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# AN ANALYSIS OF HONG KONG EXPORT PERFORMANCE

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*Abstract.* The study models the Hong Kong domestic exports and re-exports, compares the performance of exports to the rest of the world, the USA and Japan, and uses destination-and-export-type specific unit value indexes to construct real exchange rates. In general, Hong Kong exports display mean-reverting dynamics, are positively influenced by foreign income and are adversely affected by high value of its currency. The lagged export variable, foreign income, and real exchange rate provide most of the explanatory power. Other variables explain marginally the variability of Hong Kong exports.

## 1. INTRODUCTION

The objective of this article is to study the behaviour of Hong Kong exports. There is a long tradition in international economics of modelling 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 *et al.*, 2000).[1] Since Hong Kong is a small open economy, the study of its exports offers some alternative evidence on modelling 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 these ideal conditions. Thus, it offers a good setting to exploit the small-country assumption in studying trade flows.

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[1] Interested readers are referred to Goldstein and Khan (1985) and Hooper *et al.* (2000) for a detailed discussion of issues and references related to trade equation modelling.

The present empirical exercise uses a standard export demand equation as the benchmark. I then investigate the effects of real exchange rate volatility, 'third'-country competition, domestic wages and the costs of imports from China on Hong Kong's export volume. The study has several salient features. First, to alleviate simultaneity and non-stationarity 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's domestic exports and re-exports are modelled separately. Hong Kong is an important entrepôt. Its export activity depends increasingly 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 are evolving quite differently. Thus, studying these two export types individually should give reliable measures of income and price elasticities.[2] To highlight the variations across export destinations, I also compare the performance of Hong Kong's aggregate exports, and its exports to the USA 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's exports. For most of the 1990s, the domestic inflation in Hong Kong was higher than that in the USA. Since the Hong Kong dollar is effectively pegged to the US dollar, people usually assert that the Hong Kong dollar was overvalued before the 1997 financial crisis, and that exports were adversely affected by the strong Hong Kong dollar. Nonetheless, this claim is over-stated.[3] In fact, during this period export prices showed a declining trend, and the Hong Kong export performance did not appear to have been weakened. Therefore the use of a general price level index such as the consumer price index may not yield a proper assessment of Hong Kong's export performance. In the present paper the relative price variables are the real exchange rates constructed from destination-and-export-type specific unit value indexes.

As anticipated, Hong Kong's exports are found to behave differently among export types and across destinations. In general, they display mean-reverting dynamics, are positively influenced by foreign income, and are adversely affected by the strength of its currency. The effects on export volume of real exchange rate volatility, 'third'-country competition, domestic wages and the

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

[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 non-tradables sectors. Apparently, the non-tradables-driven domestic inflation rate has a limited impact on export prices. The lack of connection between prices of non-tradables and exports contributes to the divergence of the Hong Kong CPI-based and UVI-based real exchange rates. The divergence of price indexes may explain why the conventional PPP for Hong Kong does not hold. 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.

cost of imports from China depend upon the category of exports under examination. In general, the effects on aggregate exports are different from those on exports to Japan and the USA.

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

The next section sets out the basic analytical framework and discusses the choices of variables. Section 3 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's imports are investigated in Section 4, which also presents a heuristic assessment of relative contributions of the explanatory variables. Section 5 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 Hong Kong's real exchange rate. It is anticipated that foreign income boosts demand for Hong Kong exports and that 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. For instance, it is implicitly assumed that there is no money illusion and that the exports are not inferior goods. Further, under the assumptions of market perfection and small exporters who have no market power, the quantity of exports is determined by demand factors including foreign income and relative prices (Hooper and Kohlhagen, 1978; Goldstein and Khan, 1985). Apparently, the single-equation approach is more appropriate for a small open economy such as Hong Kong, which has limited market power, than for those industrial countries commonly examined in the empirical literature.

