

# China: current and potential role in infrastructure investment in Latin America

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This document has been prepared by Pablo Chauvet and Azhar Jaimurzina from the Economic Commission for Latin America and the Caribbean (ECLAC) and Taotao Chen, Run Xu and Ying Jin, of the School of Economics and Management, Tsinghua University, China. The authors appreciate the substantive contributions made by Fabio Weikert Bicalho and the work of the Infrastructure Services Unit of ECLAC under the general supervision of Ricardo J. Sánchez, Senior Economic Affairs Officer of the International Trade and Integration Division of ECLAC.

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## Abstract

In Latin America, there is a substantial gap of economic infrastructure (energy, transport, telecommunications, water and sanitation services to productive sectors and households) and a large number of infrastructure services (mainly logistics and mobility) that do not work properly, which are neither sufficient nor adequate for current needs and taking into account the region's expected population growth (86 million people in the next 15 years).

Although there have been important investments in the region and improvements in the national legal frameworks in the last decade, infrastructure developments still reproduce and strengthen the region's marked structural imbalances. They contribute to the maintenance of a poorly diversified productive structure, high logistics costs, lack of connectivity and accessibility to services. Furthermore, they are favoring the high levels of concentration of income and wealth, as well as the high vulnerability of populations to climate change.

China's investments are one way for expanding infrastructure that many Latin American countries have been seeking through Public-Private Partnerships (PPP). To attract and retain the interest of the private sector, the existence of a proper, strong governance, as well as stable and sound legal frameworks is paramount. Decision-making and implementation processes also need to be improved to ensure that the match between the infrastructure investment needs in Latin America and the Chinese financing capabilities effectively results in a leap towards the improvement of infrastructure in quantity and quality, an imperative for the sustainable development of the region.

The current document offers an overview of the needs for infrastructure investments in Latin America and the region's experience with PPP in infrastructure up to now, as well as the current capabilities and potential of the Chinese public and private sectors to join the infrastructure PPP market in Latin America.



## Introduction

In Latin America (LA), the insufficient coverage and quality of economic infrastructure, i.e. long-term engineering structures, equipment and physical facilities that are the basis for providing energy, transport, telecommunications, water and sanitation services to productive sectors and households, is a significant obstacle to the sustainable and inclusive economic growth and the progress towards internationally agreed development goals (Sustainable Development Goals, SDG), such as eradication of poverty, improvement of education, employment and health, and decoupling or reduction of environmental impacts.<sup>1</sup>

Evidence available for the region demonstrates needs not yet covered in terms of the provision of basic services. There were 18.5 million people in Latin America without access to electricity in 2014; in 2015 there were 24 million without access to improved sources of drinking water and 90 million without improved sanitation facilities. In addition, there is currently a large number of infrastructure services that does not work properly and that creates bottlenecks to sustainable growth (for example, the daily problems of transport congestion; occasional or frequent interruption of different services, such as water, electricity and telecommunications; floods due to lack of investment in new facilities or improvements to old water infrastructures; negative impacts on the environment due to infrastructures with "non-clean" technologies and, in some cases, obsolete). The fact that today's infrastructure is neither sufficient nor adequate for current needs is even more concerning in light of the United Nations' population projections indicating an expected population growth for the region of 86 million people in the next 15 years (Sánchez *et al.*, 2017).

Although there have been infrastructure investment improvements in the last decade in several components, e.g. provision (coverage), quality, subsector distribution, procurement processes, etc., the panorama offered by the infrastructure of LA still reproduces and strengthens

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<sup>1</sup> More general information about sustainable development is available at <https://sustainabledevelopment.un.org/>.

the region's marked structural imbalances. It contributes to the maintenance of a poorly diversified productive structure, the lag in the effort and performance in terms of innovation, the high concentration of income and wealth, and the high vulnerability of populations to climate change (CEPAL, 2016).

The low levels of infrastructure investment in the region can, in large part, explain the existing infrastructure gap. As shown by numerous studies and the data available from the regional development institutions, the region has not been investing enough in its economic infrastructure, constantly failing short of the levels recommended, given the pace of its social and economic development. These elements gain even greater importance in the scenario of higher scarcity of public resources and greater budget constraints strongly linked to the evolution of the commodities' prices.

As the Latin American countries look to expand the options for financing their infrastructure development, the potential of the financial resources originating from China, one of the major economic and financial actors in the region and worldwide and home to the large-scale construction industry active both domestically and internationally, cannot be ignored. The Public-Private Partnerships in infrastructure, in particular, have been a significant vehicle for the infrastructure investment in the region and now emerge as one of the most popular modes for attracting Chinese private investments in the key infrastructure services.

At the same time, to attract and retain the interest of the private sector, the existence of a proper and strong governance and a stable and durable framework are paramount. The decision-making and implementation processes also need to be improved to ensure that the match between the infrastructure investments needs in Latin America and the Chinese financing capabilities effectively result in a leap that contributes to the quantity and quality of infrastructure, conducive to the sustainable development of the region.

In this context, the current document seeks to provide data and analytical inputs to the topic of the China's potential role in the Latin American infrastructure development, by combining two perspectives: an overview of the needs for infrastructure investments in Latin America and the region's experience with PPP in infrastructure so far (Section I) and the capabilities and potentials offered currently by the Chinese public-private sector (Section II). The overall objective is to put forward recommendations that should be considered, on the one side, for the infrastructure policy and the PPP framework by the Latin American countries to attract and facilitate the infrastructure investment with origins in China, and, on the other side, for the business strategy by Chinese companies in order to successfully enter to and be part of the infrastructure PPP market in the Latin American region (Section III).

## **I. Infrastructure investments in Latin America: gaps, trends and space for public policies**

This chapter aims to summarize main characteristics of the infrastructure development in the Latin American region by briefly illustrating the existing shortage of infrastructure services and their insufficient quality (Section A) and by identifying the trends in the public policies, especially the infrastructure investment policies, which can explain the existing situation (Section B). A special attention is paid to the region's experience with the Private Public Partnerships and the current presence of financial resources originating from China in the infrastructure sector (Section C).

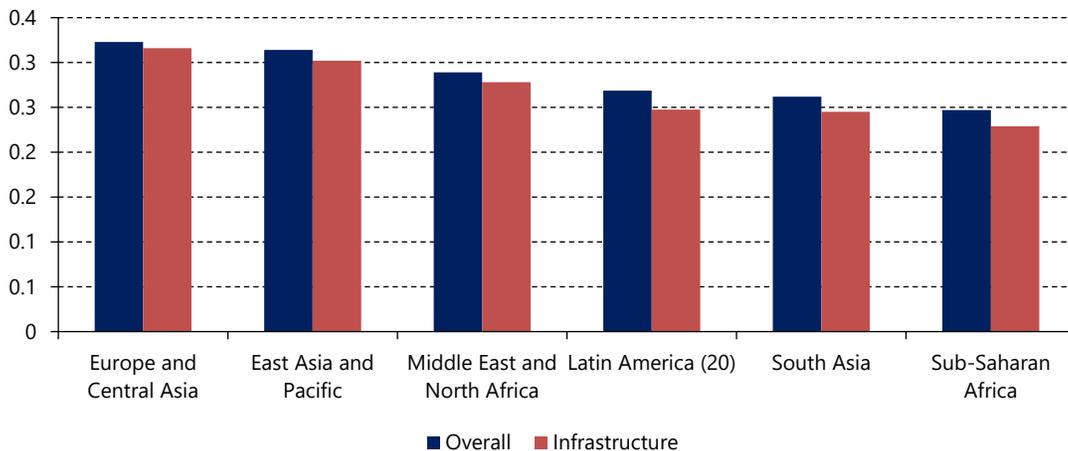
### **A. Persistent infrastructure gap in Latin America**

The continued shortage and insufficient quality of infrastructure services in Latin American countries, is illustrated by the population and/or household coverage of services in key infrastructure subsectors: rail and road transport; electricity; telecommunications; and drinking water and sanitation.

In the case of transport infrastructure, as it is shown below in chart 1, according to international perception indicators, the region is in fourth place in the world in terms of its overall logistic performance; currently and historically, it has performed only marginally better than South Asia and Sub-Saharan Africa. No country in the region is among the world logistics leaders (e.g. Panama was ranked 40<sup>th</sup> with an overall score of 3.34, when Germany was 1<sup>st</sup> scoring 4.23) and compared to other elements (sub-indicators), such as customs, international shipments, logistics quality and competence, tracking and tracing and timeliness, infrastructure generally has the worst score in the international perception by LA main trading partners (see chart 2). Despite a slight improvement between 2007 and 2016, the gap between the performance of the region and the

global leader (Germany) in infrastructure has been growing, reaching in 2016 the highest level since the start of the measurement of the LPI (from 1.76 to 1.96).

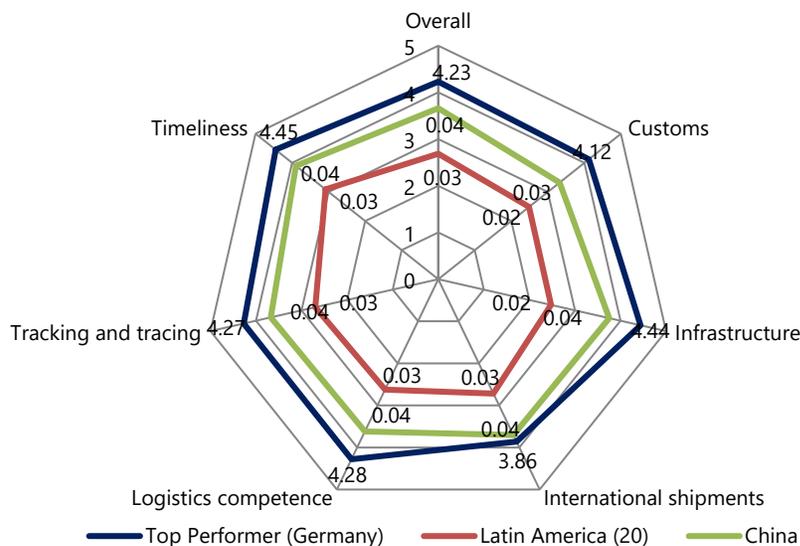
**Figure 1**  
**Latin America (20 countries) and other world regions: the International Logistics Performance Indicator (LPI), the overall and infrastructure subindicators, 2016**  
*(Score of the LPI's subindicators)*



Source: World Bank.

Note: Latin America is represented by 20 countries and the other world regions by the number of countries surveyed by the LPI (for more detail, visit <https://lpi.worldbank.org/>). Latin America (20) considers 20 countries that are members of ECLAC and conforming the Latin America group of countries: Argentina, Bolivia (Plur. State of), Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Rep. Ecuador, Guatemala, Honduras, Haiti, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Uruguay, Venezuela (Bol. Rep. of).

**Figure 2**  
**Latin America (20 countries), China and the World Top Performer: the International Logistics Performance Indicator (LPI), 2016**  
*(Score of the LPI's subindicators)*

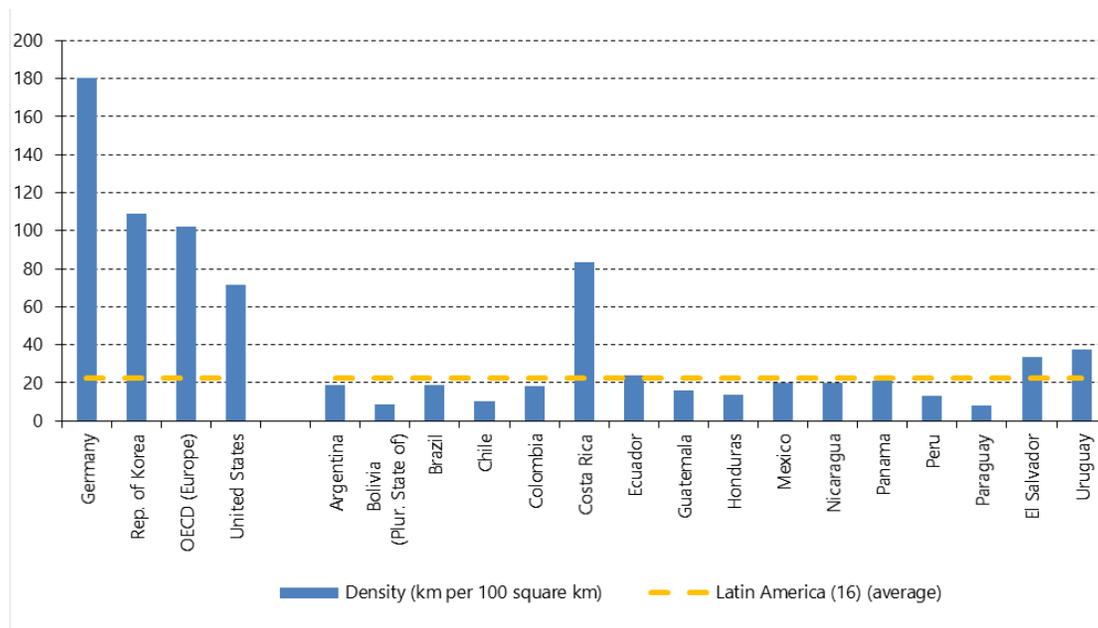


Source: World Bank.

Note: Latin America is represented by 20 countries (for more detail, visit <https://lpi.worldbank.org/>). See note of chart 1 concerning Latin America (20).

The basic data on transport infrastructure for road transport confirm perception indicators, demonstrating the insufficient level of land connectivity in the region. By 2015, the regional average of 22.8 km of road network per 100 km<sup>2</sup> was well below other countries or groups, such as Germany, the Republic of Korea, the OECD countries and the United States. See chart 3.

**Figure 3**  
**Latin America and the World (selected countries and regions): total road network density, 2015**  
*(In kilometers per 100 square kilometers)*



Source: Economic Commission for Latin America and the Caribbean (ECLAC) for Latin American countries and Organisation for Economic Cooperation and Development (OECD) for Germany, Rep. of Korea, United States and OECD (Europe).

Note: The average of Latin America considers 16 countries Argentina, Bolivia (Plur. State of), Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, and Uruguay.

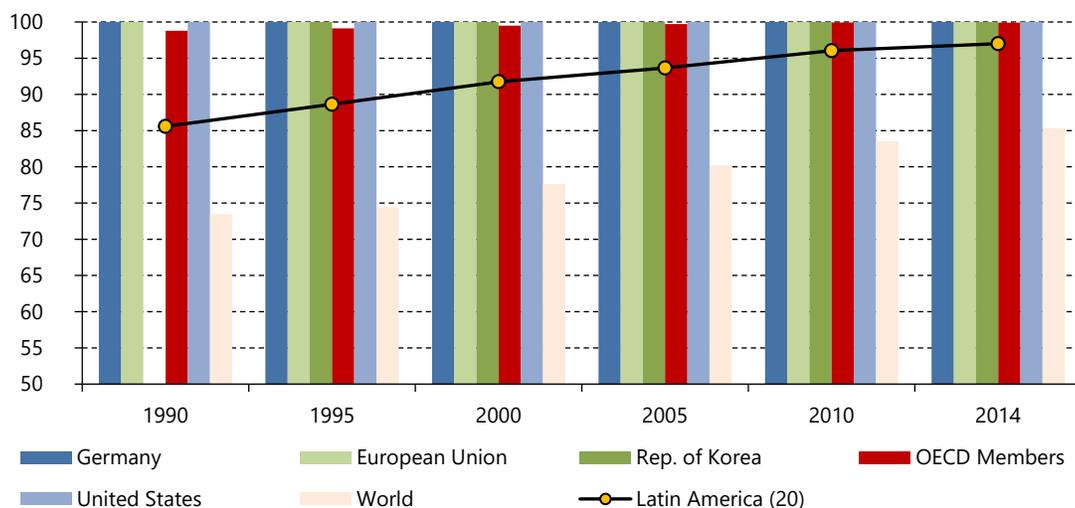
It should be noted that the region's average figures hide large divergences among countries in the region. Only four countries (Mexico, Argentina, Chile and Uruguay) are above the average road density of 22.8 km per 100 km<sup>2</sup>. Similarly, national averages conceal the high heterogeneity of land connectivity within countries. In the case of Brazil, for instance, the road density per capita varies widely between national sub-regions (according data from DNIT and IBGE, 2015). Divergences are even more pronounced when only paved roads are taken into consideration. Both road network quality (given by percentage of paved roads) and total coverage has improved in all countries of the region between 2007 and 2015. However, on average, only 23% of the road network in LA is paved, with half of the countries presenting paving levels below this regional average. Secondary and tertiary roads account for an average weight of 85% over the total network.

Compared to 2007 levels, the observed growth of the road network, that occurred in most LA countries, leading the regional average of 20.1 km in 2007 to the level of 22.8 km in 2015, translated into a positive evolution in terms of road density that is related to a vast territory. However, it should be noted that this positive development is much less important if population growth in the region is considered. In fact, the growth of the road density indicator by population is negative in most countries of the region. Contrary to this progress is the marked increase in the

number of vehicles per km of the total network in almost all the countries of LA, which in a period of less than 10 years has grown, on average, by 50%.<sup>2</sup>

In energy sector, Latin America has experienced a positive evolution in the past years as far as population access to electricity is concerned. In 2014, the coverage gap was of 3.0%, whereas in 1990 it was estimated to be at least 14.4%. This progress is nonetheless not enough, as the 2014 figure indicates that more than 18.4 million people in the region still lacked access to electricity. See chart 4.

**Figure 4**  
Latin America and the World (selected countries and regions): proportion of population with access to electricity, 1990-2014  
(In percentage of total population)



Source: World Development Indicators (World Bank) (data downloaded in July 1st, 2017).

Note: See note of chart 1 concerning Latin America (20).

In urban areas, the lack of coverage in 2014 corresponded to an average of 0.9% (more than 4.4 million people). In rural areas, however, the percentage of the population lacking access to electricity in 2014 was 11.4% (more than 14.7 million people). Whilst there has been significant progress between 1990 and 2014, the effort required to cover the shortfall has not been sufficient, leaving LA behind other economies from the standpoint of urban and rural areas.

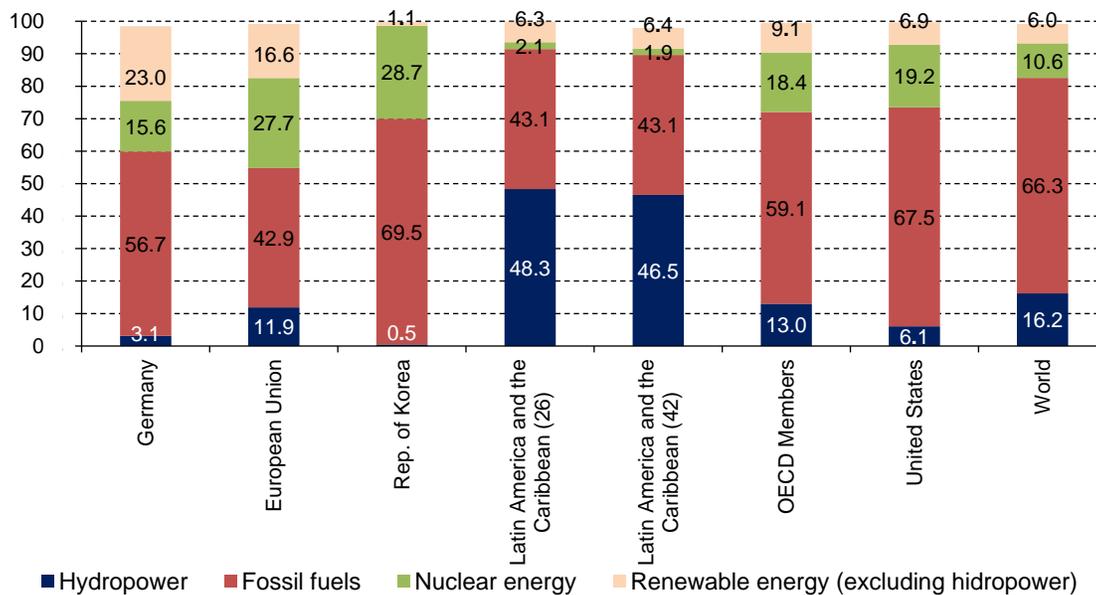
The heterogeneous situation of each country of the region, in economic, social and geographical terms, including topography and climate, leads to dissimilar coverage results. Particular attention should be paid to LA countries that are below the regional and global average of access to electricity, a problem lying mainly in rural villages.

In contrast, Latin America and the Caribbean has one of the world's cleanest electric generation matrices. This is because the region makes greater use of hydraulic sources, and, within the use of fossil sources, a greater use of natural gas. However, the low share of electricity production from renewable

<sup>2</sup> For more details and explanations see Sánchez et al., 2017.

(non-hydro) sources, as compared to the reference economies (apart from the Republic of Korea), is noteworthy. See charts 5 and 6.

**Figure 5**  
**Latin America and the World (selected countries and regions): share of different power sources**  
**in electricity generation, 2014**  
*(As percentage of total electricity generation)*



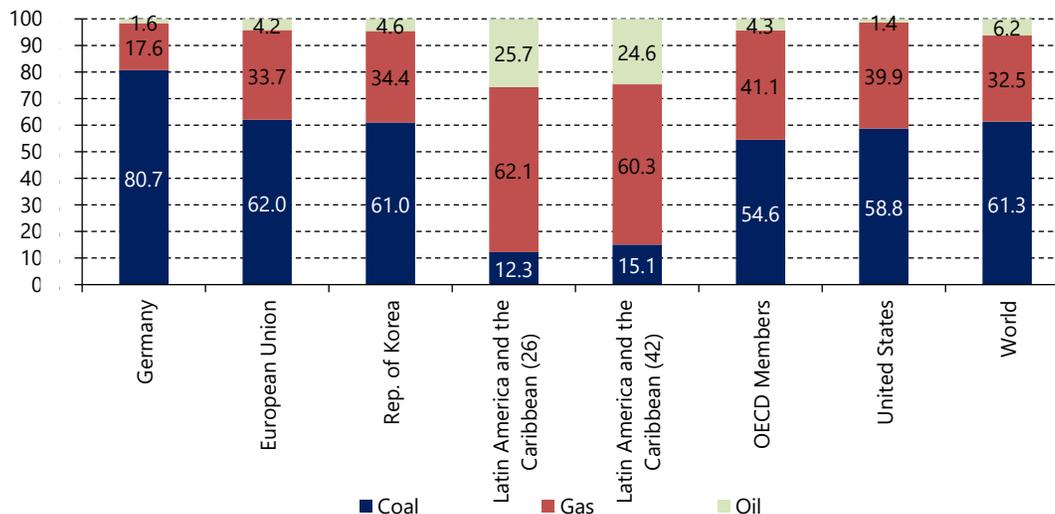
Source: World Development Indicators (World Bank) (data downloaded in July 1st, 2017).

