

The effects of real exchange rates and income on inbound tourism demand for Hong Kong from selected Asian economies

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Abstract

This note investigates how real exchange rates and income (proxied by GDP) of selected Asian economies affected their visitor arrivals to Hong Kong during 2000Q1-2019Q1. Empirical findings show that appreciation of the real exchange rate of the origin economy (against the Hong Kong dollar) and increases in visitors' income generally induced more visitor arrivals to Hong Kong in both the short and long term. Furthermore, the impact of real exchange rates on visitors' travel decisions was usually reflected earlier than the income effect, matching the intuition that visitors might be quicker to decide to switch between destinations (a substitution effect between potential destinations caused by moving exchange rates) than to increase their amount of travel in general (an income effect).

選定亞洲經濟體的實際匯率和收入對香港入境旅遊需求的影響

摘要

本文研究選定亞洲經濟體的實際匯率和收入（概括地以本地生產總值代表）如何在二零零零年第一季至二零一九年第一季期間影響訪港旅客數字。研究結果顯示，旅客來源地的實際匯率升值（兌港元）及旅客收入增加通常會導致短期和長期訪港旅客數字上升。研究亦顯示，實際匯率通常較收入更快影響旅客的外遊決定。這與直覺吻合，即旅客在決定轉換目的地（由匯率變動引起潛在目的地之間的替代效應）需時大致較增加旅行次數（收入效應）可能更短。

The views and analysis expressed in this article are those of the author and do not necessarily represent the views of the Office of the Government Economist.

I. INTRODUCTION

1. The tourism sector has been one of the pillars of Hong Kong's economy for a long time. From 2000-2018, inbound tourism alone accounted for around 3% of Hong Kong's GDP and supported around 5% of total employment¹. Asian visitors, in particular, have a pivotal role in Hong Kong's inbound tourism, comprising over 90% of total visitor arrivals to Hong Kong in 2019². Within Asia, apart from the significant increase of incoming visitors from the Mainland, the number of visitors from other Asian economies has also grown over time. As such, it is worthwhile to delve into the drivers that affect the travel decisions of these Asian visitors. This note aims to analyse and quantify the effects of real exchange rates and income on Hong Kong's inbound tourism from selected Asian economies.

II. LITERATURE REVIEW

2. Most studies of inbound tourism demand have focused on the number of visitor arrivals, while a limited number look at visitor expenditures. The main determinants for visitor arrivals in the literature are (a) the exchange rate and the relative price between the destination and origin economies; (b) the income level (usually proxied by GDP) of the origin economy; and (c) transportation costs (see Agiomirgianakis et al. (2014), Cheng (2012), Crouch (1993), Garin-Munoz (2000), Karimi et al. (2015), Li et al. (2005), Patsouratis et al (2005), Seetaram (2010), Song and Li (2008) and Zhang et al (2009) etc.). Empirically, exchange rate depreciation and lower living costs in the destination economy usually induce visitor inflows, while higher income levels in the origin economy and lower transportation costs positively influence the number of people travelling abroad.

3. Although the above-mentioned studies reach similar qualitative conclusions regarding the effects of explanatory variables on visitor arrivals, the estimated price and income elasticities of visitor arrivals were vastly different across economies and tourist groups. For example, Ongan et al. (2018) showed that tourists visiting the US were more sensitive to movements in the real exchange rate than changes in GDP. Schiff and Becken (2011) analysed inbound tourism demand for New Zealand and concluded that tourists from the traditional segments like the US, the UK and Australia were less price-sensitive, but Asian tourists were relatively more price-sensitive. Hanafiah and Harun (2010) found that appreciation of the Malaysian ringgit negatively affected incoming visitor arrivals to the economy, whilst its depreciation had uncertain effects, depending on how exchange rates fluctuated in the origin economy. Some empirical analyses (e.g. Lim (1997) and Li et al. (2005)) also showed that income and real exchange rates tended to be more important than other determinants in tourism demand models.

¹ Calculated using value added and employment figures of the Four Key Industries published by the Census and Statistics Department.

² Calculated using total visitor arrival figures published by the Hong Kong Tourism Board.

4. As for Hong Kong, Song et al. (2010) used various variables for visitor arrivals and tourist expenditures to proxy tourism demand. They found that income level and “word-of-mouth” / habit persistence effects influenced visitor arrivals to Hong Kong by the largest extent, while the real exchange rate between the origin economy and Hong Kong was the most important determinant of visitors’ expenditures. Based on an error correction model, Cheng (2012) concluded that tourists considered international tourism to be a luxury good.

