PRICING IN INTERNATIONAL MARKETS: A 'SMALL COUNTRY' BENCHMARK

David C. Parsley
Owen Graduate School of Management
Vanderbilt University, and
Hong Kong Institute for Monetary Research
David.Parsley@Vanderbilt.edu

September 2, 2002

PRICING IN INTERNATIONAL MARKETS: A 'SMALL COUNTRY' BENCHMARK

ABSTRACT

This study examines export pricing to market (PTM) in a 'small-country' context using a panel of disaggregated exports from Hong Kong to its major flexible exchange rate destinations since 1992. Conventional wisdom on PTM is taken from G7 countries, where PTM is commonplace. In contrast it is often found that U.S. exporters apparently do not mitigate export prices in response to exchange rates. This study provides a benchmark by which to interpret the puzzling behavior of U.S. export prices.

Empirically, Hong Kong's export price behavior is comparable to that from the U.S. Indeed, there is very little evidence of PTM by Hong Kong exporters. This similarity reinforces the idea that PTM behavior is also a function of home market conditions and the ability to price discriminate across markets. In line with existing research, we find little evidence of differences in PTM across export destinations.

Introduction

The extent to which exchange rate changes are 'passed-through' to import prices is part of an ongoing research agenda in both empirical macroeconomics and international finance. Theoretically, the most important factors affecting exchange rate pass-through include market conditions in the import market (Dornbusch 1987, Krugman 1987), the extent to which exporters' costs are affected by exchange rate changes, and the monetary policy environment in the import market (Parsley and Popper, 1998, Devereux 2000, and Taylor 2000). Importantly, *changes in* exchange rate pass-through reflect changes in these underlying determinants. Hence differences in pass-through often form the basis of cross-country, cross-sector, or time-series inferences about underlying market structure and/or about appropriate monetary policies.

Empirically, there are two broad approaches to studying the linkage between exchange rates and prices. The first, and more common approach, relates observed changes in prices to changes in exchange rates and other controls for demand conditions in the import market, and producer cost markups. This approach is essentially bilateral – though the estimation may be done in a panel context. An abbreviated list of recent studies in this tradition includes Mann (1986), Froot and Klemperer (1989), Parsley (1993, 1995), McCarthy (2000), and, Campa and Goldberg (2001). Alternatively, a second empirical approach – primarily due to Knetter (1989, 1993) – takes a more multilateral approach by comparing export (or import) prices across destinations (or from several sources) of the same good. This empirical approach to studying the exchange rate – price linkage focuses on cross-market (or cross-good) differences in pricing-to-market (PTM) behavior. Since the goods being studied are the same across destinations (or sources), residual variations in

the response of prices across markets of the good can be more directly associated with exchange rate changes. Thus, this approach has the advantage that errors in measuring changes in production costs and markups are mitigated.

To date, most empirical evidence regarding both pass-through and PTM is based on the experience of G7 economies, and especially the U.S. (see Goldberg and Knetter 1997 for a review of several strands of related research). Several intriguing conclusions have emerged. First, foreign exporters (to the U.S. market) price-to-market to a greater extent than do exporters from the U.S market. Indeed U.S. exporters often amplify exchange rate fluctuations. Secondly, overall, differences at the industry level seem to be more important than country level differences. That is, with the exception of the U.S., it is typically not possible to reject the hypothesis that pricing-to-market behavior is identical across destination markets, while it is possible to reject the hypothesis that pricing-to-market behavior is the same across industries – even within a country.

The purpose of this study is to examine PTM in the context of a non-G7, small open economy, vis., Hong Kong SAR. The case of Hong Kong is interesting for several reasons. First, it has a history and reputation of fierce domestic competition and open markets. Openness, defined as the ratio of imports plus exports to domestic GDP, is typically in excess of 300%, a number far in excess of the representative G7 country. As a result, the export market is of primary importance; more importantly, this openness limits exporters' ability to subsidize foreign sales with protected domestic markets. Second, with less than one half of one percent of world GDP, Hong Kong would by most definitions more closely fit the 'small country' assumption of the standard competitive model. Thus, a priori, market power considerations are likely very different than for previous studies. In

particular, is the finding that U.S. exporters do not price to market unique, or is it the other way around – i.e., is the U.S. import market uniquely competitive, thereby necessitating pricing to market? The data set used in this study can shed light on these questions.

The effect of Hong Kong's peg to the U.S. dollar (as it relates to export pricing) deserves comment. First, it is obvious that it is not possible to study the effects of exchange rate changes on export prices if there is no variation in the exchange rate. However, we include exports to the United States in the regressions reported below as a means of controlling for simultaneous changes in the 'world' price.[1] We do however, exclude exports to the mainland of China, primarily because China does not represent a final destination market, i.e., exports to China are often re-imported, only to be exported to a final destination. In this study, the focus is on Hong Kong's next nine largest trading partners; excluding the U.S., there is ample bilateral exchange rate variation vis-a-vis this group. Secondly, the currency of invoicing may be an issue given that the Hong Kong dollar is pegged to the U.S. dollar. Goldberg and Knetter (1997) note that exporter currency invoicing biases against finding PTM in the short run. Hence, the analysis in this study is conducted at an annual frequency. Moreover, the composition of domestic consumption is arguably only loosely related to that in the U.S., which would preclude viewing Hong Kong as part of an 'extended' United States. Thus, in the context of export pricing to non-U.S., non-mainland Chinese destinations, the peg should be of secondary importance.

