The Contribution of Passenger Movement to Economic Growth in Malaysia

Taasim, Shairil and yusoff, remali

Open University Malaysia, Universiti Malaysia Sabah

1 January 2017

The Contribution of Passenger Movement to Economic Growth in Malaysia

Shairil Izwan Taasim
Open University Malaysia
Email : shairil@oum.edu.my

Remali Yusoff
University Malaysia Sabah
Email : remyuf@ums.edu.my

Abstract

This study investigates the causal relations between passenger movement handled by Malaysia airports and economic growth per capita from 1990 to 2015 by using co-integration approach, Granger causality and vector autoregression (VAR) model. By applying time series analysis, we explored whether the two variables lead each other to Malaysia's economic growth. The result showed that both variables integrated to enhance Malaysia's economic performance.

Keywords: Granger, Airports, Co-Integration, GDP per capita

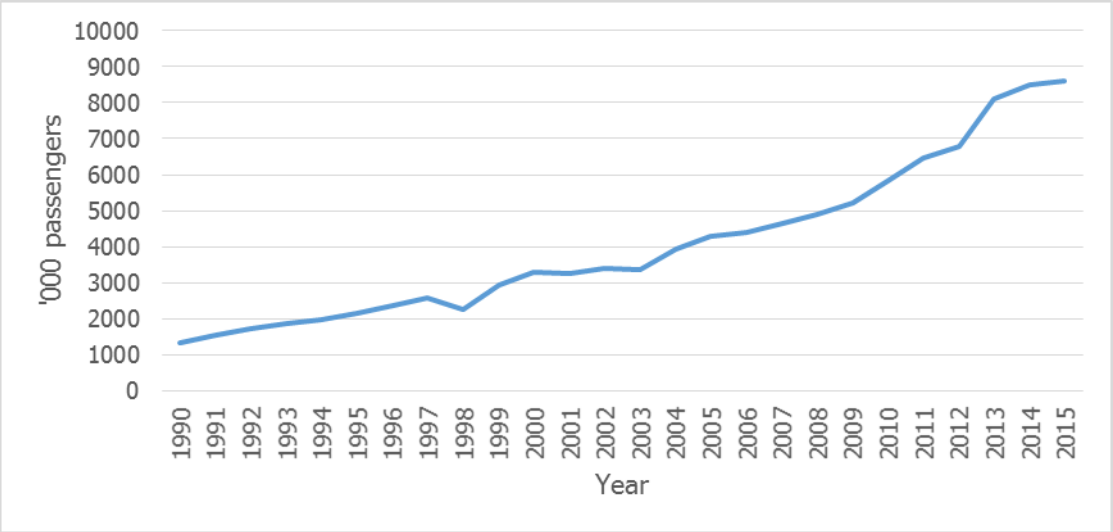
Introduction

There have been a number of empirical studies on the relationship between air transport demand and economic development (Hakim and Merkert, 2016; Karim et al., 2003; Ozcan, 2013). Air transportation enhances economic development in a faster way than vehicle or rail with the integration of rural and urban areas. The direct impact of air transportation in tourism and economic activities are especially brought by tourist arrivals and the handling of import and export shipping. Karim et al. (2003) showed that air passenger market is struggling to overcome the effects of global economic downturn and terror attacks especially the happening on 11th September 2001. Ozcan (2013) stated in his study that airports are the critical infrastructures that are believed to be essential for economic development because they substantially increase the accessibility of the regions they serve. Chang and Chang (2009) indicated that air cargo traffic and economic growth in Taiwan are co-integrated in the short and long run relationship of bi-directional causality.

In Malaysia, domestic routes are handled by Malaysia Airlines, AirAsia, Malindo Airlines and a few other airlines that have been given license to provide domestic routes. International airports in Malaysia including Kuala Lumpur International Airport, Senai International Airport, Penang International Airport, Langkawi International Airport,

Kuching International Airport and Kota Kinabalu International Airport act as the connections of Malaysia to international routes.

