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Abstract

The article examines the Hong Kong export performance. A standard export demand formulation is used as the benchmark. Then, we investigate the effects of real exchange rate volatility, "third" country competition, domestic wages and costs of imports from China on export volume. The study models the Hong Kong domestic exports and re-exports separately, compares the performance of exports to the rest of the world, the U.S. and Japan, and uses destination-and-export-type specific unit value indexes to construct real exchange rates. It is found that Hong Kong export performance varies across export types and across destinations. In general, Hong Kong exports display mean-reverting dynamics, are positively influenced by foreign income, and are adversely affected by the high value of its currency. The lagged export variable, foreign income, and real exchange rate provide most of the explanatory power. The other variables contribute only marginally in explaining the variability of Hong Kong exports.

Keywords: Trade Volume; Price and Income Effects; Exchange Rate Volatility; Third Country Competition; Wage Effects; China Factor

JEL Classification: F14

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1. Introduction

The objective of this article is to study the behavior of Hong Kong exports. There is a long tradition in international economics to model trade flows. The usual focus is on income and price elasticities and their implications for trade balances and shock propagation mechanisms across economies. Most of the published empirical studies are based on trade data from developed countries (Goldstein and Khan, 1985; Hooper, Johnson and Marquez, 2000).[1] Since Hong Kong is a small open economy, the study of its exports offers some alternative evidence on modeling trade flows.

In a typical trade model, the assumptions of a small open economy and perfect competition yield some clear and direct predictions about trade flows. These predictions, however, may not be relevant for trade data from the G7 and other industrial countries because of their size and the presence of implicit and explicit trade barriers. Hong Kong presents a different scenario. Hong Kong is a small open economy that is renowned for its laissez-faire policy and economic freedom (O'Driscoll *et al.*, 2001). There may not be an economy in the world that perfectly meets the academic description of a small open economy with perfect competition. However, Hong Kong is arguably one of the few economies that has attributes very close to these ideal conditions. Thus, Hong Kong offers a good setting to exploit the small country assumption in studying trade flows.

The empirical exercise uses a standard export demand equation as the benchmark. Then we investigate the effects of real exchange rate volatility, "third" country competition, domestic wages and costs of China imports on Hong Kong export volume. The study has several salient features. First, to alleviate the simultaneity and nonstationarity problems, the cointegration approach and the related error-correction specification are employed to examine the interactions between exports, foreign income, and export prices. The cointegration framework offers a convenient means to study the long-run and short-run interactions between these variables.

Second, Hong Kong domestic exports and re-exports are modeled separately. Hong Kong is an important entrepôt. Its export activity increasingly depends on re-exporting goods and services originating from China. A preliminary examination of data on domestic exports and re-exports suggests that these two export categories evolve quite differently over time. Thus, studying these two types of exports individually should give more reliable measures of income and price elasticities.[2] Further, to highlight the variations across export destinations, we compare the performance of Hong Kong aggregate exports, and its exports to the U.S. and Japan.

Third, it is observed that the general price level, which is routinely used to construct the relative price variable in trade equations, does not correctly reflect the competitiveness of Hong Kong exports. For most of the 1990s, the domestic inflation in Hong Kong was higher than that in the U.S. Since the Hong Kong dollar is effectively pegged to the U.S. dollar, people usually assert that the Hong Kong dollar was

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1 Interested readers are referred to Goldstein and Khan (1985) and Hooper, Johnson and Marquez (2000) for a detailed discussion of issues and references related to trade equation modeling.

2 Chinn (2002), in studying aggregate U.S. trade, reports a stable import demand function is obtained only after excluding computers and parts.

overvalued before the 1997 financial crisis, and exports were adversely affected by the strong Hong Kong dollar. The claim on the effects of domestic inflation on Hong Kong exports, nonetheless, is overstated.[3] In fact, during this period, export prices showed a declining trend and Hong Kong export performance did not appear weakened. Thus, the use of a general price level index such as the consumer price index may not result in a proper assessment of Hong Kong export performance. In the current exercise, the relative price variables are the real exchange rates constructed from destination-and-export-type specific unit value indexes.

As anticipated, Hong Kong exports are found to behave differently across export types and across destinations. In general, Hong Kong exports display mean-reverting dynamics, are positively influenced by foreign income, and are adversely affected by the strength of its currency. The effects of real exchange rate volatility, "third" country competition, domestic wages, and the cost of imports from China on export volume depend on the category of exports under examination. In general, the effects on aggregate exports are different from those on exports to Japan and the U.S..

Hong Kong is a very open economy. The ratio of trade (imports plus exports) to gross domestic output (GDP) is usually larger than 2. For instance, in 2001, the ratio of trade to GDP is pegged at 2.825, the exports to GDP ratio is 1.439, and the imports to GDP ratio is 1.386. It is widely conceived that exports contribute significantly to Hong Kong's economic success. Thus, it is conducive to investigate which is the key variable that determines Hong Kong exports. Among the factors that are statistically significant, it is found that a large portion of variations in Hong Kong exports is explained by their own past movements. The other variables contribute only marginally in explaining the variability of Hong Kong exports.

In the next section, we lay out the basic analytical framework and discuss the choices of variables. Section three reports the results of estimating the benchmark export demand equations. The effects of real exchange rate volatility, "third" country competition, domestic wages, and the cost of China imports are investigated in Section four. Section four also presents a heuristic assessment of relative contributions of the explanatory variables. Section five contains some concluding remarks.

2. The Framework

In this study, the basic export demand function is given by the canonical specification

$$y_t = f(x_t, r_t) \tag{1}$$

where y_t is the quantity of Hong Kong exports demanded by a foreign country, x_t is the foreign country's real income, and r_t is the relative price of exports given by the Hong Kong real exchange rate. It is

[3] During the 1990s, Hong Kong experienced a high inflation rate that was closely related to the boom in the real estate market and other nontradables sectors. Apparently, the nontradables driven domestic inflation rate has a limited impact on export prices. The disconnect between prices of nontradables and exports contributes to the divergence of the Hong Kong CPI-based and UVI-based real exchange rates. Hawkins and Yiu (1995), for instance, observe that the Hong Kong real effective exchange rate based on export UVI was not appreciating during the early 1990s.

expected that foreign income stimulates demand for Hong Kong exports and a strong Hong Kong dollar discourages its exports. The single equation approach is considered to be “the major thrust of this literature” (Goldstein and Khan, 1985; p. 1097). There are some assumptions underlying the single equation approach to studying export performance. For instance, it is implicitly assumed that there is no money illusion and that exports are not inferior goods. Further, under the assumptions of market perfection and a small exporter who has no market power, the quantity of exports is determined by demand factors including foreign income and relative prices (Goldstein and Khan, 1985; Hooper and Kohlhagen, 1978). Apparently, the single equation approach is more appropriate for a small open economy such as Hong Kong, which has limited market power, than those industrial countries commonly examined in the empirical literature.

Next, we consider the choice of the dependent variable. Figure 1 depicts Hong Kong aggregate domestic exports and aggregate re-exports. The aggregate total exports (the sum of domestic exports and re-exports) are given by the sum of domestic exports and re-exports. Graphs of total exports to the U.S. and Japan and their respective components are presented in Figures 2 and 3. The sample is from 1991 to 2001, which is mainly dictated by availability of the monthly data examined in the following sections. A detailed description of these trade data and other data series used in the exercise is provided in Appendix 1. These graphs give two general observations. First, the behavior of domestic exports can be quite different from re-exports. For these export destinations, domestic exports were declining while re-exports had a noticeable growth in the 1990s. Second, exports to different destinations (i.e. aggregate, Japan, and the U.S.) evolved differently in the 1990s. Given their different time profiles, we study these different categories of export data separately.

As export performance can vary substantially across export types and destinations, a natural question to ask is whether the competitiveness of different categories of Hong Kong exports can be appropriately measured by the real exchange rate constructed from Hong Kong’s general price level. The answer to this question appears to be negative. Figures 4, 5, and 6 plot the Hong Kong real exchange rates constructed from the Hong Kong consumer price index (CPI), domestic export unit value index (UVI), re-export UVI, and total export UVI.

The real exchange rates corresponding to aggregate exports are given in Figure 4. The Hong Kong real (effective) exchange rate based on CPI and those based on UVIs move in different directions for a good part of the 1990s. Specifically, the CPI based real exchange rate indicates that the Hong Kong dollar was appreciating from 1991 to 1998 and depreciating afterwards. In fact, some seriously concerns were raised about the appreciation of the CPI based real exchange rate and its implied burdens on Hong Kong exports in the 1990s. The three UVI based real exchange rates, on the other hand, present a very different scenario. The relative prices of Hong Kong exports were declining, instead of increasing as indicated by the CPI real exchange rate, throughout the 1990s.

Figures 5 and 6 display a similar divergence between the CPI and UVI based Hong Kong real exchange rates against the U.S. and Japan. Again, the country-specific CPI and UVI based exchange rates display different patterns in the first part of the 1990s and share similar movements in the second part. The contrasting behavior of CPI and UVI based real exchange rates, especially before 1998, indicates that the former real exchange rate may not accurately reflect the competitiveness of different categories of

Hong Kong exports during our sample period. Thus, the export-type-and-destination specific UVI based real exchange rates, instead of the general CPI based real exchange rate, are used as the measure of the relative price in our export demand equation.

Given the above considerations, the variables in the export demand function are modified to $y_{i,j,t}$, $x_{j,t}$, and $r_{i,j,t}$. The exports and real exchange rates are both export type and destination specific. The i-subscript indicates the export type and i = domestic exports, re-exports, and total exports. The export destinations are identified by the j-subscript and j = aggregate, Japan, and the U.S. The foreign real income variables are destination specific and are given by the world, Japan, and U.S. industrial production indexes.

3. The Basic Export Demand Equation

The data on exports, foreign income, and real exchange rates are in logarithmic terms. Monthly data from 1991 to 2001 are considered. The augmented Dickey-Fuller and Johansen tests are used to examine the unit root and cointegration properties of and $y_{i,j,t}$, $x_{j,t}$, and $r_{i,j,t}$. Since the augmented Dickey-Fuller test and the Johansen test are standard procedures, they are not discussed in the text to conserve space. Table 1 presents the augmented Dickey-Fuller unit root test results. The lag parameter is determined by the Akaike information criterion and is chosen to eliminate serial correlation in the residuals. For all the series under examination, the augmented Dickey-Fuller test does not reject the unit root null hypothesis. However, the unit root hypothesis is rejected by the first difference data. The results are largely consistent with those reported in the literature — a unit root process provides an adequate description for these economic variables.

Since the variables are I(1), the Johansen cointegration test procedure is used to determine the empirical long-run relationship between exports, foreign income, and real exchange rates. Again, the lag parameter used in the Johansen test is determined by the Akaike information criterion and is chosen to eliminate the serial correlation in the residuals. The cointegration test results are given in Table 2. There is evidence of cointegration in eight of the nine trivariate systems under consideration. Two cointegrating relationships are found in four of these eight cases. The no-cointegration case involves the domestic exports to Japan. In general, Hong Kong exports have an empirical long-run relationship with the corresponding foreign income and real exchange rate. The long-run income and price elasticities are inferred from the estimated cointegrating vectors.

For aggregate re-exports and aggregate total exports, the long-run income elasticity estimates are between 0.6 to 0.8. Four country-specific cases have two cointegrating vectors. The obvious issue is which one of the cointegrating vectors gives the relevant information. We use the significance of the error correction term in the subsequent error correction estimation to select the relevant cointegrating vector. It turns out that only the domestic exports to the U.S. equation has two significant error correction terms. For this case, the price variable has the correct sign in the first cointegrating vector and the income variable has the correct sign in the second vector. The other three cases have one significant error term corresponding to the first cointegrating vector given in the table. Thus, the income elasticity estimates are in the ranges of 2.2 to 2.7 for Japan and 0.0 to 3.4 for the U.S.. These estimates display a level of variability higher than those found among the developed countries. For instance, Goldstein and

Khan (1985) assess that the income elasticity is between 1 and 2. Hooper, Johnson and Marquez (2000) find the income elasticities for the G-7 countries are between 0.8 and 1.6.

