



CRISIS IN LAC: INFRASTRUCTURE INVESTMENT AND THE POTENTIAL FOR EMPLOYMENT GENERATION

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Abstract

Infrastructure investment is a central part of the stimulus plans of the LAC region as it confronts the growing financial crisis. This paper estimates the potential effects on direct, indirect, and induced employment for different types of infrastructure projects with LAC-specific variables. The analysis finds that the direct and indirect short-term employment generation potential of infrastructure capital investment projects may be considerable—averaging around 40,000 annual jobs per US\$1billion in LAC, depending upon such variables as the mix of subsectors in the investment program; the technologies deployed; local wages for skilled and unskilled labor; and the degrees of leakages to imported inputs. While these numbers do not account for substitution effect, they are built around an assumed “basket” of investments that crosses infrastructure sectors most of which are not employment-maximizing. Albeit limited in scope, rural road maintenance projects may employ 200,000 to 500,000 annualized direct jobs for every US\$1billion spent. The paper also describes the potential risks to effective infrastructure investment in an environment of crisis including sorting and planning contradictions, delayed implementation and impact, affordability, and corruption.

1. Introduction: Latin America and the Caribbean’s Stimulus Packages

As of February 2009, the largest economies in Latin America and the Caribbean (LAC) have announced stimulus packages that commit governments to increase spending on public works.¹ The programs range in size from 0.4 percent to 1.6 percent of each country’s Gross Domestic Product (GDP). Extrapolating these commitments to the region as a whole suggests that governments in the region plan to invest approximately an additional US\$25 billion in 2009 in public works—which is about 20 percent beyond the originally planned budget allocations.² This represents an additional 0.5 to 1.0 percent of GDP in commitments in public works, raising public capital spending levels to somewhere between 3.0 to 4.0 percent of GDP for the region as a whole.³ (See Annex 1 for details.)

¹ Public Works, in this case, mainly refers to infrastructure investments in transport, energy, and water and sanitation but may also include public housing and public edifices such as schools and hospitals. The division of expenditure expected among categories and sub-sectors is still unclear in many of the pronouncements.

² While the authors have used UNECLAC, IMF and country-level public expenditure data to attempt to verify the additionality of the stimulus announcements over originally budgeted expenditures, it remains to be seen whether fiscal, political and disbursement constraints will allow for these resources to be mobilized in the months to come. Also, the stated stimulus plans vary in degree of specificity and clarity as to timing, resourcing and additionality. The extrapolation to the region is based on the average levels of stated public works stimulus for 9 countries in LAC including the region’s 5 largest economies covering 80% of LAC’s GDP.

³ In recent years, the LAC Region has seen additional investments in infrastructure from private sector sources totaling between 1 and 2 percent of GDP per year. This range includes telecommunications investments which are mostly private throughout the region but does not include private housing stock. Calderon and Servén (2004a,b).

The stimulus packages are comprised mainly of public works. Although some of the programs may include investments in public housing and edifices, to date the majority of the projects and programs announced focus on the core infrastructure sectors of transport, water and sanitation, and energy. While discussions continue about the effects of these investments on short-term aggregate demand, the employment generation potential of these investments remains a central feature⁴. This is particularly important as LAC's unemployment levels rise in the face of the growing crisis. This note provides a preliminary estimate of the employment generation⁵ potential for different types of infrastructure investments as per the LAC stimulus packages.

2. The Impact of Infrastructure Investment on Short-Term Employment Generation

The most comprehensive way to calculate the labor impacts of a single infrastructure investment or program is to consider three levels of employment generation stemming from the investment⁶:

- Primary Impact: Those directly employed on site to undertake the task at hand;
- Secondary Impact: Those indirectly employed in the manufacture of materials and equipment that are supplied to the initial investment; and
- Tertiary Impact: The induced employment generated by the direct and indirect jobs created. This includes all of the jobs supported by consumer expenditures resulting from wages in the two previous levels.

