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ABSTRACT

This study tests the efficacy of Global Adaptation Institute (GAIN) Index, which summarizes a country's vulnerability to climate change and its readiness to improve resilience, in estimating the economic impacts of climate change to tourism. We employ panel cointegration and panel DOLS methods for sixteen countries (Albania, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Malta, Morocco, Slovenia, Spain, Syrian Arab Republic, Tunisia and Turkey) that have a coastline on the Mediterranean Sea. The results indicate that there is a cointegration relation in the model, and tourist arrivals depend negatively on vulnerability and economic readiness and depend positively on governances and social readiness.

Keywords: *Climate Change, Tourism, Tourism Receipts, GAIN Index, Panel Data.*

INTRODUCTION

Since the introduction of jet engine to commercial aviation, domestic and long-haul tourism has grown considerably making travel cheaper and destinations relatively closer. Tourism's social, cultural and environmental impacts have been studied extensively in the past; with increasing gas prices as well as the carbon foot print of the industry, tourism researchers now try to estimate the likely impact of climate change on tourist destinations and the global tourism industry. According to World Tourism and Travel Council (2012) the Mediterranean region is one of the heavily traveled areas in the world and contributes about US$1 billion in GDP to World's travel and tourism total contribution of $6.6 trillion. Mediterranean region is vulnerable to sea level rise and heat waves that might shift summer tourism to higher altitudes (Stern 2007) and therefore might lose popularity due to climate change along with a welfare loss across the regions in the world (Berrittella et al. 2006). In this context, this study tests the efficacy of Global Adaptation Institute (GAIN) Index, that is developed by GAIN to summarize a country's vulnerability to climate change and other global challenges and its readiness to improve resilience, in order to predict future tourism receipts using a panel data set of eleven countries (Albania, Croatia, Cyprus, France, Greece, Italy, Malta, Portugal, Slovenia, Spain, and Turkey) that have a coastline on the Mediterranean Sea for the period 1995-2010.

CONCEPTUAL FRAMEWORK

As it is shown in Figure 1, vulnerability to climate change is the function of exposure and sensitivity of a system. Adaptation and mitigation are policy responses to climate change, while mitigation is a direct human interference to reduce GHG emission, adaptation is an indirect

policy response to reduce the climate change impacts to a system by increasing adaptive capacity. Increased mitigation will decrease climate change by reducing GHG emission, and increased adaptation policies will decrease climate change residual impacts by increasing autonomous adaptation. Increased autonomous adaptation along with decreased GHG emission will decrease vulnerability to climate change. Thus, adverse effect of climate change will decrease due to decreased vulnerability. The general assumption is that climate change will affect tourism industry (see Bigano et al. 2005; Perry 2000; Brocheir and Ramieri 2001), to the extent the degree of vulnerability to climate change of the region, country, and industry. Overall, being economically vulnerable and its potential impact are identified to the extent the degree of dependence of the sectors on climate conditions, geography, water resources, etc. (IPCC 2001; Stern 2007). While climate is a key resource for the tourism sector, and the sector is a vital component of the global economy, the tourism sector is vulnerable to climate change, and thus adaption and mitigation policies need to be adopted by the governments and institutions to reduce GHG emission, and to adapt changed climatic conditions. However, policy responses may vary among the countries, regions, or systems in respect to their capacity of policy response.

