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Exchange Rate Movements and Tradable Goods Prices in East Asia: An Analysis Based on Japanese Customs Data, 1988–1999

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This 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 and industrial country trading partners. By using the monthly series of unit export and import values obtained from the Japanese customs data for the period 1988–99, it shows that price pass-through is much larger for Japanese exports than for Japanese imports, suggesting 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. With the notable exception of some imports from Malaysia, the degree of price pass-through was not qualitatively affected by the Asian currency crisis of 1997. [JEL F14, F32]

The purpose of this paper is to investigate the response of tradable goods prices in Japan to exchange rate movements with respect to its selected East Asian and industrial country trading partners, 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 light of the recent turmoil in the foreign exchange markets and the associated adjustment policies

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pursued, often with IMF assistance. The Asian currency crisis, 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 U.S. current account deficit did not show an immediate and marked decline despite the significant fall in the value of the U.S. 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 equiproportionately 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 (if not the only) 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, 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 U.S. 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 analyze 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, was pass-through or PTM behavior explicitly estimated either for an individual developing or emerging economy or for any of its constituent industries. Thus, an important additional contribution of the present paper is to extend the existing literature to a sample that includes a larger number of developing or emerging market economies.

[1]These included Mexico (as an importer of U.S. bourbon, orange juice, refrigerators, and switches) as well as Korea and Saudi Arabia (as importers of U.S. 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 Province of China, Korea, and most small industrial countries, the domestic cost and export price variables were affected by the exchange rate in one way or another.

I. 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 (for example, 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 U.S.) 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 U.S. 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-U.S. exporters, however, may not be reciprocated by U.S. exporters. In an often-quoted study, Knetter (1989) used the seven-digit export unit values of six U.S. and ten German export industries for the period from the late 1970s to the middle of the 1980s[5] to show that U.S. export prices were much less sensitive to exchange rate fluctuations than German export prices. Gagnon and Knetter (1995) likewise analyzed the export pricing behavior of Japanese, German, and U.S. automobile manufacturers in major industrial country markets based on annual data for the

[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 U.S. 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.

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 U.S. exporters displayed virtually no such behavior (see also Hung, Kim, and Ohno, 1993).

In a similar vein, Ohno (1989) showed that price pass-through was greater for U.S. exporters than for Japanese exporters, by defining the coefficients in terms of the real effective exchange rate and using the quarterly U.S. 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 U.S. counterparts. This asymmetry between U.S. and non-U.S. 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 U.S., 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 exporters 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 that includes 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 and elsewhere even for the same category of products; if the pricing behavior of East Asian and other exporters differs even for the same category of products exported to the same market (that is, 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 its trading partners, when there is a change in the bilateral exchange rate.

II. 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 *i*th 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),

$$P_{it} = f\left(D_{it}, MC_t, E_{it}\right). \tag{1}$$

Linearizing equation (1) and assuming that the exporting country is Japan, we have, for the Japanese exports of a given industrial product to the *i*th 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 may reflect 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 of estimating 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 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] Later, however, we will report the estimated aggregate β coefficients for all industries (as will be seen in Table 1) as well as for individual industries (as will be seen in Table 6), in order to better assess the impact of the Asian currency crisis of 1997 on the *overall* behavior of Japanese export (and import) prices.

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 weakens (if not 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. An alternative testing procedure (in which the pass-through equation was estimated on a country-by-country basis with time and industry dummies) was tried to confirm this conjecture (but not reported).[7] The point is that, for both imports and exports, the panel data methodology controls for time-specific and country-specific factors (whatever they may be), so as to better isolate the impact of an exchange rate change on the prices of traded commodities.

III. 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

[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]As a way of controlling for differences in marginal cost across source countries, we have estimated the pass-through equation on a country-by-country basis, with time dummies (this time, to adjust for relevant cost between the country concerned and Japan) and industry dummies. Comparison of the estimated coefficients suggests that the interpretation of the estimation results remain essentially the same particularly for the East Asian countries, namely, almost all of the pass-through coefficients are insignificantly different from zero. For the United States, however, the alternative procedure has yielded pass-through coefficients that are much closer to unity.

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).[8]

As discussed in Knetter (1989), however, the use of unit values may introduce measurement error to the extent that the products covered are heterogeneous. For example, even within the same category of traded goods (for example, 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. Within the same market, moreover, 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 11-year period from January 1988 to June 1999. 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 (in East Asia), and Germany and the United States (as representative industrial countries). 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 turned out, however, that there were occasionally missing values in one or more countries, even for some of these products. When the number of missing observations exceeded either 12 in the entire sample or 6 in the post-crisis sample alone, that particular country-product pair was excluded from the data set.