Note: Latin America and the Caribbean (42 countries), LAC (42), considers 42 countries of the region according World Bank's classification; Latin America and the Caribbean (26 countries), LAC (26), considers 26 countries of the region excluding high income economies according World Bank's classification; electricity production shares may not sum to 100 percent; fossil fuels refers to coal and derived fuels, gas (excluding natural gas liquids) and crude oil and petroleum products; renewable sources (excluding hydroelectric) includes geothermal, solar photovoltaic, solar thermal, tide, wind, industrial waste, municipal waste, primary solid biofuels, biogases, biogasoline, biodiesels, other liquid biofuels, nonspecified primary biofuels and waste, and charcoal.

Thus, the region has certain advantages for the future, such as the relatively low level of energy intensity, which is related to energy efficiency and GHG emissions. Although unconventional renewable sources still occupy a small share in the matrix, they represent opportunities for marginalized rural and urban populations. In the pursuit of sustainable development, the region should prioritize these sources to achieve inclusive growth decoupled from negative environmental impacts. (For more details and explanations see Sánchez et al., 2017).

In telecommunications sector, in 2015, LA displayed an average of 10.5 fixed broadband subscriptions per 100 inhabitants and an average of 57.9 mobile broadband subscriptions per 100 inhabitants. Regarding mobile telephony networks, the coverage was over 90% for third generation (3G) and around 70% for fourth generation (4G) in the first quarter of 2017, in a sample of 18 of the region's countries. Nevertheless, there is still a wide demand gap, since the average number of subscribers is only 53% of the population covered.

**Figure 6**  
**Latin America and the World (selected countries and regions): share of different fossil fuel sources in electricity generation, 2014**  
*(As percentage of total electricity generated from fossil fuel sources)*



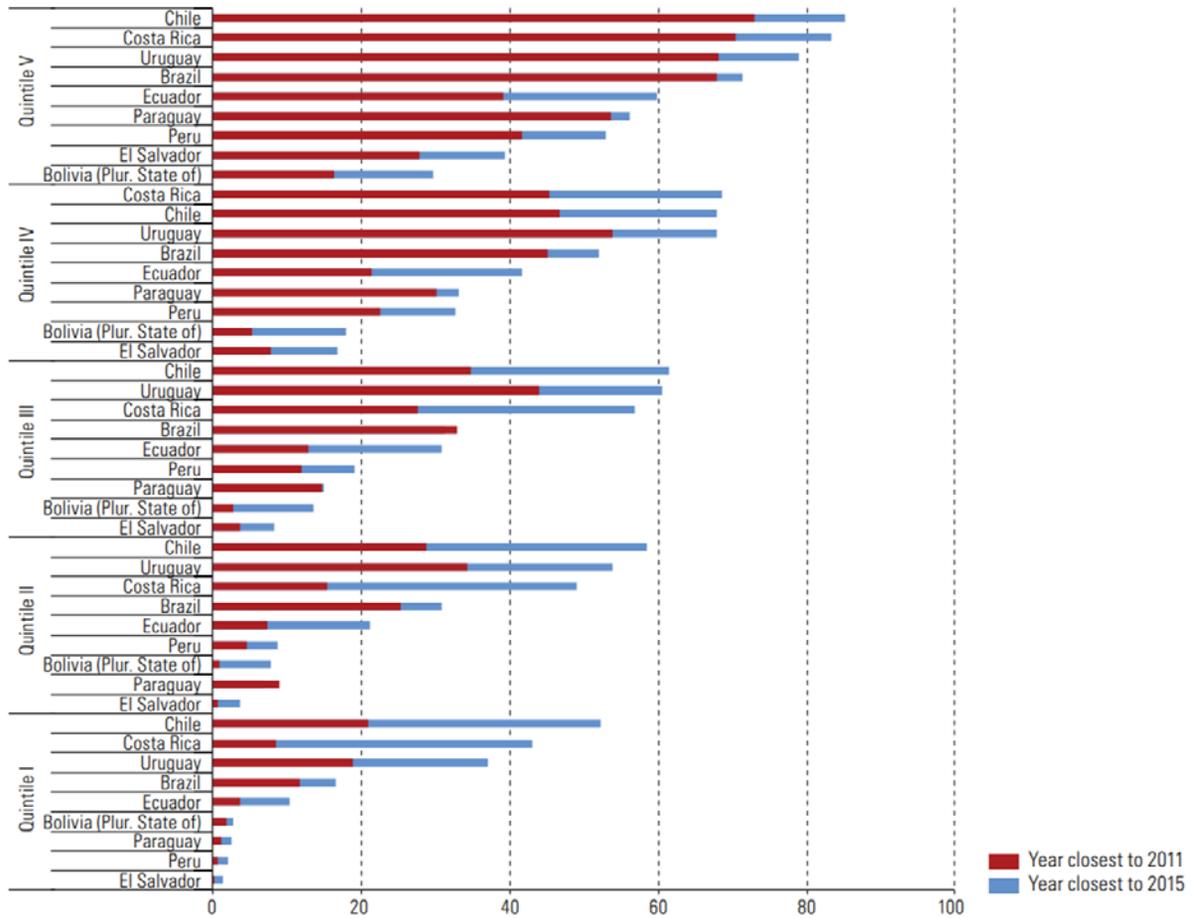
Source: World Development Indicators (World Bank) (data downloaded in July 1st, 2017).

Note: Latin America and the Caribbean (42 countries), LAC (42), considers 42 countries of the region according World Bank's classification; Latin America and the Caribbean (26 countries), LAC (26), considers 26 countries of the region excluding high income economies according World Bank's classification; fossil fuels refers to coal and derived fuels, gas (excluding natural gas liquids) and crude oil and petroleum products.

The access to telecommunication services, as well, is subject to major disparities among income groups. Although internet access has increased in nearly all income quintiles in Latin American countries in recent years, the difference in the number of households with access to this technology between the highest and lowest income quintile remains enormous: nearly four times more in Chile and Costa Rica; between eight and nine times in Uruguay, Ecuador and Brazil; 21 in the Plurinational State of Bolivia; and 45 times in Peru (see chart 7). This hinders online access to health, education and government services, besides impairing e-commerce among Latin American economies.

The region also displays significant differences in the speed of broadband connections (and, therefore, their quality). For instance, speeds are almost six times higher in Chile and Uruguay than in Paraguay (see chart 8). Nonetheless, speeds in even the most advanced countries in the region are only around half the average for the countries of the Organization for Economic Cooperation and Development (OECD). This indicates that the infrastructure gaps analyzed above are also present in the infrastructure that is supposed to support the technological revolution.

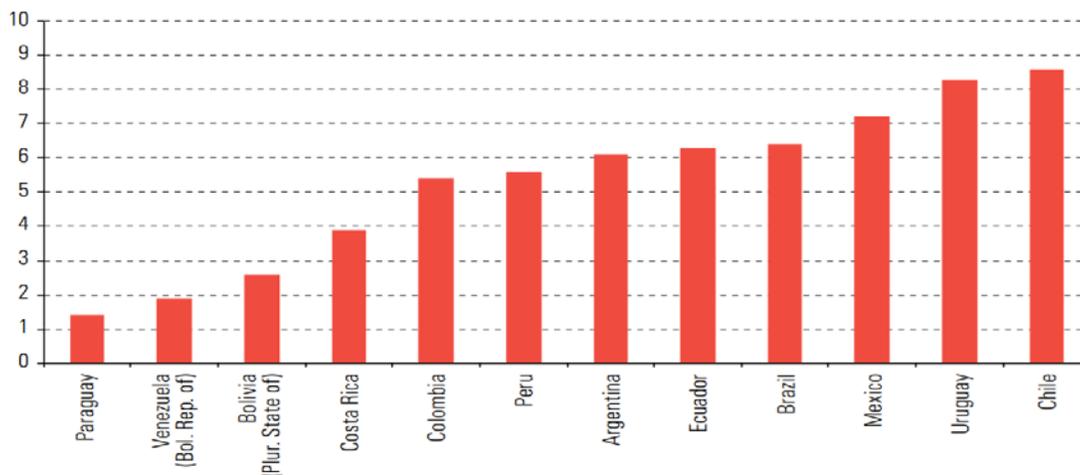
**Figure 7**  
**Latin America (9 countries): households with internet access by income quintile, around 2011 and 2015**  
*(Percentage points)*



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA), on the basis of household surveys.

Note: The methodology used to calculate household per capita income was altered between the periods considered. The types of Internet connection that are included in the different countries are the following: in Paraguay, Internet by cable or wi-fi and Internet by USB modem; in Ecuador, dial-up, dedicated line, cable modem and mobile broadband (MBB); in Uruguay, fixed-line broadband (FLB), MBB and dedicated line; in Chile, fixed broadband (FBB) and MBB, either contracted or prepaid, in addition to mobile phone or another mobile device. In Costa Rica, the question is posed per housing unit, which could include more than one household.

**Figure 8**  
**Latin America (12 countries): Internet connection speeds, fourth quarter of 2016**  
*(Megabits per second (Mb/s))*

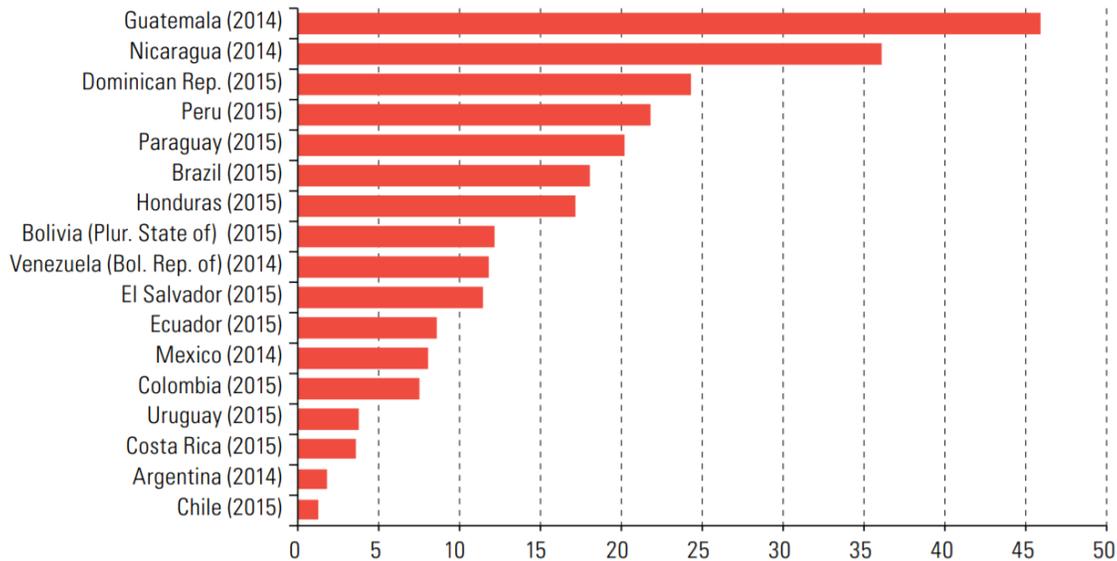


Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA), on the basis of Akamai Technologies, Akamai's State of the Internet. Q1 2016 Report, vol. 9, No.1, Cambridge, June 2016.

The region also faces gaps regarding the provision of basic drinking water and sanitation infrastructure –both in quantitative and qualitative terms. Population in LA without at least basic access to improved water sources in 2015 was 3.8%, equivalent to 23.6 million people. In turn, the coverage gap of sanitation facilities in the same year was 14.4%, meaning that 89.4 million people lacked access to this quality of service.

As in the case of electricity, coverage and access to water and sanitation services in LA countries varies in areas of population settlement with different demographic and socio-economic characteristics. In other words, disparities are amplified in the comparison between rural and urban areas, and among income groups. Sanitation coverage, for instance, is broader among households in the highest income quintile than in the lowest quintile (see chart 9); besides, the gap is wider in rural areas than in cities, indicating a differential of coverage significantly higher than in other regions of the world.

**Figure 9**  
**Latin America and the Caribbean (17 countries): differences in sanitation coverage between urban households in the highest and lowest income quintiles**  
*(Percentage points)*



Source: Economic Commission for Latin America and the Caribbean (ECLAC), based on the Household Survey Data Bank (BADEHOG).

Furthermore, in terms of technological quality, the means by which water and sanitation are provided in the lowest-income households are not comparable with water provision in higher-income households. In the case of water, for instance, access is often intermittent and vulnerable to interruptions caused by droughts and other factors. Gaps in the provision of water and sanitation services are also associated with the persistence of a high share of the population living in slums (21% of the Latin American population in 2014). Inhabitants of such settlements frequently face higher risks of exposure to communicable diseases and environmental disasters.

## **B. Public policies and the role of Governments in infrastructure development in Latin America**

As it has been observed, the shortage of economic infrastructure endowment remains one of the main features of Latin America and the Caribbean, affecting directly and indirectly the region's capacity to maximize the positive impact of infrastructure in the promotion of sustainable development. In that context, public infrastructure policies could play a direct role in improving the infrastructure endowment as long as a profound change in the way they are designed, implemented and assessed is achieved. The persistent shortage and poor quality of infrastructure services in the region can be explained, to a great extent, by two major public infrastructure policy shortcomings. First, current investment levels are not enough to satisfy the needs arising from countries' growth in the medium and longer terms. Second, public approaches to infrastructure and its services in the region are scattered and unsystematic, resulting in an inefficient supply of services and a lack of adequate infrastructure (Jaimurzina and Sánchez, 2017).

A summary of the evolution of infrastructure investment throughout the main economic and political cycles in Latin America (from 1980 to 2015) is presented in chart 11. The highest infrastructure investment coefficients in the region were observed in the eighties, when the sum of public and private investment reached its highest value (an average of 3.6% of GDP between 1980 and 1989, with a maximum of 4.1% of GDP in 1987). During this period, known as the Lost Decade, a considerable fiscal adjustment and debt restructuring followed an unsustainable public debt—mostly originated from a combination of a change in external borrowing conditions, socialization of private debt and government fiscal excess; in this context, by the end of the eighties, the public sector reduced its participation in total infrastructure investment as a percentage of GDP, as it assumed a more passive role in infrastructure development than the one it had played until then.

In fact, several programs were launched in the first half of the nineties aiming to tackle the economic stagnation and inflation resulting from the financial (debt) crisis experimented in the eighties; these stabilization and reform programs were based—to different degrees according to the country—on policy recommendations made by the Washington Consensus, which advocated for the free market operation and the reduction of state involvement through fiscal discipline, privatization, deregulation, and liberalization of trade and inward foreign direct investment, among other measures. In this period, private investment responded with greater dynamism but without compensating for the drop in public investment, leading to a noteworthy decrease in total infrastructure investment. In the nineties, the highest infrastructure investment coefficients in the region were observed in the first years of the decade, when public investment still exceeded the private (an average of 2.2% of GDP between 1990 and 1999, with a maximum of 2.5% of GDP in 1992).

Although economic reactivation was achieved in the nineties and the region could experiment a new financial cycle, with greater economic growth in comparison with the Lost Decade, that period was marked by strong external and internal turbulences. They took place, mainly, between 1997 and 2002: on the one hand, the Asian crisis and that of the Russian Federation and Turkey, and, on the other hand, the crises in Brazil, Ecuador and Argentina. In this context, after the market-oriented structure reforms and an observed procyclical bias of fiscal and monetary policies, the private investment in infrastructure also retreated and, without a recovering of the public one, the coefficients of investment in infrastructure reached their lowest value at the start of the new millennium (1.5% of GDP in 2003).

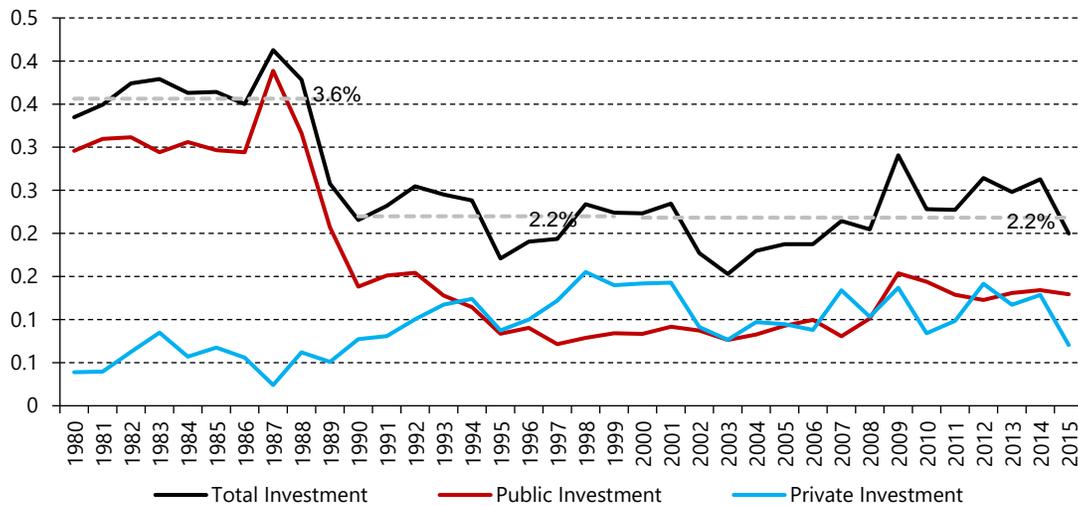
Starting in 2003, the improvement of the terms of trade (due to the super cycle of prices of commodities fed by a higher global demand, mainly from Asia, and to some supply-side restrictions) allowed Latin America to experiment a stage of greater growth and relative stability.<sup>3</sup> Although this scenario was abruptly interrupted by the global financial crisis of 2008-2009, the region economies were able to demonstrate remarkable resilience in the face of the crisis and subsequent processes, such as the deceleration of its external markets, the downturn in commodity prices, and a sluggish of both global economic and trade growth. That was achieved due to countercyclical policies and the countries' ability to quickly regain access to financial markets (despite a sharp decrease of the region GDP growth rates in 2014 and a GDP decrease in 2015). Between 2004 and 2015, the coefficients of investment in infrastructure in the region were improved

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<sup>3</sup> Regarding the latter, except for Argentina and the Rep. Bol. of Venezuela, where nowadays the exchange rate has depreciated, and inflation has reached, respectively, the two and three digits per annum.

in comparison with the first years of 2000 (an average of 2.2% of GDP between 2000 and 2015, with a maximum of 2.9% of GDP in 2009). That was mainly due to public investment, given that that investment from private sources displayed a fluctuating behavior in those years, and a notable drop in 2015.<sup>4</sup>

**Figure 10**  
Latin America (selected countries): infrastructure investment, by financing sector, 1980-2015  
(As percentage of GDP)



Source: 1980-2006: Calderón, César and Luis Servén, 2010, "Infrastructure in Latin America", World Bank Policy Research Working Paper 5317; 2007-2015: CEPAL and BID/CAF/CEPAL initiative (Infralatam).

Note: The selected countries are Argentina, Brazil, Chile, Colombia, Mexico and Peru; the main sectors and subsectors included are transport (only roads and railways), energy (only electricity), telecoms, and water and sanitation; in Argentina, the public investment in transport has not been segregated by transport mode, thus the total of public investment in transport has been considered.

For recent years, indicators do not show, *prima facie*, that Latin America has a particularly low level of infrastructure investment as a percentage of GDP, when compared with those of other countries or regions of the world. An example is given by the average infrastructure investment in the transport sector (rail and road subsectors) between 2008-2015, measured as a percentage of GDP (see chart 12); although the coefficient for Latin America is four times lower than that of China, it is only slightly lower than that of the Russian Federation, and it surpasses, to a greater or lesser extent, those of the other selected economies (including Japan, the Republic of Korea and the European Union economies).

However, as demonstrated by the empirical evidence, the stock of infrastructure in LA and the level and quality of provision of some of its services are neither adequate nor sufficient to meet the demand originated by economic and population growth. Furthermore, it is not sufficient to ensure universal coverage is achieved.

In this context, different studies have shown that there is an infrastructure gap in the region, and that it is both vertical and horizontal. That means it could respond to economic and/or demographic factors, in a sense that supply is not enough to meet demand and, therefore,

<sup>4</sup> For more information and details see Lardé and Sánchez (2014) and CEPAL (2013).

economic growth; or it could respond to certain coverage objectives, which, in the case of Latin America, have not been met—that is, the universal access to basic services provided by the economic infrastructure, such as water and sanitation, electricity and telecommunications. An example is given by Perrotti and Sánchez (2011), who conclude that it would be necessary to invest annually around 5.2% of the region's GDP, between 2006 and 2020, to meet the needs arising from companies and individuals, assuming an average annual economic growth of 3.9% (vertical gap). The same study estimates that, if the intention were to close the gap with respect to a group of countries from East Asia, expenditures would be annually 7.9% of the regional GDP (horizontal gap). The calculation of the vertical gap was subsequently adjusted to 6.2% of the GDP for the period 2012-2020. That is, the average levels of investment observed in the countries of the region have been low in relation to the values recommended by Perrotti and Sánchez and others.

