

## **The effect of the Renminbi to Hong Kong Dollar real exchange rate on Mainland arrivals to Hong Kong**

Cally Choi  
Economist

March 2019

### **Abstract**

The appreciation of the real Renminbi (RMB) exchange rate against the Hong Kong Dollar (HKD) is often expected to increase Mainland arrivals to Hong Kong in subsequent periods. This letter finds that the travel decisions of same-day Mainland visitors, whose main activity is shopping during their short stays in Hong Kong, are more responsive to changes in the real RMB to HKD exchange rate than those of overnight visitors. An even more important factor, however, is income growth, which is the main contributor to the increase in Mainland arrivals to Hong Kong over the past 13 years.

### **人民幣兌港元實質匯率 對內地訪港旅客數字的影響**

#### **摘要**

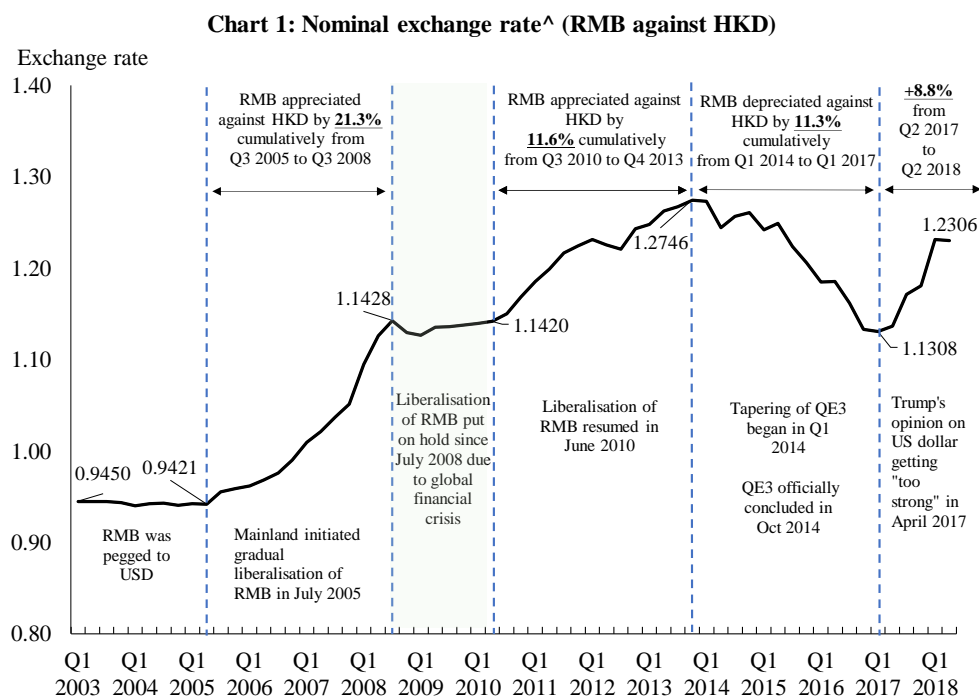
人民幣兌港元實質匯率升值一般預期會帶動隨後的內地訪港旅客數字。本札記發現即日來回的內地旅客(他們在短暫留港期間的主要活動為購物)的旅遊計劃對人民幣兌港元實質匯率變動的反應較過夜旅客更為敏感。然而，收入增長為更具影響力的因素，亦是過去十三年內地訪港旅客數字增加的主要原因。

## I. INTRODUCTION

1. The tourism industry has long been one of the pillar industries of Hong Kong. Specifically, inbound tourism contributed 3.6% of Hong Kong's GDP in 2017 and supported 5.9% of our total employment<sup>1</sup>. Mainland visitors, accounting for 76.0% of total visitor arrivals to Hong Kong in 2017, are vital to the performance of Hong Kong's inbound tourism. Since mid-June 2018, however, the Renminbi (RMB) depreciated visibly against the Hong Kong Dollar (HKD) in nominal terms amid the heightened trade tension between the US and the Mainland. This note aims to analyse and quantify the effect of the movement of the real exchange rate of the RMB against the HKD<sup>2</sup> on Mainland arrivals to Hong Kong.