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) other switches for a voltage not exceeding 1000 V (8536.50–900); (6) boards, panels, consoles, desks, cabinets, and other bases for the control or distribution of electricity (8537.10–000); (7) color cathode-ray

[8]As is the case with any price index, the Bank of Japan's export and import prices trace changes in the average price of a fixed sample of products on a wholesale level. As of January 2000, the export price index is based on the 606 prices of 209 products as reported by 386 firms, and the import price index is based on the 837 prices of 247 products as reported by 485 firms. The Bank of Japan publishes only the aggregate price series. Even if the individual product price series were disclosed to the public, each would contain the prices for only two or three destination or source countries.

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 photocopying apparatuses (9009.12–000); and (11) microscopes (9011.80–900). It should be noted that these product categories (that is, those with 84, 85, 87, and 90 double-digit designations) represent Japan's principal exports, constituting over 70 percent of total exports in value terms during the sample period. Moreover, these individual product groups (in nine-digit classification) were often the most important components of the corresponding double-digit categories, as is expected from our requirement that complete data exist for all of the sample countries for the entire sample period.

On the import side, the nine commodities are: (1) wood, sawn, chipped lengthwise, sliced or peeled, with a thickness exceeding 6 mm (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) plugs and sockets for a voltage not exceeding 1000 V (8536.69–000); (8) seats with wooden frames (9401.69–090); and (9) wooden furniture (9403.60–020). These product categories (that is, those with 44, 72, 84, 85, and 94 double-digit designations) constituted between 20 and 30 percent of Japan's total imports during the sample period. The importance of these products, however, should not be underestimated, particularly within the import of manufactures, as almost 50 percent of Japan's imports are made up of agricultural, forestry, mineral, and other homogeneous commodities.

The monthly average exchange rate and wholesale price data are obtained from the International Monetary Fund's *International Financial Statistics*, monthly issues. The yen cross rates are calculated from the U.S. 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.

IV. Estimation Results for the Entire Sample

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 June 1999, 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 but, unlike most general price indices, do not seem to possess an obvious trend-like component indicative

of nonstationarity.[9] 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 occurs when the value of β is zero, that is, 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 occurs when the value of β is unity, that is, 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,

$$p_{it} = \phi p_{it-1} + \beta_i e_{it} + \alpha_i + \gamma_t + \varepsilon_{it}, \tag{4}$$

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 correlated 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 130 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.[10]

Table 1 presents summary statistics, along with the estimated coefficients of the lagged dependent variable and the estimated aggregate pass-through coefficients for the entire samples of exports and imports. For all commodity groups, the fit (in terms of adjusted R^2) is generally good and, with the lagged dependent variable included, 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. The aggregate pass-through coefficients, presented here to indicate the overall tendency of export and import price behavior, are both significant

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

[10]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 trade-off between efficiency and consistency.

Table 1. Summary Statistics for the Entire Sample (January 1988–June 1999)

Commodities[1]	NOB	Adj-R^2	D-W	Lagged Price[2]	Aggregate Pass-Through Coefficients
Exports					
Aggregate	9894	0.978	2.201	0.47**	0.031**
Piston engines	948	0.911	2.198	0.79**	
Pumps	955	0.514	1.849	0.27**	
Forklifts	953	0.533	2.089	0.23**	
Starter motors	951	0.492	2.017	0.23**	
Switches	955	0.892	2.554	0.76**	
Electricity boards	955	0.608	2.150	0.44**	
Picture tubes	793	0.694	2.337	0.72**	
Motor vehicles	812	0.597	2.250	0.61**	
Brakes	955	0.674	2.250	0.62**	
Copiers	818	0.747	2.052	0.25**	
Microscopes	799	0.612	1.945	0.01	
Imports					
Aggregate	7339	0.969	2.214	0.50**	0.013*
Wood	685	0.720	2.307	0.49**	
Articles of wood	937	0.720	2.082	0.33**	
Scrap of steel	822	0.902	2.088	0.25**	
Computer parts	814	0.762	1.799	0.60**	
DC motors	685	0.924	2.110	0.33**	
Appliance parts	820	0.711	2.285	0.42**	
Plugs and sockets	802	0.600	2.179	0.63**	
Wooden seats	817	0.719	2.032	0.20**	
Wooden furniture	957	0.809	2.082	0.27**	

[1]For more detailed descriptions of these commodities, see Section III in the text.

[2]The estimated coefficient of the lagged dependent variable; ** (*) indicates that the coefficient is significant at the 1 (5) percent level.

but close to zero. This means that pass-through is high (if not complete) for exports and low (if not absent) for imports (remember that complete pass-through obtains when the value of β is zero for exports and when it is unity for imports).