I next consider the choice of the dependent variable. Figure 1 depicts Hong Kong's aggregate domestic exports and aggregate re-exports. The aggregate total exports are given by the sum of domestic exports and re-exports. The sample is from 1991 to 2001, which is dictated mainly by availability of the

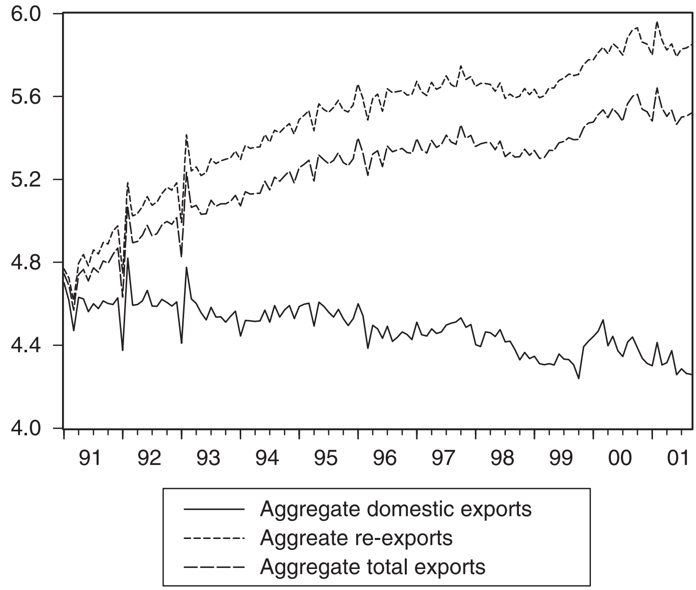


*Figure 1. Hong Kong aggregate exports, quantum indexes*

monthly data examined in the following sections. The graph strongly suggests that the behaviour of domestic exports is quite different from that of re-exports. Specifically, domestic exports were declining while re-exports showed a noticeable growth in the 1990s. A similar 'divergent' behaviour is observed for domestic exports and re-exports to the USA and Japan, the two countries that are examined in the following sections. Further, exports to different destinations (i.e. aggregate, Japan and the USA) behaved quite differently in the 1990s. Given their different time profiles, I examine these different categories of export data separately.

Since export behaviour 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. Figure 2 plots Hong Kong's real effective exchange rates, constructed from the Hong Kong consumer price index (CPI), domestic export unit value index (UVI), re-export UVI and total export UVI. It can be seen that the CPI and the UVI moved in different directions for a good part of the 1990s. Specifically, the CPI-based real effective exchange rate indicates that the Hong Kong dollar was appreciating from 1991 to 1998 and depreciating thereafter; in fact, some serious concerns were raised about the appreciation of the CPI-based real effective exchange rate and its implied burdens on Hong Kong exports in the 1990s. The three UVI-based real effective exchange rates, on the other hand, present a very different scenario: according

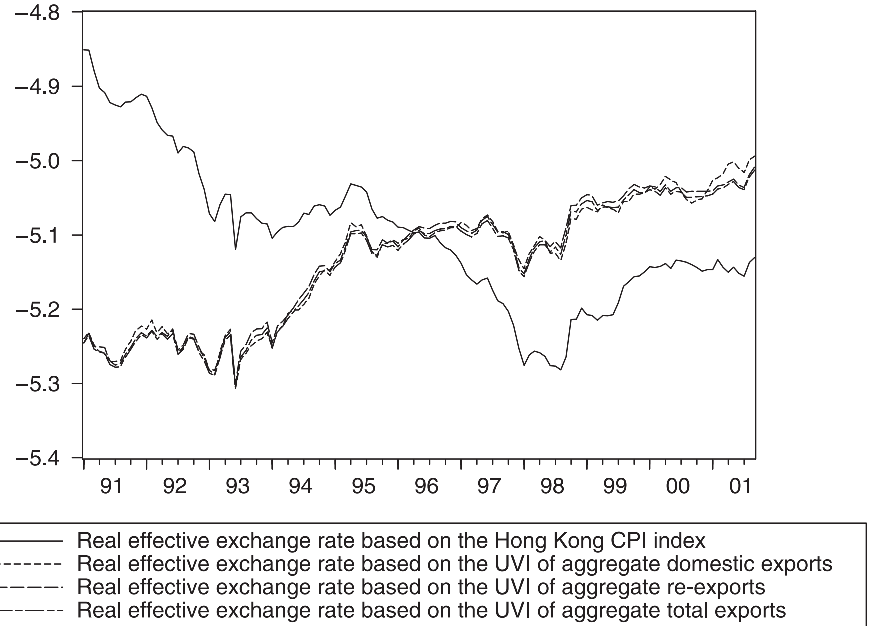


*Figure 2. Hong Kong real effective exchange rates*

to them, the relative prices of Hong Kong exports were declining rather than increasing throughout the 1990s.[4]

The contrasting behaviour of CPI and UVI-based real exchange rates indicates that the former real exchange rate may not accurately reflect the competitiveness of different categories of Hong Kong exports during the sample period. Therefore I chose to use the export-type and destination-specific UVI-based real exchange rates as the measure of the relative price in our export demand equation.

