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TOURISM, ECONOMIC EXPANSION AND POVERTY IN NICARAGUA: INVESTIGATING COINTEGRATION AND CAUSAL RELATIONS

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ABSTRACT

This study examines the causal relationship between tourism expansion, economic growth and poverty for the Nicaraguan economy. Using co-integration and causality tests, the study's results lend support to the proposition that tourism has a significant positive impact on Nicaragua's economic expansion and development. With the knowledge from the output test, the study uses a regression analysis to test the hypothesis that income growth and tourism development would lead to a decline in the proportion of people below the poverty line. The paper presents arguments in support of the proposition that tourism, as a source of economic growth and development, offers a convincing case for the use of policy instruments focused to drive a tourism-based economy or tourism programs. It discusses its potential to stimulate further research designed to have the best available estimates of tourism impacts on variables such as economic growth and poverty.

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INTRODUCTION

Face of poverty has its worst exposure in the most vulnerable developing countries which form the weakest and poorest segment of the international community. Many developing countries, however, are realizing that tourism development represents a good prospect for poverty alleviation and economic growth. International tourism is the economic sector through which developing countries have managed to increase their participation in the global economy. In fact, from Latin America, to Africa and to Asia tourism is the primary source of foreign exchange earnings in all Least Developed Countries, except oil producing countries.

The claimed link between tourism, growth and poverty alleviation is not new in the literature about economic and tourism development (Sharpley and Telfer, 2002; Bryden, 1973; Elliott-Jones, 1971). What is new, however, is the prominence that tourism has received recently in the fight against poverty by the academia, by the practitioners, and by the international agencies. Tourism has been catapulted to the forefront of the tools available to eradicate poverty effectively, relatively quickly and less costly in the developing countries. This is a shift from earlier times.

The current position of multilateral and bilateral international agencies is an important break from the past. Based on both its resilience and its alleged positive impacts for generating foreign exchange earnings, economic growth, rapid mass jobs creation, stimulus to consumption, and welfare enhancement, tourism is playing a major role in the formulation of the development strategies of developing countries. Considerable resources are allocated to tourism in the hope of reaping sustainable benefits. This position is supported by empirical evidence that tourism expansion is relevant and significant for growth and economic development (Belisle and Hoy, 1980; West, 1993; Modeste, 1995; Zhou *et al.,* 1997; Shan And Wilson, 2001; Balaguer and Cantavelle-Jorda, 2002; Dwyer *et al.,* 2003; Vanegas and Croes, 2003; Durbarry, 2002, 2004; Dritsakis, 2004; World Tourism Organization, 2002, 2004; Eugenio-Martin *et al.,* 2004; Croes and Vanegas 2006; Kim *et al*., 2006).

A large group of advocates including the World Bank and the IMF, boosted by these empirical studies, are looking at tourism as a strategy for getting out of the poverty trap for poor countries. Implicit in the proposition is that growth reduces poverty, and that since tourism generates growth, tourism therefore can alleviate poverty. Tourism, therefore, offers one of the best development opportunities in terms of foreign exchange earnings, jobs and investment attraction. The only missing link in this approach is the empirical connection between tourism and poverty alleviation.

Many governments, however, either do not take tourism seriously or fail to make the connection between tourism and poverty alleviation or both. In fact, this has resulted in a lack of empirical analysis to inform policy decisions. Particularly scarce is data on the impact of tourism on poor people. The promise of tourism for developing countries both as a vehicle to gain a competitive advantage and as a vehicle to alleviate poverty often is based on its potential impact on growth (Durbarry, 2004; WTO, 2004; Luvanga

and Shitundu, 2003; Durbarry, 2002; Elliott-Jones, 1971). This promise, however, has not been validated empirically by the proponents of this new strategy against poverty. This study is a work in progress report intended to make a contribution to the current debate, to inform researchers, practitioners and academia and to receive feedback.

The objective of the paper is to answer the following four related questions: (1) if tourism expansion has promoted growth, in the long-run, to what extent Nicaragua economic growth responds to a change in tourism demand?; (2) if an inverse relationship exists between growth and poverty, to what extent poverty reduction responds to evolution of economic activity?; (3) if a direct tourism poverty reduction transmission relationship is established, to what extent Nicaragua poverty reduction responds to the evolution of international tourism activity during the 1980-2004, period?; (4) if there is one-way, or two-way causality between economic growth and tourism expansion: tourism expansion leads to economic growth, or economic growth leads to tourism expansion, or there is a reciprocal relationship between the two variables.

This paper uses the Johansen (1988, 1991) and Johansen Juselius (1990) Full Information Maximum Likelihood co-integration procedure (CI), to estimate the long-run equilibrium relationship between tourism development, economic growth, and poverty alleviation. The existence of a long-run equilibrium relationship between tourism expansion and economic growth in Nicaragua means that both variables are causally related, at least in one direction (Granger, 1969, 1986, 1988; Engle and Granger, 1987).

TOURISM AND POVERTY WORLDWIDE

The Perils and the Dilemma

During the 1970s and 1980s, both researchers and international agencies were either indifferent to, or outright critical of, the potential opportunities that tourism could hold for the developing world. Tourism has been criticized as a strategy for economic development because it is associated with dependency upon an external –and often fickle-source of growth (Britton, 1980; de Kadt, 1979; Bryden, 1973; Perez, 1973). This negative attitude was either a result or a reflection of both the ongoing literature of that time that tourism was an unsound option for economic development and that the focus on poverty should be based on the development of agriculture. In some quarters, however, this critical attitude is still prevalent today (Wilkinson, 1987; Pastor and Fletcher, 1991; Copeland, 1991; Rao, 2002).

In the meantime, the majority of developing countries still are faced with extreme poverty– about three billion of world's inhabitants live on less than US$ 2 per day, while near 600 million of these live below the poverty line with less than US$ 1 per day (World Bank, 2000, pp 3-4). In this gloomy portrait, it seems that tourism is one of the only bright spots.

