Lifting the veil on Infrastructure Investment Data in Latin America and the Caribbean

Tomás Serebrisky, Ancor Suárez-Alemán, Cinthya Pastor, and Andreas Wohlhueter

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Index

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Figures

Introduction

Infrastructure is vital for economic growth and development; production in modern societies and the provision of basic services, such as education and health, would be impossible without reliable roads, water, sanitation, and electricity. Infrastructure boosts growth by increasing productivity, reducing production costs, facilitating the accumulation of human capital (through easier access to education), as well as by helping diversify the productive structure and creating employment (Serebrisky, 2014).

The provision of infrastructure services directly affects the productivity of an economy. Furthermore, with ample investment in the right areas, productivity growth can be sustained (Spence, 2015). For example, delivering roads and telecommunication services increases the productivity of private capital by inducing faster and cheaper transportation and communications. In turn, this can increase the scale of production, allowing for more efficient inventory management and access to markets (Straub, 2011). Similarly, good roads and efficient public transportation services can enhance the productivity of labor over the long term by decreasing workers' daily commuting times. Inadequate infrastructure investment levels are typically identified as a main cause for unsatisfactory growth performance in the emerging world (Schwab and Sala-i-Martin, 2015).

Among all investment types, investment in infrastructure is one of the most crucial for growth. Economic infrastructure (here defined as investment in transport, telecommunication, energy, water, and sanitation) complements other forms of capital and labor. If properly planned and built, infrastructure investment can eliminate bottlenecks that limit growth potential (Cavallo and Serebrisky, 2016). Infrastructure investment has the potential to impact growth positively in both the short- and long term. In the short-to-medium term, investment generates growth by boosting aggregate demand. In the long term, investment's growth effect works via aggregate supply and the productive apparatus; higher investment triggers technological changes, induces higher productive capacity, and fosters resource reallocation toward higher productivity sectors (Jiménez and Manuelito, 2013).

Latin American and Caribbean countries (LAC) have sizeable infrastructure gaps that translate into deficient services. Lack of universal coverage in electricity and water and sanitation are clear manifestations of insufficient investment. When lack of sufficient investment is combined with less than adequate regulatory and corporate governance frameworks and incentives regimes, the direct consequence is the provision of deficient services (Andres, 2007). For example, in the region, average electricity losses are 16 percent of total electricity produced, while in OECD countries they average 6 percent (Jimenez, et al., 2014). The World Bank (2012) shows that the monetary value of losses from power outages in LAC reached US$68 billion in 2012.[1] This report documents similar losses generated from water shortages or interruptions in supply, while losses due to breakage or deterioration of merchandise during shipping exceeded US$70 billion in 2012. Losses due to electrical outages as a percentage of annual

[1] The incidence was higher in Central America, where losses were equivalent to 1.5 percent of total business sales, while it was lower in the Caribbean (at 0.5 percent of sales (Serebrisky et al., 2015).

[2] It is essential to note that the IDB, CAF and ECLAC have not done the job of collecting data in an isolated way; the work has been done with various governments in the region through their ministries of finance, national planning agencies, and public investment systems. To date, 19 countries have joined this initiative in order to report on investment in infrastructure, disseminate results, and promote the analysis of its impact. This task, which began in 2011 and which provides detailed information from 19 countries between 2008 and 2015, is currently being improved in two ways: by keeping the data for all 19 countries updated and by incorporating new countries into the initiative.

sales reached 1.2 percent in LAC, compared to 0.1 percent in OECD countries (World Bank Enterprise Survey, 2010).

Additionally, Latin America has low transport infrastructure density given its income level, with paved road density similar to Africa's and about one quarter of that of the next-lowest region, the Middle East (World Bank, 2017). Also, when it comes to road safety, more than 100,000 people die each year in LAC because of road accidents. This is the main cause of death for the 15- to 29-year-old age group and its associated costs are estimated at 1 to 3 percent of GDP (Taddia et al, 2014). Moreover, in logistics performance, the LAC region ranks poorly in terms of the World Bank's Logistics Performance Indicators (LPIs), has higher costs to export than South Asia, and has longer times to export than East Asia (World Bank data, 2017).

To overcome these deficiencies, several studies have suggested that LAC needs to invest around 5 percent of GDP in infrastructure for a prolonged period to close its infrastructure gap (Serebrisky et al, 2015; Fay et al, 2017). To produce their estimations, these studies relied on infrastructure investment data that is provided by national statistics agencies. A deep look at how countries report data on infrastructure investment shows that countries do not always use the same definition for infrastructure investment. Although most countries in LAC make use of the recommendations of the International Monetary Fund regarding the classification of public expenditure, many of them classify infrastructure investment differently. Moreover, if we compare investment in infrastructure in each country, we find that even the definition of infrastructure - and therefore the sectors that are considered part of it - is not the same. As such, by relying on the infrastructure investment information provided by countries that use different definitions and methodologies, we could be comparing apples and oranges – with the risk of reaching inaccurate policy conclusions.

There is an evident need to consider how to assess investment in infrastructure in a homogeneous and standardized way. This technical note describes the existing alternatives to measure investment in infrastructure (section 2). Section 3 presents "Infralatam," which is a joint initiative developed by the Inter-American Development Bank (IDB), the Development Bank of Latin America (CAF), and the United Nations Economic Commission for Latin America and the Caribbean (ECLAC)[2] aimed at developing a methodology and database to improve the availability and quality of infrastructure investment data in Latin America and the Caribbean. The data is analyzed in section 4, together with some insights on the relationship between investment in infrastructure and infrastructure quality as well as budget deficits. Section 5 briefly summarizes some avenues for further research.

Alternatives to measure public investment in infrastructure

When it comes to measuring public investment in infrastructure, there are different strategies that can be applied. They may be summarized in two alternatives. The first one uses information from the system of national accounts (SNA), while the second uses government budget information. On the private investment side, data is typically collected on a project-by-project basis and is provided by third parties. This section focuses on the different methods of tracking investment in infrastructure, and each of the approaches is discussed[3].

PUBLIC INFRASTRUCTURE INVESTMENT

System of national accounts

A country's total annual gross domestic product (GDP) is equal to the sum of government and household spending, investment in fixed capital, changes in inventories, and exports minus imports. Within the SNA[4], investment is accounted as "gross capital formation," which in turn is measured by "the total value of the gross fixed capital formation (GFCF), changes in inventories and acquisitions less disposals of valuables." To measure infrastructure investment through the national account system, the component of interest in is GFCF in total fixed assets.

Following the SNA approach has its upsides and downsides. The main advantage is that the data is readily available through the IMF[5] following certain accounting standards and is therefore comparable across a vast number of countries. Furthermore, this approach captures the investment of both national and subnational governments.

However, the major difficulty comes with the fact that GFCF captures not only a government's investment in infrastructure assets but also its investment in non-infrastructure related assets, such as investment in dwellings, machinery and equipment, and intellectual property. Separating the former from the latter is not a trivial task, and the share of investment that does not qualify as infrastructure investment is significant for many countries, leading to an upward bias of the estimate.

Government budget

In addition to the SNA approach, infrastructure investment can be measured by analyzing government budgets. With this approach, information is derived from executed budgets for infrastructure projects from a country's ministry in charge. In the LAC context, this tends to be the ministry of economy or finance, the ministry of public investment, the ministry of production, the ministry of planning, or the ministry of energy, transport or telecommunication.

Compared to the SNA method, the clear advantage of working with government budgets is that the information can be available at the sector level and in some cases even at the project level. However, the challenge with this approach comes with the decentralized nature of the information, meaning that the data that is being collected from different public entities in different countries is not necessarily reported homogeneously nor complete. In particular, information at the sector level can be found easily for the central government. But when it comes to the rest of the Non-Financial Public Sector (NFPS), data on subnational governments or state-owned enterprises (SOEs) is less available, incomplete, and not disaggregated at the sector level. Therefore, the results obtained through government budget information tend to underestimate actual infrastructure investment.

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[3] When it comes to private investment in infrastructure, data is typically obtained from third-party providers. The most common one being used is the Private Participation in Infrastructure (PPI) database of the World Bank, which combines publicly available data on private investment in infrastructure across countries. Although the PPI information does not exhaustively capture private investment and therefore is likely to underestimate private participation, it is the most comprehensive database on private investment to date.

[4] System of national accounts 2008. https://unstats.un.org/unsd/nationalaccount/docs/sna2008.pdf

[5] Investment and Capital Stock Dataset, 1960-2015. http://www.imf.org/external/np/fad/publicinvestment/#5

IN SEARCH OF THE GOLD STANDARD

Which of the above discussed sources provide the most precise infrastructure investment numbers? As is so often the case, the answer is *it depends* . It depends on the format and condition of the available information. A brief overview of the literature in the paragraphs below reveals that there is no commonly agreed "gold standard."

