2016 Agency Report

Inter-American Development Bank (IDB)

IDB uses GCE modeling for purposes related to research, policy advice and preparation of lending operations. The Integration and Trade Sector is responsible for coordinating and carrying out the CGE modeling activities of the IDB. However, in the last year most of the CGE modeling activity has been undertaken mainly by the Climate Change and Sustainable Development Sector, with some contributions coming from the Research Department.

Trade

The Integration and Trade Sector leading project is focused on developing a multi-country/multi-sectoral recursive dynamic CGE for Latin America and the Caribbean (LAC) suitable to assess the deepening and convergence of trade agreements within the region, with a focus on rules of origin. The model is calibrated to the GTAP 9a database, includes 22 regions (18 from LAC), 8 sectors, and 5 production factors. The scenarios aim at understanding the trade, production and employment implication of the completion of a regional free trade area with and without the harmonization of the rules of origin regimes across existing trade agreements. The base scenarios are also interacted with the enforcement of mega-regional agreements such as the TTIP and TPP.

Climate change and the environment

Chisari, O. and S. Miller "Climate Change, Habits and Migration: a CGE Analysis for Large Urban Regions of Latin America", IDB-WP-659, Inter-American Development Bank.

Migration is one of the strategies used by populations to adapt to natural shocks and also to respond to economic policies. Climate change will probably have an impact on the productivity of factors and on the health of the population of the Latin America and Caribbean region, triggering migrations. In addition, policies aimed at reducing emissions (like carbon taxes) will change relative prices and the remuneration of factors and, in turn, will alter the allocation of labor between urban and rural areas. This paper explores the potential quantitative relevance of those population movements using a CGE version of the Harris-Todaro model. Two paradigmatic cases are considered: i) domestic or internal migrations, focusing on the case of Sao Paulo (Brazil) and ii) international migrations, analyzing the displacement of population from Bolivia and Paraguay to Argentina.

Banerjee, O., Cicowiez, M., Horridge, M. and Vargas, R. In Press (September 2016 release). A Conceptual Framework for Integrated Economic-Environmental Modelling. *Journal of Environment and Development*.

Economy-wide models such as Computable General Equilibrium (CGE) Models are powerful tools that provide insights on policy impacts on standard economic indicators. With the recent publication of the System of Environmental-Economic Accountings (SEEA), the power of this approach is amplified. This paper addresses an important gap in economy-wide policy modelling applications and literature by developing a conceptual framework for the integration of the SEEA in the CGE framework, enabling for the first time the analysis of policy impacts on the economy and the environment in a quantitative, comprehensive and consistent framework. Previous integrated modelling efforts have generally focused on the interaction between the economy and one environmental resource in isolation, requiring significant data reconciliation. Integration of SEEA into a CGE circumvents this resource intense process, enhancing analytical power, obviating the need for strong assumptions in reconciling economic-environmental data, reducing start-up costs, and increasing the timeliness of evidence-based policy advice.

Banerjee, O., Cicowiez, M., Vargas, R. and Horridge, M. 2016. The SEEA-Based Integrated Economic-Environmental Modelling Framework: An Illustration with Guatemala's Fuelwood/Forest Sector. GTAP Conference Paper, Washington DC, June 15 to 17, 2016.

This paper develops a CGE modelling framework that integrates the SEEA, enabling for the first time the analysis of policy impacts on the economy and the environment in a quantitative, comprehensive and consistent framework. The IEEM framework is developed and calibrated with data from Guatemala, which is the country with the most comprehensive data compiled under the SEEA framework in the Latin American and Caribbean region. The IEEM framework is applied to explore the economic, environmental and social impacts of implementation of Guatemala's fuelwood and forest incentives strategies. In addition to this being a critical policy issue for the Guatemalan government, this issue was chosen for exploration due to its multi-dimensional nature with regard to economic-environmental interactions in order to illustrate the analytical power of the IEEM framework

Banerjee, O., Alavalapati, J.R.R. and Lima, E. Revised and resubmitted. A Framework for Ex-ante Analysis of Public Investment in Forest-based Development: An Application to the Brazilian Amazon*. Forest Policy and Economics*.

This paper develops a framework for evaluating the ex-ante economic impacts of public investments in forest-based development. Computable General Equilibrium (CGE) models provide a powerful approach for evaluating public investments in sectors with strong inter-sectoral linkages and for capturing dynamic economy-wide effects. Results of CGE analysis may be analyzed in a social cost-benefit framework typically used by the public sector and multilateral development banks to assess investment viability and trade-offs between alternatives. In this paper, a dynamic CGE is developed to evaluate the impact of a development loan to promote natural forests, forest plantations and agroforestry development in the Amazonian state of Acre, Brazil. Results of the analysis demonstrate the positive impact the expansion forest-based development activities generates and the potential the approach has for comprehensive analysis of the direct, indirect and induced benefits of public forest sector investment.

