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Evaluating the Economic Viability of Public Investments in Tourism

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Abstract

Various methods have been applied to evaluating the economic viability of public investments in tourism. In this paper, we capitalize on the strengths of general equilibrium and cost benefit analytical techniques and develop an integrated approach to evaluating public investments in tourism. We apply the approach to the evaluation of a US$6.25 million investment in tourism in Uruguay from the perspective of a multi-lateral development bank and a beneficiary government. The approach is powerful in that it captures first and subsequent rounds of investment impacts both on the benefits and costs side; resource diversion and constraints are accounted for, and; the estimation of benefits is consistent with the welfare economics underpinnings of cost benefit analysis.

JEL Codes: Z3 Tourism Economics; C68 Computable General Equilibrium Models; D61 Allocative Efficiency • Cost–Benefit Analysis; O1 Economic Development; O2 Development Planning and Policy; O5 Economywide Country Studies.

Keywords: ex-ante economic impact analysis; cost benefit analysis; dynamic computable general equilibrium model; welfare economics; investment analysis; Uruguay.

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1.0. Introduction

The most appropriate methods and metrics for evaluating the economic viability of public investments in tourism and their relative strengths and limitations have been subject to discussion in the literature (Abelson, 2011; Blake, 2005; Burgan, 2001; Dwyer et al., 2004; Dwyer et al., 2016; Layman, 2004). Carefully defined public investment objectives are critical for determining the appropriate choice of method and metric. The analytical techniques available include input-output modelling, computable general equilibrium modelling (CGE), cost benefit analysis (CBA), expenditure-based methods and benefit scoring, among others. The metrics used to represent benefits include gross domestic or gross regional product, net household income or consumption, employment and welfare measures such as consumer/producer surplus and equivalent variation.

This paper contributes to the literature on tourism investment impact analysis in two ways. First, we capitalize on the strengths of two well-established analytical approaches, CGE and CBA, and develop a rigorous and integrated approach to evaluating public investments in tourism. This analysis may be undertaken from the perspective of a multilateral development bank and from the perspective of a beneficiary government. Second, in considering the beneficiary government's perspective, we build-in the repayment of a concessional loan extended by a multilateral development bank to finance the investment in a temporally dynamic modelling framework and estimate the net present value of the investment. To illustrate the approach, we estimate the economic and welfare impacts of a US$6.25 million public investment in tourism in the Uruguay River corridor from both the multilateral development bank and beneficiary government's perspectives.

This paper is organized as follows: section two provides an overview of CGE analysis, followed by a description of the main principles of CBA in section three. Section four presents key considerations for integrating CGE with a CBA approach. Section five illustrates the approach in application into a US$6.25 million public investment in tourism. Section six concludes the paper with a discussion of key findings.

2.0. Dynamic computable general equilibrium analysis

In the analysis of large public investments or policies that are expected to impact multiple sectors and actors in an economy with dynamic effects, a dynamic computable general equilibrium (DCGE) approach is powerful. DCGE analysis captures important inter-sectoral and backward and forward linkages, and the direct, indirect and induced benefits of an investment (Cattaneo, 2002, Dwyer et al., 2006, Dwyer et al., 2003, Dixon and Rimmer, 2002, Banerjee et al., 2015). Pearce et al. (2006) suggest that where projects are large and complex, partial equilibrium frameworks are seldom sufficient and that the analytical framework should be capable of considering a wide range of impacts on all sectors that may be impacted. All project spillovers, and indirect costs and benefits should be accounted for. As Pearce et al. (2006) emphasize, a core strength of the DCGE approach is its meticulous detail in appraising spillovers of an intervention.

Ex-ante economic impact analysis with DCGE models has been undertaken for public investments in the forestry (Banerjee et al., 2016a) and tourism sectors (Banerjee et al., 2015, Banerjee et al., 2016b, Taylor, 2010, Taylor and Filipski, 2014). Indeed, DCGE analysis can be applied across a broad range of economic sectors where large public investments are concerned, and inter-sectoral linkages are important. Beyond consideration of economic impacts of large public investments, DCGE models have a long history in applied policy analysis, from fiscal to trade to environmental policy analysis, with DCGE models distinguishing themselves as the 'workhorse' of policy analysis (Jones, 1965, Dixon and Jorgenson, 2012, Dixon et al., 1992). As Nobel Economist Kenneth J. Arrow stated:

"…in all cases where the repercussions of proposed policies are widespread, there is no real alternative to CGE" (Arrow, 2005).

DCGE 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). DCGE models are based on SAMs 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 countries or regions of the world (King, 1985).

A SAM is constructed based on a country's national accounts (European Commission et al., 2009) including integrated economic accounts, fiscal accounts and balance of payments data, and often government survey data such as household income and expenditure surveys. Recently, with the publication of the first international standard for environmental statistics, the System of Environmental Economic Accounting (SEEA; European Commission et al., 2012), it has become possible to integrate detailed environmental data into DCGE models. The development of the Integrated Economic-Environmental Modelling (IEEM) Platform has important applications for tourism investment analysis where tourism demand is a function of natural capital stocks and environmental quality (Banerjee et al., 2016c; Banerjee et al., in press).

