Japanese Exporters' Pricing Behaviour: Evidence from the Japanese Customs Data

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EXTENDED ABSTRACT

This study empirically examines the extent of exchange rate pass-through in Japanese exports. Firms' price setting and/or exchange rate pass-through behaviour has important implications for adjustments of trade imbalances and international transmission of macroeconomic disturbances. The exchange rate pass-through is not a new research topic and extensive analysis were conducted from around the 1980s with the background of a record US current account deficit related expenditure-switching policies implemented at that time.

Recently, the literature has turned to the issue of a possible decline in exchange rate pass-through (among others, Taylor, 2000; Campa and Goldberg, 2005; Otani, Shiratsuka and Shirota, 2005). As Taylor (2000) conjectured, a widespread and on-going decline in exchange rate pass-through implies an increasing difficulty for firms to pass through the exchange rate changes to importers under an environment of low and stable inflation as experienced in many industrialized countries since the early 1990s. We attempt to add some contributions to the literature by investigating the exchange rate pass-through in Japanese exports by commodity and by destination, while most studies look at pass-through from the import side.

The novelty of our study is three-fold. First, we use the commodity- and destination-breakdown series of Japanese exports at the 9-digit Harmonized System (HS) based level, which enables us to examine to what extent the pass-through differs across commodities and how it is different across destinations. 7 types of export commodities with at most 26 major export destinations for Japan are analysed. Second, we conduct estimations for two sub-sample periods: one is from January 1988 to December 1996 (i.e., pre-crisis period) and the other from January 1999 to December 2006 (i.e., post-crisis period), which allows us to analyse whether the exchange rate pass-through pattern changed under the post-crisis exchange rate regime in East Asia and also after a single currency, the euro, started in Europe. This analysis will also have some implications for the recent debate on possible decline in exchange rate pass-through. Finally, this paper takes into account the currency invoicing pattern in Japanese exports to East Asia and conducts pass-through estimation assuming the US dollar invoicing.

Our empirical investigation provides us with the following important findings. Fist, the exchange rate pass-through and/or PTM behaviour of Japanese exporters differs across commodities and destinations. As the results of Automobile I (compact cars) and compressors show, the degree of exchange rate pass-through declined in European countries after the start of the euro, which suggests that market structure or the degree of competition does matter for determining the exchange rate pass-through. However, the extent of exchange rate pass-through did increase when looking at the results of Automobile II (standard or medium/large size cars). The characteristics of commodities, such as degree of product differentiation, also have much to do with the exchange rate pass-through and PTM.

Second, in the East Asian markets, Japanese exporters tend to pass through the exchange rate changes to East Asian importers with the exception of the flat-rolled steel products, indicating that the characteristics of traded commodities affect the extent of pass-through and PTM. Third, the currency invoicing pattern has to do with that of exchange rate pass-through and PTM. In exports to some East Asian countries, Japanese exporters of the monolithic ICs are likely to stabilize the export prices not in terms of local currency but in US dollars. The US dollar pricing is more likely to be conducted in exports of the flat-rolled steel products to East Asian countries.

Thus, although the exchange rate pass-through declines in exports of Automobile I and compressors to Europe, the result of Automobile II indicates an increase in the exchange rate pass-through in European markets. The results are still mixed and further empirical investigation will be necessary by using much more sample commodities.

1. INTRODUCTION

Firms' price setting and/or exchange rate pass-through behaviour has important implications for adjustments of trade imbalances and international transmission of macroeconomic disturbances. In the 1980s and the early 1990s, a large number of studies examined the exchange rate pass-through in exports and/or imports of developed countries, such as the United States, Germany and Japan, and found that exporters tended to conduct the pricing-to-market (PTM) strategy in their exports to the United States by stabilizing the local currency (US dollar) price (Knetter, 1989; Marston, 1990; and Saxonhouse, 1993).

In recent years, renewed attention has been paid to the firms' price setting behaviour with a particular emphasis on a possible decline of exchange rate pass-through. As Taylor (2000) conjectured, a widespread and on-going tendency of decline in exchange rate pass-through in many industrialized countries may be attributed to an environment of low and stable inflation experienced in these countries since the early 1990s. Recent empirical studies tend to focus on the import side and to investigate the extent of exchange rate pass-through in developed countries such as the euro area (Campa and Goldberg, 2005) and Japan (Otani, Shiratsuka and Shirota, 2005).