Strategies for tourism development, however, have been found to be effective in unlocking opportunities for the most vulnerable groups within the tourism sector. In fact, in tourism policy development management there is no need for tourism negotiations, the borders already, have been, still are and will remain opened up, and with both money and passport barriers are non-existent. We can assert without any doubt, however, that competition is being ferociously pursued and promotional effort is more aggressive than ever. The WTO in its 2004 report on Tourism and Poverty Alleviation released at the Johannesburg Summit on Sustainable Development, incorporated the positive outcome of four studies that demonstrate how tourism can raise incomes, how tourism can encourage adopt poverty reduction programs, and how tourism can enhance impact of tourism development in reducing poverty.

We believe that, if properly incorporated into development strategies, the tourism sector can be a corner pillar of new productive systems aimed at significantly reducing unemployment, aimed at increasing incomes, and aimed at eradicating poverty. Of course, it goes without saying that the successful development of tourism initiatives involves harnessing a wide range of domestic and international stakeholders. In this regard, for many developing countries and particularly the least developed countries, small economies, and island states, tourism offers real opportunities.

A Consistent Performance

Can tourism work for the poor? Over the past several decades, international tourism has been steadily resilient and consistently increasing, as well as the importance of tourism for the economy of many countries worldwide. Tourism constitutes one of the major economic forces of the world. Despite the terrorist attacks on September 11, 2001 in the United States and the modest global economic performance, according to WTO, expenditures by near 800 million international tourists traveling in 2005 totaled near US$ 600 billion, roughly US$ 1.5 billion per day worldwide. In addition, tourism spending has contributed to an ameliorated balance of payments in many countries.

As such, tourism generated foreign exchange earnings have come to represent a significant revenue source, increasing employment, family income, tax revenues and economic growth in both developed and developing countries worldwide (McKinnon, 1964; Belisle and Hoy, 1980; Allen and Consenza, 1988; Khan *et al.,* 1990; West, 1993; Uysal and Gitelson, 1994; Hazari and Sgro, 1995; Durbarry, 2002; Balaguer and Cantavella-Jorda, 2002; Vanegas and Croes, 2003; Croes and Vanegas, 2006; Kim *et al*., 2006). In 2005, for example, international tourism receipts accruing to developing countries amounted to near US$150 billion, or near 25% of the total world international receipts. Tourism is the principal export in a third of all developing countries and, among the 49 Least Developed Countries it is the primary source of foreign exchange earnings.

Focusing on Nicaragua

Nicaragua, which is categorized as a low-income country offers an interesting case study of economic development. Its economic activities have focused on the exports

of coffee, manufacture exports, and more recently on tourism and so can all be integrated for modeling purposes. Our investigation, however, whether economic expansion (contraction) causes exports expansion (contraction), whether exports expansion (contraction) growth causes economic expansion (contraction), or whether a two way causal relationship exists between the two can, in the end, be established only empirically.

Nicaragua is the second poorest country in the Americas, after Haiti. Nearly 48% of its population lives in poverty as defined by the one dollar per day measure. Two out of every three people live in the rural areas and near two third of the rural population is poor. Because of rapid population growth, the number of people living in extreme poverty increased from nearly 680,000 in 1993 to nearly 800,000 in 1998. Nicaragua is also one of the High Indebted Poor Countries. In 2002, the Government of Nicaragua announced its policy to propel tourism development as a tool to combat poverty. As such, tourism is a recent phenomenon in the country (Government of Nicaragua, 2001; National Development Plan, 2002; Vanegas, 2002; Wayne and Croes, 2003).

Overall, in 2005, it is estimated that tourism directly accounts for nearly 5.7% of Nicaragua gross domestic product (GDP) and employs (direct, indirect, and induced) near 94 thousand people, or nearly 6.4% of the work force. Its importance, however, is increasing in real terms. In fact, Vanegas (2002), in his study found that of the three sectors (agriculture, manufacture, and tourism), tourism offered the largest power to generate foreign exchange earnings, generating the largest increases in jobs creation, stimulating the largest increases in economic expansion, and the largest impact on income distribution.

In the first half of this century, Nicaragua was one of the fastest growing tourist destinations in Central America. An analysis of Nicaragua tourism receipts, as a percentage of total exports of goods and services, indicates that whereas in 1990 this percentage was near 3.1%, in 2005 it was 16%, or nearly 5.14 times higher than in 1990 (Vanegas, 2002, 2006). From the balance of payments perspective, the foreign exchange earnings from tourism have represented an important source of compensation for Nicaragua's current account and more specifically, for its trade imbalances in the last five years.

THEORY AND MIXED EVIDENCE

The link between tourism and poverty reduction can be put together based on two seemingly unrelated paradigms, namely the trade-economic growth nexus on the one hand, and sustainability, on the other hand. Trade theory posits that nations export to others based on comparative advantage and that in the process nations will improve economically. In other words, openness through exports has a positive impact on the economic output of a country.

This theory maintains that exports promote growth through several channels, such as economies of scale, the potential of positive externalities in non-export sectors, the encouragement of efficient allocation of resources through increasing competition, the stimulation in research and development, investment in human capital, and the loosening of foreign exchange constraints (Sachs, 2002; Jin, 2004). In the case of tourism, however, the theory of factor endowments and absolute advantage (Vellas and Becherel, 1995) can be applied. Tourism specialization according to these perspectives is a result of abundance of resources (natural and manmade attractions) necessary to develop the supply of tourism products.

The empirical evidence about the relationship between export and growth is, however, mixed. Barro (1991), Sachs and Warner (1995), Frankel and Romer (1999), and Jin (2004), among others, attest to the positive results paradigm. Sharma and Dhakal (1994) in their study of 30 low-and-middle income developing countries found out that, export growth prima facie causes output growth in six countries; output growth prima facie causes export growth in eight countries; and no causal relationship was observed between output growth and export growth in the remaining of the countries. Oxley (1995), Harrison and Hanson (1999), and O'Rourke (2000) questioned the robust positive relationships between these two variables. However, according to Jin (2004) and Durbarry (2004) the debate highlights four flaws which might have caused this confusion, namely methodology and estimation techniques, missing variables, measurement error, and issues of aggregation of data.

