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Export Diversification Through Public Investment in Cultural Tourism: Insights from a Multi-Regional Model of Bolivia

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Abstract

The growth of cultural tourism globally has presented an important opportunity for public investment in tourism to drive economic development in developing countries. With Bolivia's regional disparities in income and opportunity, it is critical to understand the regionally differentiated welfare impacts of public investment. We develop Bolivia's first multi-regional economy-wide model and apply it to the economic analysis of a US$26 million investment in tourism to diversify export earnings and reduce poverty. While the framework is more data intensive than national level economy-wide models, a multi-regional approach is powerful for shedding light on regional trade-offs, benefits and costs, and enables analysis of smaller investment and demand shocks than that typically possible in a national level framework.

JEL Codes: D58 Computable and Other Applied General Equilibrium Models; Q56 Environment and Development • Environment and Trade • Sustainability • Environmental Accounts and Accounting • Environmental Equity • Population Growth; Z3 Tourism Economics.

Keywords: ex-ante economic impact evaluation; cost-benefit analysis; public investment in tourism development.

1. Introduction

Tourism is one of the world's fastest growing economic sectors. Cultural heritage is a primary driver of tourism, responsible for 40% of global travel, and is considered a significant and diverse tourism phenomenon of recent years (UNWTO, 2012). Cultural heritage tourism is defined as tourism activity where the visitor's motivation is to learn, discover, experience and consume the tangible and intangible cultural attractions in a destination (UNWTO, 2017). In some destinations, it has been found that cultural tourism generates higher than average local returns since its participants tend to have higher incomes (Csapo, 2012, Zadel and Bogdan, 2013). Cultural heritage tourism in Latin America and the Caribbean, through the income that it generates, can contribute to the preservation and enhancement of cultural capital (UNWTO, 2014b).

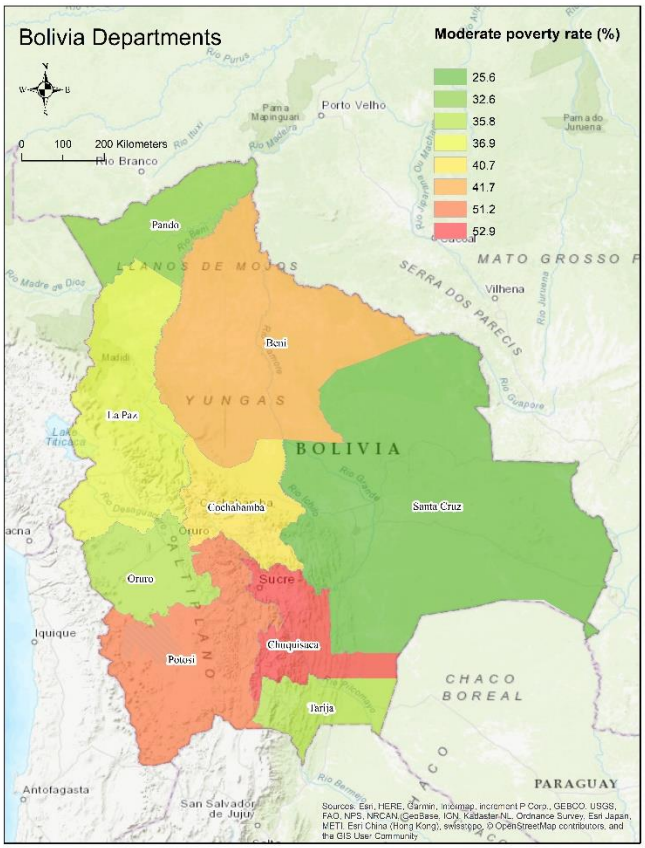
Public investment in tourism is aimed at contributing to economic development by enhancing the tourism opportunities to generate destination demand and creating an enabling environment for private investment. Public investment in tourism can be used as a strategy for reducing poverty and regional development disparities (Winters et al., 2013, Banerjee et al., 2018a, Croes and Vanegas, 2008, Blake et al., 2008, Klytchnikova and Dorosh, 2013, Njoya and Seetaram, 2017). Ex-ante economic impact and cost-benefit analysis of public investments in tourism are often standard requirements for demonstrating the economic viability and development impact of the investment (Banerjee et al., in press). The use of computable general equilibrium (CGE) models for assessing economic impacts has become more widespread in recent years. Indeed, CGE analysis is powerful in its ability to capture important inter-sectoral and backward/forward linkages, as well as the direct, indirect and induced benefits of public investment in tourism (Dwyer et al., 2006, Dwyer et al., 2003, Blake et al., 2003, Blake, 2009, Njoya and Seetaram, 2017, Banerjee et al., 2018b, Giesecke and Madden, 2011).

Much previous economy-wide impact analysis of public tourism investments has employed national (or single-region) level models which are effective in capturing the overall economic impacts. Multi-regional, subnational analysis of tourism investment is particularly powerful, though much more complex to implement and thus less prominent in the literature (Madden, 2006, Pambudi et al., 2009, Partridge and Rickman, 2008, UNWTO, 2014a, Horridge, 2011). There can be significant advantages, however, to a multi-regional approach. Multi-regional analysis can generate critical insights that are obscured in national-level analysis such as inter-regional costs, benefits and trade-offs, and can thus justify the development and implementation of these more data-intensive multi-regional models. Furthermore, where public investments are national initiatives, the multi-regional framework facilitates identification of the regions that might have to pay for the investment.

In this paper, we construct the first multi-regional CGE model for Bolivia to evaluate the regional economic impacts of a public investment in tourism. Specifically, we evaluate the impacts of a US$26 million investment in cultural heritage tourism, financed through the support of the Inter-American Development Bank. The dynamic multi-regional model of Bolivia represents its nine Departments and includes various extensions of its standard form to focus on the tourism sector. By singling out international and national tourism in each of Bolivia's Departments, the direct and indirect effects of changes in the number of tourist arrivals, length of stay and expenditure can be identified and examined in depth.

The investment considered in this analysis is Bolivia's Cultural Heritage Tourism Management Program, which has two main objectives. The first is to diversify Bolivia's export matrix by increasing international tourism receipts, thus reducing the country's dependence on the export of raw materials. In 2016, exports of minerals and natural gas were about 50% of total export earnings. Second, the Cultural Heritage Program aims to reduce poverty through the creation of employment. Poverty in Bolivia exhibits significant regional disparities. For example, moderate poverty rates were 52.9% in Chuquisaca while less than half that (25.6%) in Santa Cruz (Figure 1)[1]. Similar disparities may be observed among Bolivian cities and between urban and rural areas.

Figure 1. Bolivia's Departments and percent poverty rates in 2017.



Source: Authors' own elaboration.

The Tourism Program focuses on urban cultural tourism with investments in the creation of a cultural park, the Park for Culture and Mother Nature (PCMyT) in the city of La Paz, and in the restoration and enhancement of cultural heritage sites. In addition to La Paz, investments are planned for the urban historic centers of Sucre, Potosí and Santa Cruz. While investments are targeted within these regions of Bolivia, the model we develop considers all of Bolivia's nine Departments simultaneously.

[1] For moderate poverty, the same definition of the National Institute of Statistics (INE) of Bolivia is used. That is, all individuals with a family per capita income lower than the poverty line defined by the INE itself are considered poor. The moderate poverty line includes both food and other goods and services and was calculated at US$3.55 for the year 2017. For details on the calculation of the moderate poverty rate, see: http://www.iisec.ucb.edu.bo/assets/recurso/PobDes_IncEx_docx.pdf

This paper is structured as follows. Section two presents an overview of the multi-regional CGE model developed to evaluate the impacts of the public investment in cultural heritage tourism, highlighting features specific to the model for the analysis of tourism investments. Also, in this section, we describe the construction of the multi-regional database that underpins the model, offer some insights from preliminary analysis of the database, and provide details of the nature of the investment in cultural heritage tourism. Section three describes the scenarios implemented and results, as well as presents a cost benefit and sensitivity analysis. The paper closes with a discussion of the key findings and insights made possible through the development of the multi-regional analytical framework described here.

2. Methods and Data

2.1. Overview of the Multi-Regional CGE Model

This section describes the recursive dynamic multi-regional CGE model with tourism extensions (MRCGE-TUR) developed for this study. CGE models are mathematical models that consist of systems of equations which describe the relationships between sectors, agents and other accounts in the underlying Social Accounting Matrix (SAM). CGE models are based on a SAM for a country, region, or for all countries linked together through trade as in the Global Trade Analysis Project (GTAP) database (Aguiar et al., 2016).

A SAM provides a snapshot of an economy describing all monetary transactions between economic sectors and its agents, including households, government and enterprises, and the relationships between the modelled economy and other regions or countries (Pyatt and Round, 1985). A SAM is constructed based on a country's System of National Accounts (European Commission et al., 2009), including integrated economic accounts, fiscal accounts and balance of payments data, often complemented by government survey data such as household income and expenditure surveys and tourism expenditure surveys. Banerjee et al. (2016) describe the first and second best sources of data when constructing a SAM for tourism applications (Banerjee et al., 2016).

CGE models are commonly used to assess economic impacts and generate reports on indicators such as Gross Domestic Product (GDP), Gross Regional Product (GRP), income and employment. In developing country contexts, indicators of poverty and inequality are particularly important, though disaggregation of households by income class or urban vs. rural, is necessary to generate meaningful insights. Indicators of changes in household welfare measured by Compensating and Equivalent Variation may also be estimated in a CGE framework. Where an intervention does not occur, Equivalent Variation is the amount of income an individual would have to be given to make them as well-off (i.e. with the same level of utility) if the intervention did not take place.