A recent study by Sánchez, Lardé, Chauvet and Jaimurzina (2017) confirms this trend. It demonstrates, through an approach that considers infrastructure as a factor of production in addition to the workforce, that the annual investment (including maintenance and repair) needs in Latin America would correspond to 2.0%, 3.5%, 4.7% and 6.0% of the regional GDP between 2016 and 2030, according to four scenarios of GDP growth (1.4%, 2.5%, 3.2% and 3.9%, respectively). To these estimations, a second approach used by the authors could be added: it considers the level of infrastructure investment necessary for achieving full universal access or coverage of basic infrastructure services in three subsectors (electricity, fixed broadband and water and sanitation). Considering the same GDP growth scenarios and taking into account growth projections of population or household size, according to the case, the annual investment needs (including maintenance and repair) for the period of fifteen years would be of 1.7%, 1.6%, 1.5% and 1.4% of the regional GDP correspondingly to each GDP scenario.<sup>5</sup>

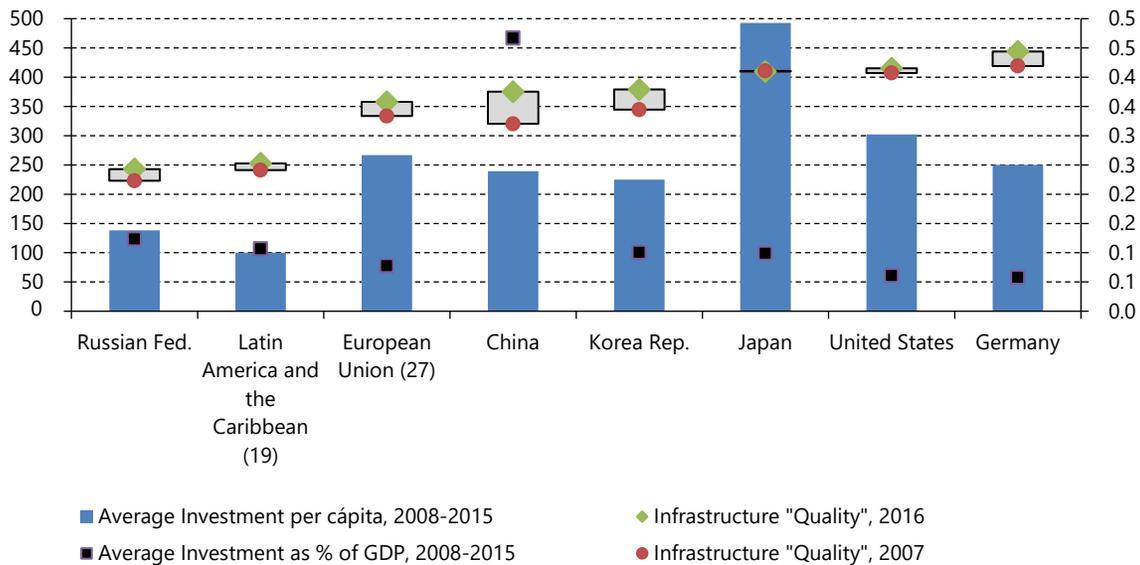
Secondly, it should be noted that other economies have invested in infrastructure during long periods not only at a more stable rhythm, but also at higher levels in terms of both GDP percentage and per capita. That is the current case of China's investments in transport infrastructure. When compared to Latin America, other countries and regions, such as those mentioned above and displayed in chart 11, have been investing in infrastructure at a faster pace in the past and have reached a higher level of infrastructure provision and quality. In addition, such economies continue to devote greater amounts of investment to infrastructure, in terms of the number of their inhabitants (per capita), than those destined by Latin American countries. See again the chart 12, where it can be noticed the average amount per capita invested in transport (rail and road) for each country or group and the quality of their infrastructure in 2016 compared to 2007. Between 2007 and 2016, the quality of the transport infrastructure was improved in most of the countries, notably in China, Korea Republic, Russian Federation, European Union and Germany—economies that have reached a level of quality superior to the average index score, but which continue to allocate more resources per capita than Latin America.<sup>6</sup>

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<sup>5</sup> For more details about the methodologies please see Perrotti and Sánchez (2011) and Sánchez et al. (2017).

<sup>6</sup> The average estimate for Latin America and the Caribbean, represented by 19 countries, is 100 dollars per capita for the period 2008-2015, in 2010 dollars, in rail and road transport investment.

**Figure 11**  
**Latin America and the Caribbean (19 countries) and selected world economies: average infrastructure investment in the transport sector, 2008-2015, and the infrastructure subindicator of LPI index, 2007 and 2016**  
*(Average of investment per capita in constant 2010 dollars —left axis—, and score of the LPI's subindicator of infrastructure and average investment as percentage of GDP —right axis—)*



Source: Infralatom, OECD, and World Bank.

Note: the infrastructure investment in the transport sector includes only the rail and road subsectors; Japan's and Korea Rep.'s investment average per capita in constant 2010 dollars correspond respectively to the period 2008-2014 and 2008-2013; it is used the infrastructure component (subindicator of the "quality of transport and trade infrastructure") of the World Bank's Logistic Performance Indicator (LPI) to measure the infrastructure quality; Latin America and the Caribbean is represented by 19 countries and European Union by 27.

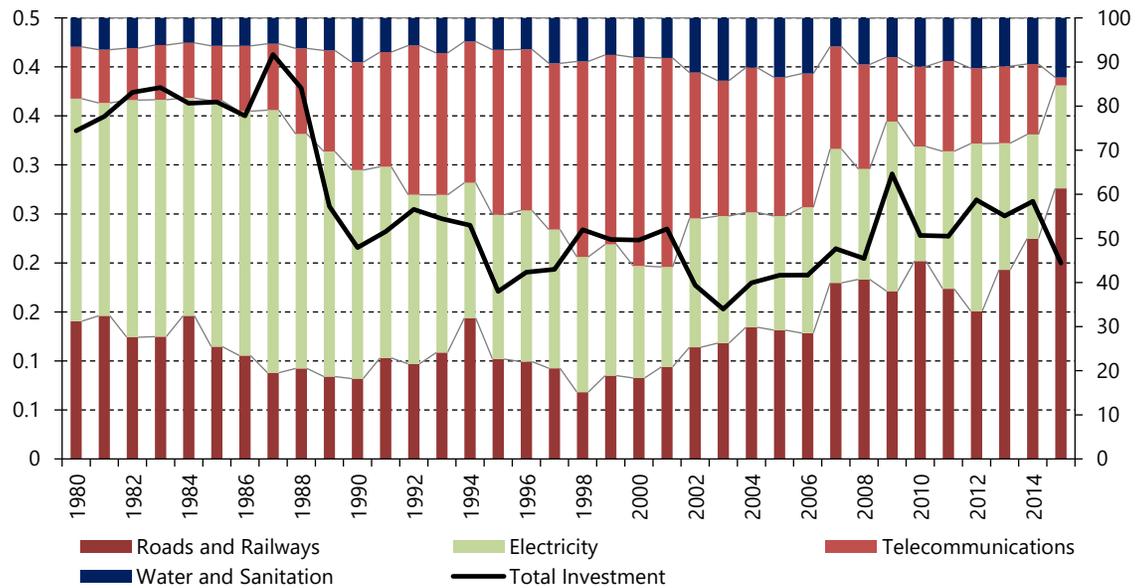
Based on the work of Sánchez et al. (2017), it is possible to calculate how much it would be necessary to invest per capita in the four subsectors of infrastructure that have been considered (road and rail transport, electricity, telecommunications and drinking water and sanitation), both in order to meet the demand (due to economic growth) and to achieve universal coverage. In the first case, the annual capital needs, including those for maintenance and repairs, would be 362, 506, 686 dollars per capita from 2016 to 2030, assuming economic growth scenarios of 2.5%, 3.2 and 3.9% respectively. To these amounts it could be added the corresponding for the achievement of universal coverage, which is 159 dollars per capita per year for the same period. That is, given the current situation, LA must make a superior effort to reach, in terms of its population, the levels of investment in infrastructure of the top performing countries.<sup>7</sup>

Another element to be considered is whether infrastructure investment follows a pattern in the medium-long-term, meaning that it could be part of a scheduled plan of infrastructure investment, or whether it is a lagged answer to the economic and political scenarios facing the countries of the region. Even though the infrastructure investment estimations for LA are based on six countries among which there are heterogeneities that should be taken into account, the

<sup>7</sup> These estimations were calculated for Latin America (represented by 20 countries), based on Sánchez et al. (2017) and population estimates and projections from CELADE, ECLAC.

distribution of the quantities as percentages of the total for each destination sector/subsector has varied over time, that is, there would not be a pattern in the long run. This can be seen in chart 12. Between 1980 and 2015, the subsector that received most of the total investments was energy (electricity) (37%), followed by transport (rail and road) (29%) and telecommunications (25%), and then, in last place, water and sanitation (9%) —which shows a more stable share.

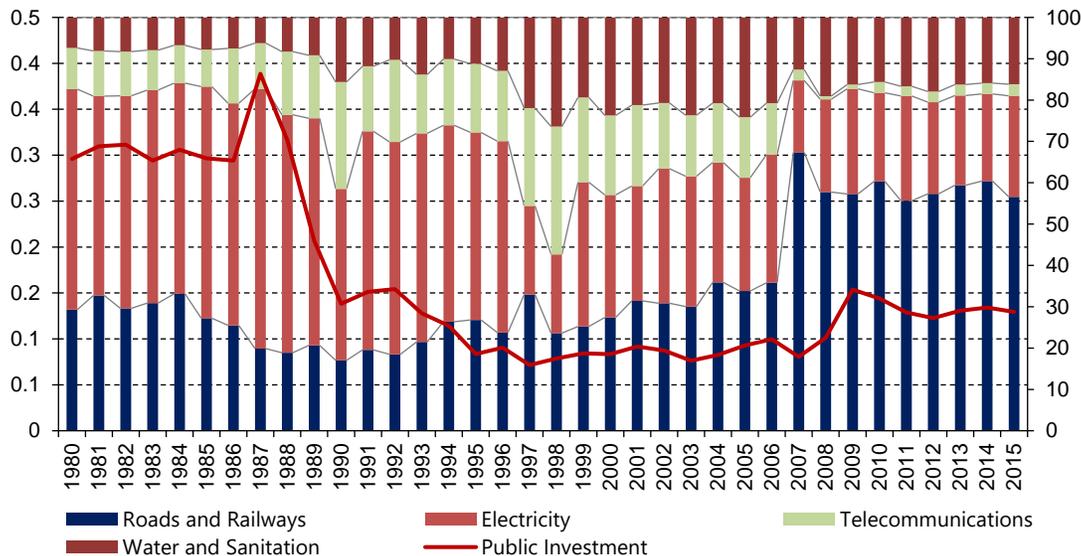
**Figure 12**  
**Latin America (selected countries): infrastructure investment, distribution by sector/subsector, 1980-2015**  
*(Total investment as percentage of GDP —left axis— and sector/subsector share distribution in percentages —right axis—)*



Source: 1980-2006: Calderón, César and Luis Servén, 2010, "Infrastructure in Latin America", World Bank Policy Research Working Paper 5317; 2007-2015: CEPAL and BID/CAF/CEPAL initiative (Infralatam).  
 Note: see figure 11.

**Figure 13**  
**Latin America (selected countries): infrastructure investment by public financing, distribution by sector/subsector, 1980-2015**

(Total investment as percentage of GDP —left axis— and sector/subsector share distribution in percentages —right axis—)

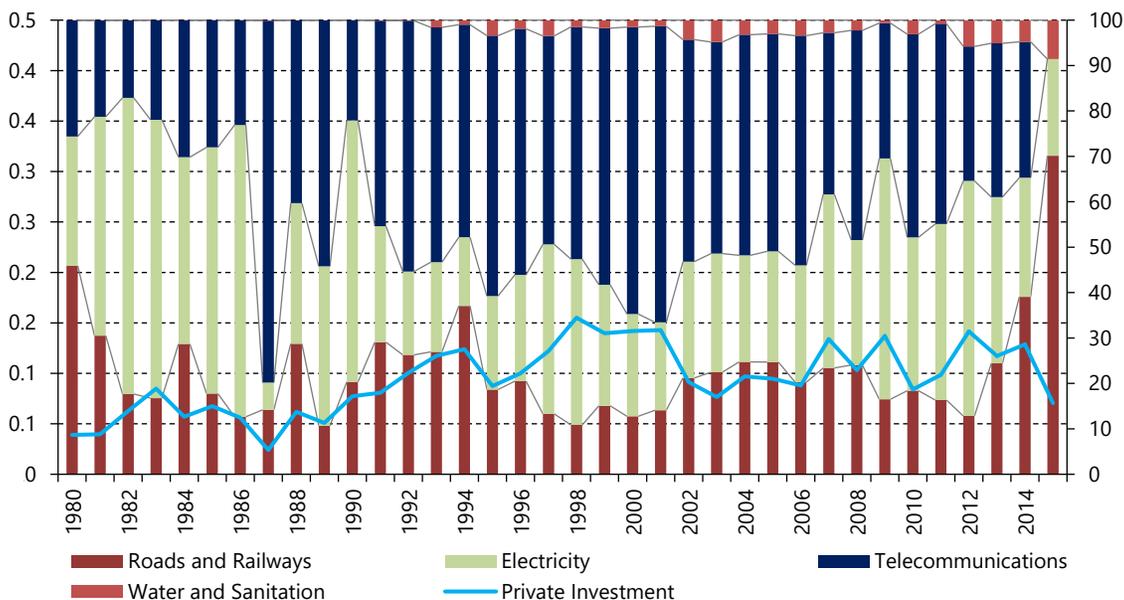


Source: 1980-2006: Calderón, César and Luis Servén, 2010, "Infrastructure in Latin America", World Bank Policy Research Working Paper 5317; 2007-2015: CEPAL and BID/CAF/CEPAL initiative (Infralatam).

Note: see figure 10.

**Figure 14**  
**Latin America (selected countries): infrastructure investment by private financing, distribution by sector/subsector, 1980-2015**

(Total investment as percentage of GDP —left axis— and sector/subsector share distribution in percentages —right axis—)



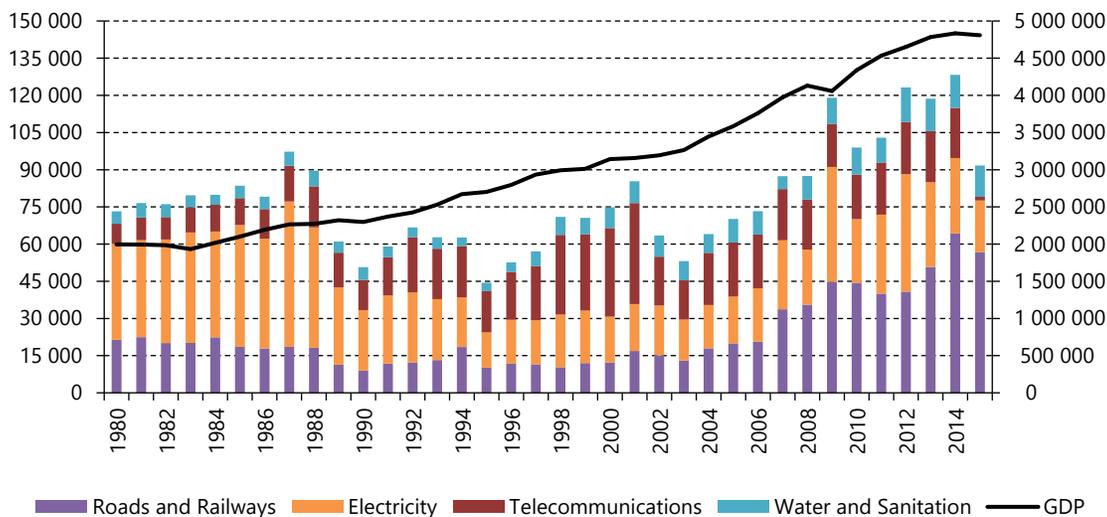
Source: 1980-2006: Calderón, César and Luis Servén, 2010, "Infrastructure in Latin America", World Bank Policy Research Working Paper 5317; 2007-2015: CEPAL and BID/CAF/CEPAL initiative (Infralatam).

Note: see figure 10.

By introducing the GDP of selected Latin American countries in the analysis, it is possible to assess the relationship between infrastructure investment and the underlying economic scenario. With that purpose, correlation coefficients are calculated for: total income (GDP) and total infrastructure investment; total income and public infrastructure investment; and total income and private infrastructure investment. For an analysis with datasets valued at current prices, a very high linear relationship is found between GDP and total infrastructure investment (0.97) in the selected countries. Correlation is also high between GDP and the amount invested by the public (0.89) and the private sectors (0.95).

In turn, when datasets are deflated and analyzed in 2010 values, no statistical relationship is found between public investment in infrastructure and GDP (see chart 16). On the other hand, a high correlation is found between private investment and GDP (0.84). Correlation coefficients vary according to the sector, but private investment in infrastructure is more positively correlated to GDP than public investment in all the individual sectors assessed. When it comes to total investment for the deflated datasets, a weaker, but positive correlation with GDP is found (0.61).

**Figure 15**  
**Latin America (selected countries): GDP and infrastructure investment, distribution by sector/subsector, 1980-2015**  
*(Total investment in absolute terms and distributed by sector —left axis— and GDP —right axis— values in millions of 2010 US\$)*



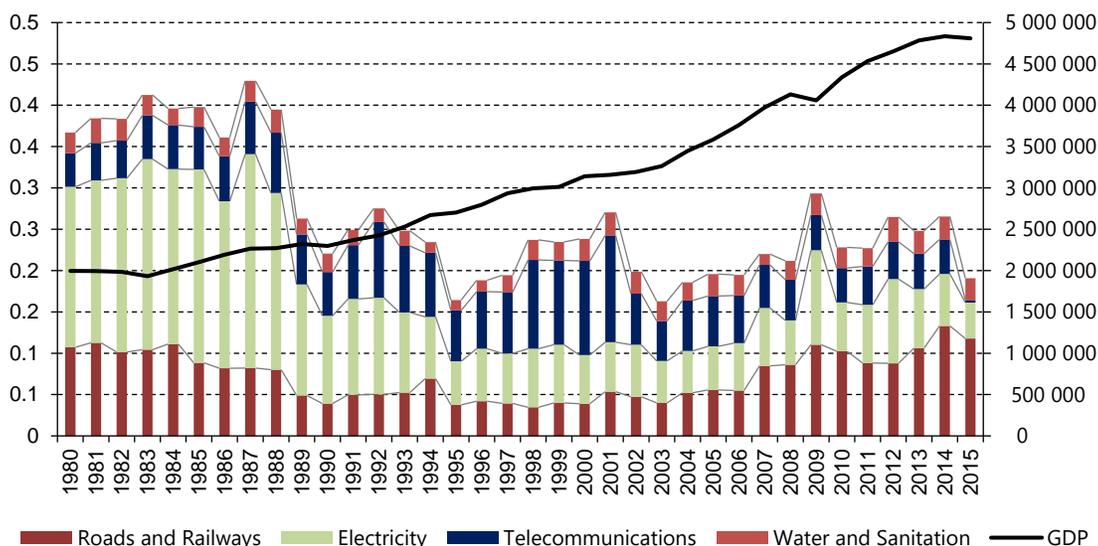
Source: 1980-2006: Calderón, César and Luis Servén, 2010, "Infrastructure in Latin America", World Bank Policy Research Working Paper 5317; 2007-2015: CEPAL and BID/CAF/CEPAL initiative (Infralatam).  
 Note: see figure 10.

Also, it is possible to analyze the relationship between GDP and investment rates in infrastructure from two different standpoints. The first is the distribution of investment by sector: transport (represented by roads and railways), electricity, information and communication technology (referred as ICT o telecommunications) and water and sanitation (see chart 16); the second is the distribution of investment according to the sphere: public and private (see chart 17). Regardless of the perspective adopted, it is possible to notice that infrastructure investment in the selected countries has been through two different stages: the period 1980-1988, when infrastructure

investment reached an average rate of 3.9% of GDP, and the period 1989–2015, with an average infrastructure investment rate of 2.3% of GDP.

Chart 17 shows that, in the first period, infrastructure investment was driven mainly by the implementation of electricity projects. ICT gained particular relevance from 1992 until 2001, and transport, which had a low participation in total investment in the period 1989–2006, recovered its importance in 2007, becoming the infrastructure sector receiving the highest amount of investment in the period 2013–2015.

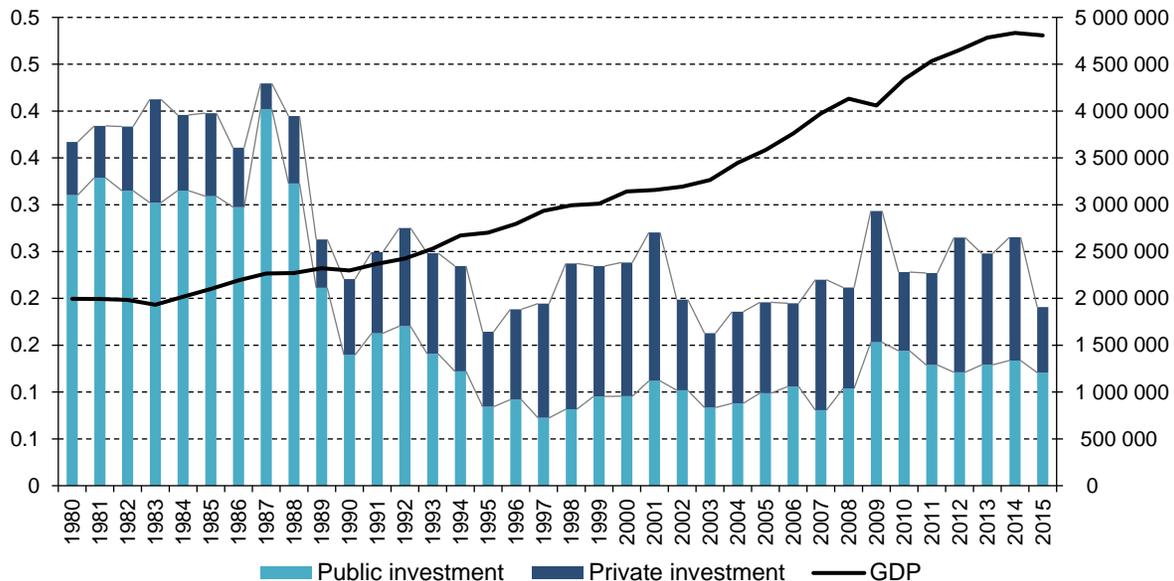
**Figure 16**  
**Latin America (selected countries): GDP and rates of infrastructure investment as percentages of GDP, distribution by sector/subsector, 1980–2015**  
*(Infrastructure investment by sector as percentage of GDP —left axis— and GDP —right axis— values in millions of 2010 US\$)*



Source: 1980–2006: Calderón, César and Luis Servén, 2010, "Infrastructure in Latin America", World Bank Policy Research Working Paper 5317; 2007–2015: CEPAL and BID/CAF/CEPAL initiative (Infralatom).  
 Note: see figure 10.