## II. REVIEW OF MOVEMENTS OF THE RMB-HKD EXCHANGE RATE AND CORRELATION WITH MAINLAND ARRIVALS

2. The nominal RMB to HKD exchange rate has generally been on a rising trend in the past 13 years (*Chart 1*). From Q3 2005 to Q2 2018, the RMB appreciated against the HKD by over 30% (30.6%).



Note: (^) Daily average exchange rate during the period.

Source: Census and Statistics Department.

<sup>1</sup> Figures subject to revision by Census and Statistics Department.

<sup>2</sup> The real exchange rate (RER) of the RMB against the HKD is defined as:

$$RER = \left(\frac{HKD}{RMB}\right) * \left(\frac{\text{Mainland's CCPI}}{\text{Hong Kong's CCPI}}\right)$$

3. Specifically, the RMB appreciated sharply by 21.3% cumulatively from Q3 2005 to Q3 2008 following the introduction of RMB liberalisation in July 2005. In view of the heightened uncertainties amid the global financial crisis, the People’s Bank of China temporarily put the liberalisation on hold from Q3 2008 to Q2 2010, during which period the RMB exchange rate remained stable. As liberalisation resumed in June 2010, the RMB continued to strengthen, albeit at a relatively moderated pace, by 11.6% cumulatively from Q3 2010 to Q4 2013. The news of tapering of quantitative easing (QE) measures at end-2013 concluded the uptrend, and the RMB depreciated against the HKD by 11.3% from its peak of 1.2746 in Q4 2013. During the most recent five quarters (Q2 2017 – Q2 2018), the RMB exchange rate rose notably by 8.8%.

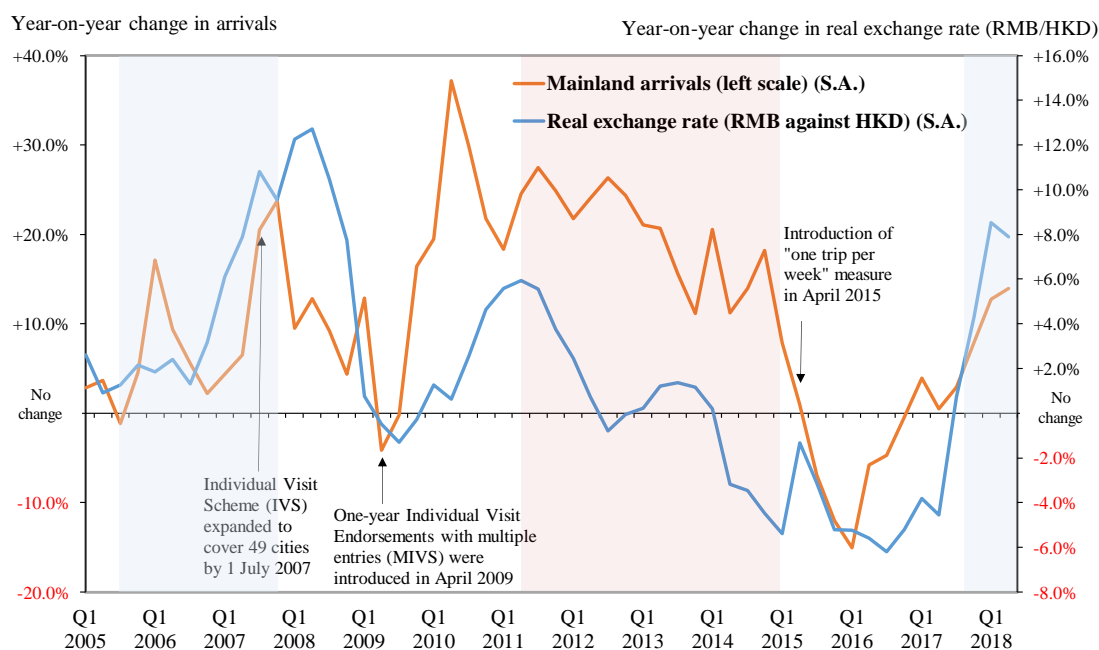
4. As shown in *Chart 2*, Mainland arrivals appear to bear some positive relationship with the real exchange rate (RMB against HKD) from Q1 2005 to Q2 2018, though the various policy measures may also have contributed. In particular, in 2005 - 2007 and late 2017 when the RMB appreciated against the HKD in real terms, the number of Mainland arrivals reverted from a year-on-year decline to positive and accelerating growth (areas highlighted in blue in *Chart 2*). Conversely, growth in Mainland arrivals decelerated visibly from Q2 2011 to Q1 2015 when the appreciation of RMB against HKD slowed and finally ended in depreciation (area highlighted in red in *Chart 2*). The first four quarters after newly-introduced major tourism policy measures such as multiple-entry Individual Visit Endorsements<sup>3</sup> (MIVS) and “one trip per week”<sup>4</sup> (OTPW) Individual Visit Endorsements are excluded from the above analysis to control for the impact of these measures on Mainland arrivals.

