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Nonlinear and time-varying growth-tourism causality

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ABSTRACT

This paper develops a panel smooth transition vector error correction model to investigate the economic growth-tourism causality. This model simultaneously resolves the estimation problems of nonlinearity, heterogeneity and endogeneity. Empirical results support that the causality is bi-directional, nonlinear, time- and country-varying in both the long run and short run. The real interest rate causes threshold effects on the link between growth and tourism. High levels of real interest rates lead to a longer time for the growth and tourism to return back to their long run equilibrium values; however, they strengthen the positive contribution from one of the variables to the other variable in the short run. Macroeconomic environment and policy are key factors that influence the threshold effects.

Introduction

The relationship between economic growth and tourism is the subject of many ongoing debates. A considerable body of literature has been devoted to exploring the causality between economic

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growth and tourism. Empirical results offer a broad array of potential correlations that converge on four divergent hypotheses (Chatziantoniou, Filis, Eeckels, & Apostolakis, 2013). The first two hypotheses suggest a unidirectional causality between the two variables, either from tourism to economic growth (*tourism-led economic growth hypothesis,* e.g. Balaguer & Cantavella-Jordá, 2002; Katircioglu, 2009) or its antithesis (*economic-driven tourism growth hypothesis,* e.g. Narayan, 2004; Oh, 2005; Payne & Mervar, 2010; Tang & Jang, 2009). The third hypothesis postulates the existence of a bidirectional relationship between tourism and economic growth (*bidirectional causality hypothesis,* e.g. Dritsakis, 2012; Kim, Chen, & Jang, 2006; Lee & Chang, 2008), whereas the fourth proposes that there is no causal relationship at all (*no causality hypothesis,* e.g. Ozturk & Acaravci, 2009).

While a large number of studies have concentrated on the analysis of the growth-tourism relationship, the investigation of the relationship in nonlinear, heterogeneous, time-varying circumstance has been nearly ignored. The ignorance may be one of the reasons that lead to divergent results in the growth-tourism relationship. As indicated by Wang (2012), it is quite possible that a linear framework oversimplifies the tourism-growth relationship and that the underlying relationship between the variables is indeed complex and nonlinear in nature. Ridderstaat, Croes, and Nijkamp (2014) also argue that the tourism-growth relationship cannot be strictly linear since the effects of tourism on economic growth adhere to the law of diminishing returns. Regarding the problems of heterogeneity and time variation, Hsiao (2003) indicates that in the presence of cross-section heterogeneity, assuming a common impact of a specific variable on other variables within panel data contexts may be misleading. Moreover, Arslanturk, Balcilar, and Ozdemir (2011) and Tang and Tan (2013) question the stability of the tourism-growth connection, showing that the magnitude of the connection fluctuates over time. Thus, in evaluating the causal relationship between tourism and economic growth, one needs to consider the problems of nonlinearity, heterogeneity, and time variation.

Recent studies have developed a nonlinear methodological framework for the examination of growth-tourism causality. However, there are at least three constraints that can be improved as the application is employed. First, the switching process in the Hansen's threshold model is *abrupt*, not smooth (Chang, Khamkaew, & McAleer, 2012; Po & Huang, 2008; Wang, 2012). This specification is impractical, especially for the low frequency data such as quarterly or annual data (Wu, Liu, & Pan, 2014). Second, the growth-tourism causality is not verified through proper statistical methods, which may generate the serious *endogeneity problem*. For example, Wang (2012) uses the model of Hansen (1999) to evaluate the threshold effect of exchange rate on the unidirectional causality from growth to tourism. Pan, Liu, and Wu (2014) adopt the panel smooth transition regression (PSTR) model to investigate the nonlinear impact of economic growth on tourism receipts. Third, the nonlinear approaches for the evaluation of the growth-tourism causality focus on a single country and ignore the *heterogeneity problem* between cross sectional units (Brida, Lanzilotta, & Sebestian, 2015; Phiri, 2015). In practice, the economic growth (or tourism receipts) in a specific group of countries (e.g. the Asian countries) may be disturbed by the worldwide recessions, but some countries may enter into or get out of recessions earlier than others. That is, both economic and tourism activities have interactive effects across countries. In this case, the nonlinear growth-tourism causality would be examined in a panel data context.

One approach for resolving the problems occurred in evaluating the relationship between tourism and growth is to employ the panel smooth transition vector error correction model (hereafter PST-VECM). A PST-VECM is constructed by rewriting the panel vector error correction model as a smooth transition one through the panel smooth transition regression (PSTR) model, recently introduced by Fok, van Dijk, and Franses (2004) and González, Teräsvirta, and van Dijk (2005). A basic PSTR model consists of two linear components combined by a nonlinear transition function and allows for smooth changes in the country-specific correlations, cross-country heterogeneity and time instability of the impact. Replacing the regressors in each PSTR model with all lagged dependent variables and one-period lagged error correction term, we can develop a PST-VECM.

The PSTR model is particularly useful for situations where the nonlinear dynamics are driven by a common regime-switching component, but where the response to this component may be different across variables. In addition, to conduct the estimation of the PSTR model, a panel data set that simultaneously covers time series and cross-sectional data is used. Obviously, a panel data set considers the heterogeneity of cross-sectional units and includes enough observations to improve estimation