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ECONOMIC ANALYSIS OF URBAN UPGRADING PROJECTS

Maria Angélica Sotomayor

Latin America's urban population jumped from 50 percent in 1960 to 75 percent in 2000 (108 and 389 million respectively), making it the most urbanized region in the world.

Municipalities throughout Latin America are struggling to keep up with this growth, in difficult economic environments, making sustainable provision of basic services a huge challenge. The World Bank is working closely with national, regional and municipal governments in developing and financing urban upgrading projects. This article shares some experiences with different techniques for estimating economic benefits and costs used by the Bank in appraising urban upgrading projects¹. The projects usually combine infrastructure investments and complementary activities to strengthen, build capacity and organize communities and government at different levels to ensure appropriate use of services provided and sustainability.



Assessing economic costs

Project economic costs include capital costs, operation and maintenance costs, rehabilitation, resettlement, and costs associated with complementary actions and contingencies. Costs of providing additional infrastructure (such as sewerage connections) necessary for users to realize intended benefits, should be included, even if not financed by the project.

Net incremental costs and benefits need to be assessed under two scenarios: with, and without the project. They should be adjusted for taxes, subsidies, and externalities, to arrive at

¹ Mass transport and mobility components should be analyzed separately.

economic prices. Embedded taxes in material and labor should be deducted, using conversion factors if available. If not, the analyst should investigate major input market distortions,

such as unskilled labor and imported goods in economies with protectionist policies, and adjust market prices to correct for major market distortions. Cash flows (in economic prices) should be discounted using the country's estimated opportunity cost of capital when available (e.g. Peru's Ministry of Finance uses 14 percent); otherwise a 12% discount rate is commonly used in Bank projects.

Methodologies for assessing economic benefits

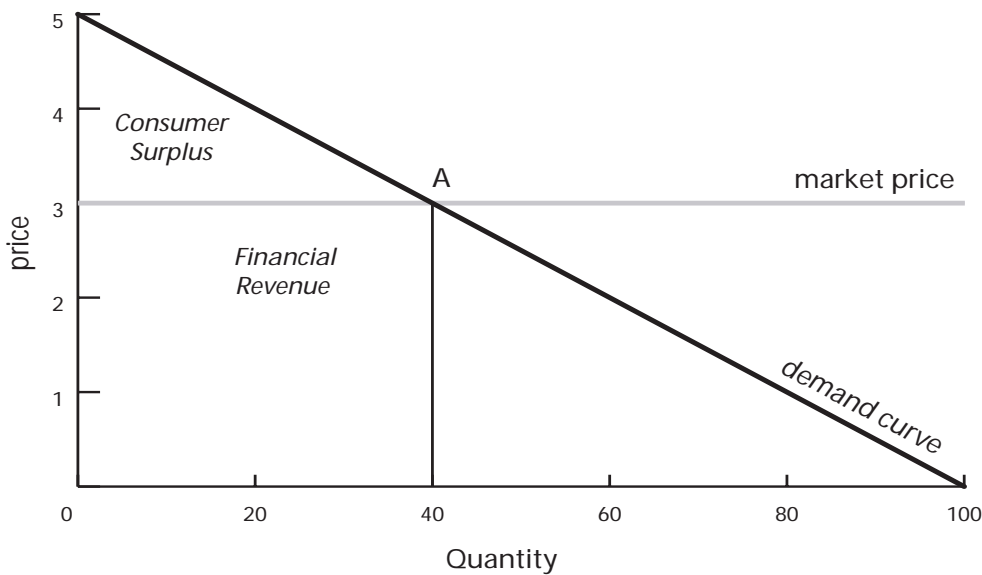
Like costs, economic benefits have to be valued at economic prices. Financial income/revenue generated by the consumption of a good (price times quantity) needs to be adjusted

to reflect the "true value" of consumption for the consumer, or "willingness to pay", represented by the area under the demand curve for any given quantity. This includes the actual payment and consumer surplus. In the example, if price is \$3, consumers will demand 40 units and pay \$120, but are willing to pay \$160 (area 0, 5, A, 40).

