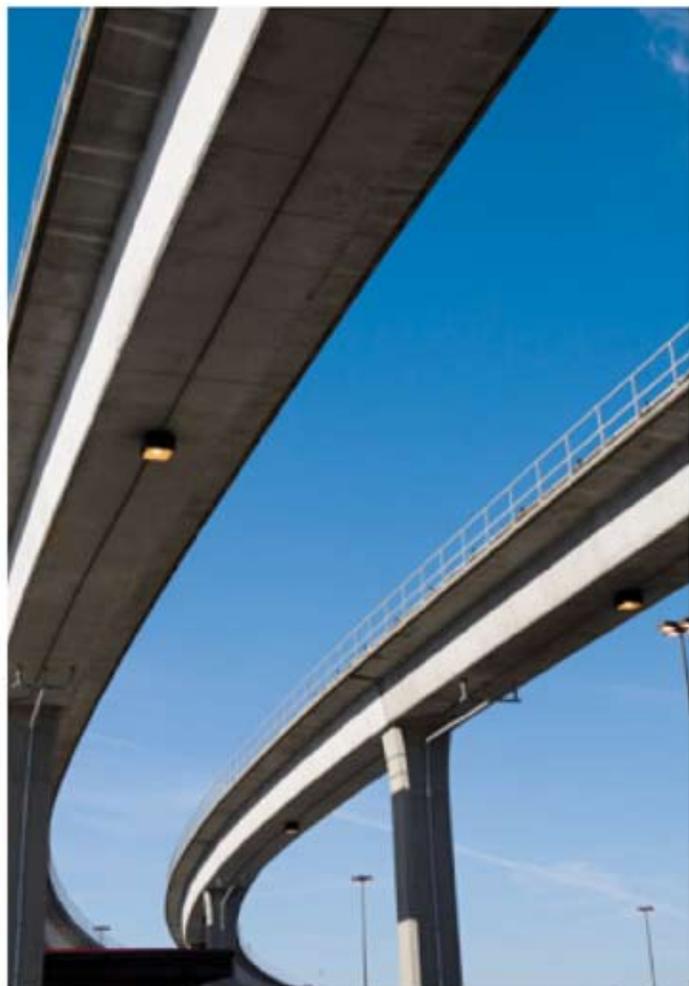


A balance and projections of the experience in infrastructure of pension funds in Latin America



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The body of research that comprises this book is the result of BBVA's interest in expanding knowledge in different fields and thus promoting fundamental changes in the markets. As such, this study provides a comprehensive review of pension fund investment in Latin American infrastructure and assesses its potential impact on both increasing the infrastructure stock and on economic growth, if conditions are achieved in which these resources are invested. To this end, the BBVA Research Department, in conjunction with the American Pension & Insurance Department, took the initiative in late 2008 to study these issues in depth.

The concept for this project was born in October 2008, in Mombasa, Kenya, where BBVA was invited to participate in the Global Forum of the International Organization of Pension Supervisors (IOPS), where the issue was raised publicly and generated enormous interest and encouragement to continue with the project. In 2009 the BBVA Research Department turned towards further developing this work and subsequently presented it at other seminars developed by the Organisation for Economic Cooperation and Development (OECD) and the Inter-American Development Bank (IDB). In addition, BBVA collaborated with several outside consultants, which allowed the first stages to be presented in two Working Papers¹, which have now culminated in this book.

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¹ "A balance of pension funds infrastructure of the investments: the experience in Latin America" (BBVA Research Department Working Paper No. 10/02) and "Projections of the impact of pension funds on investment in infrastructure and growth in Latin America" (BBVA Research Department Working Paper No. 10/03)

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Introduction

José Luis Escrivá, Eduardo Fuentes and Alicia García-Herrero

As defined by the Royal Academy of Spanish Language, infrastructure is any set of items or services deemed necessary for the creation and operation of any organization. From our point of view, we consider economic infrastructure to be those that are intended to contribute to the production and transportation of goods and services (e.g. roads, ports, airports, railways, water pipes, gas, electricity, etc.). On the other hand, we consider social infrastructure that which is indirectly part of the production process, and that stands out for its social value (e.g., hospitals, colleges and universities, prisons, etc.). Historically, a large proportion of the financing and management of infrastructures in the world has relied on direct state involvement as part of their duties. However, influenced by two important trends, the reality of our times has led to an evolution of that perspective:

- First, there is a greater emphasis on achieving higher levels of efficiency, transparency and accountability of State managed resources. This has increasingly highlighted the importance of market incentives and legal certainty for investors. That is without prejudicing its regulatory role and while continuing to act in the best interest of the state.
- Second, budgetary constraints imposed by the structural growth of key components of public expenditure, and the difficulty of continuing to raise the tax burden in countries with higher taxes in order to maintain a fiscal balance, also taking into account the fact that countries and financial markets have a greater sensitivity to increasing public deficits.

With that in mind, the State still has the duty to lead the country's development of infrastructure, manage information regarding the needs of the economy with regard to the needs of more and better infrastructure, plan how these projects should be implemented over time, and define how different agents from the public or private sector can participate.

Interestingly, public-private interaction in the financing of infrastructure has the potential to generate mutual benefits that surpass the alternative of not working together. Overall, the success of private sector participation occurs when both sectors satisfy the expectations placed on the investment:

- Expectations of the State: The public sector expects that their collaboration with the private sector will yield quality infrastructure at a reasonable price. At the same time, given the expertise of the private company, it also expects more efficient management of infrastructure than it could achieve by itself. To achieve these goals the risks inherent to the concession must be transferred to the private sector.
- Expectations of the developer/financier: The private company aims to maximize its profits while controlling risk. These aspirations are the same for financial institutions involved in financing a project, especially with regards to risks.