III. DATA

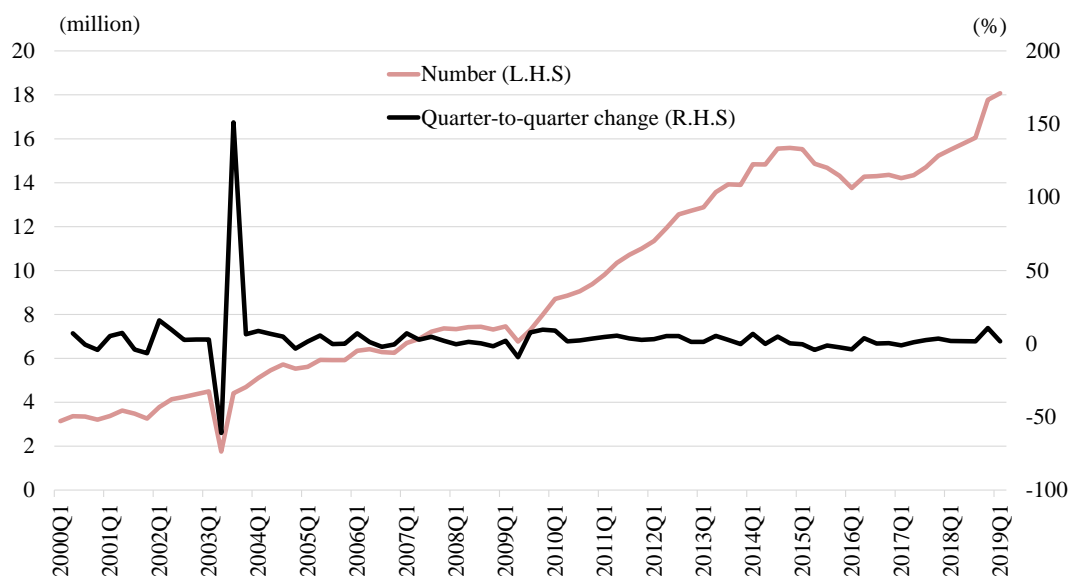
5. With reference to the previous studies, visitor arrivals to Hong Kong from four selected Asian economies, namely Japan, South Korea, Taiwan and Singapore, are chosen as a proxy for inbound tourism demand. The exchange rate and GDP data for Hong Kong and these four economies are included as possible determinants of inbound tourism demand. These economies are picked because of their relatively large shares of Hong Kong’s total incoming visitors³ and their large economic scales as compared to other economies in ex-Mainland Asia.

6. Data on visitor arrivals to Hong Kong from these Asian economies for the period 2000Q1 to 2019Q1 are from the Hong Kong Tourism Board. Nominal exchange rates of Hong Kong dollar against foreign currencies for the same period are from the Hong Kong Monetary Authority. Consumer price indices and quarterly per capita nominal GDP for the selected Asian economies are from the official statistics departments of the respective economies. Data on visitor arrivals, real exchange rates and per capita GDP are then deseasonalised with the X-13-ARIMA method.

7. *Chart 1* shows that total visitor arrivals to Hong Kong displayed extreme fluctuations within the sample period, even after adjusting for seasonality. In particular, when Hong Kong was hard hit by Severe Acute Respiratory Syndrome (SARS) in 2003, the number of visitor arrivals plunged by 61% between the first and second quarters. Yet it rebounded sharply by 151% in the third quarter after the SARS situation had largely dissipated and the Individual Visitor Scheme had been introduced. To capture these episodes of outlying volatility, dummy variables for 2003Q2 and 2003Q3 are added to the model, though a robustness check with a different sample period of 2004Q1 to 2019Q1 did not yield materially different results.

³ In 2019, the four selected economies (i.e. Japan, South Korea, Taiwan and Singapore) together accounted for around 52% of total incoming visitors from Asia (excluding the Mainland).