Moving to the individual industry estimates, Table 2 presents the estimated pass-through coefficients for Japanese exports, where the second and third figures are *t*-statistics on the hypothesis that the coefficients are zero and unity, respectively. Likewise, Table 3 presents the estimated pass-through coefficients for Japanese imports. For both Table 2 and Table 3, the right half of the table reports the fixed country effects (that is, the coefficients of country dummies) in order to see the extent of product differentiation across destination or source countries. For most products and most countries, product differentiation does not seem to be large. In fact, for a number of industries (for example, forklifts, motor vehicles, copiers, and microscopes on the export side; and wood and scrap of steel on the

Table 2. Pass-Through Coefficients and Fixed Country Effects for Japanese Exports, January 1988–June 1999 (entire sample)

	Pass-Through Coefficients							Fixed Country Effects						
	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA
Piston engines	0.015 1.02 –65.82	0.126 2.58 –17.91	–0.068 –1.91 –29.96	–0.126 –2.34 –20.88	–0.076 –2.10 –29.89	–0.023 –0.22 –10.08	0.015 0.11 –6.88	1.488 2.56	1.049 5.67	–0.179 –0.35	0.558 4.48	–0.408 –0.80	1.007 6.68	0.970 2.22
Pumps	0.020 1.98 –94.64	0.032 0.75 –22.73	0.042 1.30 –29.92	–0.132 –2.80 –24.11	–0.048 –1.51 –32.91	–0.087 –0.95 –11.89	0.134 1.04 –6.70	0.914 2.29	0.363 2.48	0.913 1.97	0.353 3.24	0.108 0.23	0.366 3.28	–0.086 –0.22
Forklifts	0.013 1.31 –100.93	0.015 0.40 –26.35	0.032 1.14 –34.51	–0.007 –0.17 –24.49	–0.061 –2.19 –37.78	–0.042 –0.52 –12.96	–0.128 –1.13 –9.92	6.168 13.23	5.600 20.13	5.961 12.33	5.635 21.08	4.634 10.22	5.862 21.14	6.395 14.31
Starter motors	–0.008 –0.57 –68.78	0.234 4.10 –13.44	0.081 1.92 –21.73	–0.064 –1.04 –17.21	0.138 3.25 –20.30	0.232 1.92 –6.34	–0.075 –0.44 –6.30	–0.084 –0.15	0.266 1.42	0.788 1.30	–0.462 –3.37	1.940 3.17	0.029 0.21	0.056 0.11
Switches	0.043 3.71 –83.29	0.029 0.64 –21.29	0.073 2.10 –26.73	0.016 0.32 –19.65	0.049 1.42 –27.69	0.142 1.44 –8.65	-0.114 –0.82 –8.01	0.850 1.99	-1.015 –5.93	0.125 0.26	-1.134 –7.93	-0.125 –0.26	-1.006 –7.25	-0.345 –0.84
Electricity boards	0.058 1.59 –25.85	0.185 1.23 –5.43	0.336 2.94 –5.82	0.135 0.82 –5.24	0.061 0.55 –8.37	0.245 0.76 –2.34	0.709 1.55 –0.63	4.789 3.38	1.969 3.83	7.319 4.38	1.929 4.98	3.081 1.90	1.484 3.82	–1.017 –0.75
Picture tubes		–0.108 –2.15 –22.00	–0.029 –0.88 –30.87	0.080 1.68 –19.33	–0.056 –1.76 –33.18	0.108 1.17 –9.67	–0.057 –0.44 –8.15		0.446 2.65	0.241 0.50	0.675 5.06	–0.058 –0.13	0.849 5.88	0.944 2.38

Table 2. *(concluded)*

	Pass-Through Coefficients							Fixed Country Effects						
	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA
Motor vehicles		–0.020	0.034	0.008	–0.028	0.107	–0.027		2.528	3.105	2.668	2.328	2.656	2.802
		–0.65	1.44	0.22	–1.15	1.57	–0.28		11.77	7.65	12.29	5.84	12.22	8.02
		–32.62	–40.79	–28.67	–42.84	–13.08	–10.77							
Brakes	–0.008	0.003	0.010	–0.009	–0.024	0.287	–0.024	–0.088	0.173	0.337	0.354	–0.159	0.246	0.297
	–1.13	0.10	0.47	–0.30	–1.18	4.53	–0.29	–0.35	1.89	1.15	5.34	–0.54	3.60	1.21
	–151.59	–36.44	–48.31	–33.51	–49.96	–11.29	–23.32							
Copiers		–0.026	–0.008	0.131	–0.012	0.270	–0.005		3.079	3.245	3.701	3.640	3.928	3.935
		–0.62	–0.25	2.78	–0.38	2.91	–0.04		14.09	6.72	16.74	7.32	16.89	9.01
		–24.41	–32.07	–18.40	–32.19	–7.88	–7.79							
Microscopes		0.223	0.222	0.066	0.185	0.577	–0.934		6.281	8.729	5.016	8.077	2.888	5.976
		1.49	1.91	0.40	1.66	1.77	–2.04		11.02	5.16	11.62	4.94	7.04	4.34
		–5.21	–6.72	–5.63	–7.32	–1.30	–4.23							

Notes: For each entry, the first figure is the estimated coefficient, the second figure is the usual *t*-statistic, and (for the pass-through coefficients only) the third figure is the *t*-statistic on the restriction that the coefficient is unity (that is, $\beta = 1$). For more detailed descriptions of these commodities, see Section III in the text.

