Name: Jaques Clerc

Institution: Universidad de Chile

Title of the work: “Applied General Equilibrium and Sustainability Indicators for Santiago”

Overall project: Risk Habitat Megacity

Supervisor: Raúl O’Ryan

Last update: September 2009

The accomplishment of more sustainable development (and urban sustainable development) requires a comprehensive methodology to perform sustainable impact assessment. Computable General Equilibrium (CGE} models are powerful tools to address sustainability issues by assessing the impacts of growth and policy interventions on the environment economic performance and equity. Direct, indirect and induced effects can be evaluated on economic variables such as regional product and sector production, social variables such as poverty and income distribution and environmental variables such as emissions to air including local and global pollutants, or discharges to water and soil.

CGE models attempt to represent the circular flow of the economy. Agents interact in different markets exchanging production factors, goods and services, and money to reach market equilibria which determine prices and quantities CGE models need to consider specifications related to production factors, prices, goods, income, savings and capital formation, demand, imports, export supply and demand, domestic market equilibria, and balance of payment equilibrium. In CGE models, sectors can vary according to the interests of the application and the level of aggregation available in the data. CGE models are real economy models and cannot be employed to analyze monetary issues.

In CGE models demand functions are obtained by consumers solving the utility maximization problem. Supply functions are the result of profit maximization. In general, markets are cleared to determine endogenously equilibrium prices and quantities in a competitive context. Equilibrium conditions are solved for the domestic and exchange (balance of payments) markets. A Social Accounting Matrix (SAM) for the Metropolitan Region is key in the application of the CGE model. To solve a CGE model a SAM must be available to calibrate the model. Calibration requires initial values of all prices, including the exchange rate, subject to the usual normalization rule. Constants like production function parameters are determined to reproduce exactly the levels of production, imports, exports, etc., of the reference year (year considered in the SAM).

A SAM is a square matrix whose corresponding columns and rows present the expenditure and receipt (income) accounts of economic actors. Each cell represents a payment from a column account to a row account. The total receipts and expenditure of each actor must balance resulting in that every row sum must equal the corresponding column sum. A typical national SAM includes accounts for production (activities), commodities, factors of production and various actors ("institutions") which receive income and demand goods. Activities pay for

intermediate inputs, factors of production, and indirect taxes, and receive payments for exports and sales to the domestic market. In a SAM, the commodity account buys goods from activities (producers) and the rest of the world (imports), and pays tariffs on imported goods, while it sells commodities to activities (intermediate inputs) and final demanders (households, government, and investment).Gross domestic product (GDP) at factor cost (payments by activities to factors of production) or value added equals GDP at market prices.

My research work will adapt available national (Chilean) level models to a Regional level using the Santiago SAM. This process will also require identifying sectors that have important implications on economic growth, environmental impacts and equity. Furthermore, this selection will require focusing on urban sustainability. Scenarios must also be carefully designed to help answer relevant questions.

In the presentation, the general methodology will be presented as well as preliminary details already available for the Santiago SAM. In particular, the strengths and weaknesses of this approach are to established and the kind of analysis which Is suitable to be analyzed in this framework will be presented.