

Panel Data Model For Tourism Demand

Kadek Jemmy Waciko, Ismail, B

Abstract -This study explained the construction of panel data models, compared the estimation performance of the Fixed Effects model and the Random Effects model. Our novelty model focuses on the 10 best travel destinations according to Tripadvisor award 2018. The most appropriate model is the Fixed Effect model with Individual Effect. The positive effect on Gross Domestic Product (GDP) partially arising from Number of International tourist arrivals, International Tourism Receipts, and International Tourism Expenditures and the negative effect on GDP partially arising from Total Employment in the tourism sector. The International Tourist Arrivals, International Tourism Receipts, International Tourism Expenditures, and Total Employment in the tourism sectors have simultaneous significant influence on GDP and adjusted together can explain changes in GDP by 95.054% from France, UK, Italy, Indonesia, Greece, Spain, Czech Rep., Morocco, Turkey, and the USA while the remaining 4.946% is explained by other variables outside the model.

Keywords: Fixed Effects model, Random Effects model

1. INTRODUCTION

The phenomenal growth of both the world-wide tourism industry and academic interest in tourism over the last forty years has generated great interest in tourism demand modeling and forecasting from both the business and academic sectors. Lim [12] noted that, although time series data are widely utilized in estimating tourism demand, few studies use cross-section or panel data. As an overview, we can see in [14] used panel data to develop a model of international tourism spending using both economic and social variables for a total of 138 countries over 7 years. The use of the data panel approach to identify the recent effects of demographic change in Japanese people's travel Propensity is also used in [15]. On the other hand, [11] estimated short-run and long-run elasticities for tourists visiting the Island of Tenerife. In addition, [13] identified factors affecting tourist arrivals to Africa. Garin-Munoz [5] and Garin-Munoz & Montero-Martin [6] modeled international tourism demand for the Canary Islands and the Balearic Islands, respectively. Some other interesting research that uses data panels in tourism demand we can see in [16] examined whether climate change has impacted regional tourism in the UK. Brida & Risso [2] studied the German demand for tourism in South Tyrol using dynamic panel data. The impact of Avian Flu on international tourist arrivals to Asian, European and African countries estimated in [10] and a panel data model of international tourism demand for Malaysia developed in [8]. Panel data are most useful when we suspect that the outcome variable depends on explanatory variables that are not observable but correlated with the observed explanatory variables. Parameter estimation in regression analysis with cross-section data carried out with OLS estimation. This method will give the results of the estimation which is the Best Linear Unbiased Estimator (BLUE) if all of the Gauss Markov assumptions are met including non-autocorrelation. When we are dealing with panel data, this last condition is certainly difficult to fulfill so that parameter estimation is no longer for BLUE. If panel data is analyzed by approaching time series

models, then there is information on the variety of unit cross-sections that are ignored in modeling. One of the advantages of panel data analysis is considering the variety that occurs in unit cross-sections. The purpose of this study:

- 1) To explain proportionally the construction of panel data models using the application in tourism demand.
- 2) To compare between the Fixed Effects Model and the Random Effects Model approaches to found the appropriate model.
- 3) To estimates parameter the appropriate model using diagnostic test criteria.

2. METHODOLOGY

2.1 Pooled Regression Model

The equation for the Pooled Regression model :

$$y_{i,t} = x_{i,t}'\beta_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where:

$y_{i,t}$ is the dependent variable where i represents countries (the cross-section dimension) and t represents time (the time-series dimension); $x_{i,t}'$ is vector of K - independent variables from country- i and observed in time- t ; $\varepsilon_{i,t}$ is the error term, The error term is identical and independently distributed or iid $(0, \sigma_{\varepsilon}^2)$ for all i and t .

2.2 Fixed Effects Model

The equation for the Fixed Effects model:

$$y_{i,t} = x_{i,t}'\beta_{i,t} + c_i + d_t + \varepsilon_{i,t} \quad (2)$$

Where c_i denotes the unobservable individual effects; d_t denotes the unobservable time effects. If the model contains c_i and d_t , is called a two-way fixed effects model, if the model contains $d_t = 0$ or $c_i = 0$ called a one-way fixed effects model.

