may be identical across destination countries, we are here allowing them to be different because our preliminary tests (not reported here) overwhelmingly rejected the restrictions that they were identical across destination (as well as source) countries.[6]

For the Japanese imports of a given industrial product from the ith country, the economic interpretation of the fixed time effect and the fixed country effect must be reversed. Now, the fixed time effect (γ) is specific to Japan as the importing country, and presumably reflects the demand and local price conditions, which are time-dependent but common across source countries. The term may also reflect the global cost or price developments. The fixed country effect (α), on the other hand, controls for source country-specific factors, including differences in the level of marginal cost or the quality of products. It should be emphasized that, on the import side, the very existence of several source countries in the sample precludes the possibility of monopolistic price discrimination. In some highly homogeneous commodities (such as scrap metal), pricing behavior may even approach that obtainable under perfect competition. Thus, the failure to account explicitly for marginal cost on the import side (other than the effect operating through wholesale prices included in the exchange rate variable – see the next section) cannot be too serious, because the local market conditions in Japan must exert more influence on the import prices of such commodities than marginal cost in the exporting country. The point is that, for both imports and exports, the panel data methodology controls for time-specific and country-specific factors, so as to better isolate the impact of an exchange rate change on the prices of traded commodities.

IV. The Panel Data

The price data used in the study are the export and import unit values calculated from the Japanese customs data on the quantities and values of nine-digit exports and imports, as published by the Japan Tariff Association in its monthly issues of *Japan Exports and Imports*. The unit values (in yen terms) are obtained by dividing the value of shipments by the quantity of shipments. The use of unit values from the customs data was necessitated by the desire to obtain destination or source-specific data. Although the Bank of Japan publishes disaggregated export and import price indices, the reported prices are not broken down by destination or source but are average figures for all destination or source countries (Marston 1990).

As discussed in Knetter (1989), however, the use of unit values may introduce measurement error to the extent that the products covered are heterogenous. For example,

even within the same category of traded goods (e.g., automobiles), different types and qualities of goods may be exported to different countries, depending on the income levels, tastes, the availability of import substitutes and other characteristics of the destination markets. Moreover, within the same market, different types and qualities of goods may be affected differently when the exchange rate changes. As the local currency depreciates, for example, it may be that the import volume of more expensive goods is reduced more than that of less expensive goods. These potential difficulties are further compounded by the use of industry (as opposed to firm-specific) data, which introduces aggregation problems. Here, we are simply assuming that the data show the behavior of a representative firm (see Knetter 1989).

The sample is made up of the monthly unit values of 11 export and 9 import products during the 10-year period from January 1988 to April 1998. In addition to Japan, which is considered to be the home country, the countries in the sample are Indonesia, Malaysia, the Philippines, Singapore and Thailand; for comparison purposes, the United States and Germany are also included. Korea, obviously a country of considerable interest, is not included in the sample because of the various restrictions it maintained on its imports from Japan during the sample period. These 20 products were selected because, according to our preliminary investigation of the customs data, they represented all of the goods that satisfied the requirement that complete data exist for all of the sample countries for the entire sample period. It has turned out, however, that there were occasionally missing values in one or more countries, even for some of these products.

On the export side, the 11 commodities are: (1) spark-ignition reciprocating internal combustion piston engines (8407.34-900); (2) fuel, lubricating or cooling medium pumps for internal combustion piston engines (8413.30-000); (3) fork-lift trucks with a compression-ignition internal combustion piston engine (8427.20-110); (4) starter motors and dual purpose starter-generators for motor vehicles (8511.40-100); (5) plugs and sockets (8536.69-000); (6) boards, panels, consoles, desks, cabinets and other bases for the control or distribution of electricity (8537.10-000); (7) colour cathode-ray television picture tubes (8540.11-000); (8) motor vehicles principally designed for the transport of persons with a spark-ignition internal combustion reciprocating piston engine of a cylinder capacity exceeding 1500 cc but not exceeding 2000 cc (8703.23-910); (9) brakes and parts (8708.39-000); (10) electrostatic photo-copying apparatuses (9009.12-000); and (11) microscopes (9011.80-900).

