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A Tale of Two Cities Revisited: Pass-through in Hong Kong and Singapore

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A TALE OF TWO CITIES REVISITED:

PASS-THROUGH IN HONG KONG & SINGAPORE

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Abstract

This paper compares the extent of exchange rate pass-through at the aggregate level into CPI and import prices in Singapore and Hong Kong for the period 1980 to 2005. A priori one might expect that these two economies which have relatively small markets and are highly open with high degree of dependence on foreign goods for domestic consumption, will be faced with relatively high exchange rate pass-through. Results suggest that exchange rate pass-through in Hong Kong is higher than in Singapore. The paper further examines whether pass-through has changed over time in the two economies.

Keywords: Exchange Rate Hong Kong, Pass-through (ERPT), Market share, Singapore.

JEL Classification: E31, F41.

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NON-TECHNICAL SUMMARY

Exchange rate pass-through (ERPT) is defined as the percent change in import prices denominated in the importing nation's currency due to one percent change in the exchange rate of the importing nation with its trading partner(s). On one extreme, if import prices are completely unresponsive to exchange rate changes then we have zero or no pass-through. On the other, if import prices change in the same proportion to exchange rate changes then we have complete or full pass-through. In the intermittent situation, if the percent change in prices is less than that of the exchange rate change, then we have incomplete or impartial pass-through. Pass-through of an exchange rate change is typically measured for a nation's import prices as well as for broader price measures like consumer or producer price index. Pass-through analysis has several implications for economic policy making. If the degree of pass-through is low then any exchange rate-based adjustments to improve the trade balance for economies may be less effective as nominal exchange rate changes do not translate into real exchange rate changes. Moreover, if pass-through is high then gyrations in the foreign market feed through directly into domestic prices and consequently imply that nominal exchange rate changes tend largely to be inflationary. The latter is particularly important for small and open economies, including Asian nations, where there is fear of inflation. Countries that have weathered inflation in the past are concerned about the effect of currency changes on domestic prices. While the existing literature on pass-through has focused more on industrialized and OECD nations, empirical research on Asian economies is limited. This paper makes a direct comparison of pass-through into import prices and CPI for Singapore and Hong Kong – two economies similar in terms of size, per capita incomes, geographical location, the degree of openness to international trade, investment and capital flows, and importance as regional financial centers. We start by developing a theoretical framework to formalize the determinants of ERPT. Next we estimate ERPT elasticities for the period 1980-2005 for the two city states using both bilateral exchange rate with the US dollar and their nominal effective exchange rates (NEERs). The paper also examines whether ERPT in the two economies has declined over time or not. We find ERPT of the US dollar exchange rate into import prices and CPI is higher for Hong Kong than it is for Singapore. Moreover, pass-through elasticity is higher for import prices than for CPI in both economies. Also, ERPT into import prices is higher for both economies in terms of bilateral US dollar exchange rate compared to the NEER. Lastly, we do not find any evidence of declining pass-through in the 1980s compared to the 1990s, other than CPI pass-through in the case of Hong Kong.

1. Introduction

It has become common-place to undertake comparative case-studies of Hong Kong and Singapore, not least because of their similarities in terms of size, per capita incomes, geographical location, degree of openness to international trade, investment and capital flows, importance as regional financial centers, and in many areas.[1] This paper revisits this tale by comparing the transmission of exchange rate changes into domestic prices in Hong Kong and Singapore for the period 1980 to 2005. A priori one might expect that these two economies which have relatively small markets and are highly open (with trade-to-GDP ratios well over 1) with high degree of dependence on foreign goods for domestic consumption will be faced with relatively high exchange rate pass-through (ERPT).

If EPRT is high, exchange rate changes feed through directly into domestic prices and consequently imply that nominal exchange rate changes tend to be largely inflationary. The obvious policy conclusion that follows is that such economies may benefit from a relatively higher degree of exchange rate rigidity. In this context it is interesting to note that while Hong Kong has maintained a hard peg to the US dollar since 1984 via a currency board arrangement, Singapore has operated a forward-looking band-basket-crawl regime since 1981 with a high *de facto* weight being given to the US dollar in the currency basket.[2]

But what is the extent of ERPT in these economies, and has it changed over time? This is the focus of the paper. The empirical literature on ERPT in Asia is limited. While none of the available papers focus specifically on comparing Singapore and Hong Kong, a handful of studies on Asian economies have included these two economies in their

dataset and analyses. For instance, Ito *et al*, (2005) examined the extent of ERPT into both aggregate import prices and consumer prices (CPI) of some Asian economies, including Singapore and Hong Kong for the period 1984Q3 - 2004Q2. Using a first differenced model with a lag of the effective exchange rate up to four periods, ERPT into import prices was found to be statistically insignificant, while that into CPI was 20 percent. The ERPT for Hong Kong's import prices is 49 percent. Using a VAR analysis, the authors also analyzed the effects of the nominal effective exchange rate changes, monetary policy, demand shocks (as captured by output gap) and supply shocks (oil price change) on aggregate prices (CPI, PPI) and import prices for the period 1995M1 - 2004M8. For Singapore, an exchange rate shock accounted for less than 20 percent variation in CPI, but only 10 percent in Singapore's import prices and PPI. The authors did not conduct a similar VAR analysis for Hong Kong.