Revealed preferences (for goods and services sold in markets)

When a project provides goods or services sold in markets, such as water and electricity, a demand curve can be derived

Figura 1: Willingness to Pay
(Financial Revenue + Consumer Surplus)



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from consumers' revealed preferences observed in the market, and used to calculate willingness to pay. Demand can be estimated using data from companies or household surveys (such as ENCOVI in Guatemala) on income, quantities consumed, and associated monetary and non-monetary costs (e.g. time spend fetching water).

Non-market methods

For slum upgrading services such as drainage and parks for which market data are non-existent or insufficient, non-direct methods must be used to assess economic benefits. Contingent valuation and hedonic pricing are commonly used in urban projects, others random utility and travel cost models. Non-market methods involve more difficulties and sources of error.

Hedonic Pricing

Hedonic pricing is a good method for estimating the economic benefits of access to improved urban services. Econometric analysis of data from observed transactions in the housing market yields estimated marginal values for particular non-market attributes of interest (such as access to services, distance to center, etc.) embodied in houses and reflected in housing prices.

This method is relatively straightforward and uncontroversial, because it is based on actual market prices and easily measured data. It is relatively inexpensive if data are readily available. If data must be gathered and compiled, costs increase substantially. For this method to work effectively: (i) the housing market should function well (it is important to discuss results and values with local realtors);

and (ii) consumers in the market, conscious of the attribute being valued. Multicollinearity is almost always present and important, and affects estimated values. To assess estimate reliability, different functional forms and different variables should be analyzed.

Contingent valuation

The contingent valuation method (CVM) involves directly asking people, in surveys, how much they would be willing to pay for specific services, although commonly used. It is the most controversial non-market method. It is called "contingent" valuation, because people are asked their willingness to pay, contingent on a specific hypothetical scenario and description of the service.

Applying CVM is generally complicated, lengthy, and expensive. To collect useful data and provide meaningful results, the CV survey must be properly designed, pre-tested and implemented. CV survey results are often highly sensitive to what people believe they are being asked to value, as well as the context described in the survey. This makes it essential for CV researchers to clearly define the specific service(s) and context, and to demonstrate that respondents understand them and are actually stating their values for these services when answering the valuation questions.

Method Advantages and Disadvantages

Hedonic Pricing Model

- Estimates values from data on actual choices. Data on property sales and characteristics are readily available, and can be related to other data sources to obtain descriptive variables.
- Property markets are relatively efficient in responding to information, so can be good indications of value. Property records are often reliable.
- Only benefits related to housing prices can be measured. Most slum-upgrading interventions do affect housing prices, so the method is generally useful. It can only capture willingness to pay for perceived differences in attributes, and their direct consequences. If beneficiaries are unaware of linkages between the attribute and benefits to them or their property, the value will not be reflected in home prices.

- Hedonic pricing assumes that beneficiaries have opportunities to select their preferred combination of features, given their incomes. However, the housing market may be affected by outside influences, like taxes, interest rates, etc.
- The method is relatively complex to implement and interpret, requiring statistical expertise. Results depend heavily on model specification. Much data must be gathered and manipulated. The time and expense of applying hedonic pricing depend on data availability and accessibility.



Contingent Valuation

- Contingent valuation is enormously flexible and can be used to estimate the economic value of virtually anything. It is best for estimating values for goods and services that are easily identified and understood by users and consumed in discrete units (e.g., user days of recreation).
- It requires competent survey analysts to achieve defensible estimates, but results are easy to analyze and describe. Monetary values can be presented as means or median values per capita or per household, or as aggregate values for affected populations.
- CV has been widely used for two decades, and considerable research is being conducted to improve the methodology, make results more valid and reliable, and better understand its strengths and limitations.
- Controversy remains over whether it adequately measures willingness to pay for environmental quality. CV assumes that people understand the good in question and will state contingent preferences just as they would reveal them in a real market. However, most people are unfamiliar with placing monetary values on environmental goods and services and may lack an adequate basis for stating their true value. CVM is difficult to apply in valuing continuous variables such as water consumed through a piped system.
- Answers to willingness to pay questions may be biased because respondents answer a different question than the surveyor intended. Rather than ex-



pressing value for the good, respondents might be expressing feelings about the scenario or the valuation exercise itself. For example, respondents may state a positive willingness to pay because they feel good about the act of paying for a social good (the “warm glow” effect), although they may believe that the good itself is unimportant. Respondents may state a positive willingness to pay to signal that improved environmental quality is important to them. Alternatively, some respondents may value the good, but state low willingness to pay, because they disapprove of some aspect of the scenario, such as increased taxes.