Chart 1.
Seasonally adjusted visitor arrivals to Hong Kong



IV. MODEL

8. As mentioned earlier, real exchange rates and income levels are the most prevalent determinants of visitors' spending and travel behaviour in the literature. Exchange rates affect the cost of tourism activities in tourists' possible destinations as compared to those in their origin economies, and therefore would influence the decision whether or not to travel abroad. In other words, domestic tourism is a benchmark when tourists consider their travel plans, assuming the former is a substitute for international tourism to certain extent.⁴ Moreover, as discussed in para. 7, two time dummy variables are added to extract volatility specific to the SARS outbreak in 2003Q2 and 2003Q3. Converting all the variables to quarterly frequency, and taking logs, the model can be summarised as follows:

$$\ln VA_{it} = \beta_0 + \beta_1 \ln REX_{it} + \beta_2 \ln Y_{it} + \sigma_1 SARS_{2003Q2} + \sigma_2 SARS_{2003Q3} + \varepsilon_{it} \quad (1)$$

9. In equation (1), visitor arrivals (VA) in Hong Kong are a function of the bilateral real exchange rate (*REX*) between the Hong Kong dollar (HKD) and currency of the origin economy, and the income level in terms of per capita GDP of the origin economy (*Y*). *REX* is defined as $NEX_i * (CCPI_{\text{origin economy}} / CCPI_{\text{HK}})$, where *NEX* is the number of units of HKD per origin economy currency in nominal terms and *CCPI* is the composite consumer price index.

⁴ In this note, real exchange rates are used instead of nominal exchange rates to take inflation in destination economies into account. On the other hand, as real exchange rates already factor in relative price differences in both the destination and the origin economies, per capita nominal GDPs in the origin economies are used to measure the visitors' income levels.

10. It is expected that the coefficients for $\ln REX$ and $\ln Y$ will both be positive. This is because appreciation in the origin economy's currency against the HKD (i.e. higher NEX) will make the visits to Hong Kong cheaper and therefore increase the number of Hong Kong's incoming tourists. On the other hand, the sign of $\ln Y$ is also expected to be positive since a higher income level in the origin economy will induce people to travel abroad in general.

11. To investigate these effects in more detail, an Autoregressive Distributed Lag (ARDL) model is used. The key advantage of this model is that it can accommodate both short- and long-term dynamics. The model in equation (1) can be generalised to an ARDL model as follows:

$$\Delta \ln VA_{it} = \alpha_0 + \sum_{j=1}^m \alpha_j \Delta \ln VA_{it-j} + \sum_{j=0}^n \gamma_j \Delta \ln REX_{it-j} + \sum_{j=0}^o \delta_j \Delta \ln Y_{it-j} + \theta_1 \ln VA_{it-1} + \theta_2 \ln REX_{it-1} + \theta_3 \ln Y_{it-1} + \lambda_1 SARS_{2003Q2} + \lambda_2 SARS_{2003Q3} + \varepsilon_{it} \quad (2)$$

12. In equation (2), the short-term effects of REX and Y on VA are captured by γ_j and δ_j respectively, while the long-term effects can be derived from θ_1 , θ_2 and θ_3 . The main purposes of using log-differenced data are to ensure all variables in the model are stationary and that the coefficients can be viewed as elasticities when analysing the regression results.

13. In order to apply the ARDL model, the variables in the model must be integrated of order 0 or 1 (I(0) or I(1)). For this reason, an Augmented Dickey-Fuller (ADF) test is used to confirm that the variables are not I(2) or higher. Second, similar to other studies using the same model, a maximum number of eight lags in equation (2) is tested. The chosen specifications are those with the most significant t-statistics for the independent variables. Third, as the effects of independent variables, including their lags, on visitor arrivals may experience short-term precariousness, the Wald test is used to identify the short-term aggregate impact of exchange rates and income levels on visitor arrivals, with the null hypotheses being $H_0: \gamma = \gamma_1 + \dots + \gamma_n = 0$ and $H_0: \delta = \delta_1 + \dots + \delta_n = 0$, and the alternative hypotheses being $H_1: \gamma = \gamma_1 + \dots + \gamma_n \neq 0$ and $H_1: \delta = \delta_1 + \dots + \delta_n \neq 0$. A statistically significant result indicates that that particular set of independent variables should have an overall influence on visitor arrivals (i.e. they are jointly significant). An insignificant result indicates that no conclusive inference about the impact of that set of independent variables can be made.

V. EMPIRICAL RESULTS AND DISCUSSION

14. The results of the ADF tests are presented in *Table 1*. In this test, the null hypothesis H_0 that the variables have a unit root (non-stationarity) is tested against the alternative that the series is trend stationary. The results show that H_0 is rejected at the 5% level of statistical significance for *VA*, *REX* and *Y* for all economies either in levels or first differences, suggesting these variables are either I(0) or I(1). As these variables are all stationary at levels or first differences, they are not I(2) and can be included in an ARDL model (Oteng-Abayie et al. (2006)).