Parsley (2003) estimated ERPT into import prices for the period 1992-2000 for 21 5-digit SITC imports at the disaggregate level from Hong Kong's top eight non-China exchange rate trading partners (viz. Germany, the Netherlands, France, United Kingdom, Taiwan, Japan, Singapore and Australia). ERPT for the nominal effective exchange rate was found to be between 80 to 95 percent for the nominal exchange rate, and 70 to 85 percent for the real effective exchange rate.[3] ERPT for Hong Kong's exports (and re-exports) to its top 9 non-mainland China export partners (Canada, Germany, Netherlands, France, UK, Taiwan, Japan, Singapore and the US) for the same time period for 29 commodities at the disaggregated 5-digit level. He found a lack of evidence of pricing-to-market in Hong Kong's exports, suggesting high ERPT into foreign prices by exporters of Hong Kong.

Sasaki (2005) examined the effects of changes in the US dollar and Japanese yen on import prices at both the aggregate level and for finer goods for selected Asian economies, viz. Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Singapore, and Thailand for the period 1973M2 - 2000M12. ERPT from the US into import prices were estimated at 52 percent for Hong Kong and 40 percent for Singapore. The ERPT coefficient of imports from Japan for Singapore was insignificant, while for Hong Kong was 4 percent.[4] At the commodity level, ERPT estimates from Japan into both Singapore and Hong Kong were significant only for golf balls and color photo paper. For Singapore, ERPT was 97 and 258 percent, respectively.[5] For Hong Kong for the same two commodities the estimates were 73 and 213 percent, respectively.

Overall, the existing literature is suggestive of the fact that ERPT in both economies is fairly high, and at least at the aggregate level, appears to be higher in Hong Kong than Singapore. The remainder of this paper undertakes a direct comparison of ERPT into these two economies for the period 1980-2005. The paper is organized as follows. Section 2 develops a simple model to formalize the determinants of ERPT. Section 3 estimates ERPT elasticities for both economies using both bilateral exchange rate with the US dollar and nominal effective exchange rates (NEERs). We consider EPRT both into consumer prices (CPI) and import prices. Section 4 examines whether ERPT in the two economies has changed over time. The final section concludes the paper.

2. A Simple Model of ERPT

Before undertaking the empirics it is useful to help formalize thoughts on the determinants of ERPT (Knetter, 1993 and Marston, 1990). We consider a firm in country

A exporting a product *i*. Firm A is a price maker and sets its own price. The profit function for A is given by:

$$\pi_A = P_i Q_i - C(Q_i) \tag{1}$$

$$\frac{\partial \pi_A}{\partial Q_i} = P_i + Q_i \frac{dP_i}{dQ_i} - C'(Q_i) = 0$$

Re-arranging we have,

$$1 + \frac{1}{\varepsilon_i} = \frac{1}{P_i} C'(Q_i)$$

where: $\varepsilon_i = \frac{dQ_i}{dP_i} \frac{P_i}{Q_i}$ is the price elasticity of demand for good *i*.

$$P_i = (\frac{\varepsilon_i}{\varepsilon_i + 1}) C'(Q_i) . \tag{2}$$

$$P_i^A = \mu C'(Q_i) . \tag{3}$$

with $\mu_i = (\frac{\varepsilon_i}{\varepsilon_i + 1})$ being the markup of price over the marginal cost.

We focus on the price of good *i* in importing nation B. Assuming no impediments to trade, the price of the product should be the same in both nations.

$$P_i^B = P_i^A E_B^A \tag{4}$$

where: E_B^A is defined as the number of units of B's currency per unit of A's currency.

Using Equations (3) in (4), we have:

$$P_i^B = \mu MC_i^B \tag{5}$$

Expressing Equation (5) in logs we get:

$$\ln P_i^B = \ln \mu + \ln MC_i + \ln E_B^A \tag{6}$$

Equation (6) shows that EPRT depends partly on the marginal costs of the producer and also on the extent of change in mark-ups of the producers.

3. Empirical Model and Results

We examine ERPT into the aggregate import prices as well as the CPI of Singapore and Hong Kong with regard to both bilateral nominal exchange rate with the US dollar as well as nominal effective exchange rates (NEERs). In order to estimate Equation (6) it is important to incorporate appropriate control variables. The primary control variables required are a measure of domestic demand for imports and for exporter's costs. In other words, the estimating equation is:

$$\ln P_i^B = \alpha_0 + \alpha_1 \ln P_i^{USA} + \alpha_2 \ln E_{US}^B + \alpha_3 MP_B + \alpha_4 \Gamma \tag{7}$$

where: Γ represents the control for exporter's costs. If $\alpha_2 = 0$ then there is no ERPT, while if $\alpha_2 = 1$ we have complete ERPT. If the coefficient lies anywhere in between then there is partial ERPT.

3.1 Data and Controls

We control for shifts in import demand by using real GDP in the case of Hong Kong and the index of manufacturing production in Singapore which proxies output.[6] With regard to costs, for ERPT into both Singapore and Hong Kong from the US (when using bilateral exchange rates) we proxy exporter's costs by using the hourly wage rate in the manufacturing industry in the US. In an alternative specification we follow Chaudhri and Hakura (2001) and Marazzi *et.al.,* (2005) by using the exporters' CPI as a proxy for exporters' costs.[7] For further sensitivity analysis we use the US producer price index as a third measure of exporter's costs.