Figure 1
Conceptual Framework
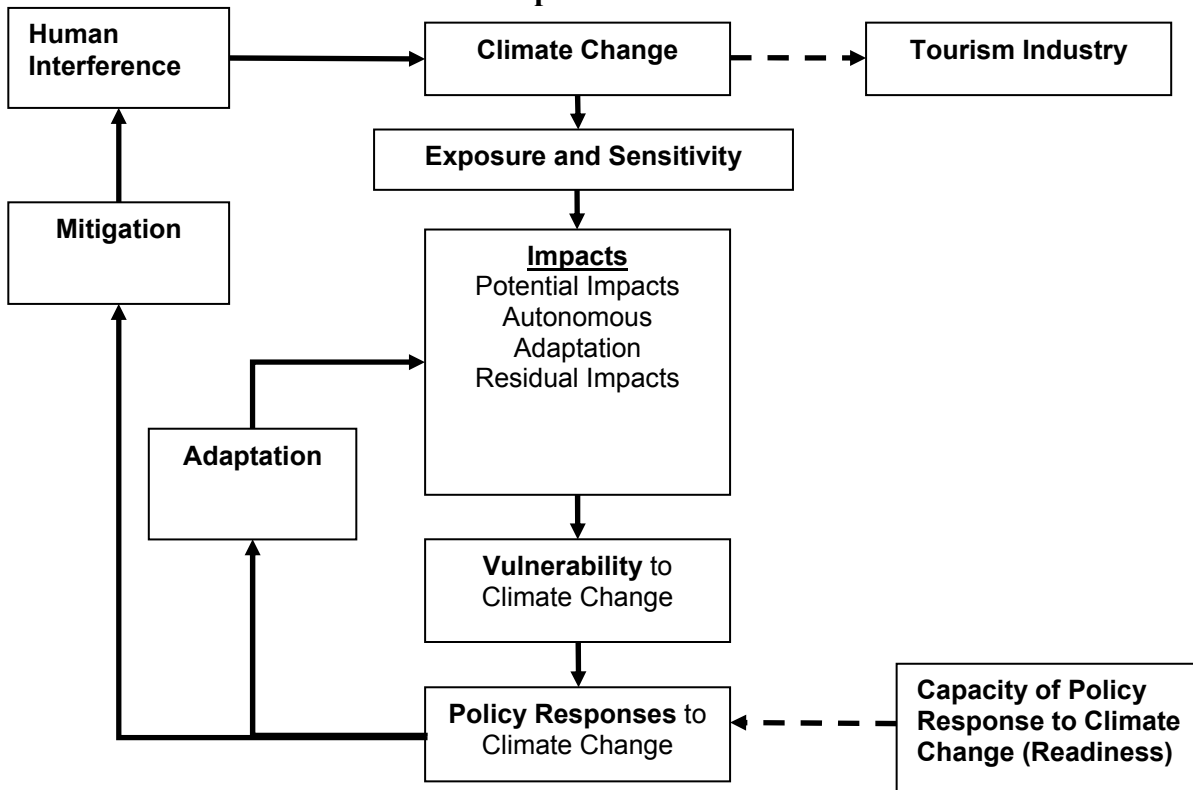
Adopted from relevant literature (see IPCC, 2001; Smit et al., 1999; Füssel & Klein, 2006; Ionescu et al., 2009)

 – – – – – Predicted relationship

EMPIRICAL MODEL AND DATA

The GAIN Index[1] is a navigation tool to assess a country's ability to address climate change and help decision-makers prioritize actions that harness the power of the private and public sectors. The Index shows the level of vulnerability of a country to the effects of climate change and other global forces, and the readiness of a country to successfully implement adaptation solutions. 14 indicators are used to measure three categories of readiness: economic, social and governance. The GAIN Index vulnerability analysis seeks to capture exposure to climate related hazards, and sensitivity to their impacts and the ability to cope with those impacts. The GAIN Index uses 24 indicators to measure three sectors that underlie human well-being (water, food and health) and three infrastructure sectors (coastal, energy and transport).

Table 1
GAIN Index Formula

(Readiness Indicators* − Vulnerablity Indicators** + 1) × 50 = GAIN Index***
*0-1 Higher is better, **0-1 Lower is better, ***0-100 Higher is better.

Based on the explanations above, tourism receipts are described as a function of the GAIN Index in our study. Accordingly, the empirical model is specified as follows:

$$lnTR_{it} = \alpha_{0i} + \alpha_{1i}lnGI_{it} + u_{it} \qquad (1)$$

where TR_{it} is tourism receipts, GI_{it} is the GAIN Index, and u_{it} is the error term. We use a panel data set of eleven countries (Albania, Croatia, Cyprus, France, Greece, Italy, Malta, Portugal, Slovenia, Spain, and Turkey) that have a coastline on the Mediterranean Sea for the period 1995-2010. The data are annual and obtained from the World Bank database and Global Adaptation Institute. We will use natural logarithmic values of variables as seen. It is anticipated that the GAIN Index to affect tourism receipts positively, that is expected sign of the α_{1i} is positive.

CONCLUSIONS

Climate change might affect current tourist destinations, and the Mediterranean is one of the regions that could be affected by climate change. Although there isn't any expectation that tourism expenditures will decrease among the world, there is an expectation that tourism expenditures will change its flows because of climate change in the long run. Tourists might adapt easily to climate change by finding new destinations to make their holidays or by changing their travel date for current destinations. However, it would not be easy to adapt climate change for tourism industry. Very little is known in this regard, but these insights would constitute an important basis for developing strategic adaptation plans for destinations (OECD and UNEP 2011). The results, as shown in Table 2, indicate that Gain Index affects tourism receipts significantly. However, further analyses will be conducted using economic, social, and environmental sub-categories of GAIN Index for each country.

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[1] See Table 1 for the GAIN Index Formula. The GAIN Index is shortly summarized here, for more information about GAIN Index you may browse http://index.gain.org/.

Table 2
Results of The Model (TR is the Dependent Variable)

Variables	Coefficients
GI	10.850^a (1.207)
Constant	-23.694^a (5.142)
R^2	0.27
N	11
T	16
Wald chi2	80.79^a
[a] shows that the coefficients and statistics are significant at 0.01 level of significance. The values in parentheses show standard errors.	

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