Tourism

Banerjee, O., Cicowiez, M., & Gachot, S. (2015a). A Framework for Ex-Ante Economic Impact Assessment of Tourism Investments- An Application to Haiti. IDB Working Paper Series No. 616. Washington DC: IDB.
https://publications.iadb.org/bitstream/handle/11319/7238/A_Framework_for_Ex-Ante_Economic_Analysis_of_Tourism_Investments_An_Application_to_Haiti.pdf?sequence=1
and
Banerjee, O., Cicowiez, M., & Gachot, S. (2015b). A Quantitative Framework for Assessing Public Investment in Tourism – An Application to Haiti. *Tourism Management*, 51, 157-173.

This study develops a linked regional computable general equilibrium and micro-simulation (RCGE-MS) model to assess the regional economy-wide and poverty impacts of a US$36 million investment in tourism in the south of Haiti. The first social accounting matrix for Haiti with a base year of 2012/2013 was constructed to calibrate the model. This research addresses three key gaps identified in the tourism impact assessment literature. First, a destination-specific tourism demand and value chain analysis was used to calibrate the shocks implemented in the model. Second, the RCGE-MS approach moves beyond the representative household configuration to enable more robust analysis of tourism investment impacts on poverty and income inequality. Third, results of this modelling were used to inform a social cost-benefit analysis to provide greater transparency in the evaluation of trade-offs between investment alternatives. Results of this analysis showed a positive impact on sectoral activity, especially for the hotel and restaurant sector (182.1% in 2040) and a 2.0% increase in Gross Regional Product by 2040. The investment helped lift some of the region's poorest out of poverty, reducing the poverty headcount by 1.6 percentage points.

Banerjee, O., Cicowiez, M. and Cotta, J. Revised and Resubmitted. Economics of Tourism Investment in Data Scarce Countries. *Annals of Tourism Research*.
and
Banerjee, O., Cicowiez, M. and Cotta, J. 2016. Economic Assessment of Development Interventions in Data Poor Countries: An Application to Belize's Sustainable Tourism Program. Centro de Estudios Distributivos, Laborales y Sociales, Universidad Nacional de la Plata. Documento de Trabajo Nro. 194.
http://cedlas.econo.unlp.edu.ar/download.php?file=archivos_upload/doc_cedlas194.pdf

Ex-ante economic impact analyses are required to demonstrate the development impact and viability of multilateral loans. These assessments are often performed under tight timelines, in data scarce environments and with limited opportunity for primary data collection. This paper develops a framework for assessing tourism interventions under these challenging conditions and evaluates a US$15 million tourism investment in Belize. This paper contributes to the literature by: (i) developing a generalizable approach to building economy-wide models in data scarce environments; (ii) generating realistic expectations of agent responses with quasi-

contingent valuation and auto-regressive integrated moving average methods. Applying the first economy-wide model for Belize, results show that the investment would stimulate GDP by 3% and reduce unemployment from 12% to 10% by 2040.

Banerjee, O., Beyene, L.M., Henseler, M., Maisonnave, H., Velasco, M. and Henseler, M. In Review. Dividends to Diversification: Cultural Tourism in the Dominican Republic. *Tourism Management*.

This paper draws together quantitative methodologies from environmental and tourism economics to develop a framework for evaluating investments in cultural tourism. Indirect and induced benefits of investment in cultural tourism contribute to the overall returns on investment and not including these considerations can result in a nontrivial undervaluation of returns. To illustrate the approach, the framework is applied to a hypothetical US$90 million investment in cultural tourism in the Colonial City of Santo Domingo in the Dominican Republic. While there is an opportunity cost of allocating resources to cultural tourism, this paper demonstrates the costs of not doing so by considering a disinvestment in cultural tourism. Results of the analysis show greater economic growth and household well-being with increased investment, with disinvestment generating significant negative consequences for economic output, employment and terms of trade.

Poverty

Hertel, T., M. Verma, M. Ivanic, E. Magalhaes, C.E. Ludena and A.R. Rios. 2015. GTAPPOV: A Framework for Assessing the National Poverty Impacts of Global Economic and Environmental Change. GTAP Technical Paper No. 31 (IDB-TN-870).
https://publications.iadb.org/handle/11319/7242#sthash.99CYBypt.dpuf

This is a revised version of Global Trade Analysis Project (GTAP) Technical Paper No. 31 originally published in 2011. This revised version includes lessons learned from data processing of household surveys from countries in Latin American and the Caribbean (LAC). The revised version is based on the experience of processing 31 countries, 18 of those from LAC. The household data processing for LAC countries was funded by the Inter-American Development Bank (IDB), under coordination from Carlos Ludena at the Climate Change and Sustainability Division of the IDB, and the technical expertise of Eduardo Magalhaes.