As displayed by chart 18, another remarkable feature differentiates the periods 1980–1988 and 1989–2015. Whereas the public sphere was responsible by an average of 82% of total infrastructure investment in the first period, that rate would fall to an average of 52% in the second period. That means the sharp decrease of the total infrastructure investment rate since 1987 could be explained, to a great extent, as a drop of public investment in infrastructure —being the electricity sector the most affected. That gap was partially filled by an increase of private investment, which was observed mainly in the ICT sector.

**Figure 17**  
**Latin America (selected countries): GDP and rates of public and private infrastructure investment as percentages of GDP, 1980-2015**  
*(Infrastructure investment as percentage of GDP —left axis— and GDP —right axis— values in millions of 2010 US\$)*



Source: 1980-2006: Calderón, César and Luis Servén, 2010, "Infrastructure in Latin America", World Bank Policy Research Working Paper 5317; 2007-2015: CEPAL and BID/CAF/CEPAL initiative (Infralatom).

Note: see figure 10.

### C. Public Private Partnerships (PPPs) in infrastructure: regional experience and lessons learned

Public-Private Partnerships (PPPs) are a contractual method for procuring and delivering public assets (either new or upgraded existing assets) and public services. A universally accepted definition for the concept of PPP does not exist, as the terminology is subject to variations according to the context in which it is used. In some of them, PPPs are used to denote any form of association between the public and private sectors for reaching a common goal (ADB, EBRD, IDB, IsDB, MIF, PPIAF and WBG, 2016).

A narrow definition<sup>8</sup> for PPPs, however, is provided by the World Bank and deemed suitable for the purposes of the present study: "A long-term contract between a public party and a private party, for the development (or significant upgrade or renovation) and management of a public asset (including potentially the management of a related public service), in which the private agent bears significant risk and management responsibility through the life of the contract, provides a significant portion of the finance, and remuneration is significantly linked to performance and/or the demand for or use of the asset or service, so as to align the interest of both parties" (ADB et al., 2016).

<sup>8</sup> It is called a narrow definition because it introduces the private participation in the financing of PPP contracts as a necessary condition. The broad definition of PPP includes all the features indicated as essentials but not the private finance which would not be a condition to be the PPP a method for delivering public infrastructure and/or services as an alternative to conventional procurement.

## 1. PPPs and infrastructure development

As an arrangement for procuring infrastructure and services, PPPs have gained importance in emerging markets and developing economies as a tool for addressing structural bottlenecks once they could provide access to private capital and expertise in a programmatic manner. There is a set of important benefits they could bring about as long as a set of conditions and circumstances are in place. Such motivations could be put together in three groups: those related to the financial nature of PPPs, the ones related to project effectiveness and efficiency, and others related to expertise and innovation. Some of these benefits, as identified by ADB et al. (2016) and Rozas, Bonifaz and Guerra-García (2012), are discussed below, as long as with some caveats concerning their validity.

### a) Financing

Through the mobilization of financial resources from the private sector, PPPs allow infrastructure projects to be developed in contexts where there are budget constraints and urgent social needs to be met. As an alternative method for financing infrastructure, PPPs may open the possibility of increasing social expenditures without compromising fiscal stability and inflation control, allowing the implementation of ambitious development programs which otherwise would not be put in place. This is particularly relevant in contexts where public borrowing is limited by fiscal regulations and the debt level is close to prescribed limits.

The fact that, under a PPP, funds to finance infrastructure could come from the private partner (in the form of equity plus debt, raised through a PPP vehicle), rather than from the government budget, does not necessarily imply that the investment will not be accounted for as public debt (particularly when government pays the contractor and not by means of user charges). Still, many PPPs may not impact public debt as long as they meet specific criteria, depending on the national accounting standards adopted by a country. On the other hand, when a PPP is not recognized as contributing to public debt, there is risk of ignoring or dismissing long-term fiscal implications on public budget sustainability.

It should be noted, however, that the present value of the initial government savings resulting from a PPP could equal revenues from user charges that would have been collected under a regime of public provision, and, additionally, there is a risk that a potential abuse of PPPs will unduly burden society, either through user charges or the impact of government future payments. Furthermore, the implementation of PPPs entails public expenditures in several processes such as project design, tendering, preparation/appraisal, monitoring resources or the quality of services and provision of funding for meeting guarantee requirements. As PPPs are significantly more complex than convention procurement methods and usually involve higher transaction costs, a great amount of specialized resources might be consumed by the government when this route is chosen. This disadvantage could be minimized if the project is of sufficient (capital) size.

Another motivation of financial nature is the increased flexibility PPPs may provide to governments, regardless of the implications to its reported debt position. The so-called “cash-motivation” means that PPPs dismiss the needs for governments to allocate resources in the short-term budget for the years of construction, include the funds required for the project in its treasury strategy, or negotiate additional debt for the project. Moreover, PPP projects could be attractive to debt funders who may not be interested in providing loans directly to governments, allowing the mobilization of additional funding sources, and, at the same time, ensuring there is an up-front commitment of

resources for maintenance and technical reliability of the infrastructure in the long term. PPPs are also associated to the advantages of accountability and transparency, as they usually imply the existence of a financial facility exclusively dedicated to the specific need for which the partnership was established—which also responds to the involvement of multiple parties in the transaction.

#### **b) Efficiency and effectiveness**

Given that private agents seek primarily project profitability and cost-effectiveness rather than political or social welfare goals (“for-profit” versus “non-profit” nature), PPPs allow them to bring greater efficiency into every component of the project cycle (investment, financing and operation of public assets and services). On the one hand, integration of such functions and competition among firms could lead to cost reduction and increase of social welfare, which would result from decreases in tariffs and higher quality of services provided. On the other hand, it is argued that private companies’ search for efficiency could result in a loss of social welfare through the prioritization of investment options that discriminate populations groups by density or income segments. This way, the greater efficiency hypothesis only holds under the assumption that private companies achieve their desired growth targets in revenue and profitability by charging lower tariffs than those that would be charged by public providers and in the absence of a national project evaluation system that would enable countries to allocate public resources efficiently.

The fact is that potential long-term efficiency (when applying PPP to the right project and under the right structure and procurement process) and effectiveness (when using PPP for achieving the desired outcomes in a time and cost-effective way) gains are an important motivation for the use of PPPs as an alternative to conventional ways of financing and procuring infrastructure projects. Among the factors responsible for such incremental efficiency through PPPs, it is possible to identify some related to a potential increase in the allocative efficiency (i.e. the maximization of the project’s prospected benefits), and others related to risk management, (life-cycle) cost management and innovation.

PPPs could improve the allocation of infrastructure investment resources by preventing the implementation of projects with negative social value (the so-called “white elephants”). This means PPPs could play an important role in countries that lack efficient social project evaluation systems (which should test procurement solutions through Value for Money exercises, such as the Cost-Benefit Analysis). Notwithstanding, PPPs should not be regarded as an alternative to those evaluation systems, which are a condition for avoiding public resources to be captured by interest groups to the detriment of infrastructure’s social profitability (e.g. incremental social benefits or saving social cost -in energy efficiency, gas emissions, noise pollution, and so on). Therefore, a condition for PPPs to meet the goals for which they are usually conceived is that the projects are socially justifiable.

From the cost perspective, an advantage of PPPs could arise from the higher business flexibility enjoyed by the private sector when it comes to negotiating with subcontractors and fitting to a labor framework. In addition, PPPs could render technical efficiency gains—reducing the cost and/or increasing the quality of the asset or service— through the assignment of different phases of infrastructure projects to the same company, that is, integrating design, construction (or rehabilitation), financing, maintenance and operation of infrastructure. As highlighted by ADB et al. (2016), although a PPP contract does not necessarily imply that the private agent will finance part of or all the works, it does assume that different phases are bundled together (especially life-cycle cost management) and significant responsibilities and risk are borne by the private agent. Thus, the long-term expected cost to public sector may be lower and/or the expected benefits may be higher,

even after considering the higher cost of capital (financial cost) associated with private financing.<sup>9</sup> A disadvantage of integrating could be the significant risk in the face of the possibility of market concentration by private operators (which in many cases they are a small number of multisector companies). This lack of competition for the market is a disadvantage to the government when negotiating a new contract or in a renegotiation.

From the standpoint of risk management in a PPP, the private partner has a natural incentive to design and construct infrastructure in a way that minimizes maintenance and renewal risks, aiming at achieving long-term savings in the project overall life-cycle cost. Furthermore, as risk assessment and management practices for risk events adopted by the private sector are regarded as being more efficient than the ones adopted by the public sector, the private partner will usually require a lower risk premium than the cost the government would face if it retained the risks. Besides, the performance of due-diligence by the private sector investors and financiers themselves provides even more risk oversight. Time risk could be transferred as well, if payments to the contractor are granted once assets are constructed and commissioned. In addition, the linking of payments to performance provides to PPPs a supplementary incentive for the quality of service; that is, a PPP may offer reliability in the time and cost of meeting the required objectives.

### c) Expertise and innovation

Another benefit associated to PPPs is the fact that, in most cases, they are attractive to those companies, either national or international, which display expertise and previous experience in the specific sector where investments are to be performed. This, according to the multinational firm theory, would imply further efficiency gains from technology transfer by foreign direct investment (FDI) enterprises, and higher standardization of production patterns through integration and globalization. Nonetheless, rather than being regarded as an automatic outcome of the participation of FDI enterprises in PPP schemes, incorporation of new technologies is likely only when it is part of the business model. Furthermore, possible changes in private companies' ownership and development strategies might affect the achievement of efficiency gains if the new controller does not have the same expertise or experience in the corresponding activity.

As PPP contracts are performance-oriented and properly prescribe the output (service) specifications rather than the inputs and means that should be deployed, it is possible to state that they are likely to encourage innovation. By allowing the contractor to structure its own means and methods, further efficiency gains and savings could emerge from the application of innovative techniques and approaches. To capture such gains, however, the PPP tender and evaluation process should focus on price and cost drivers. Additionally, PPPs could bring "demonstration effect" when the private sector introduces innovations that can be adopted in other projects or in other service provisions.

There are other potential benefits and drawbacks of using PPPs that are not specific to the grouping indicated above. They are more general, and one is the usually high political exposure and visibility of this type of procurement, which could contribute for a specific contract to be subject to political disputes after changes in the government administration. Associated to that is the potential public controversy that could emerge from misinformation regarding the impacts of a PPP on charges

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<sup>9</sup> The cost of private financing includes a risk premium in the form of a margin in interest rates and the equity Internal rate of Return (IRR) (e.g. risk adjusted return) requested by the private equity capital, which by definition is a more financial instrument than the alternative of direct government financing. However, the government's cost of borrowing understates the true cost of financing as it does not remunerate the government for bearing the risk in the project.

faced by final users (especially when substituting a direct provision of a public service). Both problems could, nonetheless, be mitigated by adopting effective communication strategies, searching political consensus on the use of the PPP model, and establishing a PPP program. Moreover, conditions to be met by contractors should be clearly defined and stated in all contexts in the form of guidelines, and it is essential that processes capable of ensuring that such conditions are in place.

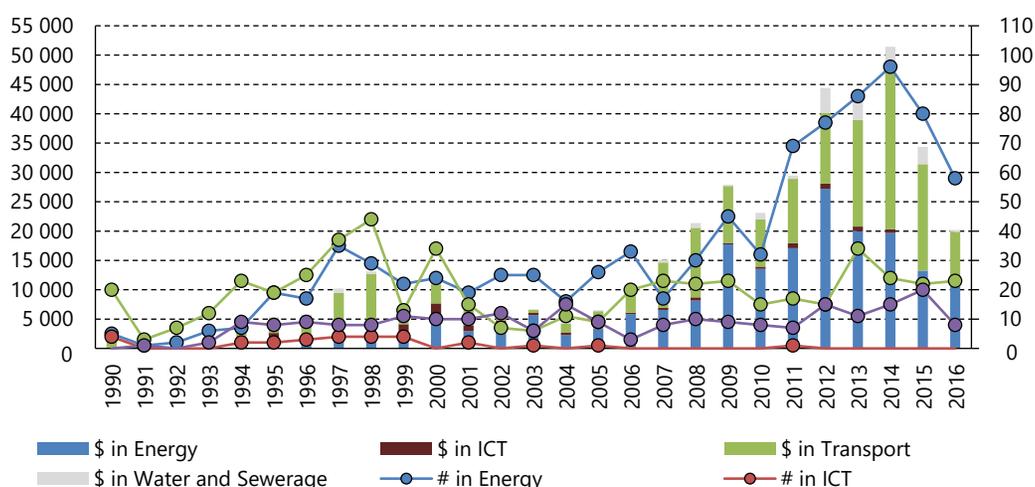
## 2. PPPs in Latin America

In Latin America, the adoption of PPPs as a procurement modality for infrastructure projects has varied substantially from one country to another. The PPP experience of some economies in the region, such as Mexico and Argentina, dates to the late eighties. In the nineties, other countries, such as Chile, Colombia and Brazil, also started implementing public-private partnerships for infrastructure procurement, leading to a gradual dissemination of this type of instrument in the region in the following decades (Vassallo, 2015).

The amount invested by private sponsors in Latin America through PPP has increased considerably from 1990 to 2016 and, particularly, between 2005 and 2014 (see chart 18). In that year, investment by private parties through PPPs in the region added up to US\$ 51.4 billion, reaching its maximum in the same year the region's GDP attained its highest historical value (US\$ 6.25 trillion in current values, according data from the ECLAC–CEPALSTAT Databases). Investments have been concentrated mainly on transport and energy projects, with a smaller amount invested in water and sewerage projects (and a much smaller amount in ICT projects). Since 2014, however, investments have dropped significantly in the region, following the decrease of Latin American countries' real GDP. In general terms, the overall number of projects has followed the trend of investment; for the energy sector, in particular, the number of projects increased remarkably between 2010 and 2014, which was also followed by a sharp decrease in 2015 and 2016.

**Figure 18**  
PPP initiatives in Latin America: amount invested by private sponsors and number of projects  
in the four main sectors, 1990–2016

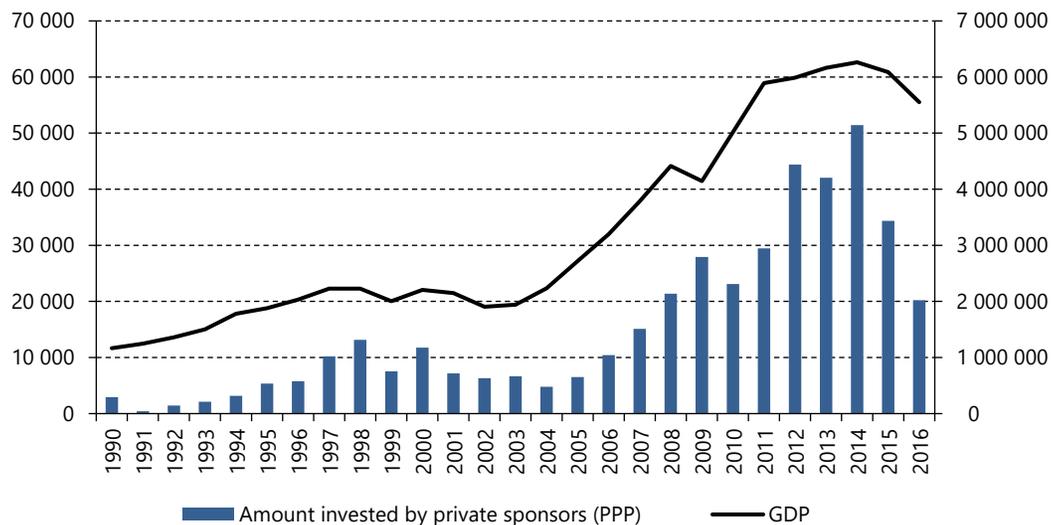
(For each sector, number of PPP projects in infrastructure —right axis— and amount invested through PPP projects in infrastructure by private sponsors in millions of current US\$ —left axis—)



Source: Prepared by the authors, on the basis of PPI Project Database, World Bank (data downloaded in February 2018).

Note: Latin America is represented by 20 countries. See note of chart 1 concerning Latin America (20).

**Figure 19**  
**PPP initiatives in Latin America: amount invested by private sponsors and GDP, 1990-2016**  
*(Amount invested through PPP projects in infrastructure by private sponsors —left axis— and GDP —right axis— values in millions of current US\$)*



Source: Prepared by the authors, on the basis of PPI Project Database, World Bank (data downloaded in February 2018).

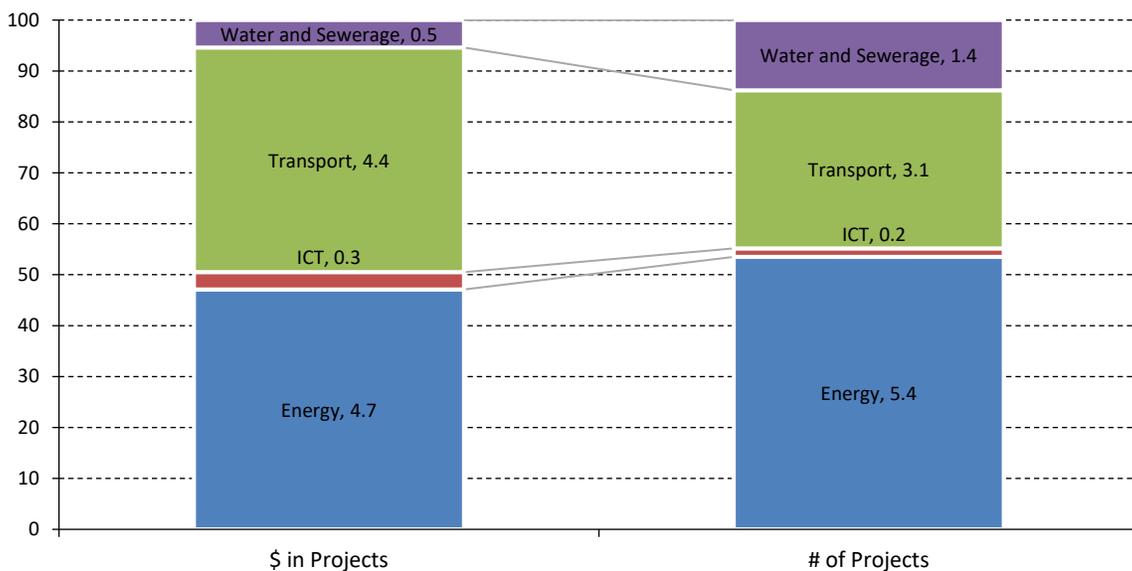
Note: Latin America is represented by 20 countries. See note of chart 1 concerning Latin America (20).

Although the energy and transport sectors concentrate most of the investment in the region (accounting, together, for more than 91% of the amount invested through PPPs and more than 84% of the number of projects in that modality of procurement), projects within each of these sectors have different characteristics: transport ventures usually involve greater amounts of investment (an average of US\$ 350 million/project, in comparison with US\$ 217 million/project for the energy sector). Due to the relatively smaller size of water and sewerage projects (US\$ 96 million/project), the share of the total number of PPP projects in Latin American countries assigned to that category (13.8%) is higher than its share of the total amount invested by private sponsors (5.4%). In the ICT sector, in turn, projects tend to have a higher value invested than average (US\$ 505 million/project). Chart 20 provides a sense of the dimensions of PPP projects in Latin America in the period 1990-2016.

When it comes to the distribution of investments per country, the six biggest Latin American economies (Brazil, Mexico, Colombia, Chile, Peru and Argentina) concentrate more than 93% of the total investment by private sponsors through PPPs (see chart 21). Brazil, as the biggest economy in Latin America, has attracted the highest share of PPP investments in the region (more than 55% of the total amount invested), followed by Mexico (with 12.7% of total investment). Remarkably, Argentina—the third largest economy in the region—occupies only the sixth position in terms of amount invested (4.2% of total), reflecting an atmosphere that did not encourage the implementation of PPPs in the country during the period under analysis. From the perspective of number of projects, however, the PPP distribution within the region is, to a certain extent, less concentrated (see chart 22). From that standpoint, Brazil has 45.6% of Latin American PPP projects, whereas countries like Mexico, Chile and Argentina are assigned an increased share of PPP ventures. The six largest economies are the target of 87% of PPP projects, the remainder being invested in 14 other countries across LA.