---

<sup>3</sup> The Mainland authorities introduced a one-year multiple-entry Individual Visit Scheme endorsement for Shenzhen residents to visit Hong Kong in April 2009.

<sup>4</sup> Starting April 2015, multiple-entry Individual Visit Endorsements are superseded by “one trip per week” Individual Visit Endorsements that allow the endorsement holders to visit Hong Kong only once a week.

**Chart 2: Mainland arrivals and real exchange rate (RMB against HKD)  
(Quarterly, Q1 2005 - Q2 2018)**



Sources: Hong Kong Tourism Board & Census and Statistics Department.

5. Same-day and overnight visitors from the Mainland are characterised by different motives. While same-day Mainland visitors mostly come to Hong Kong for shopping (spending on shopping<sup>5</sup> accounts for nearly 90% of their total spending<sup>6</sup>), overnight Mainland visitors come mainly for vacation, business, visiting friends or relatives or other purposes<sup>7</sup>. As the majority of same-day Mainland visitors come from nearby cities such as Shenzhen and Guangzhou with good accessibility to Hong Kong, their travel decisions may be more responsive to changes in the external environment and other relevant considerations (for instance, fluctuations in the RMB exchange rate) than their overnight counterparts who may require more lead time to plan their trip. Also, same-day and overnight visitors may react differently to different tourism policy measures.

6. Therefore, it might also be useful to examine whether and to what extent the same set of macroeconomic factors (such as economic growth or the real exchange rate) would have different effects on their travel decisions. Raw data suggest that

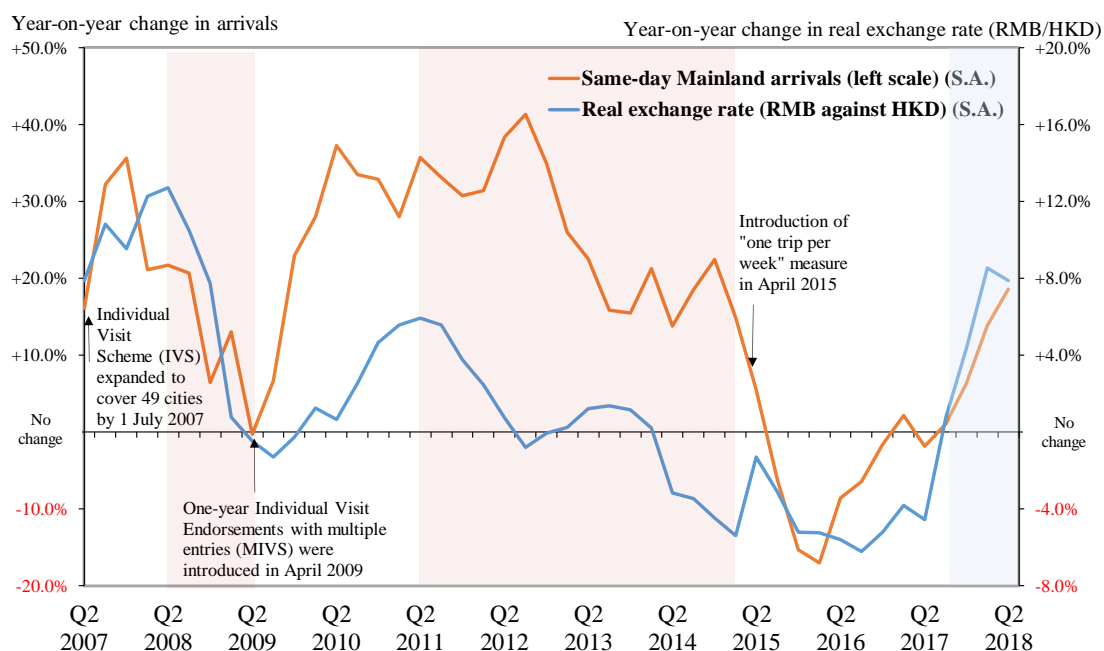
<sup>5</sup> Other main categories of spending apart from “Shopping” include “Hotel Bills”, “Meals Outside Hotels”, “Entertainment”, “Tours” and “Others”.

