


INVESTIGATING THE ASSOCIATION BETWEEN AVERAGE HOTEL PRICES AND INTERNATIONAL TOURISM

Anupam Dutta^A



ARTICLE INFO	ABSTRACT
<p>Article history: Received: March, 26th 2024 Accepted: May, 24th 2024</p>	<p>Objective: The present study intends to examine the long- and short-run associations between average hotel prices and the international tourism demand in Singapore.</p>
<p>Keywords: Average Hotel Price; International Tourism; Singapore; Non-Linear ARDL Models.</p>	<p>Theoretical Framework: Employing Johansen Cointegration method and linear ARDL bound tests, we fail to capture the long-term linkage between average hotel prices and the number of visitors in Singapore. We then consider the application of non-linear ARDL (NARDL) models in order to explore whether the non-existence of the long-run connection is due to the non-linear structure of the variables.</p>
	<p>Method: We use monthly data which range from January 1995 to December 2022 yielding a total of 336 observations. All the data on average room rate and total tourist arrivals are retrieved from Thomson Reuters DataStream database. The starting period of the data used in our empirical analysis is dictated by data availability.</p>
	<p>Results and Discussion: The findings reveal that the NARDL model successfully detects the aforesaid association between the variables under consideration. Furthermore, adopting the Toda–Yamamoto test for Granger causality suggests a strong bidirectional short-run connection between these two variables.</p>
	<p>Research Implications: Policymakers could utilize these outcomes to implement appropriate strategies (e.g., stabilizing the hotel prices, rebranding the country as an attractive destination) for receiving significant attention from international tourists.</p>
	<p>Originality/Value: Although Singapore has been one of the major destinations for international tourists over the years, assessing the relationship between average hotel prices and the total number tourists visiting Singapore does not receive much attention in earlier studies. This study aims to extend such scarce literature.</p>
	<p>Doi: https://doi.org/10.26668/businessreview/2024.v9i6.4760</p>

INVESTIGAÇÃO DA ASSOCIAÇÃO ENTRE OS PREÇOS MÉDIOS DOS HOTÉIS E O TURISMO INTERNACIONAL

RESUMO

Objetivo: O presente estudo pretende examinar as associações de longo e curto prazo entre os preços médios dos hotéis e a procura turística internacional em Singapura.

Referencial Teórico: Empregando o método de cointegração de Johansen e testes lineares ARDL, não conseguimos capturar a ligação de longo prazo entre os preços médios dos hotéis e o número de visitantes em Singapura. Consideramos então a aplicação de modelos ARDL não lineares (NARDL) para explorar se a inexistência da conexão de longo prazo se deve à estrutura não linear das variáveis.

Método: Utilizamos dados mensais que vão de janeiro de 1995 a dezembro de 2022, rendendo um total de 336 observações. Todos os dados sobre tarifa média de quarto e total de chegadas de turistas são obtidos do banco de dados Thomson Reuters DataStream. O período inicial dos dados utilizados na nossa análise empírica é ditado pela disponibilidade dos dados.

^A Doctor in Applied Econometrics. School of Accounting and Finance, University of Vaasa. Vaasa, Finland.
 E-mail: adutta@uwasa.fi Orcid: <https://orcid.org/0000-0003-4971-3258>

Resultados e Discussão: Os resultados revelam que o modelo NARDL detecta com sucesso a referida associação entre as variáveis em consideração. Além disso, a adoção do teste Toda-Yamamoto para a causalidade de Granger sugere uma forte ligação bidirecional de curto prazo entre estas duas variáveis.

Implicações da Pesquisa: Os decisores políticos poderiam utilizar estes resultados para implementar estratégias apropriadas (por exemplo, estabilizar os preços dos hotéis, reformular a marca do país como um destino atraente) para receber uma atenção significativa dos turistas internacionais.

