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Modelling Tourism Development and Long-run Economic Growth in Aruba

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Modelling Tourism Development and Long-run Economic Growth in Aruba

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Abstract

Tourism has over the past decades turned into a core activity for accelerated growth. The purpose of this study is to determine the role of tourism in the economy of Aruba. More specifically, this investigation attempts to answer the following questions: (1) *is there is a long-run equilibrium relation between tourism development (TD) and economic growth in Aruba?*; and (2) *if so, what is the causality direction between TD and economic growth?* This exercise involves applying an econometric methodology consisting of unit root testing, cointegration analysis, vector error correction modeling (VECM), and Granger causality testing. The results show there is one cointegrating relation between these two variables, while the VECM comprises both a short- and a long-run relation. The short-run dynamics of the model suggests a speed of correction of 0.25%, meaning that it would take about 10.5 years to correct for disturbances back to equilibrium. The long-run relation indicates that a 1% change in tourism revenues would lead to a 0.49% increase in real GDP in the long-run, *ceteris paribus*. Our findings have also empirically verified the presence of the Tourism-Led Growth Hypothesis (TLGH) in the case of Aruba. They show that tourism is in part an endogenous growth process, requiring a systematic allocation of resources (e.g., financial means, leadership, creativity, innovation, and entrepreneurship) to sustain its development for local and regional economies.

Keywords: endogenous growth, tourism development, economic growth, sustainability, Aruba, tourism receipts, gross domestic product, unit root, cointegration, VECM, Granger causality

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1. Introduction

Development is, according to Capello & Nijkamp (2011), by definition endogenous, and is fundamentally dependent on the organization of the territory itself. The endogenous growth of a sector has to do with forces within that segment (among others, leadership, creativity, innovation, and entrepreneurship) that command its outcome. The theoretical basis for this endogenous development is the Endogenous Growth Theory, which generally sees economic growth primarily as an endogenous outcome of an economic system, and not the result of forces that impact it from the outside (Romer, 1994). The endogenous growth theory has led to a resurgence of interest in the determinants of long-run growth (Pack, 1994), and emphasizes technology, human capital and increasing returns as key factors to growth (Martin & Sunley, 1998). Technology is a central component of endogenous growth, particularly when it comes to its innovation function that allows an economy to produce new and better products (Broda et al., 2006), with human capital often considered as its complementary engine of growth (Lucas, 1988).

The endogenous growth theory tends to emphasize the virtues of high-tech sectors as potentially more promising for high long-run growth than a non high-tech service sector such as tourism (Brau et al., 2003; Croes, 2011). However, tourism, through specialization, can be closely related to increasing returns, the latter having a reinforcing effect on the advantages achieved by markets, businesses and industries (Arthur, 1996). The question is then whether tourism's impact on economic growth is temporary, or one that is sustainable over the long-haul.

Modeste (1994) cites a number of reasons why tourism is a positive factor in the economic growth of a country: (1) it produces foreign exchange earnings that are not only essential to import consumer goods, but also capital and intermediate goods; (2) tourism facilitates the use of resources that are in line with the factor endowment of a country; (3) tourism creates job opportunities for people at a destination; (4) tourism promotes improvement in a country's infrastructure, benefitting not only tourists, but also residents of a destination; (5) tourism is considered a conduit for transferring new technological and managerial skills into an economy; and (6) it is considered a potential for creating positive linkages with other sectors of the economy (e.g., agriculture, manufacturing, and other service industries).

Considering the benefits of tourism, it can be argued that tourism has the potential to become a strategic engine of long-run economic growth. It should also be added however, that uncontrolled tourism growth may have a devastating impact on landscape quality or environmental conditions. Clearly, sustainability in tourism calls for a long-run balance between the economy and the ecology. This long-term influence of tourism on economic growth has become known in the literature as the Tourism-Led Growth Hypothesis (TLGH). According to Chen & Chiou-Wei (2009), if the TLGH is valid, more resources should be allocated to the tourism industry above other sectors. Therefore, it is important for governments to know if the TLGH applies to a given country, as it determines the extent to which allocating more resources to the tourism sector produces increasing levels of income (Balaguer & Cantavella-Jordá, 2002).

The discussion as to whether tourism causes long-term economic growth goes beyond the national level, and the views do not always point in the same direction. On the one hand, the

World Tourism Organization and the World Travel & Tourism Council strongly support the notion that tourism can play an important role for developing countries in terms of economic growth (Cortés-Jiménez et al., 2009). On the other hand, an institution such as the World Bank, which has an influential role on both the way governments perceive the influence of tourism in their economies, and on the financing of tourism projects, has underestimated the opportunity to promote and direct the economic force of tourism (Hawkins & Mann, 2007). These opposing views provide one further reason to establish whether tourism is important for economic growth.

The TLGH recognizes a unidirectional relationship from tourism development (TD) to economic growth, but, clearly, a reciprocal connection, whereby economic growth influences TD, cannot be discarded (Chen & Chiou-Wei, 2009). This so-called Economic-Driven Tourism Growth Hypothesis (EDTGH) recognizes a unidirectional causal relation from economic growth to TD. If the EDTGH is supported by empirical evidence, more resources would need to be allocated to leading industries instead of tourism (Chen & Chiou-Wei, 2009). The tourism industry will then in turn benefit from the resulting overall economic growth.

A unifying relation between both TLGH and EDTGH is acknowledged by the reciprocal hypothesis (RH) which maintains that the relationship between TD and economic growth is bi-directional instead of unidirectional (Chen & Chiou-Wei, 2009). The latter authors suggest in this case that the resource allocation strategy should emphasize both tourism and other leading industries.

The question whether tourism causes economic growth and/or *vice versa* is still inconclusive. The relationship between TD and economic growth has been extensively researched in the literature, but the results remain conflicting (Katircioglu, 2009; Tang & Jang, 2009; Belloumi, 2010; Lean & Tang, 2010; Tang, 2011b). According to Tang & Jang (2009), these inconsistencies may be a reflection of the country effect (differences in the weight of tourism in the overall economy, size and openness of economies, and production capacity constraints).