The classical literature about economic growth investigated the impact of several determinants on growth. A large number of empirical studies have focused on the causal relationship between traded goods and economic growth and development. The review of the literature, however, showed that none of the studies have ever examined tourism. Recently, a few studies have examined whether tourism can be an engine of economic growth. For example, Shan and Wilson (2001), Balaguer and Cantavella-Jorda (2002), Vanegas and Croes (2003), Durbarry (2004), Dritsakis (2004), Oh (2005), Croes and Vanegas, 2006; and Kim *et al.,* (2006) analyzed the impact of tourism on economic growth in China, Spain, Aruba, Mauritius, Greece, South Korea, Nicaragua, and Taiwan respectively. All of them, except in the Korean economy, concluded that, there is a positive relationship between the two.

Eugenio-Martin *et al.,* (2004) based on a panel data approach, used a broader sample for 21 countries in Latin America and suggested causality between tourism and economic growth rate and suggested that tourism expansion is adequate for the economic growth of low-and-medium income countries. Other studies sought to investigate whether small countries specializing in tourism are more likely to grow faster than other countries (Lanza and Pigliaru, 2002; Sachs, 2002; Grassl, 2003; Croes, 2005). Their findings suggested that size per se is not relevant with regard to economic growth, but rather functional specialization in tourism is the relevant factor. However, these studies in general suggested that growth through tourism is attributed to an increasing terms-of-trade and to endowment of natural resources.

Trade-growth theory, however, was mainly involved with ascertaining the efficient allocation of resources, but not on the distributional effects of the allocation. Tourism as an engine of growth was measured based on its efficiency aspects. These aspects were further stressed through tourism economic impacts studies. The latter gauged how tourism reverberates through the economy by identifying this impact through several channels, such as jobs, taxes and income (Archer, 1973; Mathieson and Wall, 1992; Zhou *et al.,* 1996; Mihalic, 2002; Mak, 2003; Vanhove, 2005). On the other hand, Copeland (1991) was one of the first observers to pinpoint that tourist expenditures might have different distributional effects on different social groups.

POVERTY CONNECTION IN THE WAITING LIST

A coherent framework that would link tourism and poverty alleviation had to wait to the unfolding debate within the sustainability literature. Tourism and sustainability were initially linked through the economic management of scarcity of resources as inputs "upstream" in the value chain and the amelioration of impacts "downstream" (William and Shaw, 1998; Mazzanti, 2002). The presence of market imperfections and moral hazard issues in the production and consumption of tourism was clarified (Keane, 1996; Crase and Jackson, 2000).

For example, in order to address market distortions, transaction costs should be integrated in the adjustment process towards equilibrium. Thus, more attention was paid to the role of government in remedial and coordination tasks in tourism, and its distributional effects became more relevant in the discussion (Mazzanti, 2002). Consequently, Mak (2003), for example, argued to distinguish the notion of efficiency from equity: an action that might improve everyone's wellbeing may enhance some people's welfare more than others. If those who benefited from this efficiency are the richest, then improved efficiency might be entirely consistent with more inequality.

This would be unacceptable in light of the growing poverty in the world. Combining optimality with individual and social disadvantages should become one of the basic tenets of tourism expansion and development. In this sense, tourism expansion and development both needs to receive support from, and needs to give support to the local communities, as tourism activities affect an entire community. This means that the new growth and development strategy should focus on social equity, and thus poverty reduction.

In short, the poverty connections do exist and they are already embedded in what we have called, elsewhere, *the democratization of the dollar*: transfer of wealth and income from residents of developed and developing countries to residents of developing and least developed countries, ample participatory opportunities for all sectors of the economy, acting as a catalyst for change, and by promoting conditions in which the poor people are able to participate and increase their incomes and their standards of living (Vanegas and Croes, 2003, 2004).

MODEL SPECIFICATION AND DATA

Model Specification

The study departs from a standard growth accounting function framework in order to assess the impact of tourism on growth. It attempts to quantify the contribution of different determinants of output growth. Total exports are disaggregated by its main components: agriculture, manufacture, and tourism. The premise here is that tourism expansion is one of the prime movers of economic growth. Therefore, it is proposed that international tourism increase has a positive relationship with economic growth, and this on its turn triggers a reduction of poverty transmission impact.

Our general long-run model may be written as follows:

(1) $Y_{gdpt} = f(X_{cot}, X_{mat}, X_{tout}, CAP_t, SCH_t, \mu_t)$

Where, Y_{gdp} represents real gross domestic product utilized as a proxy for economic expansion; X_{co} represents real exports of coffee; X_{ma} represents manufacture exports; X_{tou} represents real tourism receipts (or foreign exchange earnings) at 1995 prices, used as a proxy for tourism expansion; CAP is real investment as a proportion of GDP utilized as a proxy for physical capital; SCH is human capital represented by secondary school enrollment; μ_t represent the error terms. Expressing equation (1) in linear logarithmic form, we investigate the multivariate relationship represented by equation (2):

(2) $LnY_{gdpt} = \delta_0 + \delta_1 LnX_{cot} + \delta_2 LnX_{mat} + \delta_3 LnX_{tout} + \delta_4 LnCAP_t + \delta5 LnSCH_t + \mu_t$

Because there are more than two variables in the equation, there can be more than one co-integration vector. In this context, the variables in equation (2) may feature as part of several equilibrium relationships governing the joint evaluation of the variables. In such a case, we use the Johansen and Juselius method to detect for the number of co-integration vectors if any exist.

Data

The annual data used in this study refer to the period 1980-2005. The base period is 100 = 1995 prices. The data for the poverty variable were supplied by the technical secretariat Office of the President of Nicaragua (SETEC) and reconciled with the Central Bank of Nicaragua (Banco Central de Nicaragua/CBN). The poverty data have been subjected to strict quality control standards for inclusion in the analysis. The financial data for the gross domestic product, exports, and tourism receipts have been reported on a yearly basis by the CBN: economic indicators, 1960-1999 and several

issues of the statistical bulletin of the CBN (Indicadores Económicos y Boletín Estadístico (Economic Indicators and Statistical Bulletin of the CBN)[1].