For the countries of the European Union (EU), public infrastructure investment has been measured through the SNA method in various forms. For example, Wagenvoort, de Nicola and Kappeler (2010) calculated public investment in infrastructure as a fraction of government GFCF. More recently, Revoltella and Brutscher (2016) built on this approach by exploiting a change in Eurostat reporting. Eurostat now lists GFCF by asset class, which allowed them to isolate actual investment in infrastructure from investment in other buildings and structures. Comparing the old measure of infrastructure investment with the new one, the authors conclude that GFCF in total fixed assets is a "rather poor proxy for infrastructure investment" in the European context. The authors revised the aggregate numbers for the EU to roughly half of the previous estimates between 2005 and 2015, and, additionally, they found that infrastructure investment reacted much more sensitively (by dropping sharply) to the European financial crisis than previously believed.

Recently, the World Bank developed an open budget initiative named Boost, *a one-stop shop for budget data worldwide with the hope of bringing visibility to countries' efforts in this field, facilitating access and promoting use of spending data, and motivating other countries into action* [6]. It gathers data on public spending for several sectors and subsectors. Boost provides sectoral investment estimates for an increasing number of countries around the globe by predominantly looking at GFCF in fixed assets.

The Asian Development Bank (2017) discusses three different measures to account for both public and private infrastructure investment in Asian countries. The first measure adds government budget spending and Private Participation Initiative (PPI) data of the World Bank[7], the second one combines general government GFCF with PPI data, and the third one relies on GFCF in construction (excluding the building sector) in order to obtain an estimate of overall investment. As discussed above, one would expect that the first measure would provide the most conservative results. In fact, the sum of budget and PPI data does result in the lowest numbers and seems less prone to outliers than the other two measures that rely on GFCF information.

For LAC countries, there are studies that draw on GFCF information (e.g., Manuelito and Jimenez, 2015) and others that analyze budget data (e.g., Perrotti and Sanchez, 2011) in order to estimate public infrastructure investment. LAC countries tend to follow the IMF national account standard. As discussed above, this allows for a relatively straightforward estimation of infrastructure investment through the SNA approach; However, with the caveat that it impedes the separation of infrastructure and non-infrastructure related investment. This being said, LAC provides the ideal testing ground to compare the two measurement methodologies. The bottom-up approach of working through the budgets is extremely valuable to obtain a better understanding of the differences between the two methods and what is missed when choosing one way or the other.

Finally, one must acknowledge that the budget approach involves a significantly larger effort than the SNA method both in terms of resources and time. It requires the collection and organization of budget information in a comparable manner and coordination with different national and subnational actors in every country. In an ideal world, this information would be updated annually. From this discussion it becomes clear that the budget approach is more accurate but that it also is more resource-intensive than the SNA method. It can be concluded that most studies and investment reporting exercises follow the GFCF not due to its precision but because it is simpler and more sustainable over time, while still providing a relatively good proxy of real infrastructure investment data.

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[6] http://wbi.worldbank.org/boost/boost-initiative

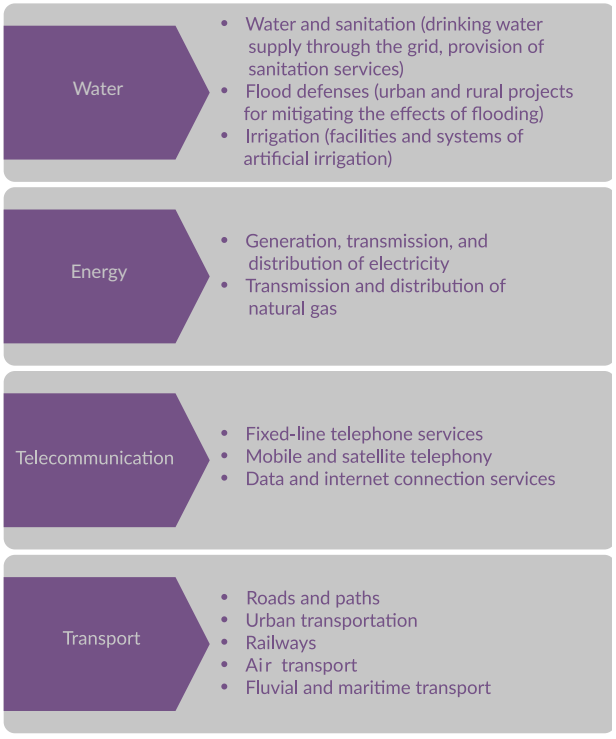
[7] Private Participation in Infrastructure (PPI) Database is a joint initiative between the World Bank's Public-Private Partnership Group and its Public-Private Infrastructure Advisory Facility (PPIAF). It provides information on more than 6,400 infrastructure projects with private participation in low- and middle-income countries. Next to sources and destination of investment flows, it includes information on contractual arrangements, main investors, technology, capacity among others. For further information see https://ppi.worldbank.org/

The Infralatam initiative

SECTORS

Infralatam uses the budget approach to report public investment in economic infrastructure. Under this definition, it includes four sectors: energy, telecommunication, transport, and water and sanitation. The focus is on infrastructure services and utilities, and, therefore, infrastructure investment related to oil and gas production, as well as oil refining and petrochemical investment, are excluded. Social infrastructure is also excluded (schools, hospitals, dwellings, and security infrastructure). Thus, Infralatam reports investment for the sectors and subsectors included in figure 1.

Figure 1. Sectors and subsectors considered in the Infralatam database



SOURCE OF INVESTMENT

Infralatam considers accrued public investment[8] from national and subnational (regional and local) government levels and from SOEs [9].

Public investment is defined as capital expenditure, particularly gross fixed capital formation expenditures made by sectors included in figure 1. Current expenditures are not included because they do not increase the yield or capacity of existing fixed assets nor do they significantly extend their expected useful lifespan.

The following types of investments are considered[10]:

- **New Projects or Improvement and Expansion Projects:** Projects that add production capacity through construction and/or acquisition of a new productive unit, those increasing productive potential or the lifespan of an already existing unit, or those which allow for the same production capacity but with greater quality and/or at reduced cost.

- **Replenishment Projects:** Projects that aim to replace old assets with others of similar nature and scope, replenish worn-out productive potential, or replenish the most essential equipment to guarantee assets' normal functioning.

8 Whenever possible. If not, budgeted investment is presented. However, the caveat is that usually when comparing these numbers with accrued numbers, they can be overestimated when execution is low and underestimated when budgets present supplementary credits. See appendix 1 for the complete list of sources.

9 Given the depth of this information, in some cases information has not been available, and this caveat has been detailed for each case.

10 For more details on methodology, see www.infralatam.info

- **Pre-Investment Expenses:** Expenditures including professional services, costs of pre-feasibility and feasibility studies needed to carry out a project.

- **Maintenance Expenses:** Expenditures on maintenance that reduce the depreciation of assets and increase their life cycle.

It should be mentioned that in some cases general investment, such as pre-investment expenses or maintenance expenses, cannot be disaggregated at the subsector level, but instead are reported at the sector level. In that case, for practical purposes, this investment has been added to the subsector with the highest investment.

Private investment data is obtained from the PPI database, which collects the different forms that private participation acquires in public-private partnership (PPP) schemes. Regarding the type of projects from the PPI database that are considered in Infralatam, concession projects, greenfield projects, and divestitures have been taken into account. Management and lease contracts have not been considered given that capital expenditure in these types of contracts comes from the public sector, so they are already included within reported data on public investment. Regarding the status of the projects, all projects have been considered, except those cancelled and distressed. Regarding the type of expenditure, only investment in physical assets have been considered; hence, committed payments are not included.

There are some weaknesses with the PPI database: i) it does not consider all private investment in the infrastructure sectors; ii) it considers committed investment; and iii) it provides the financial closure year of the projects instead of the investment year[11]. Despite these weaknesses, it is, to the best extent of our knowledge, the largest and best database available to measure private investment in infrastructure[12].

Infralatam reports the sum of public and private investment data for illustrative purposes only, as it constitutes an approximation of total investment. Comparisons or aggregations between public and private reported data should be used carefully because even if it includes the same sectors, it is measured differently.

Public investment is measured on an accrual basis, while private investment considers investment commitments, not actual amounts invested. Also, private investment is measured at the project's financial closure and not at the expected disbursement year. As a result, there is a trend to perceive higher volatility with private investment.

COVERAGE AND PERIOD

As of the date of publication of this technical note, Infralatam reports infrastructure investment data from 2008 to 2015 in 19 countries (figure 2): Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, and Uruguay.

Figure 2. Latin American and Caribbean countries included in Infralatam (as of December 2017)

[11] The financial closure year has been considered as the investment year.

[12] Alternative sources of data include the Infrastructure Journal Database (www.ijglobal.ocm) and Preqin Database (https://www.preqin.com/).