In contrast, our study focuses on the export side of exchange rate pass-through using the Japanese customs data that provides us with the commodity- and destination-breakdown series of Japanese exports at the 9-digit Harmonized System (HS) based level. Takagi and Yoshida (2001) also used the Japanese customs data to investigate the exchange rate pass-through of Japanese exports to and imports from Asian countries. Parsons and Sato (2007) used more sample commodities and destination countries than Takagi and Yoshida (2001), and empirically examined to what extent the exchange rate pass-through differs across commodities traded and how it differs across destinations. Whereas Parsons and Sato (2007) estimated a common slope coefficient in their panel analysis, the extent of exchange rate pass-through is likely to differ across destination countries.

The novelty of our study is three-fold. First, we estimate the extent of exchange rate pass-through for 7 products in Japanese export to at most 26 major destinations: the United States, Canada, Australia, 14 European countries and 9 East Asian economies. Although a single equation approach is employed, we can examine to what extent the pass-through differs across destination countries. Second, we conduct estimation for two sub-sample periods: one is from January 1988 to December 1996 and the other from January 1999 to December 2006. By dividing the sample in this way, we can analyse whether the pass-through behaviour changed before and after the currency crisis in East Asia and also since the starting of a single currency, the euro, in Europe. Our estimates will have implications for the recent debate on possible decline in exchange rate pass-through. Finally, we allow for the currency invoicing pattern in Japanese exports to East Asia and run the pass-through estimation assuming the US dollar invoicing, while most studies analyse the exchange rate pass-through assuming the producer currency pricing or local (destination) currency pricing.

The remaining of this paper is organized as follows. Section 2 discusses the analytical framework of this study. Section 3 describes the data issue and provides the results of empirical estimation. Finally, section 4 concludes this study.

2. ANALYTICAL FRAMEWORK

Exchange rate pass-through is defined as (or can be measured by) the percentage change in local currency import prices resulting from a one percent change in the exchange rate between the exporter's and importer's currencies (Goldberg and Knetter, 1997). The literature typically assumes a monopolistically competitive firm that produces in the domestic country and sells in both domestic and foreign markets. It is assumed that market segmentation and, hence, imperfect arbitrage between markets enables exporters to differentiate the selling prices across domestic and destination markets (countries). The extent of exchange rate pass-through is assumed to reflect the exporter's pricing behaviour. The standard regression equation can be derived from a profit maximization problem of exporting firms and the following regression equation is a simplified version of Marston (1990):

$$\Delta \ln(p_t^k / p_t^d) = \alpha + \sum_{i=0}^{3} \beta_i \Delta \ln E_{t-i}^k + \varepsilon_t, \quad (1)$$

where p denotes a firm's selling price; superscripts k and d represent the selling price (i.e., export price) in the foreign country k and that in domestic market, respectively, both of which are in terms of the Japanese yen; E with superscript k denotes the bilateral nominal exchange rate of the Japanese yen vis-à-vis the destination country k's currency; ε is an independent and identically distributed error term; Δ denotes the first-difference operator. We run the OLS estimation by the Almon lag method to allow for the lagged exchange rate effects, assuming that distributed lags follow quadratic forms with no end point restrictions.

Several issues are worth discussing concerning equation (1). First, cost factors such as wages and raw material/intermediate input prices are not included in equation (1). While the cost factors do have some influences through marginal costs, changes in marginal costs are unlikely to affect the export/domestic price ratio as long as common marginal costs are assumed between export and domestic goods producers. Second, we are using the monthly series of export and domestic selling prices and the nominal exchange rate. As these variables are often found to be well described as the non-stationary I(1) series, we also ran the Engel and Granger (1987) cointegration test. Although we found cointegrating relationship for about half cases, the results differ not only across destinations and products but also between two sub-periods. As our purpose is to estimate and compare the extent of exchange rate pass-through across as many export destinations as possible, we finally chose to present the results of estimation by equation (1).[1] Third, a number of studies, such as Knetter (1989) and Gil-Pareja (2002), employ a panel regression to allow for possible differences across destination markets by country effects and also to capture any quality changes of the commodities over the sample period by time dummies (period effects). However, these studies tend to estimate a common slope coefficient, whereas it is highly likely that the extent of exchange rate pass-through differs across destination markets. Although a simplified model, our single equation approach with highly disaggregated commodities enables us to estimate the destination-specific exchange rate pass-through.