The initial model specifications incorporated two dummy variables: D8290, to capture the influence of the Sandinistas-Contras civil strife. A very volatile political and socio-economic situation in Nicaragua during the time span under review when the Somoza dictatorship was succeeded by a Marxist dictatorship, which in turn, was succeeded by a democratic process by the early 1990s, and D8594, to account for the years of super-high inflation that Nicaragua witnessed between 1985 and 1994.

EMPIRICAL RESULTS

Testing for Unit Roots

All models are estimated using annual data from 1980-2005. This period and frequency is chosen because it provides the most consistent data set available to the authors at the time of writing. Before specification and estimation of CI, however, the first step is to examine the order of integration of the variables.

A stationary variable means that the mean and the variance of the series are constant through time and the auto-covariance of the series is not time varying. Integration means that past shocks remaining undiluted affects the realization of the time series forever and a time series has theoretically infinite variance and a time-dependent mean (Enders, 1995). Since a wrong choice of transformation of the data gives biased results and has consequences for wrong interpretation, it is important to examine the stationarity of time series data to set up an appropriate methodology in the formation of econometric models (Engle and Granger, 1987).

Co-integration requires that all variables in the long-run CI equation should be I(1), so that prior to testing for CI the integration order of each variable should be established. In this analysis, the unit root test is based on both the augmented Dickey-Fuller (1979, 1981) and the Phillips and Perron (1988) tests (hereafter ADF test and PP test). The advantage of the PP test over the ADF test is that the PP test is robust to a wide variety of serial correlation and time dependent heteroscedasticity.

In order to investigate the stationarity properties of the data, an analysis of each of the variables was carried out by testing for the presence of unit roots using the auxiliary equation (3)[2]:

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[1] The collected measures of gross domestic product, export values for coffee, manufacture, and tourism receipts, and poverty series all comply with the common international definitions set up by the United Nations, the World Bank, the International Monetary Fund and the World Tourism Organization. These agencies generally collect statistics directly from the countries concerned. The countries endeavor to apply standard United Nations procedures, definitions, and classification while using their special country knowledge to fit the data.

(3) $\quad\quad \Delta y^t = \alpha + \rho y^{t-1} + \beta t + \Sigma \gamma^i \Delta y^{t-I} + e^t$

Where (y^t) is the relevant time series variable, (t) is a linear deterministic trend and (e^t) is an error term with zero mean and constant variance. In constructing the co-integration regressions, we first include on the right hand side of all CI equations all the variables. Ordinary least squares are used in the estimation of these general regressions. The estimated error terms from the final co-integration regressions are then tested for unit roots using the ADF and PP tests.

The ADF[3] is a one sided test of the significance of the estimated (ρ), and its critical values are given in Fuller (1976 Table 8.5.2). In all, there is a test of the null hypothesis of the presence of unit roots against the alternative that the series is stationary, (ρ) being the parameter of interest. Lagged terms in (Δy^t) are added to ensure that the residuals are white noise. Because the ADF test will not detect any structural break, we have followed Perron (1989) suggestion and modified the ADF test by introducing the dummy variables. As a general statement, we can say that all these tests are made until achieving stationarity.

If we do not reject the null hypothesis, the series is non-stationary in levels. Tests are then performed on the series of first differences. If the null hypothesis of a unit root is rejected, the series in differences is stationary I(0) and thus the series in levels is I(1). The results are presented in Table 1. The null hypothesis for the gross domestic product variable cannot be rejected in its levels but is rejected in its first differences in both tests.

Table 1. ADF and PP unit root tests

Variables	ADF Levels	ADF first Differences	PP Levels	PP first Differences
LnY_{gdp}	-1.819	-3.835*	-1.653	-4.578*
LnX_{co}	-0.216	-4.338*	-3.112	-7.115*
LnX_{ma}	-0.422	-4.789*	-2.296	-8.743*
LnX_{tou}	-3.883*	-4.924*	-4.023*	-9.826*
LnINV	-0.657	-3.671*	-6.107*	-5.681*
LnSCH	-1.971	-4.756*	-3.735*	-4.672*
LnPO	-3.684*	-6.358*	-4.877*	-4.431*

Note: The critical values where the auxiliary test regression can contain a constant and/or a trend are -3.24 (10%) and -3.60 (5%).
* Significant at the 5% level.

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[2] We also considered two more regression equations (autoregressive process of order p) to test for the presence of a unit root. The difference between these equations concerns the presence of deterministic element α (drift) and βt (linear trend).
[3] As two readers that want to remain anonymous suggested, we omitted the explanation of unit root and co-integration tests because both tests are well known.

The same is true for the coffee, manufacture, and schooling variables and therefore a unit root might exist, with the exception of the tourism and poverty variables, where the application of the ADF and PP tests revealed that these variables are stationary in both its levels and its first differences. In this case, tourism and poverty do not need no differencing, just the log transformation.

These variables may also be co-integrated if there presents one or more linear combination among these variables that is stationary. If these variables are co-integrated, then there is a stable long-run or equilibrium linear relationship among them. It should be noted, however, that the CI relationship does not necessarily hold in every case. The application of this methodology should be subject to strict statistical tests.

Co-integration

Since the appearance of Engle and Granger (1987), the issue of CI has attracted an enormous amount of attention. An important reason for this attention, additional to that of striving for parameter reduction, of using the appropriate statistical techniques, and of the opportunity for modeling trending economic variables which obey equilibrium relations, is that co-integration allows us to solve the problem of spurious regressions. If time series variables are non-stationary in their levels they are integrated of order one and their first differences are stationary[4].

The test for co-integration between gross domestic product, tourism, coffee, and manufacture exports, and poverty a CI methodology proposed by Johansen (1988, 1995) and Johansen and Juselius (1990, 1992) is used. The advantage of this technique is that it estimates long-run or co-integration relationships between non-stationary variables using a maximum likelihood procedure which tests for the number of CI relationships and estimates the parameters of those CI relationships. Since all variables in the regression, except tourism and poverty which are in level form, are co-integrated, then there is an indication of the presence of a stable long-term or equilibrium linear relationship among them[5].