---

[1] It is not necessary to believe that the U.S. price represents the 'world' price. However, the volume of Hong Kong's exports going to the U.S. market alone accounts for roughly as much as the next eight export destinations (excluding China) combined.

This study is facilitated by unique data set of disaggregate bilateral export unit values, commodity by country, for the nine-year period 1992-2000. These represent the most detailed data available on Hong Kong's external trade. As hinted above, this level of disaggregation is crucial for studies of PTM.

The next section sketches the textbook derivation of export pricing in the simplest possible context. The resulting first order condition is well known and surprisingly general; perfect competition and monopoly are special cases. This section also discusses estimation issues and the advantages that a combined cross-section time-series approach affords. Section 3 discusses the data examined. Section 4 presents the estimation results and a final section concludes.

1. Factors influencing pass-through

Starting with the textbook model of perfect competition, profit maximization implies price equals marginal cost, or, $P_i = C_i$, where, P_i is the price of the ith good. If the good is traded internationally, the price in foreign currency, P_i^*, is simply $P_i^* = C_i/S$, where S is the domestic currency price of foreign exchange. With constant marginal cost, pass-through, i.e., the elasticity of foreign currency price with respect to the exchange rate $\left(d\ln P^* / d\ln S\right)$, is equal to one (in absolute value). Thus, in the small country, perfect competition benchmark, local currency import prices fully reflect exchange rate changes.

If we relax the perfect competition assumption, the first order condition must include a markup:

$$P_i^* = \lambda C_i/S , \qquad (1)$$

The markup (λ) is a function of the elasticity of demand (ε), $\lambda = \varepsilon_i / (\varepsilon_i - 1)$. Thus, pass-through can be less than complete if the markup varies. As noted by Goldberg and Knetter (1997) the condition in equation (1) is actually more general than the simple textbook monopoly case. On the one hand, we can consider the elasticities to be associated with a residual demand curve that takes into account the firm's perceptions of competitors' responses to changes in the firm's price. Additionally, the perfect competition case is also a special case of equation (1) when the demand elasticity is infinite.

Alternatively, if the import market is perfectly competitive with many sources of supply – both home and abroad (and not all from the same country) – pass-through will be muted. Indeed, in the limit, PTM will be complete.

Thus to estimate pass-through, empirical measures of marginal cost and factors influencing markups need to be obtained. Traditional estimates of pass-through, e.g., Mann (1986), are derived from log-linear regressions of equation (1) using aggregate (e.g., import price index) data.[2] Typically these equations include a cost index, e.g., a domestic wholesale price index, and import demand shifters, e.g., a competing price and importer's income. In these studies, pass-through to the U.S. was typically found to be around sixty percent, changes in markup thus accounted for the residual forty percent of the exchange rate change.

Two problems with these estimations include measurement error and simultaneity bias. If marginal costs are not well approximated by cost indices, which is likely, and this measurement error is correlated with the equation disturbance, then OLS estimates will be

---

[2] Typically, estimations are in percentage change form, i.e., variables included in regression equations are first-differenced, natural log values.

biased. Moreover, Goldberg and Knetter (1997) suggest the measurement error of existing cost indices may be correlated with exchange rates such that pass-through estimates are biased downward. In their example, foreign outsourcing increases this problem. While this is certainly a problem for estimation, it is not clear why measurement errors would produce relatively more downward bias for pass-through to the U.S. than elsewhere. The second, related problem, afflicting these early estimations is simultaneity bias. At the aggregate level, exchange rates and prices are both endogenous variables. Thus by definition, the exchange rate will be correlated with the disturbance term and, as before, OLS estimates will be biased (see, e.g., Parsley and Popper 1998).

Both of these issues suggest a different estimation procedure is appropriate. Consequently, the empirical approach adopted here follows that developed in Knetter (1993). These econometric problems are mitigated both by the estimation method, and by the choice of data. The empirical model is an analysis-of-covariance model, and it is estimated via a fixed-effects regression model. The model is estimated using a panel of disaggregated export unit-value data from Hong Kong to the top nine export destinations simultaneously. Markups and marginal costs are not directly observable, but including a full set of time dummies in the estimation controls for common (across destination) movements in price. As noted by Knetter (1993), the interpretation of the time effects as capturing the behavior of marginal cost is over simplified when more than one firm is in the export sector. He notes that the model still controls for common, underlying changes in industry cost.

The extent of pricing to market, then, will be measured by changes in destination specific exchange rates. An additional advantage of this data set is that it includes prices to

a major fixed exchange rate market. Since the U.S. receives the lion's share of Hong Kong's exports, and since the Hong Kong dollar is pegged to the U.S. dollar, adding the U.S. price to the equation affords a degree of freedom not normally available in studies of PTM. Other factors such as income and competitors prices in the destination market may be important for establishing the absolute level of prices in the export market, but (relative) changes in these variables will generally be of much smaller magnitude than the corresponding bilateral exchange rate. Thus the export pricing model to be estimated is:

$$\Delta p_{jt} = \theta_t + \beta_j \Delta s_{jt} + \alpha_j + \gamma \Delta p_{US,t} + \mu_{jt} \qquad (2)$$

In equation (2), lower case letters indicate natural logarithms, and Δ represents the first-difference operator. The subscripts now refer to country j at time t. It is thus a generalization of equation (1) in that the condition now considers an exporter selling the same product to multiple markets. In Equation (2) α_j is a country specific intercept, and θ_t is a time effect. Common (across export destinations) movements in marginal costs are the primary factor captured by θ_t. As noted, a separate control is entered into the equation for movements in the U.S. price at time t. None of the results reported below is sensitive the inclusion of this control. The error term μ_{jt} is assumed to be independently and identically distributed with mean zero and variance σ_μ^2. Initially, the model is estimated separately for each export product examined.