The present study aims to determine the role of tourism in the economy of Aruba. More specifically, it attempts to answer the following questions: (1) *is there is a long-run equilibrium relation between TD and economic growth in Aruba?*; and (2) *if so, what is the causality direction between TD and economic growth?* In other words, this study attempts to verify whether the TLGH, the EDTGH or the RH apply to the case of Aruba. This exercise employs an econometric methodology consisting of unit root testing, cointegration analysis, vector error correction modeling (VECM), and Granger causality testing.

The importance of this research is in its outcome, which can provide crucial information for strategic planning and policy formulation by both the government and tourism businesses (Cortés-Jiménez et al., 2009; Chen & Chiou-Wei, 2009). Moreover, empirical studies on the relationship between tourism and economic growth so far have been inconclusive, requiring more studies to contribute to unraveling the link between tourism and economic growth. Our study is expected to make a contribution to this unanswered question by presenting the case of an island that is highly specialized in tourism. Generally, island studies remain “a largely unacknowledged field of study” (Baldacchino, 2006), so there is an additional contribution of this study to this area of research.

The remaining part of this paper is organized as follows. Section 2 presents an overview of the recent literature covering empirical studies on the relation between tourism and economic growth. Section 3 discusses TD in Aruba, while Section 4 reviews the data and the applied methodology. Section 5 presents the empirical results, while Section 6 concludes and offers policy implications and lines for future research.

2. Literature review

The literature on the relationship between TD and economic growth is fairly decent when it comes to quantity of investigations. Table 1 contains a list of 28 studies on the relationship between these two constructs, with categories of applied variables, empirical methods, data periods, data frequency, country of analysis, and results. A total of 18 of the 25 presented studies verified the application of the TLGH. Another 7 studies indicated the presence of the RH, while 5 studies suggested the existence of the EDTGH, and 3 studies found no relation between TD and economic growth. Furthermore, 3 of the reviewed studies found some kind of dynamism in the relation, whereby tourism had a dying out effect on the economy over time. Though the results point overwhelmingly to a long-term impact of tourism on economic growth, there are several issues that merit a more cautious interpretation.

Unit of analysis

The studies exhibited differences in the unit of analysis. Some 18 studies had either one or two countries as the unit of analysis, which has implications for the external validity of the results, as these tend to be specific to the country being studied, and are less generalized to other situations (Croes & Rivera, 2010).

Applied empirical method and data

The studies can be categorized in three groups of empirical methods, each with their own drawbacks. About half of the studies involved cointegration analysis and the subsequent application of Granger causality testing (Balaguer & Cantavella-Jordá, 2002; Durbarry, 2004; Dritsakis, 2004; Oh, 2005; Kim et al., 2006; Lee & Chang, 2008; Brida et al., 2008; Chen & Chiou-Wei, 2009; Tang & Jang, 2009; Belloumi, 2010; Lean & Tang, 2010; Kasimati, 2011; Kreishan, 2011; Tang, 2011a/2011b). The applied tourism variables in these types of studies were not consistent for each of the investigations. For example, Oh (2005) applied tourism receipts as a measure of tourism specialization, while Kim et al. (2006) and Lean & Tang (2010) applied international tourist arrivals as a measure of tourism concentration. According to the World Tourism Organization, in times of crisis the relation between international tourist arrivals and tourism receipts gets distorted. This, because tourism receipts suffers more than tourist arrivals at these moments, as consumers tend, among others, to trade down and travel for shorter periods of time (UNWTO, 2010). Over the years, the tourism industry has been hit by several large crises, including the Asian crisis (1997), the September 11 terrorism attacks (2001), and the global financial crisis (2007-2010), backing up the possibility of important discrepancies between tourist arrivals and tourism receipts.

Another possible comparability issue in time series-based studies arises from differences in their total sample length and frequency of observations within the data timeframe. For example, Balaguer & Cantavella-Jordá (2002) used quarterly data between 1975-1997, while Tang (2011a) applied monthly data ranging between 1995-2009. According to Otero & Smith (2000), when looking for long-run equilibrium relationships, researchers should rely on data collected over a long period of time rather than on a large number of observations collected over a short period of time.

A second group of studies applied a form of panel regression to a broad set of distinct countries (Modeste, 1994; Lanza et al., 2003; Eugenio-Martín & Martín Morales, 2004; Lee & Chang, 2008; Sequeira & Nunes, 2008; Figini & Vici, 2010; Adamou & Clerides, 2010; Croes, 2011; Du & Ng, 2011). Again, alsmost all these studies found evidence of the TLGH, while only one study (Lee & Chang, 2008) found additional evidence of a reciprocal relation. The lack of proof of the RH is because most of the studies were only geared towards finding evidence of tourism specialization affecting economic growth, which is a short-coming of this type of studies. Further analysis reveals that 2/3 of these investigations used data derived from the World Bank, particularly the World Bank Development Indicators. According to the World Bank itself, (www.data.worldbank.org/about/data-overview, accessed on July 4, 2012), much of the data comes from the statistical systems of the countries themselves, and the quality of the data depends on how well these national systems perform. Countries, for example, can use different definitions and data collection techniques (Harrison, 1996) that can influence the cross-country comparability of the data and the overall panel analysis results. The World Bank further acknowledges that particularly developing countries face difficulties in providing statistics that are reliable and relevant.

A third group of studies (Ghali, 1976; Gunduz & Hatemi-J, 2005; Lee & Chien, 2008; Katircioglu, 2009; and Lean & Tang, 2010) applied a method different from the two above. For example, Ghali (1976) applied a Keynesian-type demand-oriented model to test the relationship between TD and economic growth for Hawaii, while Gunduz & Hatemi-J (2005) tested causality based on leveraged bootstrap simulation techniques for Turkey. Several of these studies had one or more similar drawbacks as those discussed in the two previous methodologies. For example, Gunduz & Hatemi-J (2005), Katircioglu (2009) and Lean & Tang (2010) applied international tourism arrivals as a proxy for tourism, while Lee & Chien (2008) used tourism receipts. Furthermore, Lee & Tang (2010) applied monthly data for a relatively short period (1989-2009).