DCGE models are commonly used to assess economic impact and as such, some of the key indicators reported are Gross Domestic Product (GDP) or Gross Regional Product (GRP). As policy makers are frequently concerned with household income, consumption and employment, these metrics are also often reported, with impacts on income and consumption typically following trends in GDP impacts. In developing country contexts, indicators of poverty and inequality are particularly important, though disaggregation of households is necessary to generate meaningful results.

Indicators of changes in household welfare measured by compensating and equivalent variation may also be estimated in a DCGE framework (Lofgren et al., 2002). Equivalent Variation (EV) is the change in household income at current prices that a change in prices would have on household welfare if income were held constant. In other words, where an intervention does not occur, EV is the amount of income an individual would have to be given to make them as well off if the intervention did take place. Since value terms in our analysis are always expressed in current terms, EV is the appropriate measure as it also reflects current prices.

Of course, where trade and fiscal policy shocks are subject of analysis, impacts on exports, imports, the exchange rate and levels of tax revenue become more relevant. With detailed representation of the environment in integrated modelling frameworks such as the IEEM Platform, semi-inclusive measures of wealth and welfare such as genuine savings may also be reported (Arrow et al., 2012; Stiglitz et al., 2010; Banerjee et al., 2016c, Banerjee et al., in press).

3.0. Cost Benefit Analysis

The origins of CBA may be traced back to an application by US Federal Water Agencies as early as 1808 where CBA was applied to evaluate the alternative use of public funds from an economy-wide perspective (Burgan and Mules, 2001; Mishan, 1988). Hanley and Spash (1993) and Pearce et al. (2006) provide a brief history of the development of CBA. CBA is theoretically grounded in welfare economics where benefits are defined as increases in well-being or utility and costs are defined as reductions in utility. Thus, for an intervention to be welfare enhancing, the 'with intervention' social benefits must outweigh the social costs within a predefined geographic area.

There are two main aggregation rules that are often applied in CBA in estimating net impacts of an intervention. The first rule sums the willingness to pay (WTP) for estimated benefits or the willingness to accept (WTA) compensation for loss of benefits across individuals or groups. WTP and WTA are at the core of welfare economics and correspond to compensating and equivalent variation. The second aggregation rule is applied in cases where it is appropriate to place a higher weight on the benefits or costs faced by different segments of the population such as the poor and more marginalized groups in society (Pearce et al., 2006).

Following Hanley and Spash (1993), CBA is conducted in seven main steps. The first step defines the project and identifies the resources to be used and for what purpose and, the population expected to be affected by the intervention. The second step identifies project impacts where all resources used in the project including raw materials, capital, labor, land and other resources are accounted for. The nature of the impacts will differ from project to project, though these impacts can range from impacts on income, output, prices, wages and property value, to changes in environmental quality. Two important concepts in the identification of impacts are additionality and displacement. Additionality takes into consideration the marginal impact of the intervention while displacement is concerned with the reallocation of resources from an existing use, to the new intervention. Both concepts are critical in how results of the analysis are presented and interpreted.

The third step involves judgement on selection of the impacts that are economically relevant. With welfare economics underpinning CBA, the goal is to maximize a social welfare function. This function is estimated as the weighted sum of the utility of each individual in the population, and where utility is understood as the value of the consumption of marketed and non-marketed goods and services. A CBA should provide a decision rule for policy makers, enabling them to select the intervention that provides the greatest social utility.

The fourth step involves physical quantification of the economically relevant impacts while the fifth step is the monetary valuation of these impacts. Ascribing a monetary value to non-market goods can be challenging, though methods for doing so are continually becoming more robust. These methods are categorized as revealed preferences and stated preferences. Revealed preferences include direct methods such as damage cost and replacement cost, and, indirect methods such as hedonic and random utility approaches. Stated preference approaches include contingent valuation and choice modelling; these stated preference methods are the primary approach for estimating non-use values (Champ et al., 2003; Pearce et al., 2006). Where ascribing a monetary value to non-market goods and services is not feasible or desirable, economic measures may be supplemented by biophysical ones (Stiglitz et al., 2010; Polasky et al., 2015).

The sixth step of the analysis applies the net present value (NPV) test which assesses whether the sum of discounted benefits exceeds the sum of discounted costs. If the result is positive, the intervention is considered to be an efficient allocation of resources. Calculation of NPV involves making a decision on the rate of time preference or discount rate, and; discounting the flow of costs and benefits, converting all values to present value terms.[1] This calculation is shown in equation 1.

[1] There is significant discussion in the literature on the appropriate discount rate for different types of interventions. In the example that follows in section 5, we use the standard discount rate applied by the Inter-American Development Bank in all its projects.

$$NPV = -I_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \cdots + \frac{C_T}{(1+r)^T}$$

(eqn' 1)

Where:

NPV = net present value;

I_0 is the initial investment;

t is the year;

T is the final year of the period of analysis;

C is the cash flow, and;

r = discount rate.