Annex A provides a detailed description of MRCGE-TUR. MRCGE-TUR is based on the model developed in Banerjee et al. (2018, 2016, 2015), extending it to a multi-regional framework to model Bolivia's nine Departments (Banerjee et al., 2016, Banerjee et al., 2015, Banerjee et al., 2017). This approach implies that for each of the nine regions, producers and consumers, government, investors, and exports and imports are identified, and their interactions are explicitly modelled. In addition, there are five key features that differentiate MRCGE-TUR from prior

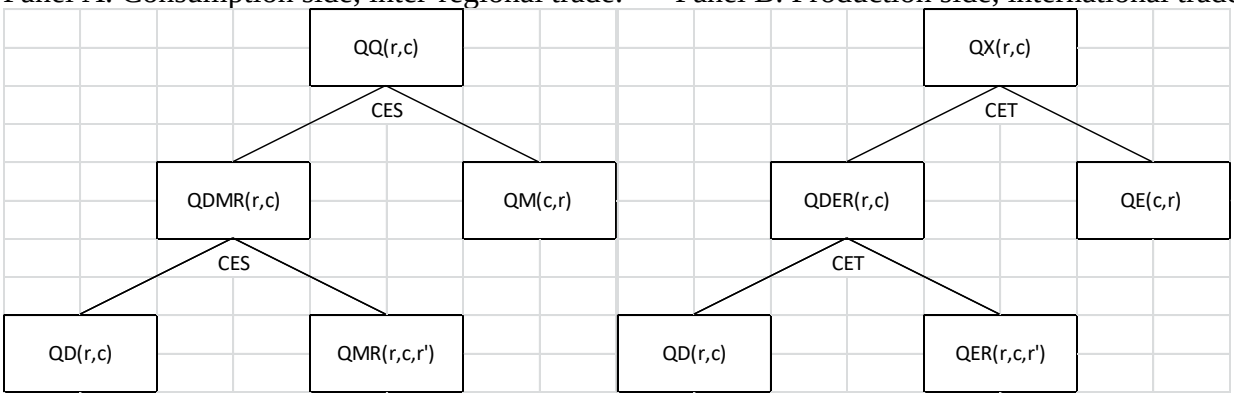
single-country versions: (i) the flow of goods and services between regions is modeled; (ii) the migration of people between regions is accounted for; (iii) commuting of workers between regions is modelled; (iv) factor income transfers between regions is explicit, and; (v) supra-national transactions such as exports and imports from each region to and from the rest of the world, and central government activity in each of the individual regions are modeled.

Our tourism extension enables the consideration of both domestic and international tourist arrivals by Department. Domestic and international tourism is modeled by the inclusion of two supra-regional institutions which represent each type of tourism. Each type of tourism demands goods and services in each of the regions visited. International tourist expenditure is financed through the rest of the world account while domestic tourism expenditure is financed by domestic households in the tourists' region of origin. Naturally, those Bolivian regions that account for the greatest number of tourists visiting other regions are typically regions with higher incomes and are also responsible for greater domestic tourism expenditure.

In terms of trade, each region can sell or buy within the region itself, in the rest of the country, and/or in the rest of the world through exports and imports. The model identifies regional institutions as households and local governments in each region, and supra-regional institutions that operate in all regions, specifically, the central government and the rest of the world. In addition, it is assumed that there is a unified capital market which implies that savings and investment balance at the national level, but not regionally. This allows for savings to be greater or less than investment in each region. In world markets, it is assumed that all regions of Bolivia are small and thus they are price takers for their exports and imports while there may be differences in prices between regions modelled.

To model trade for goods and services that are exported and imported simultaneously, we assume that goods and services are differentiated according to their region and country of origin (Armington, 1969). Thus, for a consumer of a particular region, local goods are an imperfect substitute for goods from the rest of the country. In turn, both goods are differentiated from similar goods imported from the rest of the world. In the implementation of the model, we assume that the elasticity of substitution between local goods and the rest of the country may be different from the elasticity of substitution between those goods and those imported from the rest of the world. Figure 2, Panel A shows how a composite good is formed through a constant elasticity of substitution function which aggregates a local good, a good imported from another region, and a good imported from the rest of the world. We make a symmetrical assumption for the production side which implies that the elasticity of transformation between sales to the local market and to the rest of the country may be different from the elasticity of transformation between any of those goods and exports to the rest of the world (Figure 2, Panel B).

Figure 2. Inter-regional and international trade.



Panel A, where: QQ = total supply in region; QDMR = local supply + supply imports from the rest of the country; QM = imports from the rest of the world; QD = local supply, and; QMR = purchases from the rest of the country. Panel B, where: QX = total production in region r; QDER = local sales + sales to the rest of the country; QE = exports to the rest of the world; QD = local sales, and; QER = sales to the rest of the country Source: authors' own elaboration.

MRCGE-TUR allows for the movement of labor between Bolivia's nine Departments. A constant elasticity of transformation function is used to achieve this which allows for region-specific levels of employment and wages. As an example, increases in wages in La Paz with respect to wages in the rest of the country increase labor supply in La Paz while reducing labor supply elsewhere. The calibration of the model requires an estimate of the number of workers that reside in one region and work in a region different from the one that they inhabit. The migration of workers between regions is assumed to be a function of the expected wage in each region. Different segments of the national labor market allow the existence of involuntary unemployment through a wage curve.

In terms of capital mobility between regions, several alternatives can be considered. Capital can be: specific to each region and sector; mobile between sectors but not between regions, and; mobile between both regions and sectors. This mobility can be assigned to all or a portion of total capital stock. In our application, we assume that once installed, capital becomes sector-specific or immobile.

Finally, MRCGE-TUR pays special attention to the modeling of the different levels of government. In particular, revenues and expenditures of local and central governments are identified. Departmental governments act in their respective regions through tax collection and expenditure. Both departmental and central governments tax households and economic sectors and their output. For example, the direct sub-national property tax and the central corporate income tax both tax household incomes. In contrast, other taxes are only collected by the central government, for example, tariffs on imports. The central government acts in all regions of Bolivia, collecting taxes and spending. The expenditures that can be made by both levels of government are differentiated between current expenditure and investment. Finally, both Departmental and central governments can transfer money to/from the other level of government and the rest of the world and can make transfers to households.

2.2. A Multi-Regional Social Accounting Matrix

The main source of information to calibrate a CGE model such as MRCGE-TUR is a SAM. In the case of our multi-regional model, our SAM identifies each of Bolivia's nine Departments, the relations between them in terms of inter-regional trade, and the relationship between each Department and the central government, the rest of the world, private investment, and national and international tourism.

The multi-regional SAM accounts can be separated into two large groups, namely regional and supra-regional. The first group captures the production and consumption structures of each of the regions considered in the analysis. The second group refers to accounts that are related to all regions simultaneously. This group includes, for example, the central government, the rest of the world, and the savings-investment account. The savings-investment account collects the savings of institutions while financing both public and private investment. In the case of the private sector, private investment is allocated among Bolivia's Departments.

Figure 3 focuses on two regions for simplicity of presentation, the La Paz region (lapaz) and the rest of Bolivia (rob). The following groups of interactions can be identified: (i) local transactions within La Paz and in the rest of Bolivia: quadrants [lapaz , lapaz] and [rob,rob]; (ii) transactions between La Paz and the rest of Bolivia (e.g., exports and imports of factors and goods and services): quadrants [lapaz,rob] and [rob,lapaz]; (iii) transactions between La Paz and the rest of Bolivia and the supra-regional accounts (e.g., transfers to/from the rest of the world and/or the central government): quadrants [supra,lapaz] and [supra,rob], and; (iv) transactions carried out at the national level (e.g., balance of payments of the current account and the savings-investment balance): quadrant [supra,supra].

Figure 3. The Multi-Regional Social Accounting Matrix

		lapaz	lapaz	lapaz	lapaz	lapaz	lapaz	rob	rob	rob	rob	rob	rob	supra	supra	supra	supra	supra	supra	supra	supra
		act	com	fac	hhd	gov	invg	act	com	fac	hhd	gov	invg	govc	row	trst-d	trst-f	sav	invgc	invng	total
lapaz	act		prod																		
lapaz	com	int			hcon	gcon	inv		imp-roc					gcon	exp	trst-d	trst-f		inv	inv	
lapaz	fac	va						va							inc-f						
lapaz	hhd			inc-f		tr				inc-f	tr				tr						
lapaz	gov	tax	tax		tax										tr						
lapaz	invg																	invg			
rob	act								prod												
rob	com		imp-roc					int			hcon	gcon	inv	gcon	exp	trst	trst		inv	inv	
rob	fac	va						va							inc-f						
rob	hhd			inc-f	tr					inc-f		tr			tr						
rob	gov							tax	tax		tax				tr						
rob	invg																	invg			
supra	govc	tax	tax		tax			tax	tax		tax										
supra	row		imp	inc-f	tr	tr			imp	inc-f	tr	tr									
supra	trst-d																				
supra	trst-f				trst-d						trst-d				trst-f						
supra	sav				hsav	gsav					hsav	hsav			fsav						
supra	invgc																	invgc			
supra	invng																	invng			
supra	total																				

Source: authors' own elaboration.

The construction of the multi-regional SAM for Bolivia followed several key steps. First, a national SAM was prepared using supply and use tables and integrated economic accounts from the National Accounts for the most recent year available which was 2014. The distribution of value

added to factors of production was undertaken using a supply and use table from 2007[2]. Thus, our first step was to develop a relatively simple SAM using only national accounts data. Second, some adjustments were made, including: (i) disaggregation of margins applied to domestic products, imports and exports; (ii) identification of natural resource rents (e.g. land and natural gas); (iii) commodity taxes on natural gas were treated as taxes on the corresponding activity to prevent exports from exceeding domestic output, and; (iv) the composition of public and private investment in goods and services was adjusted to reflect the fact that public investment was more intensive in its purchase of construction services. Finally, information from the National Statistics Institute (INE) and the Vice Ministry of Tourism was drawn upon to identify domestic and international tourist expenditure. The following paragraphs describe in greater detail how this expenditure data was derived from the available information.