The statistical interpretation of the β's is straightforward. PTM requires a nonzero estimate of β; in particular PTM occurs when $\beta < 0$. Note the ability to price to market requires market segmentation. Moreover, market segmentation enables losses in one market to be subsidized by profits in another. A value of zero for β implies that markups

do not vary in response to exchange rate changes. Thus there is no pricing to market. In the case of Hong Kong, the null hypothesis is that PTM is zero.

Two additional points merit discussion. First, the model is estimated using annual data. Recent research has indicated short-run exchange rate changes may not be passed through if they are thought to be temporary (e.g., Froot and Klemperer 89, and Parsley 95). Related, is the problem of invoicing currency noted previously. If exporters invoice in the importer's currency, estimates of pass-through using high frequency data are spuriously biased downward, simply because of infrequent price adjustment (see e.g., Marston, 1990). Consequently, annual data are employed in this study. Annual data have the further benefit that measurement issues are less severe, since in higher frequency data could more easily be influenced by changes in the composition of exports within a given category. That is, the unit values are likely to have a higher noise content at higher frequencies. As another precaution against the impact of large data outliers, the tables below report analysis here the top and bottom five-percent of the data have been discarded. This filter affects none of the qualitative conclusions reported below. Finally, the data are disaggregated to the greatest extent possible. At a disaggregated level exchange rate changes can arguably be treated as exogenous.

2. Data

The original source data for this study are domestic exports (Hong Kong dollar) value and quantity, disaggregated to the 5-digit SITC commodity level, from the *Hong Kong Trade Statistics: Country by Commodity Domestic Exports and Re-exports*, published by the Census and Statistics Department of Hong Kong SAR. For this study, the data were taken from the CD-ROM, *Hong Kong External Trade, volume 5 (1992-2000)*.

Unit value data have well known limitations as proxies for price (see e.g., Kravis and Lipsey 1974). In particular, unit values may change due to changes in the commodity composition of trade. The problem is especially salient at the aggregate level. Hence the focus of this study is on unit values at the most disaggregated level possible in the data. Other authors have used apparently even greater disaggregations, e.g., Knetter (1989, 1993) uses seven-digit industries, and Takagi and Yoshida (2001) examine nine-digit industries. However, on closer inspection, the unit values employed in this study appear to be of a comparable level of disaggregation. For example, Knetter examines beer, autos over 2 liters, books, and snap action switches, while Takagi and Yoshida examine plugs and sockets, microscopes, and brakes and parts. Some examples of the data included in this study are soy sauce, children's picture, drawing or coloring books, and playing cards.

Despite this level of disaggregation, there still remains the possibility for measurement error, and Hong Kong's entrepot trade data provides some unique perspective on the extent of the problem.[3] Specifically, unit values are computed for Hong Kong exports as well as for Hong Kong re-exports. These unit values are in many cases strongly related, however evidence is presented below that there are differences in unit value movements between these two data sets. Such differences presumably (largely) reflect differences in the composition of the 5-digit categories. Hence all of the analysis in this study uses both sources – exports, and re-exports. None of the paper's conclusions are dependent on the particular unit-value series chosen. Additionally, it should be reiterated that this is the best data available. Finally, from a purely statistical standpoint the issue

---

[3] That is, this data set permits two unit value series to be computed for each export product and country. In principle, these series measure the same thing – especially for non-branded goods. To my knowledge, this feature is unique to Hong Kong's external trade data.

involves the dependent variable – thus any measurement errors are incorporated into the disturbance term. Statistical problems in this case are arguably less severe than those related to miss-measurement of an independent variable.

For this study the top nine export destinations were chosen, ignoring China. Twenty-nine 5-digit export commodities were chosen from across the full spectrum of export (type) classifications. As noted, these twenty-nine products are also studied as purely re-export products as a robustness check on the data. Overall, the aim was to provide variation in terms of the types of products chosen, and to choose important export industries. Thus despite using micro-level data, the goal was to be representative – and, not dependent on a particular product or single export destination. Finally, the goal in choosing the largest export destinations was to improve the accuracy of the unit value data as a measure of price and to minimize the number of missing observations.

Econometrically, a key requirement of the data is for the commodities to be exported to as many of the export destinations as possible. This is the important variation that enables the common change in markups or marginal cost to be more accurately estimated. Unit values were constructed as the value of exports of the good divided by the quantity exported. We begin by looking at domestic exports and subsequently examine domestic re-exports.

Table 1 lists the countries, goods, and the time period included in this study. Note that excluding the mainland of China has a non-trivial effect on Hong Kong's measured trade. The next largest nine trading partners make up only roughly fifty percent of Hong Kong's external trade.