Our main interest is in the slope coefficient β in equation (1) that measures the response of the export/domestic price ratio to the exchange rate changes, so-called the "pricing-to-market (PTM) elasticities". In the case of complete pass-through (i.e., no PTM), the Japanese exporters will not take any exchange rate risks and the export price measured in the yen will not respond to the exchange rate changes, which results in the insignificant β coefficient. In contrast, in the case of incomplete pass-through (i.e., when PTM exists), the export/domestic price ratio will be positively correlated with the exchange rate changes, with the result that the slope coefficient is positive and statistically significant. Thus, the following hypothesis will be tested in the subsequent section:

Hypothesis: when exporters fully pass through the exchange rate changes to importers (i.e., no PTM), we cannot reject the null hypothesis that a value of β is equal to zero ($\beta = 0$). When exchange rate changes are not completely passed through to importers (i.e., PTM exists), we will find a positive and significant value of β.

Another important contribution of this paper is to test the above hypothesis by assuming the US dollar invoicing. It is well known that trade between developed countries is typically invoiced in either exporter's or importer's currency, with a notable exception of trade with the United States. However, trade with developing countries tends to be invoiced in the exporter's currency or the US dollar (see Sato (1999, 2003) and Parsons and Sato (2007)). Accordingly, we investigate whether Japanese exporters tend to stabilize the export price in terms of the US dollar rather than the local (destination country's) currency in their exports to developing countries, especially to the East Asian economies. In the following section, we will report and compare the results of estimation for both local currency invoicing and US dollar invoicing.

3. EMPIRICAL RESULTS

3.1. Data Description

We use the Japanese customs data that is available from the web site of the Ministry of Finance, Japan. All data are monthly spanning from January 1988 to December 2006. We calculated the unit values for each commodity by dividing the total amount of exports (yen value) by the total volume (quantity). It is often argued that unit value series do not account for quality changes in the product over time. However, unit values are the only measure of export prices that enables us to investigate the firm's pricing behaviour at a highly disaggregated level for each destination market.

We calculate the export/domestic price ratio by dividing the unit value by the corresponding domestic corporate goods price index (CGPI) or wholesale price index (WPI). Monthly series of CGPI and WPI are obtained from the web site of the Bank of Japan. Monthly series of nominal bilateral exchange rates vis-à-vis the US dollar are taken from the IMF, *International Financial Statistics*, CD-ROM, and the CEIC Global Database. We then construct the cross rate, i.e., the bilateral exchange rate of the yen vis-à-vis the destination country's currency. Bilateral exchange rate vis-à-vis each European currency is computed using the euro conversion rates that is available from the web site of the European Central Bank (http://www.euro.ecb.int/en/section/conversion.html).

[1] We also estimated error-correction model when cointegrating relationship was found. See footnote 3.

We initially collected more than 40 commodities for estimation and computed the unit value series of each commodity for 30 destination countries. Then, we carefully investigated the calculated unit value series. First, we checked whether volume of transactions of each commodity for each destination is relatively large. Although using the commodity data at the H.S. 9-digit level, heterogeneity still exists in the selected commodities. The larger the volume of transactions, the more reasonable the unit value series we calculate; otherwise, we will have a number of outliers in the computed unit value series. Such series of commodities with large variation and/or outliers were dropped from our sample, with the result that 7 types of commodities were chosen from the 4 industries: Base Metal, General Machinery, Electric Machinery and Transport Equipment industries. [2] At most 26 destination countries are investigated for estimation in equation (1). Second, we encountered many missing data in the unit value series, because the sample commodities are not necessarily exported every month to destination countries. If the unit value series have missing data for a particular destination, the estimation for the concerned destination country is neither conducted nor reported in Tables below.

3.2. Results of Exchange Rate Pass-through

Tables 1-A and 1-B show the results of the estimated β_0 coefficient obtained from equation (1) assuming the local currency pricing. [3] The estimated values of $\sum \beta_i$, so-called the long-run PTM elasticities, are not reported but available upon request. It is worth pointing out that the estimated long-run PTM elasticities tend to be less statistically significant than the corresponding short-run elasticities.