2.3 Random Effects Model

Random effects models are generally written as follows :

$$y_{i,t} = x_{i,t}'\beta_{i,t} + w_{i,t} \quad (3)$$

Where,

- Kadek Jemmy Waciko. Research Scholar, Department of Statistics, Mangalore University, Mangalagangothri-574199, Karnataka, India. Email: kadekjemmywaciko@gmail.com
- Prof. Ismail, B. Department of Statistics, Mangalore University, Mangalagangothri-574199, Karnataka, India. Email: prof.ismailb@gmail.com

$$w_{i,t} = c_i + d_t + \varepsilon_{i,t} \tag{4}$$

If the model contains c_i and d_t , is called a two-way random effects model, if model contains $d_t = 0$ or $c_i = 0$ called a one-way random effects model.

2.4. Estimation Methods

2.4.1 Generalized Least Squares

Suppose, $W_i = [w_{i1}, w_{i2}, \dots, w_{iT}]'$ In view of this form of w_{it} , we have what is often called an "error components model" then, for this model,

$$E[w_{it}^2] = \sigma_\varepsilon^2 + \sigma_u^2,$$

$$E[w_{it} w_{is}] = \sigma_u^2, t \neq s.$$

For the T observations for unit i, let $\Omega = E[w_i w_i']$. Then

$$\Omega = \begin{bmatrix} \sigma_\varepsilon^2 + \sigma_u^2 & \sigma_u^2 & \sigma_u^2 & \dots & \sigma_u^2 \\ \sigma_u^2 & \sigma_\varepsilon^2 + \sigma_u^2 & \sigma_u^2 & \dots & \sigma_u^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ \sigma_u^2 & \sigma_u^2 & \sigma_u^2 & \dots & \sigma_\varepsilon^2 + \sigma_u^2 \end{bmatrix} = \sigma_\varepsilon^2 I_T + \sigma_u^2 i i' \tag{5}$$

Where I is a T x1 column vector of 1s. Since observations I and j are independent, the disturbance covariance matrix for the full nT observations is

$$V = \begin{bmatrix} \Omega & 0 & 0 & \dots & 0 \\ 0 & \Omega & 0 & \dots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \dots & \Omega \end{bmatrix} = \Omega \otimes I_n \tag{6}$$

This matrix has a particularly simple structure. For generalized least squares, we require $V^{-\frac{1}{2}} = I \otimes \Omega^{-\frac{1}{2}}$

therefore, we need only find $\Omega^{-\frac{1}{2}}$, which is $\Omega^{-\frac{1}{2}} = \frac{1}{\sigma_\varepsilon} \left[I - \frac{\theta}{T} i i' \right]$

Where $\theta = 1 - \frac{\sigma_\varepsilon}{\sqrt{T\sigma_u^2 + \sigma_\varepsilon^2}}$ the transformations of y_i and X_i for GLS is therefore

$$\Omega^{-\frac{1}{2}} y_i = \frac{1}{\sigma_\varepsilon} \begin{bmatrix} y_{i1} - \theta \bar{y}_{i.} \\ y_{i2} - \theta \bar{y}_{i.} \\ \vdots \\ y_{iT} - \theta \bar{y}_{i.} \end{bmatrix} \tag{7}$$

and likewise for the rows of X_i . For the data set as a whole, generalized least squares is computed by the regression on these partial deviations of y_{it} on the same transformation of x_{it} . Note the similarity of this procedure to the computation in the LSDV model, which has $\theta = 1$. It can be shown that the GLS estimator is, as the OLS estimator, a matrix weighted average of the within and between units estimators:

$$\hat{\beta} = \hat{F}^w b^w + (I - \hat{F}^w) b^b \tag{8}$$

We can see the detail explained in [7].