Given the above considerations, the variables in the export demand function were 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; i.e., $i$ = domestic exports, re-exports, and total exports. The export destinations are indexed by the *j*-subscript and $j$ = aggregate, Japan and the USA. The foreign real income variables are destination-specific and are given by world, Japanese and US industrial production indexes.

## 3. THE BASIC EXPORT DEMAND EQUATION

The basic export demand equation is examined using data on Hong Kong aggregate exports and Hong Kong exports to Japan and the USA. The data

[4] Cheung (2003) shows that there is a similar divergence between the CPI and UVI-based Hong Kong real exchange rates against the USA and Japan.

*Table 1. Unit root test results*

| | Levels | | | First differences | | |
|---|---|---|---|---|---|---|
| *Variables* | *ADF statistics (lag)* | *Q(6)* | *Q(12)* | *ADF statistics (lag)* | *Q(6)* | *Q(12)* |
| *DYA* | –3.025 (4) | 0.20 (1.000) | 10.52 (0.570) | –8.365* (3) | 1.01 (0.985) | 11.02 (0.528) |
| *RYA* | –1.998 (11) | 0.59 (0.997) | 5.07 (0.955) | –2.724† (7) | 0.86 (0.990) | 15.49 (0.216) |
| *TYA* | –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) |
| *RDYA* | –2.529 (7) | 0.22 (1.000) | 2.28 (0.999) | –3.712* (6) | 0.25 (1.000) | 3.55 (0.990) |
| *RRYA* | –2.502 (7) | 0.52 (0.998) | 8.97 (0.706) | –3.632* (6) | 0.46 (0.998) | 9.85 (0.629) |
| *RTYA* | –2.526 (7) | 0.41 (0.999) | 7.01 (0.857) | –3.615* (6) | 0.43 (0.999) | 8.14 (0.774) |
| *DYJP* | –1.221 (4) | 1.01 (0.985) | 6.46 (0.891) | –7.940* (3) | 1.11 (0.981) | 6.74 (0.874) |
| *RYJP* | –2.309 (7) | 0.80 (0.992) | 6.25 (0.903) | –3.965* (5) | 2.07 (0.913) | 3.93 (0.985) |
| *TYJP* | –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) |
| *RDYJP* | –2.148 (4) | 1.66 (0.949) | 8.81 (0.719) | –6.412* (3) | 2.05 (0.916) | 8.91 (0.711) |
| *RRYJP* | –1.854 (5) | 1.99 (0.921) | 10.51 (0.571) | –6.084* (4) | 1.82 (0.936) | 10.27 (0.592) |
| *RTYJP* | –1.904 (5) | 1.74 (0.942) | 10.30 (0.590) | –6.059* (4) | 1.59 (0.953) | 10.09 (0.608) |
| *DYUS* | –2.686 (4) | 0.31 (0.999) | 4.16 (0.980) | –14.603* (1) | 3.34 (0.766) | 8.04 (0.782) |
| *RYUS* | –2.986 (6) | 0.02 (1.000) | 3.53 (0.990) | –9.651* (2) | 2.29 (0.891) | 7.60 (0.815) |
| *TYUS* | –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) |
| *RDYUS* | –1.143 (2) | 4.93 (0.553) | 9.59 (0.652) | –6.639* (1) | 3.39 (0.758) | 9.27 (0.679) |
| *RRYUS* | –0.727 (8) | 0.71 (0.994) | 6.74 (0.874) | –2.881* (7) | 0.59 (0.997) | 6.45 (0.892) |
| *RTYUS* | –0.793 (8) | 0.20 (1.000) | 6.61 (0.882) | –3.248* (6) | 1.11 (0.981) | 12.48 (0.408) |