Using the same approach to select the cointegrating vectors, the long-run price elasticity estimates are in the range of 0.4 to 0.7 for the aggregate exports, 2.7 to 2.8 for exports to Japan, and 2.2 to 3.6 for exports to the U.S.. The result is consistent with the consensus that the estimated aggregate price elasticities are smaller than the country-specific elasticity estimates. The argument for smaller aggregate price elasticity estimates is that, in aggregate trade equations, goods with relatively low price elasticities tend to have the largest price variation and a dominant effect on price elasticity estimates (Orcutt, 1950). Again, these estimates appear to be more variable than those reported in Goldstein and Khan (1985) and Hooper, Johnson and Marquez (2000).

In the majority cases, the elasticity estimates have the correct sign. Nonetheless, these estimates exhibit considerable variations across different types of exports and export destinations. Both the income and price elasticities of exports to Japan are larger than those of aggregate exports. On the other hand, the price elasticities of exports to the U.S. tend to be larger than those of aggregate exports while the U.S. income elasticities are smaller. The result highlights the heterogeneity of export behavior and the relevancy of examining these different export categories separately.

The dynamic interaction between exports, foreign income, and real exchange rates are examined using the following equation:

$$\mathrm{Y}_{i,j,t} = \alpha + \Sigma_{k=1}^{\mathrm{n}} \alpha_{i,j,k} \mathrm{Y}_{i,j,t\text{-}k} + \Sigma_{k=1}^{\mathrm{m}} \beta_{i,j,k} \mathrm{X}_{j,t\text{-}k} + \Sigma_{k=1}^{\mathrm{p}} \gamma_{i,j,k} \mathrm{R}_{i,j,t\text{-}k} + \theta_{ij} \mathrm{E}_{i,j,t\text{-}1} + \varepsilon_{i,j,t}, \tag{2}$$

where $\mathrm{Y}_{i,j,t}$, $\mathrm{X}_{i,j,t}$, and $\mathrm{R}_{i,j,t}$ are, respectively, the first differences of $y_{i,j,t}$, $x_{j,t}$, and $r_{i,j,t}$. $\mathrm{E}_{i,j,t\text{-}1}$ is the error correction term derived from the cointegrating vector and is included in the equation in which the variables are cointegrated. $\varepsilon_{i,j,t}$ is an error term. Under equation (2), which is known as the error correction specification, exports adjust to their past history, short-run variations in foreign income and real exchange rates, and deviations from the (empirical) long-run equilibrium represented by the error correction term. Compared with previous studies that use either the data themselves or their first differences, equation (2) appropriately accounts for the I(1) properties and the long-run and short-run interactions between exports, foreign income, and real exchange rates.

Table 3a contains estimation results from aggregate exports and Table 3b contains those from exports to Japan and the U.S.. To conserve space, only significant coefficient estimates are presented. The robust t-statistics are reported in parentheses underneath coefficient estimates. The $\alpha_{i,j,k}$ coefficients are all negative; indicating exports have "mean reverting" behavior. In most cases, the lag length is up to four lags.

The short-run effect of foreign income is captured by $\beta_{i,j,k}$. According to the coefficient estimates, the income effect is positive in all the specifications — an increase in foreign income boosts demand for Hong Kong exports. The lag structure is quite diverse and ranges from three lags for the three types of exports to Japan to eight lags for domestic exports to the U.S.. The multiplier effect given by

$\Sigma_{k=1}^{m} \beta_{i,j,k} / (1+\Sigma_{k=1}^{n} \alpha_{i,j,k})$ depends on the export category. Exports to the U.S. have the largest multiplier effect (3.1 for total exports to 4.2 for domestic exports) followed by aggregate exports (1.4 for re-exports to 2.0 for domestic exports) and exports to Japan (0.3 for total exports to 0.6 for domestic exports).

The short-run price effect is surprisingly weak. The $\gamma_{i,j,k}$ coefficient is significant in only two cases: domestic exports to Japan and re-exports to the U.S.. The two significant $\gamma_{i,j,k}$ coefficients have the expected sign (an increase in $R_{i,j,k}$ means a real depreciation of the Hong Kong dollar). Is the Hong Kong linked exchange rate system responsible for the weak short-run price effect? The linked exchange rate system effectively pegs the Hong Kong dollar to the U.S. dollar and, hence, reduces the variability of the real exchange rate between Hong Kong and U.S. dollars and mitigates the price effect on exports to the U.S. However, the Hong Kong dollar real exchange rates against other currencies still experience substantial variation during the sample. The linked exchange rate system, thus, does not provide a good explanation as to why the $\gamma_{i,j,k}$ coefficient is insignificant in the aggregate exports equations and the two exports to Japan equations.

The error correction term has the expected negative sign in each of the cointegrated cases. At the first glance, the θ estimates are quite large for monthly data. Without taking the lag structure of $Y_{i,j,t}$ into consideration, the θ estimates imply a monthly reversion speed of up to 27 per cent of deviation from equilibrium. However, when we incorporate the lag structure of $Y_{i,j,t}$ and consider $\theta_{i,j} / (1+\Sigma_{k=1}^{n} \alpha_{i,j,k})$, the reversion rate is reduced to a level of 7 per cent or less per month for six cases. The adjusted reversion rates for the remaining two cases are 13 per cent for domestic exports to the U.S. and 15 per cent for aggregate domestic exports.

The results in Tables 3a and 3b show that individual coefficient estimates and lag structure patterns vary considerably across different export categories. Given the dominance of re-exports, the specifications of total exports and re-exports share some similarities. The Q-statistics indicate that the estimated residuals in all the specifications in Table 3 are free of serial correlation. These specifications have a good explanatory power. The adjusted R^2 statistics are in the range of 0.37 to 0.55. For each export type, the aggregate export equation garners the highest adjusted R^2 statistics. Overall, the error correction model (2) explains the Hong Kong export data pretty well.

4. Additional Analyses

Besides income and price, there are other factors affecting export behavior. In this study, we use the augmented specification

$$Y_{i,j,t} = \alpha + \Sigma_{k=1}^{n} \alpha_{i,j,k} Y_{i,j,t-k} + \Sigma_{k=1}^{m} \beta_{i,j,k} X_{j,t-k} + \Sigma_{k=1}^{p} \gamma_{i,j,k} R_{j,t-k} + \theta_{ij} E_{i,j,t-1} + Z_{i,j,t} - \varepsilon_{i,j,t}\,, \quad (3)$$

to examine the effect of some additional variables. The additional variables considered in the following subsections include real exchange rate volatility, the "third" country effect, Hong Kong wage rates, and the cost of imports from China.

The implication of real exchange rate volatility for the level of trade has been a hotly contested issue since the breakdown of the Bretton-Woods system. The recent Asian financial crisis revived the discussion on the choice of exchange rate regimes and its implications for exchange rate volatility and trade. Interestingly, both the theoretical and empirical studies do not offer a firm conclusion on the effect of real exchange rate volatility on international trade (Côté, 1994). The "third" country effect is motivated by the observation that Hong Kong exports compete with both domestic producers in the importing country and other countries exporting to the same importing country. Thus, the (relative) prices at which the other countries export to the same importing country also affect Hong Kong exports. The wage and China variables are included to examine the effect of domestic and China costs on Hong Kong exports.

The effects of these four additional variables are examined sequentially in the following subsections.

4.1 Real Exchange Rate Volatility

The real exchange rate volatility effect is investigated using the specification

$$Y_{i,j,t} = \alpha + \Sigma_{k=1}^{n}\alpha_{i,j,k}\, Y_{i,j,t\text{-}k} + \Sigma_{k=1}^{m}\, \beta_{i,j,k}\, X_{j,t\text{-}k} + \Sigma_{k=1}^{p}\gamma_{i,j,k}\, R_{i,j,t\text{-}k} + \theta_{ij}\, E_{i,j,t\text{-}1} + \Sigma_{k=0}^{q}\, \delta_{i,j,k}\, V_{i,j,t\text{-}k} + \varepsilon_{i,j,t}\,, \tag{4}$$

where $V_{i,j,t}$ is the conditional volatility of $R_{i,j,t}$. Specifically, a GARCH(p,q) model is fitted to each individual real exchange rate series and the resulting conditional variance estimate is used as a proxy for real exchange rate volatility. West, Edison and Cho (1993) offer a justification for the use of GARCH estimates to measure exchange rate volatility. The GARCH(p,q) specifications used to generate the $V_{i,j,t}$ series and some diagnostics of these specifications are listed in Appendix 2.

The results from estimating (4) are reported in Table 4. Does real exchange rate volatility deter or promote trade? The answer, in this case, depends on which export series is being considered. For the three aggregate export equations, $V_{i,j,t}$ is significantly negative at the first lag. Real exchange rate volatility deters aggregate exports from Hong Kong. On the other hand, real exchange rate volatility has a positive impact on some types of exports to Japan and the U.S. In the literature there are theoretical arguments and empirical evidence for both a positive and negative real exchange rate volatility effect. The intriguing observation here is the different impacts of real exchange rate volatility on exports from the same economy to different destinations. While real exchange rate volatility promotes Hong Kong exports to her two major trading partners; namely Japan and the U.S., it hinders aggregate exports. Further, the lag structure is quite different across destinations — one lag for the aggregate export equations and 2 to 8 lags for exports to Japan and the U.S..

As expounded in the literature, real exchange rate volatility is one form of risk faced by exporters; its effect on the volume of exports depends on its interaction with other factors affecting export behavior. Additional information, including the mix of exports, is required to explain the heterogeneous volatility effects. Unfortunately, we do not have the necessary information to investigate the phenomenon in the current exercise.

In terms of both magnitude and significance, the inclusion of $V_{i,j,t}$ has little impact on the coefficient estimates of other variables. The only exception is that the price effect in the equation of domestic exports to Japan becomes insignificant in the presence of the real exchange rate volatility variable. Even though the volatility variable is statistically significant, it only marginally improves the goodness of fit, as measured by the adjusted R^2. The best improvement is about 2 per cent found in the equation of re-exports to the U.S..

4.2 The "Third" Country Effect

The "third" country effect is evaluated by

$$Y_{i,j,t} = \alpha + \Sigma_{k=1}^{n} \alpha_{i,j,k} Y_{i,j,t-k} + \Sigma_{k=1}^{m} \beta_{i,j,k} X_{j,t-k} + \Sigma_{k=1}^{p} \gamma_{i,j,k} R_{i,j,t-k} + \theta_{ij} E_{i,j,t-1} +$$

$$\Sigma_{k=0}^{q} \delta_{i,j,k} V_{i,j,t-k} + \Sigma_{k=1}^{s} \gamma^{*}_{i,j,k} R^{*}_{i,j,t-k} + \varepsilon_{i,j,t}, \quad (5)$$

where $R^{*}_{i,j,k}$ is the variable defining the "third" country price effect and is based on the Hong Kong export UVI and the destination economy's overall import UVI. For example, when i = re-exports and j = Japan, $R^{*}_{i,j,k}$ is defined as the first log difference of HKJY*(JPMP/UVI_RXJP), where HKJY is the Hong Kong dollar Japanese yen exchange rate, JPMP is the UVI of Japanese imports, and UVI_RXJP is the UVI of Hong Kong re-exports to Japan. A positive $R^{*}_{i,j,k}$ means an improved competitiveness of Hong Kong exports. See Appendix 1 for a more detailed description of $R^{*}_{i,j,k}$.