On the import side, the 9 commodities are:(1) wood sawn, chipped lengthwise, sliced or peeled, with a thickness exceeding 6mm (4407.99-500); (2) other articles of wood (4421.90-099); (3) waste and scrap of stainless steel (7204.21-000); (4) parts and accessories of automatic data processing machines or units (8473.30-010); (5) DC motors of an output not exceeding 10 W (8501.10-011); (6) parts and accessories suitable for use solely or principally with record players, cassette players, telephone answering machines, tape recorders and video recording apparatuses (8522.90-000); (7) other switches for a voltage not exceeding 1000 V (8536.50-090); (8) plugs and sockets for a voltage not exceeding 1000 V (9401.69-090); and (9) wooden furniture (9403.60-020).

The monthly average exchange rate and wholesale price data are obtained from the International Monetary Fund, *International Financial Statistics*, monthly issues. The yen cross rates are calculated from the US dollar exchange rates. The exchange rate variables used are the nominal exchange rates adjusted by the wholesale price indices of source or destination countries, intended to control for the movements of cost. In obtaining the cost-adjusted exchange rates, the Japanese wholesale price index is not used because presumably the fixed time effect already incorporates the Japanese price or cost level, which is time-variant but common for all source or destination countries. In estimation, all variables are expressed in logarithm.

V. Estimation Results

Equation (3) is estimated by the fixed effects (FE) least squares or least squares dummy variables (LSDV) method, using monthly data for the period from January 1988 to April 1998, except that the price (unit value) variables are all expressed in yen terms (for the basic methodology, see Hsiao 1986 and Baltagi 1995). On a visual inspection, the price variables are fairly volatile series but, unlike most general price indices, do not seem to possess an obvious trend-like component indicative of non-stationarity.[7] The exchange rate variables are defined as the logarithmic sum of the yen price of the currency of a destination or source country and its wholesale price index, such that an increase in value can be loosely interpreted as a real depreciation of the yen (except that the effect of Japanese wholesale prices, which is presumably incorporated in the fixed time effect, is excluded). This means that, in the export price equation, complete pass-through obtains when the value of β is zero, i.e., the yen price of exports does not change when the yen changes in value, such that the exchange rate change is fully passed through to the local import price in the buyer's market. On the other hand, in the import price equation, complete pass-through obtains when the value of β is unity, i.e., the yen price of imports rises (falls) one-to-one with a depreciation (an appreciation) of the yen.

As our preliminary estimation indicated the presence of significant serial correlation in residuals, it was decided to include the lagged dependent variable (p_{it-1}) in the actual estimation of equation (3) in the framework of a so-called dynamic panel data model,

$$p_{it} = \phi\, p_{it-1} + \beta_i e_{it} + \alpha_t + \gamma_t + \varepsilon_{it} \qquad (4)$$

where ϕ is the coefficient of the lagged dependent variable. In a dynamic panel data model with country dummies (such as equation (4)), it is well known that the lagged dependent variable is corelated with error terms and, worse still, the resulting bias in estimation does not vanish as sample size increases; the use of Generalized Method of Moments (GMM) estimators is generally recommended in these cases (see, for example, Nickell 1981; Beggs and Nerlove 1988; Arellano and Bond 1991). It should be noted, however, that sample size in the context of dynamic panel data models refers to the number of countries (N) and not to the number of time periods (T). In fact, it is also known that as T becomes large, the bias diminishes asymptotically, such that LSDV estimators are consistent with respect to T (see,

for example, Kiviet 1995). As our sample has over 120 time periods (far larger than typically found in conventional dynamic panel data models), we believe that our use of conventional LSDV estimators is amply justified.[8]

Table 1 presents summary statistics along with the estimated coefficients of the lagged dependent variable. For all commodity groups, the fit (in terms of adjusted R^2) is generally good and there is little evidence of serial correlation. The estimated coefficients of the lagged dependent variable, which are found to be significantly smaller than unity, confirm our earlier visual observation that the price variables are likely stationary series. Table 2 and Table 3 present the estimated pass-through coefficients for Japanese exports and imports, respectively, where the figures in parentheses are p-values for the hypothesis that the coefficients are zero (e.g., the p-value of 0.05 means that the hypothesis is rejected at the 5 percent level).