The seventh and last step is to undertake sensitivity analysis to assess which parameters have the strongest effect on NPV. Usually, the parameters tested in the sensitivity analysis are the physical quantities and qualities of inputs and outputs, prices, and in some cases, the discount rate and project time horizon.

4.0. Integration of DCGE estimates and CBA

Public investment in tourism can be motivated by the impact the investment is expected to have on income and employment which are enhanced by increased tourism expenditure in the region. Government investment interventions may be also motivated by market failures when individual tourism sector firms are unable to capture the share of tourist expenditure that is commensurate with their expenditures and promotional and organizational efforts (Burgan and Mules, 2001). Where investment is justified based on the benefits that it may bring to a region, it is important for there to be clarity on the precise definition of benefits.

From a CBA perspective, as discussed in section 3, benefits equate with changes in welfare and the net benefit is the change in welfare, net of the real resource costs. Defining benefits as increases in tourist expenditure and evaluating these in a CBA would not, however, be consistent with the welfare economics foundation of CBA. In an economic impact assessment framework, evaluation of the economic benefits in terms of tourism expenditure or regional product may be the appropriate metric, though not a measure of benefit from a welfare economics standpoint.

As discussed in Dwyer et al. (2016) and Abelson (2011), while an investment with a positive impact on GDP may be welfare enhancing, GDP alone suffers from a number of limitations as a measure of welfare. GDP measures the value of all economic output. From the income approach to estimating GDP, this includes the income earned by non-resident owners of capital and non-resident labor and as such, accounts for benefits that accrue outside of the region of interest. Second, interpreted from the expenditure approach to estimating GDP, an increase in GDP does not distinguish what the increased output is. For example, increased environmental damage requiring expenditure to correct for such damage would be recorded as a positive contribution to GDP (Stiglitz et al., 2010).

In a partial equilibrium framework, to be compatible with the welfare underpinnings of CBA, the appropriate metrics are consumer or producer surplus. In the case of tourism, however, and particularly when foreign tourists are the target market, consumer surplus is not an appropriate indicator since the consumer is a foreign visitor. Governments investing in tourism will be more concerned with the benefits that accrue to residents of their jurisdiction than the benefits perceived by individuals/consumers residing elsewhere. The alternative in a partial equilibrium framework is to estimate producer surplus where the benefit to the economy is assessed as a function of increased in local production (Burgan and Mules, 2001).

In a general equilibrium framework, household welfare or utility is the appropriate measure of benefits and can be estimated in a DCGE framework (Blake, 2005; Dwyer et al., 2016; Hanley and Spash, 1993; Pearce et al., 2006). As pointed out by Dwyer et al., (2016), EV translates an estimate of economic impact into a welfare measure based on assumptions made in the model with respect to factor mobility and constraints. Estimation of EV in a DCGE has advantages over partial equilibrium frameworks as the economy-wide approach accounts for second and subsequent rounds of direct, indirect and induced impacts generated by an investment, and; the internal consistency a DCGE affords in terms of balancing supply and demand subject to resource constraints.

Model assumptions on factor mobility and constraints are important considerations in interpreting net benefits estimated through a general equilibrium and a conventional partial equilibrium CBA approach. In a general equilibrium setting, if labor and capital are diverted from an existing use to a new intervention, the net benefit would only be positive if the new use generated greater welfare. A partial equilibrium approach would typically not account for this resource diversion and thus could lead to an overestimation of net benefits. The use of estimates of welfare impacts generated through a general equilibrium approach in a CBA overcomes this limitation, and is the method developed in section 5.

Another important consideration in both a general equilibrium and CBA framework is the opportunity cost of labor. When the opportunity cost of labor is equal to zero, the social benefit of an additional job is the wage paid to the new salaried worker. Where unemployment exists and the opportunity cost (i.e. the unemployed workers' reservation price) is less than the minimum wage, the benefit of the additional job is the difference between the minimum wage and the worker's reservation price (Bartik, 2012). In areas with high unemployment, few social safety nets and where labor is mobile between sectors and regions, it may be reasonable to assume that the opportunity cost of the unemployed worker is very close to zero. In developing country contexts, this is often the case.

Layman (2004) argues that for the results of general equilibrium analysis to provide meaningful information to policy makers, a recognized set of methods, assumptions and indicators are required. For example, any additional resources used in an intervention should be accounted for and the costs associated should be deducted from gross product (Layman, 2004; Hanley and Spash, 1993). Indeed, one of the strengths of the DCGE approach is that it is an internally consistent framework providing a strict accounting of all market costs and benefits generated by an intervention. What a DCGE approach does not do well, however, is capture non-market benefits and costs. For example, the welfare impact of increases in traffic congestion arising from an investment are difficult to capture in a standard DCGE, unless the model is designed specifically with this intent. In some cases, where non-market benefits and costs are a priori considered to be the most relevant, analysis in a partial equilibrium framework may be the most appropriate. Certainly, in the integrated approach developed in the section that follows, there remains a role for estimates derived from a partial equilibrium framework in supporting the analysis.