Table 1: Augmented Dickey-Fuller test results

Economy and series	Level	First difference	Economy and series	Level	First difference
<i>Japan</i>			<i>South Korea</i>		
<i>VA</i>	-4.806*	-11.99*	<i>VA</i>	-0.843	-10.739*
<i>Y</i>	-0.361	-7.244*	<i>Y</i>	-0.275	-8.521*
<i>REX</i>	-1.101	-5.989*	<i>REX</i>	-2.195	-5.830*
<i>Taiwan</i>			<i>Singapore</i>		
<i>VA</i>	-6.699*	-10.042*	<i>VA</i>	-2.214	-10.417*
<i>Y</i>	0.322	-8.119*	<i>Y</i>	0.520	-6.814*
<i>REX</i>	-0.800	-6.772*	<i>REX</i>	-1.616	-6.179*

Note: Asterisks denote rejection of H_0 at the 5% significance level.

15. The Breusch-Godfrey LM test is used to test the null hypothesis that the errors in equation (2) are serially independent. As the statistics for the LM test are not significant, with values of 1.211, 0.771, 0.517 and 1.815 for Japan, South Korea, Taiwan and Singapore respectively, the null hypothesis of no serial correlation is not rejected at the 5% significance level. Furthermore, the White test is conducted to detect heteroscedasticity in the models. The test statistics of 0.460, 1.135, 0.712 and 1.390 for Japan, South Korea, Taiwan and Singapore respectively signify that the null hypothesis of homoscedasticity is also not rejected at the 5% significance level.

Results for selected Asian economies

16. As shown in *Table 2*, the respective distributed lags of $\ln VA$, $\ln REX$ and $\ln Y$ in the ARDL models are (3,0,1) for Japan, (3,0,0) for South Korea, (5,2,2) for Taiwan and (6,0,2) for Singapore. The short- and long-term impacts of each variable on visitor arrivals are detailed in the same table.

Table 2: Short-term and long-term factors driving visitors from selected Asian economies to Hong Kong

Long-term Variables	Japan		South Korea		Taiwan		Singapore	
	Coefficient	Long-term impact	Coefficient	Long-term impact	Coefficient	Long-term impact	Coefficient	Long-term impact
$\ln VA_{t-1}$	-0.37***		-0.277***		-0.32***		-0.311***	
$\ln REX_{t-1}$	0.284***	0.769	0.141**	0.507	-0.015	-0.046	0.322***	1.036
$\ln Y_{t-1}$	1.253***	3.389	0.407***	1.467	-0.1***	-0.313	0.078*	0.251
Short-term Variables	Coefficient	Wald test	Coefficient	Wald test	Coefficient	Wald test	Coefficient	Wald test
$\Delta \ln VA_{t-1}$	-0.19**		0.031		-0.32***		-0.001	
$\Delta \ln VA_{t-2}$	-0.115**		0.093**		-0.227***		0.067*	
$\Delta \ln VA_{t-3}$	0.026		0.117***		-0.131***		0.093**	
$\Delta \ln VA_{t-4}$					-0.1***		0.027	
$\Delta \ln VA_{t-5}$					-0.056**		0.011	
$\Delta \ln VA_{t-6}$							0.051*	
$\Delta \ln REX_t$	0.586***		0.513**		0.072		0.455*	
$\Delta \ln REX_{t-1}$					0.344**	0.309***^		
$\Delta \ln REX_{t-2}$					0.511***			
$\Delta \ln Y_t$	0.102	1.353***^	2.088***		-0.038		-0.686*	
$\Delta \ln Y_{t-1}$	2.604***				0.797***	0.340***^	1.143***	0.289*^
$\Delta \ln Y_{t-2}$					0.261		0.411	
SAR _{2003Q2}	-1.781***		-1.394***		-1.266***			
SAR _{2003Q3}	0.392*		0.838***		0.44***			
Dynamic Specification	(3,0,1)		(3,0,0)		(5,2,2)		(6,0,2)	
Period	2000Q1-2019Q1		2000Q1-2019Q1		2000Q1-2019Q1		2000Q1-2019Q1	
R-squared	0.953		0.926		0.986		0.965	

Note : ***, **, * denote one-tail statistical significance at least at 1%, 5% and 15%, respectively.

^ Naive average of the coefficients for the period tested under the Wald test.