We divide the whole sample into two sub-samples, 1988M1-1996M12 and 1999M1-2006M12, to analyse whether Japanese exporters' pricing behaviour has changed over the period. The 1997-98 years are excluded from the sample, because East Asian countries experienced the currency crisis during the period. Let us hereafter call the former sub-sample "the pre-crisis period" and the latter "the post-crisis period". In addition, since the euro was established in January 1999, our estimation reveals whether or not Japanese exporters' pricing behaviour in European markets changed before and after the start of the euro.

Table 1-A shows the short-run PTM elasticities for (i) flat-rolled steel products, (ii) compressors, and (iii) VCRs & video projectors. First, as for the flat-rolled steel products, the short-run PTM elasticities are positive and statistically significant in most cases in the pre-crisis period. Japanese exporters did not pass through the exchange rate changes to the East Asian importers and such pass-through behaviour still exists even in the post-crisis period.

Second, in the case of compressors, which is chosen from the General Machinery industry, the pass-through pattern differs markedly between the East Asian countries and the US and European countries. In Japanese exports to East Asia, the short-run PTM elasticities are not statistically significant at all in both two sub-samples. In contrast, the PTM elasticities become positive and significant in the US and European markets. The PTM behaviour (i.e., the low pass-through) is more evident in the post-crisis period. As the US and European markets are more competitive than the East Asian ones, the above results appear to be reasonable. Moreover, the results suggest that the Japanese exporters strengthened the PTM behaviour in the European markets after the start of the euro.

Third, we chose the VCRs (for the 1988-96 period) and video projectors (for the 1999-2006 period) from the Electric Machinery industry. Since the export volume of the VCRs decreased considerably over time, we cannot get reliable results of estimation in the post-crisis period. Thus, we alternatively report the results of the video projectors in the post-crisis period. Table 1-A shows that the PTM behaviour of VCRs and video projectors becomes more evident in the post-crisis period, although we need to be careful in comparing the results between VCRs and video projectors.

Table 1-B shows the results for the monolithic ICs and two types of automobiles. We could not find any PTM behaviour in exports of the monolithic ICs to European countries for both sub-samples.

[2] The H.S. code of 7 commodities are as follows: Flat-Rolled Products (7210.49-000 for 1988M1- 2004M12 and 7210.49-099 for 2005M1-2006M12); Compressors (8414.30-100); VCRs (8521.10-000); Video Projectors (8528.30-000); Monolithic ICs (8542.19-900 for 1988M1-1995M12, 8542.30-900 for 1996M1- 2001M12, and 8542.29-900 for 2002M1-2006M12); Automobile I (compact cars: 8703.23-910 for 1988M1-2000M12 and 8703.23-919 for 2001M1-2006M12); and Automobile II (standard or medium/large size cars: 8703.23-920 for 1988M1-2000M12 and 8703.23-929 for 2001M1-2006M12).

[3] We also conducted error-correction estimation when cointegrating relationship was found by the Engle and Granger (1987) test. It is found that the results of the short-run PTM elasticities are similar between the first-difference model and error-correction model, although the extent of PTM elasticities is somewhat different. The results are available upon request.

Even in exports to the United States, the PTM elasticities are not statistically significant in the post-crisis period. This finding is particularly interesting, because the markets for ICs and semiconductor devices are very competitive and, hence, it is expected that exporters tend to stabilize the export price in line with the local (or world) market price. In contrast, the PTM elasticities became significantly positive in some East Asian markets in the post-crisis period.

Finally, the results for two types of automobiles give us important empirical evidence. As for the Automobile I (compact cars), the PTM behaviour of Japanese exporters becomes more evident in the European markets after the starting of the euro. In contrast, in the case of the Automobile II (standard or medium/large size cars), the PTM elasticities are significantly positive only in three destination countries after euro started. This difference can be attributed to the characteristics of traded automobiles. Since the Automobile II tends to be more differentiated products, it is more likely that Japanese exporters can pass through (unexpected) exchange rate changes to European importers. In exports of automobiles to the East Asian countries, the PTM elasticities are significantly positive only in Hong Kong market, which reflects that Japanese automobiles have strong competitiveness in East Asian markets. Thus, the characteristics of traded goods do matter in determining the PTM or the exchange rate pass-through behaviour.