<sup>6</sup> The respective shares in 2013, 2014 and 2015 were above 90%. The corresponding figures for 2016 and 2017 were 89.1% and 88.1%.

<sup>7</sup> The respective shares of shopping expenses among the total spending of Mainland overnight visitors in 2013 and 2014 were 71.6% and 71.8% respectively. The corresponding figures for 2015, 2016 and 2017 were 68.8%, 65.0% and 60.2%. Other major expenditure items include hotel bills and meals outside hotels.

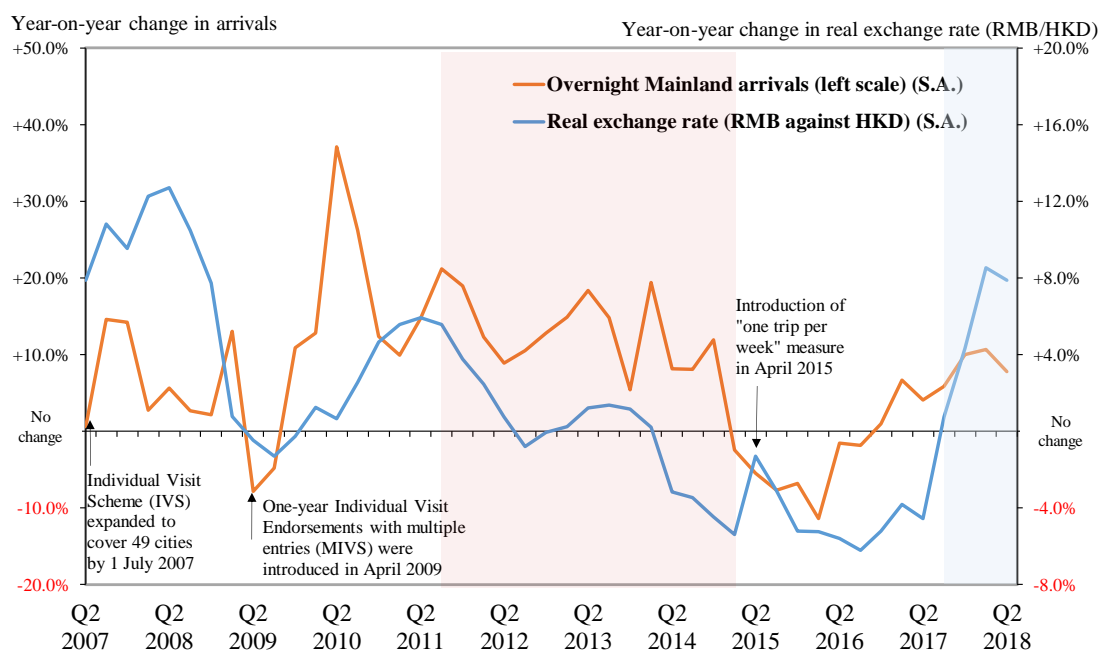
both changes in same-day (*Chart 3*) and overnight arrivals (*Chart 4*) were largely positively correlated with changes in the real exchange rate (RMB against HKD) from Q2 2007 to Q2 2018. Periods during which the accelerated increase in Mainland arrivals and the RMB to HKD exchange rate coincided are highlighted in blue while periods when decelerated growth or decline are seen in both variables are shaded in red.

**Chart 3: Same-day Mainland arrivals and real exchange rate (RMB against HKD) (Quarterly, Q2 2007 - Q2 2018)**



Sources: Hong Kong Tourism Board & Census and Statistics Department.

**Chart 4: Overnight Mainland arrivals and real exchange rate (RMB against HKD) (Quarterly, Q2 2007 - Q2 2018)**



Sources: Hong Kong Tourism Board & Census and Statistics Department.

### III. LITERATURE REVIEW

7. A number of articles in the literature point out that exchange rate movements, among other factors, affect the cost of travelling and hence the demand for tourism. A summary of the main features of selected papers are presented below.