Fulfilling these expectations can only be achieved through optimum design of all phases of the investment project: planning, competition, execution and operation. Therefore, a well-designed infrastructure process that meets the above criteria should have a significant impact on the economic growth of countries. In this sense, the optimal use for domestic savings would be to redirect it towards well-designed infrastructure investment projects that can help reduce the gap between competing countries, and thereby generate a significant impact on economic growth.

As we will see in this study, pension funds allow significant levels of savings to be incorporated through the accumulated stream of income from the private pension systems, which are invested in different types of financial assets depending on the regulations of each country. Furthermore, international experience provides significant evidence, not only for the positive impact that this type of funding can have on a country's economic growth, but also for the clear advantages participants in pension funds gain by investing their portfolios in an asset class with a desirable risk/return profile that also perfectly matches their need for financial instruments with long-term maturity life cycles that match the horizons of the pensioners. It is very important to note, however, that the sole objective of the individual capitalization pension system is to provide the best possible pensions for their members. To meet this objective, investment decisions should be made exclusively in terms of maximizing the expected returns of individual funds, subject to a determined prudent degree of risk exposure. Therefore, any positive externalities that stand out from the investments of private pension funds should be viewed in this context and should always be subject to the primary and sole purpose of the funds: to provide the largest pension.

The Latin American experience is particularly relevant in this context. On the one hand, some countries in the region have managed to accumulate significant levels of domestic savings through the introduction of individual capitalization pension systems. On the other hand, the infrastructure gap in these countries offers pension funds an opportunity for investment in local infrastructure and contribute to the economic growth and development of their countries. To get an idea of the existing infrastructure needs in Latin America now, during the 1970s the levels of infrastructure in Latin America was comparable to that of several so-called Asian Tigers. While the most powerful countries in Asia had been investing up to 5% of GDP in recent decades, during the 1980s in Latin America only around 3.5% of GDP was invested and now barely 2% is. This regression was the result of ongoing fiscal adjustments that reduced public infrastructure investment in order to achieve a balanced budget. In the 1990s the privatization process attracted more private capital, which improved the quality of infrastructure, but it could not offset the decline in public investment.

In order for governments to be able to achieve a greater level of private investment in infrastructure and for these investments to benefit the countries, there are a number of conditions that must be satisfied for all actors to meet their expectations. These conditions, which need to be present from the beginning, must rigorously approach investments from a cost-benefit perspective from all relevant points of view (financial, social, environmental, economic, etc). The presence of the proper concession law demonstrates how one key aspect can ensure the fulfillment of the best project by the best developer,

and how the supervisory activities of the state are critical to meeting these objectives. On the other hand, investors should find an environment that allows them to mitigate their investment risk. In this sense, stability and regulatory transparency (especially in relation to property rights) are necessary conditions. In addition, another important element in the process is the availability of a developed financial system that allows for the existence of infrastructure assets and that has safeguards to mitigate financial risks in place. In this sense, multilateral institutions can also play a double role by facilitating additional funding by issuing specialized instruments that also mitigate risks to other private investors.

The outcomes of this entire process have been different in every country. In this sense, the experiences of countries like Australia, the United Kingdom and Chile can be characterized as mostly successful. In other countries, however, such as in Colombia and Mexico, private participation in infrastructure funding has been more problematic.

The aim of this work is directed toward highlighting the importance of infrastructure construction on the economic growth of Latin America and the great potential offered to pension funds as possible public-private participation investors (PPP). On the other hand, this paper seeks to collect all existing information scattered on this topic and to describe the present situation in Colombia, Chile, Peru and Mexico, highlighting aspects of the PPP process that are functioning properly, as well as those that need to be improved, while at the same time closely examining the current role, that pension funds play, both directly and indirectly, on infrastructure investment in these countries.

The contents of this paper have been organized into 8 chapters. In the first, Javier Alonso, Alfonso Ugarte and David Tuesta review the most important literature on economic growth, development and infrastructure. A description of the main conceptual elements that comprise all the phases of infrastructure projects involving private participation, particularly those aspects related to various concession models, project finance and public-private participation follows immediately. The authors then focus their discussion on the potential importance of pension funds on financing infrastructure and the advantages that countries can derive from doing so. In order to do so they briefly review the logic behind these resources, how they can be channeled into different investment assets, the way different regulations provide for the formation of investment portfolios that can incorporate financial assets related to infrastructure projects, as well as the potential for these resources to be very beneficial to the members of the funds. Finally, the authors conduct an experiment that shows the opportunity cost, in terms of GDP per capita in the countries studied, in the case that they fail to provide the necessary and sufficient conditions for pension funds to invest their financial resources to their full potential over the next 50 years, according to existing legal limits. This projection is measured using an enhanced neoclassical growth model, in which GDP depends on the accumulation of traditional factors plus the introduction of infrastructure capital stock, which depends in part on the contributions of pension funds. Additionally, the increase in total factor productivity is partly endogenous by investing in infrastructure. The results are very relevant and advise each country to make the necessary reforms by removing existing barriers.

In the first section of the second chapter, Javier Alonso and David Tuesta review the infrastructure gap between Latin American countries with regard to not only developed countries, but also with respect to countries that are now direct competitors in international markets due to a lack of sufficient investment, which has directly affected their competitiveness. Additionally, it is argued that from the results of Mia *et al* (2007), that while this lack of provision of infrastructure can be an obstacle to competitiveness, it may also pose an investment opportunity for various financial institutions, specifically for pension funds. In Sections 2 to 5, the authors analyze the current state of the infrastructure sectors in each of the countries in the region and highlight their corresponding financing requirements.