2.4.2. General Feasible Generalized Least Squares Models

The estimated error covariance matrix is

$$\hat{V} = I_n \otimes \hat{\Omega}, \text{ with } \hat{\Omega} = \sum_{i=1}^n \frac{\hat{u}_i \hat{u}_i'}{n} \tag{9}$$

the error or mismatched covariance structure inside every group (if Effect= "Individual") of observations to be fully unrestricted may be affected by this framework. We can see the detail explained in [4].

2.5 Model Analysis

2.5.1 Hausman's Test

We can run a Hausman test to decide between fixed or random effects where the null hypothesis is that the preferred model is random effects vs. the alternative the fixed effects. It basically tests whether the unique errors (u_i) are correlated with the regression, the null hypothesis is they are not. Hausman (1978) in Greene [9] developed a test based on the idea that under the hypothesis of no correlation, The other essential ingredient for the test is the covariance matrix of the difference vector, $[b - \hat{\beta}]$:

$$Var [b - \hat{\beta}] = Var [b] + Var [\hat{\beta}] - Cov [b, \hat{\beta}] - Cov [b, \hat{\beta}]' \tag{10}$$

Hausman's essential result is that the covariance of an efficient estimator with its difference from an inefficient estimator is zero, which implies

$$Cov [(b - \hat{\beta}), \hat{\beta}] = Cov [b, \hat{\beta}] - Var [\hat{\beta}] = 0 \text{ or that}$$

$$Cov [b, \hat{\beta}] = Var [\hat{\beta}]$$

Inserting this result in (10) produces the required covariance matrix for the test,

$$Var [b - \hat{\beta}] = Var [b] - Var [\hat{\beta}] = \Sigma \tag{11}$$

The chi-squared test is based on the Wald criterion:

$$W = \chi [K] = [b - \hat{\beta}]' \hat{\Sigma}^{-1} [b - \hat{\beta}] \tag{12}$$

For $\hat{\Sigma}$, we use the estimated covariance matrices of the slope estimator, in the LSDV model and the estimated covariance matrix in the random effect model, excluding the constant term. Under the null hypothesis, W is asymptotically distributed as chi-squared with K degrees of freedom.

2.5.2 Breusch and Pagan's Test

This test aims to see whether there are individual/time (or both) effects in the data panel, namely by testing the hypothesis in the form

$$H_0 : c_i = 0, d_t = 0, \text{ or there is no two-way effects}$$

$$H_0 : c_i = 0, \text{ or there is no individual effects}$$

$$H_0 : d_t = 0, \text{ or there is no time effects}$$

We look at a Lagrange Multiplier test developed by Breusch and Pagan (1980), the test statistics are given by

$$LM = \frac{NT}{2(T-1)} \left[\left(\frac{\sum_{i=1}^N e_i^2}{\sum_{i=1}^N \sum_{t=1}^T e_{it}^2} \right) - 1 \right]^2 \tag{13}$$

2.5.3. Breusch-Godfrey/Wooldridge Test

Under the null of no serial correlation in the errors, the residual of a model must be negatively serially correlated, with $cor(\hat{\varepsilon}_{it}, \hat{\varepsilon}_{i,t-1}) = -1/(T-1)$ for each t, s . Wooldridge suggests basing a test for this null hypothesis on a pooled regression of FE residuals on themselves, lagged one period:

$$\hat{\varepsilon}_{i,t} = \alpha + \delta \hat{\varepsilon}_{i,t-1} + \eta_{i,t} \tag{14}$$

Rejecting the restriction $\delta = -1/(T-1)$. Makes us conclude against the original null of no serial correlation.