Data

Ludena, C.E. and M. Horridge. 2015. GTAP Regional Input-Output Data for Jamaica, Trinidad & Tobago, Puerto Rico and the Dominican Republic. Inter-American Development Bank, Technical Paper No. 871, Washington, DC.
https://publications.iadb.org/handle/11319/7241#sthash.keVselpi.dpuf

The inclusion of Jamaica, Trinidad & Tobago, Puerto Rico and the Dominican Republic into the Global Trade Analysis Project (GTAP) database, was funded by the Inter-American Development Bank (IDB), under coordination from Carlos Ludena at the Climate Change and Sustainability Division of the IDB, and the technical support of Mark Horridge from the Centre of Policy Studies, Monash University, Australia. The document describes the process of transforming the original input-out and supply use tables of these four Caribbean countries into the GTAP format.

Cicowiez, M. y H. Santander. 2015. Construcción de una Matriz de Contabilidad Social para Paraguay para el Año 2009. Banco Interamericano de Desarrollo, Nota Técnica No. 879 (IDBTN-879), Washington DC.
https://publications.iadb.org/handle/11319/7288#sthash.tw81lBny.dpuf
The document describes the construction of the Social Accounting Matrix of Paraguay that served as the basis for the Input-Output table that was included into the GTAP database.

Cicowiez, M., H. Santander, C.E. Ludena. 2015. An Input-Output Table of Paraguay for the GTAP Database. Inter-American Development Bank, Technical Paper No. 880, Washington, DC.
https://publications.iadb.org/handle/11319/7289#sthash.BQBWFInd.dpuf

The update of the input-output table from Paraguay for the Global Trade Analysis Project (GTAP) database was funded by the Inter-American Development Bank (IDB), under coordination from Carlos Ludena at the Climate Change and Sustainability Division of the IDB, and the technical support of Martin Cicowiez from CEDLAS-UNLP, Argentina. Horacio Santander from the Ministry of Finance in Paraguay provided invaluable access to national data. The authors are grateful to Angel Aguiar for his support during the process of building the Paraguay input-output table for the GTAP data base.

Other activities

Integrated economic-environmental modelling

We have submitted for funding a Science for Nature and People Partnership (SNAPP) proposal to continue integrated economic-environmental modelling (IEEM) efforts in collaboration with 18 international experts from various global institutions. The proposal abstract is as follows:

Multilateral development banks, investing billions of dollars in developing countries, and their developing country partners, are required to conduct economic impact analysis of public policy and investment proposals. Conventional economic impact evaluations (i.e. cost benefit analysis) consider impacts on standard economic indicators such as Gross Domestic Product, household income and employment. Seldom do these evaluations assess impacts on critical ecosystem assets and ecosystem services which are foundational for human well-being and future economic growth. This SNAPP proposal addresses this problem and will generate actionable

advice, rapid impact and sustainable outcomes toward improving the condition of people and the environment in two categorical ways: (i) We will develop cutting edge, globally transferable quantitative methods and tools for economic-ecosystem impact evaluation to inform public policies and investments that will enhance human well-being and the ecosystems and biodiversity upon which they are based; (ii) The methods and tools developed will be piloted and the proof of concept demonstrated in Guatemala to address the critical issues of illegal logging, deforestation and forest incentives.

The starting point for the methods that will be developed under this SNAPP Proposal is the Integrated Economic-Environmental Modelling (IEEM) framework developed by the Inter-American Development Bank. This framework is the first of its kind to incorporate detailed provisioning ecosystem service data into an economic impact evaluation framework. To advance this frontier, it is necessary to bring together diverse expertise that no one institution possesses on its own. This SNAPP Proposal and Working Group makes it possible to convene this global expertise to address the methodological challenges inherent in representing non-provisioning and nonmarket ecosystem services in economic impact evaluation frameworks. The approach will be piloted in Guatemala, where the configuration of our government and academic Working Group Partner Institutions will enable rapid uptake and action on illegal logging and deforestation in a country with one of the most extensive, diverse and threatened forest ecosystems in Central America.

GTAP organized session

"Integrated Economic-Environmental Modelling for Evidence-Based Policy and Decision Making" (GTAP 19th Annual Conference on Global Economic Analysis). The purpose of this session is to: (i) present the cutting edge of integrated economic environmental modelling and the statistical developments that underpin the approach, and; (ii) generate discussion on how to further advance integrated modelling and the conceptual issues related to incorporating ecosystem service values in the framework. This Organized session features speakers Glyn Wittwer (Victoria University), Carl Obst (Melbourne Sustainability Institute) and Onil Banerjee (IDB). A similar session will be held at the IDB on June 14 featuring speakers Carl Obst, Juan Pablo Castañeda (World Bank, WAVES) and Onil Banerjee.

Training

Session on "Integrated Economic-Environmental Modelling for Evidence-Based Policy and Decision Making" will be held in August/September, 2016 (1 week duration) in Guatemala City, Guatemala, in collaboration with the IARNA Universidad Rafael Landívar and WAVES Guatemala, World Bank.