

## **The relationship between tourism and equality in income distribution in developed and developing countries: An application of Panel VAR model**

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### **Abstract**

The purpose of this study was to examine the relationship between the tourism and equitable distribution of income for the developed and developing countries using Panel VAR. The results indicate that economic growth and the first lag (one-year lag) of international tourism income negatively affect the poverty index in developed and developing countries. Impulses due to economic growth and poverty index have the greatest effect on international tourism income so that its effect remains after 10 periods permanently.

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### **Introduction**

Poverty is a multidimensional phenomenon that influences the quality of life in several ways rather than other phenomena. It damages the human growth, limits the human development, and ultimately affects the well-being of families (Hooshmand *et al*, 2015). One of the appropri-

ate strategies for reducing poverty and unemployment is to develop tourism. Sharpley and Naidoo (2010), Jiang, DeLacy, Mkiramweni, and Harrison (2011), Croes (2014), Li, Chen, Li, and Goh (2016), showed that tourism has a significant positive impact on poverty reduction and income equality. On the

other hand, Seckelmann (2002), Tosun, Timothy and Ozturk (2003), Marcouiller, Kim, and Deller (2004), Lee and O’Leary (2008), Lee (2009), Alam and Reddy Paramati (2016) found negative impact of tourism development on income equality. Manyara and Jones (2007), Scheyvens and Momsen (2008) showed no significant relationship between tourism and the fair distribution of incomes. Considering the variety of the results, this research seeks to assess tourism’s impact on the fair distribution of incomes in the two groups of developed and developing countries. The main objective of the paper is to examine the impact of international tourism revenues on the poverty indicators in developing and developed countries by Panel VAR methods. Guris, Akay, Zeytinoglu, Sacilidi and Sadic (2016), Góes (2016), Lin and Zhu (2017), Attinasi and Metelli (2017), Ouyang and Li (2018) and Joudia (2018), used the Panel VAR model in various research. The paper also evaluates the impact of trade, inflation, economic growth, and unemployment on poverty in these two groups.

**Methodology**

Panel VAR is used as a multivariate model to estimate the relationship between tourism and the equitable distribution of income in developing (Brazil, Algeria, Egypt, Indonesia, India, Iran), and developed countries (Austria, Canada, Germany, Spanish, France, U.K. and United States) in 1999-2015. The selection criteria for countries were based on the data

access in both groups.

$$HPI=F(INF,GDP,UN,TR,TOUR)$$

HPI represents the poverty index, which is a function of INF, GDP, UN, TR, and TOUR. INF, GDP, UN, TR, and TOUR are inflation, economic growth, unemployment, trade index, and international tourism revenue to GDP ratio, respectively.

The Panel VAR was used to estimate coefficients and extract Impulse Response Functions. Panel VAR model is as follows:

$$X_{it} = \Gamma L X_{it} + U_i + \epsilon_{it} \tag{1}$$

Where,  $X_{it}$  is the dependent variable vector.  $\Gamma L$  is a polynomial matrix with lag as a dependent variable defined as  $\Gamma L = \Gamma_1 L^1 + \Gamma_2 L^2 + \dots + \Gamma_p L^p$ . The optimum lag is a one-year lag.  $U_i$  and  $\epsilon_{it}$  are fixed effects and error vectors, respectively.

**Results and Discussion**

Panel VAR method includes 5 stages. First, panel unit root testing was used. Im, Pesaran and Shin (IPS) Test was applied to examine the stationary of variables (Table 1). Second, data were evaluated by panel cointegration. Pedroni Panel cointegration test was used to examine the long-term cointegration of variables (Table 2). Regarding the results of Pedroni panel cointegration, the variables were significant at 1% for the groups.

**Table 1.** *The result for IPS unit root test in developed and developing countries*

Variables	Level		1 <sup>st</sup> Difference	
	Intercept	Trend and Intercept	Intercept	Trend and Intercept
Developing countries	INF	-4.14***	-	-
	GDP	-1.52	-1.71**	-
	UN	0.2147	0.4477	-2.73***
	HPI	0.77	-0.75	-4.185***
	TOUR	1.77	0.095	-2.861***
Developed countries	INF	-4.698***	-	-
	GDP	-4.229***	-	-
	UN	-4.970***	-	-
	HPI	1.130	-0.18307	-2.942***
	TOUR	-2.407***	-	-

\*\* And \*\*\* are the significance level at p<0.05 and p<0.01 respectively

Significance in parentheses

The dash implies that the IPS test is not required, because the variable is significant at the previous levels.