8. In empirical studies, tourism demand is often proxied by visitor arrivals and tourism receipts, for example, Goh & Law, 2002; Hiemstra & Wong, 2002; Daniel & Ramos, 2002; Cho, 2003; Song, Wong & Chon, 2003; Song, Li, Witt & Fei, 2010. The most frequently identified determinants of tourism demand are the income of the source market (proxied by GDP per capita), the real exchange rate (Webber, 2001; Lim & McAleer, 2001; Hiemstra & Wong, 2002), and the population of the source market. Other studies have tested explanatory variables such as the cost of travel (e.g. air fare); the absolute price of a consumption basket facing visitors; the price of visiting alternative tourist destinations; marketing expenditures; changes in tourism policy; and high-impact incidents such as large-scale sports events and terrorist activities.

9. Most empirical studies published before the 1990s make use of single equation linear models (e.g. log-linear models), with ordinary least squares (OLS) as the main estimation procedure (Song & Witt, 2000). Nevertheless, the existence of autocorrelation or non-stationarity may invalidate OLS estimators in some cases. To address these issues, different specifications including first-difference models, autoregressive distributed lag models and error correction models<sup>8</sup> have been adopted in more recent studies such as Webber (2001), Lim & McAleer (2001), Hiemstra & Wong (2002), Song, Wong & Chon (2003), Li, Song & Witt (2006), Song & Li (2008), Charles & Fullerton (2011) and Culiuc (2014).

10. Empirically, the price and income elasticities of visitor arrivals from different source markets exhibit a great deal of variety. Understandably, visitors from different source markets have rather distinct preferences, purposes of visiting and affordability constraints while facing different sets of substitutes. *Table 1* summarises findings on tourism demand elasticities with respect to price and income of selected key visitor source markets of Hong Kong (Song, Wong & Chon, 2003).

---

<sup>8</sup> The error correction model incorporates both long-run and short-run dynamics and can accommodate non-stationary variables that have a stable long-run relationship (a cointegrating relationship) with one another. Theoretically, some articles in the literature argue that tourists tend to make rational travel decisions based on factors such as income, exchange rates, and substitute prices in the long run. Nevertheless, due to imperfect information, it is possible that demand for tourism can deviate from equilibrium in the short run. Hence, it is meaningful to investigate the short-run and long-run parameters in the demand equation.

**Table 1: Published Tourism Demand Elasticities for Hong Kong**

Tourism demand (arrivals from source markets)	Data frequency	Modelling/ forecasting methods	Price elasticity	Income elasticity
<b>Mainland</b>	Annual	Autoregressive distributed lag model	<b>-0.402</b>	<b>1.521</b>
Singapore			-1.223	1.316
Malaysia			-0.206	1.02
Indonesia			-2.885	1.484
Taiwan			-1.729	2.140
Thailand			-0.911	0.944
United States			-1.004	1.499

#### IV. DATA AND METHODOLOGY

11. Data of higher frequency would yield more information about the impact of real exchange rate movements on visitor arrivals than annual data as the latter may mask any meaningful fluctuations in these variables during the year. Hence, quarterly Mainland arrivals are used as a proxy of tourism demand (with further breakdowns by same-day and overnight arrivals where the data are available<sup>9</sup>). Its relationship with the real RMB to HKD exchange rate (as defined in footnote 2) was investigated in this study.

12. Other determinants of Mainland arrivals tested include the income of potential Mainland visitors (proxied by the Mainland's real GDP per capita<sup>10</sup>) and the price of substitute destinations (proxied by the real exchange rate of the RMB against selected neighbouring destinations). Visitor arrivals, GDP per capita and inflation data were seasonally adjusted with the X12-ARIMA model. To reflect changes in visa administration, dummy variables for the MIVS and OTPW policies were included after these policies were introduced in April 2009 and April 2015, respectively.

<sup>9</sup> The figures for overnight and same-day visitors from the Mainland are only available from the Hong Kong Tourism Board since Q2 2006.

<sup>10</sup> Official figures compiled by the National Bureau of Statistics of China have only been released since Q1 2011. The figures are retrojected to Q1 2004 using year-on-year rates of change (at constant 2010 prices) also published by the National Bureau of Statistics.