**Figure 20**  
**PPP initiatives in Latin America: participation of each sector by amount invested by private sponsors and number of projects, 1990-2016**

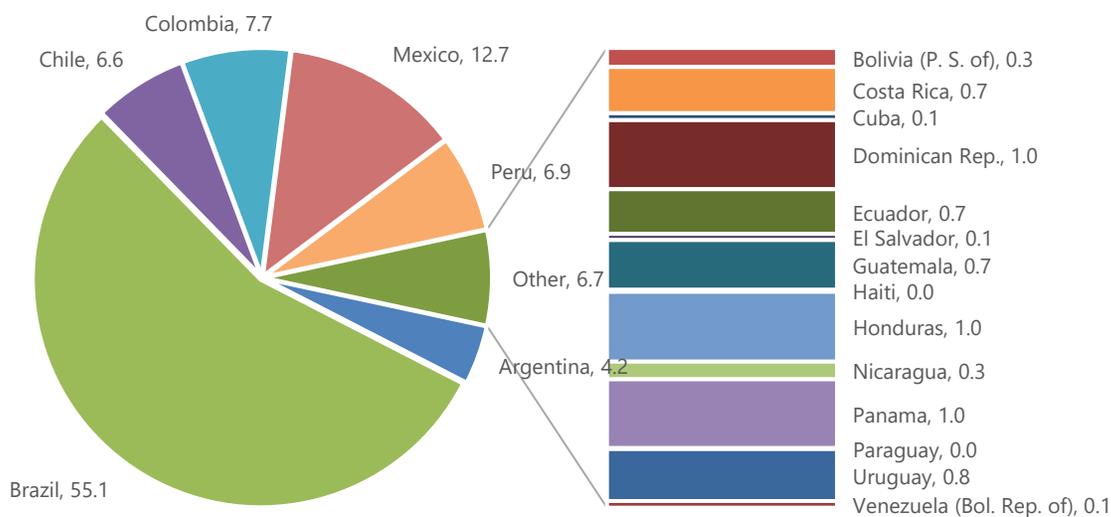
*(For each sector, percentage of the total amount invested through PPP projects in infrastructure by private sponsors in millions of current US\$ and the total number of PPP projects in infrastructure)*



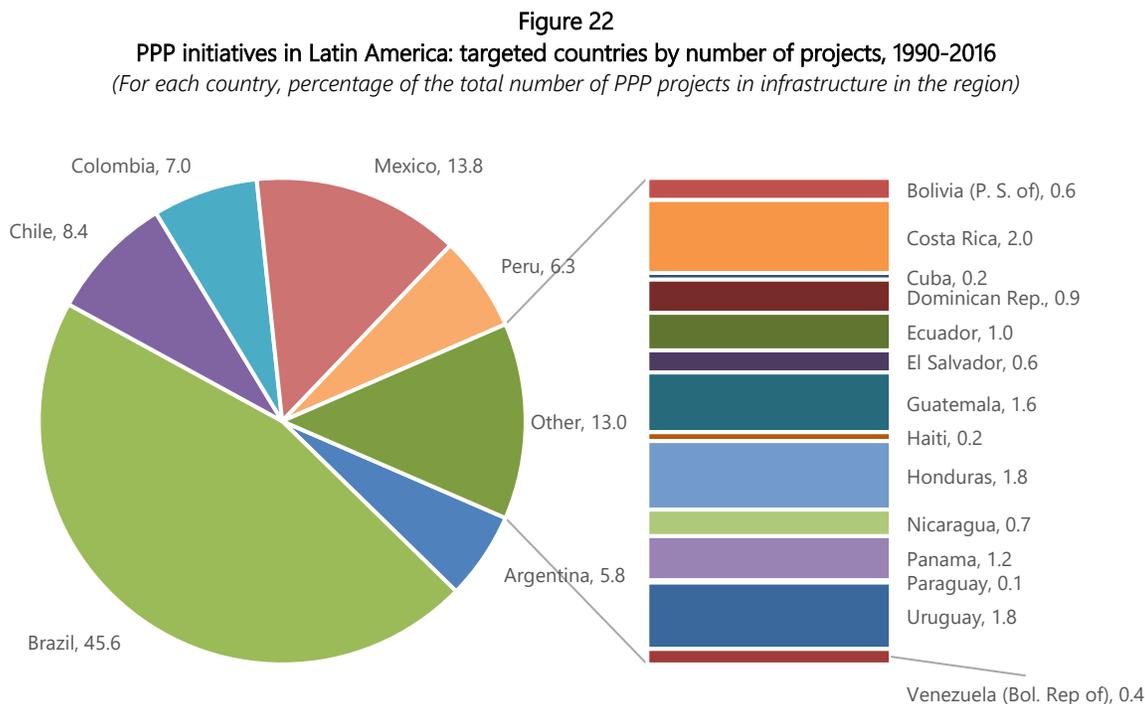
Source: Prepared by the authors, on the basis of PPI Project Database, World Bank (data downloaded in February 2018).  
 Note: Latin America is represented by 20 countries. See note of chart 1 concerning Latin America (20).

**Figure 21**  
**PPP initiatives in Latin America: targeted countries by amount invested by private sponsors, 1990-2016**

*(For each country, percentage of the total amount invested through PPP projects in infrastructure by private sponsors in the region)*



Source: Prepared by the authors, on the basis of PPI Project Database, World Bank (data downloaded in February 2018).  
 Note: Latin America is represented by 20 countries. See note of chart 1 concerning Latin America (20).

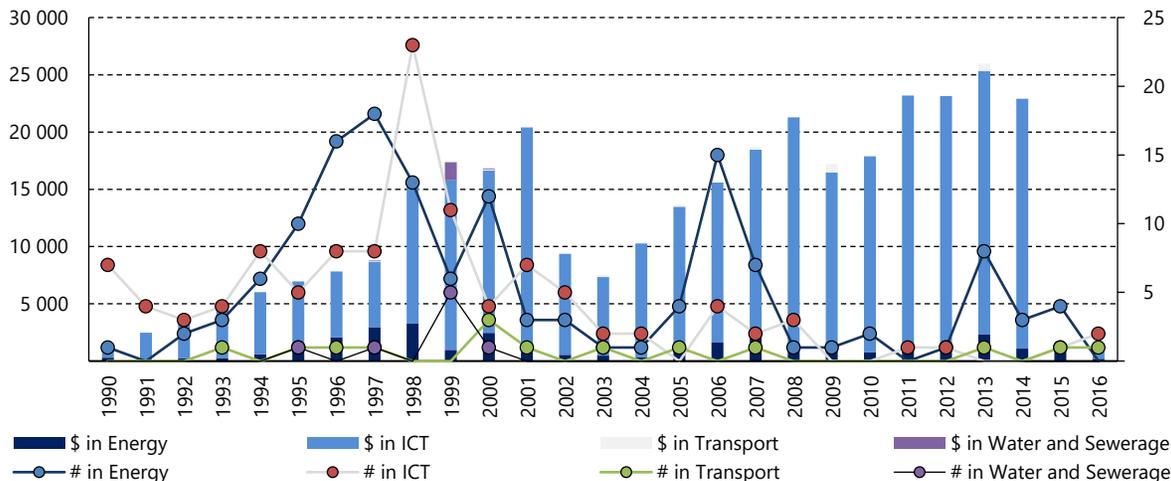


Source: Prepared by the authors, on the basis of PPI Project Database, World Bank (data downloaded in February 2018).  
 Note: Latin America is represented by 20 countries. See note of chart 1 concerning Latin America (20).

Interestingly, the evolution of other private investments in Latin America not performed as PPP contracts (i.e. merchant projects, and full and partial divestitures –that is, divested or privatized utilities or public services) follows a different pattern than the one observed for public-private partnerships (see charts 23 and 25). Rather than concentrated in the energy and transport sectors, private investments through non-PPP initiatives are strongly driven by the investment in ICT projects, which are the object of almost the totality of investments in most years between 1990 and 2016, with a moderate correlation with the evolution of the GDP (0,517). In fact, very few transport projects are found to be financed by the private sector in modalities other than PPPs, and the same could be said about water and sewerage. Energy projects are a relevant target of private investment only from the perspective of number of projects (see chart 23).

**Figure 23**  
**Other private (non-PPP) initiatives in Latin America: amount invested by private sponsors and number of projects in the four main sectors, 1990-2016**

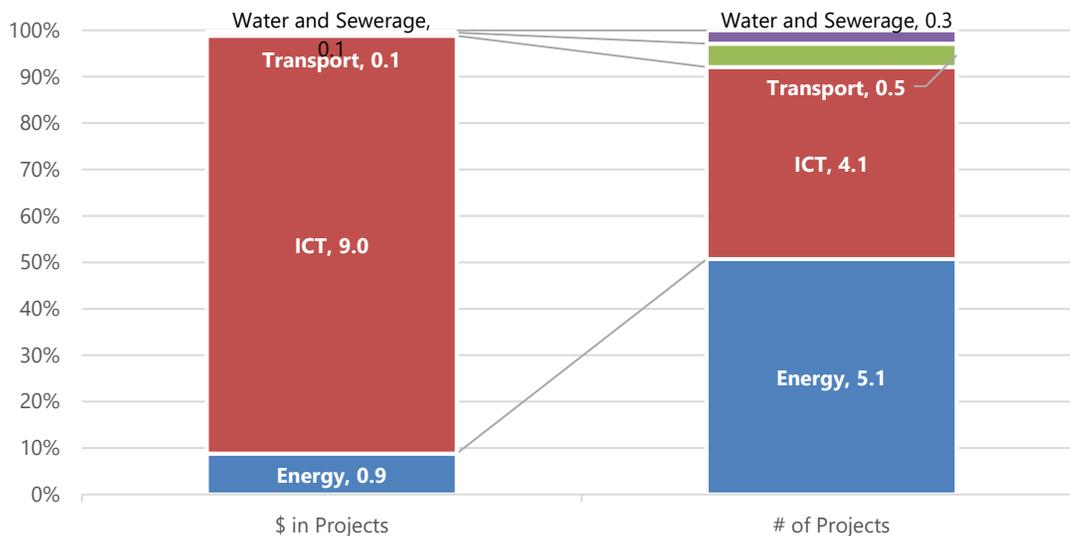
(For each sector, number of non-PPP projects in infrastructure —right axis— and amount invested through non-PPP projects in infrastructure by private sponsors in millions of current US\$ —left axis—)



Source: Prepared by the authors, on the basis of PPI Project Database, World Bank (data downloaded in February 2018).  
 Note: Latin America is represented by 20 countries. See note of chart 1 concerning Latin America (20).

**Figure 24**  
**Other private (non-PPP) initiatives in Latin America: participation of each sector by amount invested by private sponsors and number of projects, 1990-2016**

(For each sector, percentage of the total amount invested through non-PPP projects in infrastructure by private sponsors in millions of current US\$ and the total number of non-PPP projects in infrastructure)

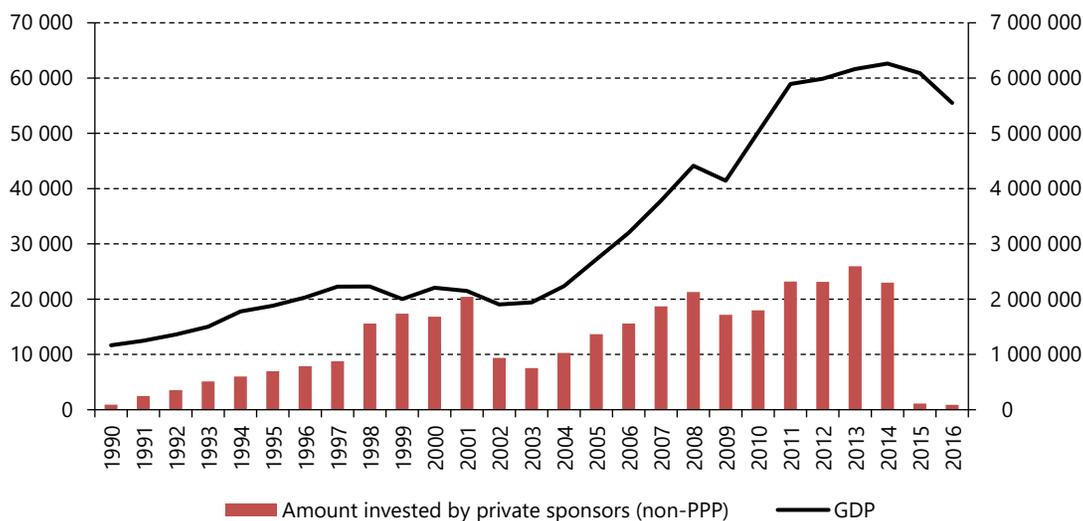


Source: Prepared by DNRI-ECLAC, on the basis of PPI Project Database, World Bank (data downloaded in February 2018).  
 Note: Latin America is represented by 20 countries. See note of chart 1 concerning Latin America (20).

Investment by private sponsors through initiatives other than PPPs achieved its lowest values in the years of 2015 and 2016. Such investment contraction could be partially explained by the recession in Brazil—the country which, by that year, had received the greatest portion of private investment—and by the economic slowdown in other important Latin American economies, such as Colombia and Argentina. That hypothesis, however, should be subject to further investigation, firstly, because the World Bank's PPI Database methodology had some changes since 2015, one of them affecting the ITC sector given that what it is tracked now is only ICT backbone infrastructure;<sup>10</sup> secondly, as investment in ICT projects had, to some extent, evolved independently from macroeconomic variables (e.g. the amount invested by private agents in non-PPP ICT projects increased by more than 244,5% between 1997 and 2001, although the GDP of the Latin American countries included in the PPI Database, in current US\$, decreased by 3.5% in the same period) (see chart 25).

**Figure 25**  
**PPP initiatives in Latin America: amount invested by private sponsors (non-PPP projects)**  
**and Latin American GDP, 1990–2016**

(Amount invested through non-PPP projects in infrastructure by private sponsors –right axis– and GDP –left axis– values in millions of current US\$)



Source: Prepared by the authors, on the basis of PPI Project Database, World Bank (data downloaded in February 2018).

Note: Latin America is represented by 20 countries. See note of chart 1 concerning Latin America (20).

### 3. Lessons learned and policy implications about PPPs in Latin America

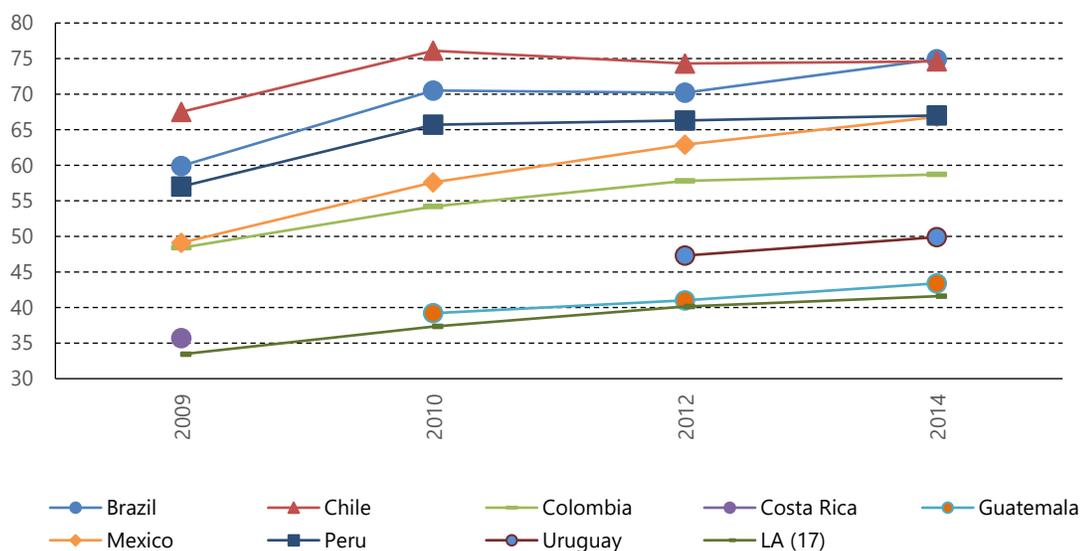
Environment for PPPs in Latin America has experienced remarkable progress in the past few years, as new legislation regulating this modality of procurement has been approved in some countries, and economies with more experience in PPPs have been expanding it to other areas other than traditional infrastructure. Such conclusions could be drawn from Infrascopes, a tool designed by The

<sup>10</sup> Since 2015, the new methodology no longer tracks purely private telecoms. Instead, it will track ICT backbone infrastructure (fiber optic cables, etc.) that has an active government component (e.g., it is a contracting authority). See <https://ppi.worldbank.org/about-us/about-ppi#>.

Economist Intelligence Unit to evaluate the capacity of countries to implement sustainable and efficient public-private partnerships in infrastructure (The Economist Intelligence Unit, 2017).<sup>11</sup>

From 2009 to 2014, the five Latin American countries with the best performance in Infrascope are among the six major economies in the region—the only exception being Argentina— (see chart 26). Uruguay and Guatemala also have scored above the Latin American average in the final years of this period. Furthermore, all the leading countries have significantly enhanced their performance between 2009 and 2014; for instance, Brazil and Mexico added 15 percentile points each to their overall scores in that period.

**Figure 26**  
The Infrascope index in Latin America: overall scores for countries above the region's average, 2009-2014  
(Scores' scales go from 0 to 100)



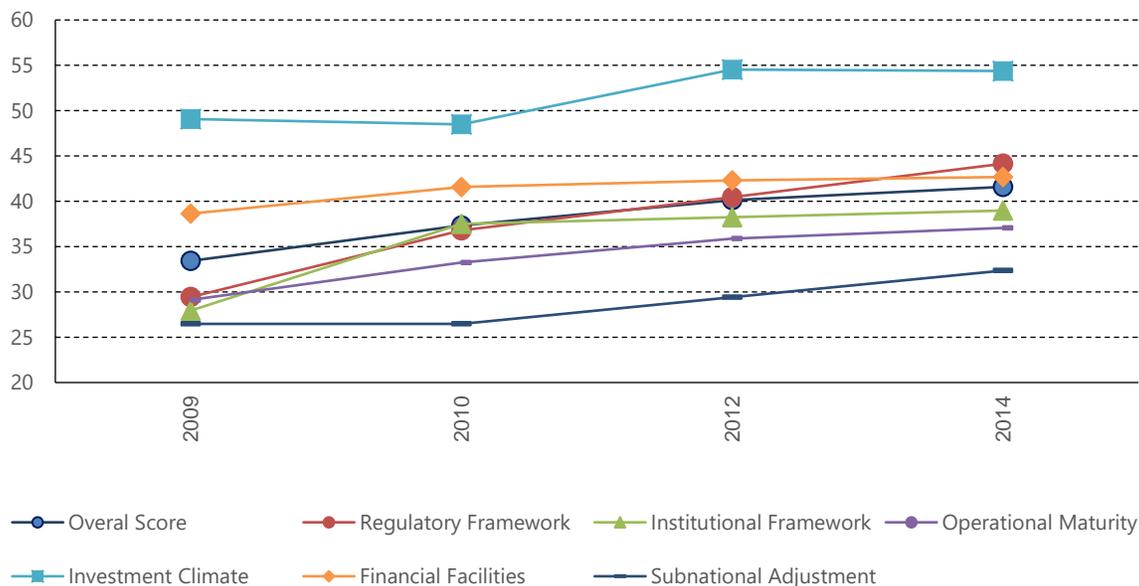
Source: Prepared by the authors, on the basis of The Infrascope, several editions, EIU (2009, 2010, 2013 and 2014).

Note: Categories as per models 2009-2014 and the weights of category or indicators is neutral. These models are not comparable with the new version launched in 2017. LA (17) is the simple average of Latin America considering 17 countries.

When assessing the average performance of the region, it is possible to notice a steady improvement in every criterion from 2009 to 2014. That is true for every category of the index, although improvements in legal and institutional framework have proved to be more substantial than in other categories (see chart 27). Overall, the investment climate is the feature in which Latin American countries has performed the best during the considered period (being the only category of the index with an overall score higher than 50 for the whole region). That result demonstrates relatively positive political will and business environment for investment through PPP contracts in the region since 2009 to 2014. On the other hand, subnational adjustment is the criterion with the worst performance by countries, indicating relatively low success and consistency of infrastructure concessions carried out at the regional, state and municipal levels in Latin America during those years.

<sup>11</sup> As per its latest version (The Economist Intelligence Unit, 2017), the index comprised 23 indicators and 78 sub-indicators, both quantitative and qualitative.

**Figure 27**  
**The Infrascopes index in Latin America: region's overall and other category scores, 2009-2014**  
*(Scores' scales go from 0 to 100)*



Source: Prepared by the authors, on the basis of The Infrascopes, several editions, EIU (2009, 2010, 2013 and 2014).

Note: Categories as per models 2009-2014 and the weights of category or indicators is neutral. These models are not comparable with the new version launched in 2017. Each score's value is the simple average of Latin America considering 17 countries.

Reasonably with the average performance of Latin America, most of the countries in the region have shown a progress in each category between 2009-2014. The regulatory framework is where the improvement has been greater, which is synchronized with the recently changed legal frameworks on public works and the new approved laws on PPP. This situation is confirmed by the upgraded version<sup>12</sup> of the Infrascopes index that place regulations at the top of the categories. Nevertheless, this new index reveals that financing, institutions, and investment and business climate are the main areas that countries should work and enhance from now to attract more private participation in infrastructure.

<sup>12</sup> The editions 2017 and 2018 are based on a new methodology, thus this model is not comparable with past editions. EIU (2017) explains that this change was adopted in order to reflect the latest industry developments for infrastructure PPPs. New topics have been incorporated such as environmental and social sustainability, fiscal control and budgeting, transparency and accountability, and new financing instruments. The scores of each category for every country and the averages calculated for LA (17) are almost the same in each year (that is, the variation of scores between 2017 and 2018 is marginal).