17. The results in **Table 2** show that the short-term effects of real exchange rates on the number of visitors from Japan, South Korea, Taiwan and Singapore to Hong Kong are all positive and statistically significant. In particular, a 1% real appreciation in the origin economy's currency against the HKD causes the number of visitor arrivals to Hong Kong to increase by 0.586% from Japan, 0.513% from South Korea, 0.309% from Taiwan and 0.455% from Singapore. Income levels as measured by per capita GDP also have positive effects. Among these economies, South Korea has the highest elasticity of 2.088, followed by 1.353 for Japan, 0.340 for Taiwan and 0.289 for Singapore. These effects are also statistically significant.

18. The results further show that real exchange rates usually have the strongest effects on tourists' travel decisions within the current quarter (i.e. one to three months before their actual visits). The income effect, however, usually influences travel decisions that occur two or three quarters later (i.e. four to nine months later). Conceivably, this occurs because it might be easier or take less time for tourists to switch the destination of a planned visit in response to a change in exchange rates (a substitution effect between potential destinations caused by moving exchange rates), than to undertake a new trip in response to higher income (an income effect).

19. The long-term impacts of real exchange rates and per capita income on visitor arrivals are obtained using the equations below:

$$\widehat{\alpha}_{REX} = - \frac{\widehat{\theta}_2}{\widehat{\theta}_1}$$

$$\widehat{\alpha}_Y = - \frac{\widehat{\theta}_3}{\widehat{\theta}_1}$$

where $\widehat{\theta}_2$ and $\widehat{\theta}_3$ are the respective estimated long-term coefficients in equation (2) and $\widehat{\theta}_1$ captures feedback from their effects on visitor arrivals. Since the variables are in logs, $\widehat{\alpha}_{REX}$ and $\widehat{\alpha}_Y$ are long-term elasticities of visitor arrivals with respect to real exchange rates and per capita GDP. **Table 3** below shows that real exchange rates and per capita GDP influence visitor arrivals positively in the long-term for most of the selected economies in Asia except Taiwan. In the ten years from 2009 to 2019⁵, despite general economic growth in Taiwan and appreciation of its currency, the number of outbound visitors from Taiwan to Hong Kong fell by 2.9% per year on average, as against an increase of 7.7% per year in the number of Taiwan's total outbound visitors. This suggests other destinations, but not Hong Kong, have been gaining popularity among Taiwanese over the years.

Table 3: Long-term coefficients of real exchange rate and per capita GDP on visitor arrivals for selected Asian economies

	<i>REX</i>	<i>Y</i>
Japan	0.769***	3.389***
South Korea	0.507**	1.467***
Taiwan	-0.046	-0.313***
Singapore	1.036***	0.251*

Note : ***, **, * denote one-tail statistical significance at least at 1%, 5% and 15%, respectively.

⁵ Considering the nine years during 2009 and 2018 to abstract from the impact of local social incidents yields similar results, with the number of outbound tourists from Taiwan decreasing by 3.1% per year on average, as against the average increase of 8.3% overall.

Extension to major economies outside Asia

20. Though not the main focus of this research, the model can also be applied to major economies outside Asia, namely the US, Australia, the UK and the EU (excluding the UK)⁶. Similar tests as before were conducted to ensure that the variables are all either I(0) or I(1). Moreover, the null hypothesis of no serial correlation is not rejected for any economy and the null hypothesis of homoscedasticity is not rejected for most economies⁷.

21. The short-term effects of real exchange rates on the number of visitors to Hong Kong from the US, Australia, the UK and the EU are positive as seen in **Table 4** (0.783 for the US; 0.276 for Australia; 0.335 for the UK and 0.114 for the EU). Similarly, income levels as measured by per capita GDPs of these economies also have positive effects on the number of visitors to Hong Kong. Among them, the US has the highest elasticity of 2.278, while those for Australia, the UK and the EU are lower at 0.498, 0.666 and 0.549 respectively. However, the statistical significance of these effects is relatively weak. **Table 5** shows that in the long term, real exchange rate appreciation and increases in per capita income for most of these economies (except for the EU, but the results are not statistically significant) will increase the number of tourists to Hong Kong, similar to the results for their Asian counterparts.

⁶ The sample period for the EU is confined to 2005Q1-2019Q1 due to data constraints.

⁷ Heteroscedasticity is detected in the US data. Hence, the Newey-West estimator is adopted to overcome possible issues of serial correlation and heteroskedasticity in the model.