5.0. Integration of DCGE and CBA: an application to Uruguay

This section uses estimates derived from a general equilibrium/DCGE approach in a CBA framework to capitalize on the strengths of the two, and; evaluates a public investment in tourism from the perspective of a multi-lateral development bank, and the beneficiary government. From the development bank's perspective, on the cost side, what is of concern is the disbursement schedule of the loan. On the benefit side, the development bank is concerned with increasing net social benefits for the borrowing country. From the perspective of the borrowing country, on the cost side, the Government is concerned with the repayment of the investment and the follow-on costs. On the benefits side, as with the development bank, the Government seeks to maximize the net social benefits accruing to the borrowing country's citizens. Based on the discussion above and since we are concerned with changes in welfare at original prices (i.e. or before intervention/pre-simulation prices), EV is the appropriate measure of welfare, and is the indicator used in the subsequent CBA to represent benefits.

The DCGE model developed in Banerjee et al. (2016, 2015) is calibrated with a new SAM for Uruguay with a base year of 2013 (Cicowiez, 2016).[2] This is a relatively standard recursive dynamic CGE model (see Lofgren et al., 2002, and; Robinson, 1989, for examples), with additional equations and variables that can single out: (i) tourism demand- both domestic and foreign; (ii) different types or modalities of tourism sector goods and services (e.g. boutique hotels versus large all-inclusive resorts and casinos), and; (iii) the impact of public investment in infrastructure on sector productivity.

The DCGE model has both national and subnational configurations. While the subnational configuration was not applied in this analysis, it can be calibrated to describe: (i) trade between the region of interest and the rest of the country, and the rest of the world, and; (ii) both local and central/national government operations in the region of interest such as tax collection and current and capital spending. In summary, the DCGE model applied here compared with other CGE models includes a combination of policy-relevant features for the study of public investment in tourism or tourism policy in a national or regional economy.

The DCGE is applied to the ex-ante economic analysis of a US$6.25 million public investment in tourism[3]. This investment is supporting tourism development in the Uruguay River corridor to create employment and income in emerging destinations, and consolidate tourism opportunities to improve regional equity. The three main objectives of the investment are to: (i) create and consolidate tourism infrastructure (US$3.555 million); (ii) catalyze private sector investment in the corridor (US$950,000, and; (iii) strengthen regional tourism governance (US$900,000). Operations and maintenance of new infrastructure is estimated at an annual cost of 3% of the value of this infrastructure while the management costs of the tourism program are equal to US$845,000 annually. Figure 2 in section 5 describes the distribution of the investment and operations and maintenance costs until 2045 which is the time horizon used in this analysis.

A SAM for 2013 was developed for Uruguay which is the most recent year for which complete national accounts data were available (Cicowiez, 2016). This SAM was extended to disaggregate foreign tourism demand/expenditure. Table 1 describes the accounts in the Uruguay SAM.

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[2] A mathematical statement for our DCGE is available from the authors upon request.

[3] The US$6.25 investment is composed of a US$5 million loan from the Inter-American Development Bank with US$1.25 million in counterpart funding.

Table 1. Main accounts in the Uruguay SAM.

Category	Item	Category	Item
Sectors	Agriculture, forestry and fishing	**Factors**	Land
12	Processed food	**continued**	Timber resources
	Manufacturing		Fisheries resources
	Utilities		Mining resources
	Mining, petroleum, chemicals	**Institutions**	Households
	Construction	**3**	Government
	Commerce		Rest of the world
	Hotel and restaurant	**Taxes**	Unskilled labor factor tax
	Transportation	**9**	Skilled labor factor tax
	Communications		Capital factor tax
	Public administration		Natural resources factor tax
	Other services		Import and export duties
Factors	Salaried labor, low skill		Direct taxes
11	Salaried labor, mid skill		Activity taxes
	Salaried labor, high skill		Other taxes
	Non-salaried labor, low skill		Social security contributions
	Non-salaried labor, mid skill	**Investment**	Private investment
	Non-salaried labor, high skill	**3**	Government transport infra investment
	Capital		Other government investment

Source: Authors' own elaboration; Uruguay SAM.

According to the SAM, Uruguay's GDP reached 1,140,989 million pesos in 2013. Uruguay imported 75,958 million pesos more than it exported, while foreign tourism demand directly contributed to almost 3.4% of GDP (table 2)[4].

[4] Exchange rate used: 28.25 pesos to 1 US dollar (January 2017).