The results in Table 5 show that the $\gamma^{*}_{i,j,k}$ estimates are positive for exports to Japan and the U.S. but are negative for aggregate exports. Given the definition of $R^{*}_{i,j,k}$, we expect $\gamma^{*}_{i,j,k}$ to be positive. Thus, the results for exports to Japan and the U.S. are consistent with the "third" country competition argument. The results from aggregate export data are, however, quite puzzling. The negative coefficients in the aggregate export equations may be partially explained by the following two reasons. First, it is noted that the $\gamma^{*}_{i,j,k}$ estimates in the aggregate export equations are only marginally significant according to the robust t-statistics. They are included mainly because they improve the adjusted R^2 statistic by 3 per cent. Another related issue is the definition of $R^{*}_{i,j,k}$. For aggregate exports, the world import UVI is used to construct the "third" country price effect variable. It is likely that the weights used to compute the world import UVI are different from those used to compute the Hong Kong real effective exchange rate.

The presence of $R^{*}_{i,j,k}$ makes the real exchange rate variable in the equation of re-exports to the U.S. and one of the volatility variables in the equation of domestic exports to Japan insignificant. Besides these two variables, the $R^{*}_{i,j,k}$ variable has little impact on other coefficient estimates. On its incremental explanatory power, the $R^{*}_{i,j,k}$ variable marginally improves the adjusted R^2 for the questions of exports to Japan and the U.S.. For the aggregate exports, the additional of the$R^{*}_{i,j,k}$ variable enhances the adjusted R^2 by about 3 per cent. While the "third" country effect is statistically significant, its incremental explanatory power is small.

4.3 Domestic Wages

The real payroll index for the manufacturing sector is used as a proxy for the domestic wage or cost factor. The effect of wages on export performance is examined using the equation:

$$Y_{i,j,t} = \alpha + \Sigma^{n}_{k=1}\alpha_{i,j,k}\, Y_{i,j,t\text{-}k} + \Sigma^{m}_{k=1}\, \beta_{i,j,k}\, X_{j,t\text{-}k} + \Sigma^{p}_{k=1}\gamma_{i,j,k}\, R_{i,j,t\text{-}k} + \theta_{ij}\, E_{i,j,t\text{-}1} + \Sigma^{q}_{k=0}\, \delta_{i,j,k}\, V_{i,j,t\text{-}k} + \Sigma^{s}_{k=1}\gamma^{*}_{i,j,k}\, R^{*}_{i,j,t\text{-}k} + \Sigma^{r}_{k=1}\lambda_{k}\, W_{t\text{-}k} + \varepsilon_{i,j,t}\,, \quad (6)$$

where W_t is the first log difference of the real payroll index. The estimation results are reported in Table 6. Again, the effect of the wage factor varies across export destinations. An upsurge in the real payroll index discourages exports to Japan and the U.S.. For aggregate exports, the real payroll effect is more complex. At the first lag, a high real payroll index tends to shrink aggregate exports. However, at the fifth lag, the real payroll effect is found to be positive. The cause of the positive real payroll effect is uncertain.

Compared with $V_{i,j,t}$ and $R^{*}_{i,j,t}$, W_t appears to have a bigger impact on the variables that are already included in the regression. For example, the presence of W_t crowds out some "third" country variables in the equations of aggregate exports, some lagged export and income variables in the equations of exports to Japan, and one error correction term in the equation of domestic exports to the U.S.. Again, compared with and, $V_{i,j,t}$ and $R^{*}_{i,j,t}$, W_t delivers a better incremental explanatory power. According to the adjusted R^2 statistics, the real payroll variable provides the largest incremental explanatory power for aggregate exports, followed by exports to the U.S. and exports to Japan.

4.4 The China Cost Factor

Hong Kong has close economic ties with Mainland China. In addition to re-exporting and outward-processing trade, Hong Kong relies on China for her daily necessities and some basic materials. It is instructive to investigate whether the costs of importing from China have any implications for Hong Kong export performance. Since we do not have the breakdown of imports from China according to our export market classification, we use an overall UVI, albeit an imprecise measure, to evaluate the China cost effect. The variable we considered is the ratio of the UVI of Hong Kong imports from China to the UVI of Hong Kong exports to the respective destination. Essentially, we implicitly assume that Hong Kong exports are affected by the cost of importing from China relative to the Hong Kong export price. The regression equation used to investigate the marginal effect of the China factor is given by

$$Y_{i,j,t} = \alpha + \Sigma^{n}_{k=1}\alpha_{i,j,k}\, Y_{i,j,t\text{-}k} + \Sigma^{m}_{k=1}\, \beta_{i,j,k}\, X_{j,t\text{-}k} + \Sigma^{p}_{k=1}\gamma_{i,j,k}\, R_{i,j,t\text{-}k} + \theta_{ij}\, E_{i,j,t\text{-}1} + \Sigma^{q}_{k=0}\, \delta_{i,j,k}\, V_{i,j,t\text{-}k} + \Sigma^{s}_{k=1}\gamma^{*}_{i,j,k}\, R^{*}_{i,j,t\text{-}k} + \Sigma^{r}_{k=1}\lambda_{k}\, W_{t\text{-}k} + \Sigma^{u}_{k=1}\tau_{i,j,k}\, C_{i,j,t\text{-}k} + \varepsilon_{i,j,t}\,, \quad (7)$$

where $C_{i,j,t}$ is the first log difference of the UVI of Hong Kong imports from China relative to the type-and-destination-specific Hong Kong export UVI.

The estimation results are summarized in Table 7. The China factor has a discernable effect on aggregate exports. However, its influence on the country-specific exports is quite ambiguous. From Table 7a, the China cost factor $C_{i,j,t}$ has a negative coefficient in the three equations for aggregate exports, indicating that a high cost of importing from China impedes Hong Kong export activity. The $\tau_{i,j,k}$ coefficient is marginally significant for aggregate domestic exports but quite significant for the other two aggregate export types. The China cost effect on country-specific exports, on the other hand, only shows up in the equation of domestic exports to the U.S.. Even though the sign is correct, the level of statistical significance is lower than the conventional 5 per cent or 10 per cent level. Thus, the China cost factor may have a more prominent effect on exports to destinations other than Japan and the U.S..

Overall, the addition of the China cost variable improves the adjusted R^2 slightly and induces small changes in other coefficient estimates.

4.5 A Heuristic Comparison

In the previous subsections, we found that the variables $V_{i,j,t}$, $R^*_{i,j,t}$, W_t, and $C_{i,j,t}$ affect Hong Kong export performance. All the specifications in Tables 4 to 7 pass the residual correlation Q-test. Nonetheless, the evidence is mainly statistical in nature. Even though these variables are found to be statistically significant, their effects are not homogenous across export types and export destinations and some of the estimated effects are not entirely consistent with theoretical predictions. Further, according to the adjusted R^2 statistic, the incremental explanatory power of these additional variables is quite small. In this subsection, we provide a heuristic assessment of the relative contributions of various groups of factors determining export behavior.

In Table 8, we report the adjusted R^2 statistics from fitting individual groups of regressors. Two specifications are considered: the basic specification given by equation (2) and the general specification given by equation (7). For the case of equation (2), we calculate the individual contributions of $Y_{i,j,t-k}$, ($X_{j,t-k}$, $R_{i,j,t-k}$), and ($Y_{i,j,t-k}$, $E_{i,j,t-1}$) and report the results in Panel A. One observation stands out — the lagged export variables provide most of the explanatory power. The non- $Y_{i,j,t-k}$ variables explain very little about the variation in Hong Kong exports. Among the non- $Y_{i,j,t-k}$ variables, the error correction term $E_{i,j,t-1}$ offers the best incremental explanatory power in two cases: re-exports and total exports to Japan; it adds 16 per cent to the adjusted R^2.

The case of equation (7) is considered in Panel B of Table 8. In this panel, we garner $V_{i,j,t-k}$, $R^*_{i,j,t-k}$, W_{t-k}, and $C_{i,j,t-k}$ into one group. The results suggested that these four variables as a group contribute little in explaining Hong Kong export variability. Even though they are statistically significant in these export equations, their explanatory power, gauged by the adjusted R^2, ranges from 0 per cent to 9 per cent. The results in Panel B corroborate those in Panel A and indicate that the lagged export variables are the key variables explaining Hong Kong export performance.

The inference of the relative contributions of these groups of regressors is not likely to be spurious. For a given export equation, the sum of the adjusted R^2 statistics from individual regressor groups is less than the adjusted R^2 statistic from the regression in which all these regressors are included. For example, consider equation (7) for the aggregate domestic exports. The results in Panel B show that the adjusted R^2 statistics for the three components ($Y_{i,j,t-k}$, $E_{i,j,t-1}$), $X_{j,t-k}$, and ($V_{i,j,t-k}$, $R^*_{i,j,t-k}$, W_{t-k}, and $C_{i,j,t-k}$) are, respectively, 39 per cent, 4 per cent, and 4 per cent. The sum of the three statistics is smaller than 59 per cent, which is the adjusted R^2 statistic of the regression that contains all three groups of regressors. Thus, these regressors tend to complement each other in explaining the variability of exports and the individual adjusted R^2 statistics do not over-state the explanatory power of individual regressor groups. Even allowing for the complementary effect, there is still strong evidence on the significant role played by the lagged exports in explaining Hong Kong export performance.

5. Concluding Remarks

The paper examines Hong Kong monthly export performance from 1991 to 2001. To address the simultaneity and nonstationarity problems, the cointegration framework and the related error-correction specification are employed to study the canonical relationship between exports, foreign income, and real exchange rates. The exercise is then extended to investigate the incremental explanatory power of real exchange rate volatility, "third" country competition, domestic wages, and costs of imports from China. The export data are categorized according to their types (domestic exports, re-exports, and the total) and destinations (the U.S., Japan, and the rest of the world) because the time paths of these export series are quite different during the sample period. Further, the destination-and-export-type specific unit value indexes are used to construct the relative prices in the export demand equations.

In sum, the selected variables explain the Hong Kong exports quite well. Most of the significant variables have the expected sign. The adjusted R^2 statistics, which measure the goodness-of-fit, of the Hong Kong export models are in the range of 0.38 (domestic exports to Japan) to 0.65 (total exports to the rest of the world). However, the effects of these economic factors on the volume of exports vary across types and destinations. One noticeable difference is found between aggregate exports and exports to Japan and the U.S.. For instance, effects of real exchange rate volatility, "third" country competition, and domestic wages on aggregate exports are different from those on exports to Japan and the U.S.. The use of aggregate export data can give a misleading picture if the focus is on the behavior of a specific category of exports.

It is known that the strength and the growth of the Hong Kong economy depend heavily on its export activity. Given its current economic difficulties, information on factors affecting Hong Kong export performance can provide some useful insights on formulating policies to improve the situation. Our analyses indicate that, far more than the external factors including foreign income, relative prices, real exchange rate volatility, and costs of importing from China, the lagged exports are the key factors determining Hong Kong exports. The extraordinary export performance of Hong Kong in the past was mainly driven by the internal dynamics of exports themselves rather than external demand conditions. A policy implication of this result is the importance of exploring and expanding the export market. Instead of waiting for external conditions to improve, a fruitful policy would be to explore ways to increase the breadth and depth of the export market and, hence, set exports on a new dynamic path.