Increasing versus decreasing returns

The positive effect of tourism on economic growth, found in most of the presented studies, suggest that tourism seems to enjoy increasing returns. This view is, however, not supported by everyone in the tourism literature. There are some authors that view the duration of the influence of TD on economic growth only as a short-term event, and not sustainable on the long-run. More specifically, they perceive the law of diminishing returns applicable on TD. Generally, this law states that the benefits from an extra unit declines as the quantity of input increases (Mankiw, 1998). Butler's Tourism Area Life Cycle (Butler, 1980) is an early example of this diminishing returns notion of tourism, suggesting that destinations have a lifecycle involving several stages of evolution (exploration, involvement, development, consolidation, stagnation, and decline or rejuvenation). At the decline stage, the destination may become a tourist slum or lose its tourist function completely. This implicitly suggests that the contribution of tourism to economic growth is not for the long-run, and Butler (2009) advocated that many modern destinations are reaching the decline phase within two decades of their establishment. In the reviewed studies, Amadou & Clerides (2009/2010) found that specialization in tourism adds to a country's rate of growth, but only at a diminishing rate. Their findings suggest that at a high level of specialization (a ratio of tourism receipts in GDP of more than 20.8%), the contribution of tourism to economic growth becomes minimal, and tourism can even become a hindrance to further growth. The findings of Figini & Vici (2010) suggest that between 1980-2005 there was a positive effect of tourism on economic growth, but in the 1990-2005 and 1995-2005 period there was no significant causal relationship between tourism specialization and economic growth. These outcomes suggest the presence of a diminishing returns process, and the authors further suggest that tourism specialization may not be a *panacea* (cure-all) to solve problems of development and growth. The dichotomy between increasing or diminishing contribution of tourism to economic growth casts further shadow of doubt on their true relationship.

Multiple studies of the same country

Some 12 studies targeted on multiple occasions the same country in the selected sample: Greece (2x), Turkey (2x), Taiwan (3x), South Korea (2x), and Malaysia (3x), limiting the geographical spread of the results. Moreover, the findings can be inconsistent for several of these same-country studies. For example, Dritsakis (2004) and Kasimati (2011) both studied the relation for Greece, but found inconsistent results. Dritsakis (2004), using quarterly real tourism receipts, real effective exchange rates and real GDP for 1960-2000 as analysis variables, applied cointegration testing, VECM, and Granger causality testing as empirical method. They found evidence of a bilateral relation between TD and economic growth, suggesting the presence of the RH for Greece. On the other hand, Kasimati (2011) investigated the link between both constructs using international tourist arrivals, real effective exchange rate and real GDP. Using annual data for 1960-2010, and a virtually similar analysis method, they found no relation between TD and economic growth.

The above overview shows that despite a voluminous literature on the relationship between tourism and economic growth, their seemingly solid conclusions are still loosely-based, given the many focal issues that still cast doubts on the overall validity of the findings. Consequently, the debate on whether tourism is an engine of long-run economic growth remains unresolved. Yet, the deliberation requires further attention by incorporating both the EDTGH and the RH, given their relevance for economic policy and their oblivious nature in many of the presented studies.

Table 1: Tourism development and economic growth in the literature

Author(s)	Main tested variables	Empirical method	Period	Frequency	Country	Causal relation
Ghali (1976)	Rate of growth of exports, private investment, state and local government expenditures, each weighted by its share in personal income	Keynesian-type demand-oriented model	1953-1979	Annual	Hawaii	TD → economic growth
Modeste (1994)	Real per capita income, per capita capital, tourism output per capita	Unit root testing, ordinary least squares with dummy variables	1981-1992 (Barbados & Antigua and Barnduda); 1985-1992 (Anguilla)	Annual	Barbados, Antugua and Barbuda, and Anguilla	TD → economic growth
Balaguer & Cantavella-Jorda (2002)	Real tourism receipts, real effective exchange rates, real GDP	Unit root testing (ADF, PP), cointegration testing (Johansen & Juselius), Granger causality testing	1975-1997	Quarterly	Spain	TD → economic growth
Lanza et al. (2003)	Share of tourism expenditure in total consumption expenditure, relative price of tourist bundle of goods and services to the consumer price deflator,	Unit root testing (DF & PP), cointegration testing (Johansen & Juselius), almost ideal demand system	1977-1992	Annual	13 OECD countries	TD → economic growth
Eugenio-Martín et al. (2004)	GDP per capita, rate of growth of tourist per capita, gross domestic investment in % of GDP, public spending on education in % of GNP, general government consumption in % of GDP, index of political stability, quality of governance of the political system of the country, number of tourist arrivals per capita, gross domestic fixed investment per capita, GDP per capita, ratio of official exchange rate and purchasing power parity public spending on education per capita, ratio of total school enrollment to the population of school going age (secondary and tertiary), life expectancy at birth, ratio of sum of exports and imports in the GDP	Arellano-Bond dynamic panel data estimator; generalized least squares AR(1) panel data model	1985-1998	Annual	21 Latin American countries	TD → economic growth (provided it is below a certain GDP per capita threshold); Economic growth → TD (conditioned that infrastructure, education, and safety are developed)
Dubarry (2004)	Real exports and real GDP	Unit root testing (ADF & PP), cointegration testing (Johansen & Juselius), vector error correction modeling, Granger causality testing	1952-1999	Annual	Mauritius	TD → economic growth
Dritsakis (2004)	Real international tourism receipts, reel effective exchange rate, real GDP	Unit root testing (ADF, KPSS), cointegration testing (Johansen & Juselius), vector error correction modeling, Granger causality testing	1960-2000	Quarterly	Greece	TD ←→ economic growth