2.5.4. Pesaran CD Test

Pesaran (2004) recommended a simple test of error cross-section dependence (CD) that is applicable to variety of panel models, including stationary and unit root dynamic heterogeneous panels with small T and Large N. The proposed test is based on an average of pairwise correlation coefficients of OLS residuals from the individual regressions in the panel rather than their squares as in the Breusch-Pagan LM test:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^N \sqrt{T_{ij}} \hat{\rho}_{ij} \right) \tag{15}$$

Where
$$\hat{\rho}_{ij} = \frac{\sum_{t=1}^T e_{it} e_{jt}}{\left(\sum_{t=1}^T (e_{it}^2) \right)^{1/2} \left(\sum_{t=1}^T (e_{jt}^2) \right)^{1/2}}$$
, $\hat{\rho}_{ij}$ is the product-

moment correlation coefficient of a model's residuals; e_{it} denoting the OLS residuals based on T observations for each $i=1, \dots, N$. In the case of an unbalanced panel only pairwise complete observations are considered, and $T_{ij} = \min(T_i, T_j)$ with T_i being the number of observations for individual i ; else, if the panel is balanced, $T_{ij} = T$ for each i, j . Under the null hypothesis of cross-section independence, $CD \sim N(0,1)$.

2.5.5. Robust Covariance Matrix Estimation.

Wald-type tests is used for Robust estimators of the covariance matrix of coefficients, consistent vs. serial correlation is generally results in the context of panel data version, see in [7]. Basically, all types assume there is no correlation between errors of different groups while allowing for heteroskedasticity. All types assume no correlation between errors of different groups while allowing for heteroskedasticity but no serial correlation, i.e.

$$\Omega_i = \begin{bmatrix} \sigma_{i1}^2 & \dots & \dots & 0 \\ 0 & \sigma_{i2}^2 & & \vdots \\ \vdots & & \ddots & 0 \\ 0 & \dots & \dots & \sigma_{iT}^2 \end{bmatrix} \tag{16}$$

While "White2" is "White1" limited to a common variance inside every group, estimated as $\sigma_i^2 = \sum_{t=1}^T \frac{\hat{u}_{it}^2}{T}$ so that

$\Omega_i = I_T \otimes \sigma_i^2$, lets a totally general structure w.r.t heteroskedasticity and serial correlation

$$\Omega_i = \begin{bmatrix} \sigma_{i1}^2 & \sigma_{i1,i2} & \dots & \sigma_{i1,iT} \\ 0 & \sigma_{i2}^2 & & \vdots \\ \vdots & & \ddots & \sigma_{iT-1,iT} \\ \sigma_{iT,i1} & \dots & \sigma_{iT,iT-1} & \sigma_{iT}^2 \end{bmatrix} \tag{17}$$

The latter is, as already observed, consistent w.r.t timewise correlation of the errors, but on the converse, unlike the White 1 and 2 methods, it relies on large n asymptotics with small T.

3. AN EMPIRICAL STUDY

3.1. The Novelty of the Model

TripAdvisor, the leading travel review site, has ranked the world's best travel destinations of 2018. The site's Travelers' Choice Awards for destinations recognized travelers' favorite destinations around the world. According to TripAdvisor award 2018, the 10 Best Travel Destinations in 2018: 1). Paris, France; 2). London, United Kingdom; 3) Rome, Italy; 4). Bali, Indonesia; 5). Crete, Greece; 6). Barcelona, Spain; 7). Prague, Czech Republic; 8). Marrakech, Morocco; 9). Istanbul, Turkey; 10). New York City, USA. This is a novelty model in tourism demand focus on the 10 best travel destinations of 2018 and data are compiled from <https://data.worldbank.org>, for the period 1995 to 2017.

This study examines the relationship between Gross Domestic Product (GDP) is related the Number of International Tourist Arrivals, International Tourism Receipts, International Tourism Expenditures, Tax Revenue in the tourism sector, and Total Employment in the Tourism sector. After transformation original data used natural log, the panel model represent as:

$$\log Y_{it} = \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + \beta_5 \log X_5 + c_i + d_t + \varepsilon_{i,t}$$

Where the variable definitions for country i are:

- Y_{it} = Gross Domestic Product for country i (US\$);
 - X_1 = Number of International Tourist Arrivals for country i (number of person);
 - X_2 = International Tourism Receipts for country i (US\$);
 - X_3 = International Tourism Expenditures for country i (US\$);
 - X_4 = Tax Revenue in tourism sector for country i (%);
 - X_5 = Total Employment in tourism sector for country i (%);
 - $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Slope coefficient for $X_1 \dots X_5$;
 - c_i = the unobservable individual effects;
 - d_t = the unobservable time effects;
 - ε_{it} = the usual disturbance term
- $i = 1, 2, \dots, 10$ (the 10 Best Travel Destinations in 2018);
 $t = 1, 2, \dots, 230$ (from 1995- 2017).