Originalidade/Valor: Embora Singapura tenha sido um dos principais destinos para turistas internacionais ao longo dos anos, a avaliação da relação entre os preços médios dos hotéis e o número total de turistas que visitam Singapura não recebeu muita atenção em estudos anteriores. Este estudo visa ampliar essa literatura escassa.

Palavras-chave: Preço Médio do Hotel, Turismo Internacional, Cingapura, Modelos ARDL Não Lineares.

INVESTIGACIÓN DE LA ASOCIACIÓN ENTRE LOS PRECIOS MEDIOS DE LOS HOTELES Y EL TURISMO INTERNACIONAL

RESUMEN

Objetivo: El presente estudio pretende examinar las asociaciones de largo y corto plazo entre los precios promedio de los hoteles y la demanda turística internacional en Singapur.

Marco Teórico: al emplear el método de cointegración de Johansen y las pruebas lineales vinculadas a ARDL, no logramos capturar el vínculo a largo plazo entre los precios promedio de los hoteles y el número de visitantes en Singapur. Luego consideramos la aplicación de modelos ARDL no lineales (NARDL) para explorar si la inexistencia de la conexión de largo plazo se debe a la estructura no lineal de las variables.

Método: Utilizamos datos mensuales que van desde enero de 1995 hasta diciembre de 2022, arrojando un total de 336 observaciones. Todos los datos sobre el precio medio de las habitaciones y el total de llegadas de turistas se obtienen de la base de datos Thomson Reuters DataStream. El período de inicio de los datos utilizados en nuestro análisis empírico está dictado por la disponibilidad de datos.

Resultados y Discusión: Los hallazgos revelan que el modelo NARDL detecta con éxito la asociación antes mencionada entre las variables consideradas. Además, la adopción de la prueba Toda-Yamamoto para la causalidad de Granger sugiere una fuerte conexión bidireccional de corto plazo entre estas dos variables.

Implicaciones de la Investigación: Los formuladores de políticas podrían utilizar estos resultados para implementar estrategias apropiadas (por ejemplo, estabilizar los precios de los hoteles, cambiar la imagen del país como un destino atractivo) para recibir una atención significativa de los turistas internacionales.

Originalidad/Valor: Aunque Singapur ha sido uno de los principales destinos para los turistas internacionales a lo largo de los años, la evaluación de la relación entre los precios promedio de los hoteles y el número total de turistas que visitan Singapur no recibe mucha atención en estudios anteriores. Este estudio pretende ampliar tan escasa literatura.

Palabras clave: Precio Medio del Hotel, Turismo Internacional, Singapur, Modelos ARDL no Lineales.

1 INTRODUCTION

The tourism industry of Singapore has been extremely successful in attracting international tourists over the years. In order to receive attention from the international travellers, the Singaporean government has launched “Uniquely Singapore” marketing campaign through Singapore Tourism Board in March 2004 (Lee, 2008). Since then the number of tourists visiting Singapore has significantly increased. For instance, international visitor arrivals in Singapore have climbed from 7.08 million in 2005 to 19.10 million in 2019¹. These

¹ The information is sourced from the website of Singapore Tourism Board.

figures suggest that the number of visitors in this small and beautiful Southeast Asian land has become doubled during the last decade. Therefore, the tourism industry in Singapore embodies a crucial role in promoting the country's economic development. A recent report, published by the Singapore Tourism Board (STB), shows that the tourism industry contributes about 4% to the Singapore economy (STB Annual Report 2011/2012, p. 5).

Considering such economic significance of tourism sector, a strand of literature has studied different aspects of tourism in Singapore. Nevertheless, investigating the association between average hotel prices and international tourism does not receive considerable attention in the existing tourism and hospitality literature (Lee, 2010a). Exceptions include Gunadhi and Boey (1986), Lee (2010a; 2011). Gunadhi and Boey (1986), for instance, examine whether there is any unidirectional cause-and-effect relationship between international arrivals and hotel room rates. Lee (2010a), however, claims that considering such unidirectional cause-and-effect models might be inappropriate, as these two variables can be determined simultaneously. Using a linear ARDL (auto-regressive distributed lag) bound tests, Lee (2010a) does not find any long-run associations between the variables considered.