**Table 1**  
**The Infrascopes index in Latin America: categories' scores for each country, 2017**

Category	Argentina	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	El Salvador	Guatemala	Honduras	Mexico	Nicaragua	Panama	Paraguay	Peru	Uruguay	Venezuela (Bol. Rep. of)	Latin America and the Caribbean (17)
Overall Score	48	72	74	74	62	49	44	64	62	65	68	64	51	58	69	64	8	59
Regulations	60	73	91	91	53	68	68	90	80	76	85	78	47	71	71	61	13	69
Institutions	42	88	68	75	40	16	31	91	80	63	61	66	11	60	66	63	0	54
Maturity	39	75	90	90	83	64	22	64	65	78	85	81	76	69	83	72	11	67
Investment & Business Climate	55	58	61	57	79	51	61	38	53	70	57	48	65	56	56	72	9	56
Financing	42	65	62	59	54	46	39	37	31	39	49	44	54	35	70	54	6	46

Source: Prepared by the authors, on the basis of The 2017 Infrascopes, EIU (2017).

Note: Categories as per Model 2017 and the weights of category or indicators is neutral. LA (17) is the simple average of Latin America considering 17 countries. Cells in green indicate values above LA (17) average.

Some interesting results of the implementation of PPP contracts in LA have been captured and summarized by Rozas et al. (2012). These observations were produced considering that implementation of PPPs was focused in some countries and to varying degrees, and the expansion and use of this form of contracting has been gradual or in stages.<sup>13</sup> Among the factors that have hindered or slowed down the greater application of PPP mechanisms in some of the countries of the region, the following stand out: the scarcity of financial facilities or alternatives (e.g. need of deepening of capital markets and incentives and roles of commercial banks), the limited technical capacity of government agencies (e.g. enhancing knowledge and understanding for the application of best practices through PPP contracts), and social and environmental conflicts (e.g. lack of clear definition of the concept, objectives and vision sought through PPPs). That reveals the adopted position and the role that the State and the private sector have had in certain countries regarding the policies and regulatory frameworks that stimulate economic activity. However, in recent years there has been an increase in units and specialized agencies to promote and execute PPPs as well as the updating or adaptation of regulatory frameworks relating to public works and services for the consideration of these provision mechanisms.

Besides the study by Rozas et al. (2012), assessments of the results of the implementation of PPPs in Latin American countries have been carried out by Vassallo (2015) and Guasch (2004). Through a comparative analysis, it is possible to identify that some of the positive effects assigned to PPPs by the technical literature are confirmed by the Latin American experience, according to

<sup>13</sup> For a summary of the evolution of the regulatory framework and approval and use of PPPs in the region's countries see Rozas et al. (2012) and "The 2017 Infrascopes. Evaluating the environment for public-private partnerships in Latin America and the Caribbean" (EIU, 2017).

the findings of at least two of the authors. They are: greater efficiency gains deriving from lower costs and integration of different stages of the project cycle; increased dynamism of private investment (without affecting the public budget); fast project execution through tendering mechanisms; user involvement in the infrastructure financing; and the execution of projects with relative high social profitability and relative low private profitability. Other effects have been observed by at least one of the authors: innovation in management systems for the provision of infrastructure services; greater degree of specialization and economies of scale in the contracts (for construction, operation, and transfer); improved quality of services; adequate balance for estimated and contingent liabilities; stronger competition among companies, resulting in efficiency gains for final users; increased coverage of services; modernization of government institutions (ad hoc organizations, laws and regulations); and development of financial instruments and mechanisms that are highly accepted in capital markets.

Rozas et al. (2012), Vassallo (2015) and Guasch (2005) also corroborate some of the problematic effects of the implementation of PPPs anticipated by the literature. According to the authors of at least two of these studies, the Latin American experience demonstrates: there is highly ineffective design of concessions (i.e. characteristics not sufficiently defined); ineffective design of legal regulatory frameworks (e.g. legal gaps to settle disputes) have delayed the completion of the works and the operation of the infrastructure; an excessive proportion of contracts is subject to renegotiation (a high number of which are deemed as opportunist); there is a low degree of knowledge and training regarding the tendering processes; and oversight of contract enforcement is insufficient. Other negative features observed by the authors of at least one of the studies are: limited insertion of quality criteria in contracts; poor allocation of risks (e.g. when offering important guarantees for the private sector to obtain funds in the capital market), which has meant that some contingent liabilities turning into actual liabilities; market skimming pricing strategies and competition conflicts; concessionaires filing for bankruptcy; poor service provision; excessive user charges; higher financial costs; rough disputes over the execution of contracts; breach of contracts; lack of transparency in tendering processes; and increase in the contingent debt of State and decrease in its indebtedness capacity.



## **II. China: its current and potential role in infrastructure investment in Latin America**

Having analyzed the needs and the PPP experience of infrastructure development in Latin America, the potential role of Chinese Players in addressing those issues. In order to identify the motivations for Chinese players to invest in Latin America, it is important to understand the strengths they possess and the challenges they are confronting. This chapter focuses on the capability accumulation process of China's infrastructure companies and the current situation of Chinese enterprises participating in the infrastructure development of Latin American countries.

### **A. The capability accumulation process of the Chinese infrastructure companies**

Different from Latin American countries, China's infrastructure construction has kept on growing for more than 30 years, mainly driven by the fast growth of domestic demand and promoted by the Chinese government. During the process, China's infrastructure enterprises have gradually learned the logic of market-oriented operations and have accumulated rich experience and management skills through a large number of construction projects. However, as most projects have been developed following a conventional contracted model, Chinese enterprises lack experience in carrying out PPP projects. In order to reflect the differences in capabilities of China's infrastructure enterprises regarding conventional procurement and PPP mode, the domestic and international development of China's infrastructure enterprises on conventionally contracted projects and PPP projects, respectively, are discussed below.

## **1. The capability development of Chinese infrastructure companies in the domestic market**

From a historical point of view, the capability building process of China's infrastructure enterprises in domestic market can be divided into three stages, which are "the state-led stage" (1949-1977), "the initial stage of market-oriented operation" (1978-1993) and "the stage for comprehensive development" (1994-present).

### **a) Conventional Procurement**

In the first stage, after the establishment of People's Republic of China in 1949, China's infrastructure construction was entirely under the State's leadership and relied on public finance. Since China adopted planned economic mechanism at that time, all infrastructure construction projects were carried out by the government. As an example of infrastructure development, the mileage of highways and railroads throughout the country, increased from 80,800 km and 21,800 km in 1949 to 855,600 km and 50,600 km in 1977, respectively, driven by the domestic demand and led by the government. A number of important infrastructures, such as the Baocheng Railway, the Yingxia Railway, the Wuhan Yangtze River Bridge, the Sichuan-Tibet Highway and the Qinghai-Tibet Highway, were also constructed in this period. As a result, the departments and institutes responsible for infrastructure construction at that time had accumulated some experience in engineering, construction, and carrying out infrastructure projects during the first stage.

In the second stage (from 1978 to 1993) China's infrastructure industry gradually became market-oriented. Since China started to adopt openness policies and tried to transit the planned economy into a market economy at the beginning of this stage, there were corresponding reforms in the infrastructure area. Regarding the executing entities, several state-owned enterprises were separated from the government after the institutional restructuring, taking responsibility for investing, managing and supervising construction and operation processes. Meanwhile, some professional construction companies were also split out, becoming responsible for the project construction by signing contract with the integrated investing and managing entity. For example, the Beijing Underground Railway Company was separated from the Beijing Bureau of Transportation in 1984 and was responsible for the investment, management and operation of Beijing's subways. Then, the China Railway Engineering Corporation was established in 1989 on the basis of the Ministry of Railways Construction Administration. Since then, enterprises have become the main executive players involved in the infrastructure development of China.

Regarding the financing approach, the People's Construction Bank of China was separated from the Ministry of Finance and mainly took the responsibility for providing loans to infrastructure projects, replacing the original approach of funding coming directly from public finance. As a result, the state-owned construction companies felt more pressure to improve their operating efficiency so that they could accumulate more income to pay back the loans. Since 1993, the reform of state-owned enterprises had given managers more autonomy, and the state-owned enterprises have become more market-oriented. Meanwhile, the reform has allowed foreign and private capital to participate in China's infrastructure construction. Thereby, on the one hand, sources of financing have been diversified; and, on the other hand, foreign companies have also brought in relevant engineering technologies and advanced concepts and skills of project management, which were combined with the vitality of local private companies, promoting further development of the Chinese infrastructure industry. One of the typical construction projects carried out at the second

stage is the Beijing-Tianjin-Tanggu Expressway, which was financed by the World Bank. This project was organized, managed and executed according to widely accepted international standards: for example, the FIDIC contract terms and the open tender procedures were adopted for procurement, and an independent supervision was assigned. By the end of the second phase, the mileage of highways and railways in China had reached, respectively, 1,083,500 km and 58,600 km, of which electric railway mileage had reached 8,900 km. Because of the opening process, China's international exchanges increased substantially in the second phase. The length of China's international routes, for example, which was equal to 55,300 km in 1978, had rapidly increased to 278,700 km by 1993. Through openness and the reforms mentioned above, Chinese infrastructure companies had started to adapt to market-oriented operation; meanwhile, after completing many projects within this stage, the experience and capabilities of Chinese infrastructure companies had greatly improved in comparison with the previous stage.

In the third stage, the demand for sustainable high-speed economic development in China further boosted the construction of many large and complex infrastructure projects including the Qinghai-Tibet Railway, the Three Gorges Hydropower Station, the West-East Power Transmission Project and the Hong Kong-Zhuhai-Macao Bridge. Compared with the previous projects, Chinese infrastructure construction companies encountered with more technical, economic, environmental, as well as social-related challenges. However, their comprehensive capabilities have been enhanced in the process of overcoming difficulties in these large and complex infrastructure projects. As an example, even though the importance of the Qinghai-Tibet Railway had long been recognized by Mr. Sun Yat-sen (1919), it did not start to be built until 2001, as there had been a lack of both technology capability and capital. In order to build it, China Railway Engineering Corporation (CRECG), the general contractor, not only needed to overcome internationally recognized technical problems, such as large-scale construction in the permafrost environment, but also faced many environment issues along Qinghai-Tibet Railway. In order to solve the permafrost problem, an observation station was established at the Fenghuoshan Mountain, on the Qinghai-Tibet Plateau early in 1961. Besides, data on various local meteorological conditions and the changes of ground temperature in the permafrost region, constituting valuable first-hand information at the very beginning. After constant researching and engineering testing for more than 30 years on this subject, China's infrastructure enterprises finally came up with a comprehensive construction plan to overcome the difficulties in the phase II of the Qinghai-Tibet Railway. The final technical plan included bypassing, bridging, hot sticks and laying thermal insulation materials, among other solutions. In order to solve the challenges of ecological environment protection, such as the need to avoid interfering in the migration of wildlife like the Tibetan antelope, CRECG set up 25 special wildlife accesses along the railway line and prohibited the construction of camps and gravel yard in the channel in order to reduce the disturbance of wildlife migration.

From the case of Qinghai-Tibet Railway, it can be seen that the construction of big and complex projects needed to overcome multidimensional challenges, and it is in the problem-solving process that Chinese infrastructure construction companies have accumulated valuable experience and have enhanced their comprehensive capabilities. In addition, the financing mechanism of infrastructure has also changed and improved in the third stage. First, after the tax-sharing reform in 1994, the role of public investment has been mainly transferred from the central government to the local governments. Second, Minimum Equity Requirement was implemented for infrastructure projects in order to further enhance the awareness of infrastructure companies of their own profits and losses. Finally, the Chinese government set up three policy banks in this stage, which were the

China Development Bank (CDB), the Export-Import Bank of China (China Exim Bank) and the Agricultural Development Bank of China (ADBC). Their responsibility has been mainly to undertake the allocation of funds for infrastructure, basic industries and pillar industries. By introducing the three policy banks, Chinese government separates the loans for commercial purposes from the ones for political purposes.

## 2. PPP Mode

Compared to the conventional procurement, the PPP mode was not introduced in China until the third stage of national infrastructure development. In contrast with the rapid development of the infrastructure industry, the PPP experience in China is relatively limited, and was interrupted several times during its development process. Starting from 1994, five BOT (Built, Operate and Transfer) pilot projects were selected by the National Development and Reform Commission (NDRC) to try the PPP mode. However, 3 years later, affected by the Asian financial crisis in 1997, the Chinese government started to implement an active fiscal policy and put a large amount of public funds by issuing treasury bonds into the infrastructure field, which directly weakened the motivation for the cooperation between local governments and public-private companies. As a result, the attempt of promoting the PPP model was interrupted.

The reinitiating of PPP mode took place in 2003, when the Chinese economy took off. To fill the huge infrastructure investment gap and to attract private capital into the infrastructure industry, Chinese local governments tried to employ the PPP mode again. However, with the outbreak of the global financial crisis in 2008, the immediate rescue plan, also known as the "four trillion" plan, was issued by the central government. Chinese local governments had to borrow heavily and invested in infrastructure in a short time, which again stagnated the ongoing efforts to promote the PPP model. In late 2014, the PPP mode was picked up again; as the Chinese economy was slowing down, infrastructure investments were needed to stimulate economy and boost market confidence. With heavy debts on local governments' shoulders, PPP mode received great attention and upgraded to an unprecedented strategic position, this time encouraged by the Chinese central government. Since then, the development of the PPP mode in China began to speed up.

In this context, since China's infrastructure enterprises have only limited and discontinuous experience in carrying out PPP projects domestically, it is understandable that the infrastructure investments by PPP mode in China only held a very small percentage of the total domestic investments. In 2016, it is estimated that PPP projects only accounted for about 3% of the annual investment in infrastructure<sup>14</sup> in China.

## B. The capability development of Chinese infrastructure companies in the international market

The internationalization of China's infrastructure enterprises originated from the Chinese government's foreign aid to the third world. With the fast development of the Chinese economy, the demand for foreign exchange has risen, and Chinese infrastructure companies have been

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<sup>14</sup> See CICC: *The investment amount of PPP projects in China this year will be about 500 billion yuan, accounting for 3% of the annual infrastructure investment*, Tencent Stock, September 1, 2016. <http://stock.qq.com/a/20160901/031192.htm> [2018-01-17].

pushed to go into the international market. After completing a large number of international projects, the technical and international business capabilities of China's infrastructure enterprises have also been continuously developed. Meanwhile, in the process of internalization of Chinese infrastructure companies, both CDB and the China Exim Bank played an important role in providing financial support.

## 1. Conventional Procurement

In general, the internalization of Chinese infrastructure companies has gone through three phases. The first phase started from the early days of the foundation of PRC to the reform and opening up in 1978. Even though the Chinese government was also in financial difficulty, it still decided to provide financial aid to the underdeveloped countries, by helping them build necessary infrastructures. With the support of these capabilities, China's infrastructure construction teams have built a large number of small and medium-sized projects abroad and learned about the customs and construction rules of the host countries. In addition, during the construction of large-scale projects like the Tanzania-Zambia Railway, Chinese construction teams have further accumulated the experience of constructing large-scale overseas infrastructure projects. However, as these projects were mainly government-led foreign aid, Chinese construction teams did not have the opportunity to cultivate market-oriented competencies and to accumulate experience in infrastructure investment and operation within this phase.

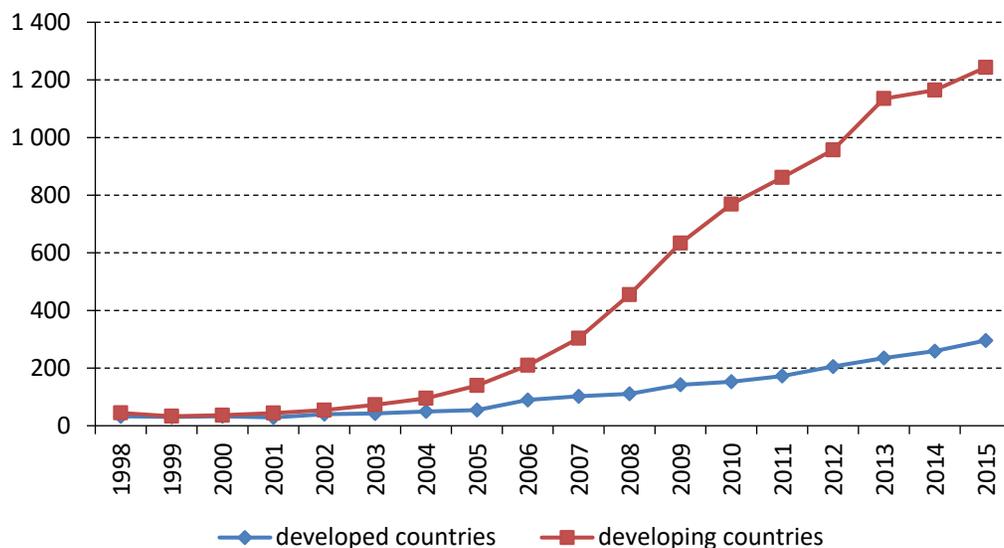
The second phase was from the reform and opening up in 1978 to the nineties. In order to support domestic economic growth, at this stage China's infrastructure construction enterprises started to participate in the international market, competing for conventional contracted projects and trying to earn foreign exchange reserves. At this stage, big state-owned infrastructure construction enterprises, such as China State Construction Engineering Corporation (CSCEC), China Road and Bridge Corporation (CRBC), etc., started to engage in overseas project bidding processes, learned how to negotiate with foreign public and private owners. This process was hard and relatively long, as Chinese infrastructure construction companies were familiar neither with the rules for participating in the international market, nor with the complex construction standards in different host countries. However, by leveraging the construction experience accumulated in previous years and financial support from Chinese banks, China's infrastructure construction enterprises gradually learned how to participate in the international infrastructure market. Hence, although the global economic downturn in the mid-eighties affected the international engineering contract market, Chinese enterprises maintained rapid growth through their own business adjustments. From 1985 to 1990, both the number and turnover of the foreign conventional contracted projects by China's infrastructure companies doubled.

Entering the nineties, when the third stage of internationalization began, China's infrastructure enterprises' international business accelerated. According to the National Bureau of Statistics of China (see chart 29), the operating turnover of overseas conventional contracted projects of China's infrastructure enterprises increased rapidly from US\$ 7.72 billion in 1998 to US\$ 153.93 billion in 2015, with a CAGR of 19.25%. Regarding the regional distribution of projects, Chinese construction enterprises have covered a wide range of countries and regions. Most of overseas conventional contracted projects are located in Asia and Africa, which accounted for 83.23% of the overall turnover by 2015. In addition, with the domestic experience of building large-scale and complex infrastructures, technical capabilities and the ever-growing international business capabilities cultivated in the development process, China's infrastructure enterprises began

to show their advantages in the international market and gradually stepped into the forefront of the world's infrastructure contractors. The Moscow-Kazan high-speed rail project in Russia is an example. As most of the project is located in the alpine region of Russia, to ensure the normal operation after the completion of the project, the contractor needed not only the qualification of general high-speed railway construction but also the experience and capability to carry out the construction in the alpine region. Due to the experience in complex infrastructure projects in China under similar environment (such as the Harbin-Dalian Railway), CRECG was chosen among other bidding companies, as one of the major contractors for the Moscow-Kazanshan high-speed rail project. In fact, CRECG's case is not an exceptional one; a large number of Chinese infrastructure enterprises have ultimately accumulated their international competitiveness through the development process in China and abroad. Among the 225 international contractors announced by *The Engineering News-Record* in 2016, *China Communications Construction Group Co., Ltd. (CCCC)* ranked third in the world, while the Power Construction Corporation of China (PowerChina), China State Construction Engineering Corporation (CSCEC), China Railway Engineering Corporation (CRECG) and China National Machinery Industry Corporation (Sinomach) also entered the top 25.

**Figure 28**  
**Cross-border conventional contracted projects in the world: turnover of the Chinese Infrastructure Enterprises, 1998-2015**

(Turnover of Chinese contractors' cross-border conventional contracted projects – values in 100 million of current US\$)



Source: China's National Bureau of Statistics. <http://www.stats.gov.cn/> [2017-12-28].

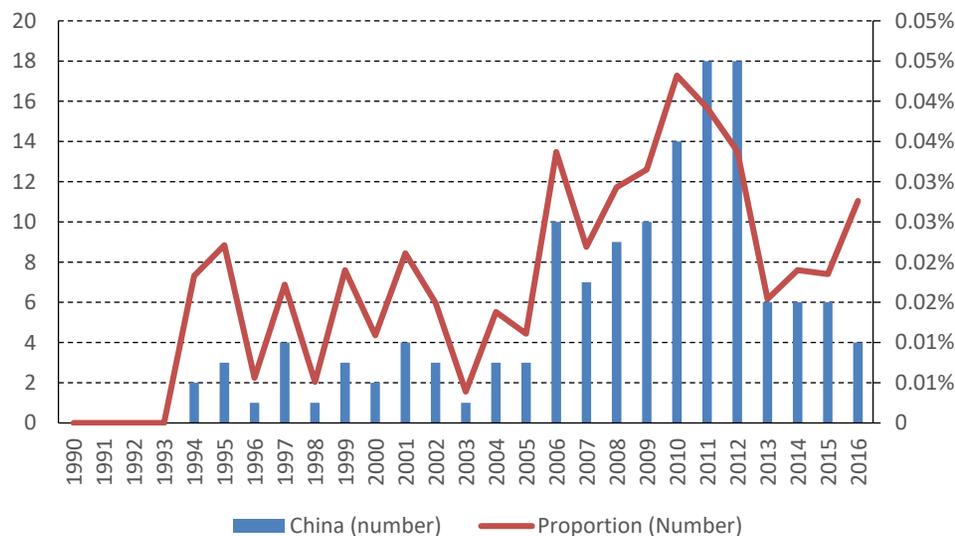
## 2. PPP Mode

Compared with the overseas traditionally contracted projects, China's overseas PPP projects are relatively scarce. According to the World Bank's Private Participation Infrastructure Investment Database (PPI Database), the cross-border PPP projects with participation of Chinese infrastructure enterprises have increased after 2005. However, the overall scale is still small and the proportion of Chinese infrastructure enterprises in the overall context is almost negligible. For instance, the first time Chinese infrastructure enterprises participated in overseas PPP projects was in 1994. In 2012, China's

infrastructure enterprises participated in 18 overseas PPP projects, which was the highest number for all these years, however, it only accounts for 3.38% of the total number of the global PPP projects of that year. One of the PPP projects led by Chinese companies in 2012, for example, was the Sky Solar Group’s investment of 75 million U.S. dollars for building an 18MW photovoltaic power station project in Chile’s Arica region. This BOO project was the first large-scale ground-based solar power station project in Chile and received a US\$ 51 million loan from the Inter-American Development Bank. In terms of the amount invested in cross-border PPP projects by Chinese private sponsors, the investment increased from US\$ 350 million in 1994 to US\$ 4.25 billion in 2012, which accounted for 4% of the total investment in global PPP projects in 2012 (see chart 30). In terms of geographical distribution, the amount invested in cross-border PPP projects invested by Chinese private sponsors are mainly concentrated in East Asia and Asia Pacific (38.96%), South Asia (26.92%) and Latin America (24.75%). The rest was invested in the following regions: Saharan South Africa (6.98%), Middle East and North Africa (1.22%) and Europe and Central Asia (1.17%).