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Table 1. Unit Root Test Results

	Levels			First Differences		
Variables	ADF statistics (lag)	Q(6)	Q(12)	ADF statistics (lag)	Q(6)	Q(12)
DXA	-3.025 (4)	0.20 (1.000)	10.52 (0.570)	-8.365* (3)	1.01 (0.985)	11.02 (0.528)
RXA	-1.998 (11)	0.59 (0.997)	5.07 (0.955)	-2.724^ (7)	0.86 (0.990)	15.49 (0.216)
TXA	-2.043 (11)	0.58 (0.997)	5.18 (0.952)	-3.011* (7)	0.85 (0.991)	15.08 (0.237)
AIP	-2.810 (11)	1.13 (0.980)	5.77 (0.927)	-3.146* (10)	1.23 (0.975)	5.49 (0.940)
RDXA	-2.529 (7)	0.22 (1.000)	2.28 (0.999)	-3.712* (6)	0.25 (1.000)	3.55 (0.990)
RRXA	-2.502 (7)	0.52 (0.998)	8.97 (0.706)	-3.632* (6)	0.46 (0.998)	9.85 (0.629)
RTXA	-2.526 (7)	0.41 (0.999)	7.01 (0.857)	-3.615* (6)	0.43 (0.999)	8.14 (0.774)
DXJP	-1.221 (4)	1.01 (0.985)	6.46 (0.891)	-7.940* (3)	1.11 (0.981)	6.74 (0.874)
RXJP	-2.309 (7)	0.80 (0.992)	6.25 (0.903)	-3.965* (5)	2.07 (0.913)	3.93 (0.985)
TXJP	-2.085 (7)	0.61 (0.996)	8.37 (0.756)	-3.930* (5)	2.34 (0.886)	7.36 (0.833)
JPIP	-2.946 (8)	1.68 (0.947)	11.15 (0.516)	-2.574^ (6)	0.84 (0.991)	9.92 (0.623)
RDXJP	-2.148 (4)	1.66 (0.949)	8.81 (0.719)	-6.412* (3)	2.05 (0.916)	8.91 (0.711)
RRXJP	-1.854 (5)	1.99 (0.921)	10.51 (0.571)	-6.084* (4)	1.82 (0.936)	10.27 (0.592)
RTXJP	-1.904 (5)	1.74 (0.942)	10.30 (0.590)	-6.059* (4)	1.59 (0.953)	10.09 (0.608)
DXUS	-2.686 (4)	0.31 (0.999)	4.16 (0.980)	-14.603* (1)	3.34 (0.766)	8.04 (0.782)
RXUS	-2.986 (6)	0.02 (1.000)	3.53 (0.990)	-9.651* (2)	2.29 (0.891)	7.60 (0.815)
TXUS	-2.950 (6)	0.50 (0.998)	3.52 (0.991)	-10.397* (2)	2.19 (0.901)	5.40 (0.943)
USIP	1.154 (3)	2.47 (0.872)	5.46 (0.941)	-4.159* (2)	2.48 (0.870)	7.05 (0.854)
RDXUS	-1.143 (2)	4.93 (0.553)	9.59 (0.652)	-6.639* (1)	3.39 (0.758)	9.27 (0.679)
RRXUS	-0.727 (8)	0.71 (0.994)	6.74 (0.874)	-2.881* (7)	0.59 (0.997)	6.45 (0.892)
RTXUS	-0.793 (8)	0.20 (1.000)	6.61 (0.882)	-3.248* (6)	1.11 (0.981)	12.48 (0.408)

Note: The significance of augmented Dickey-Fuller statistics at the 5 per cent (10 per cent) level is indicated by * (^) (Cheung and Lai, 1995). The level-specification contains a time trend and an intercept and the first-difference-specification allows for only an intercept. P-values are given in the parentheses next to the Q(p) statistics; p = 6, 12. The variables are grouped according to the export destinations; namely aggregate exports, exports to Japan, and exports to the U.S.. The variables related to the aggregate export regression are DXA = aggregate domestic exports, RXA = aggregate re-exports, TXA = aggregate total exports (domestic exports + re-exports), AIP = 'aggregate' industrial product given by the world industrial production index, RDXA = real effective exchange rate (REER) based on aggregate domestic export unit value index (UVI), RRDX = REER based on aggregate re-export UVI, and RTXA = REER based on aggregate total export UVI. Variables related to exports to Japan and to the U.S. regressions are similarly defined with the "A" for aggregate replaced by "JP" for Japan and "US" for the U.S.. See Appendix 1 for definitions of these variables.

Table 2. Cointegration Test Results

	Export Type	(T, k)	Trace Statistics H(0): r = (2, 1, 0)	CV(s) (y, x, r)
	DX	(121,6)	(0.06, 4.95, 32.85)	(1, 1.736, -0.378)
Aggregate	RX	(121,6)	(3.65, 11.76, 44.29*)	(1, -0.796, -0.681)
	TX	(121,6)	(3.24, 10.94, 39.41**)	(1, -0.622, -0.661)
	DX	(124,4)	(0.13, 7.77, 27.84)	(1, 22.742, 14.829)
	RX	(122,6)	(4.70, 24.35**, 47.93*)	(1, -2.192, -2.784)
Japan				(1,-63.117,-13.327)
	TX	(122,6)	(4.76, 24.15**, 47.79*)	(1, -2.731, -2.706)
				(1, 49.009, 7.760)
	DX	(127,1)	(5.03, 24.57*, 51.79*)	(1, 1.166, -2.211)
				(1, -0.147, 1.978)
The U.S.	RX	(123,5)	(5.03, 19.15, 52.03*)	(1, 0.027, -3.615)
	TX	(123,5)	(8.20, 23.19**, 55.61*)	(1, 0.035, -2.935)
				(1, -3.382, 0.295)

Note: The Johansen cointegration test results for nine categories of Hong Kong exports and their corresponding income and price variables are reported. The export types are DX = domestic exports, RX = re-exports, and TX = total exports (domestic exports + re-exports). The effective sample size and lag parameter are given under the column labelled "(*T,k*)." The lag parameter is chosen according to the Akaike information criterion and to eliminate serial correlation in residuals. The trace statistics with significance at the 10 per cent and 5 per cent levels indicated by ** and * are presented (Cheung and Lai, 1993). The maximum eigenvalue statistics give similar results. Significant cointegrating vectors are presented in the "CV(s)" column. The cointegrating vectors are normalized such that the coefficient of the export variables is unity.

Table 3a. The Basic Export Demand Specification

	Aggregate		
Variables	**DX**	**RX**	**TX**
Constant	3.8344*	0.9884*	1.2342*
	(3.231)	(2.977)	(2.772)
$Y_{t\text{-}1}$	-0.4869*	-0.8113*	-0.7779*
	(-5.350)	(-5.205)	(-5.487)
$Y_{t\text{-}2}$	-0.2383*	-0.7189*	-0.6869*
	(-3.892)	(-3.983)	(-4.040)
$Y_{t\text{-}3}$		-0.5072*	-0.4812*
		(-3.375)	(-3.284)
$Y_{t\text{-}4}$		-0.2459*	-0.2383^
		(-1.993)	(-1.910)
$Y_{t\text{-}5}$		-0.1145	-0.1139
		(-1.472)	(-1.435)
$X_{t\text{-}3}$		1.3044*	1.2475^
		(2.003)	(1.919)
$X_{t\text{-}5}$	2.8806*	2.0906*	2.2093*
	(3.443)	(2.392)	(2.577)
$X_{t\text{-}6}$	2.1536*	1.3220*	1.4543*
	(2.675)	(2.196)	(2.423)
$E_{t\text{-}1}$	-0.2661*	-0.1816*	-0.2112*
	(-3.242)	(-2.973)	(-2.774)
$\bar{R}^2$	0.4711	0.5477	0.5516
Q(4)	2.4642	0.3247	0.4924
	[0.651]	[0.988]	[0.974]
Q(8)	3.2292	5.1223	4.4241
	[0.919]	[0.744]	[0.817]
Q(12)	5.5250	6.5870	5.4246
	[0.938]	[0.884]	[0.942]

Table 3b. The Basic Export Demand Specification

		Japan			U.S.	
Variables	**DX**	**RX**	**TX**	**DX**	**RX**	**TX**
Constant	-0.0201*	-1.4590*	-1.9488*	2.0638*	-0.2323*	-0.1034*
	(-2.359)	(-4.795)	(-4.985)	(3.807)	(-2.438)	(-2.420)
Y_{t-1}	-0.7129*	-0.7344*	-0.7395*	-0.4124*	-0.6886*	-0.6932*
	(-5.828)	(-9.101)	(-7.822)	(-4.524)	(-6.106)	(-6.641)
Y_{t-2}	-0.3393*	-0.5361*	-0.5331*	-0.1356^	-0.4706*	-0.5293*
	(-2.383)	(-4.598)	(-4.412)	(-1.741)	(-4.141)	(-4.381)
Y_{t-3}	-0.1632	-0.3660*	-0.4269*		-0.2260*	-0.2863*
	(-1.307)	(-3.515)	(-3.661)		(-2.277)	(-2.672)
Y_{t-4}	-0.2422*	-0.1466^	-0.2398*		-0.1108	-0.1101
	(-2.366)	(-1.928)	(-2.319)		(-1.216)	(-1.326)
Y_{t-5}			-0.1170			
			(-1.615)			
Y_{t-6}		0.1115*				
		(2.314)				
Y_{t-9}		0.0973	0.1384^			
		(1.328)	(1.755)			
X_{t-1}	0.7114	0.4066^	0.4399*			
	(1.479)	(1.822)	(2.062)			
X_{t-2}					2.9201*	2.4186^
					(2.353)	(1.939)
X_{t-3}	0.8252^	0.5435*	0.5519*		2.5072^	2.5085*
	(1.681)	(2.101)	(2.014)		(1.767)	(2.292)
X_{t-5}				3.3342*	2.9915*	3.2350*
				(2.344)	(2.049)	(2.344)
X_{t-8}				3.1869^		
				(1.791)		
R_{t-4}	0.4198				1.3851	
	(1.585)				(1.387)	
$E1_{t-1}$		-0.0909*	-0.1053*	-0.2047*	-0.1403*	-0.1764*
	(-4.823)	(-5.002)	(-2.822)	(-2.368)	(-2.378)	
$E2_{t-1}$				-0.1259*		
				(-2.229)		
$\bar{R}^2$	0.3740	0.4718	0.4759	0.3976	0.4384	0.4874
Q(4)	0.4651	0.6142	0.7386	1.5631	3.6114	5.0539
	[0.977]	[0.961]	[0.946]	[0.815]	[0.461]	[0.282]
Q(8)	2.6731	2.9509	5.0247	2.2447	4.6809	5.3222
	[0.953]	[0.937]	[0.755]	[0.973]	[0.791]	[0.723]
Q(12)	5.5622	7.1492	10.1518	9.9818	7.9078	9.0731
	[0.937]	[0.848]	[0.603]	[0.618]	[0.792]	[0.697]

Note: The table contains results from estimating

$$Y_{i,j,t} = \alpha + \Sigma_{k=1}^{n}\alpha_{i,j,k}\,Y_{i,j,t-k} + \Sigma_{k=1}^{m}\beta_{i,j,k}\,X_{j,t-k} + \Sigma_{k=1}^{p}\gamma_{i,j,k}\,R_{i,j,t-k} + \theta_{ij}\,E_{i,j,t-1} + \varepsilon_{i,j,t}\,,$$

where Y, X, and R are, respectively, the first log differences of Hong Kong exports, foreign income, and type-and-destination specific real exchange rates. E1 and E2 are error correction terms. The *i*-subscript indicates the export types and *i* = domestic exports, re-exports, and total exports. The export destinations are given by the *j*-subscript and *j* = aggregate, Japan, and the U.S.. Table 3a contains results for aggregate export data and Table 3b contains results for exports to Japan and the U.S.. In the Table, DX = domestic exports, RX = re-exports, and TX = total exports. Robust *t*-statistics are given in parentheses underneath the coefficient estimates. Significance at the 5 per cent (10 per cent) level is indicated by * (^). For brevity, only significant estimates are presented. $Q(k)$ gives the Ljung-Box statistic constructed from the first k autocorrelation coefficients. The brackets below the $Q(k)$ statistics contain their *p*-values.