R-studio software is used for panel model analysis. To describe the calculation of the panel model where the panel models will be estimated is presented as follows:

Model I :

$$\log Y_{i,t} = \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + \beta_5 \log X_5 + c_i + d_t + \varepsilon_{i,t}$$

Model II:

$$\log Y_{i,t} = \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + c_i + d_t + \varepsilon_{i,t}$$

Model III:

$$\log Y_{i,t} = \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_4 \log X_4 + \beta_5 \log X_5 + c_i + d_t + \varepsilon_{i,t}$$

3.2. Analysis Model

3.2.1. Hausmann Test

In this study, we used the transformation model with natural log, and then for the analysis model, first of all, we consider to used Hausmann Test for data.

Table 1. Hausmann Test

Model	Statistics Test	p-value	Conclusion
Model I	6.2911	0.2789	Fixed Effects
Model II	12.958	0.01148	Random Effects
Model III	4.0757	0.3959	Fixed Effects

H_0 : Fixed Effects model is used for Panel Model.

H_1 : Random Effects model is used for Panel Model.

The Hausman test helps us to decide between the fixed effects and Random effects or to select the model will be used for analysis. In this case, if the p-value >0.05 then use Fixed effects, if not use random effects.

3.2.2. Breusch-Pagan Test

Summary result of Breusch-Pagan test is given in the following table 2.

Table 2. Breusch-Pagan test

Model	Hypotesis	Statistics Test	P-value	Conclusion
Model I	$H_0: c_i=0, d_i=0$	286.51	<2.2e-16	H_0 rejected, there is a two-way effects
	$H_0: c_i=0$	283.01	<2.2e-16	H_0 rejected, there is a individual effects
	$H_0: d_i=0$	3.4932	0.0616	H_0 accepted, there is no time effects
Model II	$H_0: c_i=0, d_i=0$	147.29	<2.2e-16	H_0 rejected, there is a two-way effects
	$H_0: c_i=0$	142.98	<2.2e-16	H_0 rejected, there is a individual effects
	$H_0: d_i=0$	4.3057	0.03799	H_0 rejected, there is a time effects
Model III	$H_0: c_i=0, d_i=0$	427.54	<2.2e-16	H_0 rejected, there is a two-way effects
	$H_0: c_i=0$	422.13	<2.2e-16	H_0 rejected, there is a individual effects
	$H_0: d_i=0$	5.4077	0.02005	H_0 rejected, there is a time effects

From table 2, it can be concluded that the models are presented as follows:

- 1) Model I (Fixed Effects model with individual effects),

- 2) Model II (Random Effects model with two-way effects),
- 3) Model III (Fixed Effects model with two-way effects)

3.3. Model Estimation

To estimate the Fixed Effects model and Random Effects model we used The Generalized Least Squares (GLS) and Feasible Generalized Least Squares (FGLS). Model I, model II and model III are reduced to the new models, namely:

- 1) Model A (Fixed-Effects Model with Individual Effects).

$$\log Y_{i,t} = \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_5 \log X_5 + c_i + \varepsilon_{i,t}$$

- 2) Model B (Random-Effects Model with two-way effects).

$$\log Y_{i,t} = \beta_0 + \beta_1 \log X_1 + \beta_3 \log X_3 + c_i + d_t + \varepsilon_{i,t}$$

- 3) Model C (Fixed-Effects Model with two-way Effects).

$$\log Y_{i,t} = \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_5 \log X_5 + c_i + d_t + \varepsilon_{i,t}$$

3.4. Diagnostic Tests

3.4.1. Testing for Serial Correlation

In this study, we used the Breusch-Godfrey/Wooldridge test for serial correlation in panel model where

H_0 : There is no serial correlation.