Table 1: Tourism development and economic growth in the literature *(continued)*

Author(s)	Main tested variables	Empirical method	Period	Frequency	Country	Causal relation
Gunduz & Hatemi-J (2005)	International tourist arrivals, real exchange rates, and real GDP	Unit root testing (KPSS), causality testing based on leveraged bootstrap simulation techniques	1963-2002	Annual	Turkey	TD → economic growth
Oh (2005)	Real tourism receipts and real GDP	Unit root testing (DF, ADF, and PP), cointegration (Engle and Granger), vector autoregression modeling, Granger causality testing	1975-2001	Quarterly	South Korea	Economic growth → TD
Kim et al. (2006)	International tourist arrivals and GDP	Unit root testing (ADF & PP), cointegration testing (Johansen & Juselius), Granger causality testing)	1971-2003; 1956-2002	Quarterly (1971-2003); annual (1956-2002)	Taiwan	TD ←→ economic growth
Khalil et al. (2007)	Tourism receipts and GDP	Unit root test, cointegration (Engle & Granger), Granger causality test	1960-2005	Annual	Pakistan	TD ←→ economic growth
Lee & Chang (2008)	Real tourism receipts per capita, international tourist arrivals per capita, real effective exchange rate (proxy for external competitiveness, and real GDP per capita	Panel unit root testing, panel cointegration testing, panel-based vector error correction modeling, panel Granger causality testing	1990-2002	Annual	OECD and nonOECD countries (incl. Asian, Latin American, and Sub-Sahara African countries	TD → Economic growth (for OECD countries; TD ←→ economic growth (for nonOECD countries)
Lee & Chien (2008)	Real tourism receipts, international tourist arrivals, real GDP	Unit root testing, cointegration (Johansen & Juselius procedure), weak exogeneity testing, structural breaks testing	1959-2003	Annual	Taiwan	TD ←→ economic growth
Sequiera & Nunes (2008)	Real per capita GDP, ratio of tourist arrivals to population, tourism receipts in % of exports, tourism receipts in % of GDP, investment in % of GDP, government consumption in % of GDP, secondary years of schooling above 25 years, life expectancy, black market premium, international country risk, export plus import in % of GDP, inflation	Panel regression	1980-2002	5 year periods	Multiple countries	TD → economic growth (all countries) A decreasing effect of TD on economic growth (small countries) TD → economic growth (poor countries)

Table 1: Tourism development and economic growth in the literature *(continued)*

Author(s)	Main tested variables	Empirical method	Period	Frequency	Country	Causal relation
Brida et al. (2008)	Tourism expenditure, real exchange rate, real GDP	Unit root test (ADF & KPSS), cointegration (Johansen & Juselius), weak exogeneity test, Granger causality test	1980-2007	Quarterly	Mexico	TD → economic growth
Katircioglu (2009)	International tourist arrivals, real exchange rates, and real GDP	Unit root testing (ADF & PP), cointegration (bounds test with an autoregressive distributed lag approach, and Johansen & Juselius)	1960-2006	Annual	Turkey	No relation
Chen & Chiou-Wei (2009)	Real tourism receipts (South Korea), international tourist arrivals (Taiwan), real exchange rates, and real GDP	Unit root testing (PP, KPSS, and ZA), cointegration testing (Johansen & Juselius), serial correlation and autoregressive conditional heteroskedasticity testing, EGARCH-M modeling, Granger causality testing (South Korea)	1975-2007	Quarterly	Taiwan and South Korea	TD → economic growth (Taiwan); TD ←→ economic growth (Korea)
Figini & Vici (2009)	Real per capita income growth rate, share of international tourism receipts in GDP, GDP per capita in level terms, share of public expenditure in GDP, share of investment in GDP, share of public expenditure in education	Panel regression	1980-2005	Annual	More than 150 countries	1980-2005: TD → economic growth 1990-2005: no relation 1995-2005: no relation
Adamou & Clerides (2009/2010)	GDP, life expectancy, investment, government consumption, openness, fertility rate, inflation rate, tourism receipts per GDP	Panel regresion	1980-2005	Annual	162 countries	Tourism specialization ≤ 20.8%: TD → economic growth Tourism specialization > 20.8%: Minimal to even negative influence of TD on economic growth
Tang & Jang (2009)	Aggregate sales revenues of 4 different industries (airline, casino, hotel, and restaurant) and seasonally unadjusted GDP	Unit root testing (ADF & PP), cointegration testing (Johansen & Juselius), Granger causality testing	1981-2005	Quarterly	USA	Economic Growth → TD
Belloumi (2010)	Real international tourism receipts, real GDP, and real effective exchange rate	Unit root testing (ADF & PP), cointegration testing (Johansen & Juselius), vector error correction modeling, Granger causality testing	1970-2007	Annual	Tunisia	TD → Economic growth

Table 1: Tourism development and economic growth in the literature *(continued)*

Author(s)	Main tested variables	Empirical method	Period	Frequency	Country	Causal relation
Lean & Tang (2010)	International visitor arrivals and industrial production	Granger causality testing, rolling subsample Granger causality testing	1989-2009	Monthly	Malaysia	TD ←→Economic growth
Croes (2011)	Share of tourism receipts in % of GDP, GDP per capita, share of investments in % of GDP, life expectancy	Panel unit root testing, regression using a trans-log production function	2000-2007	Annual	A sample of 17 islands around the world	TD → economic growth
Du & Ng (2011)	International tourist arrivals, income per capita, telephone per 1,000 inhabitants, literacy, life expectancy, economic freedom index	Regression with/without tourism economy dummy	1995	One year	Multiple countries	No relation
Kasimati (2011)	International tourist arrivals, real effective exchange rate, and real GDP	Unit root testing (ADF & PP), cointegration (Johansen & Juselius procedure), Wald Coefficient test, vector error correction, Granger causality testing	1960-2010	Annual	Greece	No relation
Kreishan (2011)	International tourist receipts and real GDP	Unit root testing (ADF & PP), cointegration (Johansen & Juselius procedure), Granger causality testing	1970-2009	Annual	Jordan	TD → Economic growth
Tang (2011a)	Disaggregated international tourist arrivals (Australia, Brunei, China, Germany, Indonesia, Japan, Korea, Singapore, Taiwan, Thailand, UK, USA) and real industrial production	Unit root testing (ADF & KPSS), cointegration testing (t-statistic of vector error correction model), Granger causality testing	1995-2009	Monthly	Malaysia	TD → Economic growth (5 international markets on the long run; 6 on the short run). Economic growth → TD (all international markets on the long run; 8 on the short run)
Tang (2011b)	International tourist arrivals, real industrial production index, and real effective exchange rate	Unit root testing (ADF, PP, ZA, LP), cointegration testing (Johansen & Juselius), Granger causality testing	1989-2010	Monthly	Malaysia	TD → Economic growth; Economic growth → TD

Note: ADF = Augmented Dickey Fuller test; KPSS = Kwaitkowski-Phillips-Schmidt-Shin test; PP = Phillips-Perron test; ZA = Zivot-Andrews test; LP = Lumsdaine-Papell test.