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[4] The initial model specification incorporated the INV, SCH variables and the dummy variables D8290, and D8594. The preliminary results, however, showed that these variables were non-significant, statistically, and the SCH variable has the negative sign. Some of the poor results may be do to faulty data as well as to aggregation. The possibility also exists that the shocks of the dummy variables are captured by the explanatory variables, which are subject to similar shocks. The authors, however, have not explored the data in sufficient detail to see whether deficiencies in them could account for those analyses which turned out poorly. In short, these variables failed to bring any improvement in the performance of the equations. Consequently, final estimation procedures were implemented without these variables.

[5] In practice, there are three additional CI methods that researchers have used, regularly: the Engle and Granger (1987) two stage approach; the Wickens and Breusch (1988) one stage approach; and the autoregressive distributed lag model approach (Pesaran and Shin, 1995). Due to different modeling strategies, all of these approaches have their merits, may yield elasticity values with large discrepancies for the same data set, and there has not been clear-cut evidence to show that any one is superior to the others. In this study, however, the Engle-Granger two-step CI test procedure was also utilized in the preliminary analysis. The results were less satisfactory.

Johansen's approach derives two likelihood estimators for the CI rank: a trace test and a maximum eigenvalue test. The CI rank (R) can be formally tested with the trace and the maximum eigenvalue statistics. The results are presented in Table 2. The trace statistic either rejects the null hypothesis of no co-integration among the variables or does not reject the null hypothesis that there is one co-integration relation between the variables. In implementing the Johansen procedure, an intercept and a linear deterministic trend are included in the co-integration equation. At the 5% level both tests of the stochastic matrix suggest that there is a co-integration relationship, the coefficients of the variables are significant, and they have the correct signs.

A number of lags for each of the variables were included in order to capture the short-run dynamics of the model[6]. The Akaike (1974) [AIC], and the Schwartz (1978) Bayesian [SBC], criteria were use to determine the order of the vector autoregressive. Both criteria indicated lag 3 as the optimal lag for the annual data at hand. The results are reported in Table 3.

Furthermore, a selected number of diagnostic tests are used in the selection of the final models. The Breusch-Godfrey (Godfrey, 1978) test is used to test for residual serial correlation. The statistic used in this study for the detection of the functional form is the Ramsey (1969) test. The Jarque-Bera (1980) normality test is used to test for normal distribution of the residuals in a regression model. Finally, the Engle (1982) autoregressive conditional heteroscedasticity test is applied to test the problem of heteroscedasticity under serially correlated residuals.

When normalized for a unit coefficient on real gross domestic product (LnY_{gdp}), the most appropriate co-integration regression of the long-run, is given in Table 4. The estimated coefficient indicates that tourism positively impacts Nicaragua economic expansion over time. Additionally, these results show that real coffee and manufacture exports, present the expected positive signs and the coefficients are significant at the 5% significance level.

Table 2. Results of co-integration tests for Nicaragua

R	Maximum eigenvalue	Trace	Critical Values Trace 5%	Critical Values Trace 10%
0	131.03	179.28	113.85	105.31
1	93.16	101.17	101.54	79.06
2	66.83	58.02	69.83	58.17
3	33.58_{ol}	40.64_{ol}	41.66	37.52
4	21.52	23.33	24.52	21.38
5	7.39	8.31	19.31	16.33

Note: Trace is likelihood ratio statistic for the number of co-integration vectors. Estimation has been performed with Stata 9.
[ol] indicates the optimal lag selection.

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[6] The economic results, however, are very sensitive with the use of few lags.

Table 3. Results of the AIC criteria, Schwarz, and Log-Likelihood for Nicaragua

Number of Vectors	AIC criterion	Schwarz criterion
0	-22.1458	-22.1458
1	-23.3254	-23.1556
2	-23.5440	-22.9515
3	-23.6182_{ol}	-23.0067_{ol}
4	-22.4268	-21.6123
5	-22.0646	-19.8264

Note: ol indicates the optimal lag selection.

The results also show that single equation estimation for an increase in tourism can capture the long-run relationship. The existing correlation between tourism and economic expansion is not spurious, and is quite substantial. It indicates that if tourism expansion increases by 5%, economic growth increases by 3.1%, while economic growth would increase by 2.52% if there were a similar increase in coffee exports, *ceteris paribus*. On the other hand, a 5% increase in manufacture would increase growth by 1.61%, *ceteris paribus*.

For tourism, the coefficients do seem relatively consistent with our original prediction that tourism affects (direct, indirect, induced) all components of the economy: primary (food production and technology), secondary (manufacture of tourism packages), and tertiary (provision of several services).

When normalized for a unit coefficient on poverty (LnPO), the most appropriate CI regression of the long-run, is given in Table 5. The estimated coefficient indicates that tourism reduces poverty in Nicaragua, over time. Additionally, these results show that foreign exchange earnings from tourism, presents the expected negative sign and its coefficient is significant at the 5% significance level. In the case of the impact of economic expansion (LnY_{gdp}) on poverty (LnPO), however, the value of the coefficient as compared with tourism is lower, has a negative sign, and is significant at the 5% significance level. One rationalization of this result is that the gross domestic measure is unable to convey its full long-run multiplier effects on poverty.

From the estimates it can be inferred that the presence of multiplier effects on Y_{gdp} are really important. This is a significant fact since tourism in Nicaragua really started to flourish in the last ten years. The significant positive effects of tourism on growth appear to be consistent with the arguments of among others Modeste (1995), Durbarry (2004) and Dritsakis (2004). A study by Balaguer and Cantavella-Jorda (2002) also found that earnings from international tourism affect positively the Spanish economic growth.

Granger Causality Tests

As a final step, in order to answer the causality question, the Engle and Granger (1987) causality test is applied. Engle and Granger (1987) and Granger (1988) noted that if two time-series variables are co-integrated then at least one-directional Granger-causation is present. The existence of a stable long-run relationship between economic growth and tourism expansion means that the two variables are causally related at least in

one direction. Then, another important issue to be addressed is how the long run relationship between these two variables is causally related. In other words, is tourism causing growth or is growth causing tourism? To answer the question regarding the direction of causation, the Granger causality tests were performed.