For ERPT into both Singapore and Hong Kong using NEER, we need a measure that controls for the costs of all the combined exporters supplying in the two economies. We use two measures. First is the world CPI, while the second is a measure constructed using the importing nation's nominal and real effective exchange rate (NEER and REER). IFS provides data on REER for Singapore adjusted by unit labor costs. It also offers time series data for Singapore's NEER. The ratio of the latter to the former multiplied by a measure of domestic wages allows us to extract an overall measure for foreign exporters' costs.[8] However, hourly wage rates or labor costs for Singapore was not available. As such we proxy it by using the overall producer price index (PPI)

(Equation 8). This measure was not constructed for Hong Kong due to unavailability of REER data

$$\text{Foreign costs} = \left(\frac{REER^{Sing}}{NEER^{Sing}}\right) * PPI^{Sing} \quad (8)$$

Finally, we control for any possible effects of the Asian financial crisis by constructing a dummy that assumes a value of 1 from 1997Q2 to 1998Q2 and 0 for all other periods.[9]

Data on Singapore's and Hong Kong's nominal bilateral exchange rate with the US, NEER, REER, CPI and manufacturing production indices are all sourced from the IFS. US PPI, wages and world CPI are also taken from the same source. The data spans the period 1980Q1 - 2005Q3. For Hong Kong the manufacturing production index is available from 1982Q1. As such the estimation starts from that time period.

3.2 Empirical Results

We start by testing the relationship given by Equation (7) for co-integration. The results for co-integration for ERPT into the two nations import prices and CPI from the US as well as that of their NEER, for the various specifications of the estimating equation using the alternate measures of exporters' costs are shown in Table 1.[10] The co-integration results show the presence of a co-integrating vector for most cases. This allows us to perform the regression for Equation (7) on levels. Table 2 shows the corresponding results of ERPT from the US, for both Singapore and Hong Kong's import prices and CPI.

With regard to bilateral US dollar exchange rate, results suggest that ERPT into import prices for Singapore is 46 percent when using US hourly wage rates as a proxy for exporters' (US) costs. When we use the US CPI or PPI as proxies for the cost conditions in the US, import price ERPT falls to 36 percent. ERPT into Singapore's CPI is 20 percent. It is 9 percent and 10 percent, respectively when the alternate cost conditions (i.e. US CPI and PPI, respectively) are used. For Hong Kong, import price ERPT for the three alternate specifications are 69 (US wages), 67 (US CPI) and 63 percent (US PPI), respectively, while for CPI the elasticities for the two specifications are 73 and 46, respectively. ERPT is insignificant when we use the US PPI as exporters' costs.[11] These results reinforce the earlier findings of the existing literature that ERPT into Hong Kong is higher than that in Singapore.

It might be argued that the ERPT results for Hong Kong is of limited value given the relative fixity of the Hong Kong dollar vis-à-vis the US dollar. Accordingly it is also important to consider trade-weighted exchange rate movements. ERPT of Singapore's NEER into import prices and CPI is shown in Table 3. For import prices we find ERPT to be significant at 18 percent when we use the world CPI as a proxy for exporter's costs. It is insignificant when we use our constructed measure of foreign exporters' costs. Interestingly, ERPT into Singapore's CPI is significant and higher than the corresponding import ERPT, which goes against what one might expect a priori. ERPT is 23 percent when we use world CPI and 34 percent when we use our constructed measure of foreign exporters' costs. Turning to the results for Hong Kong's import prices, we find insignificant ERPT from NEER changes. For Hong Kong's CPI, the ERPT is 34 percent.

Overall, at least in the case of CPI, results confirm that ERPT in Hong Kong exceeds that in Singapore (Table 4). We also estimated short-run ERPT by using the corresponding error correction model (ECM) of Equation (9):

$$\Delta \ln P_t^{Sing} = a_0 + a_1(ECM)_{t-1} + a_2 \Delta \ln P_t^{USA} + a_3 \Delta \ln E_t^{Sing} + a_4 \Delta MP_t^{Sing} + a_5 \Delta \Gamma_t + a_6 \Delta \ln P_{t-1}^{Sing} \quad (9)$$

The ERPT results from the US are summarized in Table 5. Using import prices, we fail to reject the null hypothesis of no EPRT, except for the specification where we use the US PPI. In this case the ERPT co-efficient is 23 percent, which is lower than the corresponding long-run ERPT of 36 percent. For Hong Kong, short-run ERPT elasticity into import prices is 33 percent for all the three specifications. The ECM results also suggest no short-run ERPT of the exchange rate changes into the CPI for both economies. Table 6 presents the short-run dynamics for ERPT using the NEER. For the ECM for Singapore's import prices, we do not find any significant ERPT. However, for CPI, as in the long-run situation, we find significant ERPT of 10 and 9 percent, respectively, for our two model specifications. There is no ERPT into either import prices and CPI for Hong Kong in the short-run. Overall therefore, there is evidence to suggest short run ERPT in both economies is lower in the short run than in the long run, as would be expected a priori.

4. Has ERPT been Declining over Time?

A recognized fact has been the general decline in the extent of ERPT since the late 1980s for industrial countries.[12] Can the same be said of Hong Kong and Singapore?

To answer this question we estimate ERPT of both the Singapore-US dollar as well as the NEER into consumer and import prices by dividing the sample period into two sub-periods, 1980Q1-1992Q4 and 1993Q1-2005Q4 to detect if EPRT has changed over the two decades. For ERPT with respect to the US dollar we use the specification with the US wage rates, while for the NEER we use the specification with the world CPI as the measure of exporters' costs.