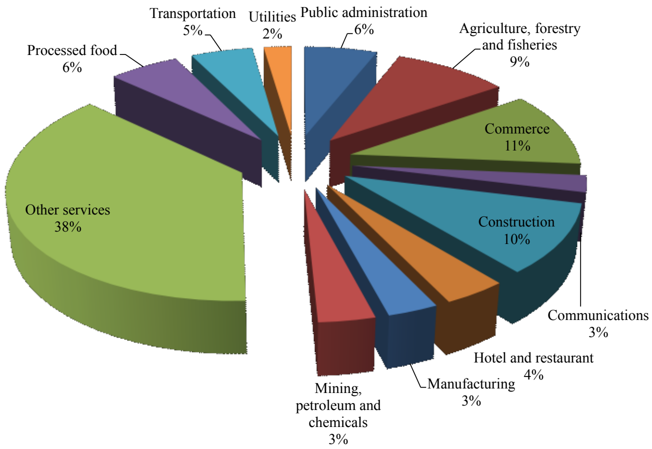
Table 2. Uruguay, 2013, total supply and demand.

Item	Millions of pesos	
Demand		
Private consumption	$	751,198
Government consumption	$	157,987
Fixed investment	$	261,421
Exports	$	235,238
Tourism demand	$	38,642
Total demand	$	1,444,487
Supply		
GDP	$	1,140,989
Imports	$	311,197
Stock change	$	(7,698)
Total supply	$	1,444,487

Source: Authors' own elaboration; Uruguay SAM.

The sectoral structure of Uruguay's economy is depicted in Figure 1. The Other services sector is the largest sector accounting for 38% of the economy's value added. Commerce is a far second followed by Construction, and then Agriculture, forestry and fisheries. While not shown here, Processed food and Agriculture, forestry and fisheries lead Uruguay's exports (35% and 28%, respectively) while Manufacturing and Mining, petroleum and chemicals account for the greatest share of imports.

Figure 1. Sector structure in 2013, value added shares.



Source: author's own elaboration.

5.1. Scenario design

This section presents the simulations, results and analysis. The following five scenarios were undertaken: (i) the baseline scenario, which is the *without investment* scenario (baseline); (ii) the investment scenario where the government investment in tourism infrastructure, institutional strengthening, and capacity building is implemented (invest); (iii) the demand scenario which simulates the projected increase in foreign overnight leisure tourism expenditure arising from the investment (demand); (iv) a combination scenario where the investment and demand scenarios are implemented jointly (combi), and; (v) combi-pay which is the combination scenario with the internalization of the repayment of the US$6.25 investment in the DCGE simulation (combi-pay). Details of each scenario follow:

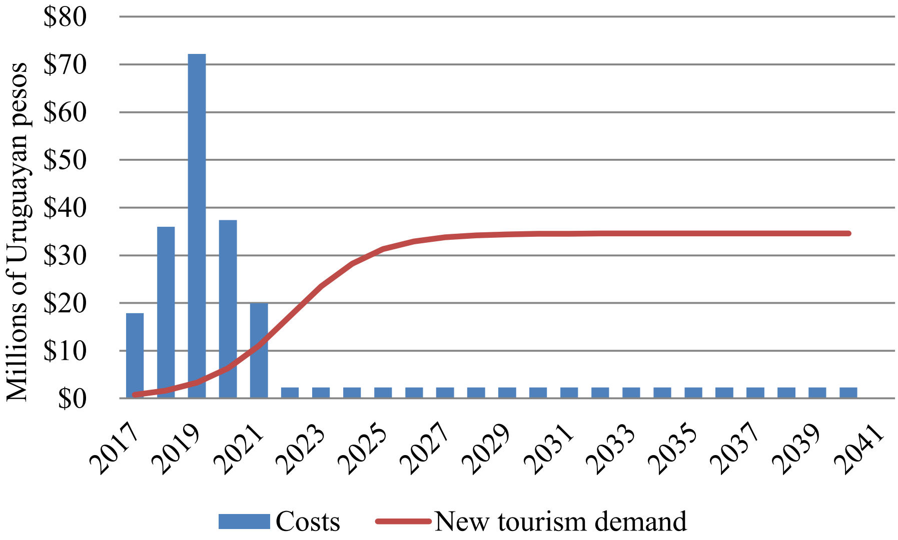
Baseline scenario: this first simulation assumes that average past trends will continue from 2014 to 2045. The non-base simulations that follow only deviate from the baseline scenario beginning in 2017.

Invest scenario: this simulation imposes increased government investment in tourism infrastructure, institutional strengthening and capacity building financed through a multilateral loan. The structure and sequencing of the investment are shown in figure 2. The year 2017 is the first year of the investment which continues until the year 2021, inclusive. The investment itself includes technical studies, interpretive touristic circuits, investments in enhancing cultural and ecological assets and visitor's centers; a tourism statistics, information and marketing system, and; tourist operator capacity building and a local competitive tourism development fund (Moreda et al., 2017).

Demand scenario: in this simulation, foreign leisure tourist overnight arrivals and expenditure are projected to increase as a result of the increased tourism opportunities created by the investment. With program tourism demand was estimated in Eugenio-Martin and Inchausti-Sintes (2016) with econometric regression analysis. In this regression, the economic value of the presence of an additional tourism attraction was estimated using tourism expenditure as the independent variable (Eugenio-Martin and Inchausti-Sintes, 2016). The three attractions considered were nautical, ecotourism and cultural tourism attractions.