Table 4: Short-term and long-term factors driving visitors from selected economies outside Asia to Hong Kong

	The US		Australia		The UK		The EU (ex UK)		
Long-term Variables	Coefficient	Long-term impact	Coefficient	Long-term impact	Coefficient	Long-term impact	Coefficient	Long-term impact	
$\ln VA_{t-1}$	-0.633***		-0.271***		-0.379***		-0.516*		
$\ln REX_{t-1}$	0.523***	0.825	0.17***	0.627	0.209***	0.552	-0.15*	-0.290	
$\ln Y_{t-1}$	0.449***	0.708	0.107**	0.396	0.389***	1.026	-0.461*	-0.894	
Short-term Variables	Coefficient	Wald test	Coefficient	Wald test	Coefficient	Wald test	Coefficient	Wald test	
$\Delta \ln VA_{t-1}$	-0.025		-0.039		-0.088*		0.021		
$\Delta \ln VA_{t-2}$	0.039				-0.029		-0.091		
$\Delta \ln VA_{t-3}$	0.051**				-0.034		-0.136		
$\Delta \ln VA_{t-4}$	0.024*				-0.043*		-0.288		
$\Delta \ln VA_{t-5}$	-0.004				-0.027		-0.032		
$\Delta \ln VA_{t-6}$	0.018**				0.008		-0.165		
$\Delta \ln VA_{t-7}$							-0.245		
$\Delta \ln VA_{t-8}$							-0.293**		
$\Delta \ln REX_t$	1.142**	0.783***^	0.276***		0.335**		-0.06	0.114*^	
$\Delta \ln REX_{t-1}$	0.527					0.367**			
$\Delta \ln REX_{t-2}$	0.681*					0.064			
$\Delta \ln REX_{t-3}$						0.149			
$\Delta \ln REX_{t-4}$							0.162		
$\Delta \ln Y_t$	2.278**		0.62	0.498*^	0.666		0.055	0.549*^	
$\Delta \ln Y_{t-1}$			0.167						0.708
$\Delta \ln Y_{t-2}$			0.707*						1.178*
$\Delta \ln Y_{t-3}$									-0.488
$\Delta \ln Y_{t-4}$									0.949
$\Delta \ln Y_{t-5}$							0.893		
SAR _{2003Q2}	-1.727***		-1.535***		-1.519***				
SAR _{2003Q3}	0.36		0.716***		0.531***				
Dynamic Specification	(6,2,0)		(1,0,2)		(6,0,0)		(8,4,5)		
Period	2000Q1-2019Q1		2000Q1-2019Q1		2000Q1-2019Q1		2005Q1-2019Q1		
R-squared	0.980		0.964		0.976		0.510		

Note : ***, **, * denote one-tail statistical significance at least at 1%, 5% and 15%, respectively.

^ Naive average of the coefficients for the period tested under the Wald test.

Table 5: Long-term coefficients of real exchange rate and per capita GDP on visitor arrivals for selected economies outside Asia

	<i>REX</i>	<i>Y</i>
US	0.825***	0.708***
Australia	0.627***	0.396***
UK	0.552***	1.026***
EU	-0.290	-0.894

Note : ***, **, * denote one-tail statistical significance at least at 1%, 5% and 15%, respectively.

VI. CONCLUDING REMARKS

22. This note investigates how real exchange rates and income (proxied by GDP) of selected Asian economies affected their visitor arrivals to Hong Kong during 2000Q1-2019Q1. An ARDL model is applied to gauge the short- and long-term impacts, while the Wald test helps identify the impact of explanatory variables on the dependent variable amid short-term precariousness. The empirical findings show that appreciation of the real exchange rate of the origin economy (against the Hong Kong dollar) and increases in visitors' income generally induce more visitor arrivals to Hong Kong in both the short- and long- term. Furthermore, the impact of real exchange rates on visitors' travel decisions was usually reflected earlier than the income effect, matching the intuition that visitors might be quicker to decide switching between destinations (a substitution effect between potential destinations caused by moving exchange rates) than to increase their amount of travel in general (an income effect).

23. There are a few caveats to this analysis. First, the methodology does not remove economy-specific factors that evolve over time (e.g. marketing expenditures on tourism). Second, some potentially important independent variables that would drive the movement of visitor arrivals are omitted, either because they are difficult to quantify (e.g. changes in tourism policy) or complex (e.g. the price of visiting alternative tourist destinations). Finally, the linear structure of the ARDL model might not fully capture all the relationships between the variables in the model.

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