H_1 : There is serial correlation.

Table 3.

Breusch-Godfrey/Wooldridge Test

Model Panel	Statistics Test	p-Value	Conclusion
Model A	0.51537	0.7728	There is no serial correlation
Model B	1.7725	0.4122	There is no serial correlation
Model C	0.7699	0.6805	There is no serial correlation

Interpretation for model A: "p-value < 0.7728, accepted H_0 , there is no serial correlation; Interpretation for model B: "p-value < 0.4122, accepted H_0 , there is no serial correlation; and Interpretation for model C: "p-value < 0.6805, accepted H_0 , there is no serial correlation.

3.4.2. Testing for cross-sectional dependence

The null hypothesis in Pasaran CD tests of independence is that residuals across entities are not correlated or connected. The residuals are tested by Pasaran CD (cross-sectional dependence) and it will be correlated across entities*. Cross-sectional dependence can lead to bias in tests results (also called contemporaneous correlation)

H_0 : There is no cross-sectional dependence.

H_1 : There is cross-sectional dependence.

Summary results of Pasaran CD test for Cross-sectional dependence in panel models are given in the following table 4:

Table 4. Pasaran CD test

Model Panel	Statistics Test	p-Value	Conclusion
Model A	0.13552	0.8922	There is no Cross-sectional dependence
Model B	-1.359	0.1741	There is no Cross-sectional dependence
Model C	-3.2423	0.001186	There is Cross-sectional dependence

It can be seen that the model C does not fulfill the assumption that there is a Cross-sectional dependence in the model so that it is excluded from the best possible model for the panel model.

3.4.3. Testing for Heteroskedasticity

Robust Covariance Matrix Estimation can be used for testing heteroskedasticity. We can see that standard errors given different types of HC (Heteroscedasticity), based on [4], there is no heteroskedasticity in Fixed Effects model and Random Effects Model, is given in the following table 5 and table 6.

Table 5.

Controlling for Heteroskedasticity: Fixed Effects

	β_1	β_2	β_3	β_4
HC ₀	0.1196	0.0724	0.0644	0.0842
HC ₁	0.1206	0.0733	0.0650	0.0849
HC ₂	0.1216	0.0737	0.0655	0.0855
HC ₃	0.1236	0.0747	0.0666	0.0869
HC ₄	0.1242	0.0750	0.0667	0.0874

Table 6.

Controlling for Heteroskedasticity: Random Effects

	β_0	β_1	β_3
HC ₀	0.3928	0.0801	0.0649
HC ₁	0.3954	0.0807	0.0654
HC ₂	0.3966	0.0810	0.0656
HC ₃	0.4004	0.0818	0.0662
HC ₄	0.3996	0.0817	0.0661

4. ESTIMATION RESULTS

It can be seen from the overall results of the analysis above, that models A and B were obtained that met the results of the diagnostic test. To determine which model is best presented through table 7 below

Table 7.

Fixed effects and Random Effects models : Estimation results

MODEL A (Fixed-Effect Model with Individual effect):				
$\log Y_{it} = \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_5 \log X_5 + c_i + \varepsilon_{i,t}$				
Coefficients	Estimate	Std. Error	t-value	Pr(> t)
β_1	0.419731	0.093715	4.4788	1.216e-05 ***
β_2	0.171607	0.071369	2.4045	0.01704 *
β_3	0.543294	0.041771	13.0064	< 2.2e-16 ***
β_5	-0.747976	0.078490	-9.5295	< 2.2e-16 ***
Residual Sum of Squares				2.3726
Adj. R-Squared				0.95054
F-statistic				1103.48
p-value				< 2.22e-16
MODEL B (Random Effect Model with two-way effect/Individual effect and time effect)				
$\log Y_{it} = \beta_1 \log X_1 + \beta_3 \log X_3 + c_i + d_t + \varepsilon_{i,t}$				
Coefficients	Estimate	Std. Error	z-value	Pr(> t)
(Intercept)	0.833420	0.225393	3.6976	0.0002176 ***
β_1	0.479763	0.047238	10.1564	< 2.2e-16 ***
β_3	0.606135	0.038210	15.8633	< 2.2e-16 ***
Residual Sum of Squares				3.5669
Adj. R-Squared				0.93438
Chisq				3262.73
p-value				< 2.22e-16