Based on the characteristics and number of new attractions to be developed through the investment, the total additional tourism expenditure was estimated at 166,521,348 pesos. This increased tourism demand was distributed according to a logistical functional form over a 10-year period, such that 2.5% of the increase was applied in the first year, 6% in the second year, 14% in the third year, 28% in the fourth year, 50%, in the fifth year, 72% in the sixth year, 87% in the seventh year, 94% in the eighth year, 98% in the ninth year and 100% in the tenth year (figure 2).

Figure 2. Distribution of investment costs and projected tourism demand increase.



Source: Authors' own elaboration.

Combi scenario: this scenario models the *invest* and *demand* scenarios combined.

Combi-pay scenario: this scenario models the *invest* and *demand* scenarios combined, and; internalizes the repayment of the US$6.25 million investment in the DCGE model.

According to conditions applied to similar multilateral loans, repayment begins after a grace period in year 7, which is year 2023 in this analysis. Interest owing and the principle payment are made annually with the final payment made in 2039. The interest rate used is 1.58% and is based on the US Dollar LIBOR[5]. The value of the repayment is held constant over the period and is equivalent to 11.85 million Uruguayan pesos. To finance repayment of the loan, direct tax rates are adjusted to generate the necessary funds.

As with any DCGE model, closure rules are required to determine the mechanisms by which demand and supply are equalized in all markets. In this analysis, government current consumption balances the government budget; investment balances the savings and investment account; the real exchange rate balances the current account of the balance of payments. Labor is fully employed and mobile across sectors, while capital and land are fully employed and immobile between sectors. The consumer price index is the numeraire.

5.2. DCGE model results

Figure 3 illustrates impacts on EV, the measure of household welfare, in millions of pesos. This represents the change in household income at current prices that a change in prices would have on household welfare if income were held constant. In other words, where an intervention does not occur, EV is the amount of income an individual would have to be compensated with to make them as well off if the intervention were to have taken place.

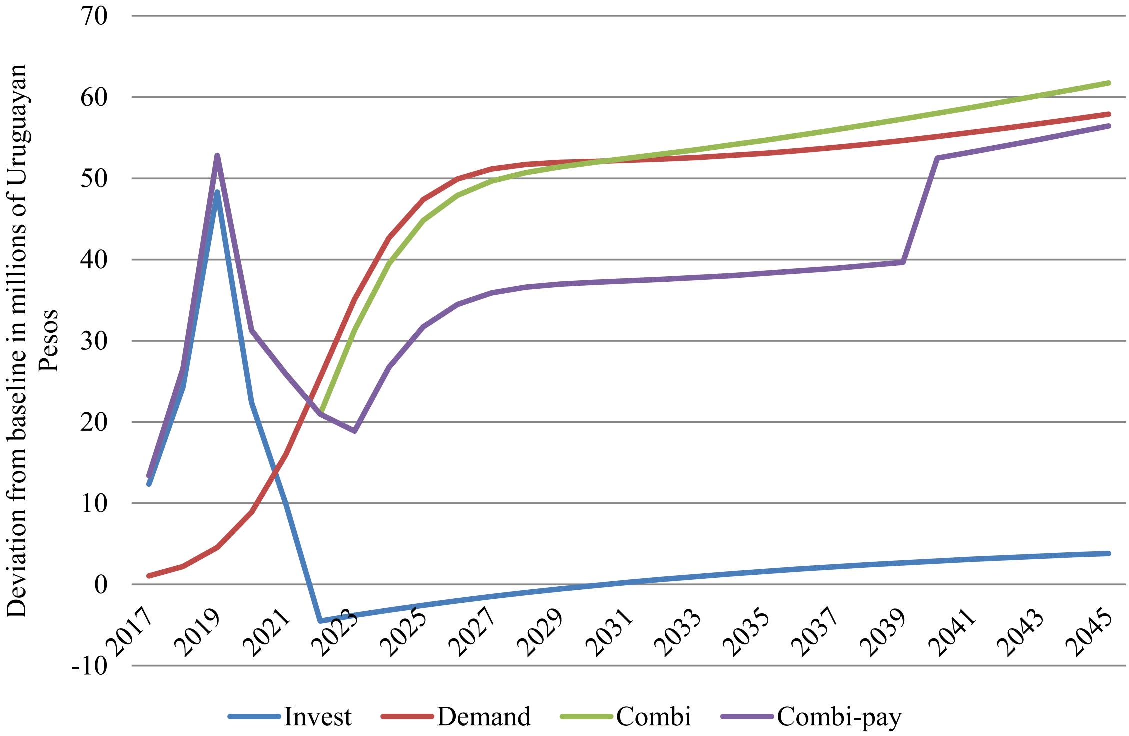
In the invest scenario, EV spikes with the disbursements of the loan, declining back to baseline levels at around 2023 and then growing more quickly than baseline thereafter once the investment's medium-run positive impacts on capital stocks begin to materialize. The impact on EV in the demand scenario naturally follows the increase in projected demand arising from the creation of new tourism attractions and opportunities. While not reported

[5] LIBOR rate retrieved on October 28, 2016.

here, the DCGE model also reports results related to employment levels, sectoral output, exports and imports, among other indicators, all of which are considered when calculating EV.