The nominal exchange rate data were obtained from the CEIC database provided by the Hong Kong Monetary Authority, and wholesale price indices were obtained from the April 2001, International Financial Statistics CD, except for Taiwan, where data from CEIC was used. Real exchange rates were constructed as equal to the nominal exchange rate deflated by the wholesale price index in the export market.

3. Basic Results

Prior to reporting regression results examining PTM coefficients, we begin with a comparison of the two export unit-value series available in this panel, i.e., the series computed from Hong Kong domestic exports, and those computed from Hong Kong's re-exports. If these two series do indeed measure the same thing, their movements should be positively correlated. A strong test of this hypothesis is whether, after controlling for individual effects (α_j), the two series move together. More formally, the test would be whether $\hat{\gamma} = 1$ in equation (3). Note that, as before, Δp represents the first difference in log price.

$$\Delta p_{jt}^{\text{exports}} = \alpha_j + \gamma\ \Delta p_{jt}^{\text{re-exports}} + \mu_{jt} \tag{3}$$

Table 2 reports the results from the twenty-nine separate regressions. In column 1 the coefficient estimates for γ are given and heteroskedasticity consistent standard errors are in parentheses. Notice that the coefficient estimates range from *negative* 0.252 to 1.088, and the adjusted R-squared statistics are similarly dispersed, but generally appear small. Indeed, in only five equations is more than fifty percent of the variation in the domestic export unit-value explained by the estimated regression. Among the estimates of γ, the results are slightly more encouraging. Eighteen of the positive coefficients are

statistically significant at the five-percent level, and none of the negative coefficients is statistically significant. Finally, column 3 reports the F-statistic for the null hypothesis that $\hat{\gamma} = 1$; fully half of the equations reject this hypothesis. As noted above, this result suggests measurement error in these unit-value series. Unfortunately, there is no way to determine which series is more accurately measured. Hence all subsequent analysis will examine domestic exports and re-exports separately.

Table 3 presents PTM estimates for domestic exports for the twenty-nine separate export industry estimations. As before, the estimation period is 1992-2000. First note that the model as outlined by equation (2) allows the PTM coefficient (β) to vary by destination country. However the table reports results imposing the constraint that β was the same across countries. Likelihood ratio tests of this restriction are reported in the column labeled $\beta_j = \beta$. The restriction is rejected for only seven of the equations. This is consistent with the hypothesis that PTM behavior does not depend critically on the destination market. This is also consistent with what Knetter (1993) finds in his examination of export behavior from Germany, Japan, the U.S. and the U.K. – i.e., PTM behavior does not depend critically on the destination market. Hence, we focus on the results of the constrained regressions.

Table 3 presents results using the nominal exchange rate as the measure of the exchange rate. Knetter (1993) argues the optimal export price should be neutral with respect to changes in the nominal rate that correspond to inflation in the destination market. Hence he reports estimates using the real exchange rate. One problem of this adjustment is that measurement error is introduced to the extent that the overall inflation

rate diverges from the rate of change of the ith commodity. Moreover, Parsley and Popper (1998) argue that the exchange rate may reflect central bank actions in response to the behavior of prices – as in the case where monetary policy insulates prices from exchange rate changes. Prices then appear unresponsive to changes in the exchange rate. The observed relationships between prices and the exchange rate will reflect central bank actions instead of the underlying relationship between exchange rates and prices. Thus endogeneity of monetary policy can bias estimates of pass-through downward. For these reasons, in this study, β was estimated using both nominal and real exchange rates for robustness, however only the estimates using the nominal exchange rate are reported.[4]

The estimates of β are given in the first column of Table 3, and heteroskedasticity consistent standard errors are given in parenthesis beneath each estimate. Recall the null hypothesis is that $\beta = 0$ – which is consistent with a lack of market segmentation and no pricing to market by Hong Kong exporters. In the table there are only five cases (at the 10% level) where we can reject the null; one food, one intermediate good, and three goods in clothing and accessories (three of these cases however imply local currency prices exacerbate exchange rate movements).[5] The one food case (sports drinks) suggest that PTM might be more important in branded goods markets; however PTM in Knetter's (1993) sample was as likely to occur in homogenous goods (e.g., titanium dioxide) as in branded items. Looking across products in Table 3, there are roughly as many positive point estimates as negative; again, these results most closely mirror Knetter's findings for

---

[4] In practice the real and nominal exchange rates are very highly correlated – suggesting little impact on PTM estimates. The correlation coefficients, by country, are Canada 0.70, Germany 0.99, Netherlands 0.98, France 0.92, Britain 0.98, Taiwan 0.93, Japan 0.99, and Singapore 0.77.
[5] Finding that local currency price movements (statistically significantly) amplify exchange rate movements is not unique to this study. Interestingly, Knetter (1993) reports similar cases for U.S. exports but not for

U.S. exports, however the overall lack of statistical significance in Table 3 prevents stronger cross-industry (or product) conclusions.

At first blush, this overall lack of PTM is somewhat counter-intuitive since it suggests destination country (local currency) import prices vary with exchange rates. The lack of PTM is often associated with market power on the part of the exporter. Recall however that with a competitive export market, the ability to price-discriminate (i.e., PTM) implies the ability to subsidize losses in one market with gains in another – possibly the home market. A priori, this is not the case for Hong Kong exporters.[6] Thus, (by implication) the empirical puzzle of low U.S. export PTM may plausibly be the result of a similar inability to subsidize across markets. Finally, in column 4 of the table, we test the hypothesis that PTM is complete, i.e., $\beta = -1$. We reject this hypothesis for 15 of the 29 cases, usually at the one-percent significance level.