The third chapter, written by Ivone Ordóñez, Javier Alonso and David Tuesta, describes how infrastructure can be financed through pension funds by examining the experiences of countries where such financing schemes have been consolidated successfully. They review the experiences of pension funds in Australia in great detail, as well as the United Kingdom, Canada, the U.S. and continental Europe. The intention here was to identify some common elements of different systems that can provide lessons for Latin American pension funds. This chapter also includes a preamble on specific aspects of the issue in Latin America before further discussing the issue in the next chapter.

The following chapters are intended to describe the current situation of pension funds financing infrastructure in Latin American countries.

In chapter four, Soledad Hormazabal shows how Chile, which carried an important public infrastructure deficit in the late 80s, made major improvements by using an ambitious BOT concession program that has helped to reduce this very substantial gap. Initially, pension funds were prevented from financing new projects because of investment regulations that sought to protect the savings of pensioners. It was discovered that the investments did not represent an undue risk, however, and institutional investors were then considered natural financiers for this type of investment. In the late 90s, the authorities devised a mechanism that removed these obstacles, while at the same time maintaining regulations that protected the pension and insurance industry, as well as the concession system. This mechanism is the Infrastructure Bond. Since then, pension funds have been extremely important in financing the vast majority of infrastructure concessions. The challenge now is to expand the second generation concession system, to include projects such as hospitals and schools.

Carolina Romero and Maria Claudia Llanes demonstrate the current situation in Colombia in the fifth chapter. Infrastructure investments in this country gained importance when the economy opened up in the early '90s, and reached an average expenditure of 4.7% of GDP in the period between 1993 and 2006. For their part, private investment in infrastructure rebounded in 2005 to levels higher than the average in Latin American history, to a share of approximately 59% of total infrastructure investment. Private investment has generally been completed through concession contracts, and in some cases through joint ventures, particularly in the case of oil and gas exploration and exploitation.

The authors find that the concession process in Colombia has been a regulatory learning process that has sought out greater involvement from private sector financing and

solved past mistakes with each change in regulation. Colombia still does not have the regulatory conditions for pension funds to invest directly in infrastructure, however, and thus far it is only able to do so indirectly.

In Chapter six, Carlos Herrera analyzes the formation of infrastructure assets in Mexico from the experience of three perspectives: 1) The public sector; 2) The private sector; 3) and the pension funds (AFORE).

The author finds that historically, the public sector has played a key role in building infrastructure through public works. From the early '80s, however, although the public sector continued to maintain a high level of direct participation in infrastructure, it was not looking to dominate all economic sectors, and in fact tried to provide room for private sector investment. In this sense, the experience of the private sector in various forms of public-private partnerships has been diverse. However, the Project Finance model has not yet been able to consolidate in Mexico for many reasons: a) a lack of supply of investment projects ; b) private participation constraints in sectors with high demand for infrastructure ; c) lack of a unified legal framework ; d) and various regulatory obstacles that inhibit the participation of institutional investors.

The chapter shows that in the case of AFORE, the investment framework has made significant progress towards extending its range of investment instruments. With regard to infrastructure, resources were being concentrated in debt instruments of public and private enterprises in infrastructure sectors until 2007. As of March 2008, however, AFORE can invest directly in infrastructure projects under the Project Finance model through structured instruments and real estate investment trusts (fibras).

While the above developments in the investment regime form the basis for how AFORE can participate more actively in infrastructure, one of the main conclusions of the chapter is that AFORE is still in the initial stages of its experience with this asset class. In this sense, increased investment in infrastructure in the short and medium terms by pension funds will also require that these investors have a wider range of financial instruments, and more specifically, instruments that are more consistent with their capacity to analyze and manage risks.

In chapter seven, Jasmina Bjeletic finds that the low investment in infrastructure in Peru remains a major problem hindering the country from improving its competitive position in the region. At the moment, current levels of infrastructure put it as one of the worst performing countries in the region, ranking 113 out of 134 countries surveyed in terms of infrastructure provisions in the 2008 Global Competitiveness Report. Private pension funds represent an important source of funding for this type of project, given the pressing need to increase investment in infrastructure and by doing so to cover the current deficit. Regulators have been flexible with the investment regime of pension funds since 2000 in order to increase portfolio diversification and improve affiliates' returns. In this manner, a greater number of financial instruments have been offered to and admitted by the regulators, which has improved the channeling of PFA resources into infrastructure.

In reviewing the current state of infrastructure development and the participation of Peruvian pension funds, one finds some elements in the regulatory framework and within

the scope of the process for awarding projects that require designing more efficient base mechanisms and project contracts in order to be attractive to investors. In fact, significant deficiencies in the concession system have been found that actually retract from and postpone investment in infrastructure. Among the most significant bureaucratic shortcomings to highlight are the contracts, the social risks, the inadequate framework for tariff setting and the inadequate oversight. However, the Peruvian pension industry has made significant efforts to finance companies committed to the infrastructure sector, but needs to develop an appropriate regulatory space for the resources they currently possess, so that more funds can be channeled directly to project development.

Finally, in Chapter eight, José Luis Escrivá, Eduardo Fuentes and Alicia García-Herr perform a cross-sectional compilation of the main conclusions drawn in this work. In summary, it stresses the important, positive impacts that Latin American countries could obtain by allowing pension funds to be used as part of their available resources in new infrastructure investment, and that the funds themselves (and therefore their affiliates) would also benefit from the investment. However, although there have been positive steps in the right direction, the necessary and sufficient conditions for this to occur in the short term (with the exception of Chile) still do not exist and further reforms are necessary.