INE publishes information on *overnight stays of foreign travelers in lodging establishments* for the cities of La Paz, El Alto (also in the municipality of La Paz), Santa Cruz, Cochabamba, Sucre (in Chuquisaca), Potosí, Oruro, Tarija, Trinidad (in Beni) and Cobija (in Pando). As a result, and since MRCGE-TUR uses information at the Departmental level, data from these ten cities was considered indicative of the flows of inbound tourism to each of Bolivia's nine Departments. In addition, due to the lack of more detailed information, we assumed that average non-resident tourist expenditure per day was homogenous across all Departments. The composition of tourist expenditure was obtained from INE and was matched with the classification of goods and services used in the national accounts. In 2014, average tourist expenditure was US$731 per international visitor.

Domestic tourist expenditure was calculated based on data collected through the 2013 Internal Tourism Expenditure Survey which was released by the Vice Ministry of Tourism. Specifically, we used the average daily expenditure per domestic visitor of US$40 and an average length of stay of 4 days for an average domestic tourist expenditure of US$160. This relatively low average domestic expenditure is in part explained by the fact that 42.3% of domestic tourists stayed in the homes of relatives or friends and thus did not incur expenditures related to accommodations.

The final step in the construction of the SAM for MRCGE-TUR was to disaggregate the national SAM into a multi-regional one, based on INE's estimates of Gross Regional Product by Department. In this process, the national output for each sector was distributed among Departments according to the participation of each Department in sectoral GDP. In the absence of Departmental supply and use tables, we assume that production technologies are the same in all Departments for a given good/service. As a consequence, and to reduce estimation errors that may be attributable to this assumption, the construction of the SAM is undertaken at the highest level of aggregation possible. With a high level of sectoral aggregation, sectors within an aggregate sector are more likely to exhibit similar production technologies across Departments than the production technologies of highly disaggregated sectors across Departments. Nonetheless, an important advantage of this multi-regional framework is that since we know the levels of production for each good and service at the Departmental level, our multi-regional SAM enables identification of the Departmental composition of consumption in terms of intermediate and final goods versus that of the rest of Bolivia.

[2] The 2014 supply and use table only provides data for total gross value added at the sectoral level, thus it was necessary to draw this information from the more detailed 2007 supply and use table.

A multi-regional model connects regions through the flow of goods and services and factors of production such as labor and capital. The procedure we follow to link regions in MRCGE-TUR is similar to that described by Horridge (2011) in the development of the database for the TERM CGE model for Australia (Horridge, 2011). Specifically, the flows of goods and services between Departments is estimated by comparing the local production of each good and service with the local consumption of each good and service. This information is known and thus ensures that the SAM has a solid empirical base.

Our SAM presents the level of disaggregation included in Table 1 below, with 35 activities and products. The Restaurants and hotels sectors are most closely aligned with a tourism sector. In addition, seven productive factors are identified: two types of work (wage and non-wage), physical capital, agricultural land, forestry and fishing resources, and two extractive resources (unrefined petroleum and natural gas, and metals). There are six institutions that appear in the SAM: two of them are regionally active and are the households and government, while four are nationally active, namely, the central government, domestic tourists, international tourists and the rest of the world.

Table 1. Activities and products in Bolivia's multi-regional SAM.

Non-industrial crops	Drinks	Construction
Industrial crops	Tabaco	Commerce
Coca	Textiles and leather	Transport
Livestock	Wood and wood products	Communications
Forestry, hunting and fisheries	Paper and paper products	Financial services
Unrefined petroleum and natural gas	Chemicals	Business services
Metallic and non-metallic minerals	Refined petroleum	Housing
Meat	Non-metallic mineral products	Other services
Milk products	Metallic mineral products	Restaurants and hotels
Milled products and breads	Machinery and equipment	Domestic services
Sugar and confectionary	Other manufactured goods	Public administration
Other food products	Electricity, gas and water	

Source: Authors' own elaboration.

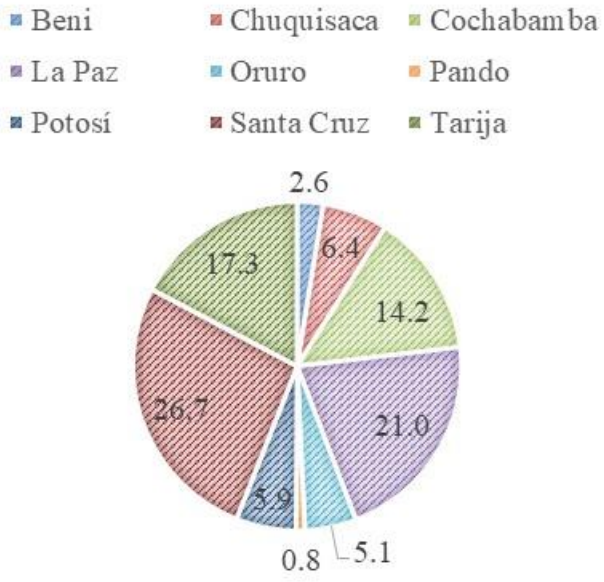
Table 2. Other accounts in Bolivia's multi-regional SAM.

Category	Item	Category	Item
Factors (7)	Wage labor	Taxes (7)	Activity taxes
	Non-wage labor		Import taxes
	Capital		Value-added tax
	Land		Product taxes
	Forestry, game and fisheries		Social security
	Unrefined petroleum and natural gas		Direct taxes
	Metallic and non-metallic minerals		Central gov direct taxes
Institutions	Households	Savings and	Savings
	Government	Investment (4)	Private investment
	Central Government		Government investment
	Rest of the world		Variations
	National tourists		
	International tourists		

Source: authors' own elaboration.

In what follows we describe Bolivia's productive structure and its Departments as viewed through our multi-regional SAM. This information provides a useful backdrop when evaluating the results of the simulations undertaken with MRCGE-TUR. Figure 4 shows the GDP share of each of Bolivia's nine Departments. The Departments of La Paz and Santa Cruz taken together account for just under 50% of GDP, while in terms of population, the two Departments comprise 54% of Bolivia's total population.

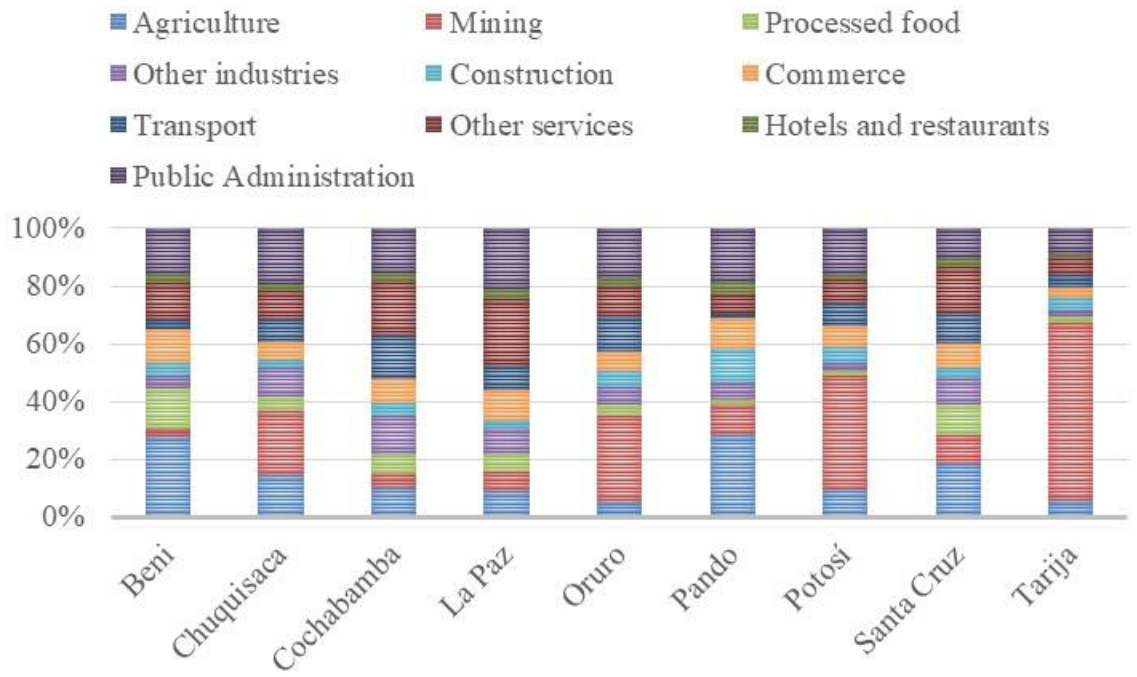
Figure 4. Departmental share of national GDP, % participation.



Source: Multi-regional SAM for Bolivia.

The structure of production of Bolivia's Departments is shown in Figure 5. For presentation, the 35 sectors identified in the SAM were aggregated into 10 sectors, several of which are directly related to the tourism sector, for example, hotels and restaurants. The multi-regional SAM shows that the structure of production of Tarija, Potosí and Oruro is strongly biased towards the mining sector. The share of processed food and other manufactured goods is relatively small, particularly in the case of Potosí and Oruro. Consequently, it is expected that an increase in international tourist expenditure or other components of final demand, will translate into an increase in imports from other Departments of Bolivia and the rest of the world. Furthermore, the data shows that La Paz, Cochabamba and Santa Cruz have important service sectors.