Table 7 shows that there is no difference across the two periods in the case of Singapore's import price ERPT from the US. For CPI, while ERPT is about 26 percent in the former period, in the latter there is no ERPT. For the NEER we find the estimates to differ more across the two sub-samples. ERPT for import prices and CPI were 20 and 28 percent, respectively in the first period, while they are 47 and 51 percent, respectively for the latter period. ERPT of Singapore's NEER changes during the 1990s was actually higher than in the 1980s. For Hong Kong we find ERPT of 62 percent of the bilateral US dollar changes into import prices in the 1980s but fail to find any ERPT in the 1990s. We do not find any ERPT into CPI in either sample periods. For NEER, also we fail to find any significant ERPT in either sub-period.

To detect possible changes in EPRT over time we also used the method of recursive least squares. This methodology adds one data point to the sample and plots the estimates over the time. A downward trend in the estimated pass-through co-efficient would be suggestive of declining EPRT. The plot of the EPRT coefficients dynamically is shown in the Figures 1-7. Figure 1 shows no decline in the ERPT estimates for Singapore-US dollar into import prices, while Figure 2 exhibits a slightly declining ERPT for CPI in the 1990s. Figures 3 and 4 show the plot for ERPT using NEER. For import prices there is no evidence of declining ERPT, while for CPI there is some evidence of

increasing ERPT. Turning to the recursive estimates for Hong Kong, ERPT for import prices do not appear to be declining, while for CPI there is clear evidence of declining ERPT. For Hong Kong's NEER, there is evidence that ERPT into CPI is again declining, while for import prices such evidence is not found.

5. Conclusion

This paper has compared the extent of transmission of exchange rate changes into consumer and import prices into two small open Asian economies, viz. Singapore and Hong Kong. Five key findings warrant highlighting. First, ERPT of the US dollar exchange rate into import prices and CPI is higher for Hong Kong than it is for Singapore. This is broadly consistent with previous studies. Second, with some exceptions, ERPT elasticity is higher for import prices than for CPI in both economies. Third, ERPT is lower in the short-run than in the long run in both nations for import prices as well as for CPI using bilateral US dollar rates. Fourth, ERPT into import prices is higher for both economies in terms of bilateral US dollar exchange rate compared to the NEER. Fifth, there is no obvious evidence of declining ERPT in the 1980s compared to the 1990s, other than CPI pass-through in the case of Hong Kong.

While it is tempting to jump to the conclusion that this suggests greater motivation for Hong Kong to maintain a relatively greater degree of exchange rate fixity, it is important to keep in mind that ERPT may be endogenous to the degree of flexibility of the exchange rate regime itself. ERPT in both economies are lower for their nominal effective exchange rate compared to their bilateral exchange rate with the US dollar and is lower in the short-term than the long-run. In the final analysis, ERPT it is

predominantly a microeconomic phenomenon. This consequently implies the need to pay more attention to ascertaining ERPT at the disaggregated level rather than at the broad macro level. This is an area for future research.

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NOTES:

1. For some instances of comparative studies pertaining to the exchange rate regimes and macroeconomic performances in the two economies, see Rajan and Siregar (2002), Devereux (2003) and Gerlach and Gerlach (2006).

2. See Cavoli and Rajan (2006) and Khor *et al.,* (2004) for detailed analyses of Singapore's exchange rate policy. Also see Rajan and Siregar (2002) for a discussion of Hong Kong's and Singapore's exchange rate regime with emphasis on the degree of misalignment. Also see Gerlach and Gerlach (2006) and Devereux (2003).

3. The country-specific ERPT estimates for the nominal effective exchange rate were -- Germany (136 percent), UK (24 percent), Taiwan (97 percent), Japan (86 percent), Singapore (158 percent), and Australia (5 percent). ERPT estimates for the real exchange rate were -- Germany (126 percent), the Netherlands (109 percent), France (113 percent), UK (26 percent), Taiwan (52 percent), Japan (62 percent), Singapore (128 percent), and Australia (2 percent).

4. See Ghosh and Rajan (2006) for a comprehensive survey on EPRT at the aggregate as well as disaggregate product level involving Singapore, Hong Kong and other Asian economies.

5. The other commodities for which no evidence of significant EPRT was found were Portland cement, Selenium, Pneumatic tires for bicycles, inner tubes for bicycle tires, aluminum foils, autos, auto engines, fishing hooks.

6. Real GDP was not available in quarterly frequency for Singapore.

7. Marazzi *et.al.,*(2005), Chaudhri and Hakura (2001) also use the foreign CPI as a measure of the exporting nations costs. For further sensitivity analysis we use the US producer price index as a third measure of exporter's costs.

8. Campa and Goldberg (2005) and Ganapolsky and Vilan (2005) also use a similar measure.

9. The dating corresponds to Khalid and Kawai (2003) who identify July 1997 to June 20, 1997 as the currency crisis period in Asia.

10. We use the methodology outlined by Johansen and Juselius (1990).

11. We also estimated import price and CPI EPRT of the bilateral dollar rate without using the dummies for the crisis period. For import prices of Singapore ERPT were 48 and 37 percent, respectively. For CPI, it is 20, 10 and 11 percent, respectively, for the three specifications. For Hong Kong import price pass-through for the three alternate specifications are 70, 68 and 64 percent, respectively, while for CPI the elasticities are 82, 54 for the two specifications and insignificant for the third one.

12. There is a growing consensus in the literature on industrial countries that the low ERPT experienced by them in recent years has been largely due to changing commodity composition of trade baskets as opposed to macroeconomic factors per se (Campa and Goldberg, 2005, Otani *et al.,* 2003 and Marazzi *et al.,* 2005).