1. Projections of the impact of pension funds on investment in infrastructure and growth in Latin America^{2,3}

Javier Alonso Meseguer, Alfonso Ugarte and David Tuesta

1.1. Economic cycles, fiscal policy and its effects on infrastructure investment in the Latin American context

Infrastructure plays a leading role in the analysis of the economic cycle as a result of the fiscal policy recommended by Keynes in the mid twentieth century. In general terms, the main approach suggests that in those phases of the lowest cycle, or of economic crisis, caused by insufficient private demand, it should be the public sector that compensates for this activity through an expansive fiscal policy. In turn, during phases of strong growth, due to the dynamism of private demand, the government must adopt a contractive fiscal policy, reducing spending and amortizing debt generated during periods of crisis.

A fundamental contribution of Keynes was to distinguish between the state's current expenditures and public investment, and specifically in investment in infrastructure. With regard to an expansive fiscal policy that uses the component of public investment in infrastructure, consisting of an increased investment financed with public debt, economic literature shows two possible effects on the private sector: a crowding-in effect, and alternatively, a crowding-out effect.

The crowding-in effect assumes that, in the short term, the demand for inputs necessary for the execution of infrastructure occurs on goods and services generally produced in the private sector, thereby increasing the sales expectations of those goods and services⁴. In terms of supply in the medium term, the provision of better public infrastructure allows for an improvement in productivity of the private capital stock, increasing its production potential.

In turn, the crowding-out effect, would be derived from the fact that the increase in public spending on investments could generate two collateral effects. On one hand, the needs of public financing could be detrimental to the perceived country risk and therefore lead to a rise in interest rates and short-term inflation. On the other hand, this could lead to an increase in companies' financial costs, making them less competitive internationally. As a final result, there would be reduced investment, production and employment. Table 1.1 shows the results obtained in various empirical works that have attempted to contrast the existence of such effects.

2 The authors acknowledge and appreciate the important contribution provided by María Claudia Llanes and David Freeman in the analysis and development of the document during the final stage.

3 The authors acknowledge and appreciate the comments and suggestions of Adolfo Albo, Tatiana Alonso, José María Aragone, Rafael Carranza, Francisco González Almaraz, Mayte Ledo, Jorge Matuk, Hugo Perea, Carmen Pérez de Muniain, Alejandro Puente, Ricardo Rodríguez Marengo, Juana Téllez, Enrique Summers, Patricio Urrutia and Joaquín Vial

4 The quantification of this effect would be derived from what is known in economic policy literature as the multiplier of public spending. (Fernández Díaz *et al*, 1995).

TABLE 1.1: Empirical evidence on the crowding in / crowding out effect

QUOTES	Sample environment	Conclusions
Oshikoya (1994)	África	For most countries in this sample, public investment in infrastructure is complementary to private sector investment
De Oliveira Cruz and Teixeira (1999)	Brasil	Private investment is crowded out by public investment in the short term, but in the long term these two variables are complementary
Blejer and Khan (1984)	Developing Countries	Government investment in infrastructure is complementary to private investment, while other types of government investment are not
Balassa (1988)	Developing Countries	Crowding-out
Greene and Villanueva (1991)	Developing Countries	Crowding-in
Heng (1997)	Developing Countries	Countries Shows that public capital can crowd-in private capital by raising the marginal productivity of labour and savings
Ghura and Goodwin (2000)	Developing Countries	Overall sample suggests crowding-in - Public investment crowds in private investment in SSAFR, but crowds out in Asia and LAC
Nazmi and Ramirez (1997)	Mexico	Crowding-out
Musalem (1989)	Mexico	Crowding-in
Ahmed and Millar (2000)	OECD and developing countries	Government expenditure crowds-out for both samples, plus pooled sample. For developing countries, government expenditure on transport and communication crowds-in
Argimon, Gonzalez-Paramo, Alegre (1997)	OECD	Crowding-in effect of private investment by public investment through the positive impact of infrastructure on private investment productivity
Monadjemi and Huh (1998)	OECD (Australia, UK, EEUU)	Empirics provide limited support for crowding-out effects of government investment on private investment

Source: Everhart and Sumlinsky (2001)

One conclusion of this evidence is that the effect of public spending on infrastructure and consequently on growth can be ambiguous. The predominant result in each country will depend on the macroeconomic circumstances in which it is immersed and the effectiveness of the complementary policies carried out. For example, an expansive fiscal policy, combined with a contractive monetary policy, could limit the increase in prices and in interest rates. A policy on income that prevents the transfer of inflation to wages such that they would grow only with productivity, would prevent the crowding-out effect. Finally, to the extent that the GDP growth rate is way below its potential rate, and agents' expectations consider remaining in this scenario over a prolonged period of time, the increase in public expenditures would not supplant private investment, since there would not be short-term business opportunities.

The expansive effect of fiscal policy is greater when it is produced through an increase in investment, than when it is made through the increase of current expenses. This is due to the fact that, together with the multiplying effect of demand, we must consider the effect of infrastructure on supply, improving productivity of the private sector, as we pointed out previously.

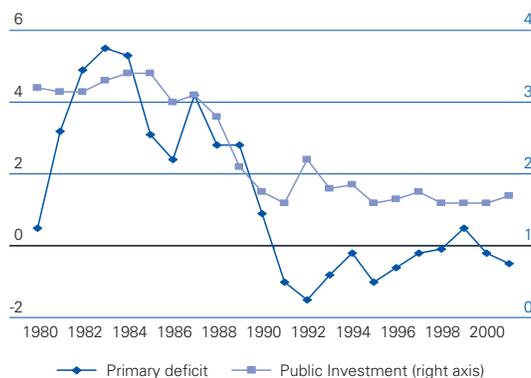
However, an expansive fiscal policy carried out through an increase in public investment has an important disadvantage. This is mainly derived from the delay that occurs from the moment in which the decision is made to build infrastructure to the moment its real effects on the economy occur. Kamps (2005) quantifies this delay in a study of 22 OECD countries of being between two and four years. This lapse is derived from the delay in the preparation and formal execution of public budgets and the time elapsed in the physical execution of the projects. This circumstance causes this tool to be an inflexible factor in its use as a counter-cyclical policy tool.