Since economic growth and tourism expansion are co-integrated, a VAR model can be constructed in terms of the levels of the data involving estimating the following regressions:

$$(4) \qquad LnY_{gdpt} = \pi^1 + \Sigma \alpha^{1m} LnY_{gdpt-m} + \Sigma \beta^{1m} LnX_{tout-m} + \mu^{1t}$$

$$(5) \qquad LnX_{tout} = \pi^2 + \Sigma \alpha^{2m} LnX_{tout-m} + \Sigma \beta^{2m} LnY_{gdpt-m} + \mu^{2t}$$

Where π is the deterministic component and μ^t satisfies all the assumptions of the standard regression model. Both hypotheses were tested by a standard F-test. The optimal lag (m) is selected with the smallest values of the AIC and the SBC criteria and with the rejection of the null hypothesis in Likelihood Ratio (LR) test. Both criteria indicated lag 3 as the optimal lag for the data at hand. According to Granger, a variable, for example, X_{tou} causes another variable Y_{gdp} with respect to a given information set that includes Y_{gdp} and X_{tou} if current Y_{gdp} can be better predicted by using past values of X_{tou} than by not doing so[7].

Table 4. Estimates of the Parameters Stabilized (Dependent variable LnY$_{gdpt}$)

Variables	Co-integration vector	Standard Errors
LnX$_{cot}$	0.501	0.116
LnX$_{mat}$	0.322	0.100
LnX$_{tout}$	0.614	0.103
Adjusted R^2 = 0.93	-----	-----
DW-statistic = 1.864	-----	-----
Serial correlation = 2.16	-----	-----
Functional form = 1.913	-----	-----
Normality = 2.214	-----	-----
Heteroscedasticity = 2.516	-----	-----

Note: LnINV$_t$ with a co-integration vector value of 0.171 (t = 1.635), and LnSCH$_t$ with a co-integration value of -0.094 (t = -1.711) were excluded from the final estimation. The authors are aware that omitting CAP and SCH while testing the causality, may bias the findings.

Table 6, reports the empirical results of the Granger-causality tests. Regardless of the number of lags introduced in the equation, a Granger-causal running from tourism expansion (X_{tou}) to economic expansion (Y_{gdp}) exists for Nicaragua. The reverse hypothesis that economic expansion causes tourism expansion is also supported, only at the 10% significance level. Based on the rejection of both null hypotheses, a feed back causality between tourism and economic development is supported using the yearly data

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[7] In addition, similar VAR models were estimated for LnX$_{cot}$, LnX$_{mat}$, LnINV$_t$, and LnSCH$_t$.

at hand. Additionally, we performed a Granger-causal test on the relationship, between Y_{gdp}-poverty reduction and X_{tou}-poverty reduction[8]. It can be observed that, poverty reduction is promoted by both variables but at different levels.

Table 5. Estimates of the Parameters Stabilized (Dependent variable LnPO$_t$)

Variables	Co-integration vector	Standard Errors
LnX$_{cot}$	-0.333	0.168
LnX$_{mat}$	-0.441	0.190
LnX$_{tout}$	-0.617	0.165
Adjusted R^2 = 0.91	-----	-----
DW-statistic = 1.932	-----	-----
Serial correlation = 2.114	-----	-----
Functional form = 2.235	-----	-----
Normality (CHSQ) = 2.038	-----	-----
Heteroscedasticity = 2.492	-----	-----

Note: For the poverty nexus, during the preliminary analysis, we estimated the following univariate equations as follows: $LnPO_t = \alpha + \beta LnY_{gdpt}$ and $LnY_{gdpt} = \gamma + \pi LnPO_t$. The estimated values for β and π were -0.23 (t = 2.1342) and -0.32 (t = 2.6671), respectively. The analysis was extended to the multivariate equation as presented in this Table 5.

The null hypothesis regarding no causation of economic expansion (Y_{gdp}) to poverty reduction (PO) is rejected at the 5% significance level. The null concerning no causation of poverty reduction (PO) to economic expansion (Y_{gdp}) is also rejected at the 5% significance level. Therefore, for Nicaragua there exists an inverse reciprocal relationship between economic expansion and poverty. Considering that the test results are robust to the different lags, conclusions drawn from the causality tests are sound and reliable. Since the coefficients in the log function implies a percentage change in the independent variable, the results can be interpreted as follows: a 5% increase in economic expansion leads to a 1.15% reduction in the poverty level and a 5% increase in PO also causes a 1.6% decrease in economic expansion. These findings give support to the hypothesis tourism expansion-economic expansion-poverty reduction nexus.

For the tourism poverty nexus, the hypothesis of tourism-led poverty reduction was accepted based on the success to find causation of tourism to poverty reduction. The test results further indicate that a 5% increase in tourism receipts leads to a 3.09% reduction in poverty. On the other hand, the hypothesis of poverty reduction to tourism was not accepted based on the failure to find causation of poverty to tourism expansion. Moreover, economic expansion causes coffee expansion but not manufacture expansion.

Other aspects of the causality results are also interesting. For example, the empirical results are consistent with the findings of Eugenio-Martin *et al* (2004) that,

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[8] Expressed by the following regressions: (6) $LnY_{gdpt} = \pi^3 + \sum \alpha^{3m} LnY_{gdpt-m} + \sum \beta^{3m} LnPO_{t-m} + \mu^{3t}$; (7) $LnPO_t = \pi^4 + \sum \alpha^{4m} LnPO_{t-m} + \sum \beta^{4m} LnY_{gdpt-m} + \mu^{4t}$; (8) $LnX_{tout} = \pi^5 + \sum \alpha^{5m} LnX_{tout-m} + \sum \beta^{5m} LnPO_{t-m} + \mu^{5t}$; (9) $LnPO_t = \pi^6 + \sum \alpha^{6m} LnPO_{t-m} + \sum \beta^{6m} LnX_{tout-m} + \mu^{6t}$.

tourism expansion is adequate for the economic growth of low-income countries and Nicaragua is one of them. Also the results indicate that tourism, as a large global industry and a source of economic growth, provides a significant opportunity to consider an economic policy and development management strategy supported by a tourism-based economy.