*Notes*: The significance of augmented Dickey–Fuller statistics at the 5% (10%) level is indicated by * (†) (Cheung and Lai, 1995). The level-specification contains a time trend and an intercept. The first-difference version allows for only an intercept. *P*-values are given in parentheses next to the $Q(p)$ statistics; $P = 6, 12$. The variables are grouped according to export destinations, namely aggregate exports, exports to Japan and exports to the USA. The variables related to the aggregate export regression are: *DYA* = aggregate domestic exports, *RYA* = aggregate re-exports, *TYA* = aggregate total exports (domestic exports + re-exports), *AIP* = 'aggregate' industrial production given by the world industrial production index, *RDYA* = real effective exchange rate (*REER*) based on aggregate domestic export unit value index (UVI), *RRDY* = *REER* based on aggregate re-export UVI, and *RTYA* = *REER* based on aggregate total export UVI. Variables related to exports to Japan and to the USA regressions are similarly defined with the 'A' for aggregate replaced by 'JP' for Japan and 'US' for the USA. See Cheung (2003) for definitions of these variables.

on exports, foreign income and real exchange rates are in logarithmic terms. Monthly data from 1991 to 2001 are considered.[5] The augmented Dickey–Fuller and Johansen tests are used to examine the unit root and cointegration properties of $y_{i,j,t}$, $x_{j,t}$ 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 was 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

[5] A detailed description of these trade data and other data series used in the exercise is provided in Cheung (2003).

*Table 2. Cointegration test results*

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

*Notes*: 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: *DY* = domestic exports, *RY* = re-exports, and *TY* = 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 so as to eliminate serial correlation in residuals. The trace statistics with significance at the 10% and 5% levels indicated by ** and * are presented (Cheung and Lai, 1993). The maximum eigenvalue statistics, which were not reported for brevity, 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 variable is unity.

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 seven of the nine trivariate systems under consideration. Two cointegrating relationships are found in four of these seven cases. 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 and 0.8. Four country-specific cases have two cointegrating vectors. The obvious question is which of the cointegrating vectors gives the relevant information. I used 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 equation relating to domestic exports to the USA has two significant error correction terms. In 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 2.2–2.7 for Japan and 0.0–3.4 for the USA. These estimates display a level of variability higher than those found among the developed countries. For instance, Goldstein and Khan (1985) calculate that the income elasticity is between 1 and 2; and Hooper *et al.* (2000) find that 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 0.4–0.7 for the aggregate exports, 2.7–2.8 for exports to Japan and 2.2–3.6 for exports to the USA. 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 *et al.* (2000).

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

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

$$Y_{i,j,t} = \alpha + \textstyle\sum_{k=1}^{n}\alpha_{i,j,k}Y_{i,j,t-k} + \sum_{k=1}^{m}\beta_{i,j,k}X_{j,t-k} + \sum_{k=1}^{p}\gamma_{i,j,k}R_{i,j,t-k} + \theta_{ij}E_{i,j,t-1} + \varepsilon_{i,j,t} \tag{2}$$

where $Y_{i,j,t}$, $X_{j,t}$ and $R_{i,j,t}$ are, respectively, the first differences of $y_{i,j,t}$, $x_{j,t}$ and $r_{i,j,t}$; $E_{i,j,t-1}$ is the error correction term derived from the cointegrating vector and is included in the equation in which the variables are cointegrated; and $\varepsilon_{i,j,t}$ is an error term. Under (2), which is known as the error correction specification, exports adjust to their past history, to short-run variations in foreign income and real exchange rates, and to 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 3(a) contains estimation results from aggregate exports, and Table 3(b) contains those from exports to Japan and the USA. 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 that exports have 'mean-reverting' behaviour. The lag length ranges from two to nine months.