Table 4a. The Incremental Effect of Real Exchange Rate Volatility

		Aggregate	
Variables	**DX**	**RX**	**TX**
Constant	4.0177*	1.0526*	1.3295*
	(3.401)	(3.044)	(2.876)
Y_{t-1}	-0.4737*	-0.8114*	-0.7770*
	(-5.262)	(-5.256)	(-5.558)
Y_{t-2}	-0.2378*	-0.7336*	-0.7064*
	(-3.925)	(-4.014)	(-4.088)
Y_{t-3}		-0.5345*	-0.5159*
		(-3.418)	(-3.372)
Y_{t-4}		-0.2789*	-0.2807*
		(-2.136)	(-2.136)
Y_{t-5}		-0.1448^	-0.1516^
		(-1.726)	(-1.811)
X_{t-3}		1.1999^	1.1118
		(1.769)	(1.633)
X_{t-5}	2.8764*	2.1794*	2.3134*
	(3.479)	(2.467)	(2.682)
X_{t-6}	2.1960*	1.4090*	1.5582*
	(2.758)	(2.307)	(2.564)
E_{t-1}	-0.2769*	-0.1917*	-0.2252*
	(-3.395)	(-3.036)	(-2.868)
V_{t-1}	-159.879*	-66.0720	-95.5241*
	(-2.807)	(-1.586)	(-2.031)
$\bar{R}^2$	0.4752	0.5488	0.5560
Q(4)	2.4216	0.3510	0.2554
	[0.659]	[0.986]	[0.993]
Q(8)	3.7177	6.7627	6.0484
	[0.882]	[0.562]	[0.642]
Q(12)	5.8918	7.7318	6.6494
	[0.921]	[0.806]	[0.880]

Table 4b. The Incremental Effect of Real Exchange Rate Volatility

		Japan			U.S.	
Variables	**DX**	**RX**	**TX**	**DX**	**RX**	**TX**
Constant	-0.0453*	-1.4893*	-1.9488*	1.7854*	-0.2757*	-0.1034*
	(-2.797)	(-4.862)	(-4.985)	(3.280)	(-2.907)	(-2.420)
Y_{t-1}	-0.6875*	-0.7500*	-0.7395*	-0.4526*	-0.6756*	-0.6932*
	(-5.782)	(-9.153)	(-7.822)	(-4.647)	(-6.024)	(-6.641)
Y_{t-2}	-0.3026*	-0.5519*	-0.5331*	-0.1594^	-0.4583*	-0.5293*
	(-2.146)	(-4.705)	(-4.412)	(-1.964)	(-4.196)	(-4.381)
Y_{t-3}	-0.1429	-0.3816*	-0.4269*		-0.2343*	-0.2863*
	(-1.105)	(-3.643)	(-3.661)		(-2.409)	(-2.672)
Y_{t-4}	-0.2129*	-0.1566*	-0.2398*		-0.1325	-0.1101
	(-2.139)	(-2.041)	(-2.319)		(-1.571)	(-1.326)
Y_{t-5}			-0.1170			
			(-1.615)			
Y_{t-6}		0.1237*				
		(2.694)				
Y_{t-9}		0.0925	0.1384^			
		(1.299)	(1.755)			
X_{t-1}		0.4270^	0.4399*			
		(1.938)	(2.062)			
X_{t-2}					2.6052*	2.4186^
					(2.194)	(1.939)
X_{t-3}	0.8068^	0.5190*	0.5519*		2.7117^	2.5085*
	(1.696)	(2.014)	(2.014)		(1.869)	(2.292)
X_{t-5}				3.0861*	3.0310*	3.2350*
				(2.256)	(2.131)	(2.344)
X_{t-8}				3.2147^		
				(1.837)		
R_{t-4}				1.7797^		
				(1.856)		
$E1_{t-1}$		-0.0920*	-0.1053*	-0.1890*	-0.1528*	-0.1764*
		(-4.872)	(-5.002)	(-2.706)	(-2.660)	(-2.378)
$E2_{t-1}$				-0.1096^		
				(-1.922)		
V_{t-2}		15.6101*				
		(2.065)				
V_{t-3}	31.9274*					
	(2.061)					

Table 4b. The Incremental Effect of Real Exchange Rate Volatility (Continued)

	Japan			U.S.		
Variables	**DX**	**RX**	**TX**	**DX**	**RX**	**TX**
$V_{t\text{-}4}$				993.376^	1099.99*	
				(1.878)	(2.917)	
$V_{t\text{-}8}$				770.947*		
				(2.727)		
$\bar{R}^2$	0.3700	0.4783	0.4759	0.4108	0.4604	0.4874
Q(4)	0.2856	1.2466	0.7386	1.4195	4.3654	5.0539
	[0.991]	[0.870]	[0.946]	[0.841]	[0.359]	[0.282]
Q(8)	3.6338	3.9378	5.0247	2.1528	7.3934	5.3222
	[0.889]	[0.863]	[0.755]	[0.976]	[0.495]	[0.723]
Q(12)	6.8175	8.1221	10.1518	7.5559	9.1256	9.0731
	[0.869]	[0.776]	[0.603]	[0.819]	[0.692]	[0.697]

Note: The table contains results from estimating

$$Y_{i,j,t} = \alpha + \Sigma_{k=1}^{n}\alpha_{i,j,k}\, Y_{i,j,t\text{-}k} + \Sigma_{k=1}^{m}\beta_{i,j,k}\, X_{j,t\text{-}k} + \Sigma_{k=1}^{p}\gamma_{i,j,k}\, R_{i,j,t\text{-}k} + \theta_{ij}\, E_{i,j,t\text{-}1} + \Sigma_{k=0}^{q}\delta_{i,j,k}\, V_{i,j,t\text{-}k} + \varepsilon_{i,j,t}\,,$$

where V is the real exchange rate volatility given by GARCH estimates. See the Note to Table 3 for definitions of other variables. Table 4a contains results for aggregate export data and Table 4b contains results for exports to Japan and the U.S..

Table 5a. The Incremental Effect of 'Third' Country Competition

	Aggregate		
Variables	**DX**	**RX**	**TX**
Constant	3.9359*	1.0527*	1.3289*
	(3.441)	(3.523)	(3.342)
Y_{t-1}	-0.4662*	-0.7781*	-0.7403*
	(-5.669)	(-6.573)	(-6.934)
Y_{t-2}	-0.2400*	-0.7083*	-0.6746*
	(-3.778)	(-4.525)	(-4.475)
Y_{t-3}		-0.5348*	-0.5106*
		(-3.627)	(-3.506)
Y_{t-4}		-0.2730*	-0.2719*
		(-2.181)	(-2.160)
Y_{t-5}		-0.1526*	-0.1599*
		(-2.050)	(-2.184)
X_{t-3}		1.5175*	1.4475*
		(2.897)	(2.762)
X_{t-5}	2.9556*	2.5793*	2.6905*
	(3.558)	(2.647)	(2.890)
X_{t-6}	2.4084*	1.7600*	1.9469*
	(3.116)	(2.601)	(2.869)
E_{t-1}	-0.2706*	-0.1920*	-0.2251*
	(-3.433)	(-3.508)	(-3.329)
V_{t-2}	-226.2503*	-83.6731^	-120.129*
	(-2.811)	(-1.749)	(-2.177)
R^*_{t-1}	-0.9242	-0.8921	-0.9461
	(-1.291)	(-1.191)	(-1.283)
R^*_{t-4}		-0.7043	-0.7087^
		(-1.555)	(-1.662)
$\bar{R}^2$	0.5001	0.5769	0.5882
Q(4)	3.6011	0.6707	0.6180
	[0.463]	[0.955]	[0.961]
Q(8)	5.9989	9.9773	9.1849
	[0.647]	[0.267]	[0.327]
Q(12)	8.1214	12.7296	11.0363
	[0.776]	[0.389]	[0.526]

Table 5b. The Incremental Effect of 'Third' Country Competition

	Japan			U.S.		
Variables	**DX**	**RX**	**TX**	**DX**	**RX**	**TX**
Constant	-0.0196*	-1.3867*	-1.9488*	1.7854*	-0.2632*	-0.0891*
	(-2.282)	(-4.535)	(-4.985)	(3.280)	(-2.898)	(-2.217)
Y_{t-1}	-0.6965*	-0.7416*	-0.7395*	-0.4526*	-0.6975*	-0.7167*
	(-5.962)	(-9.237)	(-7.822)	(-4.647)	(-6.500)	(-7.364)
Y_{t-2}	-0.3226*	-0.5497*	-0.5331*	-0.1594^	-0.4903*	-0.5702*
	(-2.314)	(-4.772)	(-4.412)	(-1.964)	(-4.280)	(-4.623)
Y_{t-3}	-0.1450	-0.3725*	-0.4269*		-0.2800*	-0.3392*
	(-1.155)	(-3.565)	(-3.661)		(-2.939)	(-3.230)
Y_{t-4}	-0.2209*	-0.1526*	-0.2398*		-0.1789*	-0.1739*
	(-2.325)	(-2.014)	(-2.319)		(-2.125)	(-2.057)
Y_{t-5}			-0.1170			
			(-1.615)			
Y_{t-6}		0.1260*				
		(2.664)				
Y_{t-9}		0.0929	0.1384^			
		(1.337)	(1.755)			
X_{t-1}		0.4358*	0.4399*			
		(1.990)	(2.062)			
X_{t-2}					2.9274*	3.0007*
					(2.436)	(2.494)
X_{t-3}	0.7836	0.4842^	0.5519*		2.7706^	2.4483*
	(1.607)	(1.907)	(2.014)		(1.965)	(2.405)
X_{t-5}				3.0861*	2.6064^	2.3890^
				(2.256)	(1.866)	(1.870)
X_{t-8}				3.2147^		
				(1.837)		
$E1_{t-1}$		-0.0857*	-0.1053*	-0.1890*	-0.1488*	-0.1512*
		(-4.540)	(-5.002)	(-2.706)	(-2.709)	(-2.163)
$E2_{t-1}$				-0.1096^		
				(-1.922)		
V_{t-2}		15.5980^				
		(1.950)				
V_{t-4}				993.376^	1006.10*	
				(1.878)	(2.891)	
V_{t-8}				770.947*		
				(2.727)		
R^*_{t-2}		0.3442				
		(1.514)				

Table 5b. The Incremental Effect of 'Third' Country Competition (Continued)

	Japan			U.S.		
Variables	**DX**	**RX**	**TX**	**DX**	**RX**	**TX**
R^*_{t-4}	0.7158^				1.6366*	1.5059*
	(1.933)				(2.854)	(2.681)
$\bar{R}^2$	0.3706	0.4824	0.4759	0.4108	0.4757	0.5088
Q(4)	0.1860	1.3844	0.7386	1.4195	5.5675	6.5961
	[0.996]	[0.847]	[0.946]	[0.841]	[0.234]	[0.159]
Q(8)	2.5299	4.1368	5.0247	2.1528	7.6061	7.2381
	[0.960]	[0.845]	[0.755]	[0.976]	[0.473]	[0.511]
Q(12)	5.9505	8.5577	10.1518	7.5559	9.9101	10.7241
	[0.919]	[0.740]	[0.603]	[0.819]	[0.624]	[0.553]

Note: The table contains results from estimating

$$Y_{i,j,t} = \alpha + \Sigma_{k=1}^{n}\alpha_{i,j,k} Y_{i,j,t-k} + \Sigma_{k=1}^{m} \beta_{i,j,k} X_{j,t-k} + \Sigma_{k=1}^{p}\gamma_{i,j,k} R_{i,j,t-k} + \theta_{ij} E_{i,j,t-1} + \Sigma_{k=0}^{q} \delta_{i,j,k} V_{i,j,t-k} + \Sigma_{k=1}^{s}\gamma^*_{i,j,k} R^*_{i,j,t-k} + \varepsilon_{i,j,t},$$

where R^* is the "third" country price variable based on the Hong Kong export UVI and the destination economy's overall import UVI. See the Notes to Tables 3 and 4 for definitions of other variables. Table 5a contains results for aggregate export data and Table 5b contains results for exports to Japan and the U.S..