These findings give support to the hypothesis tourism expansion, economic expansion, and poverty reduction nexus. From these estimates it can be inferred that the presence of multiplier impacts from tourism on gross domestic product and poverty are really important. This is significant fact since tourism in Nicaragua has grown, recently, as a faster pace, and the tourism share of total exports increased to about 16 percent. This is a significant contribution to economic growth and employment, and it has a substantial impact on the balance of payments account.

Table 6. Granger Causality Tests

Causation From	LnY_{gdpt}	LnX_{cot}	LnX_{mat}	LnX_{tout}	$LnPO_t$
LnY_{gdpt}	---	8.034 [a]	2.331	3.567	5.478 [a]
LnX_{cot}	3.674	---	2.036	0.736	3.038
LnX_{mat}	3.811	2.222	---	0.978	3.413
LnX_{tout}	7.904 [a]	1.137	3.127	---	8.037 [a]
$LnPO_t$	3.741	2.448	2.835	3.063	---

Note: [a] shows that these statistics are significant at the 5% level of significance.

POLICY IMPLICATIONS

In terms of policy decisions, we as researchers are mostly practical researchers, who try to answer the question, what exactly should Nicaragua or for this matter any other least developed country do right now to propel economic expansion and reduce poverty? But then this question is only relevant in terms of what kind of inference we have obtained? This question in turn depends on the use to which the inference will be put in Nicaragua, namely, the tourism-economic expansion-poverty and development policy framework of Nicaragua. In this context, policy decisions can be guided only in broad outlines by economic expansion regressions.

For Nicaragua, the findings, however, support the proposition that tourism, as a source of economic growth and development and as one of the most important worldwide industry, offers a convincing case for the use of policy instruments, such as targeted investment policy, marketing and promotion, and the support of tourism organizations focused to drive a tourism-based economy or tourism programs and projects. The findings are in line with the results obtained by Elliott-Jones (1971), Archer (1973), Lea (1988), Khan *et al* (1990), Khan *et al* (1995), Dwyer (2003), Smeral (2003), Vanegas and Croes (2003), Dritsakis (2004), Durbarry (2004), Mak (2004), Vanhove (2005), and Kim *et al*., (2006).

Disaggregating exports into various sectors, we find evidence that the tourism sector has had the major impact on the economy of Nicaragua during the past two decades, although the coffee and manufacturing sectors have contributed significantly to growth. For Nicaragua and perhaps for other developing countries, the knowledge of this piece of information could play an important role in determining the appropriate development strategy to realize more benefits from tourism expansion and development management. Furthermore, it suggests that if Nicaragua follows the path of tourism expansion, there will be at the same time a significant feedback from its economic conditions.

The fact that the direct impact of tourism expansion on poverty is greater than the direct impact of economic expansion on poverty is probably due to:

- The presence of a large underground or informal economy in Nicaragua. In this sense, the Y_{gdp} is unable to capture the full economic spill over. In fact, most of the official figures of the Y_{gdp} in Latin America economies do not account for the economic value of the informal economy.

- The speculation that both the level of openness of the tourism sector and the countrywide distribution of tourism-generated proceeds, as such, tourism has come to represent a wide spread revenue source, increasing employment, household income, and improved standards of living.

- Its recognized power of rapid and mass employment creation both during the implementation of the investment process and during the operation process. In other words, tourism spending does not distinguish between the legal and the non-legal economy and thus its participatory and distributional impacts are felt throughout the economy.

This scientifically verified information is crucial for the private, public, and governmental stakeholders of the economy to manage the tourism operations and planning in order to maximize the tourism foreign exchange earnings. Because the government of Nicaragua has adopted the policy of poverty reduction, tourism presents an excellent case to lead the structural transformation of the economy and reduce social and economic inequalities.

Overall, the findings suggest that tourism can become a powerful development device in alleviating poverty. The reason for this is the nature of the tourism production and consumption process. Typically, a tourist does not consume the product at a destination from only one supplier, but rather a bundle of services as a whole. The simultaneity of production and consumption of the product provides an important opportunity to include all sectors -- including poor sectors and marginal areas -- into the production and consumption process. Therefore, the poor can benefit through jobs availability, business sales such as food produce, handcrafts and souvenirs, and the provision of transport services and other indirect services to tourists.

LIMITATIONS, CHALLENGES, AND FURTHER RESEARCH

Limitations of the Study

A basic limitation lies in the empirical information needed for quantification. As we all know, time series have some well recognized disadvantages including relatively few observations, handling of structural changes, inter-correlation of independent variables, and serial correlation.

Other limitations relate to simultaneous solutions determined by production, consumption, and exports, and too high a degree of aggregation. The estimates obtained in this study, however, are consistent with the relationships and values obtained by other authors, and also consistent with those reported in other countries (Belisle and Hoy, 1980; Davis *et al.*, 1988; Khan *et al.*, 1990; West, 1993; Uysal and Gitelson, 1994; Archer, 1995; Balaguer and Cantavella-Jorda, 2002; Vanegas and Croes, 2003; Durbarry, 2004; Oh, 2005; Croes and Vanegas, 2006; and Kim *et al.*, 2006). Comparison of estimates from different studies, however, must be made with some caution since different studies involve different purposes, assumptions, models, estimation methods, data bases, level of data aggregation and relevant time period.

Another inherent limitation of any economic expansion analysis is the construction of economic expansion functions. Economic expansion response is particularly subject to variations that depend not only on the time period allowed but also on the influences of other factors such as exchange rates, productivity, and market behavior.

The authors of this study would argue that economic expansion response analysis has been and will continue to be a useful instrument in providing guidance for private and government authorities in economic policy determination. It is clear, however, that seldom, if ever, does economic expansion analysis alone determine economic policies. Both supplemental judgment and ancillary data and analysis typically must and do enter policy determinations as do political considerations and group pressures. This is by way of saying that economic analysis is only a part of the set of variables involved in policy determinations and economic expansion analysis is only a part of the set of economic considerations involved.