Table 1-A. Results of Short-Run Exchange Rate Pass-Through (Destination Currency Pricing)

	Flat-Rolled Steel Products		**Compressors**		**VCRs & Video Projectors**	
Destination:	1988M1-1996M12	1999M1-2006M12	1988M1-1996M12	1999M1-2006M12	1988M1-1996M12	1999M1-2006M12
Korea	0.49 (0.24) *	0.65 (0.26) **	0.81 (0.51)	- -	5.02 (4.21)	-0.70 (2.29)
Mainland China	0.14 (0.11)	0.60 (0.19) **	0.81 (1.41)	0.70 (1.23)	1.07 (0.86)	-8.01 (3.50) *
Taiwan	0.71 (0.26) **	0.57 (0.31) #	0.34 (0.28)	0.21 (0.34)	-3.10 (1.58)	0.19 (0.84)
Hong Kong	0.48 (0.30)	-0.20 (0.53)	-0.03 (0.96)	-4.89 (4.01)	0.75 (0.69)	0.52 (0.65)
Thailand	1.05 (0.15) **	0.35 (0.14) **	0.17 (0.39)	0.03 (0.87)	0.92 (0.66)	0.40 (0.78)
Singapore	0.85 (0.17) **	0.23 (0.31)	0.14 (0.39)	-0.04 (1.03)	0.96 (0.37) **	-1.29 (0.78)
Malaysia	0.59 (0.14) **	0.06 (0.29)	0.99 (0.82)	2.64 (2.18)	1.97 (0.83) *	0.20 (0.94)
Philippines	- -	0.21 (0.36)	-4.41 (3.26)	0.43 (1.03)	2.66 (1.84)	0.61 (1.37)
Indonesia	- -	0.02 (0.16)	- -	0.04 (1.00)	- -	- -
Norway	- -	- -	- -	- -	-0.07 (1.13)	- -
Sweden	- -	- -	0.24 (0.14) #	-0.01 (0.17)	2.18 (1.10) *	1.54 (0.79) *
Denmark	- -	- -	- -	- -	-0.17 (0.90)	- -
United Kingdom	- -	- -	0.22 (0.22)	0.38 (0.13) **	0.71 (1.49)	1.23 (0.56) *
Netherlands	- -	- -	0.32 (0.12) **	0.16 (0.08) *	-0.74 (1.55)	-0.14 (0.75)
Belgium	- -	- -	0.20 (0.68)	- -	-0.74 (1.50)	- -
France	- -	- -	0.24 (0.16)	0.47 (0.14) **	0.18 (1.28)	0.65 (0.67)
Germany	- -	- -	-0.33 (0.19) #	0.04 (0.10)	1.14 (1.04)	0.73 (0.37) *
Switzerland	- -	- -	- -	- -	0.20 (0.94)	-0.28 (1.10)
Portugal	- -	- -	- -	-1.41 (0.54) **	-0.24 (1.24)	1.74 (1.46)
Spain	- -	- -	- -	0.54 (0.41)	1.20 (1.09)	0.93 (0.77)
Italy	- -	- -	-0.03 (0.13)	0.86 (0.22) **	0.42 (0.67)	0.55 (1.17)
Finland	- -	- -	- -	- -	0.19 (0.80)	0.16 (0.83)
Austria	- -	- -	- -	- -	1.00 (0.93)	- -
Canada	0.45 (0.19) *	- -	- -	0.58 (0.36)	0.76 (0.61)	0.52 (0.65)
United States	0.56 (0.15) **	- -	0.38 (0.14) **	0.45 (0.15) **	0.96 (0.39) *	1.15 (0.36) **
Australia	0.48 (0.24) *	0.25 (0.23)	0.15 (0.14)	0.23 (0.13) #	0.04 (0.40)	-0.35 (0.27)

Note: Double asterisks (**), a single asterisk (*), and a sharp (#) denote 1 percent, 5 percent and 10 percent significance levels, respectively. Figures in parenthesis are standard errors. The β_0 coefficient, so-called short-run PTM elasticities, obtained by estimating equation (1) is reported.