*Table 3(a) The basic export demand specification*

| *Variables* | Aggregate | | |
|---|---|---|---|
| | *DY* | *RY* | *TY* |
| Constant | 3.8344* | 0.9884* | 1.2342* |
| | (3.231) | (2.977) | (2.772) |
| $Y_{t-1}$ | −0.4869* | −0.8113* | −0.7779* |
| | (−5.350) | (−5.205) | (−5.487) |
| $Y_{t-2}$ | −0.2383* | −0.7189* | −0.6869* |
| | (−3.892) | (−3.983) | (−4.040) |
| $Y_{t-3}$ | | −0.5072* | −0.4812* |
| | | (−3.375) | (−3.284) |
| $Y_{t-4}$ | | −0.2459* | −0.2383^ |
| | | (−1.993) | (−1.910) |
| $Y_{t-5}$ | | −0.1145 | −0.1139 |
| | | (−1.472) | (−1.435) |
| $X_{t-3}$ | | 1.3044* | 1.2475† |
| | | (2.003) | (1.919) |
| $X_{t-5}$ | 2.8806* | 2.0906* | 2.2093* |
| | (3.443) | (2.392) | (2.577) |
| $X_{t-6}$ | 2.1536* | 1.3220* | 1.4543* |
| | (2.675) | (2.196) | (2.423) |
| $E_{t-1}$ | −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 3(b) The basic export demand specification*

| *Variables* | Japan | | | USA | | |
|---|---|---|---|---|---|---|
| | *DY* | *RY* | *TY* | *DY* | *RY* | *TY* |
| 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) |

*Table 3(b) continued*

| | Japan | | | USA | | |
|---|---|---|---|---|---|---|
| Variables | DY | RY | TY | DY | RY | TY |
| $X_{t-3}$ | 0.8252† (1.681) | 0.5435* (2.101) | 0.5519* (2.014) | | 2.5072† (1.767) | 2.5085* (2.292) |
| $X_{t-5}$ | | | | 3.3342* (2.344) | 2.9915* (2.049) | 3.2350* (2.344) |
| $X_{t-8}$ | | | | 3.1869† (1.791) | | |
| $R_{t-4}$ | 0.4198 (1.585) | | | | 1.3851 (1.387) | |
| $E1_{t-1}$ | | −0.0909* (−4.823) | −0.1053* (−5.002) | −0.2047* (−2.822) | −0.1403* (−2.368) | −0.1764* (−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 [0.977] | 0.6142 [0.961] | 0.7386 [0.946] | 1.5631 [0.815] | 3.6114 [0.461] | 5.0539 [0.282] |
| $Q(8)$ | 2.6731 [0.953] | 2.9509 [0.937] | 5.0247 [0.755] | 2.2447 [0.973] | 4.6809 [0.791] | 5.3222 [0.723] |
| $Q(12)$ | 5.5622 [0.937] | 7.1492 [0.848] | 10.1518 [0.603] | 9.9818 [0.618] | 7.9078 [0.792] | 9.0731 [0.697] |

*Notes*: 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 USA. Table 3(a) contains results for aggregate export data, and Table 3(b) contains results for exports to Japan and the USA. In the table $DY$ = domestic exports, $RY$ = re-exports and $TY$ = total exports. Robust $t$-statistics are given in parentheses underneath the coefficient estimates. Significance at the 5% (10%) 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.

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's 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 USA. 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 USA have the largest multiplier effect (3.1 for total exports and 4.2 for domestic exports), followed by aggregate exports (1.4 for re-exports and 2.0 for domestic exports) and exports to Japan (0.3 for total exports and 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 USA. 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

US dollar, and hence reduces the variability of the real exchange rate between Hong Kong and the USA and mitigates the price effect on exports to the USA. However, the Hong Kong dollar real exchange rates against other currencies continued to experience substantial variation during the sample period. Thus, the linked exchange rate system does not provide a good explanation of 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 first glance, the $\theta$ estimates are quite large for monthly data. Without taking the lag structure of $Y_{i,j,k}$ into consideration, the $\theta$ estimates imply a monthly reversion speed of up to 27% 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% or less per month for six cases. The adjusted reversion rates for the remaining two cases are 13% for domestic exports to the USA and 15% for aggregate domestic exports.

The results in Tables 3(a) and 3(b) 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 equations share some similarities. The $Q$-statistics indicate that the estimated residuals in all the specifications in Table 3 are free of serial correlation.[6] These specifications have a good explanatory power. The adjusted $R^2$ statistics are in the range of 0.37–0.55. 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 behaviour. This section considers the effect of real exchange rate volatility, the 'third'-country effect, Hong Kong wage rates and the affect of the cost of imports from China on Hong Kong exports.