Economic infrastructure investment in LAC – a data analysis

According to Infralatam, the total average of public and private investment in infrastructure[13] in LAC is 3.5 percent of regional GDP between 2008 and 2015 (figure 3). In 2008, investment as a share of GDP was around 3 percent, and since that year, it steadily increased until 2013, where it peaked at roughly 4.2 percent of GDP. Since then, the overall spending dropped again, and in 2015 it was 3.2 percent of GDP. In terms of US dollars, the overall amount invested over the course of this period (2008-2015) was approximately $US 1 trillion. To put this into perspective, this is almost the equivalent of Mexico's GDP in 2016[14]. LAC's average annual investment in infrastructure over this period was US$130 million, which represents twice as much as Guatemala's GDP or about half of Chile's. Figures 13 to 16 in Appendix B present this analysis at a sectorial level.

Analyzing at a country level, figure 4 illustrates that while in 2008 Panama, Belize, and Honduras were the countries that invested the most in infrastructure, in 2015, Bolivia, Peru, and Colombia led investment in this area among LAC countries. In some countries, as is the case for Bolivia, Peru, Colombia, Dominican Republic, and Trinidad and Tobago, investment has more than doubled as a percent of GDP between 2008-2015. Figures 17 to 20 in Appendix B provide the results of this country level analysis separately for each of the four infrastructure sectors.

How has investment in infrastructure been distributed between the public and private sector? Has this distribution changed over time? Figure 5 illustrates the share of public and private participation in total investment for LAC for the period 2008-2015. On average, private participation has been around 30 percent and this ratio has been surprisingly stable over time. It has ranged from its lowest share of 21 percent in 2009 to its highest share of 38 percent in 2013.

Figure 6 shows the average investment of both the public and private sector over the period 2008 – 2015, by country. Nicaragua, Bolivia, and Panama are the countries with the highest overall infrastructure investment rates over the period 2008-2015, while Uruguay, Mexico, and Trinidad and Tobago are at the low end. On average, across all countries, the public sector contributed around 70 percent of overall investment or 2.5 percent of regional GDP, while the private sector mobilized roughly 30 percent of total investment or 1 percent of regional GDP. Honduras (62 percent), Brazil (54 percent) and Chile (49 percent) have the highest relative share of private sector participation. On the other hand, Infralatam data suggests that public investment in Belize, Guyana, Trinidad and Tobago, and Bolivia represent close to 100 percent of total investment.

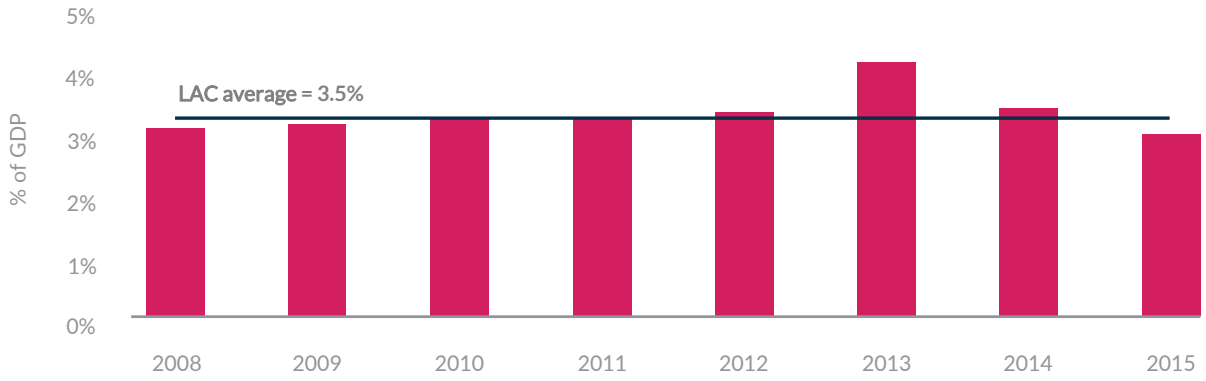
Regarding sectors, between 2008 and 2015 approximately 44 percent of total investment in LAC was in transport, followed by energy (30 percent), telecommunication (15 percent), and water and sanitation (11 percent) (figure 7). This represents 1.6 percent of regional GDP for transport, 1.0 percent for energy, 0.6 percent for telecommunication, and 0.3 percent for water and sanitation. While investment shares of water and sanitation, energy, and telecommunication infrastructure remained largely constant over the years, transport has seen a steady and clear increase since 2012.

Within transport, the lions' share of investment went to road infrastructure (75 percent), and smaller shares were dedicated to railways (13 percent), fluvial and maritime transport (7 percent), and air transport infrastructure (5 percent). Of the total energy sector investment, around 90 percent was devoted to infrastructure needed for the generation, transmission, and distribution of electricity. The remaining 10 percent went to transmission and

[13] From here forward, infrastructure investment here refers to economic infrastructure in the classical sense and includes investments in transport, energy, telecommunication, and water and sanitation. Also LAC refers to the 19 countries covered by Infralatam.

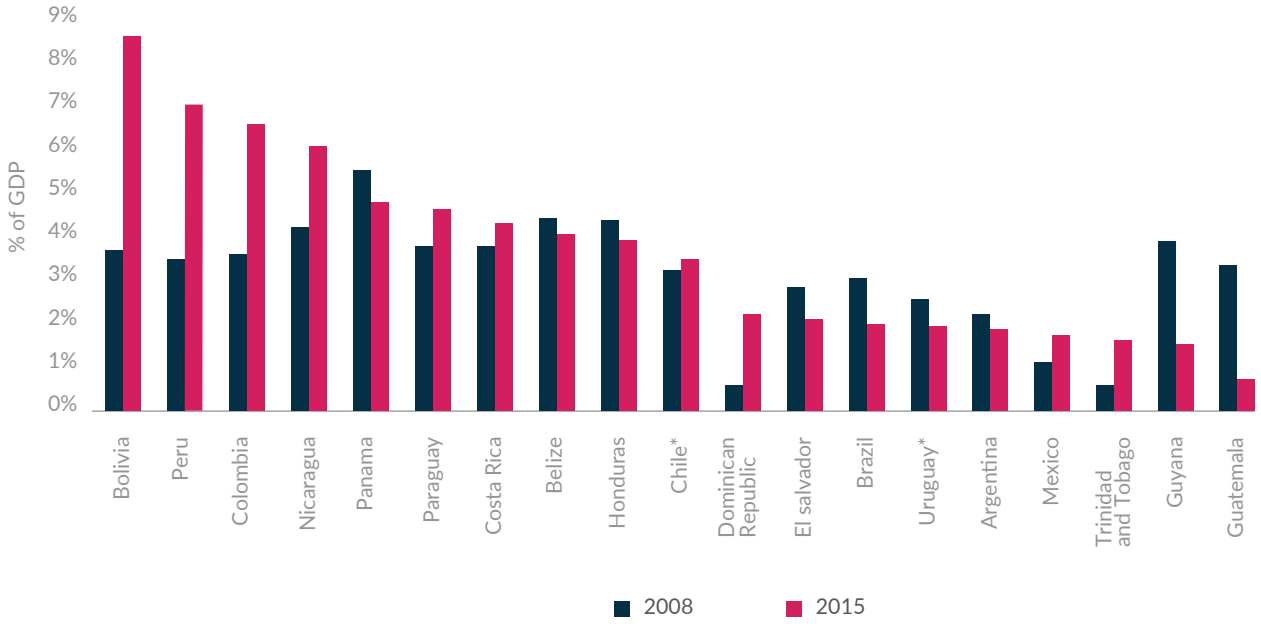
[14] https://data.worldbank.org/data-catalog/GDP-ranking-table

Figure 3. Total investment in infrastructure, LAC average 2008-2015



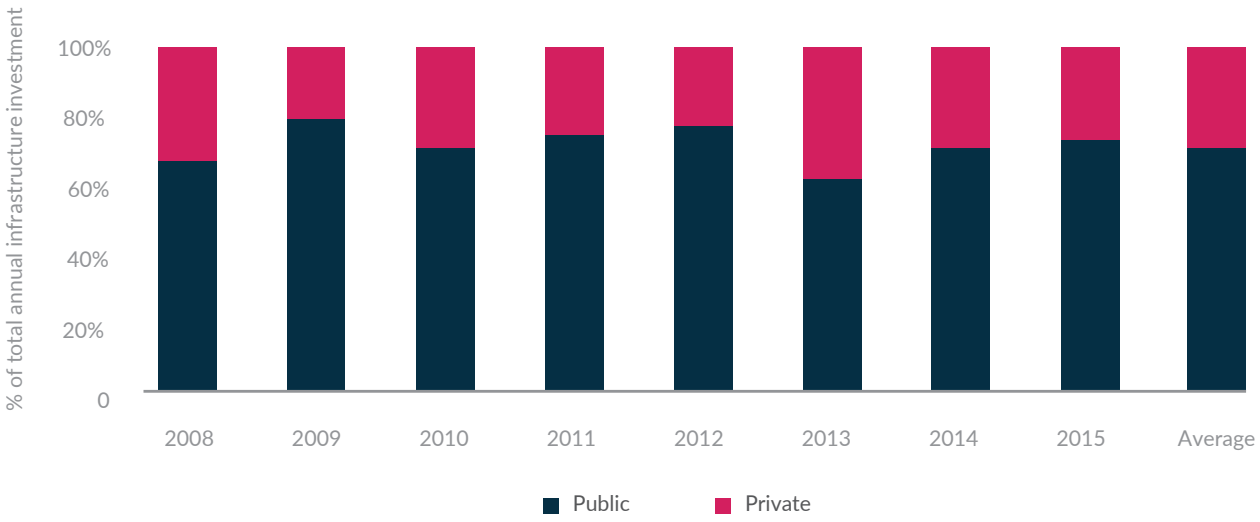
Source: Infralatam database, www.infralatam.info.