Table 3. Pass-Through Coefficients and Fixed Country Effects for Japanese Imports, January 1988–June 1999 (entire sample)

	Pass-Through Coefficients							Fixed Country Effects						
	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA
Wood	0.017	0.007	0.050		0.053		0.003	2.731	2.048	2.985		3.422		2.057
	2.46	0.28	2.69		2.57		0.04	7.57	6.20	6.34		6.50		4.71
	–146.45	–38.30	–51.16		–46.01		–15.44							
Articles of wood	–0.006	0.018	–0.066	0.071	0.020	0.215	–0.063	–1.905	–1.347	–2.174	–1.104	–0.683	1.231	–1.505
	–0.42	0.33	–1.70	0.76	0.48	1.38	–0.41	–2.86	–2.12	–2.42	–1.28	–0.69	0.89	–1.58
	–71.94	–18.11	–27.64	–9.90	–22.98	–5.03	–7.04							
Scrap of steel	–0.008	0.003	0.000	–0.038	–0.010		0.015	2.980	3.466	3.410	3.093	3.156		3.583
	–2.20	0.20	0.01	–1.63	–0.90		0.37	13.08	14.31	11.66	11.81	10.15		11.48
	–262.97	–67.44	–95.64	–44.19	–86.93		–24.27							
Computer parts		0.091	0.094	–0.015	0.227	–0.053	0.092		1.524	3.418	0.788	6.252	0.494	1.799
		1.66	2.45	–0.17	5.05	–0.33	0.59		2.35	3.75	0.97	5.82	0.35	1.83
		–16.61	–23.58	–11.46	–17.23	–6.69	–5.87							
DC motors		0.093		0.076	0.085	0.297	0.062		0.149		–0.416	1.470	3.827	1.316
		1.65		0.81	1.93	1.77	0.38		0.23		–0.48	1.42	2.55	1.27
		–16.18		–9.88	–20.67	–4.19	–5.70							
Appliance parts		0.274	–0.018	–0.044	–0.056	0.532	–0.155		4.309	1.093	0.642	–0.743	6.712	1.220
		3.02	–0.28	–0.30	–0.79	2.00	–0.60		3.99	0.74	0.48	–0.45	2.82	0.75
		–8.00	–16.11	–7.09	–14.98	–1.76	–4.49							
Plugs and sockets		–0.017	–0.017	–0.131	0.179	0.139	–0.121		–1.824	–1.828	–2.850	2.880	–0.393	–2.224
		–0.25	–0.36	–1.19	3.24	0.71	–0.63		–2.29	–1.63	–2.73	2.26	–0.23	–1.83
		–15.30	–21.36	–10.22	–14.84	–4.41	–5.84							

Table 3. *(concluded)*

	Pass-Through Coefficients							Fixed Country Effects						
	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA
Wooden seats	–0.063 –3.61 –60.90	–0.138 –2.05 –16.94	–0.091 –1.85 –22.16		–0.129 –2.44 –21.31	–0.167 –0.89 –6.17	0.750 4.09 –1.36	–2.401 –2.94	–1.083 –1.38	–0.753 –0.66		–2.310 –1.88	0.298 0.18	6.590 5.62
Wooden furniture	0.011 0.66 –58.86	0.032 0.49 –14.77	0.134 2.87 –18.59	0.932 8.05 –0.59	0.097 1.88 –17.51	0.031 0.16 –5.11	0.470 2.53 –2.85	0.823 1.03	0.463 0.60	4.295 3.90	9.355 8.58	3.001 2.47	2.315 1.37	4.905 4.11

Notes: For each entry, the first figure is the estimated coefficient, the second figure is the usual *t*-statistic, and (for the pass-through coefficients only) the third figure is the *t*-statistic on the restriction that the coefficient is unity (that is, $\beta = 1$). For more detailed descriptions of these commodities, see Section III in the text.

import side), the fixed country effects are remarkably similar, giving some credibility to the integrity of the unit value data.