The implication of real exchange rate volatility for trade has been a hotly contested issue since the breakdown of the Bretton Woods system. The recent Asian financial crisis revives the discussion about the choice of exchange rate regimes and its implications for exchange rate volatility and trade. Interestingly, neither theoretical nor empirical studies offer a firm conclusion about the effect of real exchange rate volatility on international trade (Côté, 1994). The 'third'-country effect is motivated by the observation that Hong Kong's exports compete both with domestic producers in the importing country and with other countries exporting to the same importing country. Thus, the (relative) prices at which the other countries export to the same importing country have an additional effect on Hong Kong exports. The wage and 'China' variables are included to examine the effects on Hong Kong exports of domestic wages and the cost of importing from China.

[6] The LM diagnostic test offers similar conclusions.

The effects of these four additional variables are examined using the augmented export demand specification

$$Y_{i,j,t} = \alpha + \Sigma_{k=1}^{n}\alpha_{i,j,k}Y_{i,j,t-k} + \Sigma_{k=1}^{m}\beta_{i,j,k}X_{j,t-k} + \Sigma_{k=1}^{p}\gamma_{i,j,k}R_{i,j,t-k} + \theta_{ij}E_{i,j,t-1} + \Sigma_{k=0}^{q}\delta_{i,j,k}V_{i,j,t-k} + \Sigma_{k=1}^{s}\gamma^{*}_{i,j,k}R^{*}_{i,j,t-k} + \Sigma_{k=1}^{r}\lambda_{k}W_{t-k} + \Sigma_{k=1}^{u}\tau_{i,j,k}CN_{i,j,t-k} + \varepsilon_{i,j,t}. \quad (3)$$

The real exchange rate volatility effect is captured by $V_{i,j,t}$, which is the conditional volatility of $R_{i,j,t}$. Specifically, a GARCH($p$, $q$) model is fitted to each of the individual real exchange rate series and the resulting conditional variance estimate is used as a proxy for real exchange rate volatility. West *et al.* (1993) offer a justification for the use of GARCH estimates to measure exchange rate volatility.[7]

The 'third'-country price effect is represented by the variable $R^{*}_{i,j,k}$. It 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_RYJP*), where *HKJY* is the Hong Kong dollar–Japanese yen exchange rate, *JPMP* is the UVI of Japanese imports and *UVI_RYJP* is the UVI of Hong Kong re-exports to Japan. A positive $R^{*}_{i,j,k}$ means an improved competitiveness of Hong Kong exports.

The first log difference of the real payroll index for manufacturing sector, $W_t$, is the proxy for domestic wage/factor effects. Since I do not have the breakdown of imports from China according to my export market classification, I use an overall UVI, albeit an imprecise measure, to evaluate the China cost effect. The variable I considered is the ratio of the UVI of Hong Kong imports from China to the UVI of Hong Kong exports to their respective destinations. Essentially, I implicitly postulate that Hong Kong's export activity is affected by the cost of importing from China relative to the Hong Kong export price. Thus, the 'China cost' factor $CN_{i,j,t}$ is given by 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 results from estimating (3) are reported in Table 4. Again, only significant coefficient estimates and their robust $t$-statistics are presented. The effects of these four additional explanatory variables are discussed in turn.

First, 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 USA. In the literature there are theoretical arguments and empirical evidence for both a positive and a negative real exchange rate volatility effect. In the present exercise the intricate observation is the differing impact of real exchange rate volatility on exports from the same economy to

[7] The GARCH ($p$, $q$) specifications used to generate the $V_{i,j,t}$ series and some diagnostics of these specifications are given in Cheung (2003).

*Table 4(a) The augmented export demand specification*

| | Aggregate | | |
|---|---|---|---|
| *Variables* | *DY* | *RY* | *TY* |
| 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) |
| $R^*_{t-2}$ | −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 4(b) The augmented export demand specification*

| | Japan | | | USA | | |
|---|---|---|---|---|---|---|
| *Variables* | *DY* | *RY* | *TY* | *DY* | *RY* | *TY* |
| 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) |
| $Y_{t-1}$ | −0.7119* | −0.7858* | −0.7302* | −0.6091* | −0.6836* | −0.7067* |
| | (−6.335) | (−9.958) | (−8.101) | (−8.301) | (−7.840) | (−8.852) |
| $Y_{t-2}$ | −0.2815* | −0.5886* | −0.4977* | −0.2505* | −0.4508* | −0.5330* |
| | (−2.308) | (−5.680) | (−4.425) | (−3.099) | (−4.685) | (−5.441) |
| $Y_{t-3}$ | | −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) |