Using an Input-Output Model that considers all levels of inputs to construction, the US Federal Highway Administration has estimated employment generated or supported from investments in highways.⁷ Keeping in mind the shortcomings of these calculations—and adjusting for them with available data from LAC on wages, leakages by sub-sector⁸ and skilled and unskilled labor divisions—the approach to calculating direct and indirect jobs provides a basis for estimating the employment generation potential of investments in all areas of infrastructure in countries outside of the US. A review of project documents, IEG reports, and sectoral ESW provides a sufficient starting point for this analysis with information about construction costs and direct employment levels for a variety of infrastructure projects across Latin America. By assigning wage assumptions to workers according to skill sets, estimating domestic and foreign content for both materials and equipment, a leveled set of results in terms of direct and indirect annualized employment can be calculated for a given sum of money

⁴For a summary of other related issues such as risks to effective infrastructure investment, impact of public expenditure stimulus on short- and long-term growth, the balance between new investments vs. maintenances see Schwartz, Andres, Dragoiu (2009).

⁵This note uses the term “employment generation” to refer to annualized short-term jobs mobilized directly or indirectly as the result of an investment. It does not consider substitution effects or imply change in the long-term labor stock.

⁶See, for example, Heintz and Pollin (2009) and Romer and Bernstein (2009),.

⁷JOBMOD2.1: A Comprehensive Model for Estimating Employment Generation from Federal-Aid Highway Projects (2006). Boston University Center for Transportation Studies under subcontract to Battelle Memorial Institute for U.S. Department of Transportation Federal Highway Administration Office of Transportation Policy Studies See also Weels (2008) for more recent results of this model.

⁸In calculating secondary labor generation, a portion of machinery and equipment inputs are assumed to be imported depending upon the technology deployed in the sub-sector providing a very basic discount for leakage.

expended—in this case US\$1billion. These estimates do not account for substitution effect and are thus most applicable to economies with slack labor conditions and high unemployment among day laborers and construction workers.

The most important result of this summary analysis is that the range of direct employment impacts is tremendous: from 750 direct short-term positions per US\$1billion spent on coal-fired generation projects to 100,000 short-term positions for water supply and sanitation network expansion. In addition, the results are highly sensitive to assumptions about wages and the division between skilled and unskilled workers. The direct employment generation potential of a public works project is thus highly sensitive to: the sectoral allocation of the proposed program; the technology to be employed in each project, and the local labor market traits of the country in question. Indirect job estimates are also highly sensitive to the division between locally produced versus imported inputs.

With those sensitivities in mind, a “prototypical mix” of infrastructure investment⁹ implemented in LAC would generate about 40,000 direct and indirect short-term positions per US\$1billion spent. Even with an assumed multiplier of 2.0 for further induced employment and no crowding out or substitution effect, this would mean employment generation of about 2 million jobs for the incremental US\$25 billion so far proposed as stimulus in 2009 in the LAC region. This would represent about 7 percent of LAC’s estimated unemployed in 2009. The estimates correspond to capital investment projects in various countries across the region. [See Annex 2 for details.]

There is a sub-set of infrastructure interventions, which, however limited in scope, may provide the opportunity for even greater direct employment benefits: rural road maintenance. Such programs typically¹⁰ invest up to 90 percent of the total project costs in labor activities. Regional data suggest that between 200 and 500 annualized positions are generated for every million dollar spent on these initiatives by employing unskilled workers in rural areas paid at the minimum wage. The jobs generated from labor intensive maintenance projects would, in turn, generate very few indirect jobs because of the lack of material and equipment inputs. Nevertheless, labor intensive projects coupled with well-targeted social programs may be considered a highly progressive intervention for reducing the impact of the crisis on poor communities. Again, the primary employment generation numbers assume no substitution effect.

In advising governments on the design of stimulus plans, it becomes clear that the employment story is complex and the investment decision should be made in the context of the explicit objectives of the government in the medium to long term. Beyond the varying labor results, fast and significant expansion of infrastructure investments presents important practical challenges to the efficiency and the efficacy of the stimulus program. A shortlist of these challenges might include: sorting and planning

⁹ Based on country experience with infrastructure investment we assumed a composition of these stimulus as: 50% in Transport (25% in highways, 20% in urban roads, and 5% in rural roads), 30% in Electricity (25% in generation of electricity and 5% in rural electrification), and 20% in Water and Sanitation (15% in coverage expansion and 5% in treatment plants). We simulated different composition and the estimations were significantly robust.