The objectives of this research are two-fold. First, we aim to assess whether the non-existence of the long-run relationship between international arrivals and relative hotel price, as evidenced by Lee (2010a), is due to the non-linear structure of the variables. To reach our goal, we consider the application of non-linear ARDL bound tests in our empirical analysis. For comparison purposes, the results from linear ARDL models are also presented. In addition, we also employ the Johansen cointegration test to investigate whether the variables under consideration comove in the long run. Second, we make use of the Toda–Yamamoto (TY) version of Granger causality approach, developed by Toda and Yamamoto (1995), for the purpose of identifying the short-term 'lead-lag' connection between hotel prices and number of tourist arrivals. Adopting the TY approach is advantageous, as applying this method does not depend on whether a variable of interest is $I(0)$, $I(1)$ or $I(2)$, not-cointegrated or cointegrated of any arbitrary order. Besides, it is free of the bias linked to stationarity or cointegration tests, as this method requires no inspection of cointegrating features of the process (Jain & Ghosh, 2013; Dutta, 2017).

Our empirical research mainly contributes to the scarce literature exploring the linkage between hotel price and international tourism in the context of Singapore. In doing so, the present study provides a novel extension to important articles such as Gunadhi and Boey (1986) and Lee (2010a, 2011). The findings of our paper have important implications for those involved in tourism industry. The rest of the paper is organized as follows. The following

section outlines the data and methodologies used in our empirical part. Results are discussed in Section 3. Section 4 concludes our work.

2 THEORETICAL FRAMEWORK

We use monthly data which range from January 1995 to December 2022 yielding a total of 336 observations. All the data on average room rate and total tourist arrivals are retrieved from Thomson Reuters DataStream database. The starting period of the data used in our empirical analysis is dictated by data availability.

3 METHODOLOGY

In our empirical analysis, we consider the following unrestricted linear ARDL regression without any time trend component:

$$\Delta y_t = \omega + \sum_{i=1}^n \alpha_i \Delta y_{t-i} + \sum_{i=1}^n \beta_i \Delta x_{t-i} + a x_{t-1} + b y_{t-1} + \varepsilon_t \quad (1)$$

In Equation 1, x and y could be either room rate or total number of visitors arriving in Singapore. That is, we estimate the above model separately using both average room rate and total number of visitors as the dependent variables. With a view to examining the cointegrating relationship, testing for $H_0: a = b = 0$ suffices. Next, we require to compute the F-statistics. Note that Pesaran et al. (2001) introduced two different sets of critical values, which are used as the upper-bound and the lower-bound for purely I(1) and I(0) series, respectively. We conclude that the variables of interest would have a long-term association if the test statistic surpasses the upper-bound critical value (Lee 2010b).

Next, the non-linear version of the ARDL (NARDL) approach assumes the following form

$$\Delta y_t = \omega + \sum_{i=1}^n \alpha_i \Delta y_{t-i} + \sum_{i=1}^n (\beta_i \Delta x_{t-i}^+ + \gamma_i \Delta x_{t-i}^-) + a_1 x_{t-1}^+ + a_2 x_{t-1}^- + b y_{t-1} + \varepsilon_t \quad (2)$$

where:

$$x^+ = \sum_{i=1}^m \Delta x_i^+ = \sum_{i=1}^m \max(\Delta x_i, 0) \text{ and}$$

$$x^- = \sum_{i=1}^m \Delta x_i^- = \sum_{i=1}^m \min(\Delta x_i, 0)$$

Cointegration exists between the variables if $H_0: a_1 = a_2 = b = 0$ is rejected. It is noteworthy that the NARDL approach has been widely used in earlier literature. Previous studies such as Katrakilidis and Trachanas (2012), Bildirici and Turkmen (2015) and others also conduct similar analyses in their empirical works.