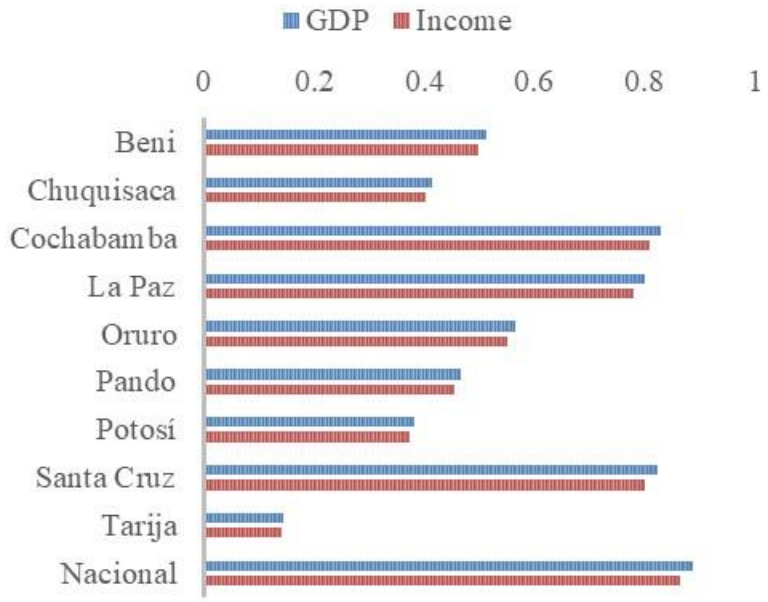
Figure 5. Productive structure of each of Bolivia's Departments, % participation.



Source: Multiregional SAM for Bolivia.

Multiplier analysis is often used to demonstrate the economic impacts of public investments in tourism, though its limitations are well-known and discussed elsewhere (Banerjee, 2008). Figure 6 presents international tourism GDP and income multipliers for each of Bolivia's nine Departments. The fact that all multipliers are less than one indicates that any increase in international tourist expenditure in a given Department will result in an increase in imports from other Departments and from the rest of the world. A multi-regional approach reveals that the two most equipped Departments to meet increased tourism demand are La Paz and Santa Cruz, and to a lesser degree, Potosí and Chuquisaca. These findings are also consistent with Figure 5. Note that the corresponding multiplier at the national level is greater than those of the Departments; had a national-level database and CGE approach been implemented, these insights would have been obscured.

Figure 6. International tourism GDP and income multipliers.



Source: Multiregional SAM for Bolivia.

2.3. The Investment in Cultural Heritage Tourism

Details of the investments to be undertaken under Bolivia's Cultural Heritage Tourism Management Program are presented in Table 3. The Program is comprised of two main components. The first one is a US$13.5 million investment in the creation of the PCyMT park in La Paz. This investment will create a new leisure space in the city, offering a unique cultural experience, reflecting the diverse cultures of Bolivia and their relationship with their environment. The zone of the park financed by this Program will offer tourists experiences related to Bolivia's different ecological zones, enabling them to interact through interpretative landscapes, games and cultural performances.

The second component is valued at US$10,5 million and is comprised by three types of investments. The first type of investment is related to works aiming at to enlarging the dinosaur park, Parque Cretácico in Sucre. This park is home to one of the largest collections of dinosaur footprints in the world with over 5,000 of them. In addition, the park offers life size dinosaur sculptures as well as a museum providing information on the area and its prehistorical inhabitants. Access to the site has been an issue for viewing the footprints and thus this investment will improve access to enhance the visitor experience. The second type of investment will establish a competitive fund in the historic centers of La Paz, Sucre, Potosí and Santa Cruz for the development of tourism circuits and for supporting collective organizations and small and medium enterprises across a range of project interventions.

The third type of investment of the second component of the Program will finance US$5 million in projects to restore iconic buildings and structures in the historic centers of La Paz, Sucre, Potosí and Santa Cruz. The investments will be selected in part based on their potential to catalyze private sector investment. Accompanying all components of the Program, are costs related to administration, monitoring and evaluation which total US$2 million.

Table 3. Program investments, USD.

		Year 1	Year 2	Year 3	Year 4	Year 5
	Component 1: Design/implementation of the Mother Earth and Culture Park					
La Paz	Construction + manufacted goods	$3,367,164	$9,543,755	$ 589,080		
	Component 2: Restoration of cultural patrimony					
Sucre	Cretacic Park					
	Construction + electric/water/gas + manufactured goods		$ 600,000	$1,400,000		
	Competitive fund					
La Paz	Business services	$ 19,250	$ 35,750	$ 41,250	$ 82,500	$ 96,250
Santa Cruz	Business services	$ 19,250	$ 35,750	$ 41,250	$ 82,500	$ 96,250
Chuquisaca	Business services	$ 145,250	$ 269,750	$ 311,250	$622,500	$ 726,250
Potosí	Construction + business services	$ 61,250	$ 113,750	$ 131,250	$262,500	$ 306,250
	Component 3: Restoration of buildings and cultural heritage					
la Paz	Construction + manufactured goods + business services	$ 87,500	$ 162,500	$ 187,500	$375,000	$ 437,500
Santa Cruz	Construction + manufactured goods + business services	$ 87,500	$ 162,500	$ 187,500	$375,000	$ 437,500
Chuquisaca	Construction + manufactured goods + business services	$ 87,500	$ 162,500	$ 187,500	$375,000	$ 437,500
Potosí	Construction + manufactured goods + business services	$ 87,500	$ 162,500	$ 187,500	$375,000	$ 437,500
	Administration, monitoring and evaluation					
La Paz	Business services	$ 53,317	$ 134,305	$ 65,214	$ 97,537	$ 149,626
Santa Cruz	Business services	$ 53,317	$ 134,305	$ 65,214	$ 97,537	$ 149,626
Chuquisaca	Business services	$ 53,317	$ 134,305	$ 65,214	$ 97,537	$ 149,626
Potosí	Business services	$ 53,317	$ 134,305	$ 65,214	$ 97,537	$ 149,626

Source: Program investment matrix.

3. Scenarios and Results

3.1. Scenarios

Our approach to implementing the scenarios in MRCGE-TUR allows us to introduce the public investment as well as expectations related to tourism demand, while maintaining all other variables constant. In this way, any differences between scenario results and the baseline are attributable to the Program.

Our study considers the baseline and 4 scenarios, which are:

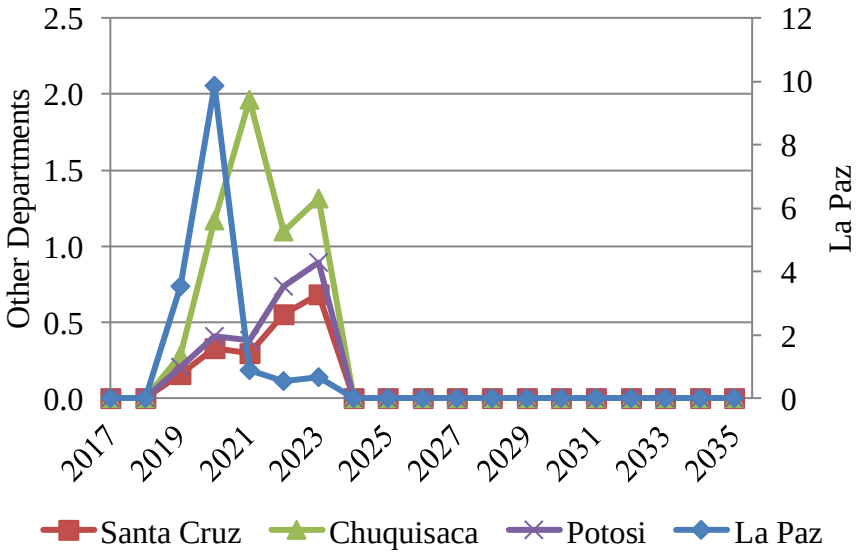
BASE: the first scenario is the baseline projection which models the development trajectory of the Bolivian economy in the absence of the investment program and other shocks. BASE is essentially the 'business as usual' scenario. To calibrate our expectations on the growth trajectory of the economy, we draw from International Monetary Fund projections and assume that GDP grows on average at 4% per year over the period 2018 to 2050 (IMF, 2018). Domestic tourism is also projected to grow at this rate while growth in international tourist arrivals follows the historical trend. Population projections for each of Bolivia's Departments were obtained from INE. Finally, we assume that the supply of agricultural land grows by 0.1% per year across all departments and extractive natural resource endowments grow at the same rate as GDP.

INVEST1: in this scenario we simulate the Program investment in La Paz, Sucre, Santa Cruz and Potosí. The investment is financed entirely through external resources received by the Government. We consider the following investment shocks:

- US$13.5 million in La Paz for the construction of PCyMT;
- US$2 million in Sucre (Chuquisaca) for the expansion of the Parque Cretácico;
- US$3.5 million for the competitive fund, allocated across the four cities according to the following shares: La Paz 7.9%, Santa Cruz 7.9%, Sucre 59.3%, and Potosí 25%;
- US$4 million for restoration of cultural heritage structures and buildings, distributed in equal shares to La Paz, Santa Cruz, Chuquisaca and Potosí, and;
- US 1 million for tourism promotion
- US$ 2 million for administration, monitoring evaluation.

These investments are implemented over a 5-year period, from 2019 to 2023. Figure 7 shows how the investment is disbursed, with investment peaking in 2020. Repayment of the investment does not occur in this scenario; repayment is considered in the COMBI1+REPAY scenario below.

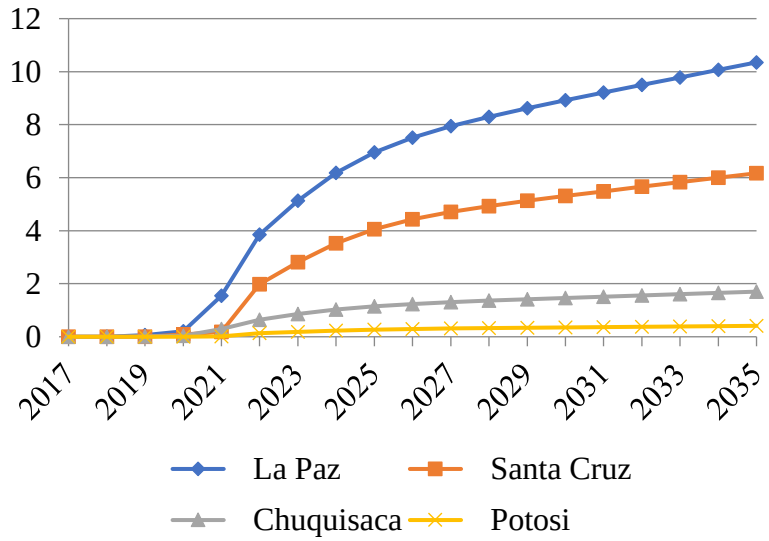
Figure 7. INVEST1 by Department, millions of USD.