In summary, there is no overwhelming evidence that PTM behavior depends critically on export destination; indeed there is very little evidence of *any* price discrimination. Apparently Hong Kong exporters fully pass through exchange rate changes to destination market local currency prices. These results are consistent with what Knetter (1993) finds for exports from the U.S. Moreover, the results differ starkly from what he finds for exports from Germany, Japan, and the U.K. For exports from these countries Knetter finds much stronger evidence of PTM – though even for these countries he finds 'weak' evidence that PTM behavior does not depend critically on export

---

exports from Germany, Japan, or the U.K.

[6] However, another possibility (consistent with the findings) is that importer profit margins vary – with the net result that local currency retail prices remain relatively unaffected by exchange rate changes. This is more consonant with the findings of studies examining prices of imports. Unfortunately, it is not possible to isolate this channel with the available data.

destination. This suggests there may indeed be a difference in the behavior of exporters from (non-U.S.) G7 countries and from smaller economies.

Robustness

Most studies of the Hong Kong economy recognize the historical importance of its role as an entrepot. In Table 3, the focus was on Hong Kong exports only. However, for this study the distinction between purely domestic, and so-called re-exports, is less compelling. Moreover, as noted in Table 2, the export unit-value series computed from domestic exports and those for re-exports are less than perfectly correlated. Thus, in Table 4 the analysis is repeated for Hong Kong's re-exports. For comparability, the same goods are studied as before.

Table 4 conveys much the same story as Table 3, though in Table 4, even fewer – i.e., just over one-third of the point estimates of the PTM coefficients are negative. Additionally, of the three statistically significant coefficients, two are greater than zero – implying local currency prices amplify exchange rate movements. Thus, again we generally cannot reject the hypothesis that exporters from Hong Kong pass-through 100% of all exchange rate changes to local currency import prices. This is exactly the 'small-country, perfect competition' prediction. As in Table 3, we are able to reject the hypothesis that PTM is complete ($\beta = -1$) for slightly more than half of the products. Overall, of the G7 countries for which we have similar estimates, PTM behavior of Hong Kong exporters most closely mirrors the U.S. case.

The low R-squared statistics and large standard errors reported in Tables 3 and 4 suggest that the minimalist specification estimated and reported there may be inadequate.

Hence, the equations were re-estimated incorporating a lagged dependent variable in each equation. A second re-estimation excluded destination specific fixed effects. A third re-estimation excluded country specific effects, and finally, the analysis was done including all observations (i.e., not excluding price changes above the 95th and below the 5th percentiles of the empirical distributions). The rationale for adding the lagged dependent variable to the basic specification given in equation (2) is to mitigate possible effects of autocorrelation in the residuals. These alternative specifications are not included here to conserve space, but had no impact on the results.

Finally, the data were pooled across products in an attempt to increase the power of the statistical tests. These results are reported in Table 5. In the top panel we present the results for Hong Kong exports, and in the lower panel, we focus on re-exports. In each panel we report four pooled regressions: food, intermediate goods, clothing and accessories, and other consumer goods. The pooled results tell the same story. Namely, we cannot reject the hypothesis of zero PTM for any of the regressions. Additionally, we are able to reject the hypothesis of complete PTM for seven of the eight regressions. We also tested – and rejected for seven of the eight cases, (not reported) one specific case of partial PTM, i.e., $\beta = -0.5$.

Thus, we conclude that Hong Kong exporters typically fully pass-through exchange rate changes to local currency import prices. This conclusion is robust to the exclusion or inclusion of statistically extreme values, to several alternate econometric specifications, and it holds whether one examines nominal or real exchange rates, or whether we consider either domestic exports, or re-exports. Moreover, these conclusions do not appear

sensitive to the particular destination market considered (at least among the nine

destination markets considered here).

4. Conclusions

Using nine export destinations, this study has examined the PTM behavior of a panel

of five-digit exports from Hong Kong for the years 1992-2000. The simple, competitive

model predicts complete pass-through to (foreign) local currency prices, or alternatively no

pricing to market. This competitive model is somewhat counter-intuitive however in the

case of a small country. In the small country (exporter) case, it is at least plausible that the

buyer (importer) may exert pressure for the exporter to absorb some of the exchange rate

change. Similarly, it is sometimes conjectured that a large exporting country (e.g., the

U.S.) may exert market power in the export market, and hence refuse to absorb any of the

impact of exchange rate changes.

Most existing evidence, taken from G7 countries, finds varying (but positive) degrees

of pricing to market. The notable exception is for exports from the United States. Existing

evidence suggests that exporters from the U.S. apparently do not price to market, while

other countries routinely pass-through less than 100% of exchange rate changes. By

bringing new, non-G7 evidence to this issue, this study provides a benchmark by which to

interpret the puzzling behavior of U.S. export prices. A priori, Hong Kong represents the

small-country, competitive case. In particular, Hong Kong's highly competitive business

environment has been well documented. Moreover, there would appear little risk of

violating the 'small country' assumption in the case of Hong Kong.