**Figure 29**  
**Cross-border PPP initiatives in the world: number of projects invested by Chinese private sponsors and its proportion, 1990-2016**

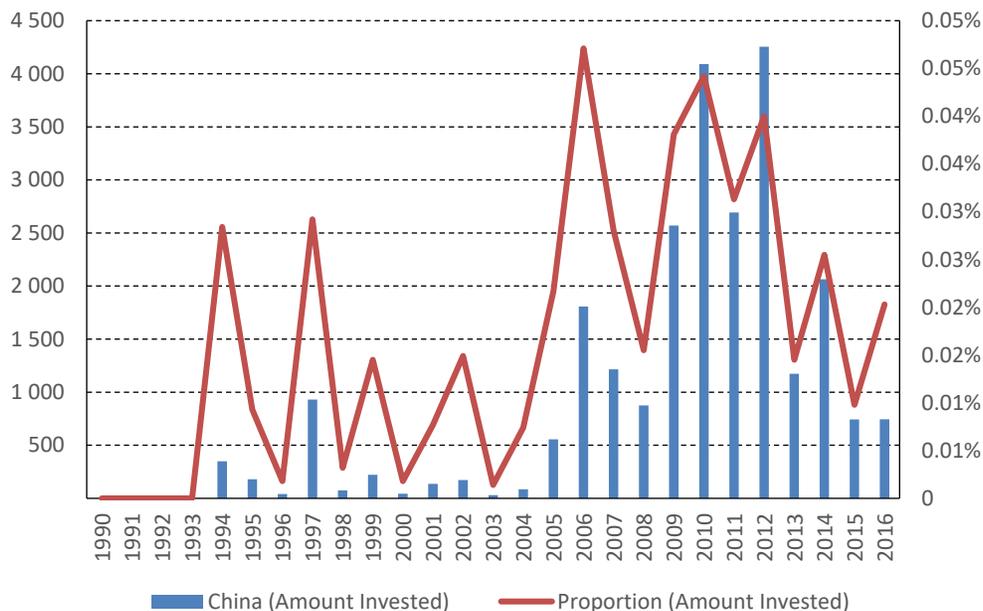
*(Number invested through cross-border PPP projects in infrastructure by Chinese private sponsors —left axis and its proportion of the global total PPP projects —right axis)*



Source: Prepared by the authors, on the basis of PPI Project Database, World Bank (data downloaded in February 2018).

**Figure 30**  
**Cross-border PPP initiatives in the world: amount invested by Chinese private sponsors and its proportion, 1990-2016**

*(Amount invested through cross-border PPP projects in infrastructure by Chinese private sponsors —left axis and its proportion of the global total PPP projects — right axis – values in millions of current US\$)*



Source: Prepared by the authors, on the basis of PPI Project Database, World Bank (data downloaded in February 2018).

To sum up, from the domestic and international development process, China’s infrastructure companies have been accumulating rich experience in conventional procurement, while still being unfamiliar with the PPP mode in general. The PPP development process in China did not start until 1994 and has been interrupted several times by regional and global economic crises. In addition, China’s infrastructure companies that have participated in the overseas infrastructure market are mostly construction companies, which have mainly been undertaking the construction part of projects at their early international foray stage. Therefore, Chinese construction companies have accumulated very limited experience in infrastructure investment and operation.

### **C. The current participation of the Chinese companies in Latin America**

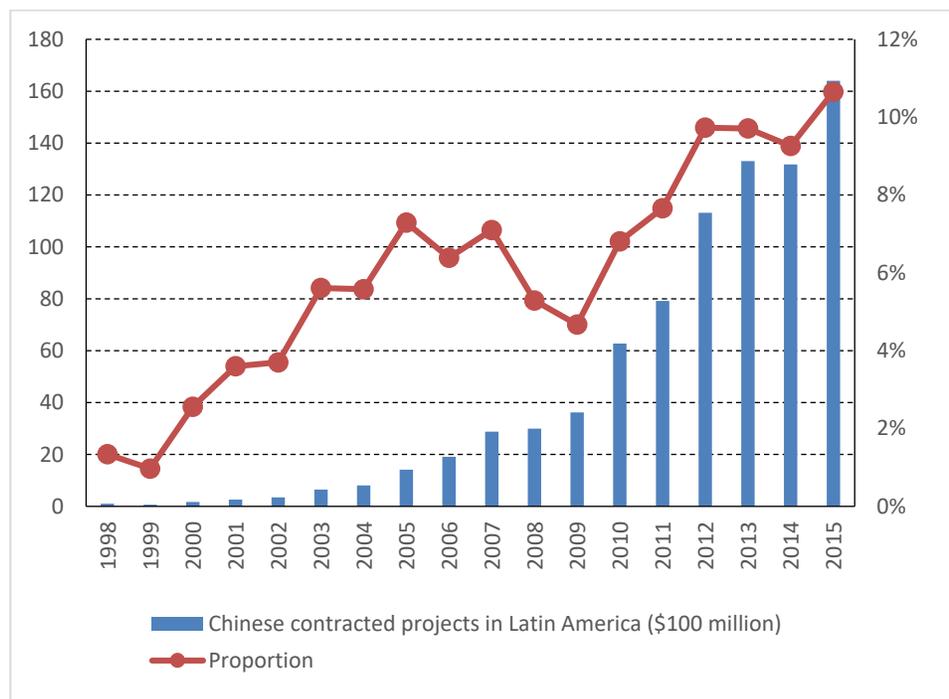
Based on the analysis of the capability building process of Chinese infrastructure companies, in this section, data analysis and a semi-structured interview methodology will be applied to see the current situation and potential advantages and disadvantages of the Chinese companies in Latin America.

## 1. Current participation of Chinese companies in the infrastructure projects in Latin America

In line with the accumulated capabilities of China's infrastructure enterprises in domestic and early international operations, China's infrastructure enterprises have made remarkable achievements in the conventional contracted business in Latin America as well. So far, the conventional contracted projects in which Chinese companies participate have covered 33 countries with a total turnover of US\$ 67.22 billion in Latin America and the Caribbean. Chart 31 shows the amount and proportion of Chinese companies in Latin American conventional contracted projects.

**Figure 31**  
Cross-border conventional contracted projects in selected Latin American countries:  
turnover of the Chinese Infrastructure Enterprises, 1998-2015

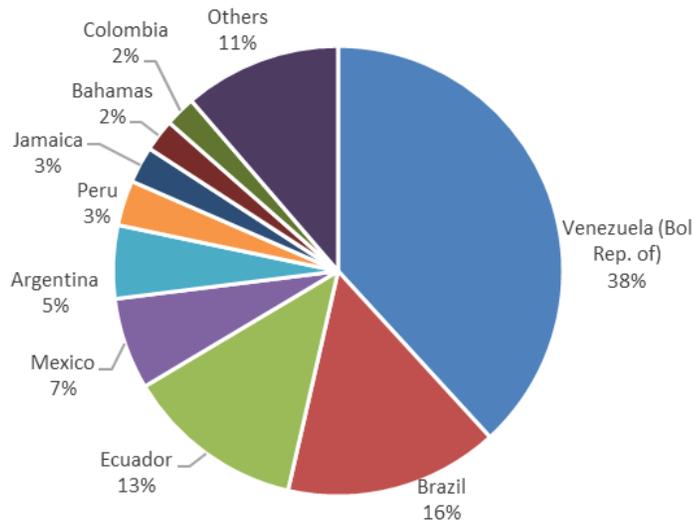
(Turnover of Chinese contractors' cross-border conventional contracted projects – values in 100 million of current US\$)



Source: National Bureau of Statistics of China. <http://www.stats.gov.cn/> [2017-12-28].

The accomplished turnover of Chinese traditional contracted projects in Latin America grew rapidly, especially after 2010. In 2015, it reached a maximum of US\$ 16.4 billion, and Latin America has also become the fastest growing region for Chinese overseas conventional contracted projects in recent years. Then, according to country distribution, as it can be seen in Chart 32, Venezuela (Bol. Rep. of) was the country reporting the highest share of traditional contracted projects among Latin American countries (40% of total turnover of Chinese infrastructure enterprises in Latin America), followed by Brazil (16%), Ecuador (11%) and Mexico (7%). Besides, it is worth mentioning that China's conventional contracted projects in Latin America have been largely funded by China's policy banks.

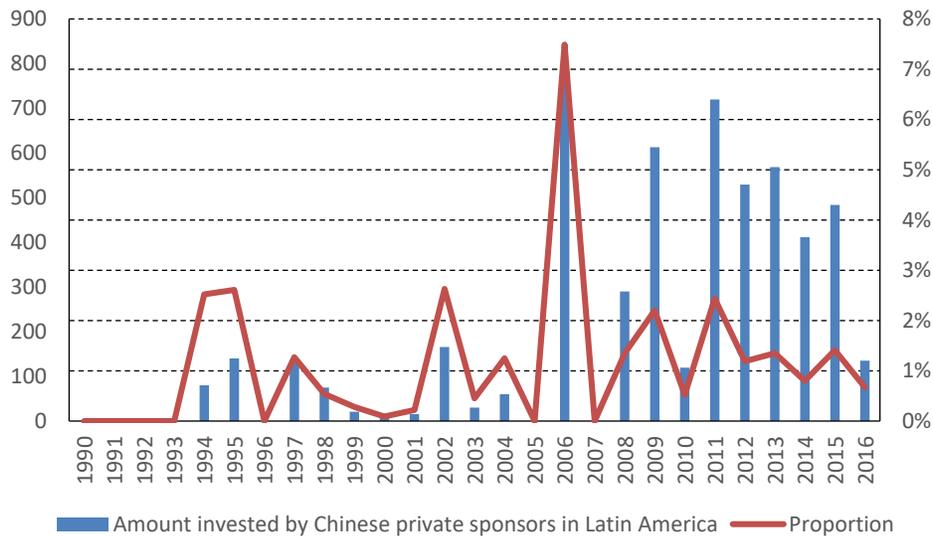
**Figure 32**  
**Cross-border conventional contracted projects in selected Latin American countries: distribution of the Chinese conventional contracted project's turnover by country, 1998-2015**  
*(In percentages of the total turnover of Chinese contractors' cross-border conventional contracted projects in Latin America)*



Note: Calculated by adding up the conventional contracted projects' turnover of each country from 1998 to 2015  
 Source: National Bureau of Statistics of China. <http://www.stats.gov.cn/> [2017-12-28].

In contrast to the conventional contracted projects, the level of participation of Chinese infrastructure companies in PPP projects has been quite low. According to the World Bank's PPI Database, Chinese companies' first participation in PPP project in Latin American infrastructure area was in 1994 when Hutchison Port Holdings invested US\$ 80 million in the Buenos Aires New Port Terminal 5 (Buenos Aires Puerto Nuevo Terminal 5) in Argentina. Chart 33 shows the amounts invested by Chinese companies in Latin American PPP projects. It can be seen clearly that Chinese infrastructure companies' participation in PPP projects in Latin America was less than 3% in most years. Among the countries where Chinese companies participated, Brazil was the biggest host, with a 78.13% of the total amount invested in the period 1990-2016. In addition, Chinese infrastructure companies were also involved in PPP projects in Panama, Colombia, Chile, Mexico and Argentina (6.34%, 5.64%, 4.13%, 3.98% and 1.78%, respectively). Compared with traditional contracted projects in Latin America, Chinese private companies' participation levels in PPP projects in Latin America are far behind.

**Figure 33**  
**PPP initiatives in Latin America: amount invested by Chinese private sponsors and its proportion, 1990-2016**  
*(Amount invested through PPP projects in infrastructure by Chinese private sponsors —left axis and its proportion of the total PPP projects in Latin America —right axis— values in millions of current US\$)*



Source: Prepared by the authors, on the basis of PPI Project Database, World Bank (data downloaded in February 2018).

Similar to the development in China and the rest of the world, based on the rich construction and management experience, China's infrastructure enterprises have achieved sustained high growth in Latin America's conventional contracted projects field. However, as a latecomer to the PPP field in Latin America, China's infrastructure companies are still showing low levels of participation.

## **2. Challenges and opportunities for Chinese infrastructure companies and financial institutions in infrastructure development in Latin America —Remarks from a semi-structured interview**

In order to have a more realistic and thorough understanding of the participation of Chinese infrastructure enterprises and financial institutions in the Latin American infrastructure sector, it was conducted a semi-structured interview with seven Chinese infrastructure enterprises and financial institutions that have participated in or are participating in Latin American infrastructure in recent years. They are: two policy banks, the most internationalized commercial bank, and four outstanding infrastructure companies with rich experiences, both inside China and around the world.

In the interview, it was discussed with each enterprise about the business environment in Latin America, the motivation for their participation, the general challenges of their participation and their current and potential solution regarding the challenges. Besides, since PPP projects are probably more challenging to them, the additional challenges and potential solutions regarding PPP projects, specifically, are also questioned and emphasized. The outcome of the interview is summarized as follows.

In terms of the business environment evaluation, first of all, the interviewed enterprises are generally optimistic about the opportunities brought by the demand of Latin American

infrastructure development and recognize that the PPP mode will be the mainstream and even the most important mode of the operation in the future for infrastructure development in Latin America. Second, China's infrastructure enterprises and financial institutions have realized that the capability of governments in managing PPP projects is an important factor that determines the success of such projects. Furthermore, they are aware, to some extent, that these capabilities of Latin American governments in managing PPP projects are varied and developed to different degrees in each of the national governments. For those countries where the market has great potential and the government has good PPP management capacity or good credibility, Chinese enterprises show greater enthusiasm for participation. For example, the interviewee from China Harbor Engineering Company (CHEC), who participated in the "Autopista al Mar 2" highway project in Colombia, considered that the road concession model in Colombia has iterated many times and the institutional arrangements of the fourth-generation project have been very mature. The interviewee from the Bank of China (BOC), of the Peru representative office, directly stated that whether in terms of the project rates of return, or the country risk, government credibility, foreign exchange controls and taxation, it was worth investing heavily in the areas of infrastructure in Chile, Colombia, and Peru. State Grid Corporation of China's (SGCC) interviewee considered the Brazilian power transmission and distribution markets were very attractive and showed optimism about their current and further development. The interviewee from China Three Gorges Corporation (CTG) also made it clear that they are "optimistic about the future development of Brazil's economy and the clean energy market". At the same time, Chinese companies have also acknowledged the challenges of participating in the Latin American infrastructure market. Most of them mentioned that the existing or incumbent competitors, both local and multinational, constitute a great competition pressure for the Chinese enterprises that have just entered in the Latin American infrastructure market.

In terms of the entry motivation, the answers from the enterprises' interviewees are mainly two. First, due to the slowdown of China's domestic infrastructure construction and China's economy entering into a "new normal", the opportunities in domestic market for Chinese infrastructure enterprises, that have gained sufficient experience and capabilities, have reduced. On the other hand, a large number of Latin American countries are currently distressed by the huge gap in infrastructure construction, which is a good opportunity for Chinese enterprises to expand their overseas markets. For example, infrastructure construction companies like CHEC and China Railway Engineering Corporation (CRECG) have placed more emphasis on expanding their markets and grasping the opportunities brought about by infrastructure needs in Latin America. In addition to the business development, infrastructure investors such as the SGCC and CTG also emphasized investment opportunities brought by external factors. For example, the interviewee from CTG said that due to the financial strain caused by the political donation scandal in Brazil in late 2015, the Brazilian government sought to sell part of its hydropower assets, which gave them a good investment opportunity. Among financial institutions, the typical motivation of commercial banks, such as BOC, is to provide better service to its customers like CHEC and CRECG, which are now trying to explore Latin American markets. The CDB and the China Exim Bank, as China's policy banks, have already supported the economic and social development both at home and for some developing countries such as in Africa, through financial tools such as preferential facilities, government concessional loans and preferential export buyers' credits, etc. Therefore, participating in infrastructure development in Latin America, on the one hand, has supported the overseas development of China's infrastructure enterprises; on the other hand, this is an opportunity to cover an unsatisfied demand or a specific need for infrastructure in the recipient countries.

In terms of the general challenges of participating in infrastructure in Latin America, in addition to the natural complexities in carrying out infrastructure projects, the remote geographical distance, as well as cultural and institutional differences between China and Latin America, have also added additional difficulties to the participation of Chinese enterprises in Latin American infrastructure area. The interviewed enterprises generally recognized the above challenges, meanwhile, different types of enterprises also expressed different risk concerns. Infrastructure enterprises, which participate in infrastructure construction mainly through conventional contracted projects, are relatively more concerned with the challenges posed by project implementation like feasibility study, tendering process, construction and operation due to unfamiliarity with local laws (such as EIA requirements, labour law, etc.), culture, construction standards and languages.

In terms of the special challenges of PPP projects, different types of respondents provided different answers. According to the foregoing analysis, most of the projects Chinese infrastructure enterprises participated, both domestically and internationally, are conventional contracted projects. Therefore, PPP projects clearly pose a significant challenge to them. Overall, the main extra challenge comes from simply being unfamiliar with PPP projects. Some interviewee mentioned that PPP projects in Latin America have more stringent requirements on bidding materials, are larger in scope and require enterprises to follow up and to operate in longer periods compared with the traditional procurement projects. Participating in PPP projects in Latin America do require more and deeper understanding of the local environment, both physical and social, which is obviously the current weakness of almost all the Chinese infrastructure companies.

From the interview, it has been learned that China's infrastructure construction companies are still accustomed to participating in the infrastructure market in Latin America through the conventional procurement mode. Although the importance of the PPP mode has been widely recognized and Chinese infrastructure construction companies show positive attitude to learn, they still remain cautious about PPP projects due to the challenges above. Unlike the Chinese infrastructure construction companies that have been engaged in contracting business for a long time, infrastructure investors from China such as the SGCC and the CTG believe that there is no additional challenge of PPP projects to them. This is partly because these infrastructure investors adopt business models similar to PPP in China and are familiar with the whole process of financing, investment and operation. On the other hand, these infrastructure investors are mainly engaged in hydropower and electrical grids—most of the projects in these two industries have a good profitability and do not rely heavily on the subsidies of the host governments. For financial institutions, on the one hand, the financing of PPP projects is large in scale and long in duration, which make the risks are relatively more difficult to control than a conventional procurement project. On the other hand, the hesitation of infrastructure companies would indirectly affect the interests of financial institutions' participating in PPP projects, as the difficulties and relevant risks associated with the companies would spread to them and would endanger their own benefits.

Faced with these challenges, the interviewed companies also explained their thoughts and experience in dealing with them. Since both Chinese infrastructure enterprises and financial institutions are more familiar with traditional contracted projects, they will give priority to traditional contracted mode when it is possible. For infrastructure companies, they expressed that, first, they will make the necessary effort to learn from and comply with the local system, regulations, as well as customs (including land acquisition rules, environmental protection requirements, labour and community relations, etc.). If they feel their capabilities are inadequate, they would internally hire

local employees in specialized or key positions, or through third-party agencies for dealing with these issues. According to some interviewees, it would be difficult at the very beginning, but along with the time, when participating in such projects, then the required capabilities would be improved. CRECG is a good example of this capability-improving process.

Second, they would try to involve in projects whose industry or contract mode they are familiar with, and then extend their business to new areas. For example, CHEC started its business in the Caribbean through marine engineering projects in Jamaica, the subsector of infrastructure construction that they are best at. When they were familiar with the local environment, they began actively studying the PPP model and sought opportunities to work with local enterprises. Third, in order to do business in Latin America in the long term, some Chinese infrastructure companies started to train management talents and let them be familiar with the Latin American environment through participating in projects. As for financial institutions, the interviewees explained that they usually control risks by selecting industries and making necessary arrangements on financing structures. They also evaluate the credit and financial capabilities of host countries' government in sovereign guaranteed loans. In addition, the assessment of project's idiosyncratic risk is a must procedure. For example, in the evaluation system of CDB, the detected potential serious environmental risks would constitute a project's "one-vote veto" factor. Regarding PPP projects, first, some interviewees from financial institutions said that they would consider accompanying infrastructure companies to participate in risk-controllable PPP projects in the adaptation phase, such as a railway concession project in Uruguay, in which the project's revenue comes from government financial deferred payment. Second, some interviewees mentioned that signing a clear PPP contract with host government is a worth-learning risk control method. For example, although the Metro Line 2 in Peru has been postponed repeatedly because of land acquisition problems, the project consortium still received the corresponding compensation according to the prior agreement with the Peruvian government, so that the interests of the financial institutions participating in the financing were protected.

Third, almost all the interviewees from financial institutions expressed their attitude to participate more in PPP projects; and some interviewees are willing to accompany Chinese infrastructure companies trying and learning the whole process of the PPP projects in Latin American countries. Finally, almost all the interviewees from financial institutions expressed their willingness to seek collaboration opportunities with the regional development banks, as well as strong local and multinational banks for big infrastructure projects in Latin America.