Figure 1: Growth of Passengers Handled by Malaysia Airports



Source: Transports Statistic Malaysia, 2016.

As stated in Figure 1, passengers handled by Malaysia airports has been growing yearly, among the 27 airports across Malaysia with six international airports including Kuala Lumpur International Airport, Senai International Airport, Penang International Airport, Langkawi International Airport, Kuching International Airport and Kota Kinabalu International Airport. Malaysia's economy rely on tourism which is the major contributor to economic growth, giving more incentives to Malaysia airports with the development of the new KLIA2 to offer more comfort to airport users.

In this paper, we analysed the dynamic relationship between passenger movement in Malaysia airports and Malaysia real gross domestic product (GDP) in accelerating Malaysia's economic growth by using econometric models. A Granger causality test is performed following the co-integration approach to show the direct causality between economic growth and passenger movement.

Literature Review

There are many different studies on the importance of airport development to economic development. Airports are critical infrastructures that are believed to be essential for economic development because they substantially increase the accessibility of the regions they serve (Ozcan, 2013). Moreover, there are other studies that focused their research on the impact of air transport to tourism industry (Bieger & Wittmer, 2006).

Many empirical researches have been done on tourism and economic growth which focus on registered tourists and passengers in airports. Oh (2006) found that the quick development of tourism led to a growth of household incomes and government revenues directly and indirectly by means of multiplier effect. However, existing airports which bring in tourists from other countries play important roles in economic development especially in urban and rural areas. Goetz (1992) in his study found a positive and mutual interdependence between air transportation and urban economic growth in US urban areas. Air transportation is related to the generation of income to Malaysia citizens especially in rural areas that have their own attractions.

Access to facilities at airports is an added value of attraction that provides comfort to passengers. Increasing empowerment and advances in technology are the aspects to be considered if the government wants to achieve high hospitality in airports. Debbage (1999) examined the linkage between airport operation and the structural composition of regional economy. His main finding was that those places experiencing significant increase in air passenger volume achieved considerable gains in employment, especially in the employment of administrative and auxiliary workers. Chou (1993) examined the distribution and accessibility of airports and found that the change of city air service nodes was the result of economic development and population growth, instead of the spoke-route structure operation.

Liu (2000) examined the relationship between the development of civil aviation industry and GDP growth in China and did not find any positive relation between the two variables during 1985-1999. But Ye, Li and Li (2005) also conducted a co-integration test showing that GDP growth caused the growth in civil aviation industry, but not the other way round. Platform commerce in sea port and railways have been implemented in the early 1930's when industries were booming in Europe but there existed some obstacles in the development of industries such as limited access and time constraint. Air transportation solves the problem of time constraint in commerce industry while information technology helps air transportation to become more efficient and adds more values in terms of economic impacts. Bennell and Prentice (1993) examined the impacts of airport activities on economic development in Canada and found that there was a significant effect of airports activities on employment in the country. Button et al. (2010) suggested that income per capita in the neighbouring areas could increase by 0.18–0.4% due to an increase of 10% in air passenger traffic.

Data and Model

Data in this study are yearly data of passengers handled by Malaysia airports (Pax) and real gross domestic product (GDP) from 1990 to 2015. The data of passengers exclude transit passengers from Malaysia Airports Berhad (MAB) while the real GDP data which represents economic growth are provided by Ministry of Finance Malaysia. The VAR model and co-integration model were estimated using data over the period of 1990 to 2015. As for empirical analysis, we used the variables in their logarithmic transformations, which are LgGDP and LgPax respectively. It is necessary to transform the variables into their natural logarithms to make interpretations based on the elasticity of data.

The causality tests between air passenger and economic growth involved estimating the following bivariate regressions:

$$Passenger_t = \mu 1 * GDP_{t-1} + \mu 2 * Pax'_{t-j} + \acute{e}_{1t}, \quad (1)$$

$$GDP_t = \mu 1 * GDP_{t-1} + \mu 2 * Pax'_{t-j} + \acute{e}_{1t}, \quad (2)$$

Where μ is the deterministic component, PaxLG represents passenger and GDPLG represents economic growth. Engle and Granger (1987) found that if two time series variables are co-integrated, then at least one directional Granger causation exists. To answer the question regarding the direction of causation, the Granger causality test were performed.