Figure 4. Total investment in infrastructure by LAC country, 2008 vs. 2015



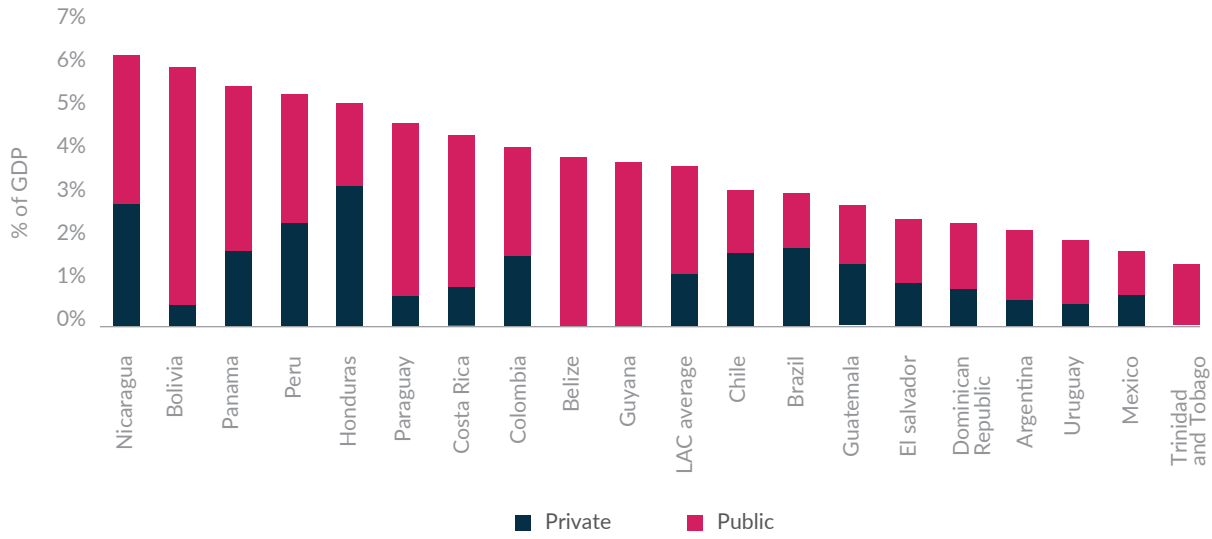
Source: Infralatam database, www.infralatam.info.
Note: For Chile (2014) and Uruguay (2013) latest available investment figures are reported

Figure 5. Share of public and private investment in infrastructure in LAC, 2008–2015



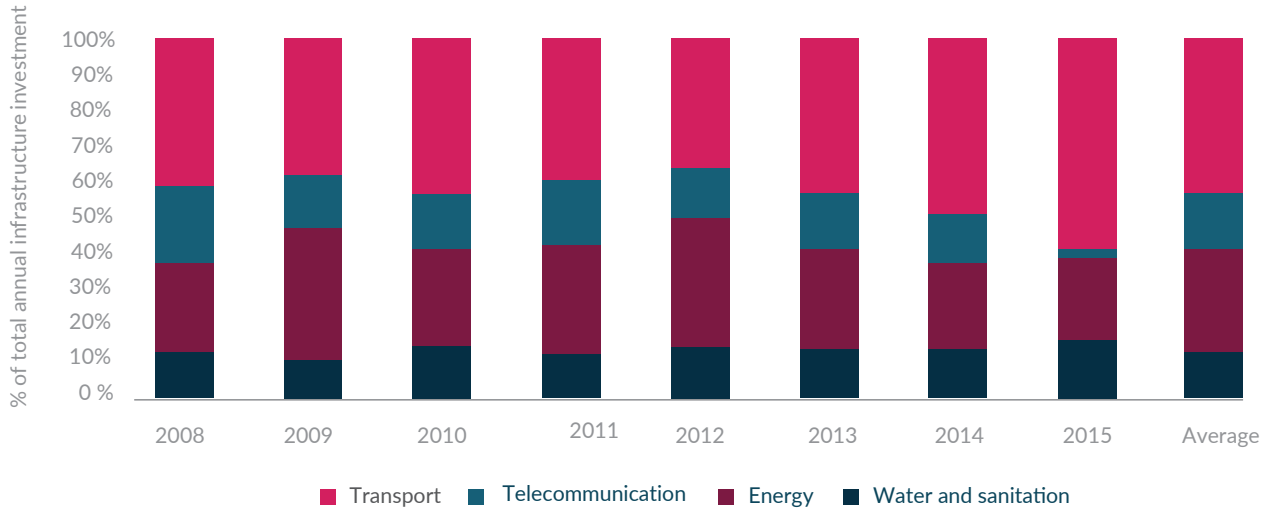
Source: Infralatam database, www.infralatam.info.

Figure 6. Public and private investment in infrastructure as a share of GDP by LAC country, average 2008–2015



Source: Infralatam database, www.infralatam.info.

Figure 7. Infrastructure investment by sector as a percentage of total annual infrastructure investment in LAC, 2008–2015



Source: Infralatam database, www.infralatam.info.

distribution infrastructure for natural gas. Lastly, water and sanitation infrastructure represents about 87 percent of the total investment dedicated to the sector, while irrigation (10 percent) and flood defenses (3 percent) attracted relatively little capital.

Figure 8 shows how individual LAC countries have prioritized investment to infrastructure sectors over the period 2008 to 2015. Countries with the highest share of spending directed to the transport sector are Panama (68 percent of total annual investment in economic infrastructure), Bolivia (66 percent) and Colombia (65 percent). When it comes to energy, Guyana (62 percent) and Uruguay (51 percent) stand out, channeling more than half of their total investment level to this sector. Trinidad and Tobago (24 percent), Peru (18 percent) and Bolivia (16 percent) have the highest relative shares of investment in water and sanitation infrastructure. Finally, Central American countries dominate the telecommunication sector. Relative investment shares in Belize (35 percent), El Salvador (33 percent), and Nicaragua (28 percent) are the highest throughout the region.

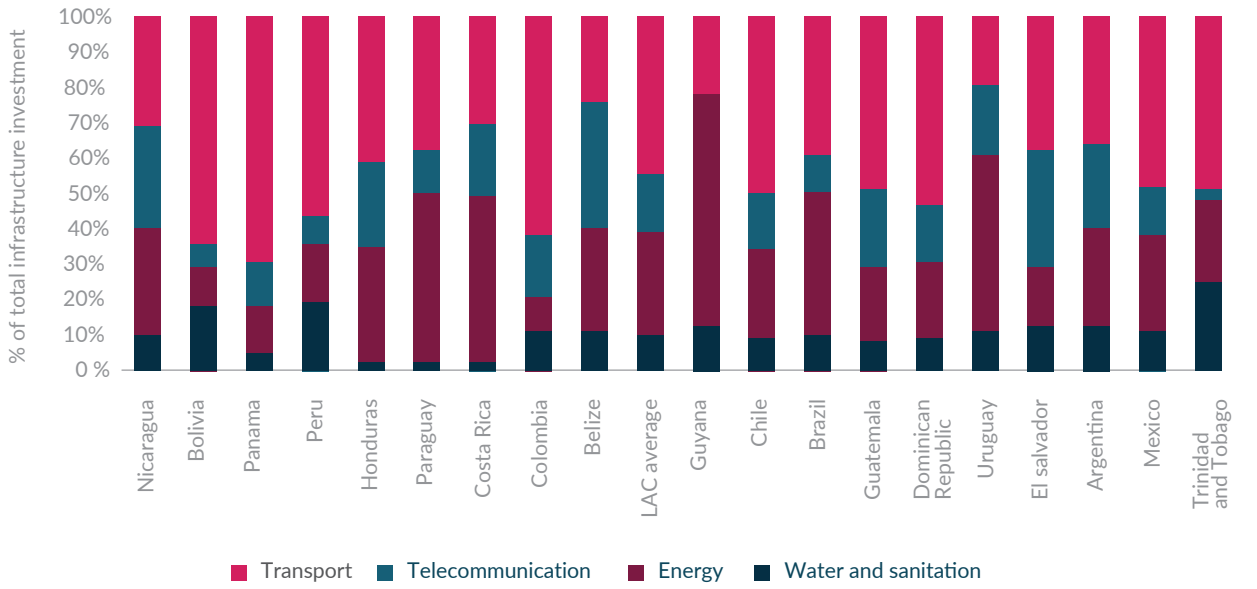
Although the aggregate level of public and private participation in infrastructure investment has not changed significantly in recent years (figure 3), the pattern has changed within the four sectors (figure 9). As one would expect, telecommunication and energy are the sectors with the highest shares of private investment, on average 75 and 36 percent of total investment over the period from 2008-2015, respectively. The pattern for transport and water and sanitation is the opposite, with private investment participation equaling 13 and 3 percent, respectively. This behavior has been almost steady over recent years, except for the transport sector, which has witnessed an increase in private sector participation since 2013.