3.3. US Dollar Pricing

We have so far analysed the extent of exchange rate pass-through or PTM in response to changes in the exchange rate of the Japanese yen vis-à-vis the destination country's currency. However, it must be noted that Japanese exports, especially to the East Asian countries, tend to be invoiced either in the yen or in the US dollar. To allow for such currency invoicing pattern, we re-estimate equation (1) for exports to the East Asian countries by using the bilateral exchange rate of the yen vis-à-vis the US dollar for all East Asian destinations. The results are shown in Table 2.

Table 1-B. Results of Short-Run Exchange Rate Pass-Through (Destination Currency Pricing)

	Monolithic ICs		**Automobile I (compact)**		**Automobile II (standard)**	
Destination:	1988M1-1996M12	1999M1-2006M12	1988M1-1996M12	1999M1-2006M12	1988M1-1996M12	1999M1-2006M12
Korea	0.88 (0.92)	-0.17 (0.79)	- -	- -	- -	- -
Mainland China	0.19 (0.46)	1.19 (0.62) #	0.78 (0.74)	0.09 (0.31)	0.14 (0.19)	-0.41 (0.37)
Taiwan	0.45 (0.38)	1.17 (0.67) #	- -	- -	- -	1.49 (0.91)
Hong Kong	0.38 (0.49)	0.05 (1.38)	-0.72 (0.57)	0.45 (0.26) #	0.33 (0.26)	0.86 (0.36) *
Thailand	0.09 (0.74)	0.80 (1.50)	-1.27 (0.84)	- -	0.46 (0.80)	0.57 (0.74)
Singapore	-0.39 (0.73)	1.24 (0.68) #	0.58 (0.30) #	0.17 (0.34)	- -	-0.08 (0.31)
Malaysia	0.69 (0.62)	-0.24 (1.59)	0.30 (0.40)	- -	- -	-1.44 (1.03)
Philippines	-1.39 (1.53)	-0.27 (0.94)	- -	- -	-0.44 0.47171	- -
Indonesia	- -	-1.12 (0.91)	- -	- -	- -	- -
Norway	- -	- -	0.24 (0.23)	0.48 (0.22) *	0.37 (0.56)	-0.36 (0.62)
Sweden	- -	- -	0.07 (0.21)	0.69 (0.32) *	0.63 (0.39)	0.48 (0.31)
Denmark	- -	- -	0.56 (0.20) **	0.58 (0.35)	-0.21 (0.56)	0.81 (0.44) #
United Kingdom	0.50 (0.41)	-0.75 (1.67)	0.06 (0.15)	1.12 (0.29) **	0.58 (0.27) *	1.22 (0.54) *
Netherlands	-2.25 (1.70)	-1.19 (2.53)	0.29 (0.25)	0.11 (0.25)	1.33 (0.51) **	0.36 (0.41)
Belgium	-0.67 (1.62)	1.24 (1.43)	0.33 (0.20) #	0.71 (0.38) #	0.66 (0.47)	-0.79 (0.83)
France	-1.10 (1.08)	-0.54 (3.24)	0.21 (0.28)	0.38 (0.33)	1.34 (0.57) *	-0.22 (0.61)
Germany	0.84 (0.53)	-0.91 (1.28)	0.56 (0.15) **	0.60 (0.19) **	0.50 (0.30) #	-0.13 (0.37)
Switzerland	- -	- -	0.35 (0.12) **	0.44 (0.16) **	0.39 (0.17) *	0.34 (0.34)
Portugal	- -	- -	0.22 (0.35)	0.90 (0.76)	- -	- -
Spain	0.83 (1.24)	0.51 (3.00)	- -	0.93 (0.31) **	- -	0.70 (0.53)
Italy	2.28 (1.55)	-3.20 (3.11)	- -	0.27 (0.30)	- -	0.17 (0.62)
Finland	- -	-0.84 (2.38)	0.41 (0.18) *	0.33 (0.24)	0.85 (0.56)	0.31 (0.30)
Austria	0.77 (1.30)	- -	0.25 (0.15) #	0.74 (0.25) **	0.98 (0.32) **	1.37 (0.53) *
Canada	- -	- -	-0.03 (0.25)	0.14 (0.39)	0.29 (0.16) #	0.66 (0.18) **
United States	0.79 (0.39) *	0.46 (0.51)	0.53 (0.10) **	0.63 (0.18) **	0.64 (0.11) **	0.69 (0.12) **
Australia	0.98 (1.22)	- -	0.10 (0.11)	0.14 (0.13)	0.35 (0.10) **	-0.04 (0.11)

Note: Double asterisks (**), a single asterisk (*), and a sharp (#) denote 1 percent, 5 percent and 10 percent significance levels, respectively. Figures in parenthesis are standard errors. The β_0 coefficient, so-called short-run PTM elasticities, obtained by estimating equation (1) is reported.