The combi scenario represents essentially the sum of the invest and demand scenarios, reaching over an additional 60 million pesos by 2045 compared with the baseline. Finally, the combi-pay scenario follows a similar trend as the combi scenario, though the combi-pay trend is between 5 and 15 million pesos lower than the combi scenario during the loan repayment period. There is also an upward jump in household welfare in 2039 once the loan is repaid; at this point, the impact on EV rises close to the level of the demand scenario in 2045. The rate of growth from 2039 forward in the combi-pay scenario follows the rate of growth of the combi scenario. In 2045, the difference between the combi and the combi-pay scenario is 5.3 million pesos. The cumulative difference between the combi and combi-pay scenario by 2045 is almost 289 million pesos.

Figure 3. Impact on equivalent variation, deviation from baseline; millions of pesos.



Source: Authors' own elaboration.

Table 3 provides an overview of key macro-indicators and their deviation from their baseline values in year 2021 (the final year of the investment), 2030, and 2045. Both exports and imports decline in all scenarios. The trend with fixed investment in the case of the demand, combi and combi-pay scenarios is to decline, generally in later years of the time horizon. GDP impacts are positive in all scenarios and years. The government consumes more goods and services in all scenarios, except for the demand scenario which is a function of its allocation of resources toward the development of new tourism attractions. Private consumption generally follows GDP trends, while private investment tends toward decline. This is a characteristic outcome of a sudden increase in government investment, as it tends to temporarily crowd out private investment during the period of accelerated public investment (Banerjee et al., 2016b, Dwyer et al., 2006).

Table 3. Key macro-indicators, difference from baseline for select years; pesos.

	Invest			Demand			Combi			Combi-pay		
	2021	2030	2045	2021	2030	2045	2021	2030	2045	2021	2030	2045
Absorption	$ 23,776,888	$ 22,544,796	$ 1,511,127	$ 6,123,212	$ 1,097,552	$ 16,441,985	$ 51,949,193	$ 51,990,462	$ 24,874,406	$ 38,986,637	$ 53,459,075	$ 58,111,859
Private consumption	$ 12,335,328	$ 9,874,528	$ (128,827)	$ 3,825,857	$ 1,064,894	$ 16,014,234	$ 52,094,158	$ 57,909,887	$ 13,400,210	$ 25,888,854	$ 51,964,250	$ 61,734,233
Government consumption	$ 10,379,263	$ 11,436,345	$ 1,174,536	$ 1,174,536	$ -	$ -	$ -	$ -	$ 10,379,263	$ 11,436,345	$ 1,174,536	$ 1,174,536
GDP market prices	$ 5,983,982	$ 2,608,372	$ 1,482,741	$ 6,261,819	$ 1,016,903	$ 15,271,118	$ 49,053,846	$ 50,736,926	$ 7,000,722	$ 17,877,840	$ 50,535,886	$ 56,997,094
Tourism demand	$ -	$ -	$ -	$ -	$ 4,311,381	$ 67,829,186	$ 275,874,934	$ 432,689,976	$ 4,311,381	$ 67,829,186	$ 275,874,934	$ 432,689,976
Exports	$(11,209,913)	$(14,915,115)	$ (356,782)	$ 1,350,535	$ (2,204,359)	$(35,233,022)	$(152,497,564)	$(252,644,471)	$ (13,414,305)	$ (50,148,185)	$(152,854,491)	$(251,294,414)
Imports	$ (6,582,993)	$ (5,021,309)	$ 328,395	$ (1,211,927)	$ (2,187,670)	$(33,767,032)	$(126,272,717)	$(181,299,040)	$ (8,770,761)	$ (38,789,798)	$(125,943,632)	$(182,510,326)
Fixed investment	$ 1,062,298	$ 1,233,923	$ 465,419	$ 1,122,819	$ 32,658	$ 427,751	$ (144,965)	$ (5,919,426)	$ 1,094,933	$ 1,661,438	$ 320,289	$ (4,796,910)
Private fixed investment	$ (6,906,731)	$ (7,795,026)	$ (712,270)	$ (54,870)	$ 32,658	$ 427,751	$ (144,965)	$ (5,919,426)	$ (6,874,095)	$ (7,367,511)	$ (857,400)	$ (5,974,599)
Government fixed investmen	$ 7,969,029	$ 9,028,949	$ 1,177,689	$ 1,177,689	$ -	$ -	$ -	$ -	$ 7,969,029	$ 9,028,949	$ 1,177,689	$ 1,177,689

Source: Authors' own elaboration.