*Table 4(b) coninuted*

| | *Japan* | | | *USA* | | |
|---|---|---|---|---|---|---|
| *Variables* | *DY* | *RY* | *TY* | *DY* | *RY* | *TY* |
| $Y_{t-6}$ | | 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) |
| $X_{t-5}$ | | | | 3.1519* | 2.5617† | 2.3907† |
| | | | | (2.454) | (1.910) | (1.977) |
| $X_{t-8}$ | | | | 3.5946* | | |
| | | | | (2.112) | | |
| $E_{t-1}$ | | –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) |
| $W_{t-2}$ | | –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] |

*Notes*: The table contains results from estimating

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

where $V$ is the real exchange rate volatility given by GARCH estimates, $R^*$ is the 'third'-country price variable based on the Hong Kong export UVI and the destination economy's overall import UVI, $W$ is the first log difference of the real payroll index, and $CN$ 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 Table 3 for definitions of other variables. Table 4(a) contains results for aggregate export data and Table 4(b) contains results for exports to Japan and the USA.

different destinations. While real exchange rate volatility promotes Hong Kong's exports to two of her major trading partners, i.e. Japan and the USA, it hinders her aggregate exports. Further, the lag structure is quite different across destinations – one lag for the aggregate export equations and 2–8 lags for exports to Japan and the USA.

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

The results in Table 4 show that the $\gamma^*_{i,j,k}$ estimates are negative for aggregate exports but positive for some types of exports to Japan. Given the definition of $R^*_{i,j,k}$, we can expect $\gamma^*_{i,j,k}$ to be positive. Thus, the results for exports to Japan and the USA 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 marginally improve the adjusted $R^2$. 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 construct the world import UVI are different from those used to construct the Hong Kong real effective exchange rate.

The effect of the wage factor ($W_t$) varies across export destinations. An upsurge in the real payroll index discourages exports to Japan and the USA. 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 this positive real payroll effect has not been ascertained.

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's export performance. The estimation results show that the China factor captured by $CN_{i,j,t}$ has a discernable effect on aggregate exports. However, its influence on the country-specific exports is somewhat ambiguous. In Table 4(a) the $CN_{i,j,t}$ has a negative coefficient in the three aggregate export equations, indicating that the 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, shows up only in the equation of domestic exports to the USA. Even though the sign is correct, the level of statistical significance is lower than the conventional 5% or 10% level. Thus, the 'China cost' factor may have a more prominent effect on exports to destinations other than Japan and the USA.

*Table 5 The adjusted* $R^2$

| Export category | Explanatory variables Ys | Xs, Rs | Ys, E | All |
|---|---|---|---|---|
| *(a) Basic specification* | | | | |
| *DYA* | 0.3676 | 0.0445 | 0.3930 | 0.4711 |
| *RYA* | 0.4245 | 0.0610 | 0.4883 | 0.5477 |
| *TYA* | 0.4385 | 0.0643 | 0.4851 | 0.5516 |
| *DYJP* | 0.3560 | 0.0019 | 0.3560 | 0.3740 |
| *RYJP* | 0.2711 | 0.0756 | 0.4381 | 0.4718 |
| *TYJP* | 0.2740 | 0.0701 | 0.4380 | 0.4759 |
| *DYUS* | 0.3040 | 0.0373 | 0.3423 | 0.3976 |
| *RYUS* | 0.3358 | 0.0317 | 0.3387 | 0.4384 |
| *TYUS* | 0.4027 | 0.0150 | 0.4010 | 0.4874 |

| Export category | Explanatory variables Ys | Xs | Ys, E | Vs, R*s, Ws, CNs | All |
|---|---|---|---|---|---|
| *(b) Final specification* | | | | | |
| *DYA* | 0.3676 | 0.0445 | 0.3930 | 0.0420 | 0.5896 |
| *RYA* | 0.4245 | 0.0610 | 0.4883 | 0.0775 | 0.6316 |
| *TYA* | 0.4385 | 0.0643 | 0.4851 | 0.0867 | 0.6506 |
| *DYJP* | 0.3547 | – | 0.3547 | –0.0039 | 0.3791 |
| *RYJP* | 0.2711 | 0.0756 | 0.4381 | 0.0243 | 0.5037 |
| *TYJP* | 0.2783 | 0.0701 | 0.4313 | 0.0187 | 0.4902 |
| *DYUS* | 0.3040 | 0.0373 | 0.3109 | 0.0123 | 0.4618 |
| *RYUS* | 0.3358 | 0.0098 | 0.3387 | 0.0550 | 0.5063 |
| *TYUS* | 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 (3)) reported in Table 4. The adjusted $R_s^2$ 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. *DY* = domestic exports, *RY* = re-exports, *TY* = total exports, *A* = aggregate exports, *JP* = exports to Japan, and *US* = exports to the USA. See the previous tables for definitions of other variables.