Table 8.
the unobservable individual effects for each Country

No	Country	the unobservable individual effects
1.	France	1.776
2.	UK	1.776
3.	Italy	1.839
4.	Indonesia	1.819
5.	Greece	1.736
6.	Spain	1.573
7.	Czech Republic	1.589
8.	Morocco	1.717
9.	Turkey	1.826
10.	USA	1.877

By looking at the value of the Residual Sum of Squares (RSS) of each model, where for models A=2.3726 and model B=3.5669, based on the principle of simplicity or Parsimony that by viewing the minimum of RSS value. It can be concluded that model A is the most appropriate model. We can see also, the value of Adj. R-Squared for model A =0.95054 higher than the value of Adj. R-Squared for model B=0.93438. We found that model A (Fixed Effects Model with Individual effect) is the best panel model, with values of the unobservable individual effect (C_i) for each country presented in table 8. In table 7, for model A, where β_1 , β_2 and β_3 are all significant (t-value > Pr(>|t|)), this implies that the positive effect on Gross Domestic Product (GDP) arising from Number of International tourist arrivals; International Tourism Receipts; and International Tourism Expenditures, although the negative effect on Gross Domestic Product arising from Total Employment in tourism sector, where β_5 is also significant (t-value < Pr(>|t|)). Furthermore, Adj. R-Squared = 0.95054 and F-statistic = 1103.48 (p-value = < 2.22e-16), this implies that all independent variables are adjusted together explain the variable GDP (dependent variable) by 95,054% while the remaining 4.946% is explained by other variables outside the model and all independent variables are statistically significant at a = 5% which means all independent variables have a significant influence on the GDP variable.

5. CONCLUSIONS

- 1).Based on panel data analysis method, the most appropriate model is the Fixed Effects model with Individual Effects
($\log Y_{it} = 0.42 \log X_{1t} + 0.17 \log X_{2t} + 0.54 \log X_{3t} - 0.75 \log X_{5t} + c_i + \varepsilon_{it}$)
where the values of c_i (Unobservable Individual Effects) for each countries such as France (1,776); UK(1.776); Italy(1.839); Indonesia(1.819); Greece(1.736); Spain(1.573); Czech Rep.(1.589); Morocco(1.717); Turkey(1.826) and USA(1.877) respectively.
- 2) Based on the F test, the Number of International Tourist Arrivals, International Tourism Receipts, International Tourism Expenditures, and Total Employment in the tourism sector, have a simultaneous significant influence on The Gross Domestic Product (GDP). Results of this study shows that the International Tourist Arrivals, International Tourism Receipts, International Tourism Expenditures, and Total Employment in tourism sectors as

factors that can explain changes in Domestic Products Gross (GDP) from France, UK, Italy, Indonesia, Greece, Spain, Czech Rep., Morocco, Turkey, and the USA.