5.3. Cost-benefit analysis

In this section, the investment is considered from the perspective of a multilateral development bank, and; from the perspective of the beneficiary government. From the perspective of the lender, the NPV of the investment is calculated by: (i) calculating the EV; (ii) comparing this deviation from baseline in EV alongside the cost of the loan as it is disbursed in the first 5 years of project implementation. In this case, all costs are assessed in the first 5 years which has significant implications for the NPV of the investment, particularly if the discount rate is high. We use the standard discount rate of 12% used by the multilateral lender, the Inter-American Development Bank, in this analysis, and; (iii) NPV is then calculated as indicated in equation 1.

From the perspective of the beneficiary government, the government only begins incurring the direct costs of the investment once repayment begins in year 2023. Loan repayments occur annually until the entire investment is repaid in 2039.

Table 4. Net present value and internal rate of return from the multilateral lender and beneficiary's perspective; pesos.

Scenario		NPV	IRR
Combi Development Bank	$	182,904,636	40%
Combi-pay Beneficiary	$	251,592,563	N/A

Source: Owners' own elaboration.

Table 4 shows the results of the analysis from both the multilateral lender and the beneficiary's perspective. With all direct costs incurred in the first 5 years of the period of analysis, the NPV from the lender's perspective is $182.9 million pesos. This is lower than the NPV of $251.6 million pesos estimated from the beneficiary's perspective. While the analysis undertaken from the beneficiary's perspective results in a higher NPV than from the lender's perspective, it does consider follow-on costs that may arise from the repayment of the loan. Specifically, modelled in this way, just as the DCGE model accounts for first, second and subsequent round impacts of increased economic activity, this approach also considers first, second and subsequent rounds of impacts of costs incurred and the forgone economic activity due to resource allocation toward the repayment of the loan.

From the multilateral lender's perspective, the investment results in an internal rate of return (IRR) of 40%. From the beneficiary's perspective, the absence of a negative cash flow renders it impossible to calculate an IRR for the investment. The reason for this is that since no costs are incurred until 2023, there is no negative cash flow in the initial years of the investment, in contrast to the first approach where the investment is assessed from the lender's perspective. Even after 2023, the benefits outweigh the annual repayment costs. This may not be an issue, however, since in practice, once an investment loan has been formulated, the CBA is often used to validate the economic viability of the loan rather than compare among investment opportunities which is a core application of the IRR.

6.0. Conclusions

In this paper, we draw on the strengths of CBA and DCGE modelling and present a rigorous and integrated approach to evaluating public investments in tourism. We undertake this analysis from the perspective of a multi-lateral development bank, and from the perspective of the beneficiary government. A new feature in our approach, is that in considering the beneficiary government's perspective, we build-in the repayment of the public investment into the DCGE and then estimate the NPV of the investment. A significant advantage of this approach is that just as first, second and subsequent round impacts of increased economic activity are considered in the analysis, so are these multiple rounds of impacts considered on the cost side, and as such, any forgone economic activity due to resource allocation toward the repayment of the loan.

For compatibility with the welfare economics foundations of CBA and the characteristics of public investment in tourism where the target beneficiary is frequently the household, EV estimated with a DCGE is the appropriate measure of welfare. There are several strengths of the DCGE approach for estimating benefits. First is its ability to capture first and subsequent round investment impacts on household welfare, on both the benefit and cost side. Second, a general equilibrium framework estimates overall net benefits robustly where resource diversion and factor constraints are important considerations. Third, a DCGE model's internally consistent accounting framework renders double counting of benefits (and costs) impossible.

The analysis of a US$6.25 million tourism investment in Uruguay is undertaken from the perspective of a multilateral development bank and the beneficiary government. Viewed from the perspective of the multilateral lender, with the cost to the lender incurring in the first 5 years, the NPV is lower than when compared with the NPV estimated from the perspective of the beneficiary government. This result is explained by the fact that costs incurred by the beneficiary government are only incurred following the grace period, with repayment beginning in 2023. It is the distribution of these costs and the discounting of net benefits that results in the lower NPV from the perspective of the multilateral development bank.

Internalizing the repayment of the investment as undertaken in the analysis from the beneficiary's perspective is arguably more defensible than considering investment costs outside of the modelling framework. In this way, resources allocated to repayment of a debt have implications for current year expenditure and thus have an opportunity cost which is accounted for in this approach. As we have seen, despite this consideration of opportunity cost, the NPV of the investment will tend to be higher when considered from the beneficiary government's perspective where there is a grace period or costs are incurred by the beneficiary further in the future than when considered from the lender's perspective.

One potential drawback of the approach is that, given the repayment schedule of the investment examined in this study, it was not possible to calculate an IRR from the beneficiary's perspective. This of course is a function of the repayment schedule and magnitude of benefits. If there is no negative cash flow as is the case with the Uruguayan example, it is not possible to calculate an IRR. This would also be the case from the multilateral bank's perspective, if the magnitude of benefits generated were to outweigh costs in all years of the analysis. This, however, should only be a real issue if the CBA is used to compare alternative investments, rather than explore, enhance transparency and demonstrate the economic viability of a specific investment.

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