Third, the optimal lag was selected to explain the model. Table 3 illustrates the duration of optimal lag for the groups. According to Table 3, Schwartz statistic was used to protect the degree of freedom and data. The number of optimal lags equals 1 for the groups.

Fourth, the relationship between variables was considered. Finally, the long-term relationship for convergent panels was extracted through vector autoregression (VAR). Table 4 shows the results of the developed countries estimation using the Panel Var model.

The economic growth with one lag, the poverty index with one lag and international tourism revenue to GDP with one lag affect the poverty index and the coefficients of these variables are -0.274, 0.977, -0.4 respectively. The unemployment rate is the last variable that

affects the poverty index as much as 0.105. Table 5 shows the estimation results of the developing countries using the Panel VAR model.

The economic growth with one lag and the international tourism revenue to GDP with one lag decrease poverty index as much as 0.48, 0.03 respectively. The poverty index with one lag and the unemployment rate had a significant and positive effect on the poverty index as much as 0.904, 0.309 respectively in developing countries.

The dynamic interactions among variables and Variance analysis were conducted. Impulse Response functions show the response of endogenous variable to the effects of another variable (Figures 1, 2).

**Table 2.** The result for panel cointegration using Pedroni test

	Statistics	
	Developing countries	Developed countries
Panel <i>v</i> -Statistic	-1.824	-2.1711
Panel <i>rho</i> -Statistic	1.403	2.968
Panel PP-Statistic	-12.051***	-5.532***
Panel ADF-Statistic	-3.425***	-1.021
Group <i>rho</i> -Statistic	2.661	4.850
Group PP-Statistic	-16.019***	-6.023***
Group ADF-Statistic	-4.005***	-0.409

\*\*\* is the significance level at  $p < 0.01$

**Table 3:** The results for testing VAR lag

	lag	Log L	LR	FPE	AIC	SC	HQ
Developing countries	0	-476.460	NA	21267615	31.061	31.293	31.137
	1	-303.910	278.603	1600.304	21.542	22.930*	21.994
	2	-271.135	42.28*	1110.909*	21.041	23.585	21.870
	3	-250.388	20.078	2154.184	21.315	25.015	22.521
	4	-202.061	31.178	1200.093	19.810*	24.667	21.393*
Developed countries	0	-1187.736	NA	44764232	31.8063	31.960	31.867
	1	-699.5785	898.2102	193.9797	19.455	20.382	19.825
	2	-673.5369	44.444	190.3605	19.427	21.127	20.106
	3	-652.7951	32.633	218.1309	19.541	22.013	20.528
	4	-626.4859	37.885	220.0215	19.506	22.750	20.801

\* shows the optimal lag

LR, FPE, AIC, SC, HQ are Likelihood Ratio, Phillips-Perron, Akaike Information Criterion, Schwarz Criterion, Hannan-Quinn Criterion Respectively.