13. To quantify the exact impact of the RMB exchange rate on Mainland arrivals and separate its impact from other relevant factors (e.g. economic growth), regression analysis has been undertaken using the OLS method. A log-log model is adopted for which the coefficients can be readily interpreted as the elasticity of the dependent variable with respect to the independent variables.

14. For the OLS estimator to be consistent, all variables in the model must be stationary and weakly dependent (i.e. integrated of order zero  $I(0)$ ). Augmented Dickey-Fuller test results indicate the possible presence of unit roots in the time series of Mainland arrivals (including overnight and same-day Mainland arrivals), the Mainland's real GDP per capita and the real RMB-HKD exchange rate. Since the first differences of these time series variable are stationary, the problem of spurious regression can be avoided. Differencing time series variables also removes linear time trends. Nevertheless, by taking the first difference, some information embodied in the long-run interaction of these variables will inevitably be lost. While some articles in the literature attempt to use error correction models to explore the statistically meaningful linear relationship of non-stationary series in the long run, this is only possible if such a relationship exists, and in this case an Engle-Granger test does not indicate that any such cointegrating relationship is present.

15. With reference to the literature, the real exchange rate (RMB against HKD), real GDP per capita of the Mainland, and dummy variables for tourism policies have been included in the model<sup>11</sup> to identify the appropriate structural equation. Considering that travel decisions and relevant arrangements of visitors are usually made some time before arrival, lags of these variables are suitably tested in order to find the best fit. Further, a Durbin-Watson test does not indicate the presence of positive serial correlation in the regression error term. *Table 2* summarises the coefficient estimates for all Mainland arrivals as well as same-day and overnight Mainland arrivals.

---

<sup>11</sup> Substitute prices (measured with reference to prices and exchange rates in other regional destinations including South Korea, Japan, Taiwan and Singapore) were also tested, but the variations in exchange rates were not sufficient to obtain reasonably precise parameter estimates.



**Table 2: Summary of coefficient estimates**

Dependent variables:	$\Delta \text{Ln}$ (ML_ARR)	$\Delta \text{Ln}$ (SD_ML_ARR)	$\Delta \text{Ln}$ (ON_ML_ARR)
Independent variables:			
$\Delta \text{Ln}$ (RGDPPC) <sub>t-1</sub>	-	1.696 <i>1.52</i>	-
$\Delta \text{Ln}$ (RGDPPC) <sub>t-2</sub>	2.029 <i>2.14</i>	-	3.839 <i>3.08</i>
$\Delta \text{Ln}$ (RER) <sub>t-1</sub>	0.738 <i>1.99</i>	0.927 <i>2.30</i>	-
$\Delta \text{Ln}$ (RER) <sub>t-2</sub>	-	-	0.484 <i>1.00</i>
MIVS (Dummy) <sub>t-1</sub>	0.054 <i>4.01</i>	0.051 <i>3.22</i>	0.062 <i>3.47</i>
OTPW (Dummy) <sub>t</sub>	-0.033 <i>-2.29</i>	-0.047 <i>-3.06</i>	-0.008 <i>-0.50</i>
Constant	-0.048 <i>-1.91</i>	-0.027 <i>-0.95</i>	-0.106 <i>-3.25</i>
No. of observations	55 quarters (Q4 2004 – Q2 2018)	48 quarters (Q2 2006 – Q2 2018)	48 quarters (Q2 2006 – Q2 2018)
Adjusted R-squared	0.2926	0.3460	0.2574
F-statistic	6.58	7.22	5.07

where

- $\Delta$  : Variable in quarter  $t$  – variable in quarter  $t - 1$
- ML\_ARR <sub>$t$</sub>  : Mainland arrivals in quarter  $t$  (seasonally adjusted)
- SD\_ML\_ARR <sub>$t$</sub>  : Same-day Mainland arrivals in quarter  $t$  (seasonally adjusted)
- ON\_ML\_ARR <sub>$t$</sub>  : Overnight Mainland arrivals in quarter  $t$  (seasonally adjusted)
- RGDPPC <sub>$t$</sub>  : Real GDP per capita of the Mainland in quarter  $t$  (seasonally adjusted)
- RER <sub>$t$</sub>  : RMB to HKD real exchange rate in quarter  $t$  (seasonally adjusted)
- MIVS <sub>$t$</sub>  : “Multiple-entry” Individual Visit Endorsements (dummy variable) in quarter  $t$
- OTPW <sub>$t$</sub>  : One trip per week measure (dummy variable) in quarter  $t$

Figures in *blue italics* are *t-statistics* for the estimated parameters.