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Table 1: Co-integration Test Results

Singapore			Hong Kong		
Null Hypothesis: No co-integrating vector			Null Hypothesis: No co-integrating vector		
	Trace Statistic	Eigen value Statistic		Trace Statistic	Eigen value Statistic
Specification 1	71.232	48.876	Specification 1	128.805	71.74067
Specification 2	76.754	50.117	Specification 2	125.088	64.60132
Specification 3	40.086	25.477	Specification 3	148.536	77.70989
Specification 4	76.38	46.349	Specification 4	127.655	70.06378
Specification 5	82.857	52.258	Specification 5	127.031	68.16782
Specification 6	50.742	36.479	Specification 6	133.830	75.50205
Specification 7	69.866	42.269	Specification 7	96.332	52.71501
Specification 8	37.002	22.089	Specification 8	na	na
Specification 9	65.323	38.801	Specification 9	99.468	66.42017
Specification 10	54.441	38.896	Specification 10		
5% critical value	47.856	27.584	5% critical value	47.856	27.584

Each co-integration test is done for the corresponding specification in the subsequent tables. For instance specification 1 here is the co-integration result for estimating eq.(1) in Table 2.

Table 2: Import Price and CPI Pass-through of Singapore and Hong Kong from the US

	Singapore						Hong Kong					
	Import price			CPI			Import price			CPI		
	1	2	3	4	5	6	1	2	3	4	5	6
c	**5.800*** **	**6.141*** **	**3.293*** **	**2.538*** **	**2.453*** **	**2.194*** **	**3.244*** **	**3.347*** **	**2.208*** **	**-4.858*** **	**-4.087*** **	**-10.979*** **
	0.340	0.303	1.254	0.143	0.143	0.816	0.143	0.138	0.191	0.297	0.237	0.813
lexrt	**0.463*** **	**0.351*** **	**0.360*** **	**-0.196*** **	**-0.093*** **	**-0.105*** **	**-0.697*** **	**-0.673*** **	**-0.633*** **	**-0.733*** **	**-0.462** **	-0.031
	0.061	0.056	0.068	0.026	0.026	0.037	0.082	0.079	0.071	0.214	0.181	0.168
lmp_i	**0.212*** **	**0.249*** **	-0.117	-0.019	-0.013	0.099	**0.338*** **	**0.311*** **	**0.330*** **	**0.542*** **	**0.352*** **	**0.458*** **
	0.062	0.055	0.077	0.026	0.025	0.049	0.023	0.022	0.020	0.085	0.078	0.103
lwageusa	**-0.522*** **			**0.487*** **			**0.270*** **			**1.832*** **		
	0.125			0.055			0.027			0.101		
Lcpiusa		**-0.620*** **			**0.488*** **			0.264			**1.734*** **	
		0.109			0.053			0.024			0.082	
Lppiusa			0.354			**0.436*** **			**0.475*** **			**2.928*** **
			0.344			0.222			0.038			0.241
cr_dum	**-0.047*** **	**-0.049*** **	**-0.041*** **	**0.024*** **	**0.025*** **	**0.031*** **	0.016	0.014	**0.019***	**0.165*** **	**0.162**	**0.207*** **
	0.011	0.009	0.012	0.004	0.004	0.007	0.010	0.010	0.010	0.031	0.028	0.046
Adj. R^2	0.718	0.753	0.637	0.982	0.980	0.954	0.764	0.797	0.808	0.930	0.952	0.883
N	103	103	103	103	103	103	94	94	94	94	94	94

Terms below co-efficient denote standard errors. *, **,*** indicates significance at the 10%, 5%, 1% level

Lexrt = USD-bilateral rate; lmp_i= manufacturing production index; lwageusa = US wage rate; Lcpiusa = US CPI; Lppiusa = US PPI; cr_dum =A dummy that assume the value of 1 fro 1997Q2-1998Q2 and 0 otherwise.

Table 3: Import Price and CPI Pass-through of Singapore and Hong Kong's NEER

	Singapore				Hong Kong	
	Import price		CPI		Import price	CPI
	7	8	9	10	7	9
C	**3.353*** **	**1.752*** **	**2.995*** **	**2.611*** **	**3.683**	-0.253
	0.333	0.400	0.147	0.291	0.606	0.643
Lneer	**-0.186** **	0.065	**-0.234*** **	**-0.346*** **	0.057	**-0.338*** **
	0.080	0.057	0.034	0.057	0.128	0.100
Lmpsing	**0.374*** **	**-0.155*** **	0.030	**0.170*** **	**0.205*** **	**0.292*** **
	0.040	0.014	0.027	0.009	0.029	0.048
lcpiworld	**-0.286*** **		**0.087*** **		**0.054*** **	**0.426*** **
	0.021		0.017		0.011	0.010
Lforeign costs		**0.835*** **		**-0.080** **		
		0.073		0.039		
cr_dum	**-0.048*** **	0.005	-0.007	-0.012	**0.023***	**0.092*** **
	0.014	0.010	0.005	0.008	0.012	0.016
Adj. R^2	0.815	0.909	0.989	0.976	0.712	0.986
N	103	103	103	103	94	94

Terms below co-efficient denote standard errors. *, **,*** indicates significance at the 10%, 5%, 1% level

Lneer = nominal effective exchange rate; lmp_i= manufacturing production index; lcpiworld = World CPI; Lforeign costs = foreign costs measure from eq.(8); cr_dum =A dummy that assume the value of 1 fro 1997Q2-1998Q2 and 0 otherwise.