3. Tourism in Aruba

Aruba has some 50 plus years of experience with a tourism industry. Starting from 1959, the island built its first 100-room hotel, modeled after similar ones in Florida and Puerto Rico (Cole & Razak, 2009). However, the tourism industry played only a small role in the overall economic development of the island, given the dominant position of an oil refinery, the Lago Oil & Transport Company, Ltd. (Vanegas & Croes, 2000). The situation changed drastically in 1985, when the oil refinery closed its doors, shocking the Aruban economy like its has never seen before, At that time, the refinery contributed to about 25% of Aruba's gross domestic product (GDP), and directly and indirectly employed between 30%-40% of Aruba's population (Ridderstaat, 2007). Moreover, it provided about 50% of the foreign exchange earnings of the island and contributed to about 40% of all tax earnings.

The detrimental situation made finding a new source of economic activity more than necessary. The most obvious way to increase income and foreign exchange receipts was to expand the tourism industry (Ridderstaat, 2007). Soon, new hotels, shopping malls and other commercial buildings were rising from the ground. The number of hotel rooms more than tripled, from 2,078 in 1986 to 7,092 in 2011. The efforts paid off: the number of stay-over visitors grew from 181,211 in 1986 to 871,316 in 2011. The stimulus also included cruise tourism, where the number of cruise passengers grew from 73,338 in 1986 to 599,893 in 2011. Tourism receipts grew from Afl. 283.0 million in 1986 to Afl. 2,413.5 million in 2011. The World Travel & Tourism Council (2012a) estimates that tourism in Aruba accounts for 66.6% of the GDP and 68.0% of total employment. Moreover, their calculations show Aruba ranking on, respectively, the 14th and 5th place in the world when it comes to the contribution of tourism to GDP and employment.

4. Data and methods

The two variables used here to investigate the relation between TD and economic growth are tourism receipts (TOURREC) and GDP, both in US$ million.[4] Studies by Balaguer & Cantavella-Jordá (2002), Lee & Chang (2008), Katircioglu (2009), Chen & Chiou-Wei (2009), and Kasimati (2011) apply either the real effective exchange rates or the real exchange rates as additional variables. But, this variable is only available for Aruba after 1986, and singly covers the relation with the United States. Omitting this variable is, however, not new, given that similar studies by Oh (2005), Kim et al (2006), Khalil et al. (2007), Lee & Chien (2008), and Kreishan (2011) applied only real tourism receipts and real GDP. Both variables were converted to real terms (2005=100) using the annual change in the consumer price index as a deflator. The data were subsequently transformed into log functions to facilitate interpretation of the calculated

[4] Prior to 1986, the official currency of Aruba was the Netherlands Antillean guilder (ANG). Since 1986, the official currency of Aruba is the Aruban florin (Afl.), which replaced the ANG at par. Both currencies have been pegged to the U.S. dollar at 1 US$ = 1.79 ANG/Afl., with the unchanged peg for the ANG going back to 1971. For the purpose of this study, the data will be converted to US$ million.

coefficients (LTOURRECR and LGDPR). This means that a 1% change in an independent variable has an x% change in the dependent variable.

The analysis period is from 1972 to 2011, and consists of 40 annual data points. The data of the early years (1972-1985) are from both the Central Bureau of Statistics of the former Netherlands Antilles and the International Monetary Fund. Data after 1985 is from the Central Bank of Aruba. Figure 1 shows the pattern of development of both variables, which are fairly similar, especially after the mid-1980s when tourism became more dominant in the economy. Specifically, the average annual growth (1973-2011) of the GDP was 1% with a coefficient of variation (CV) of 818 percent, indicating a high level of volatility in relation to the mean growth. In the case of TOURRECR, the average annual growth was 4.2% with a CV of 310%. For the period 1986-2011, the annual growth rates (and CVs) were 3.8% (CV=176%) and 5.9% (CV=173%), respectively for LGDPR and LTOURRECR. This indicates that TD likely explained most of the volatility of economic development during 1986-2011.

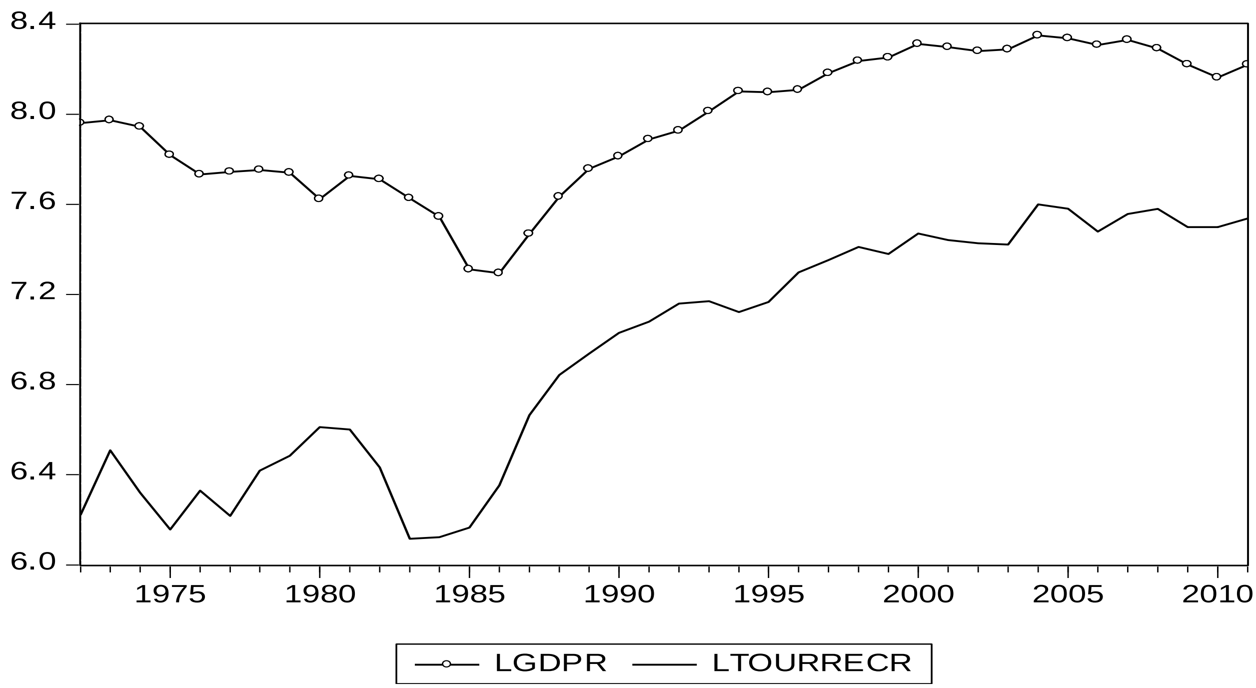

Fig. 1: Gross domestic product and tourism receipts (in US$)