Statistical Challenges

A number of challenges have been indicated by the policy implications and limitation just reviewed. Here are a few of the challenges. It is probably safe to say that most coefficients for economic expansion would continue to be obtained from time series analysis. In any such analysis there are a number of issues which the researcher must face. These include: choice of the statistical methods; choice of the functional form; choice of the model; choice of the time period to be considered; choice of the unit time; choice of the definition of the variables to be included; choice of the level of data aggregation; and choice of the appropriate unit of measurement.

In this context, the estimation of economic expansion function is not without a challenge. From the authors' perspective, the chief challenge to this type of analysis is data availability and the quality of the data which is available. Whether or not the data is sufficiently "rich" to support the statistical estimation of all these coefficient values is open to question. If not, one cannot expect to obtain all the estimates.

With respect to modeling, it is important to remember that all models are appropriate; different models are simply appropriate for different things. In this regard, any dynamic economic expansion regression equation fitted to aggregate time-series data is at best an approximation to the underlying structure within a narrow domain of movement in the set of independent variables. For example, if the influence of a variable is neglected, the values of the estimated coefficients will tend to be overestimated, as the estimated coefficients will involve direct as well as indirect impacts. The challenge with the standard forms of dynamic models, however, is that extremely restrictive assumptions about the structure of the dynamic adjustment processes are made.

A great deal of research has been conducted on economic expansion both by economists and non-economists. It is important to emphasize, however, that in economic expansion analysis, as well as in every other part of econometrics, crude techniques or indeed sophisticated ones are not substitute for a sensitive interpretation of data, for imaginatively seeking causation, and for bringing all peripheral and inferential evidence to bear. The interrelation of economic expansion, tourism, poverty, and data is a job for the skilled researcher, rather that a motionless econometric procedure and an unthinkable computer. Rigid application of 'best practices' or 'accepted techniques' will probably always obscure more than it 'enlightens'.

An obvious conclusion from the preceding discussion is that an array of possible dynamic models and statistical procedures confronts the research worker interested in economic expansion and causation analysis. Since the techniques differ in what they can accomplish, the appropriate one will depend to a great deal on the specific objective of the economic expansion-tourism-poverty study. No one procedure will best answer all the possible questions concerning the relationships and response of these variables.

Further Research

Economic expansion response and to detect causal relationships probably have never received such intense study as during the last two decades. There has been a tremendous input of research resources and professional man hours. Many of us have been professional beneficiaries of this grist, undoubtedly, we shall continue to be. However, treating an economic hypothesis or problem as if it were purely statistical is not always the best approach. It is surely safe to say that not all our problems are 'good' statistical methodologies. Some further research on economic expansion and causality relationships needs to be devoted to the question of what kind of public and private intervention is needed, on the one hand, at promoting and increasing international tourism demand and, on the other hand, providing and fostering the development of tourism supply.

Another possible area of research is between estimates of short and long-run response. Use of current values or variables lagged one year result in estimates for short-run parameters, while use of longer lags and recursive sets of equations can produce estimates for long-run situations. Both can be found within a single model. Whether one or the other or both are sought depend very largely on the objectives of the study. Data on both types of response can be of great tourism development value.

One additional question now deserves consideration. Is the economic wealth created by tourism widely shared, or does it increase social, political and economic inequalities? Empirical research on this issue will do much to further clarify the true nature of the tourism impact currently being felt not just in Nicaragua but throughout Latin American and African countries.

This study, however, is only the first phase of a larger study. Further adaptations will be made to explore directly the complex statistical problems related with other forms of dynamic modeling and to obtain new estimates of economic expansion functions. We hope, as work progresses to incorporate improvements in both the data and the model. What immediately comes to our mind, for example, is the need to make comparison analysis with methodologies such as the time-varying parameter approach, error correction and autoregressive distributed lag models. Additionally, it would be instructive for economic expansion and tourism researchers if the forecasting performance of the different distributed-lag models could be compared. In a phase now underway, we incorporate alternative dynamic systems for modeling economic expansion, tourism demand and forecasting.

CONCLUSIONS

This article has assessed tourism as a tool for economic expansion and poverty reduction in Nicaragua. Because the government adopted the policy of investing large sums of public money in the fight against poverty, Nicaragua presents an excellent case to determine how much the tourism sector contributed to economic expansion and poverty reduction. The study set out to answer four interrelated questions concerning the tourism-led growth hypothesis and the growth-poverty nexus hypothesis. In order to accomplish this goal, the study performed co-integration techniques and Granger causality tests.

The conclusion is straightforward: there is a long-run stable relationship between economic growth and tourism, and causality testing confirms the existence of that relationship in Granger sense, which signifies that the results support the tourism growth-led hypothesis. The magnitude of the parameter suggests that tourism has significant long-run spillover effects in Nicaragua. Our study further indicates that tourism has a significant impact on poverty alleviation after taking into account the difference between the official and unofficial economy. This enhances the economic expansion-poverty nexus hypothesis, which is supported by some researchers, practitioners, and international institutions.

The relevance of our findings suggests the need for government intervention in the development strategy of tourism expansion. Systematic allocation of resources to stimulate and promote tourism is necessary in order to sustain tourism as an engine of growth for development. On the other hand, the mixed economic configuration of scarce natural and cultural resources, which jointly provide private and public services, makes it necessary that the government engages in the optimal economic management of these resources. These resources on whose scarcity tourism relies, makes consensus over sustainability rules and rent distribution which are relevant elements in policy making.

While the particular models used in this paper are not perfect representations of economic realities, the results show that a significant contribution to understanding the relationship between economic expansion, tourism and poverty can be made by formulating dynamic economic models of the same general type used in this study. The results presented indicate some discrepancy in the tourism-growth-poverty coefficient values. The investigation of differences among these coefficient values appears to be one of he most promising areas of future research.

Finally, the statistical results presented in this study are preliminary in nature. Therefore, their implications should be taken with the necessary caution. Some of the shortcomings are the too high degree of aggregation, the non-inclusion of other macroeconomic variables, and the lack of attention to simultaneous determination of economic variables. Perhaps the major weakness of the economic expansion analysis is the oversimplification of the tourism expansion and poverty relationship. This is an inevitable limitation of a single country time series analysis of economic expansion. It is to be hoped that this study will stimulate further research designed to overcome some of these deficiencies mentioned earlier.

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