From Table 4, we find that the variables $V_{i,j,t}$, $R^*_{i,j,t}$, $W_t$ and $CN_{i,j,t}$ affect Hong Kong's export performance. All the specifications in this table 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 homogeneous across export types and export destinations, and some of the estimated effects are not completely consistent with theoretical predictions.

Table 5 offers a heuristic assessment of the relative explanatory powers of various groups of right-hand-side variables. The table reports the adjusted $R^2$ statistics, which are proxies for explanatory power, arising from fitting individual groups of regressors. Two specifications are considered: the basic specification given by equation (2), and the augmented specification given by (3). For the case of (2) I calculated the individual explanatory powers of $Y_{i,j,t-k}$, $(X_{j,t-k}, R_{i,j,t-k})$ and $(Y_{i,j,t-k}, E_{i,j,t-1})$; the results are reported 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's 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% to the adjusted $R^2$.

The case of equation (3) is considered in panel (b) of Table 5. In this panel $V_{i,j,t-k}$, $R^*_{i,j,t-k}$, $W_{t-k}$ and $CN_{i,j,t-k}$ are grouped together. The results suggest that these four variables as a group have limited ability in explaining Hong Kong's export variability. Even though they are statistically significant in these export equations, their explanatory power, gauged by the adjusted $R^2$, ranges from 0% to 9%. The results in panel (b) corroborate those in panel (a) and indicate that the lagged export variables are key in explaining Hong Kong's export variability.

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 (3) 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 ($V_{i,j,t-k}$, $R^*_{i,j,t-k}$, $W_{t-k}$,$CN_{i,j,t-k}$) are, respectively, 39%, 4% and 4%. The sum of these three statistics is smaller than 59%, which is the adjusted $R^2$ statistic of the regression that includes all three groups of regressors. Thus, these regressors tend to complement each other in explaining the variability of exports, and the individually adjusted $R^2$ statistics do not overstate the explanatory power of individual regressor groups. Even allowing for the complementary effect, there is still strong evidence for the significant role played by lagged exports in explaining Hong Kong's export performance.

## 5. CONCLUDING REMARKS

The paper examines Hong Kong's monthly export performance from 1991 to 2001. To address the problems of simultaneity and non-stationarity, the cointegration framework and the related error-correction specification were employed to study the canonical relationship between exports, foreign income and real exchange rates. The exercise was then extended to investigate the incremental explanatory power of real exchange rate volatility, 'third'-country competition, domestic wages and the cost of imports from China. The export data are categorized according to their types (domestic exports, re-exports and total) and destinations (the USA, 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 to the USA. 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 USA. The use of aggregate export data can give a misleading picture if the focus is on the behaviour of a specific category of exports.

It is known that the strength and the growth of Hong Kong's economy depend heavily on its export activity. Given Hong Kong's current (i.e. the early 2000s) economic difficulties, information on factors affecting its export performance can provide some useful insights for formulating policies to improve the situation. The present analysis indicates that, far more than external factors – including foreign income, relative prices, real exchange rate volatility and costs of importing from China – the key factors affecting Hong Kong's exports are the lagged exports. One interpretation is that the extraordinary export performance of Hong Kong in the past has likely been driven by the internal dynamics of the exports themselves rather than by external demand conditions. Instead of waiting for external conditions to improve, a fruitful policy would be to explore ways of increasing the breadth and depth of the export market, thereby setting exports on a new dynamic path. However, a limitation of the current exercise is that, with the models currently under investigation, no insights can be offered on exactly what policy should be pursued to explore and expand the export market. Further analyses evaluating effects of different types of export promoting policies are thus warranted.

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