INFRASTRUCTURE INVESTMENT AND QUALITY

Low investment levels in infrastructure have created a sizable infrastructure gap, which is being reflected in the low quality of current infrastructure services (Serebrisky et al, 2015). The World Economic Forum's survey on perceptions of infrastructure quality —the most cited and used survey worldwide —reveals that the quality of infrastructure in LAC is lagging, particularly compared with advanced economies and high-growth Asian economies.

Is investment in infrastructure correlated with the quality of infrastructure in LAC? To that end, Infralatam data together with the Infrastructure Quality Index from the World Economic Forum (WEF)are employed[15]. Figure 10 suggests there is a positive relationship between the change in perception of infrastructure quality and the

Figure 8. Infrastructure investment by subsector as a percentage of total infrastructure investment in selected LAC countries, average 2008–2015



Source: Infralatam database, www.infralatam.info.

2-year lagged value of investment in physical infrastructure assets[16]. This means that higher investment might in fact be associated with a more favorable perception of quality in the years following the investment. With this in mind, the trend in LAC is of concern: 12 out of 17 LAC countries experienced a drop in their quality index between 2010 and 2017 (by an average of 0.47), despite the fact that average infrastructure investment in the LAC region over the period was 3.5 percent of GDP. The fact that the reported quality fell reinforces the idea that LAC faces a significant infrastructure gap that requires higher and more sustained levels of investment.

What happens to the pattern if one looks at an objective measure of infrastructure quality instead of a subjective one? The World Bank's indicator on the quality of trade and transport infrastructure, which is one of the six dimensions used to construct the Logistics Performance Index (LPI)[17], is an adequate indicator for this exercise. Figure 11 seems to suggest that a quadratic function best describes the relationship between this objectively measured quality indicator and the 2-year lagged value of investment in transport and telecommunication infrastructure[18]. The intuition could be that low levels of total investment may have a huge impact on performance in some cases (maintenance), while in some others these changes may be achieved with huge investment (new infrastructure). However, the most likely explanation is that investment has frankly been too low in most cases and thus incapable of lifting the quality of infrastructure.

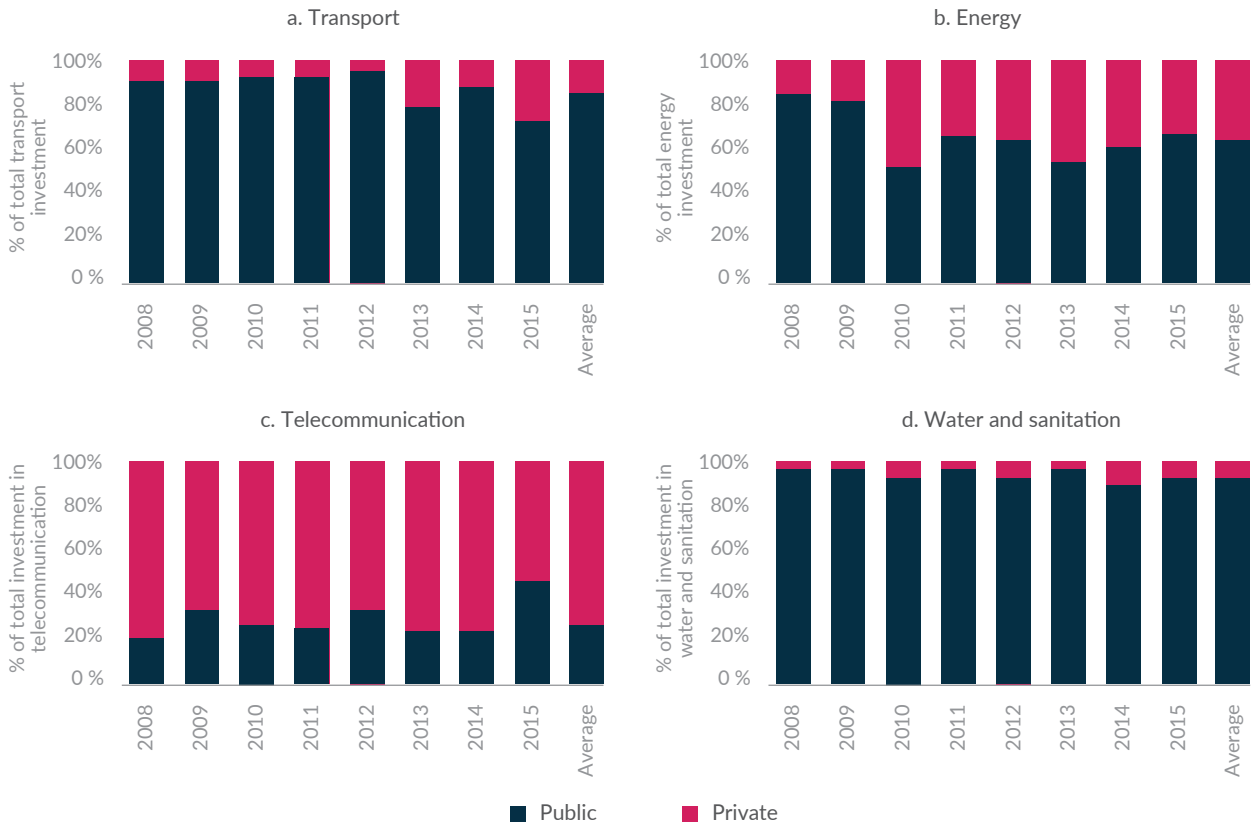
15 This indicator ranges from 1 to 7, and is based on self-reported perceptions of quality, not the objective quality of infrastructure. Still, it provides a good proxy of reality. For more information, refer to https://www.weforum.org/reports/the-global-competitiveness-report-2016-2017-1

16 A lag between actual investment in infrastructure and the public's perception of infrastructure quality has been assumed. The rationale behind this assumption is that between the investment in infrastructure and the progress (or termination) of construction works typically lie several years. So naturally, the change in perception of infrastructure quality tends to have a delayed reaction to infrastructure investment. In the example above, the average infrastructure investment between 2008 and 2015 is correlated with the change in perception of infrastructure quality between 2017 and 2010 to allow for the lag to establish.

17 This indicator ranges from 1 to 5 and evaluates the quality of e.g. ports, railroads, roads and information technology. For more information, refer to https://lpi.worldbank.org/international/scorecard

18 The intuition for the use of lagged values is the same as explained in the previous graph.

Figure 9. Public and private infrastructure investment by subsector as a percentage of total infrastructure investment within the subsector in LAC, 2008–2015



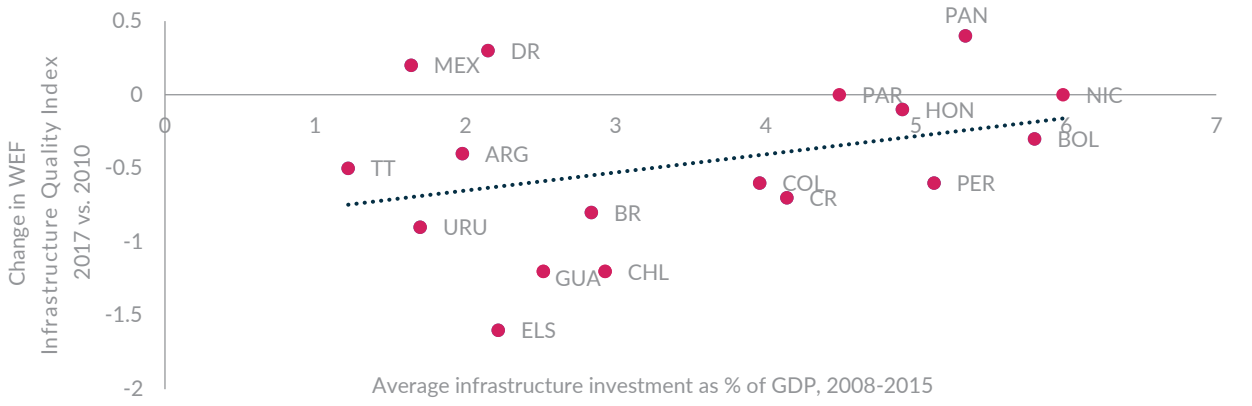
Source: Infralatam database, www.infralatam.info.