In the same manner that fiscal policy can be expansive, in a strong growth economic cycle, public expenditures could be used as a contractive policy, thereby adopting a counter-cyclical policy.

Considering the above, we might ask what the policy on investment in infrastructure has been in the environment of the Latin American economic cycle.

As can be seen in Chart 1.1, based on Calderón and Servén's 2004 document, we were able to observe that the fiscal consolidation of the Latin American area at the beginning of the nineties was produced thanks to a sharp decline of public investment in infrastructure from investment figures close to 5% of GDP at the beginning of the eighties to a mere 1.5% a decade later. The measure was very effective, leading to a budget surplus between 1991 and 1998. Since the countries were conscious of the fact that this measure reduced their capacity for long-term growth, many of them began ambitious privatization programs of public infrastructure projects, providing additional resources for fiscal consolidation and creating the bases for private companies, many of them of an international nature, to invest in a continuous manner in each country.

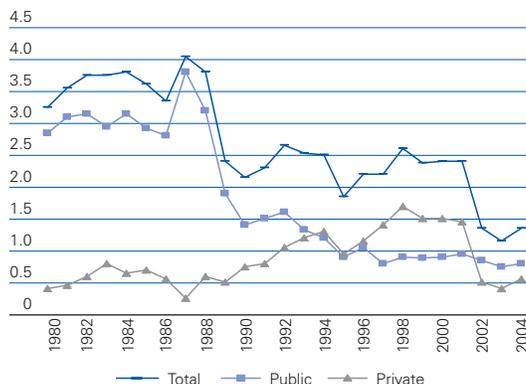
CHART 1.1: Primary deficit in public investment in infrastructure
(as % of GDP)



Source: Calderón and Servén (2004)

The objective was only partly obtained. As seen in Chart 1.2, the strong reduction of public investment in infrastructure coincided with a rally in private investment derived from various privatization processes and the boom in foreign direct investment. Finally, the crisis at the beginning of the 2000 decade set investment back in comparison to other countries, notably reducing total investment. As derived from the Servén study of 2008, the private sector was unable to compensate for the decline in public investment since 1987.

CHART 1.2: Investment in infrastructure in six major countries in Latin America
(as % del GDP)



Source: Servén (2008)

In the short term, this measure allowed balancing the public balance, but it has led to a decade lost in terms of establishing the means that would allow for long-term sustainable growth in the region, through a sustained increase of infrastructure projects.

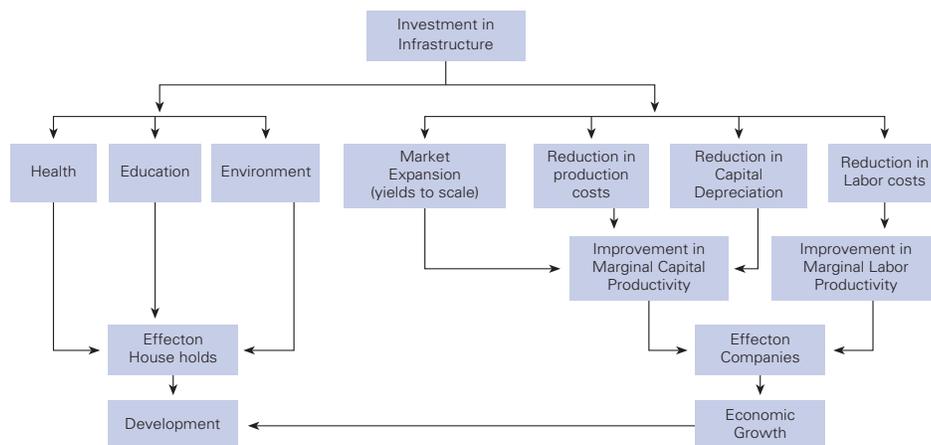
To summarize, the last 20 years in Latin America have led to two important conclusions. The first is that it is not advisable to use investment in infrastructure in fiscal consolidation policies, since this implies restricting the possibility of achieving sustainable long-term growth. The second is that private investment can be a factor that helps the development of the country, but there must be a savings base and native investment that allows for the construction of the necessary infrastructure projects independently of international financial circumstances. Thus, the accumulation of domestic savings through private pension funds in Latin America, for example, could fulfill this role satisfactorily.

1.2. Infrastructure projects, growth and development

The effect of infrastructure projects on the economy has multiple facets that are worth noting. The best known, due to the vast number of studies it has given rise to, is the effect that these projects have on economic growth. Based on the works of Solow, and all the theory of endogenous growth that began in the fifties, there has been an effort to explain how and why some countries grow and others do not. The law of diminishing returns to scale in the cumulative and constant factors (physical productive capital) for total factors, described a dynamic of transition toward a stationary state without growth. Solow’s residual endogenization through various methods (externalities, scientific discoveries, learning by doing, etc.) and the incorporation of new productive factors that affect the efficiency of the factors (for example, human capital) allow them to escape from a stationary state, moving it over time. This trend of models introduced infrastructure projects as a factor for growth to be added to the representative production function. The seminal works of Ashauer (1989a, 1989b, 1989c) included infrastructure as an additional productive factor (see Chart 1.3).

Another more direct effect of infrastructure projects on the economy is how they affect families. The availability of certain facilities such as schools, hospitals, public sewage, access to drinking water, electric power, telecommunications, etc. are elements that have a special impact on the well-being of households. These infrastructure projects serve not only to produce, but have a very important social function that translates into economic development (see Chart 1.3).