Source: authors' own elaboration.

SPEND1: this scenario uses the willingness to pay estimates obtained through a stated preference, contingent valuation study undertaken to inform expectations of international tourism demand with the Program investment (Lurmetrika, 2018). Willingness to pay estimates consider the new tourism opportunities and attractions generated by each of the types of investments described in the INVEST scenario. A conservative approach is taken to the analysis by using the minimum willingness to pay values reported. In addition, while the stated preference study found that a proportion of international tourists would have lengthened their stay in Bolivia had the new and/or enhanced attractions been present, we do not consider any extension of tourists' stay.

Figure 8. SPEND1 scenario: additional with Program international tourist expenditure, millions of USD.



Source: authors' own elaboration.

COMBI1: this scenario jointly implements INVEST1 and SPEND1 scenarios to capture the combined effect of the Program investment and the increase in international tourism demand.

COMBI1+REPAY: This scenario is the COMBI1 scenario with the difference that the repayment of the loan is built into the MRCGE-TUR simulation exercise. Repayment occurs over a period of 25 years with a 6-year grace period. Repayment thus begins in 2025 and concludes in 2050. Based on LIBOR, the benchmark interest rate at which banks lend funds to on another, an interest rate of 2.6% is applied to the loan[3].

3.2. Results and Analysis

Table 4 presents key macroeconomic results at the national level in 2035. As these results show, the Program would have a positive impact across all indicators presented. However, due to the relatively small magnitude of the shocks, the impacts are relatively modest. For example, by 2035, the number of poor people would be reduced by almost four thousand people. In comparing the BASE number of poor people in 2017 and 2035, it is evident that economic growth in the baseline would have a comparatively large impact on reducing the poverty rate, from 36% in 2017 to 24% in 2035. Another advantage of our multi-regional framework is that had a national-level CGE approach been used, it would be challenged to generate meaningful results for shocks the size of those implemented here.

[3] The LIBOR is used as this forms the basis of Sovereign Guaranteed Loans issued by the Inter-American Development Bank.

Table 4. Scenario impacts on tourism exports, expenditure, receipts, and employment and poverty for reference years 2017, 2023 and 2035.

Item	BASE	INVEST1	SPEND1	COMBI1	COMBI1 +REPAY
2017					
Tourism exports: Exports (%)	5.26	5.26	5.26	5.26	5.26
Tourism exports: GDP (%)	2.32	2.32	2.32	2.32	2.32
Tourism receipts (millions of USD)	758	758	758	758	758
Number of jobs (thousands)	5,604	5,604	5,604	5,604	5,604
Number of poor (thousands)	4,060	4,060	4,060	4,060	4,060
Population (thousands)	11,146	11,146	11,146	11,146	11,146
Poverty rate (%)	36.42	36.42	36.42	36.42	36.42

Item	BASE	INVEST1	SPEND1	COMBI1	COMBI1 +REPAY
2023					
Tourism exports: Exports (%)	5.66	5.66	5.93	5.93	5.93
Tourism exports: GDP (%)	2.48	2.48	2.58	2.58	2.58
Tourism receipts (millions of USD)	1,036.9	1,036.9	1,085.7	1,085.7	1,085.7
Number of jobs (thousands)	6,555	6,555	6,556	6,556	6,556
Number of poor (thousands)	4,393	4,393	4,392	4,392	4,392
Population (thousands)	12,125	12,125	12,125	12,125	12,125
Poverty rate (%)	36.23	36.23	36.22	36.22	36.22

2035	BASE	INVEST1	SPEND1	COMBI1	COMBI1 +REPAY
Tourism exports: Exports (%)	5.34	5.34	5.68	5.68	5.68
Tourism exports: GDP (%)	2.38	2.38	2.51	2.51	2.51
Tourism receipts (millions of USD)	1,595.5	1,595.5	1,696.7	1,696.7	1,696.7
Number of jobs (thousands)	8,999	8,999	9,001	9,001	9,001
Number of poor (thousands)	3,407	3,407	3,403	3,403	3,404
Population (thousands)	14,110	14,110	14,110	14,110	14,110
Poverty rate (%)	24.15	24.15	24.12	24.12	24.12

Source: Authors' own estimates. Notes: Tourism exports: Exports (%) is the ratio between international tourism receipts and total exports. Tourism exports: GDP (%) is the ratio between international tourism receipts and GDP.

Program impacts on tourism exports, expenditure and receipts would be more pronounced. For example, in 2035, tourism exports as a percent of total exports would increase from 5.34% in 2035 to 5.68% with the Program in the COMBI1+REPAY scenario. Tourism expenditure as a share of GDP would increase from 2.38% to 2.51% in COMBI1+REPAY. Tourism receipts would increase from US$1,595.5 million to US$1,696.7 million.

Table 5 focusses on the ratio of tourism exports to GDP at the Departmental level. Not surprisingly, the greatest positive impacts are found in La Paz, where in the COMBI1 scenario in 2035, the tourism export to GDP ratio would increase by 0.35 percentage points. What these results also indicate is that the tourism export to GDP ratio would fall considerably between 2035 and 2050. In the case of La Paz, for example, in the COMBI1+REPAY scenario, this ratio would fall from 4.41% in 2035 to 3.56% in 2050. Figure 8 shows that, after an initial increase, the difference between base and non-base scenarios in terms of tourist's spending stabilizes. Also of note in explaining this result is that the growth rate imposed for the additional foreign tourism spending is below the GDP growth rate.

Table 5. Tourist export to GDP (%) ratio.

		BASE	INVEST1	SPEND1	COMBI1	COMBI1+ REPAY
Chuquisaca	2017	2.43	2.43	2.43	2.43	2.43
Chuquisaca	2023	2.74	2.74	2.89	2.89	2.89
Chuquisaca	2035	2.73	2.73	2.91	2.91	2.91
Chuquisaca	2050	2.24	2.24	2.38	2.38	2.38
La Paz	2017	3.97	3.97	3.97	3.97	3.97
La Paz	2023	4.24	4.24	4.52	4.52	4.52
La Paz	2035	4.06	4.06	4.41	4.41	4.41
La Paz	2050	3.29	3.29	3.56	3.56	3.56
Potosi	2017	1.05	1.05	1.05	1.05	1.05
Potosi	2023	1.17	1.17	1.21	1.21	1.21
Potosi	2035	1.18	1.18	1.23	1.23	1.23
Potosi	2050	1.00	1.00	1.03	1.03	1.03
Santa Cruz	2017	3.21	3.21	3.21	3.21	3.21
Santa Cruz	2023	3.44	3.44	3.56	3.56	3.56
Santa Cruz	2035	3.30	3.30	3.46	3.46	3.46
Santa Cruz	2050	2.68	2.68	2.80	2.80	2.80
Total	2017	2.32	2.32	2.32	2.32	2.32
Total	2023	2.48	2.48	2.58	2.58	2.58
Total	2035	2.38	2.38	2.51	2.51	2.51
Total	2050	1.95	1.95	2.05	2.05	2.05

Source: Authors' own estimates.

Tourism receipts would increase across periods, from US$ 289.4 million in 2017 to US$944 million in 2050, with no decline as in the case of tourism exports as a share of GDP between 2035 and 2050.

Table 6. Tourism receipts, millions of USD.

		BASE	INVEST1	SPEND1	COMBI1	COMBI1+ REPAY
Chuquisaca	2017	51.9	51.9	51.9	51.9	51.9
Chuquisaca	2023	75.9	75.9	80.5	80.5	80.5
Chuquisaca	2035	123.8	123.8	133.1	133.1	133.1
Chuquisaca	2050	183.8	183.8	196.9	196.9	196.9
La Paz	2017	289.4	289.4	289.4	289.4	289.4
La Paz	2023	394.0	394.0	421.8	421.8	421.8
La Paz	2035	603.2	603.2	659.4	659.4	659.4
La Paz	2050	864.7	864.7	944.0	944.0	944.0
Potosi	2017	19.8	19.8	19.8	19.8	19.8
Potosi	2023	28.6	28.6	29.6	29.6	29.6
Potosi	2035	46.3	46.3	48.5	48.5	48.5
Potosi	2050	68.3	68.3	71.5	71.5	71.5
Santa Cruz	2017	285.5	285.5	285.5	285.5	285.5
Santa Cruz	2023	390.7	390.7	405.9	405.9	405.9
Santa Cruz	2035	601.0	601.0	634.5	634.5	634.5
Santa Cruz	2050	864.0	864.0	911.2	911.2	911.2
Total	2017	757.6	757.6	757.6	757.6	757.6
Total	2023	1036.9	1036.9	1085.7	1085.7	1085.7
Total	2035	1595.5	1595.5	1696.7	1696.7	1696.7
Total	2050	2293.8	2293.8	2436.6	2436.6	2436.6

Source: Authors' own estimates.