Methodology and Result

Unit Root Test

First, the specification and estimation of co-integration and VAR were required to examine the stationarity of the variables. A test of stationarity is important to set up the specification and estimation of the correct model (Engle & Granger, 1987). Stationary variables refer to variables with constant mean, variance and covariance through time, which means they are not random (Taasim and Yusoff, 2014). The stationarity of the series was investigated by employing unit root tests developed by Phillips and Perron (1988).

Table 2: ADF and PP

Instrument	Augmented Dickey Fuller (ADF)			
	Level		First Difference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
PaxLG	0.051	0.195	-5.534*	-4.605*
GDPLG	0.061	0.154	-5.215*	-5.215*
	Philip Perron			
	Level		First Difference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
PaxLG	-1.429	-0.798	14.84	4.388
GDPLG	0.606	0.154	-5.810	-5.216

*significant at 0.01

The results from the ADF test are shown in Table 2. Despite some minor differences in the findings, the obtained results indicated that the two variables – PGLG and GDPLG are integrated of order I(1).

VAR model.

In Table 3, there are two associate vectors between air passenger movement and economic growth. A value higher than 0.05 supports a double-sided causality relation in the co-integration test. Two co-integration equalities can also be defined if there exists a long term relationship in time series data.

Table 3: Johansen Co-Integration Test

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.502889	26.64467	20.26184	0.0057*
At most 1 *	0.337180	9.870044	9.164546	0.0367*

*Significant at 0.05

Granger (1988) found that if two time series variables are co-integrated, then at least one directional Granger causation exists. Granger causality test was performed as a final step to answer regarding the direction of causation. VAR model was developed in which all variables are endogenous (Sim, 1980).

There are three hypothesises, which are passenger movement affects economic growth, economic growth affect passenger movement and both demonstrate a relationship. Relationships were tested using Granger causality approach to determine whether the lags

of one variable enter into the equation of another variable (Enders, 1995). The optimal lag 1 was selected with the smallest value of Akaike Information Criteria (AIC) and Schwartz Bayesian Criteria (SBC) which are presented in Table 4.

AIC = T log [Σ] + 2N

SBC = T log [Σ] + N log (T), where [Σ] is the determinant of variance/covariance matrix of residuals and N represents the total number of parameters estimated in all equations. In order to test the aforementioned three hypothesises, a two-variable VAR system can be expressed as below:

$$\left[\frac{\Delta GDP_T}{\Delta Pax_t}\right] = \beta_0 + \beta_1\left[\frac{\Delta GDP_{t-1}}{\Delta Pax_{t-1}}\right] + \beta_2\left[\frac{\Delta GDP_{t-2}}{\Delta Pax_{t-2}}\right] + \cdots . + \beta_x\left[\frac{\Delta GDP_{t-x}}{\Delta Pax_{t-x}}\right] + \beta_{x+1}\left[\frac{D_{t-4}}{D_{t-4}}\right] + \mu_t$$

Where β_0 is a vector constant term, β_1 is the matrix of parameters and μ_t is the innovation term.

Table 4: VAR Lag Selection

	AIC	SBC
Lag 1[a]	-3.682	-3.389
Lag 2	-3.391	-2.900
Lag 3	-3.142	-2.451
Lag 4	-2.922	-2.629

[a] indicates optimal lag

Granger Causality Test

Table 3 displayed the results of Granger causality test on the annual data. The null hypothesis regarding the causation of passengers (PGLG) on economics growth (GDPLG) was rejected at 5% significance level. The null hypothesis of economic growth (GDPLG) causing passenger movement (PGLG) was also rejected at 5% significance level. The result of analysis in this study indicated that passenger movement leads to economic growth development and economic growth leads to passenger expansion as shown in Table 5.