According to Table 2, in terms of the *t*-statistics on the hypothesis that the coefficient is zero (that is, pass-through is complete), most of the estimated values of β are either insignificantly different from zero or (if significant) numerically small, meaning that pass-through is either complete or substantial. Of the 20 statistically significant estimates, moreover, nine have negative values (meaning that the export price in yen falls when the yen depreciates); of the positive estimates, the highest value is still only 0.336 (for switches exported to the Philippines). On the other hand, in terms of the *t*-statistics on the hypothesis that the coefficient is unity, all but two of the estimated values of β turned out to be significantly different from unity, meaning that there was at least some pass-through. The two exceptions are electricity boards exported to the United States (the coefficient of 0.709) and microscopes exported to Germany (0.577). The overall weight of the evidence thus seems to suggest that pass-through is either complete or substantial for Japanese export prices, a result at variance with the implications of the conventional wisdom in the literature that Japanese exporters display greater PTM behavior. However, the imperfect pass-through observed for electricity boards exported to the United States and microscopes exported to Germany is consistent with the conventional wisdom, which is based on industrial country data.

From Table 3, however, the opposite conclusion seems to emerge about the price pass-through behavior of Japanese imports. In many cases, the hypothesis that the value of β is not significantly different from zero (that is, pass-through is absent) cannot be rejected,[11] meaning that pass-through is far from complete (for which the value of unity is required). Of the significant coefficients, many are even negative (meaning that the local import price in yen falls when the yen depreciates); most of the positive coefficients are numerically small, ranging between 0.02 and 0.27. The exceptions are appliance parts imported from Germany (the coefficient of 0.53), wooden seats imported from the United States (0.75), and wooden furniture imported from Singapore (0.93) and the United States (0.47).[12] In this context, it is noteworthy that, even for imports from the United States, a significant incidence of local price stability (in Japan) is observed for all commodities except wooden seats and wooden furniture. Taken at face value, this is again at odds with the conventional wisdom that United States exporters pass through almost all of exchange rate changes to local prices in the buyer's market.[13]

[11]Given the possibility that use of monthly data (which may not show sufficient variability in some cases) may bias the estimates towards zero, we have estimated the pass-through equation by using the alternative (inverse) definition of β (such that complete pass-through occurs when it is zero) in order to make sure that the lack of statistical significance is not an artifact of the way β is defined. We have found that the coefficients are generally significantly different from zero, so that the results reported in the text are robust with respect to the definition of the β coefficient as well as the use of monthly data.

[12]Of these four product-country pairs, the hypothesis that the coefficient is not significantly different from unity (that is, pass-through is complete) is rejected for three. The hypothesis cannot be rejected only for wooden furniture imported from Singapore.

[13]It should be remembered that, as noted in footnote 7, the alternative testing procedure has yielded coefficient estimates that are much closer to unity for the United States. Thus, we stress the tentative nature of this statement.

V. The Impact of the Asian Currency Crisis of 1997

In order to see how the Asian currency crisis of 1997 might have affected the pass-through behavior of Japanese export and import prices, we have repeated the estimation of the pass-through equation by using the sample that excludes the post-crisis observations. Unfortunately, at this stage, not enough observations are available to conduct a similar estimation for the post-crisis period alone. Hence, we will make a conjecture about the impact of the Asian currency crisis by comparing the pass-through coefficient estimates of the entire sample and the pre-crisis sample. Admittedly, this procedure likely underestimates the impact of the currency crisis, to the extent that the pre-crisis sample does not differ much from the entire sample in terms of coverage, and we thus stress the tentative nature of our exercise.[14] As an additional basis for our conjecture, however, we will subsequently also estimate the industry-wide aggregate pass-through coefficients, by dividing the sample into the pre-crisis and the post-crisis periods (see Table 6 in the concluding section).

Table 4 and Table 5 report the estimated pass-through coefficients, along with the fixed country effects, for export and import prices, respectively, during the pre-crisis period of January 1988–June 1997. Comparison of Table 4 with Table 2 (for export prices) suggests that there is little change in the overall pass-through estimates (in terms of general numerical values and statistical significance) for most commodities and for most countries. In fact, Chow tests (not reported) cannot reject the hypothesis that, for each industrial product, all the coefficients were stable throughout the sample period. This, however, does not necessarily mean that the currency crisis did not change the individual coefficients. For example, the export price pass-through coefficients seem to increase considerably (that is, pass-through becomes much less complete) when the post-crisis period is excluded, for Malaysia (from 0.03 to 0.54) and the United States (from 0.13 to 0.36) in the case of pumps, and for Thailand (from 0.05 to 0.32) in the case of switches. Even so, while some minor differences are observed, it seems reasonable to conclude that the Asian currency crisis did not have a major qualitative impact on the price pass-through behavior of Japanese exports. Throughout the period, pass-through remained either complete or substantial.

Moving to the import prices, a comparison of Table 5 with Table 3 suggests that there was also little change in the estimated pass-through coefficients (in terms of numerical values and statistical significance) between the entire sample and the pre-crisis sample for most imports, including wood, articles of wood, scrap steel, DC motors, and plugs and sockets.[15] We may thus conclude that, for the most part, the Asian currency crisis did not have a major qualitative impact on the pass-through behavior of Japanese import prices, either, so that import pass-through was either absent or small. The exceptions were certain imports from Malaysia whose estimated price pass-through coefficients increase substantially (that is, pass-

[14]We did perform Chow tests, however, to see if there was a structural break in the estimated coefficients.