- 3) Based on the t-test, the number of International Tourist Arrivals, International Tourism Receipts, and International Tourism Expenditures, has a partial positive impact that is significant to the Gross Domestic Product (GDP). Results of this study reveal that the Number of International Tourist Arrivals, International Tourism Receipts, and International Tourism Expenditures, as factors that can explain changes in the Gross Domestic Product (GDP) from France, UK, Italy, Indonesia, Greece, Spain, Czech Rep., Morocco, Turkey, and the USA.
- 4) Based on the t-test, Total Employment in the tourism sector has a partial negative impact that is significant to the Gross Domestic Product (GDP). The results of this study show that Total Employment in the tourism sector as a factor that can explain changes in the Gross Domestic Product (GDP) from France, UK, Italy, Indonesia, Greece, Spain, Czech Rep., Morocco, Turkey, and the USA. Its surprising results that may reveal the possibility of unreported transactions, low payment to increased employment and the black market in the sector that does not reflect the reality of employment contribution to the Gross Domestic Product (GDP).
- 5) Based on Adj.R square, this implies that the Number Of International Tourist Arrivals, International Tourism Receipts, International Tourism Expenditures, and Total Employment in the tourism sector, adjusted together explain the Gross Domestic Product (GDP) by 95.054% from France, UK, Italy, Indonesia, Greece, Spain, Czech Rep., Morocco, Turkey, and the USA while the remaining 4.946% is explained by other variables outside the model.
- 6) Future research can modify this panel model by adding some dummy variables and use that model for forecasting purposes related to applications in tourism demand.

REFERENCES

- [1] Baltagi, BH Econometric Analysis of Panel Data.Chichester:Wiley. 2013.
- [2] Brida, J. G., & Risso, W. A. A dynamic panel data study of the German demand for tourism in South Tyrol. tourism and Hospitality Research, 9(4), 305-313. 2009.
- [3] Carey,K.. Estimation of Caribbean Tourism Demand: Issues in Measurement and Methodology. Atlantic Economy Journal, 19,32-40. 1991.
- [4] Croissant, Y., & Millo, G. Panel Data Econometrics in R: The plm Package." Journal of Statistical Software, 27(2). 2008 URL <http://www.jstatsoft.org/v27/i02/>
- [5] Garin-Munoz, T. Inbound international tourism to Canary Islands: A dynamic panel data model. Tourism Management, 27(2), 281-291. 2006.
- [6] Garin-Munoz, T., & Montero-Martin, L. F.. Tourism in the Balearic Islands: A dynamic model for international demand using panel data. Tourism Management, 28(5), 1224-1235. 2007
- [7] Greene, W.H. Econometric Analysis. Prentice Hall, New Jersey. 2003.
- [8] Habibi, F., Rahim, K. A., Ramchandran, S., & Chin, L.. Dynamic model for international tourism demand for Malaysia: Panel data evidence. International Research Journal of Finance and Economics, 33, 207-217. 2009.

- [9] Hsiao, C.. Analysis of Panel Data. Cambridge: Cambridge University Press. 1986.
- [10] Kuo, H.-I., Chang, C.-L., Huang, B.-W., Chen, C.-C., & McAleer, M.. Estimating the impact of Avian Flue on international tourism demand using panel data. *Tourism Economics*, 15(3), 501-511. 2009.
- [11] Ledesma-Rodriguez, F. J., & Navarro-Ibanez, M.. Panel data and tourism: A case study of Tenerife. *Tourism Economics*, 7(1), 75-88. 2001.
- [12] Lim, C. An Econometric Classification and Review of International Tourism demand Models. *Tourism Economics*, 3, 69-81. 1997
- [13] Naude, W. A., & Saayman, A. Determinants of tourist arrivals in Africa: A panel data regression analysis. *Tourism Economics*, 11(3), 365-391. 2005.
- [14] Romilly, P., Liu, X., & Song, H. Economic and social determinants of international tourism spending: A panel data analysis. *Tourism Analysis*, 3(1), 3-16. 1998.
- [15] Sakai, M., Brown, J., and Mak, J. Population aging and Japanese International Travel in the 21st century. *Journal of Travel Research*, 38, 212-220. 2000.
- [16] Taylor, T., & Ortiz, R. A. Impacts of climate change on domestic tourism in the UK: A panel data estimation. *Tourism Economics*, 15(4), 803-812. 2009.
- [17] Wooldridge, J.M., *Econometric Analysis of Cross Section and Panel Data*, second edition, MIT Press, Massachusetts. 2010.