In line with Lee & Chien (2008) and Kreishan (2011), this study employs the Augmented Dickey-Fuller test (ADF) and the Phillips-Perron test (PP) to examine whether the data are non-stationary (Dickey & Fuller, 1979; Phillips & Perron, 1988). The ADF test consists of estimating the following equation (Gujarati & Porter, 2009):

$$\Delta LGDPR_t = \beta_{11} + \beta_{12}t + \delta_1 \Delta LGDPR_{t-1} + \sum_{i=1}^{m} \alpha_{1i} \Delta LGDPR_{t-i} + \varepsilon_{1t} \quad (1)$$

$$\Delta LTOURRECR_t = \beta_{21} + \beta_{22}t + \delta_2 \Delta LTOURRECR_{t-1} + \sum_{i=1}^{m} \alpha_{2i} \Delta LTOURRECR_{t-i} + \varepsilon_{2t} \quad (2)$$

where β_{11}, β_{12}, β_{21}, β_{22}, $\alpha_{1i}\ldots\alpha_{1m}$, $\alpha_{2i}\ldots\alpha_{2m}$ are coefficients, t is a time or trend variable, and ε_{1t} and ε_{2t} are white noise error terms, meaning that they are statistically independent and have a constant variance. The ADF will test the null hypothesis whether $\delta_1 = 0$ and $\delta_2 = 0$. In case we cannot reject the null hypotheses, both LGDPR and LTOURRECR are considered nonstationary variables.

Phillips-Perron (1988) developed a modification of the (Augmented) Dickey-Fuller procedure allowing for fairly mild assumptions concerning the distribution of the error terms (Enders, 1995). The critical values of the PP test are the same as those of the ADF.

The tests for stationarity are performed both on the levels and the first differences of the variables. Commonly, the assumption of stationary economic variables can be presumed to hold after differencing these series (Engle & Granger, 1987). Testing for stationarity is a precondition to assess whether LGDPR and LTOURRECR have a long-term relation. According to Engle & Granger (1987), if both variables are I(d), with *d* denoting the order of integration, then the linear combination ($z_t = LGDPR_t - aLTOURRECR_t$, with *a* being a constant suggesting some possible scaling needs to be done before achieving stationarity) will also be I(d). Engle & Granger (1987) contend further that the components of a vector x_t are said to be integrated of order d,b, denoted $x_t \sim CI(d,b)$, if (1) all components of x_t are I(d); and (2) there exists a vector α ($\alpha \neq 0$) so that the linear combination $z_t = \alpha' x_t \sim I(d-b)$, where $b > 0$, with α being called the cointegrating vector. It is possible in these cases that z_t is an I(0) process, meaning that it is a stationary process with a constant mean, constant variance, and autocorrelations that depend only on the time distance between any two variables in the series, and it is asymptotically uncorrelated (Wooldridge, 2009). It is important to note that more than 1 cointegrating relation is possible (for example, we could look at the linear combination $z_t = (LTOURRECR_t - aLGDPR_t)$). In the case of LGDPR and LTOURRECR being cointegrated, there is a long-run relation between these variables that prevent them from drifting away from each other. In other words, there is an equilibrium force that keeps both variables together in the long-run (Kim et al., 2006). To investigate the long-run relation, this study employs the procedure developed by Johansen (1988, 1991) and Johansen & Juselius (1990) to conduct cointegration testing using vector autoregression (VAR) approach. The testing process involves determining if LGDPR and LTOURRECR are cointegrated, and how many cointegrated relations there are. This study applies two types of methods (trace statistic and maximum eigenvalue statistic) to determine (the number of) cointegrating relation(s).

Engle & Granger (1987) developed the close relationship between co-integration and error correcting models. While in the long-run, two cointegrating variables have an equilibrium relation, in the short-run they may be in disequilibrium (Gujarati, 1995). The error correction model incorporates both a long-run and short-run behavior of the relationships between LGDPR and LTOURRECR, thereby allowing us to study the short-run dynamics that work back towards the long-run equilibrium relation. Folowing Enders (2010), the error correction models considered in this study have the following form:

$\Delta LGDPR_t =$
$\alpha_1 + \sum_{i=1}^{n} \alpha_{11} \Delta\, LGDPR_{t-i} + \sum_{i=1}^{n} \alpha_{12} \Delta LTOURRECR_{t-i} + \alpha_{LGDPR}(LGDPR_{t-1} - \beta_1 LTOURRECR_{t-1}) + \varepsilon_{LGDPRt}$ (3)

$\Delta TOURRECR_t = \alpha_2 + \sum_{i=1}^{n} \alpha_{21} \Delta LTOURRECR_{t-i} + \sum_{i=1}^{n} \alpha_{22} \Delta\, LGDPR_{t-i} + \alpha_{LTOURRECR}(LGDPR_{t-1} -$
$\beta_1 LTOURRECR_{t-1}) + \varepsilon_{LTOURRECRt}$ (4)

where β_1 = the parameter of the cointegrating vector ($LGDPR_t = \beta_0 + \beta_1 LTOURRECR_t + e_t$), ε_{LGDPRt} and ε_{LGDPRt} are white-noise disturbances, and α_1, α_2, α_{11}, α_{12}, α_{21}, α_{22}, α_{LGDPR}, $\alpha_{LTOURRECR}$ are all parameters.