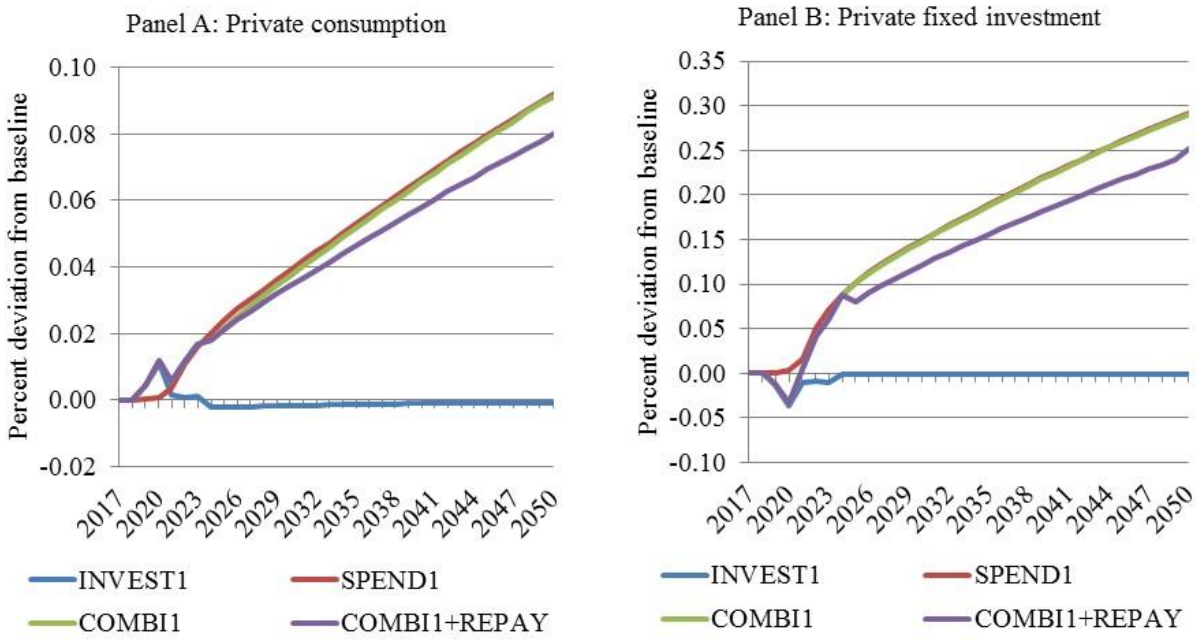
Figure 9 Panel A shows the percent deviation from baseline in private consumption and reveals that the investment financed with foreign resources would have positive impacts on the level of economic activity during the disbursement period (INVEST1). Once the investment is fully disbursed, however, there would be a decline in private consumption. This result is explained by the fact that the public investment alone does not generate any significant long-term impacts on the economy. Considering the increase in tourism demand that the investment is expected to bring about, however, results in higher private consumption. Alternative relationships could be established between public and private investment in MRCGE-TUR. For example, one alternative is to assume that public investment has a crowding-in effect on private investment. In such a case, private investment and the corresponding capital stock would have increased following the increase in public investment. Another alternative is to assume that public investment has a positive impact on total factor productivity, which is another source of long-term growth

Figure 9, Panel B shows that during the investment phase, there would be a crowding out of private investment (INVEST1). This is result is explained by three pathways in order of importance: (i) in the short run, the public investment increases the price of construction services which has a negative impact on private investment from 2019 to 2023; (ii) a temporary regional appreciation of the exchange rate during the investment phase also would reduce private investment in the short run. This is a common impact of public investment in a general equilibrium framework; (iii) third,

there would be a reduction in the accumulation of private capital during the investment phase which has a negative albeit small impact on private investment in subsequent years.

Where the increase in foreign tourism demand is considered in the scenarios, impacts on private consumption and fixed investment would be positive. The repayment of the loan is shown to have a small dampening effect and in particular, there is a small drop in private investment once loan repayment begins in 2023. This is explained by the model closure and that the Government would need to increase taxes to repay the loan, although by a very small amount. Consequently, the amount of domestic savings available to finance investment decreases.

Figure 9. Panel A. Private consumption; Panel B. Private fixed investment; Annual percent deviation from baseline.

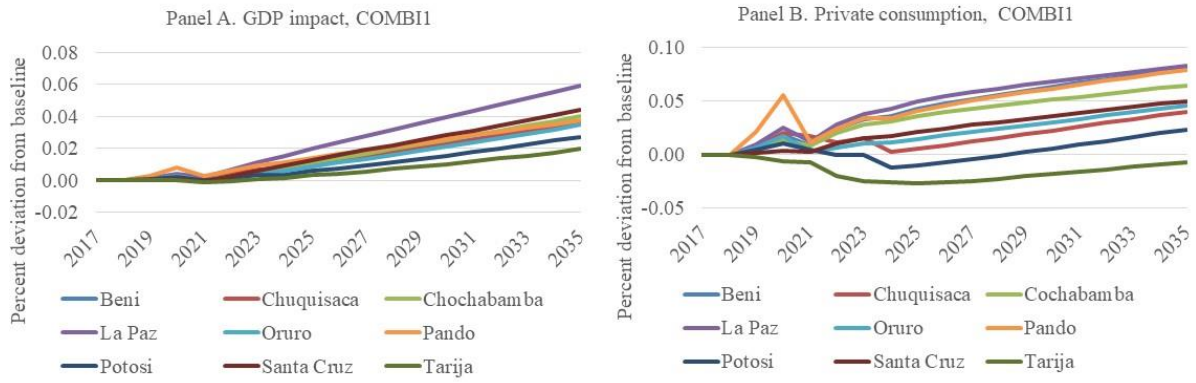


Source: Authors' own estimation.

Figure 10, Panel A shows the GDP impact of the Program investment and increase in international tourism demand on each of Bolivia's Departments and shows that there would be significant positive impacts on GDP arising from the Program. In addition, and one of the results elucidated by the implementation of a multi-regional framework such as MRCGE-TUR, is that there would be positive spillovers for other Bolivian Departments that were not subject to the investment or increase in international tourism demand. Potosí is also an interesting case where the GDP impact would be less pronounced than in the other three Departments participating in the Program. This result is explained by the real exchange rate appreciation that would arise from the investment and its negative impact on mining, the main productive activity in Potosí which accounts for 40.5% of its GDP. This impact is also a function of our treatment of export volumes where we have assumed that export volumes of natural gas and mining products follow the baseline trends. Note that in BASE, the evolution of exports is endogenous, though export growth closely follows that of GDP. The decrease in regional output brought about by the exchange rate appreciation also drives private consumption lower during the investment phase in Potosí and Tarija (Figure 10, Panel B). Private

consumption would recover after 2029 when the impact of increased foreign tourist expenditure predominates. Noteworthy is the spike in private consumption in Pando in 2020 arises due to the relatively large share of construction services in Gross Regional Product. Thus, the investment has a positive impact on Pando given its sales of construction services in particular to the rest of Bolivia. Again, these findings would have been obscured should a national-level CGE have been implemented.

Figure 10. Panel A. GDP impact, COMBI1; Panel B. Private consumption. Annual percent deviation from baseline.

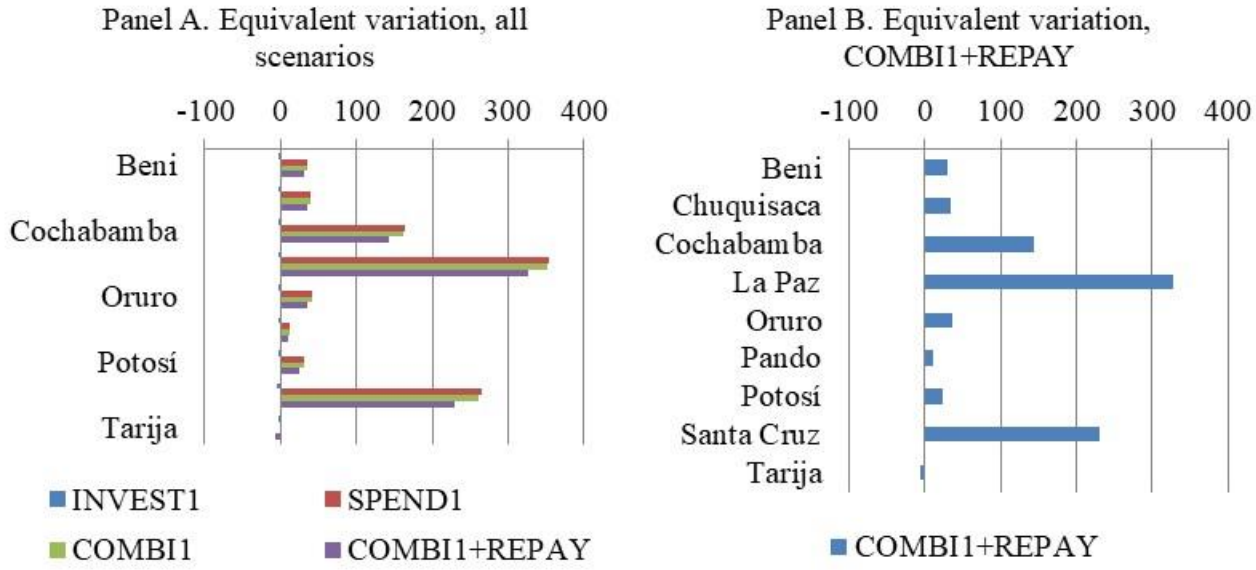


Source: authors' estimates.

Figure 11 shows impacts on cumulative equivalent variation which is a measure of well-being and is used in the cost-benefit analysis of the Program in section 3.3. Recent papers by Farrow and Rose (2018) and Banerjee et al. (2017) discuss the advantages of using a general equilibrium approach to estimate the economic impacts of public investments and the relevance of equivalent variation as an indicator of the net welfare impacts (Farrow and Rose, 2018, Banerjee et al., 2017). Equivalent variation values the direct and indirect effects, both positive and negative, of any change simulated with MRCGE-TUR.

Due to the temporary crowding out of private investment, the INVEST1 scenario would have a negative though very small impact on welfare. All other scenarios would generate a positive welfare gain, with Tarija as the exception. The negative impact on Tarija, where natural gas represents 61.1% of GDP, is explained by the exchange rate appreciation and export growth assumptions discussed above. Panel B shows the greatest gain in welfare would be experienced in La Paz, followed by Santa Cruz and Cochabamba.