[15]Again, this observation is supported by Chow tests (not reported), which cannot reject the hypothesis that, for each industrial product, all the coefficients remained stable throughout the sample period.

Table 4. Pass-Through Coefficients and Fixed Country Effects for Japanese Exports, January 1988–June 1997 (pre-crisis sample)

	Pass-Through Coefficients							Fixed Country Effects						
	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA
Piston engines	–0.026	–0.288	–0.008	–0.142	–0.122	–0.028	0.088	–0.074	0.138	0.584	0.529	–1.099	0.931	0.704
	–0.61	–2.46	–0.15	–2.76	–1.54	–0.29	0.60	–0.05	0.52	0.75	4.63	–1.01	6.49	1.61
	–23.70	–11.01	–18.28	–22.27	–14.15	–10.90	–6.19							
Pumps	0.109	0.543	0.076	–0.120	–0.005	–0.060	0.364	4.209	1.509	1.477	0.446	0.819	0.425	–0.631
	2.44	4.48	1.33	–2.42	–0.06	–0.62	2.38	2.58	5.28	1.85	4.02	0.73	3.72	–1.43
	–19.86	–3.78	–16.20	–22.51	–12.42	–10.90	–4.17							
Forklifts	–0.010	–0.234	–0.040	–0.023	–0.089	–0.055	–0.413	5.166	4.919	4.818	5.471	4.100	5.710	6.996
	–0.28	–2.36	–0.85	–0.56	–1.32	–0.69	–3.23	3.78	14.93	6.91	18.94	4.31	18.97	13.63
	–27.38	–12.45	–22.18	–24.89	–16.22	–13.12	–11.05							
Starter motors	0.001	–0.804	0.068	–0.144	–0.080	0.233	0.240	0.267	–1.926	0.542	–0.548	–1.054	0.000	–0.824
	0.02	–6.23	1.15	–2.75	–0.94	2.29	1.51	0.16	–6.49	0.66	–4.93	–0.90	0.00	–1.78
	–21.44	–13.97	–15.72	–21.86	–12.75	–7.52	–4.78							
Switches	–0.027	0.138	0.064	0.048	0.315	0.208	–0.129	–1.733	–0.896	–0.076	–1.246	3.466	–1.123	–0.347
	–0.55	1.06	1.02	0.87	3.36	1.90	–0.77	–0.97	–2.91	–0.09	–8.04	2.70	–7.42	–0.72
	–20.94	–6.61	–15.05	–17.40	–7.28	–7.24	–6.72							
Electricity boards	0.261	–0.488	0.166	0.091	–0.318	0.291	0.159	12.297	0.629	5.148	2.052	–1.995	1.554	0.535
	1.64	–1.16	0.83	0.52	–1.11	0.85	0.30	2.12	0.65	1.84	5.16	–0.50	3.89	0.34
	–4.65	–3.53	–4.16	–5.17	–4.58	–2.06	–1.56							
Picture tubes		0.107	–0.103	0.139	0.102	0.266	0.123		1.058	–0.610	0.835	2.272	0.959	0.645
		0.97	–1.76	2.88	1.35	2.86	0.86		3.89	–0.75	6.26	2.13	6.65	1.54
		–8.08	–18.76	–17.85	–11.84	–7.92	–6.14							

Table 4. *(concluded)*

	Pass-Through Coefficients							Fixed Country Effects						
	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA
Motor vehicles		0.142 1.63 –9.84	0.023 0.55 –23.71	0.037 1.01 –26.19	0.010 0.18 –16.76	0.126 1.75 –12.09	–0.129 –1.16 –10.10		2.897 9.45	2.982 4.79	2.710 11.30	2.888 3.40	2.690 11.24	3.120 7.58
Brakes	–0.034 –1.16 –35.32	–0.180 –2.29 –15.00	0.072 1.92 –24.73	–0.017 –0.51 –31.32	–0.040 –0.76 –19.63	0.327 4.73 –9.73	–0.010 –0.10 –10.18	–1.067 –1.00	–0.227 –1.24	1.174 2.26	0.363 5.33	–0.398 –0.54	0.222 3.13	0.247 0.86
Copiers		–0.379 –3.34 –12.14	–0.084 –1.58 –20.32	0.133 2.79 –18.13	–0.171 –2.24 –15.30	0.458 4.79 –5.68	0.013 0.09 –6.86		2.795 9.31	2.671 3.56	4.242 17.43	1.991 1.87	4.378 17.49	4.440 9.27
Microscopes		–0.699 –1.68 –4.09	0.408 1.76 –2.54	0.026 0.15 –5.55	–0.443 –1.57 –5.11	0.674 1.96 –0.95	–0.710 –1.33 –3.21		4.455 4.54	11.357 3.51	5.107 11.59	–0.445 –0.11	2.800 6.77	5.393 3.45

Notes: For each entry, the first figure is the estimated coefficient, the second figure is the usual *t*-statistic, and (for the pass-through coefficients only) the third figure is the *t*-statistic on the restriction that the coefficient is unity (that is, $\beta = 1$). For more detailed descriptions of these commodities, see Section III in the text.