**Table 4. Results of Model Estimation by Panel VAR for Developed Countries**

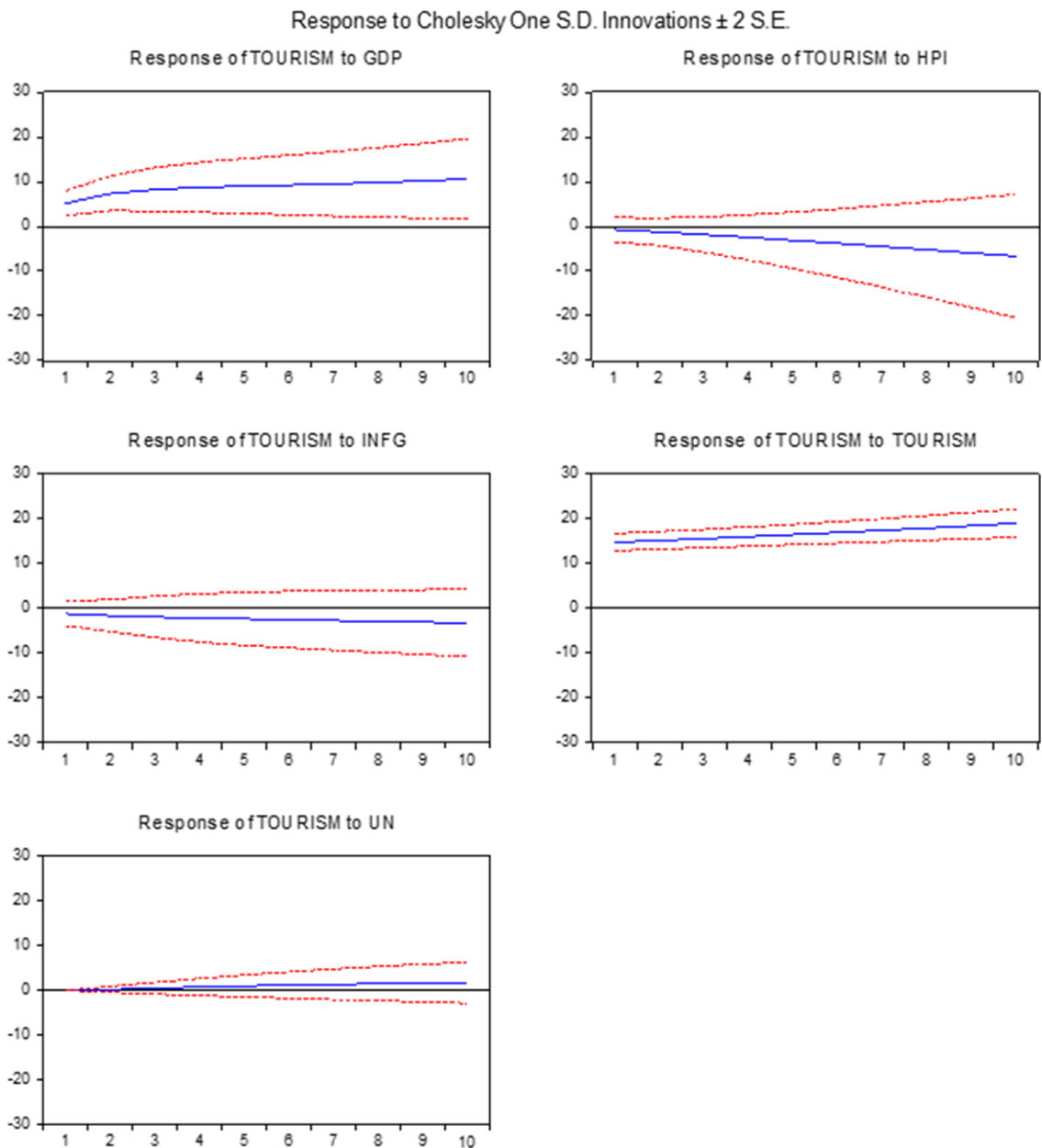
Variables	GDP			HPI			INFG			TOUR			UN		
	Coefficient	SD	t	Coefficient	SD	t	Coefficient	SD	t	Coefficient	SD	t	Coefficient	SD	t
GDP(-1)	0.417	0.079	5.263***	-0.274	0.115	-2.371**	0.319	0.117	2.715***	1.820	1.085	1.677*	-0.224	0.041	-5.407***
HPI(-1)	-0.024	0.027	-0.892	0.977	0.040	24.05***	0.0060	0.041	0.145	-0.253	0.380	-0.665	-0.253	0.380	-0.665
INFG(-1)	-0.0081	0.049	-0.164	0.071	0.072	0.988	0.529	0.073	7.184***	-0.229	0.680	-0.337	-0.0035	0.025	-0.135
TOUR(-1)	2.99E-05	0.0004	0.071	-0.4	0.061	-6.55***	0.0003-	0.0006	-0.506	1.029	0.005	180.743***	0.0002	0.0002	1.108
UN(-1)	0.091	0.043	2.085**	0.105	0.064	1.641*	0.0082-	0.064	-0.127	0.350	0.599	0.584	0.901	0.022	39.39***
C	1.114	0.454	0.452	0.085	0.663	0.128	0.394	0.673	0.585	-6.678	6.216	-1.074	1.232	0.237	5.193
R <sup>2</sup>		0.255			0.874			0.381			0.997			0.935	
Adj.R <sup>2</sup>		0.223			0.868			0.354			0.997			0.932	
F		7.834			158.7261			14.048			8311.100			331.6905	