¹⁰ Peru - Second Rural Roads Project (P044601); data from Mexico Subsecretario de Transporte, MTC, and Guatemala - Second Rural and Main Roads Project (P055085).

contradictions, delayed disbursement and impact, the affordability of these packages, and corruption risks.

Sorting and Planning Contradictions: Infrastructure investments often contain complementarities (e.g., modes of transport assets along a supply chain) or substitution effects (e.g., rail versus road for transport or gas versus electricity supply for heating). They might also contain contradictory character traits intended to meet different objectives. For example, a road investment component might meet employment goals, but could contribute to automobilization and higher carbon emissions in the long-term. A renewable energy component might meet environmental objectives but may not demonstrate significant employment benefits given the high import components. Governments will need to call upon the capacity for ex ante project evaluation; cross-sectoral convening ability; and the authority to prioritize, scale and permit projects according to impact analysis.¹¹ This will enable the development of investment packages that converge short-term goals of stimulus with the long-term goals of sustainable growth.

Delayed Implementation and Impact: The lifecycle of project preparation for medium or large-scale projects is generally 1 to 3 years, although projects that are simply awaiting financing may be “shovel ready.” However, it is possible that projects that have been sitting in pipeline will require new demand studies, updated cost projections or even recalibrated willingness and ability to pay analyses given the shifting resources of consumers and the changing prices of inputs in the crisis environment. Moreover, several countries in LAC habitually disburse less than their annually expected disbursements—typically around 75 percent of plan. Given the importance of timeliness in generating stimulus effect, delays and slow disbursements would have a significant and perhaps irreversible effect on the impact of the project.

Affordability of the Stimuli Packages: The potential scope, size and timing of LAC’s proposed stimuli packages will be determined by fiscal space—the room in a government’s budget that allows it to provide resources for additional projects without jeopardizing the sustainability of its financial position or the stability of the economy. In other words, fiscal space must exist or be created if extra resources are to be made available for worthwhile government spending¹². LAC’s proposed stimuli packages present enormous demand on the limited fiscal space in the region and the room for aggressive responses is heterogeneous across the region.¹³

Corruption Risks: Emergency environments often create the impetus for shortcuts, particularly as they relate to time-consuming safeguard practices. In a crisis situation, governments may feel justified in seeking to bypass lengthy procurement policies such as international competitive bidding, pre-qualification, and re-bidding in the case of insufficient competition or non-responsive bids¹⁴. The

¹¹ The Global Experts Team for Public Sector Management, in conjunction with LCSPS, is undertaking a study of best practices in the management of stimulus programs that includes a review of US and other OECD institutional arrangements.

¹² Heller (2005).

¹³ Calderon and Fajnzylber (2009)

¹⁴ Kenny (2007).

temptation to trade time for competition raises the risk of corruption, collusion, and public skepticism. Rushed procurement processes run the risk of being self-defeating and costly elements of stimulus.

3. Conclusions

Infrastructure investment is already a central part of the stimulus plans of LAC as the region confronts the growing financial crisis. The employment generation potential of the infrastructure investment component of stimulus may be considerable—averaging around 40,000 jobs per US\$1billion in LCR for a basket of investment. This excludes the tertiary effects of induced employment from direct and indirect employee consumption.¹⁵ Albeit limited in scope, rural road maintenance projects initiated through micro-enterprises may produce 200,000 to 500,000 direct jobs per US\$1billion of disbursements. Levels of employment generation per package of investments is highly sensitive to local wages, the division among skilled and unskilled workers, the sector under consideration (i.e., the component pieces in the “basket”), the technology being deployed in each project investment, the degree of importation of inputs, and— in areas without slack labor conditions—substitution effect.

To understand the impact of investments in times of crisis, policy makers will benefit from sector-level analysis, comparative technology analysis, and data on the sourcing of inputs. In addition, in order to assure the effectiveness of infrastructure investments in a crisis environment, governments may wish to consider the strengthening of planning processes which weigh the trade-offs associated with multiple investments; procurement processes which are robust in the face of time pressures; and disbursement plans which keep up with the levels of expected investment activity. Finally, short-term plans for infrastructure investment are most effective when viewed in the context of the long-term objectives of growth and poverty alleviation which remain infrastructure’s fundamental contribution to economic activity.