16. A number of observations are noted from the regression analysis for all Mainland arrivals:

- **All coefficients are statistically significant at the 5% level** (except the constant term) **and their impact on Mainland arrivals is in line with economic intuition.** In particular, increases in the real exchange rate (RMB against HKD) in previous quarter led to increases in Mainland arrivals in the subsequent quarter between Q4 2004 and Q2 2018 and vice versa. That is to say, a stronger RMB would be followed by an increase in Mainland arrivals in subsequent periods.
- Yet **Mainland arrivals were relatively inelastic to the change in the real exchange rate**, i.e. for every 1% appreciation in the RMB against the HKD in real terms in the previous quarter, Mainland arrivals would increase by 0.738% in the following quarter and vice versa.
- By comparison, **the impact of the Mainland’s real GDP per capita on Mainland arrivals to Hong Kong was far more noticeable and elastic**, i.e. the number of Mainland visitors would increase by 2.029% for every 1% increase in real GDP per capita two quarters ago. This figure also suggests that travelling to Hong Kong was considered a luxury good to Mainland residents in the sense that consumption would increase more than proportionately alongside income growth.
- **The introduction of the MIVS measure in April 2009 is estimated to have increased Mainland arrivals by 5.548%**<sup>12</sup> in all subsequent periods with a one-quarter delay, **while the OTPW measure that came into effect in April 2015 reduced Mainland arrivals by some 3.290%**<sup>13</sup> from Q2 2015 onwards, as compared to a hypothetical situation in which these two policy measures do not exist.

---

<sup>12</sup> The marginal impact of the introduction of the MIVS measure on Mainland arrivals is calculated by:

$$\frac{(\text{ML\_ARR}_{\text{MIVS}=1} - \text{ML\_ARR}_{\text{MIVS}=0})}{(\text{ML\_ARR}_{\text{MIVS}=0})} = \frac{(\text{ML\_ARR}_{\text{MIVS}=1})}{(\text{ML\_ARR}_{\text{MIVS}=0})} - 1 = \text{Exp}(0.054) - 1 = 5.548\%$$

<sup>13</sup> The marginal impact of the introduction of the OTPW measure on Mainland arrivals is calculated by:

$$\frac{(\text{ML\_ARR}_{\text{OTPW}=1} - \text{ML\_ARR}_{\text{OTPW}=0})}{(\text{ML\_ARR}_{\text{OTPW}=0})} = \frac{(\text{ML\_ARR}_{\text{OTPW}=1})}{(\text{ML\_ARR}_{\text{OTPW}=0})} - 1 = \text{Exp}(-0.033) - 1 = -3.290\%$$

17. The results and key observations for the separate regressions for same-day and overnight Mainland visitors are summarised below:

- Most of the coefficients remain statistically significant and are in line with economic intuition.
- **Same-day Mainland visitors have a higher elasticity with respect to the RMB to HKD real exchange rate (0.927 for the preceding quarter, statistically significant at 5%) than their overnight counterparts (0.484 for the period two quarters ago, not statistically significant),** though both parameters are still inelastic. Based on spending patterns, the majority of same-day Mainland visitors came to Hong Kong for shopping. Among other reasons such as better quality and more variety of goods, reaping the benefit of the price gap between the two places is often a key motive. Hence, the finding that same-day Mainland visitors are more sensitive to changes in the real exchange rate than overnight Mainland visitors appears to be justifiable.
- **On the other hand, the elasticity of same-day Mainland visitors to real GDP per capita in preceding quarter was 1.696 (statistically significant at 15%), visibly lower than the elasticity of 3.839 (statistically significant at 5%) with respect to the same variable two quarters ago for their overnight counterparts.** This plausibly reflects the different motives underlying the two groups of visitors because an overnight vacation for leisure is more of a luxury good than a same-day shopping trip across the border and requires a longer lead time for planning.
- While the implementation of the MIVS measure had a statistically significant boosting effect on both overnight and same-day arrivals, the OTPW measure mainly reduced the number of same-day visitors and was found to have an insignificant impact on overnight visitors. This is consistent with the policy objective of the Government to attract higher-spending overnight visitors while taking into account the receiving capacity of Hong Kong as a compact city.