4 RESULTS AND DISCUSSIONS

Table 1 shows the findings of our stationarity tests (i.e., ADF and PP tests). In both case, we wish to test H_0 : the variables are non-stationary. The results indicate that the time series under study are non-stationary at levels, but become stationary after taking the first difference. Hence none of these indexes appears to be integrated of order 2.

Table 1

Unit root test results

	ADF	PP
Panel A: Levels		
Room rate	-0.74	-0.99
Total arrivals	-0.19	-2.31
Panel B: 1 st difference		
Room rate	-16.15***	-24.45***
Total arrivals	-3.91***	-46.37***

Notes: *** $p < 0.01$

Now before discussing the findings of ARDL bound tests, we first review the findings of the Johansen cointegration method. Since the time series are non-stationary at levels, the Johansen cointegration test can be performed. Table 2 demonstrates the outcomes of this test. The findings suggest that there is no long-term relationship between room rates and number of visitors, as the null hypothesis of no cointegration cannot be rejected.

Table 2

Johansen cointegration tests

	Test statistics	Critical values	Decision
λ_{trace}			
$H_0: r = 0 \text{ vs. } r \geq 1$	4.91	15.49	No cointegration
$H_0: r \leq 1 \text{ vs. } r \geq 2$	0.03	3.84	No cointegration
λ_{max}			
$H_0: r = 0 \text{ vs. } r = 1$	4.89	14.26	No cointegration
$H_0: r \leq 1 \text{ vs. } r = 2$	0.03	3.84	No cointegration

Notes: This table displays the outcomes of Johansen cointegration test. The findings suggest that there is no long-term relationship between room rates and number of visitors, as the null hypothesis of no cointegration cannot be rejected.

Next, Table 3 exhibits the outcomes of the ARDL process². After selecting the correct lag order, the autocorrelation among the residuals are checked to determine if the chosen process is accurately specified. Now, the findings of the ARDL model demonstrates that cointegration does not exist between the variables under consideration given that the F-statistics have not exceeded the I(1) bound critical value. Since the test statistic is found insignificant, we conclude that hotel price and number of international tourists would not have any long-term linkage. This finding is consistent with that reported by Lee (2010a).

Table 3

Results of linear ARDL bound tests

Dependent variable	F-statistic	Decision
Room rate	2.54	No cointegration
Total arrivals	0.13	No cointegration

Note: The critical F-statistic at the 5% level for model with all I (1) series is 5.73. See Table CI(iii) with k=1 on page 300 of Pesaran et al. (2001).

*** $p < 0.01$

As discussed in the introductory section, the prime objective of this study is to assess whether the lack of long-term connections between international arrivals and average room rate is the consequence of the non-linear structure of these time series. To shed light on this concern, we now focus on the findings of the NARDL specification which are exhibited in Table 4. Looking at the results, we now report the presence of long-term connections, as the test statistics in both cases are statistically significant at 1% level. Therefore, it can be inferred that although the Johansen cointegration test along with the linear ARDL models provide evidence in favor of the null hypothesis of no cointegration, the use of NARDL process confirms the long-run relation between hotel price and international tourists visiting Singapore.

Table 4

Outcomes of NARDL bound tests

Dependent variable	F-statistic	Decision
Room rate	12.62***	Long-run association exists
Total arrivals	25.05***	Long-run association exists

Note: The critical value is 6.36.

*** $p < 0.01$

² We evaluate the number of lags on the basis of Akaike and Schwarz information criteria.

Next, Table 5 presents the Toda–Yamamoto test results. We conduct this analysis considering a vector-autoregressive (VAR) structure. Consistent with the ARDL models, we evaluate the number of lags on the basis of Akaike and Schwarz information criteria. These results suggest that there is bi-directional causality between the variables under study. It is worth mentioning that Lee (2010a) also documents similar findings in his research using traditional granger causality tests.