Table 4: Exchange Rate Pass-through in Hong Kong and Singapore

		Singapore		Hong Kong	
		Import prices	CPI	Import prices	CPI
Bilateral USD rate	US wage	46%	19%	69%	73%
	US CPI	35%	9%	67%	46%
	US PPI	36%	10%	63%	insignificant pass-through
NEER	World CPI	19%	23%	insignificant pass-through	34%
	Constructed foreign costs measure	insignificant pass-through	34%	na	na*

* For Hong Kong REER was not available. As such the measure for foreign exporters' costs could not be constructed.

Table 5: Import Price and CPI Pass-through of Singapore and Hong Kong from the US – ECM

	Singapore						Hong Kong					
	Import prices			CPI			Import prices			CPI		
	1.1	2.1	3.1	4.1	5.1	6.1	1.1	2.1	3.1	4.1	5.1	6.1
C	-0.005	**-0.010****	**-0.008*****	0.000	-0.001	**0.002*****	0.001	0.000	0.000	0.001	0.000	**0.003***
	0.004	0.005	0.003	0.001	0.001	0.001	0.003	0.004	0.001	0.002	0.002	0.001
$ECM_{(t-1)}$	**-0.147****	**-0.192*****	**-0.150*****	**-0.131*****	**-0.091****	**-0.090*****	**-0.076****	**-0.085****	**-0.090****	-0.007	-0.010	**-0.012****
	0.064	0.061	0.033	0.030	0.029	0.031	0.032	0.034	0.039	0.007	0.009	0.007
Δlexrt	0.065	0.075	**0.226*****	0.035	0.040	0.040	**-0.324*****	**-0.334*****	**-0.339*****	-0.041	-0.046	-0.037
	0.089	0.075	0.057	0.031	0.027	0.029	0.080	0.075	0.078	0.035	0.040	0.039
Δlmpsing	**0.051***	0.045	-0.004	0.002	-0.001	0.007	0.010	0.009	**0.012****	**0.013****	**0.010****	**0.013****
	0.029	0.027	0.026	0.007	0.008	0.007	0.009	0.009	0.007	0.006	0.005	0.005
Δlwageusa	0.405			**0.295****			-0.019			0.245		
	0.311			0.118			0.288			0.222		
Δlcpiusa		**1.050****			**0.464*****			0.225			0.296	
		0.465			0.120			0.395			0.198	
Δlppiusa			**1.322*****			**0.120*****			0.294			0.041
			0.282			0.025			0.116			0.071
Δlimprsg$_{(t-1)}$	**0.327*****	**0.272****	0.122	**0.422*****	**0.359*****	**0.355****	**0.331****	**0.324****	**0.297***	**0.791*****	**0.760*****	**0.748*****
	0.119	0.109	0.092	0.135	0.086	0.139	0.154	0.151	0.150	0.049	0.048	0.060
Adj. R^2	0.161	0.259	0.497	0.383	0.447	0.436	0.271	0.273	0.331	0.628	0.633	0.634
F-stat	4.827***	7.989***	20.783***	13.427***	17.194***	16.490***	7.833***	7.926***	10.109***	32.011***	32.712***	32.926***

Terms below co-efficient denote standard errors. *, **,*** indicates significance at the 10%, 5%, 1% level.

Table 6: Import Price and CPI Pass-through of Singapore and Hong Kong's NEER – ECM

	Singapore				Hong Kong	
	Import prices		CPI		Import prices	CPI
	7.1	8.1	9.1	10.1	7.1	9.1
C	0.006	**-0.003****	0.001	**0.003*****	**-0.004***	-0.001
	0.003	0.001	0.001	0.001	0.002	0.001
$ECM_{(t-1)}$	**-0.251*****	-0.082	**-0.195*****	**-0.147*****	**-0.124****	**0.045*****
	0.067	0.062	0.040	0.044	0.060	0.016
∆lneer	-0.072	-0.013	**-0.103*****	**-0.093*****	0.047	0.040
	0.156	0.096	0.030	0.028	0.113	0.031
∆lmpsing	**0.071*****	-0.015	**0.012***	0.022	0.009	**0.010***
	0.026	0.017	0.007	0.009	0.009	0.005
∆lcpiworld	**-0.259*****		**0.061****		**0.146****	**0.202*****
	0.098		0.025		0.063	0.051
∆lforeigncost		**0.662*****		-0.009		
		0.091		0.019		
$\Delta limpr/cpisg_{(t-1)}$	**0.335*****	0.044	**0.340*****	**0.295*****	**0.360****	**0.554*****
	0.113	0.039	0.129	0.102	0.170	0.077
Adj. R^2	0.262	0.780	0.450	0.450	0.281	0.676
F-stat	8.089***	0.791	17.334***	15.470***	8.196***	39.445***

Terms below co-efficient denote standard errors. *, **,*** indicates significance at the 10%, 5%, 1% level.

Table 7: Pass-through for Two Decades

	1980Q1-1992Q4	1993Q1-2005Q3	!980Q1-1992Q4	1993Q1-2005Q3
		Singapore		
	Sing-US dollar		NEER	
Import prices	0.043	0.043	**-0.202***	**0.468****
CPI	**-0.265****	-0.054	**-0.284****	**-0.508****
	1980Q1-1992Q4	1993Q1-2005Q3	!980Q1-1992Q4	1993Q1-2005Q3
		Hong Kong		
	Hong Kong-US dollar		NEER	
Import prices	**-0.621****	-4.941	-0.079	0.513
CPI	-0.227	-1.741	-0.142	-0.276