Table 5. Pass-Through Coefficients and Fixed Country Effects for Japanese Imports, January 1988–June 1997 (pre-crisis sample)

	Pass-Through Coefficients							Fixed Country Effects						
	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA
Wood	–0.016	0.079	0.100		0.016		0.026	1.070	2.643	3.939		2.357		2.006
	–0.75	1.11	4.00		0.33		0.53	1.13	3.22	6.23		2.16		5.59
	–48.19	–13.00	–35.89		–20.81		–19.54							
Articles of wood	0.027	–0.142	–0.043	0.030	–0.044	0.007	–0.015	–0.449	–3.157	–1.676	–1.529	–2.164	–0.585	–1.210
	0.40	–0.64	–0.58	0.29	–0.30	0.03	–0.09	–0.15	–1.26	–1.00	–1.64	–0.63	–0.31	–1.16
	–14.64	–5.10	–14.09	–9.60	–6.96	–4.64	–6.14							
Scrap of steel	–0.077	–0.002	0.027	–0.040	–0.039		0.014	0.027	3.560	4.163	3.226	2.650		3.733
	–4.36	–0.04	1.42	–1.67	–1.02		0.34	0.03	5.36	8.70	11.58	3.01		11.34
	–60.87	–17.59	–51.52	–42.79	–27.07		–23.73							
Computer parts		0.753	0.177	–0.011	0.009	–0.064	0.156		8.928	5.381	0.903	1.385	0.448	2.273
		3.25	2.41	–0.12	0.06	–0.30	0.95		3.45	3.20	1.03	0.42	0.24	2.17
		–1.07	–11.21	–10.65	–6.79	–5.02	–5.12							
DC motors		0.010		0.061	0.076	0.574	0.026		–0.770		–0.556	1.256	6.234	1.122
		0.04		0.60	0.48	2.48	0.15		–0.29		–0.59	0.35	3.03	1.01
		–4.19		–9.21	–5.91	–1.84	–5.48							
Appliance parts		1.485	0.118	–0.093	0.187	–0.281	0.035		17.847	4.220	0.235	4.734	–0.245	2.436
		3.92	0.97	–0.59	0.77	–0.78	0.13		4.21	1.54	0.16	0.85	–0.08	1.41
		1.28	–7.29	–6.94	–3.34	–3.57	–3.53							
Plugs and sockets		0.224	–0.054	–0.170	0.177	0.445	–0.134		0.889	–2.658	–3.160	2.852	2.282	–2.264
		0.80	–0.59	–1.44	0.97	1.69	–0.66		0.28	–1.26	–2.82	0.69	0.98	–1.75
		–2.76	–11.36	–9.89	–4.51	–2.11	–5.54							

Table 5. *(concluded)*

	Pass-Through Coefficients							Fixed Country Effects						
	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA	Indonesia	Malaysia	Philippines	Singapore	Thailand	Germany	USA
Wooden seats	0.066 0.84 –11.98	0.564 2.13 –1.65	0.115 1.24 –9.52		0.294 1.67 –4.01	–0.808 –3.22 –7.20	1.029 5.25 0.15	3.310 0.94	6.661 2.26	3.890 1.85		7.264 1.81	–5.300 –2.40	8.352 6.65
Wooden furniture	0.212 2.87 –10.66	1.160 4.52 0.62	0.267 3.23 –8.90	0.913 7.82 –0.75	0.584 3.49 –2.48	–0.338 –1.43 –5.67	0.668 3.61 –1.80	9.849 2.95	12.981 4.51	7.258 3.85	9.106 8.24	14.044 3.66	–0.968 –0.47	6.125 5.13

Notes: For each entry, the first figure is the estimated coefficient, the second figure is the usual *t*-statistic, and (for the pass-through coefficients only) the third figure is the *t*-statistic on the restriction that the coefficient is unity (that is, $\beta = 1$). For more detailed descriptions of these commodities, see Section III in the text.

through becomes more complete) when the post-crisis period is excluded, namely, from 0.09 to 0.75 for computer parts, from 0.27 to 1.49 for appliance parts, from –0.14 to 0.56 for wooden seats, and from 0.03 to 1.16 for wooden furniture. In other words, for these imports from Malaysia, the pass-through coefficients were high before the crisis but became smaller after the crisis. At this time, we cannot be sure about the extent to which the imposition of capital controls in Malaysia might have contributed to this considerable reduction in pass-through coefficients (that is, smaller pass-through or greater local price stability in Japan) after the crisis.