Granger (1988) noted that if two variables are cointegrated, then there must be at least a unidirectional causation. In the case where both LGDPR and LTOURECR have a long-run relation, then either LGDPR causes LTOURRECR or *vice versa*, or both. The latter implies that there is a bilateral relation between LGDPR and LTOURRECR. The Granger causality test allows us to statistically determine the direction of causality between these two variables. In our case, and following Gujarati & Porter (2009), the test involves the following bivariate regressions:

$\Delta LGDPR_t = \sum_{i=1}^{n} \alpha_i \Delta\, LGDPR_{t-i} + \sum_{j=1}^{n} \beta_j \Delta LTOURRECR_{t-j} + u_{1t}$ (5)

$\Delta TOURRECR_t = \sum_{j=1}^{n} \lambda_j \Delta LTOURRECR_{t-j} + \sum_{i=1}^{n} \delta_i \Delta LGDPR_{t-i} + u_{1t}$ (6)

where u_{1t} and u_{2t} are uncorrelated disturbances, and α_i, β_j, λ_i and δ_i are coeffcients. The null hypothesis (LTOURRECR does not Granger cause LGDPR) cannot be rejected if:
$\beta_1 = \beta_2 = \beta_3 = \dots \beta_j = 0$. Similarly, the null hypothesis (LGDPR does not Granger cause LTOURRECR) cannot be rejected if:
$\delta_1 = \delta_2 = \delta_3 = \dots \delta_i = 0$

The hypothesis testing occurs through a standard F-test, with the number of lagged terms determined by the minimum of the Aikaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and the Hannan-Quinn Information Criterion (HQIC). We can now distinguish between four possible cases:

1. Unidirectional causality from LGDPR to LTOURRECR (LGDPR → LTOURRECR);
2. Unidirectional causality from LTOURRECR to LGDPR (LTOURRECR → LGDPR);
3. Feedback or bilateral causality, where both variables influence each other (LGDPR ←→ LTOUURECR);
4. Independence, where there is no relation between LGDPR and LTOURRECR (LGDPR ←/→LTOURRECR).

5. Empirical results

All estimated have been obtained using STATA version 12. Graphical inspection (Figure 1) reveals the possible presence of unit roots in both LGDPR and LTOURRECR. Prior to testing for stationarity, we first selected the type of model, based on ordinary least squares. Of the three possible models (random walk without a drift, random walk with a drift, and random walk with a drift around a deterministic trend), the last one (model including an intercept and a trend) was selected based on tested statistical properties.

Subsequently, we determined the maximum number of lags, following the method suggested by Schwert (1989):

$$P_{max} = int\left[12x\left(\frac{T}{100}\right)^{\frac{1}{4}}\right] \quad (7)$$

where P_{max} indicates the maximum number of lags, and T indicates the number of observations. Given a T of 40 in our case, the maximum lag length was determined at 9. Next, we established the optimal lag within that maximum, based on the minimum of the AIC, SIC, and HQIC. The optimal lag length for level variables was 2, while for first difference variables the optimal lag length was determined at 1. Table 2 shows the results of the stationarity tests. Given the ADF and PP results, both LTOURRECR and LGDPR appear to be stationary at the first difference level, indicating that both variables are integrated of order one, I(1).

Table 2: Unit root test results

	LTOURRECR		lag number	LGDPR		lag number
Level						
ADF	-2.566		2	-2.454		2
PP	-2.191		2	-2.041		2
First difference						
ADF	-3.801	**	1	-3.687	**	1
PP	-5.349	*	1	-3.785	**	1

Note: Δ denotes the first difference of the variables under review. The ADF and PP test equations include both an intercept and a linear time trend. The optimal lags are based on the minimum of the Aikaike Information Criterion (AIC), the Schwartz Information Criterion (SIC) and the Hannan-Quinn Information Criterion (HQIC). The symbols *, ** and *** indicate, respectively the 1%, 5% and 10% percent significance levels.

Given both LTOURRECR and LGDPR are integrated of the same order, we can proceed with a long-run equilibrium analysis using the cointegration method. Before that, we determined the optimal lag length for the combination of the two variables, based on the lowest value of the AIC, SIC, and HQIC. Given the relatively small sample, the Likelihood Ratio test, as suggested by Oh (2005), cannot be performed in this study. Moreover, in line with Pindyck & Rubinfeld (1991), we run the lag length test for different lag maximums, in this case from 1 to 12, to make sure that the results are not sensitive to the choice of the lag length. From lag length 12 going downwards to lag 6, the results vary for each selected lag maximum. However, below lag 6, all the results indicate lag 1 as the optimal delay. Therefore, we select lag 1 as the optimal lag length.

Next, we conducted the cointegration test based on Johansen (1988/1991) and Johansen & Juselius (1990), with the results included in Table 3. At r = 0, we reject the null hypothesis that there are zero cointegrating relations. However at r = 1, both the trace statistic and the maximum eigen value statistic are smaller than their respective critical values at both 1% and 5%, indicating that we cannot reject the null hypothesis of 1 cointegrating equation. We can conclude from these results that there is one cointegrating vector between LTOURRECR and LGDPR, indicating there is a long-run relationship between both variables.

Table 3: Cointegration test results on LTOURRECR and LGDPR

Trace statistic								Maximum eigen value statistics							
r = 0	5%	1%	r ≤ 1	5% cv		1% cv		r = 0	5% cv	1% cv	r ≤ 1	5% cv		1% cv	
21.8541	15.41	20.04	2.5690	3.76	*	6.65	*	19.2850	14.07	18.63	2.5690	3.76	*	6.65	*

Note: *r* denotes the number of cointegrating relations. *cv* indicates critical values for rejection of the null hypothesis at 5% and 1%., and are based on the Osterwald-Lennum (1992). The symbol * indicates significance levels. The optimal number of lags is 4.

Following Enders (2010), we apply here the Engle and Granger (1987) four-step procedure to estimate the long-run relation between tourism and economic growth, and the speed of adjustment in case of disequilibrium. Briefly, this method involves first regressing both variables on each other (interchangeably as dependent and independent variables), subsequently estimating the residuals from these regressions. Next, we determined whether these residuals were stationary or not, and the last step involved estimating the error correction models. For this purpose, we tested several dummy variables, including D_{7284} (dummy capturing the presence of the Lago refinery), D_{7375} (dummy capturing the first oil crisis effect on the Aruban economy), D_{80} (dummy capturing the second oil crisis effect on the Aruban economy), D_{85} (dummy capturing the effect of the closure of the Lago refinery in March 1985), D_{8601} (dummy capturing the development of the tourism industry after the closure of the Lago refinery), and D_{0104} (dummy capturing the aftermath of the September 2011 terrorist attacks). In the end, only D80 and D85 proved statistically significant. The results are included in Table 4.