CHART 1.3: Diagram of the effect of infrastructure projects on the economy



Source: SEE BBVA

1.2.1. Infrastructure projects and growth

The theories of economic growth promoted by Solow in the fifties, in which the main factors of production were capital, labor and a residual that included the remaining non-measurable factors (mainly technological innovation) have been enriched with new contributions that have improved the explanatory power of this model.

In fact, to illustrate this, let us define the Cobb-Douglas initial production function characterized by the expression:

$$Y_t = A_t(K_t)^\alpha (L_t)^\beta \quad (1.1)$$

where GDP for the year t (Y_t) is explained by the accumulation of capital (K_t) of the same period, the labor force (L_t) and the residual to which we referred above (A_t). This function presents constant returns to scale for the group of factors ($\alpha + \beta = 1$) and decreasing returns for each of these ($\alpha < 1$, $1 - \beta < 1$).

Later, the works of Ashauer (1989a, 1989b, 1989c) included an additional element as a production factor: infrastructure projects. The intuition of this modification was derived from the empirical verification that the growth rate of productivity in the United States began to decline shortly after the decline of public investment in infrastructure. According to this study, the impact of this reduction was 57% of the decline in productivity. With this, the model assumed the following expression:

$$Y_t = A_t(K_t)^\alpha (L_t)^\beta (G_t)^\chi \quad (1.2)$$

Where G_t represents expenditure in infrastructure projects and χ is the elasticity of this factor that would be lower than one. Again, we observe constant returns to scale ($\alpha + \beta + \chi = 1$).

The main argument regarding the contribution of infrastructure projects to economic growth is derived from their contributions to increases in the marginal productivity of labor and capital. In this sense, the development of infrastructure favors the securing of more productive privately financed projects, expanding markets and achieving greater returns to scale. Moreover, better infrastructure allows for a lower depreciation of productive capital (for example, tires) and lowers companies' expenditures, reducing production times and improving the distribution of merchandise. The facility of improved communications helps to attract a more qualified labor force to specific areas which were previously labor deficient (Ferreira, 1999; Agenor *et al*, 2006).

The empirical evidence that supports this perspective has had its share of problems. Gramlich (1994) shows the difficulties of finding empirical relationships between growth and infrastructure projects due to the difficulty of measuring the latter. Moreover, he emphasizes that many effects linked to development are not contemplated in the given GDP variable, with which the contribution of infrastructure projects could be limited by actual conditions.

The fact that investment in infrastructure shows decreasing returns to scale assumes that those investment will be the most profitable in terms of generating growth and

social development when the stock is low. At the same time, according to Canning *et al*, (1999), there is a path of optimum infrastructure accumulation. Any allocation of resources that is under this curve will provide increases to GDP as investment increases, even though the total growth potential would not be fully taken advantage of. If the allocation is above the curve, resources could be used more productively, and thus we would not observe effects on economic growth due to crowding-out.

In general, these factors can also explain why in some countries positive effects on economic growth are observed while in others they are not. Thus we might find an empirical regularity, which would lead us to affirm that in developing countries there is a tendency to observe positive effects because they benefit from the law of decreasing returns to scale, while in developed countries, the rate of accumulation could be above the optimum and therefore an important contribution would not be perceived.

In a survey on infrastructure projects and growth, De la Fuente *et al* (2004) seem to find evidence of this (see Table 1.2). Among studies conducted in various countries and in the United States, the results seem to be mixed. However, in the developing countries there seems to be unanimity in the results of the conclusion that investment in infrastructure has beneficial effects on productivity and growth.

TABLE 1.2: Distribution of results in studies that show the effect of infrastructure investment on productivity or growth

Area studied	No. of studies	Percentage that shows positive effects	Percentage that does not show significant effects	Percentage that shows negative effects
Multiple countries	30	40	50	10
United States	41	41	54	5
Spain	19	74	26	0
Developing countries	12	100	0	0
TOTAL MEDIAN	102	53	42	5

Source: De la Fuente and Estache (2004)

1.2.2. Infrastructure and development

Chart 1.3 shows a diagram of the effects of infrastructure on the development of families. Concretely, we can say that improvement in the provision of infrastructure allows for the optimization of vital factors in the well-being (or on occasion on the survival) of individuals. At the same time, the improvement of living conditions immediately translates into more efficient factors of production. Thus, infrastructure is an appropriate vehicle to link more closely the relationship between growth and development. The relationship is primarily established through three main avenues which are worthwhile discussing in this chapter: health, education and the environment.

a) Health and nutrition

The construction of infrastructure projects which provide the population with access to sources of potable or drinking water and public sewage, could presumably substantially improve the health of the population, preventing numerous diseases. This especially affects children by significantly reducing their mortality rate (Leipzig *et al*, 2003).

On the other hand, access to energy sources (gas and electricity) substantially improves families' health by reducing the cost of boiling water and providing the possibility of refrigerating medicine and food.

At the same time, the improvement of transportation systems allows access to new foods from other regions or countries, which makes it easier for the population to have a more varied diet that is less subject to local seasonal changes. This also reduces the dependence on the local availability of foods in light of adverse conditions, improving food supply in the region due to appropriate infrastructure (Wang *et al*, 2003).

Finally, improved communication and transportation routes allows rapid access to health-care for people that live in isolated regions, and also allows the population to have access to disease prevention programs.

In the end, all these elements lead to a healthier population that is more productive and therefore generates greater wealth.

b) Education

In numerous studies it has been observed that school registration rates (especially among women) increase considerably with the construction of adequate roads and transportation. The improvement of roads allows teachers from other cities to be hired (Khandker *et al*, 2004).