\*\* And \*\*\* are significance at p<0.05 and p<0.01 respectively

**Table 5. Results of Model Estimation by Panel VAR for Developing Countries**

Variables	GDP			HPI			INFG			TOUR			UN		
	Coefficient	SD	t	Coefficient	SD	t	Coefficient	SD	t	Coefficient	SD	t	Coefficient	SD	t
GDP(-1)	0.180	0.105	1.714*	-0.48	0.131	-3.66***	0.173	0.351	0.492	-0.056	0.367	-0.152	-0.156	0.099	-1.57
HPI(-1)	-0.074	0.057	-1.279	0.904	0.052	17.2***	0.048	0.139	0.348	-0.032	0.146	-0.233	0.047	0.039	1.199
INFG(-1)	-0.016	0.053	-0.303	-0.056	0.047	-1.181	0.335	0.128	2.61***	-0.0026	0.133	-0.0200	0.0026	0.036	0.073
TOUR(-1)	0.012	0.006	1.982**	-0.03	0.005	-6***	-0.006	0.015	-0.407	1.014	0.016	62.922***	-9.18E-05	0.004	0.021
UN(-1)	0.027	0.049	0.556	0.39	0.044	8.86***	-0.015	0.119	-0.129	-0.048	0.124	-0.389	0.899	0.033	26.660***
C	5.551	1.679	3.305	1.105	1.515	0.729	4.897	40.05	1.208	2.674	4.230	1.208	0.621	1.144	0.054
R <sup>2</sup>		0.180			0.941			0.151			0.994			0.957	
Adj.R <sup>2</sup>		0.093			0.934			0.061			0.994			0.953	
F		2.072			150.060			1.683			1835.100			213.7751	