### **3. Advantages and weaknesses of the Chinese infrastructure companies and financial institutions in infrastructure development in Latin America** **—Remarks from a semi-structured interview**

Based on the analysis above, the advantages and weaknesses of Chinese infrastructure companies and financial institutions can be summarized as follows.

Regarding the advantages, the main strengths of Chinese infrastructure enterprises are their sufficient engineering and project management capabilities, which can be seen in the extensive construction projects in China, Latin America and other parts of the world. Especially, due to the complex geologic features in China, China's infrastructure enterprises have accumulated more strengths in carrying out large and complex projects. It also has been witnessed many times by the author's team's on-site investigations in Latin America. As for the advantages of Chinese financial

institutions, for both commercial banks and policy banks, their clear advantages are being rich in capital. After 30-40 years of development in China serving the fast growth of Chinese economy, they have accumulated substantial capital at hand. In addition, in order to strengthen the investments in Latin American countries, China has set up two special funds for the Latin American region, i.e. the China-LAC Industrial Cooperation Investment Fund (CLAI Fund) and the China-LAC Cooperation Fund (CLAC Fund).<sup>15</sup> These two funds, combined with the major commercial banks and policy banks mentioned above, mainly support the development of Chinese infrastructure companies in Latin American countries.

Beyond the advantages of Chinese infrastructure enterprises and financial institutions, the role of the Chinese government is also important. The "One Belt, One Road" initiative proposed by China in 2013 has been extended to the Latin American region now. The Chinese development ideas and experience might also have its influence on some extent in the collaboration of China and Latin America in the near future.

In comparison with the local and multinational infrastructure corporations which are active in the Latin American market, the weaknesses of China's infrastructure enterprises and financial institutions are also obvious. First of all, many differences at state, industry or firm level, constitute obstacles for Chinese enterprises to invest in infrastructure projects in Latin America. As mentioned before, China's infrastructure enterprises and banks are not familiar with the local business and social environments such as environmental standards, unions, and community culture in various countries of Latin America. All this unfamiliarity poses substantive challenges for late comers from China. Besides, Chinese enterprises and financial institutions are also prone to some misunderstandings about the role of the government in Latin American countries. For example, compared with China, following the Washington Consensus and the philosophy of market economy, governments play relatively limited role in both economic and social aspects in most Latin American countries, which means, in most cases, companies need to deal with complex local issues by themselves. At this point, the capabilities of Chinese enterprises are weaker than local and multinational corporations (MNCs) from Europe and North America that entered the region at earlier stages.

For PPP projects, Chinese enterprises have not managed to accumulate relevant and sufficient operational experience both in domestic markets and in their early international expansion. Sophisticated feasibility studies in an unfamiliar environment, complex bidding documents in foreign languages (like Spanish and Portuguese) and long operation cycles also pose more challenges to Chinese infrastructure companies. Similar to Chinese enterprises as latecomers, Chinese banks have not enough experience with managing PPP projects, especially in controlling different types of risks associated with these projects. In addition, Chinese policy banks also have

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<sup>15</sup> The CLAI Fund was launched in June 2015 with the total size of USD 30 billion (10 billion in the first phase). The CLAC Fund was launched in January 2016 with the total size of USD 10 billion. The strategic position of the two funds is acting as a market-oriented financial investor to pursue reasonable return and financial sustainability over medium and long term. For geographic focus and investment areas, both funds invest primarily in Latin American and the Caribbean countries. They do not limit themselves to particular sectors, however the current focuses would be industries such as energy and minerals, infrastructure, agriculture, manufacturing, high technology and financial cooperation. In terms of the project selection, both funds seek strategic and/or commercial results in countries with political stability and acceptable foreign exchange risk. Besides, they emphasize the respect for local laws and regulations on environmental protection, labour rights protection and relevant social norms in the host countries where the projects would be carried out. As for the size of capital distributed for each project, generally, the CLAC Fund invests no more than 100 million US dollars and the CLAI Fund allocates capital from tens of millions to 500 million US dollars in a single project.

had fewer opportunities to support enterprises in PPP projects than traditional procurement projects through ways that they are familiar with, such as sovereign guaranteed loan. So currently both Chinese infrastructure enterprises and financial institutions as latecomers, except for a small number of well-positioned Chinese investors, are all weak in PPP projects in Latin America.

### **III. Conclusions**

The overview of the needs for infrastructure investments in Latin America and the region's experience with PPP in infrastructure so far, combined with the analysis of the capabilities and potentials offered by the Chinese companies, help identify the key contextual elements for potential LA-China cooperation on infrastructure development (Section A). Furthermore, it allows for the formulation of policy recommendations for Latin American countries, as well as Chinese companies with regard to their business strategy, and for regional development institutions, such as ECLAC, the Center for China and Latin America Management Studies of Tsinghua University and multilateral development banks (Section II).

#### **A. Potential for Latin America-China cooperation on infrastructure development**

In terms of the main contextual elements, the following conclusions can be drawn, based on the analysis provided above.

First, in terms of the need for economic and social development in Latin American countries and compared with the infrastructure development in Asian countries such as China and South Korea, there remains a significant infrastructure gap in key infrastructure sectors, such as transport, energy, telecommunication and water and sanitation. The size and the nature of the gap varies according to the sector and depending on the country, but it remains one of the main features of the Latin American structural imbalances.

Second, according to the analysis, the insufficient level of investments is one of the main reasons for the existing infrastructure gap. Besides, infrastructure investments in Latin America, both public and private, have followed the cycle of GDP growth in the region to a large extent; it was even more so for private investments and for the PPP projects. There are wide ranges of disparity

in infrastructure development among countries, such as different investments sources (public investment and private investment) for different infrastructure segments (ICT, transportation, energy, and drinking water and sanitation); and different contractual modes for infrastructure development (PPP and non-PPP mode) for different countries and infrastructure segments etc.

Third, the role of governments, measured both by the investment ratio and by their participation in planning, managing, as well as supervising projects, has been and remains crucial for the infrastructure development in Latin America. Based on historical data, even though the volume of public investments as a ratio of total infrastructure investments has dropped substantially in comparison with the first half of the eighties, it still represents, on average, more than 51% of total infrastructure investments (this is for the period 2000-2015, but between 2008 and 2015 the average increases to 54%). Beyond this, the role governments play by providing functions of planning, managing and supervising the infrastructure development is even more important than their role as direct sponsors. Hence, shortages in infrastructure policies and overall governance have an equally negative impact, if not a bigger one, on the lack of progress toward a better infrastructure endowment in the region.

Fourth, during last decade, there has been clear progress in implementing PPP projects in Latin America, seeking to take advantage of the potential positive impacts of the PPP contractual mode in terms of financing, efficiency and effectiveness, as well as expertise and innovation. PPPs in infrastructure have secured an important place in the region's infrastructure development and are likely to remain a very significant part of this landscape in the future. At the same time, the region's experience with PPPs suggests that there are still considerable challenges and room for improvement, especially as far as the public policies are concerned.

Fifth, with the ever-improving relationship between China and Latin America and the "One belt, One road" initiative extending to Latin America, a growing number of Chinese companies and financial institutions have demonstrated their interest in participating in infrastructure development in the region. Some pioneer companies and financial institutions have already been in the market, carrying out infrastructure projects and accumulating valuable experience.

Even as latecomers, the hard and substantial practice both in the domestic market and in their early internationalization process have allowed China's companies and financial institutions to accumulate some strengths in comparison with other players, such as local, regional firms and MNCs from other regions. Availability of capital and financial resources and possessing technical and engineering skills, especially for large and complex projects –under traditional procurement contracts–, are recognized as comparative advantages of Chinese companies and financial institutions.

Sixth, due to the multiple differences between China and Latin American countries in terms of culture, political, administrative and social development path, China's companies and financial institutions also show some weakness compared with other players (such as local, regional firms and MNCs from other regions). Limitations of Chinese companies include the fact that, as latecomers, their understanding of the complex business environments in the region and their capabilities for dealing with local (social) issues, such as unions and social-cultural (community) dynamics, are not as advanced as those of their competitors. In addition, given their limited experience carrying out PPP projects both in the domestic and in international markets, being

unfamiliar with the mechanism of PPP projects is also an obvious obstacle for Chinese companies and financial institutions in participating in infrastructure markets in many Latin American countries.

In this context, to effectively take advantage of a potential match between the Latin American needs in terms of infrastructure investments and the resources and capabilities of the Chinese sponsors, there is a clear need for strategic actions by all actors involved, be it Latin American countries, Chinese sponsors and/or the development actors in the region.

## **B. Policy implications and recommendations**

Based on the facts and conclusions mentioned above, in order to further improve infrastructure development in Latin American countries, and to attract and encourage Chinese companies and financial institutions to participate in infrastructure development in the region, policy implications and strategic suggestions for both sides, governments of Latin American countries and Chinese companies and financial institutions, are introduced as below. In addition, given complex differences between China and the region, an important role that can be assumed by regional development actors, like multilateral development banks and think tanks from Latin America and China, is also explained.

### **1. Policy implications for governments in Latin American countries**

From the analysis above, governments of Latin American countries should aim at keeping a stable political and economic environment, working towards sustaining a certain level of GDP growth in each country and the region as a whole. At the same time, it is crucial for governments to improve infrastructure developments by increasing public investment through other mechanisms of participation or partnerships with the private sector and allowing a set of incentives for investment in infrastructure and its financing (and then funding), where regulation and standards are clear to all parties. Likewise, governments should clearly state the commitments and roles that will be assumed in the investment and the forms of financing (and funding) in their infrastructure development (and operation) plans.

Besides, since different segments of infrastructure are associated with economic and social benefits of different natures, all kinds of development modes, both PPP mode and non-PPP, that are deemed as appropriate for the development of different infrastructure segments should be recognized and encouraged. Only in this way, the investment sources could be more diversified and the resources that can be attracted for financing infrastructure developments in Latin America could be maximized.

Since PPP has been recognized as the mainstream mode for infrastructure development in Latin American countries, both currently and in near future, there are more specific advice and policy implications for the governments in the region.

Based on the Latin American countries' experience, Rozas et al. (2012) and Vassallo (2015) draw some recommendations for the region regarding the application of PPPs as a way to promote infrastructure procurement. In general terms, they could be summarized as the following points:

- at the State level, diversifying the use of PPPs (to any infrastructure and at every level, sub-regional and local), and establishing subsidies to the demand for PPP projects with high social profitability and low or negative private return, communicating to society the

advantages of PPPs for developing and improving standard of living, and creating public access to each PPP projects' information;

- at the legal and institutional level (specific to PPPs), improving the regulatory framework of PPPs for providing infrastructure and related services, improving the supervision and control of the management of PPP, implementing evaluation methods for assessing Value for Money (not only ex ante but also in media res and ex post), and creating conditions for greater participation and competition in the tender;
- at the tendering, contractual and project level, restructuring business areas in the renegotiation of contracts, and distributing (transferring) risks appropriately to create added value (for an optimal balanced distribution of risks between the parties, commercial and investment risks must be shared).

In a way, most of the specific insights provided by the authors fall into the overall recommendation of improving the government organizations and agencies working on PPP mechanisms and the involving regulatory framework. On the one hand, some challenges can be addressed by assigning clear roles and functions to the government entities involved in PPPs, and those of the officials in charge, establishing efficient systems for control and monitoring of contracts, and enhancing training and properly preparing human resources. On the other hand, it is suggested that is necessary to put in place mechanisms to resolve conflicts quickly and independently, and for those disputes that cannot be resolved, introduce regulatory changes in the legal system in order to apply decisions in accordance with law (avoiding expensive compensations to the State and legitimacy conflicts).

The recommendations concerning the tendering process, contractual standards and project performance target not only greater flexibility, but also better consistency and transparency in some of the activities or elements within some aspects of PPP mechanics. For instance, when requesting for tender, it is important to set clear, objective, simple and efficient competition factors and qualification criteria (e.g. awarding the contract to the bidder submitting the bid with the lowest price, or the lowest cost—cost-effectiveness approach considering life-cycle costing— or best value for money—the most economically advantageous bid based on quality criteria), avoiding award schemes based on multiple criteria or that aim to maximize the government cash account.

Regarding contractual standards, it is recommended to combine contracting procurement mechanisms (e.g. management contracts with concessions) to control and minimize risks (commercial, investment, etc.). Also, it is important to authorize periodic reviews of the fundamental variables (with trigger clauses) in the cases of unexpected events, with maximum adjustment limits or criteria of gradualism—depending on investment adjusting to demand. Any other contractual change must be limited to what is strictly necessary, and as long as it relates to the public interest and a maximum of social utility is guaranteed. Otherwise, substantive modifications to the original project design and contract—which implies increasing costs above a certain percentage— must be tendered (especially the contractor's proposals to reduce opportunistic practices). Furthermore, a renegotiation should be accepted only when a significant number of previously established causes are accumulated and after having met certain milestones or key objectives of the contract. Any intervention by the judiciary and executive power authorities in contracts should be avoided, as this could increase regulatory risk and make the operation more expensive by directly affecting users.

Finally, only projects properly formulated and based on economic, social and environmental feasibility studies approved by the government agencies should be accepted. The income models of the contractors should be more linked to the provision of the service than to the use of infrastructure (as the contractors have very little influence on managing the risk of demand for the service—or use of the asset—but can, contrarily, do much to manage—improve—the quality of service). In addition, it is recommended that the projects to be considered arise from sectoral strategic planning (not as isolated initiatives), and that the risks of the projects and guarantees offered by the States be properly and clearly assessed.

All these recommendations should be regarded as part of the overarching exercise of identifying the role PPPs could play for the provision of infrastructure in Latin American countries. In this sense, it is paramount that the role of public sector in financing infrastructure projects be reassessed, in a sense that the States promote co-financed projects through mechanisms that encourage the presentation of initiatives, whether public or private (e.g. by a reasonable prize to the sponsor that does not cancel the ex-ante competition conditions). This way, it is highly desirable to open the possibilities of financing PPP projects to all available sources (not only those coming from the financial systems: multilateral development banks, bilateral aid agencies, and national and foreign banking; but also those originating in the capital markets, such as institutional investors, pension funds and insurance companies, and through specific instruments like projects bonds and infrastructure debt funds). This would require specific regulatory and institutional frameworks (including legal, tax environment and infrastructure market) for financial systems and capital markets aimed to improve their stability and efficiency (sustainability) and, thus, the access to financing and guarantees and at a lower funding cost.

Clearly, the achievement of such conditions can only be ensured by the existence of macroeconomic and social stability, which, to some extent, remains a challenge for some Latin American economies. Furthermore, the attainment of a higher level of regulatory homogeneity in the region would be necessary for enhancing the perspectives for PPPs and attract investors. That would require, on the one hand, homogenizing (as far as possible) the regulatory bases, the contract models and the methodological criteria of the pre-investment studies and, on the other hand, standardizing the studies of PPP in areas such as engineering, demand, financial structure of risks and guarantees, legal analysis, and structuring of schedules and management plans.

## **2. Strategic suggestions for Chinese companies and financial institutions**

From the standpoint of Chinese companies and financial institutions, the infrastructure gaps in Latin America could represent a good business opportunity for both sides. After all, benefits of developing infrastructure would mean more business for Chinese companies and larger coverage of infrastructure services for Latin American countries. Besides, the ever-closer relationship, both economic and political, between China and Latin American countries, shows a more solid foundation for trust building and collaboration between the two sides, which, to some extent, would help to reduce the country level risks or perception thereof.

Meanwhile, it is still worth noting that there are risks associated with the business environment in different countries within the region, besides the risks associated with the differences between China and Latin American countries. To master and control the risks at firm-level, on the one hand, Chinese companies and financial institutions should put great efforts on learning and seeking pertinent advice, carefully trying to get more understanding of the business

environment, respecting the relevant law, regulations, as well as social norms; and on the other hand, they are also encouraged to collaborate or get into alliances with local, regional and international players that possess complementary strengths, so that the risks can be diversified or managed.

Regarding the infrastructure projects to choose, given the experience and capabilities accumulated in the domestic and international market, it is undoubted that Chinese companies and financial institutions would prioritize projects in engineering, procurement and construction (EPC), or other traditional contracted modes that they are competent at and familiar with; it is still worth bearing in mind that the PPP mode is deemed as an increasingly used vehicle to promote infrastructure development currently and in the near future. In this regard, it is necessary for Chinese companies and financial institutions intending to participate in infrastructure development in Latin America to build the relevant knowledge and pay close attention to certain facts, as follows.

First, even though the PPP mode has been adopted and applied in European countries much earlier than in Latin American countries (and in many other countries around the world, as well), there is no universal model to follow. As it is mentioned in part A of the document, and as indicated by the analysis of the PPI Database and the evaluation from EIU, the way PPP projects have been carried out vary according to the country and to the infrastructure segment. Thus, it is crucial to try to learn the detailed regulations as well as the typical arrangements of PPP mechanism in each potential host country. One possible way forward would be classifying and analyzing the tender documents of previous projects in order to understand the bidding factors, qualification standards, and subsequent risk-benefit sharing rules of different types of PPP projects (modes), according to segment and location area, and paying special attention to the changes and their dynamics. Naturally, the tender documents of PPP projects are relatively more complex than conventional procurement, and in order to better understand the procedures and requirements for every process (not only the tendering), language talents with certain professional background are also indispensable. Another possibility, as stated below, is to consider creating entities (through special-purpose entity/vehicle) or joining forces (through joint ventures or partnerships) with local companies to enjoy the experience and knowledge that the latter have on the concerning country.

Second, as it has been recognized, even though many Latin American countries have made good progress in carrying out PPP projects in previous years, most of them are currently trying to improve their capacities thereof. According to the suggestions indicated in the section above, there are at least three dimensions of the PPP mechanism to work on, such as at state level, at the legal and regulatory and institutional level, and at the tendering, contractual and project level. As latecomers and having a limited experience in PPP projects in Latin America, it is of paramount importance for Chinese companies and financial institutions to pay close attention to the regional think tanks and development banks, such as ECLAC, IDB and CAF, and renowned experts in PPP, for their advice on specific levels, segments as well as circumstances, for improving their capabilities in dealing with the PPP mechanisms. It is also highly recommended that Chinese companies and financial institutions contact, for guidance purposes, government agencies or departments that are associated with the design or planning, implementation, monitoring and evaluation of PPP projects, such as the Department of Coordination of Public Works Concessions of the Ministry of Public Works in Chile.

Third, it is important for Chinese companies and financial institutions which are interested in participating in infrastructure development in Latin America through PPP to gain relevant

experience by actively getting involved in such projects. Considering the advantages and disadvantages recognized in part B of this article, it is highly recommended for Chinese companies and financial institutions to seek appropriate local partners with complementary strengths to form consortiums or partnerships, to share and join forces for different ventures (as projects, processes or stages thereof), and distribute risks and benefits in a reasonable way during the life time of targeted projects.

Finally, it is imperative to bear in mind the Latin American region's commitment to pursue internationally agreed development goals (known as the Sustainable Development Goals, SDG). Thus, Latin American governments would take into account these goals and their targets, which are based on the three pillars of sustainable development (economic, social and environmental), when setting up their infrastructure development plans. Hence, it is worth reminding Chinese companies and financial institutions to pay attention to and try to adapt to the goals of targeted projects, which might be in line with the region's sustainable development goals.

### **3. The roles and efforts expected of development actors in Latin America and China**

Given the challenges and needs in the complex scenario regarding the infrastructure development in Latin American countries, as well as further efforts that need to be deployed in terms of resources and competences, the joint efforts of think tanks from Latin America and China for collaborating with and supporting projects' sponsors might be seriously required and highly recommended.

On the one hand, these institutions possess rich expertise, knowledge, data and information about all countries within the region. They have accumulated broad competences, which qualify them to share best practices, to compare experiences of different countries, and to boost synergies and new ideas for the whole region.

Correspondingly, the Chinese think tanks whose work is associated with Latin America, such as TSCCLA (Center for China & Latin America Management Studies, Tsinghua University), possess the expertise of international business and management from top universities in China. Furthermore, they have wide connections with big Chinese construction companies and financial institutions, as well as with Chinese government portfolios' head areas, such as the Ministry of Commerce or the Ministry of Foreign Affairs. This positioning also supports the think tank's unique role and capacity to understand the competences and performance of Chinese companies in Latin America, and to efficiently communicate with the Chinese government and its relevant areas, such as department and agencies.

With regard to the development actors' strengths (competences) described above, and confronting the substantial differences between China and the Latin American region, it is strongly expected that the think tanks and other development actors from both sides, China and Latin America, work together closely in order to unscramble better ways to overcome the numerous challenges in infrastructure development in Latin American countries, as well as to seize the potential opportunities offered by Chinese companies and financial institutions willing to contribute to closing the region's infrastructure gaps. Moreover, based on this complementarity, it is also expected that think tanks of both sides work out together mutual beneficial pathways and facilitate efficient cooperation between Chinese companies, and former or incumbent, local or international, sponsors to join forces for infrastructure development in Latin America.

In this regard, for accompanying the joint efforts, Latin American think tanks might be required, according to their mission and objectives, to help settling controversial or disputed decisions or actions during the different stages of infrastructure regional projects, and to facilitate the dialogue and negotiations among the relevant countries. Also, they might be required to provide research and analysis, or even advice and technical assistance, on the feasibility study process of projects involving two or more countries.

Correspondently, Chinese think tanks might be also required to help Chinese companies and financial institutions to improve their understanding of Latin America's business environment, including not only economic and political issues, but also cultural-social, environmental and regulatory. Moreover, they could play a role in facilitating learning of all relevant aspects about PPPs, as well as communicating and creating constructive dialogue with relevant Chinese government's departments/agencies for a reasonable policy support.

Finally, to improve cooperation between Chinese sponsors and local or international ones, the think tanks of both sides should join forces with governments to facilitate communication and knowledge exchange not only among the sponsors of both sides, but also with the departments/agencies in charge of infrastructure development and PPP. As a result of the joint efforts, mutually beneficial outcomes could be expected.

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