Empirically, Hong Kong's export price behavior is consistent with the competitive

paradigm. In only a few cases is there evidence of local currency pricing to market by

Hong Kong's exporters. Moreover, consistent with results found by Knetter (1993), there is no compelling evidence of differences in PTM across the destination countries in the sample. An alternative interpretation suggests itself for future research. Namely, intermediaries in the import market may vary profit margins, thus mitigating local currency retail price fluctuations.

Bibliography

Bleaney, Michael, 1997, "Invoicing-currency effects in the Pricing of Japanese Exports of Manufactures", **Canadian Journal of Economics**, November, pp. 968-974.

Dornbusch, Rudiger, 1987, "Exchange Rates and Prices", **American Economic Review**, 77:1, March, pp. 93-106.

Froot, Kenneth and Paul Klemperer, 1989, "Exchange Rate Pass-through when Market Share Matters", **American Economic Review**, 79:4 pp. 637-54.

Goldberg, Pinelopi, and Michael Knetter, 1997, "Goods Prices and Exchange Rates: What Have We Learned?", **Journal of Economic Literature**, 35, September, pp. 1243-72.

Goldfajn, Ilan, and Sergio Werlang, 2000, "The Pass-through from Depreciation to Inflation: a Panel Study", Working paper.

Ghost, Atish, and Holger Wolf, 1994, "Pricing in International Markets: Lessons from *The Economist*", NBER workingPaper # 4806.

Knetter, Michael, 1989, "Price Discrimination by U.S. and German Exporters", **American Economic Review**, 79:1, March, pp. 198-210.

Knetter, Michael, 1993, "International Comparisons of Pricing-to-Market Behavior", **American Economic Review**, 83:3, June, pp. 473-486.

Kravis, Irving, and Robert Lipsey, (1974), "International Trade Prices and Price Proxies", in Nancy Ruggles (ed.), *The Role of the Computer in Economic and Social Research in Latin America*, New York: Columbia University Press, pp. 253-66.

Krugman, Paul, 1987, "Pricing to Market when the Exchange Rate Changes", *in Real-Financial Linkages among Open Economies*, Eds.: Sven Arndt and J. David Richardson. Cambridge: MIT Press, pp. 49-70.

Mann, Catherine, 1986, "Prices, Profit Margins and Exchange Rates", *Federal Reserve Bulletin*, pp. 366-79.

Marston, Richard, 1990, "Pricing to Market in Japanese Manufacturing", **Journal of International Economics**, 29, pp. 217-36.

McCarthy, Jonathan, 2000, "Pass-Through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Economies", Federal Reserve Bank of New York working paper.

Parsley, David, 1993, "Exchange Rate Pass-Through: Evidence from Aggregate Japanese Exports", **Southern Economic Journal**, Volume 60, Number 2, October, pp. 454-463.

Parsley, David, 1995, "Exchange Rate Pass-Through with Intertemporal Linkages: Evidence at the Commodity Level", **Review of International Economics,** October, Volume 3, Number 3, pp. 330-341.

Parsley, David, and Helen Popper, 1998, "Exchange Rates, Domestic Prices, and Central Bank Actions: Recent U.S. Experience", **Southern Economic Journal**, April, Volume 64, Number 4, pp. 957-972.

Taylor, John, 2000, "Low Inflation, Pass-through, and the Pricing Power of Firms", **European Economic Review**, 44, pp. 1389-1408.

Takagi, Shinji and Y. Yoshida, 2001, "Exchange Rate Movements and Tradable Goods Prices in East Asia: An Analysis Based on Japanese Customs Data, 1988-98", IMF Staff Papers, Volume 48, no. 2, pp. 266-289.

Table 1: Countries and Goods Included (1992 – 2000)

	Countries	Share of Hong Kong's Domestic Exports (2000)
1	Canada	1.8%
2	Germany, Fed. Rep.	5.1%
3	Netherlands	2.2%
4	France	1.5%
5	United Kingdom	5.9%
6	Taiwan	3.4%
7	Japan	2.8%
8	Singapore Rep.	2.6%
9	United States	26.3%

Goods Included

Food

1	09841	Soya Sauce
2	09849	Other sauces and preparations thereof, mixed condiments & seasonings
3	09891	Pasta, cooked or stuffed; couscous
4	11102	Waters (including mineral and aerated), containing added sugar or other sweetening matter or flavor, and other non-alcoholic beverages, NES

Intermediate Goods

5	58130	Flexible pipes and tubes, having minimum burst pressure of 27.6 MPA
6	64212	Folding cartons, boxes and cases, of non-corrugated paper or paperboard
7	65243	Other woven fabric, containing 85% or more of cotton, denim, weighing > 200 g/sq m
8	69631	Razors, non-electric
9	77119	Other electrical transformers
10	77121	Static converters
11	77255	Other switches for a voltage not > 1000 v
12	77258	Plugs & sockets for a voltage not > 1000 v
13	77811	Primary cells and primary batteries
14	77884	Electric sound or visual signalling apparatus