Figure 11. Panel A. Cumulative equivalent variation, all scenarios; Panel B. Cumulative equivalent variation, COMBI1+REPAY scenario, millions of USD.

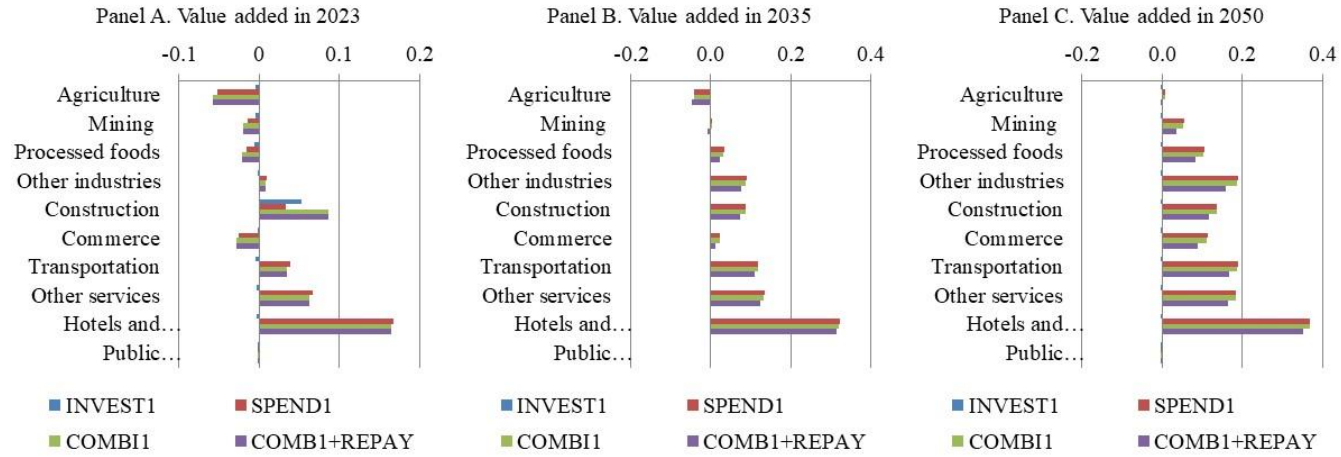


Source: authors' own estimates.

Figure 12 shows the impacts on aggregate sectoral value added in three periods: 2023, 2035 and 2050. These time periods were selected to illustrate that impacts are heterogenous across sectors and time. The year 2023 represents the final year of the investment phase. Resources in the form of capital and labor would be demanded more intensively by those sectors creating the new tourism opportunities, namely, the construction sectors, transportation, other services and hotels and restaurants. This in turn would draw resources away from other sectors such as agriculture, mining, processed foods and commerce. By 2035, activity would begin to pick up again in those sectors that experienced a decline during the investment phase such as processed food and commerce. By 2050, the impacts of the investment and increased international tourism demand would have worked their way through the economy and the impacts would be positive across almost all sectors.

Impacts where the loan is required to be repaid (COMBI1+REPAY) would only dampen this increased economic activity slightly.

Figure 12. Aggregate sector value added in 2023 (Panel A), 2035 (Panel B) and 2050 (Panel C); annual percent deviation from the baseline.



Source: Authors' own estimates.

3.3 Cost-benefit analysis

INVEST1, COMBI1 and COMBI1+REPAY all include the Program investment financed through foreign funds from the rest of the world. In figure 3, this financing occurs as a transaction between column [supra,row] to row entry [supra,govc]. In the case of COMBI1+REPAY, the loan is repaid with interest according to the description in section 3.1. The cost benefit analysis provided here serves to calculate Net Present Value (NPV) and the Internal Rate of Return (IRR) which are the indicators often required by Governments and multi-lateral institutions as a check of the viability of the investment.

Five important features of our cost-benefit analysis are important to note. First, EV is used as the measure of welfare and its calculation includes the Program investment costs in INVEST1, COMBI1 and COMBI1+REPAY scenarios. Second, with foreign funds financing the Program, these funds represent additional Government revenues and do not imply a trade-off between any current or future Government expenditure in the INVEST1 and COMBI1 scenarios. With the repayment of the loan included in COMBI1+REPAY, an albeit postponed trade-off between government expenditures does occur, beginning in 2023 with the repayment of the loan. Third, at the national level, EV is positive for all years in INVEST1, COMBI1 and COMBI1+REPAY. The consequence of positive net welfare impacts for all years is that while an NPV may be calculated, an IRR is incalculable[4]. Should an IRR be required by decision makers, the impact on EV from the SPEND1 scenario could be used. Since Program investment costs are not included in SPEND1, the Program welfare impact may be compared alongside Program investment costs outside of the model.

[4] Note that should GDP have been used in the cost-benefit analysis, an IRR could be calculated for all scenarios. GDP, however, is not considered to be an appropriate measure of welfare.

Fourth, EV in this analysis is computed as the sum of the EV for each of Bolivia's nine Departments. The impacts on well-being of all Bolivian households are weighted equally. Should it be useful for decision making, it would be possible to undertake a cost-benefit analysis for each Department individually. This of course is a distinct advantage of the multi-regional approach. The fifth and final noteworthy feature of our cost-benefit analysis is that as discussed in Banerjee et al. (in press, 2017) and Farrow and Rose (2018), through the use of an economy-wide model, we capture the direct, indirect and induced impacts, both positive and negative, of an intervention. A conventional cost-benefit analysis typically only considers direct benefits and costs. Furthermore, one of the main aims of the Program is to reduce poverty and thus the beneficiaries we are concerned with are Bolivian households. The MRCGE-TUR framework enables us to generate estimates of household welfare, whereas a conventional cost-benefit analysis would require the implementation of some form of household-level stated preference study to estimate ex-ante the welfare impacts of the Program. This type of survey can be prohibitively time consuming and costly to implement in the short timeframe usually available during project preparation.

NPV for INVEST1, COMBI1 and COMBI1+REPAY are calculated as presented in equation 1.

Mathematically:

$$NPV = \sum_{t=2017}^{2050} \frac{EV_t}{(1+intrat)^{t-2017}}] \quad (1)$$

Where: NPV= Net Present Value

$t = 0$: 2019

$t = 17$: 2050

EV_t: equivalent variation in period t.

$intrat$: discount rate (12% in this case)

The NPV of SPEND1 shows, however, that it is the increase in tourism demand that would have the greatest positive impact on the economy. COMBI1+REPAY shows that the repayment of the loan would reduce NPV from US$88.3 million in COMBI1 to US$81.9 million in COMBI1+REPAY.

Table 10. Net Present Value (millions of USD).

Scenario	NPV
SPEND1	93.0
COMBI1	88.3
COMBI1+REPAY	81.9

Source: authors' own estimates.

3.4 Sensitivity Analysis

The results of a computable general equilibrium model such as MRCGE-TUR are a function of: (i) model structure, in particular, the functional forms used, and the macroeconomic closure rules chosen; (ii) baseline data including the SAM used in model calibration, and; (iii) the values assigned to model elasticities, or more generally, the free parameters of the model. Certainly, elasticities used in this and other studies imply some margin of error. For this reason, the sensitivity of the results to the values of elasticities used is tested through sensitivity analysis. Thus, to the extent that the conclusions of the analysis are robust to changes in the set of elasticities used for calibration, we will have a higher degree of confidence in the results.

In this sensitivity analysis, we assume that each of the elasticities of the model is distributed uniformly around the values used in this study. A wide range of variation is applied to each elasticity, specifically, plus or minus 75%. A variation of the systematic sensitivity analysis originally proposed by Harrison and Vinod (1992) was implemented (Harrison and Vinod, 1992). By applying a range of values for each elasticity, we generate a distribution of results and construct confidence intervals around these results.

The first step of the sensitivity analysis requires the identification of the elasticities to be included in the analysis; we include the elasticities of substitution for factors of production, trade-related elasticities, consumption elasticities, and the unemployment elasticities of the wage curves. In the second step, a Monte Carlo simulation is undertaken to randomly sample, with replacement, elasticity values for the set of elasticities included in the analysis. Next, MRCGE-TUR is calibrated with the set of randomly selected elasticities. Third, all counterfactual scenarios are re-run to generate new results. The, the previous steps are repeated, 500 times in our case, to generate results distributions, means, standard deviations and confidence intervals for each model result.

For illustrative purposes, Table 11 presents results of the sensitivity analysis for NPV. These results show that results are robust to changes in model elasticities and that a variation of 75% around each model elasticity still would generate a positive NPV. In the case of COMBI1, the NPV would be between US$49.7 million and US$57.6 million. To explore the response of NPV to variation in specific elasticities, we regress NPV with model elasticities as the independent variables. We found that a key elasticity is that of the wage curve. Specifically, the smaller the elasticity (the flatter the curve between wages and employment), the greater the NPV. This finding was similar for the case of private consumption. The institution behind this result is relatively simple: a smaller elasticity implies that employment can increase without much increase in wages. Thus, an increase in economic activity generated by increased tourism expenditure can have a greater impact on employment with a smaller elasticity for employment with respect to wages.

Table 11. Results of sensitivity analysis, millions of USD.

	SPEND1	COMBI1
Mean	52.1	53.7
Standard deviation	1.9	2.0
Lower limit	48.3	49.7
Upper limit	55.9	57.6

Source: authors' own estimates.

4. Conclusions

In this paper we evaluated the economic impact of a US$26 million investment in cultural heritage tourism in Bolivia. For this purpose, we developed a multi-regional dynamic computable general equilibrium model, MRCGE-TUR. Our framework captures the direct, indirect and induced impacts of the Program as well as its regionally and temporally heterogenous impacts on key economic indicators.