¹⁵ Although US estimates from highway construction more than double the employment generation estimates when induced jobs are added, it should be remembered that other forms of transfers from government—tax credits, CCTs, food stamps—would also generate induced employment

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Annex 1: Stimulus Plans for LAC

The Table below summarizes the region's major commitments to economic stimulus that have been announced in recent weeks and the estimation of region-wide investment levels. The five countries included in the table represent over 75 percent of the region's population and GDP.

Table A1: Stimulus Plans for LAC, 2009

	2009 Stimulus Pkg		Total Public Works		Ratio Stimulus vs Total Investment
	Investment in Public Works		(2009)		
	\$B	% GDP	\$B	% GDP	
Argentina	4.4	1.6%	17.1	6.1%	25.7%
Brazil	6.7	0.5%	23.3	1.7%	28.8%
Chile	0.7	0.4%	4.7	2.7%	15.0%
Mexico	6.9	0.8%	43.6	4.8%	15.8%
Peru	1.6	1.3%	5.8	4.6%	27.6%
LAC (*)	25	0.5% to 1.0%	125	3% to 4%	20%

(*) For the LAC estimates, we extrapolated the figures to those countries without information.

Source: UNECLAC (2009), IMF, National Legislation Data, Consensus Economics (2009), and Authors' calculations.

Note: Many countries have proposed multiyear packages. These estimates capture the additional investments in public work to be implemented in 2009 in addition to the budget proposed previously for the year 2009. (*) For LAC's estimates, we extrapolated the figures to those countries without information.

Annex 2: Annual Direct Employment

The table below provides the results for an estimate of Annual Direct Employment per US\$1Billion spent.

Table A2: Employment Levels for Representative Infrastructure Capital Investment Projects in LAC, by Country and Sub-sector

	Qualified workers	Non-qualified workers	Domestic inputs (mainly material)	Foreign inputs (mainly equipment)	Others	Total	Annual Direct Employment (per US\$1B/yr) [°]
Transport							
Colombia - Access to neighborhoods (streets)	15%	6%	49%	16%	14%	100%	22,500
Colombia - Feeder routes for Transmilenio		43%	27%	23%	6%	99%	35,833
Brazil - Roads	3%	9%	22%	63%	3%	100%	16,577
Argentina - Rosario - highways	1.3%	0.3%	60%	38%	0%	100%	1,650
Water and Sanitation							
Honduras - Improvement on water captation	28%	12%	40%	20%		100%	43,333
Honduras - Rehabilitation of water networks	30%	20%	40%	10%		100%	58,333
Honduras - Expansion of water networks	20%	30%	40%	10%		100%	66,667
Honduras - New treatment plant	10%	10%	80%	0%		100%	25,000
Colombia - Expansion of WSS networks	8%	56%	32%	4%		100%	100,000
Brazil - Rain Drainage networks	8%	16%	48%	28%	0%	100%	34,001
Brazil - Sewerage	4%	11%	68%	17%	0%	100%	21,746
Energy							
US - Solar PV	3%-5%			95%-97%		100%	2,700
US - Wind Power	4%-6%			94%-96%		100%	3,400
US - Biomass	1%-2%			98%-99%		100%	700
US - Coal-fired	1%-2%			98%-99%		100%	750
US - Natural gas-fired	2%-4%			96%-98%		100%	1,700
Brazil - Hydropower	5%-10%			90%-95%		100%	4,500
Peru - Rural Electrification	14%	7%	26%	53%	0%	100%	23,000

[°] These estimates were based on an hourly wage of \$3 for non qualified workers and \$6/hr for qualified one for 2,000 working hours a year.

Source: World Bank project documents: Honduras - Water and Sanitation Program (P103881), Colombia - Bogota Urban Services Project (P074726), Brazil - Bahia Poor Urban Areas Integrated Dev (P081436), and Argentina - Santa Fe Road Infrastructure (P099051). Energy estimates are from the UNEP (2008), Peru - Rural Electrification (P090116), and Brazil - Cana Brava hydropower plant. Authors' calculations.