The co-existence of passenger movement leading economic growth and economic growth leading passenger expansion indicated a relationship between the two variables. This can be seen in the development of airport facilities and the increased openness in Malaysia's economic policy where the two variables influence each other.

Table 5: Causality Test for Passengers and GDP

	Passengers does not cause GDP		GDP does not cause Passengers	
Optimal Lag	1		1	
F-statistic	6.111		6.313	
P-value	0.022*		0.019*	
VAR Order	F-statistic	p-value	F-statistic	p-value
2	3.311	0.058	2.228	0.135
3	1.928	0.166	0.996	0.419
4	0.876	0.505	1.065	0.413
Obs	25			

Note: Optimal lag is determined by AIC and SBC,
*Null hypothesis is rejected at 5% significance level.

Concluding Remarks

The movement of passengers in Malaysia apart from the influx of tourists, as well as access to each area within Malaysia are getting easier. Tourism sector plays a very important role in the contribution of national economy due to the influx of tourists in increasing the flow of money within the country. In addition, the trickle-down effect from passenger movement in the aspect of tourism also contributed to the increase in consumer revenues especially among Small Medium Enterprises (SMEs).

The impacts from the air crash of MH370 and MH17 was not significant as shown in figure 1, but there was a significant slow movement in the increase of passengers. We are in Malaysia, which is a country with its unique attractions, especially well-known with its five-star airport facilities. The expansion of airports such as Kota Kinabalu Airport, Sandakan Airport and Senai Airport is one of the initiatives of Malaysia airports to attract more tourists and provide five-star hospitality in our airports. The conclusion of the study showed that the relationship between GDP and passenger movement are interrelated, namely GDP leads to passenger movement and passenger movement leads to economic growth.

References

Bieger, T., & Wittmer, A. (2006): Air transport and tourism-Perspective and challenges for destination, airlines and governments, Journal of Air Transport Management, 12, 40-46

Benell, Dave W. and Prentice, Barry E. (1993) A regression model for predicting the economic impacts of Canadian airports, Logistics and Transportation Review, 29 (2), 133- 139.

Button, K., Lall, S., Stough, R., and Trice, M. (1999). High-technology employment and hub airports. Journal of Air Transport Management, 5(1), 53–59.

Chou, Y.H. (1993) Nodal accessibility of air transportation in the United States, 1985-1989, Transportation Planning and Technology, 17, 25-37.

Engle, R.F. & Granger, C.W.J. (1987). Cointegration and error correction: Representation, estimation and testing. Econometrica 50, 987–1007.

Goetz, A.R. (1992) Air passenger transportation and growth in the US urban system, 1950- 1987, Growth and Change, 23, 218-242.

Ozcan, I., C. 2013. Air passenger traffic and local employment: Evidence from Turkey. European Journal of Transport and Infrastructure Research 13(4): 336-356.

Karim, M.R., Narupiti, S., Parikesit, D., and Kushari, B. 2003. Airport Development in Southeast Asia – Case study of Malaysia and Thailand. Journal of the Eastern Asia Society for Transportation Studies, Vol. 5. 484- 498.

Oh, Chi-Ok. 2005. The Contribution of Tourism Development to Economic Growth in the Korean Economy. Tourism Management. Vol 26. 39-44.

Keith G. Debbage (1999) Air transportation and urban-economic restructuring: competitive advantage in the US Carolinas, Journal of Air Transport Management, 5, 211-221.

Liu Y. (2000) Analysis on the relationship between GDP growth rate and the growth rate of main civil aviation indicators of China, Civil Aviation Economics and Technology, (Minhang Jingji yu Jishu, in Chinese), 9, 8-10.

Zhou, Y.; Zhongmin, Li and Xiaofeng, Li (2005) Empirical research on the relationship between the development of China's civil aviation and economic growth, Journal of Tianjin University of Technology. 5, 81-85.

Shairil Izwan Taasim, PhD
Open University Malaysia
MALAYSIA

Remali Yusoff, (Prof Dr.)
Faculty of Business, Economic and Accountancy
University Malaysia Sabah
MALAYSIA