On the other hand, appropriate teaching facilities also lead to lower absences and withdrawals from school due to illness and to improved scholastic achievement.

The improvement of education allows the labor factor to be more efficient and capable, thereby further contributing to economic growth.

c) The environment

Regular access to more efficient energy sources, such as electricity and/or gas, allows the population to replace other sources of traditional energy. The possibility of heating the household with other energy sources reduces the need to use wood as an energy source, thereby preventing deforestation and preserving the local biodiversity (see WHO, 2005).

Moreover, the improvement of education and infrastructure for the recycling of trash improves the environment of the region, making the population healthier.

All these factors translate into improvements in the health and education of the population on the whole, thereby leading to the improvement of families' well-being. This

well-being also presumes an improvement in labor conditions, which in turn leads to substantial improvements in growth. In this way, it is verified that growth and development are two sides of the same coin. Agenor *et al* (2006) emphasize this relationship and the positive impact of infrastructure on both.

1.3. The formulas of participation of the private sector in the financing of infrastructure

Throughout history, infrastructure financing has followed two main routes of development: public financing and private financing. In accordance with the tradition of each country, one or the other has prevailed. Currently, however, the model that is gaining ground is a mix of both formulas. This has allowed the government to liberate resources to finance other types of more social projects without neglecting a major factor in long-term economic growth. The various possible mechanisms for financing infrastructure are summarized in Table 1.3.

CHART 1.3: Different financing and management modes of infrastructure

		FINANCING			
		PUBLIC	PUBLIC (with deferred payment)	PRIVATE	MIXED (Public-private)
MANAGEMENT	DIRECT	<ul style="list-style-type: none"> - Construction contract with certification deposits - Public contributions to e instrumental entities and institutions - Public debt - Construction contract with total 	<ul style="list-style-type: none"> - Public debt. - Construction contract with total price payment (German model) 		
	INDIRECT	<ul style="list-style-type: none"> - Rental - Converstion concessions 	<ul style="list-style-type: none"> - Shadow toll - Infrastructure management service agreement 	<ul style="list-style-type: none"> - Tradicional concession - <i>Project Finance</i> 	<ul style="list-style-type: none"> - APP or PPP

Source: Izquierdo and Vassallo (2004)

Despite the fact that the modes of public financing⁵ are very interesting due to the various options available to governments, in this chapter we will make an in-depth analysis of the formulas of private and mixed financing, since these are the ones that offer greater possibilities for the participation of pension funds in different countries.

The administration model is also important. In most countries, the management of infrastructure has traditionally been done directly by the state, however, the financing formulas are increasingly reverting to a type of private management due to the advantages provided by the specialization of bidders of new investment projects.

⁵ For more information on this options, see Izquierdo *et al* (2004) pages 166 to 211.

The main advantages that private investment financing offers infrastructure projects are concentrated on the following points:

- Private investment in infrastructure projects allows for the fiscal consolidation of the public budget, freeing resources for other social expenditure items or to reduce tax pressures.
- It improves the allocation of resources, transferring the cost of infrastructure projects to the user or beneficiary, thus improving the efficiency and equality of its use.
- It realizes all the positive effects for the economies noted in Table 1.3 by the construction of said infrastructure. If the public budget were not able to execute the project alone, the difference would represent the opportunity cost.
- Some studies show that private infrastructure projects offer better quality at a lower cost than public infrastructure projects due to the different incentive structure. In light of the hypothesis that not building a facility due to limitations in the public budget may represent certain opportunity costs in terms of growth and development, some countries (such as Germany and the United Kingdom) that had previously rejected private financing initiatives for infrastructure projects are now adapting the necessary laws and procedures to allow for this in their long-term planning (see Izquierdo *et al*, 2004).

As an example of the change in trends observed, Table 1.4 includes the number and value of private financing initiatives at the world level, by geographic area and by sector.

TABLE 1.4: Private investments (financing) in transportation infrastructure projects at the world level between 1985 and 2003
(US\$ billions)

	Highways		Railroads		Airports		Ports		Total	
	Nº	\$	Nº	\$	Nº	\$	Nº	\$	Nº	\$
North America	107	32,8	16	11,7	18	5,3	1	0,3	142	50,1
Latin America	79	20,2	22	7,2	7	0,8	12	0,9	120	29,1
Europe	82	55,7	35	72,2	14	4,0	12	0,6	143	132,5
Africa-Middle East	7	3,2	1	0,2	1	0,2	3	0,2	12	3,8
Asia Far-East	56	41,7	31	51,8	24	37,9	13	4,6	124	136,0
TOTAL WORLWIDE	331	153,6	105	143,1	64	48,2	41	6,6	541	351,5

Source: Izquierdo and Vassallo (2004), page 176

It can be easily verified that the highways and railroads sector account for most of the infrastructure projects financed by private enterprise. As to the number of projects, with the exception of the case of Africa, the rest of the geographic areas participate in generally similar amounts of initiatives. In this regard, the great number of projects financed in Latin America is particularly noteworthy, especially considering its relatively low economic weight.

In terms of the value of these investments, the cases of Europe and the Far East are outstanding, each with investments of around US\$130 billion, in contrast to US\$50 billion and US\$29 billion in North and South America respectively. It could be assumed, therefore, that the average value of each project in the latter geographic area is lower than in Europe and the Far East. Total private financing of infrastructure projects at a world level, according to this data, is US\$351 billion.

1.3.1. The concession system

The usual manner of participation by the private sector in the construction and operation of infrastructure projects in different countries begins with a concession process, by which the various government administrations may transfer the construction risk of infrastructure projects to concessionaires in exchange for the right to temporarily operate the projects and for which they receive remunerations. As we shall see, the risks associated with the process make it a necessary, although insufficient, condition to have a concession law for the successful participation of the private sector (see Izquierdo *et al* 2004).