\*\* And \*\*\* are the significance level at p<0.05 and p<0.01 respectively

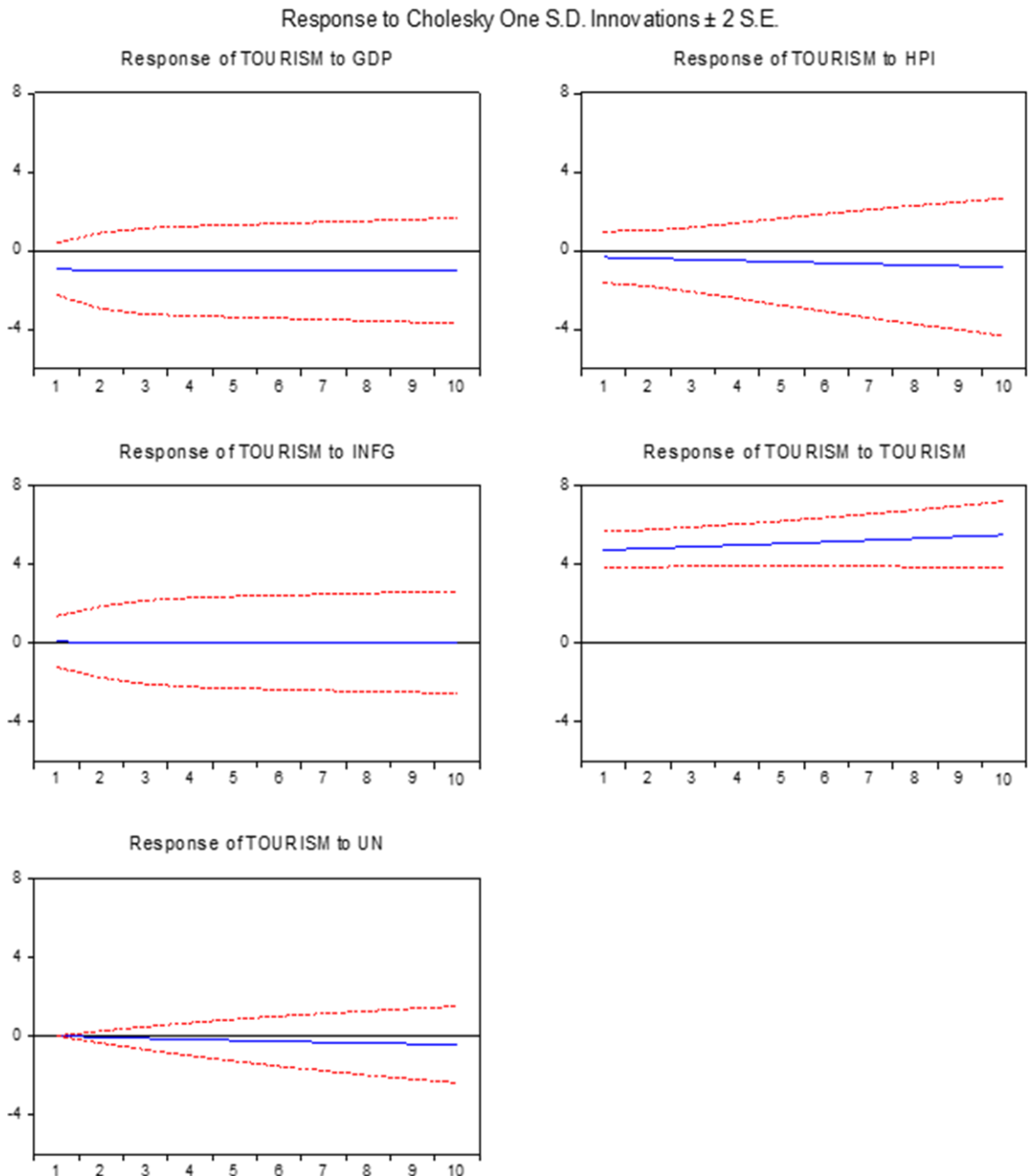


**Figure 1.** Tourism income response to explanatory variables for developed countries

The result showed that the response of tourism income to economic growth, poverty index, and inflation are incremental, and the effect is stable after 10 periods in developed countries. Considering the Variance analysis for two groups of countries, Impulse Response functions show the response of endogenous

variable to the effects of another variable while variance analysis measures each effect on endogenous variable variance.

In Table 6, 88.371% of tourism incomes are explained by the same variable and 10.789% by economic growth in period 1. 83.80% of



**Figure 2.** *Tourism income response to the explanatory variable for developing countries*

error variance for tourism incomes is explained by the same variable, 15.006% by economic growth and 1% by other variables in period 2. According to Table 7, 95.734% of tourism incomes are explained by the same variable, followed by economic growth with 3.724%.

### **Conclusion, limits and perspectives**

This paper examined the relationship between tourism and equality in income distribution in developed and developing countries using PanelVar. The estimation results showed that the economic growth rate and international income of tourism had a significant and positive

**Table 6.** Variance analysis for tourism income in developed countries

period	S.E.	Tourism	GDP	HPI	INF	UN
1	15.698	88.371	10.789	0.244	0.594	0.000
2	23.121	83.801	15.006	0.413	0.770	0.0072
3	29.211	81.002	17.382	0.662	0.923	0.029
4	34.602	79.188	18.701	0.989	1.055	0.064
5	39.574	77.889	19.440	1.389	1.171	0.108
6	44.287	76.849	19.861	1.857	1.274	0.156
7	48.845	75.931	20.109	2.386	1.367	0.204
8	53.318	75.063	20.264	2.969	1.451	0.250
9	57.757	74.207	20.371	3.599	1.529	0.291
10	62.197	73.344	20.456	4.269	1.601	0.327

**Table 7.** Variance analysis for tourism income in developing countries

period	S.E.	Tourism	GDP	HPI	INF	UN
1	4.847	95.734	3.724	0.512	0.027	0.000
2	6.928	95.282	4.092	0.597	0.019	0.0074
3	8.565	95.078	4.197	0.683	0.016	0.023
4	9.980	94.964	4.201	0.772	0.014	0.047
5	11.259	94.882	4.161	0.865	0.012	0.076
6	12.445	94.809	4.104	0.963	0.011	0.110
7	13.563	94.736	4.038	1.064	0.011	0.148
8	14.631	94.660	3.970	1.170	0.010	0.188
9	15.659	94.579	3.901	1.278	0.0099	0.230
10	16.658	94.452	3.834	1.389	0.0095	0.274

effect and unemployment had a significant and negative effect on the poverty index in both groups. These results are consistent with previous studies (Luinga and Shitundo (2003), Gartner (2008), Zandi *et al* (2014) and Hooshmand *et al* (2015)).

Further studies could be focused on collected data of poverty index and other indicators that effect on tourism. Given the tourism policy implications, we suggest to adopt appropriate policies to improve the business environment, the income distribution system to support the poor, the general livelihoods, and reduce income inequality in both groups. It is also proposed to expand and strengthen tourism infrastructure to increase the number of tourists. Therefore, making benefit for indigenous people is required to deal with expanding poverty, given the undeniable role of tourism in poverty alleviation.

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