Clothing and Accessories

15	83199	Other handbags
16	84119	Men's or Boy's anoraks, ski-jackets, wind cheaters and the like, not knitted or crocheted
17	84140	Men's or Boy's trousers, bib and brace overalls & shorts, not knitted or crocheted
18	84151	Men's or Boy's shirts, of cotton, not knitted or crocheted
19	84260	Women's or girl's trousers, shorts, breeches and bib and brace overalls & shorts, not knitted or crocheted
20	84482	Women's or girl's briefs and panties, not knitted or crocheted
21	84530	Jerseys, pullovers, cardigans, waistcoats & similar articles knitted or crocheted
22	84692	Other gloves, mittens and mitts, knitted or crocheted
23	84812	Gloves, mittens and mitts, of leather or composition leather, not for sports
24	84843	Hats and other headgear, knitted or crocheted, or made up from lace, felt, or other textile fabric in the piece; hairnets
25	88423	Spectacles, goggles and the like, corrective, protective or other
26	88541	Wrist watches, battery or accumulator powered w/case not made of or clad w/precious metals

Other

27	89212	Children's picture, drawing or coloring books
28	89437	playing cards
29	89829	Musical boxes, fairground & mechanical street organs & other musical instrument, NES; decoy calls, whistles etc.

Table 2: Comparison of Domestic Exports and Re-export Unit-Value Series

Food:	β	Obs.	F statistic	Adjusted R-squared
Soy sauce	0.413*	53	19.93*	0.30
	(0.132)			
Other sauces	0.294*	65	78.33*	0.18
	(0.080)			
Pasta	0.217	65	74.72*	0.05
	(0.091)			
Sports drinks	0.058	48	297.32*	-0.09
	(0.055)			
Intermediate Goods:				
Flexible pipes	-0.056	26	127.92*	-0.38
	(0.093)			
Folding cartons	0.875*	65	0.68	0.31
	(0.151)			
Other woven fabric	0.480*	44	30.71*	0.37
	(0.094)			
Razors, non electric	-0.252	34	20.84*	-0.18
	(0.274)			
Other electrical transformers	0.111	65	33.82*	-0.07
	(0.153)			
Static converters	0.721*	65	2.13	0.14
	(0.191)			
Other switches	0.167	64	17.82*	-0.08
	(0.197)			
Plugs and sockets	0.335	59	1.67	-0.13
	(0.515)			
Primary cells and batteries	-0.215	65	10.44*	-0.07
	(0.376)			
Signaling apparatus	0.760	63	0.48	-0.03
	(0.346)			
Clothing and Accessories:				
Other handbags	1.037	32	0.01	0.47
	(0.474)			
Men's or boy's ski-jackets	0.922*	65	0.42	0.89
	(0.122)			
Men's or boy's trousers	0.998*	65	0.00	0.87
	(0.045)			
Men's or boy's shirts	0.937*	65	1.80	0.79
	(0.047)			
Women's or girl's trousers	0.927*	65	1.34	0.18
	(0.063)			
Women's or girl's briefs	0.392*	65	41.35*	0.94
	(0.095)			
Jerseys, pullovers	0.958*	65	1.63	-0.16
	(0.033)			
Other gloves & mittens	-0.074	55	35.33*	0.02
	(0.181)			
Gloves & mittens	0.763	37	0.65	-0.03
	(0.293)			
Hats	0.555	65	2.57	0.03
	(0.278)			
Spectacles	0.986*	65	0.00	0.21
	(0.218)			
Wrist watches	1.088*	65	0.82	0.66
	(0.097)			
Other:				
Coloring books	0.040	64	16.13*	-0.11
	(0.239)			
Playing cards	0.097	56	56.95*	-0.12
	(0.120)			
Musical boxes	0.324	43	6.86*	0.09
	(0.258)			

Heteroskedasticity consistent standard errors in parenthesis, * denotes significant at the 1% level.

Table 3: Estimated Pricing to Market, Hong Kong Domestic Exports

Food:	β	Obs.	$Ho: \beta_j = \beta$	$Ho: \beta = -1.0$	$\overline{R}^2$
Soy sauce	-0.751	67	27.0*	0.10	-0.01
	(0.800)				
Other sauces	-0.472	72	9.8	3.37**	-0.05
	(0.288)				
Pasta	0.474	72	10.4	4.10*	-0.11
	(0.727)				
Sports drinks	-1.109*	61	16.2**	0.04	-0.03
	(0.560)				
Intermediate Goods:					
Flexible pipes	0.530	47	24.0*	6.51*	0.08
	(0.599)				
Folding cartons	-0.117	72	8.9	1.99	0.33
	(0.625)				
Other woven fabric	-0.625	62	15.6*	0.95	0.20
	(0.385)				
Razors, non electric	-1.954	39	19.5*	0.13	-0.14
	(2.616)				
Other electrical transformers	0.123	72	8.1	1.31	-0.14
	(0.982)				
Static converters	2.816	72	5.9	4.41*	-0.05
	(1.816)				
Other switches	-1.844	71	1.9	0.45	-0.13
	(1.248)				
Plugs and sockets	0.154	66	2.2	0.40	-0.06
	(1.819)				
Primary cells and batteries	-0.319	72	5.9	0.35	-0.20
	(1.140)				
Signaling apparatus	8.023*	54	5.6	15.1*	0.02
	(2.323)				
Clothing and Accessories:					
Other handbags	3.796	29	11.1	2.90**	0.19
	(2.814)				
Men's or boy's ski-jackets	1.222	72	6.5	3.89*	-0.15
	(1.126)				
Men's or boy's trousers	0.568*	72	12.2	52.6*	0.03
	(0.216)				
Men's or boy's shirts	0.360*	72	8.4	67.2*	0.25
	(0.166)				
Women's or girl's trousers	0.306	72	7.7	22.0*	-0.04
	(0.278)				
Women's or girl's briefs	0.326	72	9.5	8.74*	-0.01
	(0.448)				
Jerseys, pullovers	0.015	72	19.5*	34.6*	-0.02
	(0.173)				
Other gloves & mittens	-3.342*	62	16.6**	4.76*	-0.12
	(1.073)				
Gloves & mittens	2.408	43	11.7	3.72*	-0.18
	(1.766)				
Hats	-0.604	72	8.2	0.17	-0.07
	(0.959)				
Spectacles	-0.898	72	4.6	0.02	-0.12
	(0.798)				
Wrist watches	-0.036	72	13.5	4.25*	-0.17
	(0.468)				
Other:					
Coloring books	-0.102	71	12.8	0.46	0.00
	(1.331)				
Playing cards	-0.563	68	8.2	0.26	-0.11
	(0.849)				
Musical boxes	2.036	52	12.2	1.26	-0.04
	(2.705)				