Table 6a. The Incremental Effect of Domestic Wages

		Aggregate	
Variables	**DX**	**RX**	**TX**
Constant	3.6806*	1.0365*	1.3292*
	(3.205)	(4.099)	(4.048)
Y_{t-1}	-0.5415*	-0.7795*	-0.7842*
	(-6.652)	(-7.458)	(-7.399)
Y_{t-2}	-0.3090*	-0.6804*	-0.6996*
	(-5.092)	(-5.164)	(-4.848)
Y_{t-3}		-0.4212*	-0.4293*
		(-3.386)	(-3.081)
Y_{t-4}		-0.1990^	-0.1792^
		(-1.880)	(-1.727)
Y_{t-5}		-0.0990	-0.0892
		(-1.569)	(-1.338)
X_{t-3}		1.3342*	1.2555*
		(2.402)	(2.365)
X_{t-5}	3.2628*	2.1752*	2.5213*
	(4.265)	(2.822)	(3.297)
X_{t-6}	2.5668*	1.4423*	1.8088*
	(3.356)	(2.262)	(2.767)
E_{t-1}	-0.2531*	-0.1872*	-0.2250*
	(-3.180)	(-4.077)	(-4.011)
V_{t-1}	-211.988^	-106.303*	-111.223*
	(-1.692)	(-2.222)	(-2.018)
R^*_{t-1}	-1.0466^	-0.8414	-0.9713
	(-1.963)	(-1.337)	(-1.644)
W_{t-1}	-2.0373*	-2.2073*	-1.8792*
	(-2.296)	(-2.243)	(-2.007)
W_{t-5}	1.7274*		1.1931
	(2.187)		(1.482)
$\bar{R}^2$	0.5865	0.6189	0.6425
Q(4)	0.9618	0.6674	0.7268
	[0.916]	[0.955]	[0.948]
Q(8)	1.7715	11.8145	10.7213
	[0.987]	[0.160]	[0.218]
Q(12)	3.3994	17.2397	14.1929
	[0.992]	[0.141]	[0.289]

Table 6b. The Incremental Effect of Domestic Wages

Variables	Japan DX	Japan RX	Japan TX	U.S. DX	U.S. RX	U.S. TX
Constant	-0.0109	-1.4182*	-1.6986*	0.7147^	-0.2731*	-0.0932*
	(-1.077)	(-4.792)	(-4.712)	(1.861)	(-3.318)	(-2.406)
Y_{t-1}	-0.7119*	-0.7858*	-0.7302*	-0.6175*	-0.6836*	-0.7067*
	(-6.335)	(-9.958)	(-8.101)	(-8.269)	(-7.840)	(-8.852)
Y_{t-2}	-0.2815*	-0.5886*	-0.4977*	-0.2530*	-0.4508*	-0.5330*
	(-2.308)	(-5.680)	(-4.425)	(-3.057)	(-4.685)	(-5.441)
Y_{t-3}		-0.3982*	-0.3311*		-0.2108*	-0.2662*
		(-3.800)	(-3.123)		(-2.192)	(-2.668)
Y_{t-4}	-0.1483^	-0.1501*	-0.1277		-0.1412	-0.1302
	(-1.768)	(-2.011)	(-1.486)		(-1.650)	(-1.586)
Y_{t-6}		0.1453*				
		(2.987)				
Y_{t-9}		0.0759	0.1439*			
		(1.191)	(2.023)			
X_{t-1}		0.4134^	0.3899^			
		(1.954)	(1.835)			
X_{t-2}					3.0964*	3.1131*
					(2.729)	(2.675)
X_{t-3}		0.4569^	0.5338*		2.7913*	2.5140*
		(1.907)	(1.992)		(2.004)	(2.571)
X_{t-5}				3.0791*	2.5617^	2.3907^
				(2.403)	(1.910)	(1.977)
X_{t-8}				3.6214*		
				(2.091)		
E_{t-1}		-0.0878*	-0.0919*	-0.1455*	-0.1599*	-0.1681*
		(-4.820)	(-4.746)	(-2.057)	(-3.275)	(-2.556)
V_{t-2}		18.4074*				
		(2.254)				
V_{t-4}				1091.80*	840.324*	
				(2.629)	(2.318)	
V_{t-8}				843.503*		
				(3.013)		
R^*_{t-2}		0.3370				
		(1.522)				
R^*_{t-4}	0.7956*				1.5854*	1.4052*
	(2.087)				(2.596)	(2.437)

Table 6b. The Incremental Effect of Domestic Wages (Continued)

		Japan			U.S.	
Variables	**DX**	**RX**	**TX**	**DX**	**RX**	**TX**
W_{t-1}	-2.7300^		-1.3794^	-2.0774*	-1.9366*	-2.0913*
	(-1.691)		(-1.944)	(-3.445)	(-2.073)	(-2.731)
W_{t-2}		-1.4199*				
		(-2.017)				
W_{t-9}				-1.8301*		
				(-2.605)		
$\bar{R}^2$	0.3791	0.5037	0.4902	0.4530	0.5063	0.5493
Q(4)	0.8397	1.6279	1.7638	2.6130	5.2459	6.1479
	[0.933]	[0.804]	[0.779]	[0.625]	[0.263]	[0.188]
Q(8)	3.5808	4.6780	6.6638	3.2089	10.2446	7.6891
	[0.893]	[0.791]	[0.573]	[0.921]	[0.248]	[0.464]
Q(12)	7.2349	8.5714	10.7899	6.6853	13.8514	12.9129
	[0.842]	[0.739]	[0.547]	[0.878]	[0.310]	[0.375]

Note: The table contains results from estimating

$$Y_{i,j,t} = \alpha + \Sigma_{k=1}^{n}\alpha_{i,j,k} Y_{i,j,t-k} + \Sigma_{k=1}^{m} \beta_{i,j,k} X_{j,t-k} + \Sigma_{k=1}^{p}\gamma_{i,j,k} R_{i,j,t-k} + \theta_{ij} E_{i,j,t-1} + \Sigma_{k=0}^{q} \delta_{i,j,k} V_{i,j,t-k} + \Sigma_{k=1}^{s}\gamma^{*}_{i,j,k} R^{*}_{i,j,t-k} + \Sigma_{k=1}^{r}\lambda_k W_{t-k} + \varepsilon_{i,j,t},$$

where W is the first log difference of the real payroll index. See the Notes to Tables 3, 4 and 5 for definitions of other variables. Table 6a contains results for aggregate export data and Table 6b contains results for exports to Japan and the U.S..

Table 7a. The Incremental Effect of the cost of Importing from China

		Aggregate	
Variables	**DX**	**RX**	**TX**
Constant	3.6256*	0.9986*	1.2716*
	(3.178)	(4.244)	(4.053)
Y_{t-1}	-0.5426*	-0.7696*	-0.7744*
	(-6.629)	(-8.001)	(-7.695)
Y_{t-2}	-0.3060*	-0.6590*	-0.6787*
	(-5.138)	(-5.364)	(-4.929)
Y_{t-3}		-0.4020*	-0.4077*
		(-3.506)	(-3.043)
Y_{t-4}		-0.1882^	-0.1681
		(-1.849)	(-1.622)
Y_{t-5}		-0.1068^	-0.0949
		(-1.780)	(-1.475)
X_{t-3}		1.4926*	1.3848*
		(2.894)	(2.749)
X_{t-5}	3.2691*	2.2720*	2.5829*
	(4.297)	(3.036)	(3.458)
X_{t-6}	2.5372*	1.4069*	1.7299*
	(3.294)	(2.338)	(2.683)
E_{t-1}	-0.2490*	-0.1802*	-0.2149*
	(-3.150)	(-4.209)	(-4.005)
V_{t-1}	-235.384^	-104.963*	-116.228*
	(-1.776)	(-2.263)	(-2.042)
R^*_{t-1}	-1.0796*	-0.8659	-1.0127^
	(-2.067)	(-1.453)	(-1.780)
W_{t-1}	-2.0734*	-2.2348*	-1.9365*
	(-2.346)	(-2.353)	(-2.090)
W_{t-5}	1.6705*		1.0848
	(2.134)		(1.370)
CN_{t-2}	-0.8816	-1.3911*	-1.2202*
	(-1.602)	(-2.324)	(-2.085)
$\bar{R}^2$	0.5896	0.6316	0.6506
Q(4)	0.5992	0.6148	0.9742
	[0.963]	[0.961]	[0.914]
Q(8)	1.2907	9.3425	9.3463
	[0.996]	[0.314]	[0.314]
Q(12)	2.3919	15.4257	12.9779
	[0.999]	[0.219]	[0.371]

Table 7b. The Incremental Effect of the cost of Importing from China

	Japan			U.S.		
Variables	**DX**	**RX**	**TX**	**DX**	**RX**	**TX**
Constant	-0.0109	-1.4182*	-1.6986*	0.7363^	-0.2731*	-0.0932*
	(-1.077)	(-4.792)	(-4.712)	(1.887)	(-3.318)	(-2.406)
ΔY_{t-1}	-0.7119*	-0.7858*	-0.7302*	-0.6091*	-0.6836*	-0.7067*
	(-6.335)	(-9.958)	(-8.101)	(-8.301)	(-7.840)	(-8.852)
ΔY_{t-2}	-0.2815*	-0.5886*	-0.4977*	-0.2505*	-0.4508*	-0.5330*
	(-2.308)	(-5.680)	(-4.425)	(-3.099)	(-4.685)	(-5.441)
ΔY_{t-3}		-0.3982*	-0.3311*		-0.2108*	-0.2662*
		(-3.800)	(-3.123)		(-2.192)	(-2.668)
ΔY_{t-4}	-0.1483^	-0.1501*	-0.1277		-0.1412	-0.1302
	(-1.768)	(-2.011)	(-1.486)		(-1.650)	(-1.586)
ΔY_{t-6}		0.1453*				
		(2.987)				
ΔY_{t-9}		0.0759	0.1439*			
		(1.191)	(2.023)			
ΔX_{t-1}		0.4134^	0.3899^			
		(1.954)	(1.835)			
ΔX_{t-2}					3.0964*	3.1131*
					(2.729)	(2.675)
ΔX_{t-3}		0.4569^	0.5338*		2.7913*	2.5140*
		(1.907)	(1.992)		(2.004)	(2.571)
ΔX_{t-5}				3.1519*	2.5617^	2.3907^
				(2.454)	(1.910)	(1.977)
ΔX_{t-8}				3.5946*		
				(2.112)		
Z_{t-1}		-0.0878*	-0.0919*	-0.1496*	-0.1599*	-0.1681*
		(-4.820)	(-4.746)	(-2.084)	(-3.275)	(-2.556)
V_{t-2}		18.4074*				
		(2.254)				
V_{t-4}				1055.09*	840.324*	
				(2.452)	(2.318)	
V_{t-8}				913.320*		
				(2.358)		
R^*_{t-2}		0.3370				
		(1.522)				
R^*_{t-4}	0.7956*				1.5854*	1.4052*
	(2.087)				(2.596)	(2.437)
W_{t-1}	-2.7300^		-1.3794^	-2.1625*	-1.9366*	-2.0913*
	(-1.691)		(-1.944)	(-3.583)	(-2.073)	(-2.731)

Table 7b. The Incremental Effect of the Cost of Importing from China (Continued)

	Japan			U.S.		
Variables	**DX**	**RX**	**TX**	**DX**	**RX**	**TX**
W_{t-2}		-1.4199*				
		(-2.017)				
W_{t-9}				-1.9399*		
				(-2.786)		
CN_{t-2}				-0.9850		
				(-1.420)		
$\bar{R}^2$	0.3791	0.5037	0.4902	0.4618	0.5063	0.5493
Q(4)	0.8397	1.6279	1.7638	2.7325	5.2459	6.1479
	[0.933]	[0.804]	[0.779]	[0.604]	[0.263]	[0.188]
Q(8)	3.5808	4.6780	6.6638	3.7525	10.2446	7.6891
	[0.893]	[0.791]	[0.573]	[0.879]	[0.248]	[0.464]
Q(12)	7.2349	8.5714	10.7899	7.0219	13.8514	12.9129
	[0.842]	[0.739]	[0.547]	[0.856]	[0.310]	[0.375]

Note: The table contains results from estimating

$$Y_{i,j,t} = \alpha + \Sigma_{k=1}^{n}\alpha_{i,j,k} Y_{i,j,t-k} + \Sigma_{k=1}^{m} \beta_{i,j,k} X_{j,t-k} + \Sigma_{k=1}^{p}\gamma_{i,j,k} R_{i,j,t-k} + \theta_{ij} E_{i,j,t-1} +$$

$$\Sigma_{k=0}^{q} \delta_{i,j,k} V_{i,j,t-k} + \Sigma_{k=1}^{s}\gamma^{*}_{i,j,k} R^{*}_{i,j,t-k} + \Sigma_{k=1}^{r}\lambda_{k} W_{t-k} + \Sigma_{k=1}^{u}\tau_{i,j,k} C_{i,j,t-k} + \varepsilon_{i,j,t},$$

where C is the first log difference of the UVI of Hong Kong imports from China relative to the type-and-destination-specific UVI of Hong Kong exports. See the Notes to Tables 3, 4, 5 and 6 for definitions of other variables. Table 7a contains results for aggregate export data and Table 7b contains results for exports to Japan and the U.S..