Figure 1: Recursive Estimates of USD pass-through into Singapore's Import Prices

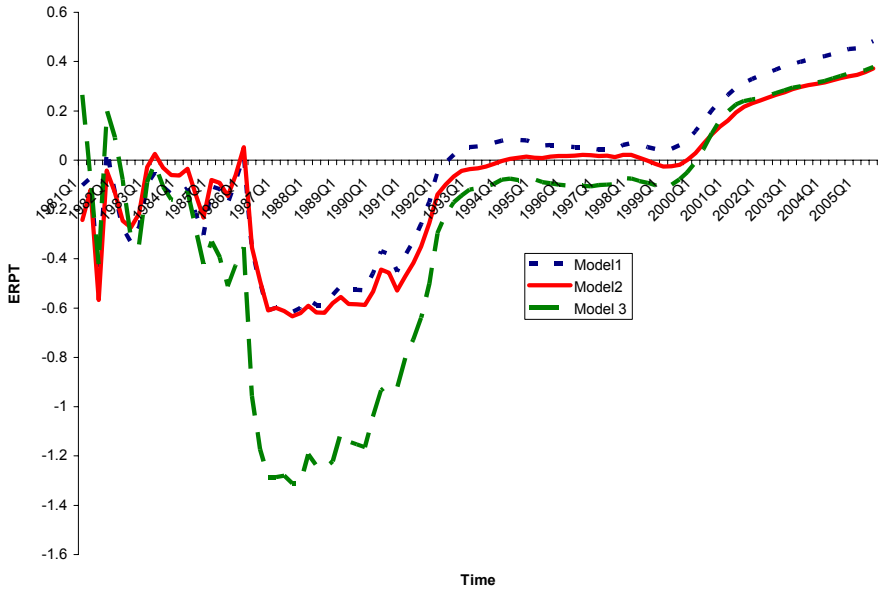

Figure 2: Recursive Estimates of USD pass-through into Singapore's CPI

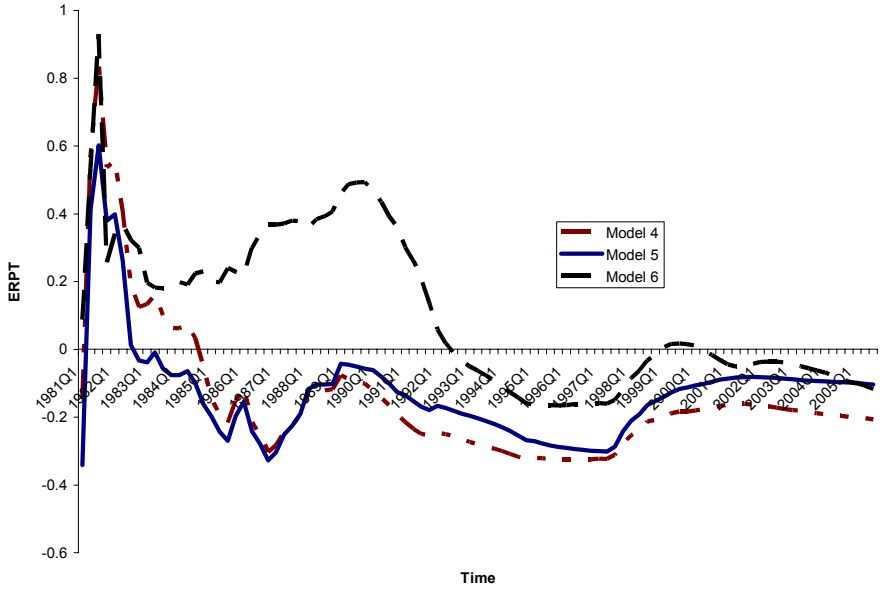

Figure 3: Recursive Estimates of NEER pass-through into Singapore's Import Prices