According to Table 2, the estimated values of β are generally insignificantly different from zero, meaning that pass-through is complete for many of the Japanese exports sold in many of the markets in the sample. Even for the United States, the hypothesis that the coefficient is zero (i.e., pass-through is complete) can be rejected only in two commodities, namely, pumps and electricity boards. Obviously, the price setting behavior of Japanese exporters depends on the market and the type of commodities. Interestingly, for example, more PTM behavior is observed for pumps and forklifts (the hypothesis of complete pass-through is rejected in 4 out of 8 destination markets), while PTM behavior for copiers is observed only for Germany. At any rate, the general lack of strong PTM behavior on the part of Japanese exporters contrasts sharply with the conventional wisdom in the literature that they display little PTM behavior, at least compared to the US and (to a lesser extent) German counterparts.

From Table 3, the opposite conclusion seems to emerge about the pricing of Japanese imports. In an overwhelming portion of the commodities and source countries included in the sample, the hypothesis that the value of β is zero cannot be rejected, meaning that pass-through is far from complete (for which the value of unity is required). Even in the 11 cases where the hypothesis of zero pass-through can be rejected at the 1 or 5 percent level, four coefficients have a negative sign. It is noteworthy that, even for imports from the United States, a significant incidence of local price stability is observed, the phenomenon which is at odds with the conventional wisdom that US exporters pass through almost all of exchange rate changes to local prices in the buyer's market.

In order to give structure to the otherwise disorderly array of coefficient values scattered over a wide range, it may be useful to isolate those values that are conducive to external adjustment for each of the sample countries (Table 4). The value of β is considered to be conducive to external adjustment if the implied pricing behavior causes the import price to move in the same direction as the exchange rate. In the case of exports, the import price moves in the same direction as the exchange rate as long as β is smaller than unity. If it is equal to or greater than unity, a depreciation (an appreciation) of the yen causes the yen

Table 1. Summary Statistics

Commodities 1/	NOB	Adj-R^2	D-WL	Lagged price 2/
Exports:				
Piston Engines	861	0.928	2.622	0.81**
Pumps	861	0.486	1.810	0.17**
Forklifts	861	0.535	2.108	0.25**
Starter Motors	738	0.477	2.061	0.21**
Plugs and Sockets	861	0.885	2.547	0.74**
Electricity Boards	861	0.616	2.127	0.41**
Picture Tubes	492	0.678	2.289	0.65**
Motor Vehicles	492	0.928	2.634	0.81**
Brakes	861	0.669	2.330	0.67**
Copiers	738	0.747	2.051	0.23**
Microscopes	492	0.614	2.006	0.02
Imports:				
Wood	615	0.815	2.555	0.58**
Articles of Wood	738	0.730	2.146	0.26**
Scrap of Steel	738	0.897	2.111	0.27**
Computer Parts	615	0.642	2.317	0.58**
DC Motors	615	0.920	2.094	0.30**
Appliance Parts	615	0.817	2.416	0.64**
Switches	369	0.480	2.106	0.54**
Plugs and Sockets	615	0.772	2.100	0.29**
Wooden Furniture	738	0.777	2.115	0.34**

1/ For more detailed descriptions of these commodities, see Section IV in the text.
2/ The estimated coefficient of the lagged dependent variable; ** indicates that the coefficient is significant at the one percent level.