INVESTMENT IN INFRASTRUCTURE AND GOVERNMENT BUDGET DEFICIT

According to Cavallo and Serebrisky (2016), lower growth and more difficult macroeconomic prospects in LAC threaten to halt the recovery of public infrastructure investment that started in 2005. Ardanaz and Izquierdo (2016) show that capital expenditures are procyclical in Latin America, meaning that they decline when growth slows. Carranza, Daude, and Melguizo (2014) estimate that between 1987 and 1992—a period of financial and fiscal crises in LAC—one third of the improvement in fiscal accounts came at the expense of lower investment in infrastructure. Cavallo and Serebrisky (2016) report that total expenditures in LAC in 2007–14 increased by 3.7 percent of GDP but that more than 90 percent of the increase corresponded to current expenditures; only 8 percent was devoted to longer-term investment, such as infrastructure.

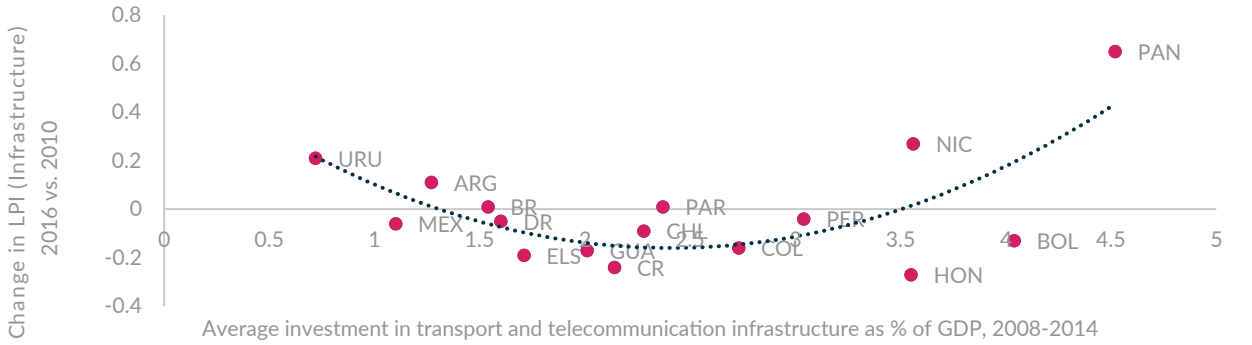
From Infralatam data, figure 12 lends support to the hypothesis that in times of economic crises infrastructure spending is typically one of the first areas to be cut back on. Correlating the average budget deficit/surplus between 2008 and 2015 with the change in infrastructure investment between 2013-2015 and 2008-2010 results in a clear positive relationship. It is important to note here that the commodity crisis hit the resource-rich Latin America and Caribbean region during the analyzed period. The graph therefore suggests that the countries with the largest reductions in infrastructure spending compared to pre-crisis levels tended to have the highest budget deficits.

Figure 10. Relationship between average infrastructure investment (2008-2015) and the change in perception of infrastructure quality (2017 vs. 2010) in selected LAC countries



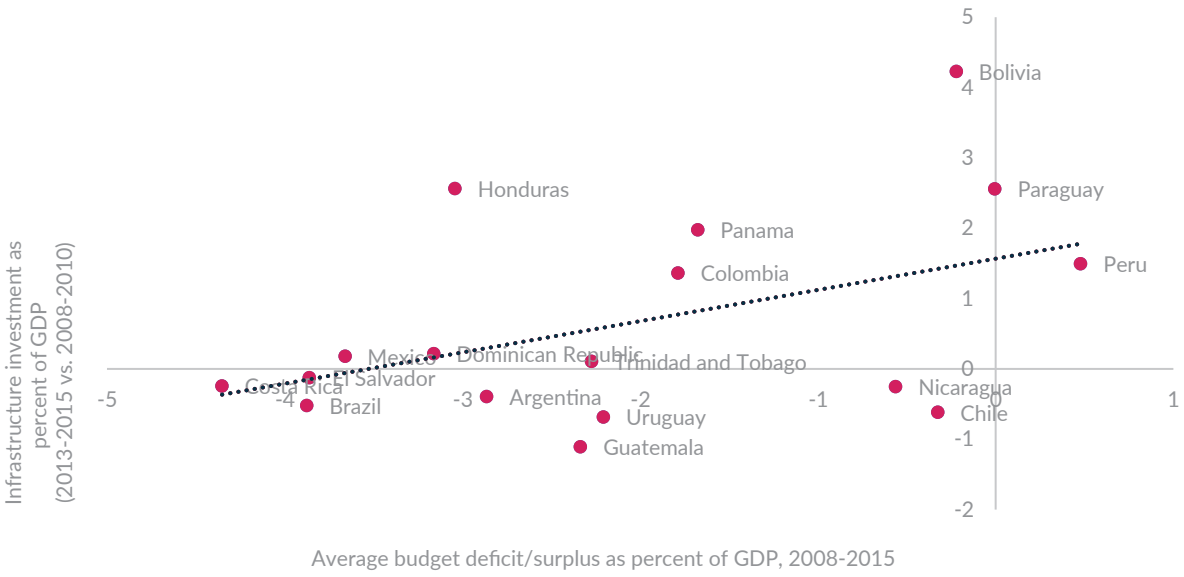
Source: Infralatam database and WEF Quality of Infrastructure (2017).

Figure 11 Relationship between average transport and telecommunication investment (2008-2014) and the change in the infrastructure dimension of the Logistics Performance Index (2016 vs. 2010) in selected LAC countries



Source: Infralatam database and World Bank LPI (2017).

Figure 12 Relationship between average budget deficit/surplus as a percent of GDP (2008-2015) and the change in infrastructure investment (2013-2015 vs. 2008-2010) in selected LAC countries



Source: Infralatam database and World Bank LPI (2017).

Final Comments

There is a global need for a uniform and commonly agreed definition for the measurement of infrastructure investment. Studies so far have relied on gross fixed capital formation data from the system of national accounts to estimate public infrastructure investment. However, this data impedes – among many other limitations already discussed in previous sections – the separation of non-infrastructure related investment, such as investment devoted to dwellings, machinery and equipment, and intellectual property, and therefore, can lead to inaccurate conclusions.

To overcome data reporting limitations and inaccuracies, the Inter-American Development Bank (IDB), the Development Bank of Latin America (CAF), and the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) joined forces to design and implement a methodology to collect and report infrastructure investment data based on a budget approach. This technical note highlights that while the budget approach is more accurate, it is also more resource-intensive than measuring infrastructure investment with data from the system of national accounts.

The result of this interinstitutional data collection effort is the web portal "Infralatam", an online database and public good that provides detailed and updated information for all economic infrastructure subsectors, i.e. energy, telecommunication, transport, and water and sanitation. As of December 2017, Infralatam provides data for 19 countries in LAC for the period of 2008 to 2015, with the objective to cover 26 countries and to be updated every 2 years.

The present document presents some insights on the evolution of infrastructure investment in the region. The ultimate objective of this document is to provide some initial numbers and ideas to motivate further analysis and research. Infralatam's ambition is to be widely known and used; both by public and private institutions and actors. Provided that most data collection exercises have shortcomings, a fundamental operational principle of Infralatam is the opportunity provided to all users to challenge and improve the data since its main objective is to contribute to the formulation of well-designed policies to improve the quantity and quality of infrastructure services.

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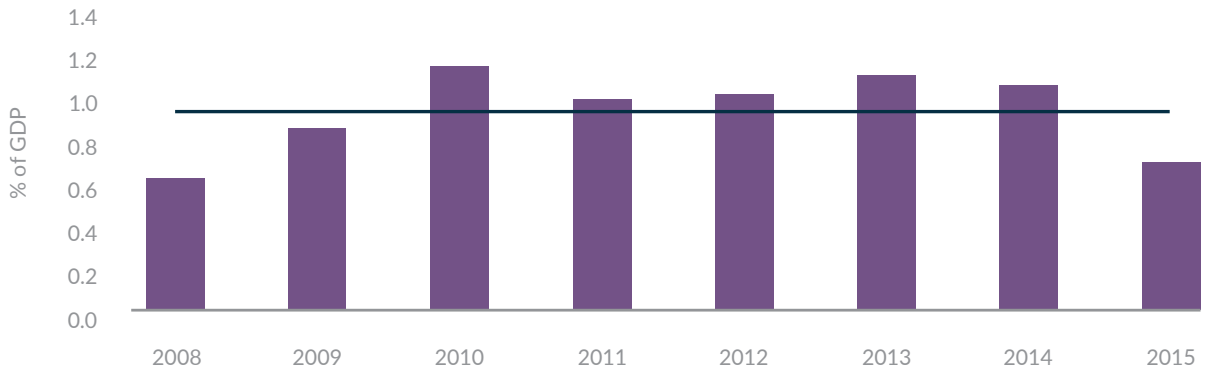
Appendix A: Data sources by country

Public investment data is obtained from budget execution numbers, both at the national and sub-national government levels. Information was provided by:

- Argentina: Ministerio de Producción
- Belize: Ministerio de Finanzas Públicas, Dirección de Presupuesto
- Bolivia: Dirección General de Gestión de la Inversión Pública, Viceministerio de Inversión Pública y Financiamiento Externo (VIPFE)
- Brazil: Secretaria de Planejamento e Investimentos Estratégicos y Secretaria de Orçamento Federal (SOF), Ministério do Planejamento, Orçamento e Gestão
- Chile: Ministerio de Desarrollo Social
- Colombia: Ministerio de Hacienda y Crédito Público, Dirección Nacional de Planeación
- Costa Rica: Dirección General de Presupuesto de la Nación, Ministerio de Hacienda
- Dominican Republic: Dirección General de Inversión Pública, Ministerio de Economía, Planificación y Desarrollo
- El Salvador: Ministerio de Hacienda
- Guatemala: Dirección Técnica de Presupuesto y Dirección de Asistencia a la Administración Financiera, Municipal Ministerio de Finanzas Públicas, Secretaría de Planificación y Programación de la Presidencia (SEGEPLAN), Dirección de Inversión Pública
- Guyana: Ministry of Public Infrastructure
- Honduras: Dirección General de Inversión Pública y Dirección de Presupuesto, Secretaría de Finanzas (SEFIN)
- Mexico: Secretaría de Hacienda y Crédito Público
- Nicaragua: Ministerio de Hacienda y Crédito Público
- Panama: Dirección de Presupuesto de la Nación, Ministerio de Economía y Finanzas, Autoridad Nacional del Canal de Panamá
- Paraguay: Subsecretaría de Economía, Ministerio de Hacienda
- Peru: Ministerio de Economía y Finanzas
- Trinidad and Tobago: Ministry of Planning and Sustainable Development
- Uruguay: Oficina de Planeamiento y Presupuesto y Contaduría General de la Nación

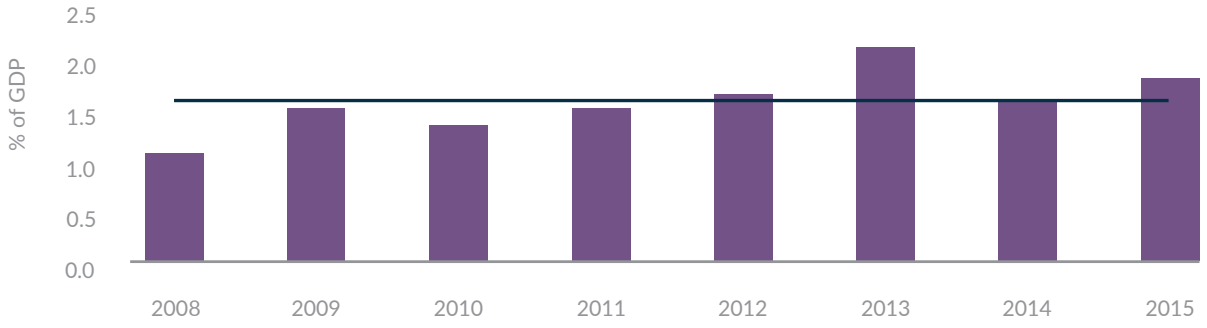
Appendix B: Additional figures

Figure 13. Total investment in energy infrastructure, LAC average 2008-2015



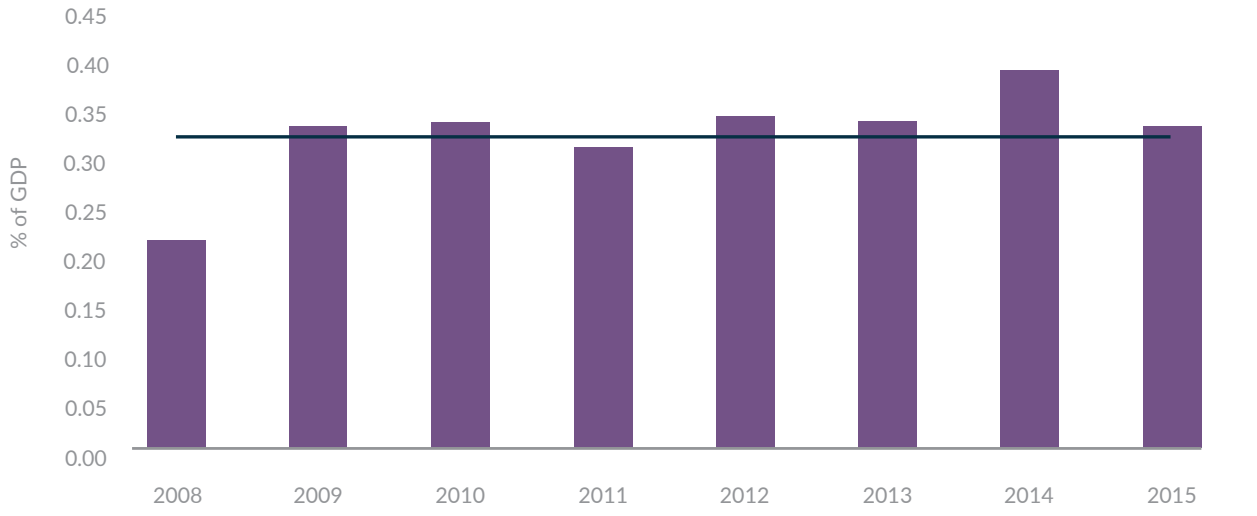
Source: Infralatam database, www.infralatam.info.

Figure 14. Total investment in transport infrastructure, LAC average 2008-2015



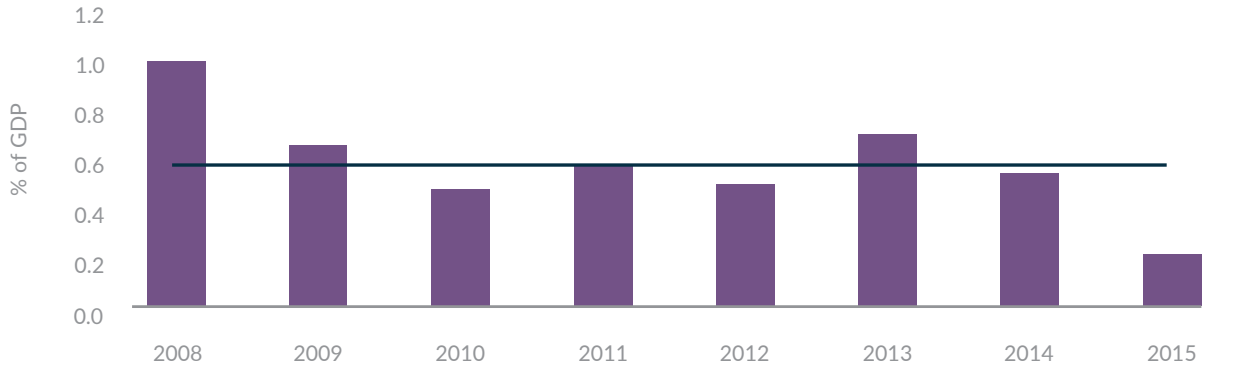
Source: Infralatam database, www.infralatam.info.

Figure 15. Total investment in water and sanitation infrastructure, LAC average 2008-2015



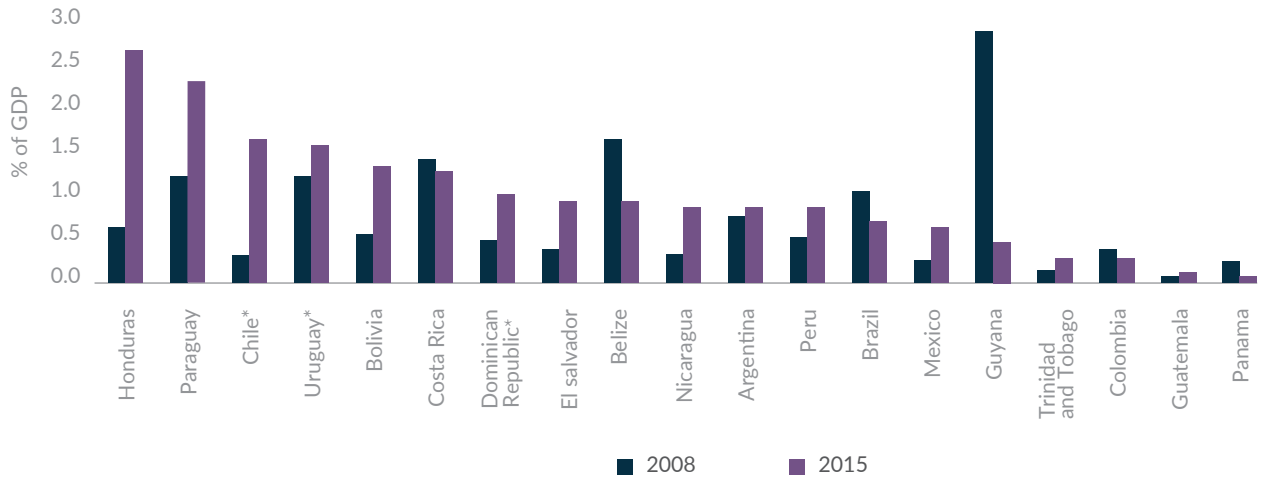
Source: Infralatam database, www.infralatam.info.