## Conclusion and way forward

18. As discussed above, the key observations from the regression analyses are:

- The RMB to HKD real exchange rate in the previous quarters is a statistically significant determinant of Mainland arrivals to Hong Kong, though the latter were inelastic with respect to this variable. Analysed by length of stay, same-day Mainland arrivals were much more sensitive to movements in the real exchange rate than their overnight counterparts.
- Meanwhile, Mainland arrivals were more responsive to income growth (proxied by growth in the Mainland's real GDP per capita) than changes in the real exchange rate. Past data<sup>14</sup> suggest that the rising real GDP per capita of the Mainland was the main growth engine of Mainland arrivals to Hong Kong over the past years, more than offsetting the negative impacts brought about by other variables, such as the OTPW measure.

19. Total tourism expenditure, the main indicator of the performance of Hong Kong's inbound tourism, is determined not only by arrivals but also by visitors' spending during their stays in the city. Due to data limitations<sup>15</sup>, however, the determinants of Mainland visitors' spending in Hong Kong remains a subject of interest for further exploration at the moment. On the bright side, the expected impact of the RMB to HKD real exchange rate on Mainland arrivals per se would still provide some useful information for policymakers, in particular on the direction and magnitude of changes in inbound tourism in case of events that entail significant implications for the real exchange rate.

---

<sup>14</sup> Multiplying the average annual growth rates of different independent variables in the model by their respective coefficients yields the expected growth of the dependent variable, holding other factors constant. It follows that the contribution of the movement of each independent variable to the growth of the dependent variable can be calculated. Our model and the actual data show that the growth in real GDP per capita of the Mainland from Q4 2004 to Q4 2017 accounted for more than 100% of the increase in Mainland arrivals during the period. It has the largest impact on Mainland arrivals and more than offsets the negative impacts of other variables such as the OTPW measure.

<sup>15</sup> Due to the small sample size of the relevant survey, the tourism spending statistics for same-day visitors have only been released by the Hong Kong Tourism Board semi-annually since 2005, thereby restricting the number of available data points to only 27 as at December 2018.

References:

1. Charles J. and Fullerton T. (2011). “An error correction analysis of visitor arrivals to the Bahamas”, *Tourism Economics*, 18 (1): 253-259.
2. Cho V. (2003). “A comparison of three different approaches to tourist arrival forecasting”, *Tourism Management*, 24 (3): 332-330.
3. Culiuc A. (2014), “Determinants of international tourism”, IMF Working Paper WP/14/82.
4. Daniel S. and Ramos F. (2002), “Modelling inbound international tourism demand to Portugal”, *International Journal of Tourism Research*, 4 (3): 193-209.
5. Goh C. and Law R. (2002) “Modelling and forecasting tourism demand for arrivals with stochastic non-stationary seasonality and intervention”, *Tourism Management*, 23 (5): 499–510.
6. Hiemstra S. and Wong K. (2002) “Factors affecting demand for tourism in Hong Kong”, *Journal of Travel & Tourism Marketing*, 13: 43-62.
7. Li G., Wong K., Song H. and Witt (2006) “Tourism demand forecasting: a time varying parameter error correction model”, *Journal of Travel Research*, 45 (2): 175-178.
8. Lim C. and McAleer M. (2001) “Cointegration analysis of quarterly tourism demand by Hong Kong and Singapore for Australia”, *Applied Economics*, 33 (12): 1599-1619.
9. Song H. and Li G. (2008) “Tourism demand modelling and forecasting—a review of recent research”, *Tourism Management*, 29 (2): 203-220.
10. Song H., Li G., Witt S. and Fei B. (2010) “Tourism demand modelling and forecasting: how should demand be measured?”, *Tourism Economics*, 16 (1): 63-81.
11. Song H. and Witt S. (2000) “Traditional methodology of tourism demand forecasting”. In *Tourism demand modelling and forecasting: modern econometric approaches*. Pergamon: Oxford.

12. Song H., Wong K. and Chon K. (2003) “Modelling and forecasting the demand for Hong Kong tourism”, *International Journal of Hospitality Management*, 22 (4): 435-451.
13. Webber A. (2001) “Exchange rate volatility and cointegration in tourism demand”, *Journal of Travel Research*, 39 (4): 398-405.