All coefficients, except the intercept, are significant and show the right sign. The Durbin-Watson statistic and the Breusch-Godfrey LM test both indicate the absence of serial correlation, meaning that the disturbance terms are not autocorrelated. The Breusch-Pagan test result shows the disturbances have the same variance, conveying that there is no heteroskedasticity, meaning that the variance in the error term is the same for all observations. The short-term dynamics of the model are specified by the coefficient of the $\hat{e}_{t-1}$, which indicates the speed of adjustment of the system. In case of a random shock, e.g., a 10% jump, the system would return to equilibrium in about 10.5 years. The long-run elasticity can be seen from the cointegrating regression, and the interpretation of the elasticity of GDP to changes in tourism receipts should be considered as follows: a 1% growth in tourism receipts would lead to a 0.49% increase in real GDP in the long-run, *ceterus paribus*. This result is fairly in line with the findings of Croes (2011), who estimated that a 1% growth in the ratio of tourism receipts to GDP is associated with a 0.27% growth in the GDP per capita of Aruba for 1980-2003.

Table 4: Error correction model results and cointegrating regression

Independent variable	Dependent variable	
	$\Delta LGDPR_t$	t-statistic
$\Delta LGDPR_{t-1}$	0.1668	***
$\Delta LTOURRECR_{t-1}$	0.1395	**
$\hat{e}_{t-1}$	-0.2500	*
D_{80}	-0.1325	*
D_{85}	-0.2330	*
α_1	0.0084	
Adjusted R^2	0.7309	
DW	1.9799	
F	21.10	*(p=0.0000)*
Breusch-Godfrey LM test	0.03	*(p=0.9541)*
Breusch-Pagan/Cook-Weisberg test	0.06	*(p=0.8098)*

Cointegrating regression

	$\Delta LGDPR_t$	t-statistic
$LTOURRECR_{t-1}$	0.4883	*
β1	4.2704	*
Adjusted R^2	0.7137	

Note: The symbols *, ** and *** indicate, respectively the 1%, 5% and 10% significance levels.

The results above show a possible causality running from LTOURRECR and LGDPR. This link can be further verified by applying Granger causality test to determine the directional causation. The results of this test are included in Table 5. The optimal lag was selected using the smallest value of the AIC, SIC, and HQIC. For stability purposes, we tested the results against different lag selections, and the results showed consistency. The F-statistics for the first hypothesis indicated rejection of the premise that LTOURRECR does not Granger cause LGDPR. But the second hypothesis (LGDPR does not Granger cause LTOURRECR) cannot be rejected based on the F-statistic. The results provide empirical evidence of a causality running from TD to economic growth.

6. Conclusion

This study investigated the relationship between tourism development and economic growth in Aruba. The results show there is one cointegrating relation between these two concepts, while the VECM consisted of both short and long-run relations. The short-run dynamics of the model suggests a speed of recovery of 0.25%, meaning that it would take about 10.5 years to correct for disturbances back to equilibrium. The long-run relation indicates a 1% change in tourism receipts would lead to a 0.49% increase in real GDP in the long-run, *ceterus paribus*. These findings show that tourism is in part an endogenous growth process, and verified the presence of the TLGH in the case of Aruba. Moreover, they indicate that tourism has mattered in the economic growth process of Aruba in the last 40 years. The results, however, did not support the presence of the EDTGH or the RH in the case of Aruba.

Table 5: Granger causality Wald test

Hypothesis	Optimal lag	F-statistic	Prob > F	Conclusion
H_0: LTOURRECR does not Granger cause LGDPR	1	23.5250	0.0000	LTOURRECR→ LGDPR
	2	26.0660	0.0000	
	3	27.8520	0.0000	
	4	33.8220	0.0000	
	5	32.6820	0.0000	

/

H_0: LGDPR does not Granger cause LTOURRECR	1	2.3602	0.1240	LGDPR →LTOURRECR
	2	6.1284	0.0470	
	3	3.0937	0.3770	
	4	3.3254	0.5050	
	5	10.9150	0.0530	

Note: Causality tests have been carried out with one degree of freedom at a 5% significance level.

These findings are important for policy makers, because they can now argue in favor of allocating more financial resources to the tourism industry (for more tourism supply and promotion) aimed at obtaining higher levels of economic growth in the future. This is also backed by Croes & Vanegas Sr. (2008) who put it as follows: "Systematic allocation of resources to stimulate and promote tourism is necessary to sustain tourism as an engine of growth and development." (p. 102). Furthermore, the endogenous nature of tourism requires policy makers to take care of building and maintaining adequate conditions (for example, leadership, creativity, innovation, and entrepreneurship) to guarantee a long-term growth potential of tourism and, ultimately, the economy.

Analyzing the relationship between TD and economic growth is a careful consideration that needs to be contemplated in every country that wants to focus on tourism as part of its economic development strategy (Kim et al., 2006). This will provide information to policy makers about how tourism contributes to long-term economic growth, *ceterus paribus*, but also how fast a country could move back to equilibrium relation after a shock or disturbance. This type of study could also help policy makers in their decision to allocate more funds to the propelling of tourism.

Future research should focus on the decomposition of the variable tourism receipts, by market of origin. This would further enhance the understanding of which country of origin contributes to a long-run relation with economic growth. Tang (2011) conducted a study in this direction, where the author disaggregated tourist arrivals into 12 different markets. The challenge is now to apply disaggregated tourism receipts data to investigate which markets have a long-run effect on economic growth (and/or *vice versa*). Another avenue for future research is to disaggregate tourism receipts into cash and non-cash payments. If one only finds a link between non-cash transactions and economic growth, this may possibly indicate the influence of the dollarization phenomenon (i.e., the holding by residents of a significant share of their assets in the form of foreign-currency-denominated assets (IMF, 1999)) on the cash transactions' part of tourism receipts (cash tourism dollarization bias). Recording of these cash transactions may lag in these cases the actual transaction time, thereby breaking the link between tourism and economic growth. Future research should consider the influence of these lag effects on the relationship between tourism and economic growth.

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