Table 2. Results of Short-Run Exchange Rate Pass-Through (US Dollar Pricing)

	Flat-Rolled Steel Products		**VCRs & Video Projectors**		**Monolithic ICs**	
Destination:	1988M1-1996M12	1999M1-2006M12	1988M1-1996M12	1999M1-2006M12	1988M1-1996M12	1999M1-2006M12
Korea	0.44 (0.23) *	0.78 (0.19) **	4.10 (3.97)	1.11 (1.74)	0.58 (0.87)	0.46 (0.60)
Mainland China	0.59 (0.17) **	0.60 (0.19) **	2.33 (1.52)	-8.05 (3.51)	1.42 (0.81) #	1.14 (0.62) #
Taiwan	0.76 (0.25) **	0.54 (0.24) *	-3.24 (1.52)	-0.24 (0.68)	0.68 (0.37) #	1.55 (0.52) **
Hong Kong	0.46 (0.30)	-0.21 (0.53)	0.75 (0.69)	0.50 (0.65)	0.37 (0.50)	0.13 (1.36)
Thailand	0.91 (0.13) **	0.40 (0.12) **	0.71 (0.56)	1.12 (0.72)	0.02 (0.63)	0.67 (1.39)
Singapore	0.72 (0.14) **	0.17 (0.25)	0.78 (0.31) **	-1.12 (0.64) #	0.23 (0.61)	1.14 (0.55) *
Malaysia	0.69 (0.13) **	0.03 (0.28)	1.44 (0.82) #	0.40 (0.91)	0.68 (0.61)	0.10 (1.56)
Philippines		0.48 (0.40)	3.37 (2.17)	0.51 (1.53)	-1.76 (1.81)	-0.19 (1.05)
Indonesia		0.35 (0.33)				-0.75 (1.86)

Note: Double asterisks (**), a single asterisk (*), and a sharp (#) denote 1 percent, 5 percent and 10 percent significance levels, respectively. Figures in parenthesis are standard errors. The β_0 coefficient, so-called short-run PTM elasticities, obtained by estimating equation (1) is reported.

First, the significance level of PTM elasticities improves to a certain extent for the flat-rolled steel products and the monolithic ICs. Since the East Asian currencies are less correlated with the US dollar in the post-crisis period, the above finding may suggest that US dollar invoicing still prevails in exports to several East Asian countries. In contrast, the PTM elasticities are not significantly positive in exports of VCRs and video projectors for the post-crisis period, which implies that Japanese exporters have stronger tendency to pass through the exchange rate changes to East Asian

importers, likely because these Japanese products are more differentiated in East Asian markets.

4. CONCLUSION

By analysing the pricing behaviour of Japanese exporters with the commodity- and destination-breakdown of Japanese customs data, we have obtained several important findings. First, the exchange rate pass-through and/or PTM behaviour differs across destinations. In East Asian markets, Japanese exporters tend to pass through the exchange rate changes to East Asian importers with the exception of the flat-rolled steel products. In contrast, PTM is more prevalent in US and European markets. The above findings suggest that the degree of competition in markets has to do with the firm's pricing behaviour. Second, the characteristics of traded products also do matter for the exchange rate pass-through or PTM. In European markets, the PTM elasticities are less significant in Automobile II than in Automobile I, which implies that exporters with more differentiated products tend to pass through exchange rate changes to importers. Third, by allowing for US dollar invoicing, we found that Japanese exporters tend to stabilize the export price even in East Asian markets for some products such as flat-rolled steel products and monolithic ICs. Finally, we found that the degree of exchange rate pass-through of compressors and Automobile I declined in European countries after the starting of the euro, which has important implications for the recent debate on possible decline of exchange rate pass-through. However, the extent of exchange rate pass-through did increase when looking at the results for Automobile II. Thus, the results are still mixed and it is a bit too early to make any strong statement on the debate on declining exchange rate pass-through. Further empirical investigation will be necessary by using much more sample commodities.

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