Heteroskedasticity consistent standard errors in parenthesis, *, ** denote significant at the 1%, & 5% levels. All equations include time and country dummies.

Table 4: Estimated Pricing to Market, Hong Kong Re-Exports

	β	Obs.	$Ho: \beta_j = \beta$	$Ho: \beta = -1.0$	$\overline{R}^2$
Food:					
Soy sauce	-0.552	55	0.33	0.25	0.02
	(0.895)				
Other sauces	0.240	64	0.07	2.19	-0.17
	(0.837)				
Pasta	-1.651**	64	2.29	0.43	-0.04
	(0.991)				
Sports drinks	0.014	58	0.00	0.40	-0.14
	(1.608)				
Intermediate Goods:					
Flexible pipes	-1.679	36	0.52	0.06	0.04
	(2.795)				
Folding cartons	-0.169	64	0.23	8.01*	0.55
	(0.294)				
Other woven fabric	-0.712	46	0.58	0.08	0.01
	(1.016)				
Razors, non electric	-1.506	38	0.60	0.17	-0.14
	(1.230)				
Other electrical transformers	-0.063	64	0.01	2.98	-0.02
	(0.543)				
Static converters	1.853	64	2.03	5.29**	-0.06
	(1.239)				
Other switches	0.293	64	0.11	3.72**	-0.12
	(0.670)				
Plugs and sockets	0.255	64	0.22	4.11**	-0.01
	(0.619)				
Primary cells and batteries	0.465	64	1.88	21.1*	-0.04
	(0.319)				
Signaling apparatus	1.131	48	1.74	8.59*	0.24
	(0.727)				
Clothing and Accessories:					
Other handbags	-0.291	40	0.08	0.48	-0.23
	(1.016)				
Men's or boy's ski-jackets	0.369	64	2.02	10.6*	-0.08
	(0.420)				
Men's or boy's trousers	0.065	64	0.05	20.6*	0.08
	(0.235)				
Men's or boy's shirts	0.828*	64	5.87	30.4*	0.16
	(0.331)				
Women's or girl's trousers	0.380	64	1.23	30.7*	0.11
	(0.2449				
Women's or girl's briefs	0.583	64	0.74	9.62*	-0.12
	(0.511)				
Jerseys, pullovers	0.475*	64	5.60	53.7*	0.35
	(0.201)				
Other gloves & mittens	0.035	64	0.00	2.78	0.20
	(0.620)				
Gloves & mittens	0.665	56	1.68	13.2*	0.03
	(0.458)				
Hats	0.124	64	0.09	5.86*	-0.11
	(0.464)				
Spectacles	-0.583	64	1.38	0.48	0.02
	(0.597)				
Wrist watches	0.369	64	1.13	16.6*	0.19
	(0.336)				
Other:					
Coloring books	0.362	64	0.33	6.26*	-0.07
	(0.544)				
Playing cards	-0.587	58	0.13	0.16	-0.24
	(1.032)				
Musical boxes	-0.196	62	0.01	0.26	0.05
	(1.566)				

Heteroskedasticity consistent standard errors in parenthesis, *, ** denote significant at the 5%, & 10% levels. All equations include time and country dummies.

Table 5: Estimated Pricing to Market, Pooled Results

	β	Obs.	$Ho: \beta_j = \beta$	$Ho: \beta = -1.0$	$\overline{R}^2$
Hong Kong Exports					
Food	-0.042 (0.181)	216	9.66	27.9*	-0.02
Intermediate Goods	0.115 (0.336)	502	5.31	11.0*	0.02
Clothing and Accessories	0.150 (0.149)	625	8.87	59.2*	0.03
Other Consumer Goods	-0.384 (0.749)	149	13.11	0.67	-0.03
Hong Kong Re-exports					
Food	-0.221 (0.261)	225	8.81	8.91*	-0.01
Intermediate Goods	0.255 (0.171)	500	9.08	53.7*	0.04
Clothing and Accessories	0.159 (0.137)	650	16.04	71.1*	0.02
Other Consumer Goods	0.157 (0.557)	162	6.53	4.32**	-0.01

Heteroskedasticity consistent standard errors in parenthesis, *, ** denote significant at the 1%, & 5% levels. All equations include time, good, and country dummies.