Table 2. Estimated Pass-through Coefficients for Japanese Exports, 1988-1998 1/

Commodities 2/	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	United States
Piston Engines	0.024 (0.87)	0.156 (0.59)	0.724** (0.00)	-0.092 (0.67)	0.182 (0.48)	0.393 (0.15)	0.180 (0.45)
Pumps	-0.113 (0.48)	-1.082** (0.00)	0.012 (0.95)	-0.393* (0.08)	1.746** (0.00)	0.165 (0.56)	0.509** (0.04)
Forklifts	-0.138 (0.30)	-0.530** (0.04)	-0.211 (0.20)	-0.392** (0.04)	-0.498** (0.00)	-0.520** (0.03)	-0.083 (0.69)
Starter Motors	–	0.997** (0.01)	0.372 (0.13)	0.154 (0.58)	0.506 (0.13)	1.005** (0.01)	0.422 (0.18)
Plugs and Sockets	0.388** (0.02)	0.138 (0.67)	-0.420** (0.05)	0.093 (0.70)	0.378 (0.19)	0.285 (0.35)	0.059 (0.83)
Electricity Boards	-1.372** (0.01)	0.376 (0.72)	0.998 (0.14)	0.669 (0.39)	-1.060 (0.26)	0.121 (0.90)	2.382** (0.01)
Picture Tubes	–	–	–	0.182 (0.46)	0.239 (0.40)	0.385 (0.23)	0.142 (0.60)
Motor Vehicles	–	0.295** (0.00)	–	-0.110 (0.11)	–	0.060 (0.48)	0.044 (0.55)
Brakes	-0.042 (0.68)	0.211 (0.29)	-0.210* (0.10)	-0.069 (0.63)	0.059 (0.73)	0.078 (0.67)	0.073 (0.65)
Copiers	–	-0.448 (0.14)	0.194 (0.33)	0.008 (0.97)	-0.165 (0.54)	0.954** (0.00)	0.005 (0.99)
Microscopes	–	–	–	-1.538* (0.08)	-0.265 (0.79)	1.227 (0.28)	0.077 (0.94)

1/ Figures in parenthesis are p-values; ** and * indicate that the coefficient is significant at the 5 and 10 percent, respectively; the value of zero means complete pass-through.
2/ For more detailed descriptions of these commodities, see Section IV in the text.

Table 3. Estimated Pass-through Coefficients for Japanese Imports, 1988-1998 1/

Commodities 2/	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	United States
Wood	0.053 (0.51)	0.049 (0.75)	-0.150 (0.13)	–	-0.077 (0.57)	–	-0.012 (0.92)
Articles of Wood	-0.270 (0.22)	0.248 (0.55)	0.645** (0.02)	–	0.274 (0.46)	-1.156** (0.00)	-0.362 (0.27)
Scrap of Steel	0.006 (0.92)	-0.183 (0.12)	-0.113 (0.14)	-0.209** (0.02)	-0.114 (0.28)	–	-0.119 (0.22)
Computer Parts	–	–	-0.256 (0.33)	0.080 (0.79)	1.039** (0.00)	0.704* (0.07)	0.662** (0.05)
DC Motors	–	0.151 (0.77)	–	0.533 (0.16)	0.193 (0.67)	-1.798** (0.00)	0.771* (0.07)
Appliance Parts	–	-0.331 (0.58)	-0.068 (0.86)	0.097 (0.82)	0.573 (0.27)	–	0.146 (0.76)
Switches	–	–	–	-0.712 (0.22)	–	0.143 (0.85)	-0.711 (0.27)
Plugs and Sockets	-0.400 (0.16)	-0.013 (0.98)	–	–	-0.141 (0.77)	-0.983** (0.05)	0.446 (0.30)
Wooden Furniture	-0.308 (0.29)	–	-0.518 (0.15)	2.905** (0.00)	-0.244 (0.62)	1.529** (0.00)	0.640 (0.16)

1/ Figures in parenthesis are p-values; ** and * indicate that the coefficient is significant at the 5 and 10 percent, respectively; the value of unity means complete pass-through.
2/ For more detailed descriptions of these commodities, see Section IV in the text.

Table 4. Frequency of Estimated Pass-through Coefficients That Are Conducive to External Adjustment
(Percentage points in parentheses)

	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	United States
Exports:1/							
	6/6	7/9	7/8	10/11	8/10	7/11	9/11
	(100%)	(78%)	(88%)	(91%)	(80%)	(64%)	(82%)
Imports:2/							
	0/5	1/6	1/6	1/6	2/8	2/6	4/9
	(0%)	(17%)	(17%)	(17%)	(25%)	(33%)	(44%)

1/ The criterion is that the β coefficient is significantly smaller than unity.
2/ The criterion is that the β coefficient is significantly greater than zero.

export price to change one-to-one or more than one-to-one with the exchange rate, such that the local import price in the buyer's currency either does not change or even rises (falls). For imports, the same reasoning suggests that, as long as β is greater zero, the yen import price moves in the same direction as the exchange rate.