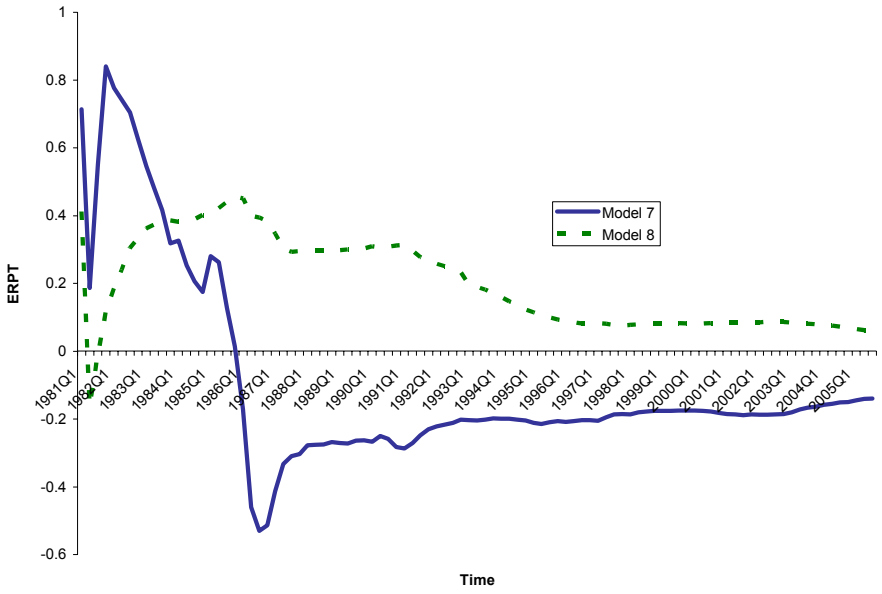

Figure 4: Recursive Estimates of NEER pass-through into Singapore's CPI

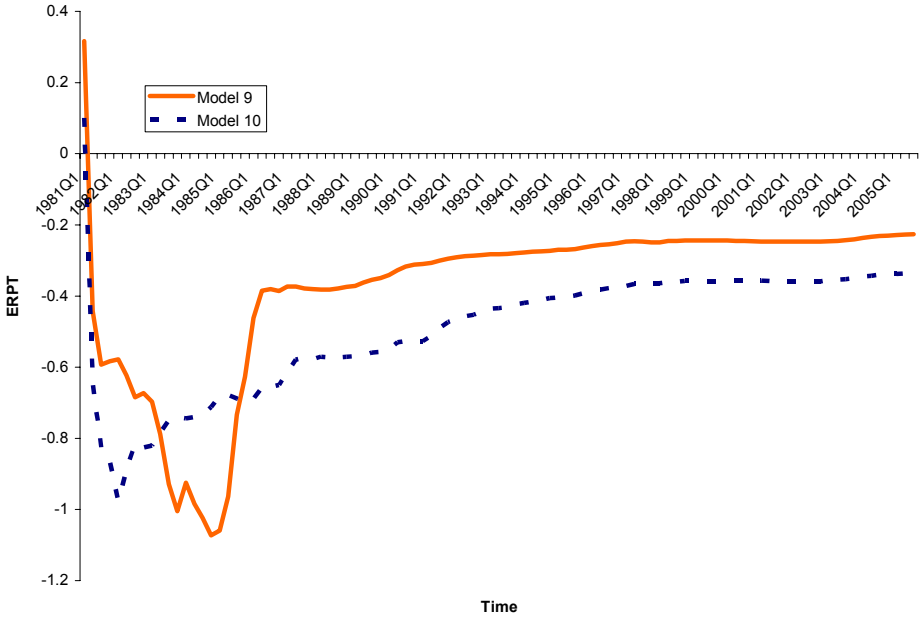

Figure 5: Recursive Estimates of USD pass-through into Hong Kong's Import Prices

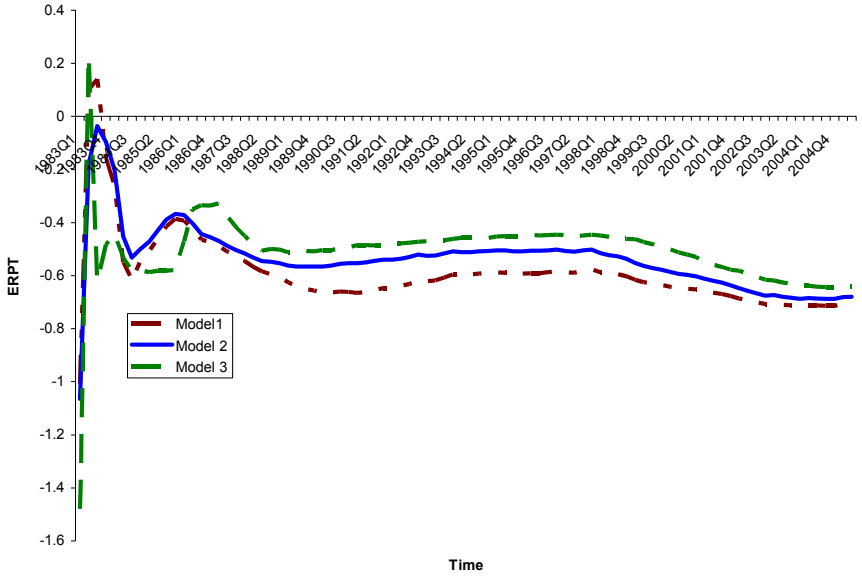

Figure 6: Recursive Estimates of USD pass-through into Hong Kong's CPI

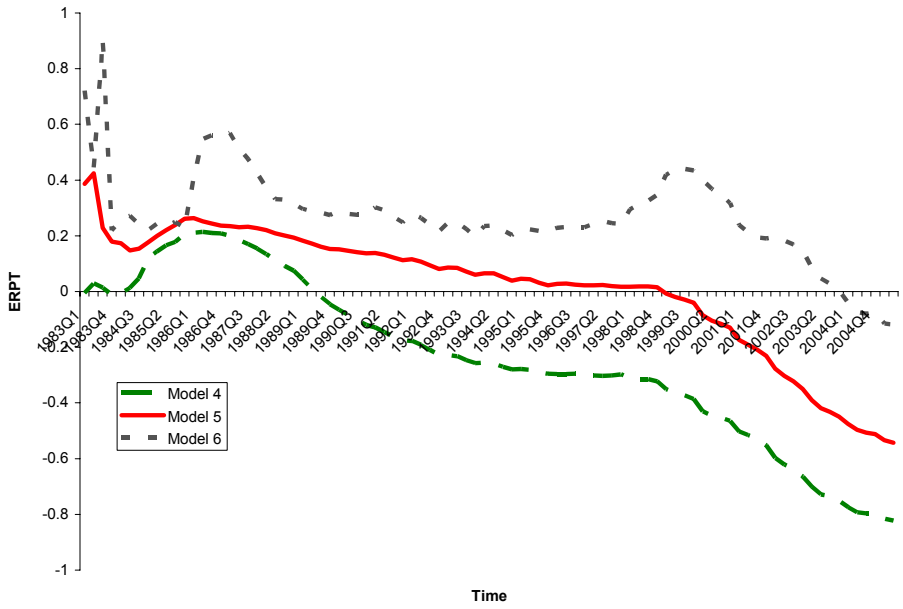

Figure 7: Recursive Estimates of NEER pass-through into Hong Kong's Import Prices and CPI