- Respondents may make associations that the researcher had not intended. For example, if asked for willingness to pay for improved visibility (through reduced pollution), respondents may answer based on health risks that they associate with air pollution.
- Some researchers argue that people make hypothetical and actual decisions in fundamentally different ways. For example, respondents may fail to take questions seriously because they will not actually have to pay the stated amount. Responses may be unrealistically high if respondents believe they will not have to pay for the good or service but their answer may influence future supply. Responses may be unrealistically low if respondents believe they will have to pay.
- If respondents are first asked for their willingness to pay for one part of an environmental asset (e.g. one lake in an entire lake system) and then asked to value the whole asset (e.g. the whole lake system), the amounts stated may be similar $\frac{3}{4}$ the “embedding effect.” Respondents’ expressed willingness to pay sometimes depends on where something is placed on a list of things being valued $\frac{3}{4}$ the “ordering problem.” Respondents may give different willingness to pay amounts, depending on the payment vehicle chosen. For example, taxes may elicit protest responses from those who oppose tax increases. Contributions or donations may elicit answers that reflect people’s sense of their “fair share”, rather than expressing their actual value for the good.
- Strategic bias arises when the respondent provides an biased answer tailored, to influence a particular outcome. Information bias may arise when respondents are asked to value attributes with which they have little or no experi-

Approaches for Analyzing Urban Upgrading Projects

Project and components	Method for estimation of economic benefits	NPV (US\$ 000)	EIRR (%)
The Venezuela-Caracas Slum Upgrading Project is financing basic urban services and infrastructure in two informal settlement areas, including water, sanitation, access, drainage, community centers, public lighting, electricity and resettlement housing. Communities determine their own neighborhood improvement plans.			
Potable Water	Contingent Valuation	19,645 a/	-
Sewerage	Contingent Valuation	1,863 a/	-
Access Principal Secondary	Travel time and vehicle operating costs	9,986 a/ 34,843 a/	-
Colombia's Bogotá Urban Services Project is providing improved mobility and access through major urban transport investments and water, sanitation and related basic services, particularly for 1.2 million residents in low-income areas.			
Mobility	Travel time and vehicle operating costs	122,300	25%
Urban Upgrading: I. Perdomo G. Yomasa	Hedonic-property values b/	1,456 13,624	19% 60%
Brazil's Recife Urban Upgrading Project is improving water, sanitation, lighting, transport, land tenure security, macro and micro drainage, offering parks and recreation areas in low income areas in the Beberibe basin.			
Beberibe basin (indirect impact area)	Hedonic-property values	12,176	34%
Urban upgrading in low-income areas	Hedonic-property values	51,079	38%
Resettlement (risk prone areas)	Hedonic-property values	2,380	25%
Water	Revealed preferences	8,238	37%
a/ NPV calculated using a 10% discount rate. b/ Economic analysis based on a sample of investments in two areas (I. Perdomo and G. Yomasa).			

ence; the amount and type of information presented to respondents may affect their answers.

- Non-response bias is a concern when sampling respondents, since individuals who do not respond may have, on average, different values than individuals who do respond.

World Bank's recent experience in LAC

Given the complexity of urban upgrading projects, and their importance for achieving poverty reduction goals in the region, efforts have been made by the Bank to integrate different approaches in analyzing these projects to account for attributes of goods and services and user attitudes not captured by traditional market methods of valuation. The following table summarizes the results of the economic analysis of some of the latest urban upgrading projects financed by the Bank in the region. The complexity of the analysis and the use of appropriate valuation techniques has evolved and will continue to do so as projects have become more complex to better respond to new development challenges in the region. In making the decision of what method to use the only rule is to use revealed preferences whenever possible. When revealed preferences are not used, hedonic pricing works well if the project is expected to increase overall property values, whereas for environmental benefits contingent valuation is better.

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About the Author

Maria Angélica Sotomayor is an Economist in the Water & Sanitation Cluster of the Finance, Private Sector and Infrastructure Department in the World Bank's Latin America Caribbean Region.

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