According to Table 4, which simply reports the frequency of adjustment-conducive β coefficients for each of the sample countries without a test of statistical significance, we find that the coefficients for export pricing are overwhelmingly conducive to external adjustment. On the other hand, the coefficients for import pricing are generally not conducive to external adjustment. They are even less so with imports from East Asia than with those from Germany and the United States. Although it is not clear how much of this result (obtained from the limited sample of mere 20 commodities) can be generalized, and we must bear in mind the danger of basing a conclusion about macroeconomics upon the few pieces of microeconomic evidence, our limited exercise seems to suggest that, as far as bilateral trade with Japan is concerned, the external adjustment of East Asian countries has been facilitated by the pricing behavior of Japanese exporters, but not by the pricing behavior of their own exporters.

VI. Conclusion

The paper has used a dynamic panel data model to estimate the pass-through coefficients of 20 nine-digit industrial commodities that are traded between Japan and its seven trading partners in East Asia and elsewhere, namely, Indonesia, Malaysia, the Philippines, Singapore, Thailand, Germany and the United States. On the basis of estimating export and import price equations by using the monthly series of unit export and import values obtained from the Japanese customs data for the period 1988-1998, we have obtained the result that pass-through is generally much larger for Japanese exports than for Japanese imports, meaning that the yen prices of Japanese imports do not fall (rise) very much when the yen appreciates (depreciates), whereas the prices of Japanese exports rise (fall) considerably in the buyer's currency. In terms of external adjustment in East Asia, the export pricing behavior has been more conducive than the import pricing behavior.

The pricing behavior of Japanese exporters, as suggested by the empirical results of the paper, contrasts sharply with the earlier observations made in the literature (surveyed in Section II) to the effect that Japanese exporters display considerable PTM behavior. Here, instead, they are shown to pass through much of exchange rate changes to the local import prices in the buyer's currency, at least for many of the products and markets considered in the study. Moreover, we have seen a significant incidence of local price stability in Japan even for those commodities imported from the United States. This is also at odds with the conventional wisdom that US exporters generally pass through most of exchange rate changes to local prices in the buyer's market. Of course, it is not clear how much of these results obtained from the limited sample of mere 20 commodities can be generalized, and there is always a danger of basing our conclusion about a macroeconomic phenomenon such as the trade balance upon the few pieces of microeconomic evidence. With all this caveat,

however, it must be true that export pricing behavior depends much on the type of products as well as the market of destination.

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Endnotes

1. These included Mexico (as an importer of US bourbon, orange juice, refrigerators and switches) as well as Korea and Saudi Arabia (as importers of US orange juice and breakfast cereal).

2.As the authors themselves admit, however, no clear-cut results were obtained except for the fact that, in Taiwan, Korea and most small industrial countries, domestic cost and export price variables are affected by the exchange rate.

3. The products included were small passenger cars, passenger cars, trucks, tires and tubes, agricultural tractors, construction tractors, color TVs, tape recorders, record players, amplifiers, magnetic recording tape, microwave ovens, cameras and copying machines.

4. Mann (1986), however, noted that the pass-through ratio for US exports was close to 100 percent.

5.The commodities included were onions, bourbon, orange juice, breakfast cereal, refrigerators, and switches for the United States; and fan belts, titanium dioxide pigment, small cars, large cars, beer, white wine, sparkling wine and potassium chloride for Germany.

6. In our preliminary estimation of equation (3) with no lagged dependent variable, the hypothesis that the β coefficients are identical across destination or source countries (given the country dummies) was rejected in 8 out of 11 exports and 5 out of 9 imports at the 1 percent level; the hypothesis that the coefficients are identical with no country dummies was rejected in all 20 cases at the 1 percent level.

7. This observation is confirmed by the estimated coefficients of the lagged dependent variable, which are significantly smaller than unity (see Table 1 below).

8. Kiviet (1995) even shows that when N is small, least squares dummy variables estimators have a smaller variance than GMM estimators, so that there is a tradeoff between efficiency and consistency.