Our results show that the investment had a positive impact on the economy by boosting GDP and reducing poverty. Our cost-benefit analysis of the Program showed that the NPV and IRR of the investment was US$87.4 million and 29.7% which provides an economic justification for the investment at a 12% discount rate, the standard rate applied in cost-benefit analysis of IDB investments. The multi-regional approach provides a number of important advantages and insights over a single-country framework. The size of the shocks implemented were relatively small compared with the size of the regional economies. In the case of the Program investment and the increase in tourism demand, these shocks are equivalent to 0.15% and 0.05% of La Paz's GDP, respectively. The use of a national-level single country framework as is typically implemented in impact analysis would not generate very meaningful results at the national scale.

In estimating tourism demand, our multi-regional approach enabled us to focus on tourism demand in specific subnational destinations such as the Parque Cretácico. Our implementation of the Program increase in demand is thus undertaken at the Departmental level. With the multi-regional approach enabling estimation of the structure of production of each region, we are able to identify those regions of the country that are the most prepared to meet increased demand (figure 5) as well as those regions where incentives to spur development in some economic sectors would be advantageous. The regional approach also enables estimation of regional tourism multipliers which provides insights on which regions will rely more heavily on imports from other regions and the rest of the world to meet growing tourism demand.

Knowledge of the productive structure of each region is key to interpretation of results. For example, figure 10 shows a spike in private consumption in the Pando region. The reason for this is the relatively large share of construction services in Pando's Gross Regional Product. Thus, the investment has a positive impact on Pando given its sales of construction services to other Departments of Bolivia. The slightly negative impact of the investments on private consumption in Tarija and Potosí are also elucidated using the multi-regional approach. These Departments are highly dependent on the production of mining commodities and as demand increases for most goods and services with the Program investment, the price of capital and labor increases for all sectors, mining included.

The ability to calculate tourism income and GDP multipliers at the regional level enables public investment to target those regions of the country that exhibit the greatest multiplier effect to maximize tourism's contribution to economic development. To reduce regional disparities, a critical issue in the case of Bolivia, knowledge of regional structures of production and the composition of tourism demand can help government to target support to those sectors that are lagging behind. This support can be targeted to reducing exports from other regions of the country and from abroad to current and future tourism demand by strengthening local value chains.

Where welfare, poverty and inequality are objectives of public investment in tourism, the ability to calculate these indicators at a regional level is particularly powerful. While analysis may show that a public investment is welfare enhancing, this improvement in welfare could be experienced by those regions that were already well-off prior to the intervention. Our multi-regional approach enables us to calculate poverty and inequality indicators at the regional level, as well as welfare impacts of public investments; it is also possible to distinguish rural and urban impacts within regions which could also be important where investments are aimed to reach rural and marginalized populations.

Where a government may be interested in maximizing economic returns to a public investment, the multi-regional approach enables one to undertake a cost-benefit analysis for each region. While not undertaken in this paper, this would enable consideration of regional impacts in terms of internal rates of return and net present value, which may be particularly important where the repayment of a loan is a concern and benefits and costs are not evenly distributed across regions.

References

AGUIAR, A., NARAYANAN, B. & MCDOUGALL, R. 2016. An Overview of the GTAP 9 Data Base. *2016,* 1**,** 28.

ARMINGTON, P. S. 1969. A Theory of Demand for Products Distinguished by Place of Production (Une théorie de la demande de produits différenciés d'après leur origine) (Una teoría de la demanda de productos distinguiéndolos según el lugar de producción). *Staff Papers (International Monetary Fund),* 16**,** 159-178.

BANERJEE, O. 2008. *Socioeconomic and Environmental Impacts of Forest Concessions in Brazil: A Computable General Equilibrium Analysis.* PhD Doctoral dissertation, University of Flrida.

BANERJEE, O., CICOWIEZ, M. & COTTA, J. 2016. Economics of tourism investment in data scarce countries. *Annals of Tourism Research,* 60**,** 115-138.

BANERJEE, O., CICOWIEZ, M. & GACHOT, S. 2015. A quantitative framework for assessing public investment in tourism – An application to Haiti. *Tourism Management,* 51**,** 157-173.

BANERJEE, O., CICOWIEZ, M. & MOREDA, A. 2017. Reconciliation Once and For All: Economic Impact Evaluation and Social Cost Benefit Analysis. *IDB Working Paper No. 835.* Washington DC: Inter-American Development Bank.

BANERJEE, O., CICOWIEZ, M. & MOREDA, A. in press. Evaluating the Economic Viability of Public Investments in Tourism. *Journal of Benefit-Cost Analysis*.

BANERJEE, O., CICOWIEZ, M., MORRIS, E. J. & MOREDA, A. 2018a. Boosting tourism's contribution to growth and development: Analysis of the evidence. *Review of Development Economics,* 22**,** 1296-1320.

BANERJEE, O., CICOWIEZ, M., OCHUODHO, T., MASOZERA, M., WOLDE, B., LAL, P., DUDEK, S. & ALAVALAPATI, J. R. R. 2018b. Financing the sustainable management of Rwanda's protected areas. *Journal of Sustainable Tourism,* 26**,** 1381-1397.

BLAKE, A. 2009. The Dynamics of Tourism's Economic Impact. *Tourism Economics,* 15**,** 615-628.

BLAKE, A., ARBACHE, J. S., SINCLAIR, M. T. & TELES, V. 2008. Tourism and poverty relief. *Annals of Tourism Research,* 35**,** 107-126.

BLAKE, A., SINCLAIR, M. T. & SUGIYARTO, G. 2003. Quantifying the Impact of Food and Mouth Disease on Tourism and the UK Economy. *Tourism Economics,* 9**,** 449-463.

CROES, R. & VANEGAS, M. 2008. Cointegration and Causality between Tourism and Poverty Reduction. *Journal of Travel Research,* 47**,** 94-103.

CSAPO, J. 2012. The Role and Importance of Cultural Tourism in Modern Tourism Industry. *In:* KASIMOGLU, M. & AYDIN, H. (eds.) *Strategies for Tourism Industry- Micro and Macro Perspectives.* INTECH.

DWYER, L., FORSYTH, P. & SPURR, R. 2003. Inter-Industry Effects of Tourism Growth: Implications for Destination Managers. *Tourism Economics,* 9.

DWYER, L., FORSYTH, P. & SPURR, R. 2006. Assessing the Economic Impacts of Events: A Computable General Equilibrium Approach. *Journal of Travel Research,* 45**,** 59-66.

EUROPEAN COMMISSION, INTERNATIONAL MONETARY FUND, ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, UNITED NATIONS & BANK, W. 2009. System of National Accounts 2008. EC, IMF, OECD, UN, WB.

FARROW, S. & ROSE, A. 2018. Welfare Analysis: Bridging the Partial and General Equilibrium Divide for Policy Analysis. *Journal of Benefit-Cost Analysis,* 9**,** 67-83.

GIESECKE, J. A. & MADDEN, J. R. 2011. Modelling the Economic Impacts of the Sydney Olympics in Retrospect – Game Over for the Bonanza Story?*. *Economic Papers: A journal of applied economics and policy,* 30**,** 218-232.

HARRISON, G. & VINOD, H. 1992. The Sensitivity Analysis of Applied General Equilibrium Models: Completely Randomized Factorial Sampling Designs. *The Review of Economics and Statistics,* 74**,** 357-62.

HORRIDGE, J. M. 2011. The TERM Model and its Database. Clayton: Centre of Policy Studies, Monash University.

IMF 2018. World Economic Outlook: Challenges to Steady Growth. Washington DC: International Monetary Fund.

KLYTCHNIKOVA, I. & DOROSH, P. 2013. Tourism sector in Panama: Regional economic impacts and the potential to benefit the poor. *Natural Resources Forum,* 37**,** 70-79.

LURMETRIKA 2018. Estudio de Valoración Contingente para la Estimación de la Disposición a Pagar por el Parque de las Culturas y La Madre Tierra y los Recursos Patrimoniales en las Ciudades Principales de Bolivia (Fondo Concursal). Bilbao: Lurmetrika.

MADDEN, J. 2006. Economic and Fiscal Impacts of Mega Sporting Events: A General Equilibrium Assesment. *Public Finance and Management,* 6**,** 346-394.

NJOYA, E. T. & SEETARAM, N. 2017. Tourism Contribution to Poverty Alleviation in Kenya: A Dynamic Computable General Equilibrium Analysis. *Journal of Travel Research***,** 0047287517700317.

PAMBUDI, D., MCCAUGHEY, N. & SMYTH, R. 2009. Computable general equilibrium estimates of the impact of the Bali bombing on the Indonesian economy. *Tourism Management,* 30**,** 232-239.

PARTRIDGE, M. D. & RICKMAN, D. S. 2008. Computable General Equilibrium (CGE) Modelling for Regional Economic Development Analysis. *Regional Studies,* 44**,** 1311-1328.

PYATT, G. & ROUND, J. I. (eds.) 1985. *Social Accounting Matrrices: A Basis for Planning,* Washington DC: The World Bank.

UNWTO 2012. Tourism and Intangible Cultural Heritage. Geneva: United Nations World Tourism Organization.

UNWTO 2014a. Computable General Equilibrium Modelling for Tourism Policy- Inputs and Outputs. *Statistics and TSA Issues Paper Series.* Madrid: United Nations World Tourism Organization.

UNWTO 2014b. Tourism: A Tool to Preserve Cultural Heritage in Latin America and the Caribbean. *In:* RISI, M. (ed.) *Press release 14015.* Santo Domingo: UNWTO.

UNWTO 2017. Twenty-second session of the UNWTO General Assembly in Chengdu, China. Chengdu: United Nations World Tourism Organization.

WINTERS, P., CORRAL, L. & MORA, A. M. 2013. Assessing the Role of Tourism in Poverty Alleviation: A Research Agenda. *Development Policy Review,* 31**,** 177-202.

ZADEL, Z. & BOGDAN, S. 2013. Economic Impact of Cultural Tourism. *UTMS Journal of Economics,* 4**,** 355-366.