Table 8. The Adjusted R^2

A. Basic Specification

Export Category	Explanatory Variables: Ys	Xs, Rs	Ys, E	All
DXA	0.3676	0.0445	0.3930	0.4711
RXA	0.4245	0.0610	0.4883	0.5477
TXA	0.4385	0.0643	0.4851	0.5516
DXJP	0.3560	0.0019	0.3560	0.3740
RXJP	0.2711	0.0756	0.4381	0.4718
TXJP	0.2740	0.0701	0.4380	0.4759
DXUS	0.3040	0.0373	0.3423	0.3976
RXUS	0.3358	0.0317	0.3387	0.4384
TXUS	0.4027	0.0150	0.4010	0.4874

B. Final Specification

Export Category	Explanatory Variables: Ys	Xs	Ys, E	Vs, R*s, Ws, Cs	All
DXA	0.3676	0.0445	0.3930	0.0420	0.5896
RXA	0.4245	0.0610	0.4883	0.0775	0.6316
TXA	0.4385	0.0643	0.4851	0.0867	0.6506
DXJP	0.3547	—	0.3547	-0.0039	0.3791
RXJP	0.2711	0.0756	0.4381	0.0243	0.5037
TXJP	0.2783	0.0701	0.4313	0.0187	0.4902
DXUS	0.3040	0.0373	0.3109	0.0123	0.4618
RXUS	0.3358	0.0098	0.3387	0.0550	0.5063
TXUS	0.4027	0.0150	0.4010	0.0439	0.5493

Note: The table contains the adjusted R^2 statistics from fitting individual groups of regressors to the export demand equations. Panel A presents the results based on the basic export demand specification (equation (2)) reported in Table 3. Panel B presents the results based on the export demand specification (equation (7)) reported in Table 7. The adjusted R^2s reported under "All" are the statistics when all the regressors are included. The export categories are defined by the combination of export types and export destinations. DX = domestic exports, RX = re-exports, TX = total exports, A = aggregate exports, JP = exports to Japan, and U.S. = exports to the U.S.. See the previous tables for definitions of other variables.

Figure 1. Hong Kong Aggregate Exports, Quantum Indexes

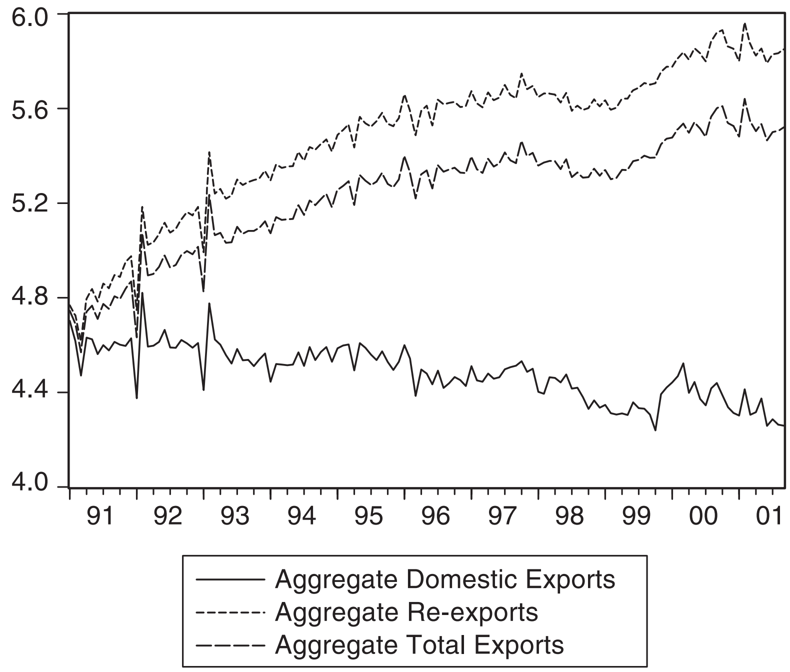


Figure 2. Hong Kong Exports to Japan, Quantum Indexes

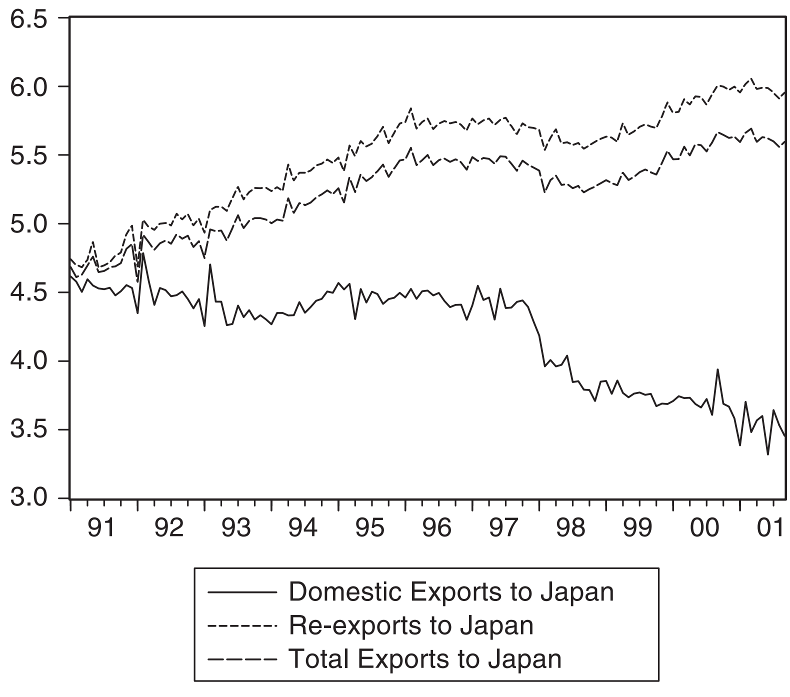


Figure 3. Hong Kong Exports to U.S., Quantum Indexes

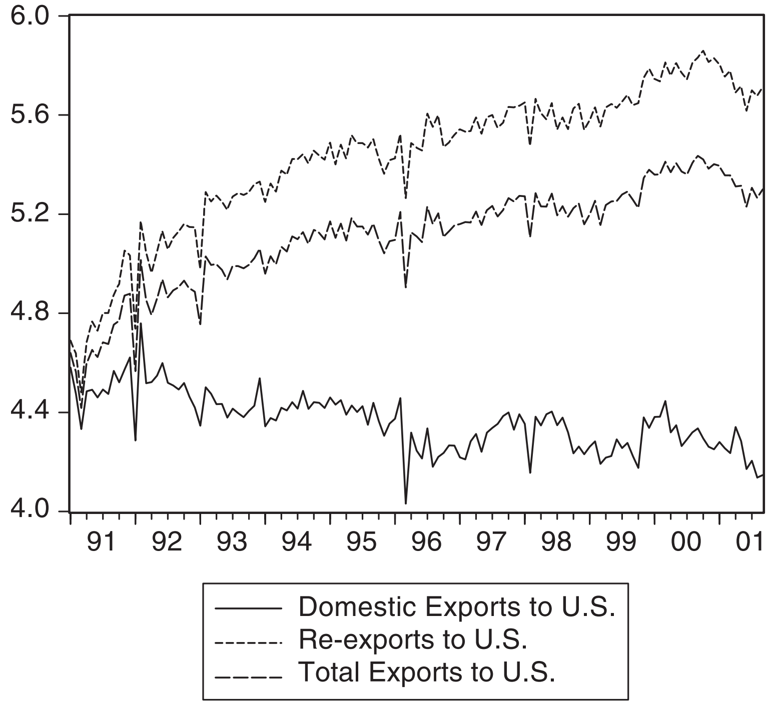


Figure 4. Hong Kong Real Effective Exchange Rates

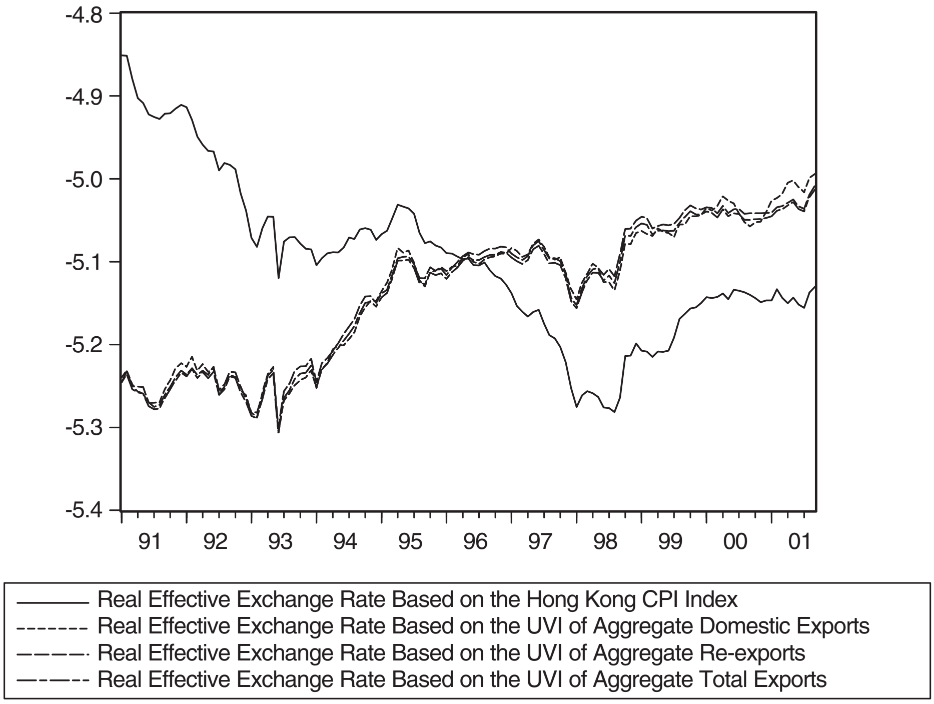
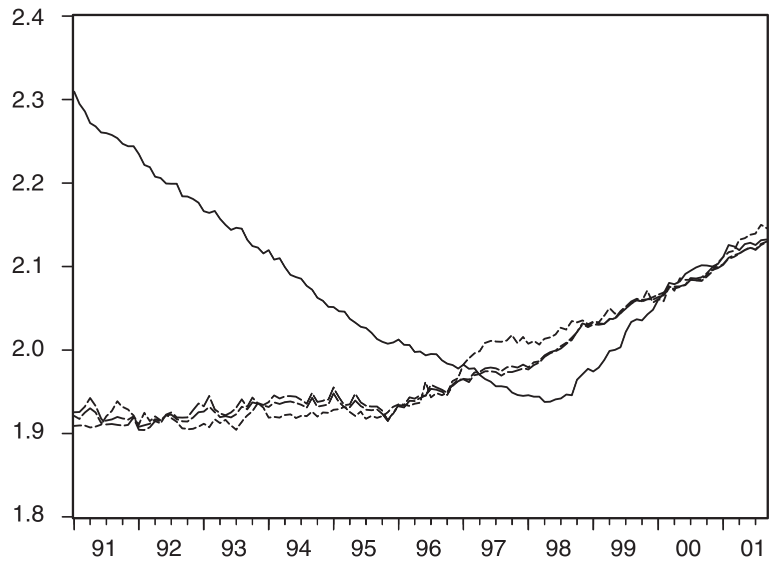


Figure 5. Hong Kong Real Exchange Rates (Against Japan)

——— Hong Kong Dollar and Japanese Yen Real Exchange Rate Based on the Hong Kong CPI Index
------- Hong Kong Dollar and Japanese Yen Real Exchange Rate Based on the UVI of Domestic Exports to Japan
– – – Hong Kong Dollar and Japanese Yen Real Exchange Rate Based on the UVI of Re-Exports to Japan
—–—- Hong Kong Dollar and Japanese Yen Real Exchange Rate Based on the UVI of Total Exports to Japan

Figure 6. Hong Kong Real Exchange Rates (Against U.S.)