Figure 16. Total investment in telecommunication infrastructure, LAC average 2008-2015



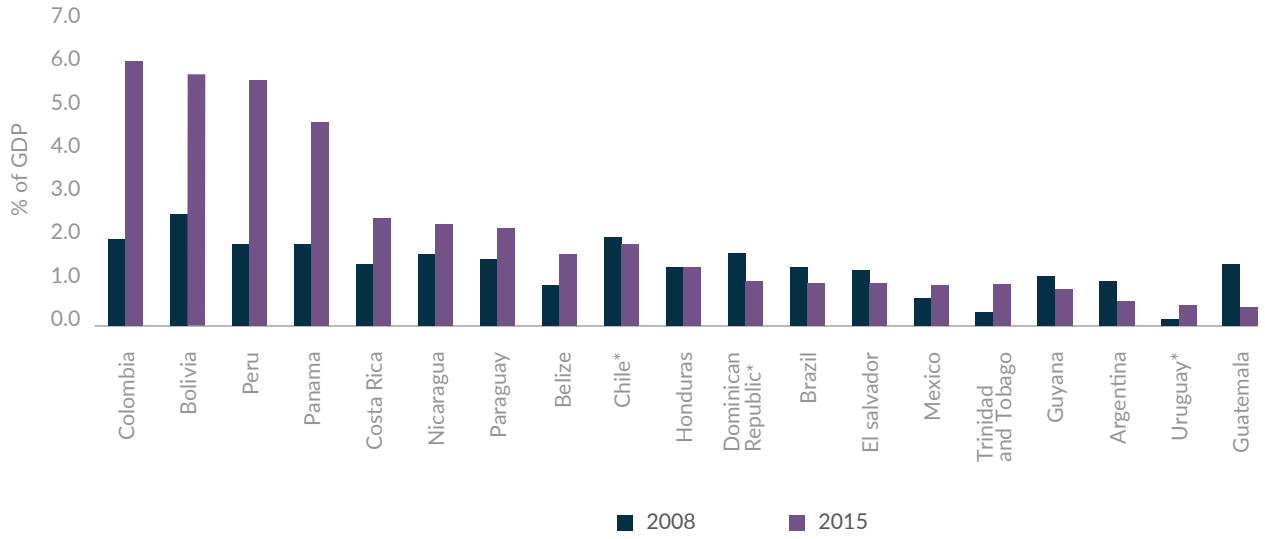
Source: Infralatam database, www.infralatam.info.

Figure 17. Total investment in energy infrastructure by LAC country, 2008 vs. 2015



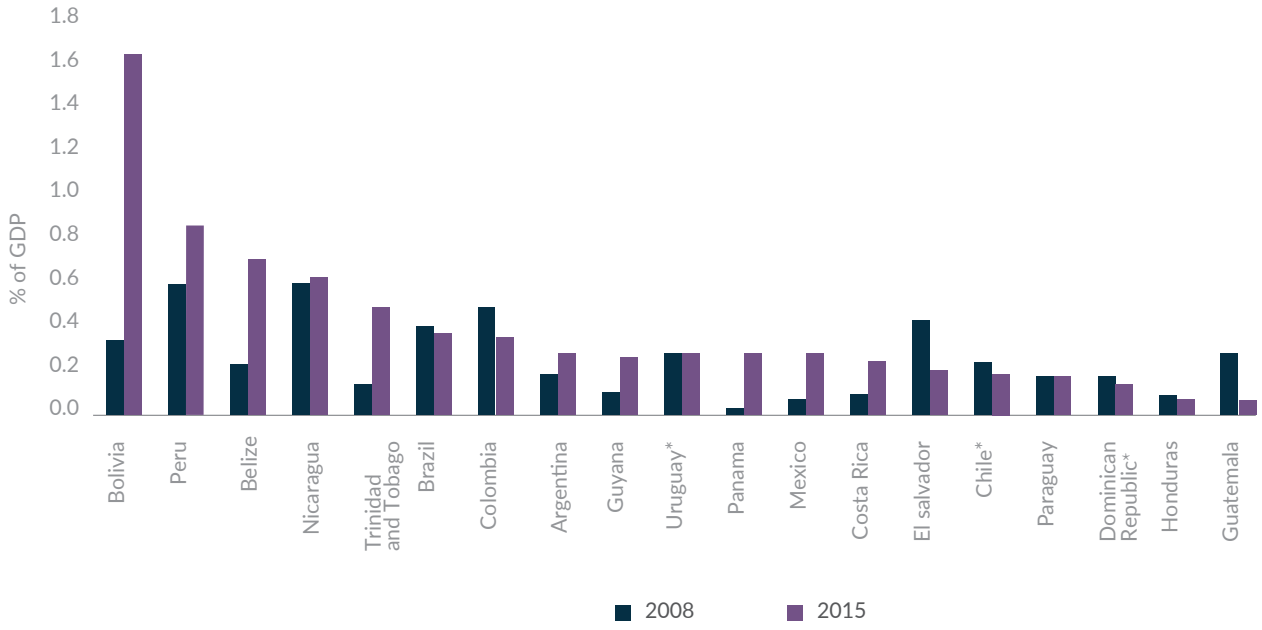
Source: Infralatam database, www.infralatam.info.
Note: For Chile (2014) and Uruguay (2013) latest available investment figures are taken. For the Dominican Republic the earliest investment number is 2009.

Figure 18. Total investment in transport infrastructure by LAC country, 2008 vs. 2015



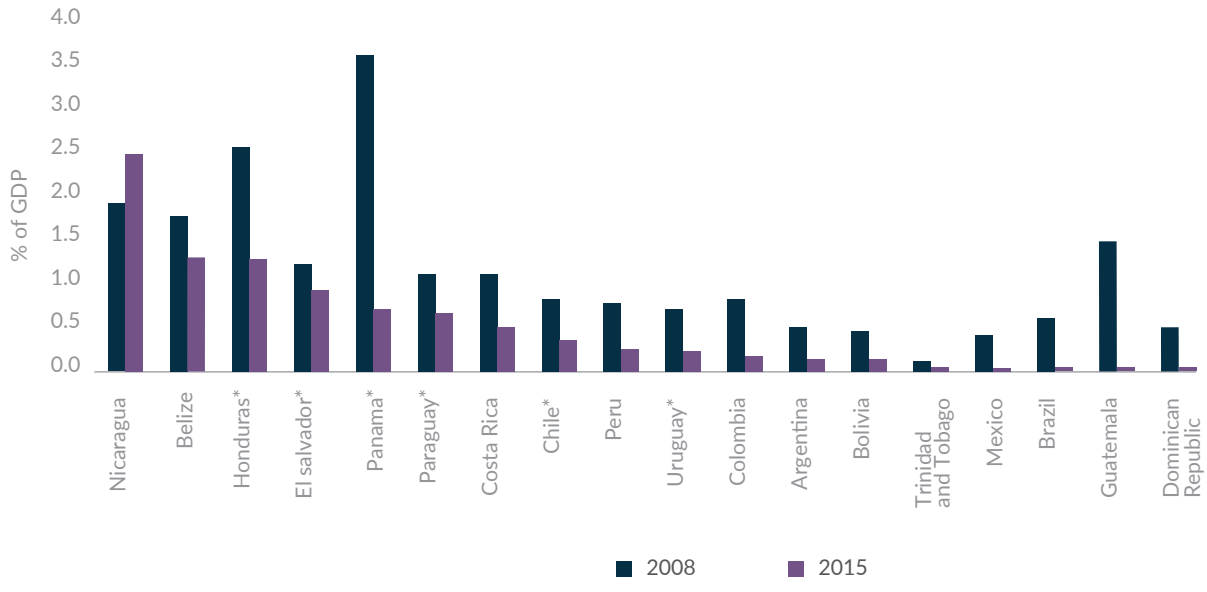
Source: Infralatam database, www.infralatam.info.
Note: For Chile (2014) and Uruguay (2012) latest available investment figures are taken. For the Dominican Republic the earliest investment number is 2009.

Figure 19. Total investment in water and sanitation infrastructure by LAC country, 2008 vs. 2015



Source: Infralatam database, www.infralatam.info.
Note: For Chile (2014) and Uruguay (2012) latest available investment figures are taken. For the Dominican Republic the earliest investment number is 2009.

Figure 20. Total investment in telecommunication infrastructure by LAC country, 2008 vs. 2015



Source: Infralatam database, www.infralatam.info.
Note: For Chile (2014), El Salvador (2014), Honduras (2014), Panama (2014), Paraguay (2014) and Uruguay (2013) latest available investment figures are taken.