VI. Conclusion

This 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 1988–99, 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. This means that, in terms of external adjustment in East Asia, the export price pass-through behavior has been more conducive than the import price pass-through behavior.

This overall result (of greater pass-through for Japanese exports than for Japanese imports) was not affected very much by the Asian currency crisis of 1997. Comparison of the estimated pass-through coefficients between the entire sample and the pre-crisis sample suggested that the price pass-through behavior of both exports and imports remained essentially the same for most products and for almost all countries, subject to the qualification that this procedure likely underestimates the magnitude of the difference, if any. This general result, based on the comparison of the entire sample with the pre-crisis sample (necessitated by the lack of sufficient observations for the post-crisis period alone), can be further substantiated by the comparison of the industry-wide aggregate pass-through coefficients estimated separately for the pre-crisis and the post-crisis periods, which also suggests that pass-through is either complete or substantial for exports and virtually absent for imports (Table 6). The exception was the price pass-through coefficients of some imports from Malaysia, which were high before the crisis but became significantly smaller after the crisis.

The price behavior of Japanese exports, as suggested by the empirical results of the paper, contrasts sharply with the implications of the earlier observations made in the literature (surveyed in Section I) to the effect that Japanese exporters display considerable PTM behavior. Here, instead, for whatever reason, 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. At least in monthly data, moreover, we have seen a significant incidence of local price

Table 6. Aggregate Pass-Through Coefficients

	Entire Sample (January 1988–June 1999)		Pre-Crisis (January 1988–June 1997)		Post-Crisis (July 1997–June 1999)	
Export						
Piston engines	–0.012	(–0.65)	–0.086	(–2.15)	–0.039	(–0.64)
Pumps	0.007	(0.52)	–0.049	(–1.21)	0.015	(0.65)
Forklifts	0.016	(1.53)	0.016	(0.63)	–0.024	(–0.77)
Starter motors	–0.010	(–0.54)	–0.052	(–1.20)	–0.105	(–1.58)
Switches	0.040	(2.91)	0.054	(0.27)	0.064	(2.33)
Electricity boards	0.040	(0.89)	0.254	(1.81)	–0.094	(–0.85)
Picture tubes	–0.026	(–0.98)	0.083	(1.95)	–0.213	(–1.85)
Motor vehicles	0.003	(0.11)	0.060	(1.54)	0.130	(1.41)
Brakes	–0.010	(–1.32)	0.024	(1.03)	0.003	(0.17)
Copiers	0.006	(0.21)	0.081	(1.69)	–0.200	(–1.75)
Microscopes	0.135	(1.50)	0.085	(0.54)	–0.175	(–0.65)
Import						
Wood	0.019	(2.12)	0.040	(1.69)	0.021	(0.63)
Articles of wood	0.011	(0.68)	0.030	(0.60)	–0.033	(–1.42)
Scrap of steel	–0.009	(–2.04)	–0.032	(–2.42)	0.012	(1.15)
Computer parts	0.089	(2.22)	0.119	(1.85)	–0.054	(–0.48)
DC motors	0.055	(2.43)	0.068	(1.47)	–0.055	(–1.41)
Appliance parts	–0.007	(–0.27)	–0.004	(–0.10)	0.132	(1.42)
Plugs and sockets	0.000	(–0.01)	–0.066	(–0.90)	0.053	(0.36)
Wooden seats	–0.026	(–1.41)	0.072	(1.09)	–0.020	(–0.50)
Wooden furniture	0.044	(2.18)	0.324	(5.43)	–0.018	(–0.33)

Notes: Pass-through coefficients when they are assumed identical across countries; figures in parentheses are *t*-statistics.

stability in Japan even for those commodities imported from the United States. This is also at odds with the conventional wisdom that U.S. exporters generally pass through most of exchange rate changes to local prices in the buyer's market.

Of course, these results are subject to some qualifications. For one thing, use of monthly data (necessitated by the need to preserve as many observations as possible for the post-crisis period) may have biased the coefficient estimates toward zero. For another, the lack of adequate control for local cost in source countries may also have biased the coefficient estimates toward zero, especially for imports from the United States.[16] Moreover, it is not even clear how much of these results obtained from the sample of 20 commodities can be generalized. In view of these limitations, the modest lesson to be learned from our exercise may be that the pricing of tradable goods depends substantially on the type of product as well as the market of destination, so that it is well to exercise caution in accepting too literally the so-called conventional wisdom of the literature concerning the response of Japanese export and import prices to a change in the exchange rate.

[16]See footnote 7.

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