——— Hong Kong Dollar and U.S. Dollar Real Exchange Rate Based on the Hong Kong CPI Index
------- Hong Kong Dollar and U.S. Dollar Real Exchange Rate Based on the UVI of Domestic Exports to U.S.
– – – Hong Kong Dollar and U.S. Dollar Real Exchange Rate Based on the UVI of Re-Exports to U.S.
—–—- Hong Kong Dollar and U.S. Dollar Real Exchange Rate Based on the UVI of Total Exports to U.S.

Appendix 1. Data Definition

Variables	Definition	Range	Source
DXA	Quantum Index: HK's Aggregate Domestic Exports (sa)	1/91 - 9/01	C&S
RXA	Quantum Index: HK's Aggregate Re-Exports (sa)	1/91 - 9/01	C&S
TXA	Quantum Index: HK's Aggregate Total Exports (sa)	1/91 - 9/01	C&S
DXJP	Quantum Index: HK's Domestic Exports to Japan (sa)	1/91 - 9/01	C&S
RXJP	Quantum Index: HK's Re-Exports to Japan (sa)	1/91 - 9/01	C&S
TXJP	Quantum Index: HK's Total Exports to Japan (sa)	1/91 - 9/01	C&S
DXUS	Quantum Index: HK's Domestic Exports to U.S. (sa)	1/91 - 9/01	C&S
RXUS	Quantum Index: HK's Re-Exports to U.S. (sa)	1/91 - 9/01	C&S
TXUS	Quantum Index: HK's Total Exports to U.S. (sa)	1/91 - 9/01	C&S
AIP	Industrial Countries: Industrial Production Index (sa)	1/91 - 8/01	IFS
JPIP	Japan: Industrial Production Index (sa)	1/91 - 9/01	IFS
USIP	U.S.: Industrial Production Index (sa)	1/91 - 9/01	CEIC
RDXA	Real Exchange Rate: HK's Domestic Exports	1/91 - 9/01	s.d.
	$= \left(\text{HK's Real Effective Exchange Rate Index} \times \frac{\text{UVI\_DXA}}{\text{HKCPI}} \right)^{-1}$		
RRXA	Real Exchange Rate: HK's Re-Exports	1/91 - 9/01	s.d.
	$= \left(\text{HK's Real Effective Exchange Rate Index} \times \frac{\text{UVI\_RXA}}{\text{HKCPI}} \right)^{-1}$		
RTXA	Real Exchange Rate: HK's Total Exports	1/91 - 9/01	s.d.
	$= \left(\text{HK's Real Effective Exchange Rate Index} \times \frac{\text{UVI\_TXA}}{\text{HKCPI}} \right)^{-1}$		
RDXJP	Real Exchange Rate: HK's Domestic Exports to Japan	1/91 - 9/01	s.d.
	$= \text{(period average spot rate of HKD/1000 JPY)} \times \frac{\text{JPCPI}}{\text{UVI\_DXJP}}$		
RRXJP	Real Exchange Rate: HK's Re-Exports to Japan	1/91 - 9/01	s.d.
	$= \text{(period average spot rate of HKD/1000 JPY)} \times \frac{\text{JPCPI}}{\text{UVI\_RXJP}}$		

RTXJP	Real Exchange Rate: HK's Total Exports to Japan	1/91 - 9/01	s.d.
	$= \text{(period average spot rate of HKD/1000 JPY)} \times \frac{\text{JPCPI}}{\text{UVI\_TXJP}}$		
RDXUS	Real Exchange Rate: HK's Domestic Exports to U.S. (sa)	1/91 - 9/01	s.d.
	$= \text{(period average spot rate of HKD/USD)} \times \frac{\text{USCPI}}{\text{UVI\_DXUS}}$		
RRXUS	Real Exchange Rate: HK's Re-Exports to U.S. (sa)	1/91 - 9/01	s.d.
	$= \text{(period average spot rate of HKD/USD)} \times \frac{\text{USCPI}}{\text{UVI\_RXUS}}$		
RTXUS	Real Exchange Rate: HK's Total Exports to U.S. (sa)	1/91 - 9/01	s.d.
	$= \text{(period average spot rate of HKD/USD)} \times \frac{\text{USCPI}}{\text{UVI\_TXUS}}$		
VDXA	Volatility (h_t) of **RDXA** from GARCH estimation	9/91 - 9/01	s.d.
VRXA	Volatility (h_t) of **RRXA** from GARCH estimation	9/91 - 9/01	s.d.
VTXA	Volatility (h_t) of **RTXA** from GARCH estimation	9/91 - 9/01	s.d.
VDXJP	Volatility (h_t) of **RDXJP** from GARCH estimation	6/91 - 9/01	s.d.
VRXJP	Volatility (h_t) of **RRXJP** from GARCH estimation	7/91 - 9/01	s.d.
VTXJP	Volatility (h_t) of **RTXJP** from GARCH estimation	7/91 - 9/01	s.d.
VDXUS	Volatility (h_t) of **RDXUS** from GARCH estimation	9/91 - 9/01	s.d.
VRXUS	Volatility (h_t) of **RRXUS** from GARCH estimation	10/91 - 9/01	s.d.
VTXUS	Volatility (h_t) of **RTXUS** from GARCH estimation	9/91 - 9/01	s.d.
TCDXA	Third-country variable for **DXA**	1/91 - 9/01	s.d.
	$= \text{(period average spot rate of HKD/USD)} \times \frac{\text{UVI\_WM}}{\text{UVI\_DXA}}$		
TCRXA	Third-country variable for **RXA**	1/91 - 9/01	s.d.
	$= \text{(period average spot rate of HKD/USD)} \times \frac{\text{UVI\_WM}}{\text{UVI\_RXA}}$		

TCTXA	Third-country variable for **TXA**	1/91 - 9/01	s.d.

$$= \text{(period average spot rate of HKD/USD)} \times \frac{\text{UVI\_WM}}{\text{UVI\_TXA}}$$

TCDXJP	Third-country variable for **DXJP**	1/91 - 9/01	s.d.

$$= \text{(period average spot rate of HKD/1000 JPY)} \times \frac{\text{JPMP}}{\text{UVI\_DXJP}}$$

TCRXJP	Third-country variable for **RXJP**	1/91 - 9/01	s.d.

$$= \text{(period average spot rate of HKD/1000 JPY)} \times \frac{\text{JPMP}}{\text{UVI\_RXJP}}$$

TCTXJP	Third-country variable for **TXJP**	1/91 - 9/01	s.d.

$$= \text{(period average spot rate of HKD/1000 JPY)} \times \frac{\text{JPMP}}{\text{UVI\_TXJP}}$$

TCDXUS	Third-country variable for **DXUS**	1/91 - 9/01	s.d.

$$= \text{(period average spot rate of HKD/USD)} \times \frac{\text{USMP}}{\text{UVI\_DXUS}}$$

TCRXUS	Third-country variable for **RXUS**	1/91 - 9/01	s.d.

$$= \text{(period average spot rate of HKD/USD)} \times \frac{\text{USMP}}{\text{UVI\_RXUS}}$$

TCTXUS	Third-country variable for **TXUS**	1/91 - 9/01	s.d.

$$= \text{(period average spot rate of HKD/USD)} \times \frac{\text{USMP}}{\text{UVI\_TXUS}}$$

PM	Real Payroll Index for Manufacturing Sector in Hong Kong (linearly-interpolated from quarterly data)	1/91 - 9/01	C&S
CNDXA	China variable for **DXA** $= \frac{UVI\_MCN}{UVI\_DXA}$	1/91 - 9/01	s.d.
CNRXA	China variable for **RXA** $= \frac{UVI\_MCN}{UVI\_RXA}$	1/91 - 9/01	s.d.
CNTXA	China variable for **TXA** $= \frac{UVI\_MCN}{UVI\_TXA}$	1/91 - 9/01	s.d.
CNDXJP	China variable for **DXJP** $= \frac{UVI\_MCN}{UVI\_DXJP}$	1/91 - 9/01	s.d.
CNRXJP	China variable for **RXJP** $= \frac{UVI\_MCN}{UVI\_RXJP}$	1/91 - 9/01	s.d.
CNTXJP	China variable for **TXJP** $= \frac{UVI\_MCN}{UVI\_TXJP}$	1/91 - 9/01	s.d.
CNDXUS	China variable for **DXUS** $= \frac{UVI\_MCN}{UVI\_DXUS}$	1/91 - 9/01	s.d.
CNRXUS	China variable for **RXUS** $= \frac{UVI\_MCN}{UVI\_RXUS}$	1/91 - 9/01	s.d.
CNTXUS	China variable for **TXUS** $= \frac{UVI\_MCN}{UVI\_TXUS}$	1/91 - 9/01	s.d.

The Appendix summarizes the definitions of data used in the text. See the text and the tables for the meanings of the notation. Addition notation used in the Appendix is CPI = Consumer Price Index, JPMP = Import Price Index of Japan, USMP = Import Price Index of U.S., UVI_WM = Unit Value Index of World Imports, UVI_MCN = Unit Value Index of Hong Kong's Imports from China, C&S = Census and Statistics Department, and s.d. =derived from the existing data series.

Appendix 2. Summary of GARCH Specifications

Variables	Specifications	Residuals		Squared Residuals	
		Q(6)	Q(12)	Q(6)	Q(12)
Sample period: 1991:1 — 2001:9					
RDXA	AR(3,7), ARCH(1)	1.13	4.06	1.25	4.54
RRXA	AR(3,7), ARCH(1)	2.52	10.50	0.60	6.55
RTXA	AR(3,7), ARCH(1)	1.90	8.67	0.65	5.95
RDXJP	AR(1,4), ARCH(1)	2.99	13.80	2.29	8.92
RRXJP	AR(1,5), ARCH(1)	2.21	12.30	6.30	15.70
RTXJP	AR(1,5), ARCH(1)	2.67	13.60	5.59	14.50
RDXUS	AR(1,2,7), ARCH(1)	2.59	4.39	4.09	6.70
RRXUS	AR(4,7,8), ARCH(4)	3.67	9.90	4.67	9.05
RTXUS	AR(4,7), ARCH(1)	3.98	10.60	5.62	10.00

The Appendix gives the AR-GARCH specifications that are used to generate real exchange rate volatility considered in the text. The Q-statistics computed from the residuals and their squares of these specifications are not significant at conventional significance levels.