Table 5

Outcomes of TY approach

Dependent variable →	Room rate	Total arrivals
Room rate	-	22.51 (0.00)***
Total arrivals	56.78 (0.00)***	

Notes: *p*-values are shown in brackets. The number of lags is 8.

*** *p*<0.01

5 CONCLUSION

Singapore is typically considered as one of the top 20 tourist destinations in the world (Lee, 2009). The tourism sector of Singapore is therefore important for the country's overall financial growth and development. Over the past few years, the tourism industry contributes significantly to the Singaporean economy. Taking such economic impact of tourism sector into consideration, previous researchers have extensively analyzed different features of tourism in Singapore. Nonetheless, much less attention has been paid to the link between average hotel prices and the number of international visitors. The aim of this present study is to fill this void.

To serve our purpose, we investigate the long-run and short-run association between the studied variables. Using Johansen Cointegration method and linear ARDL bound tests does not document any long-run linkage between average hotel prices and the number of visitors. Lee (2010a) also documents the same while using the bound testing procedure. We then make use of the non-linear ARDL (NARDL) approach in order to assess whether the non-existence of the long-run connection is due to the non-linear structure of the variables. Our results show that the NARDL model successfully detects the aforesaid association between the variables under consideration. Furthermore, adopting the TY test for Granger causality reports a bidirectional short-term linkage between the two time series.

Our empirical findings could have important implications for those participating in tourism sector. Since the results of non-linear ARDL models suggest that average room prices and tourist arrivals appear to be cointegrated, returns from investments in the Singaporean

tourism sector might be sustainable in the long run. Policymakers, on the other hand, could also utilize these outcomes to implement appropriate strategies for receiving significant attention from international tourists. One such policy could be stabilizing the hotel prices. To do so, more effective monitoring systems could be adopted. In addition, the government of Singapore should continue rebranding the country as an attractive destination. Finally, economists and researchers should consider using non-linear approaches rather than applying linear models with a view to properly understanding the association between the variables under study.

REFERENCES

- Bildirici, M. E., & Turkmen, C. (2015). Nonlinear causality between oil and precious metals. *Resources Policy*, 46(2), 202–211.
- Dutta, A. (2017). Implied Volatility Linkages between the US and Emerging Equity Markets: A Note. *Global Finance Journal*, 35, 138-146.
- Gunadhi, H., & Boey, C.K. (1986). Demand elasticities of tourism in Singapore. *Tourism Management*, 7(4), 230–310.
- Jain, A., & Ghosh, S. (2013). Dynamics of global oil prices, exchange rate and precious metal prices in India. *Resources Policy*, 38(1), 88–93.
- Katrakilidis, C., & Trachanas, E. (2012). What drives housing price dynamics in Greece: new evidence from asymmetric ARDL cointegration. *Economic Modeling*, 29(4), 1064–1069.
- Lee, C. G. (2008). Tourism and economic growth: the case of Singapore. *Regional and Sectoral Economic Studies*, 8(1), 89–98.
- Lee, C. G. (2009). Are tourist arrivals stationary? Evidence from Singapore. *International Journal of Tourism Research*, 11(4), 409–414.
- Lee, C. G. (2010a). The dynamic interactions between hotel room rates and international inbound tourists: Evidence from Singapore. *International Journal of Hospitality Management*, 29(4), 758- 760.
- Lee, C. G. (2010b). Health care and tourism: evidence from Singapore. *Tourism Management*, 31(4), 486–488.
- Lee, C. G. (2011) The determinants of hotel room rates: Another visit with Singapore's data. *International Journal of Hospitality Management*, 30(3), 756–758.
- Pesaran, M.H., Shin, Y., & Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289–326.
- Singapore Tourism Board. 2012. STB Annual Report 2011/2012.
- Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possible integrated processes. *Journal of Econometrics*, 66(1-2), 225 – 250.