The concession systems may adopt numerous forms which we will discuss further on, however, in order to be considered optimal, all of these forms must comply with two fundamental requirements:

- Given that the infrastructure projects respond to a model of natural monopoly, the concession must be the outcome of a competitive process in which the winning bidder represents the best project.
- The concession must ensure a controllable level of risk for the investment to be attractive for the bidder.

These conditions can be formalized by means of diverse contract agreements differentiated by the property of the infrastructure, the financing and operation regime. The internationally accepted terminology is as follows:

- The BOT Model (*Build, Operate, Transfer*): the private sector builds the infrastructure and acquires the right to operate it for a determined period of time. When this period is over, the operation rights revert to the State. This is the type of model usually followed by project financing.
- The BOOT Model (*Build, Own, Operate, Transfer*): this is the same as the previous model except that during the operation period of the infrastructure, the concessionaire is the owner. Upon termination of the concession, both the ownership and the right of operation returns to the state. This model allows the concessionaire greater financing guarantees, since it is the owner of the infrastructure project.
- The BOO Model (*Build, Own, Operate*): the same as the boot model with one exception; at the end of the operation period, ownership of the property reverts to the State, since the useful period of the infrastructure coincides with that of its operation.

- The BLT Model (*Build, Lease, Transfer*): a corporation is established that is in charge of managing the leasing of a public project. The State administration makes payments previously agreed upon for this operation.
- The DBFO Model (*Design, Build, Finance, Operate*): the same as the BOT model with one exception; the design of the project corresponds to the concessionaire and its corresponding retribution is made by means of shadow toll payments⁶.
- The DCMF Model (*Design, Construct, Manage, Finance*): the same as the DBFO, but in addition, management is transferred to the concessionaire (common for prisons, hospitals, etc.)

Regardless of whatever concession model used, it must comply with certain phases, the correct implementation of which will be vital for achieving a successful project.

1.3.2. Elements of the concession process

A good design of the concession process is a necessary condition, although not sufficient for the successful construction of infrastructure projects by the private sector.

In the preparatory phase, it must be decided whether an infrastructure project is necessary from a socio-economic standpoint, and if the participation of the private sector in the project represents an advantage. Then, the pre-qualification process of the candidates follows and the bidding process will be crucial in selecting the best project. A detailed study of all the possible risks and the availability of the tools for their mitigation will make it possible to carry out the project with guarantees. Finally, it is very important that there are public controls that guarantee the quality committed with regards to the infrastructure. All these phases will be itemized below and must comply with two general conditions: they must all be carried out with utmost transparency and in the shortest possible time.

a) Preparatory aspects of the bidding process

The various public administrations, through their planning departments, prepare long-term investment plans in which an in-depth analysis must be made with regards to the cost/benefit of each project and the best usable concession model.

There may be cases in which private enterprises detect infrastructure projects that it may be interested in participating in and proposes this intention to the Public Administration. In case the government agrees that the project is viable and necessary from a socio-economic standpoint, it will open a bidding process to as many bidders as may be interested in participating, and if it considers it convenient, it may reimburse the expenses incurred by the company that presented the project (see Izquierdo and Vasallo, 2004; Yescombe, 2007).

⁶ A payment made for the use of infrastructure with private financing in which the state pays a tariff agreed upon in terms of the public use of such infrastructure.

The study process of the projects approved may follow two alternate routes:

- The Administration proposes a fully-developed project to the bidders so that they may present their bids, allowing them to propose marginal modifications.
- The Administration only proposes an infrastructure project with general details and it is the concessionaire companies that present alternative projects.

b) The process of pre-qualification and selection of candidates

The criteria for the selection of candidates for the bidding process to a concession may be subject to various parameters. In the first place, pre-qualification may be open (it can be open to any company), or closed, if a specific criterion is selected for participation.

If the choice is made to filter the participating bidders, the criteria to choose the candidates may correspond to objective parameters, such as the company's financial position, or they may be subjective, such as reputation and the technical capacity to carry out the infrastructure project. Another filter that incorporates some cost or the presentation of guarantees in order to be considered as pre-qualified may also be used.

Thus, the objective of limiting the number of bidders is that only those who have a true interest and a real possibility of winning will participate in the process. In any case, the whole processes must be conducted with the maximum transparency to avoid inappropriate selections that respond to motives that are not strictly technical.

c) Bidding mechanisms

Multiple criteria can be established in the bidding process. In general, every concession must comply with an equilibrium between income flow and the costs of the concession, considering both of these plus a benefit.

$$\sum_{i=1}^n \frac{p_i q_i}{(1 + \alpha)^i} = I + \sum_{i=1}^n \frac{C_i}{(1 + \alpha)^i} \quad (1.3)$$

Where p_i is the rate in the year i , q_i is the traffic of the year i , n is the number of years, C_i is the cost of the concession, I is the initial investment and α is the profitability of the project.

Traditionally it is said that a bidding process is "through the left", when the main criteria is concerned with questions of income. Alternatively, it is said to be "through the right" when it is concerned with variables related to cost or expense. Thus, the most common methods are:

- Bidding that considers a minimum profitability rate: the concession is granted to the company that offers a lower rate of return on assets.
- Bidding due to a lower rate: In this case, the concession is granted to the consortium that offers the minimum toll, given the same project or equivalents.
- Bidding due to a minimum concession term: it is granted to the company that offers the lowest concession term, given a homogeneous rate or project among the participating bidders.

- Bidding for the minimum subsidy or the highest payment for the concession: in those projects that require a subsidy because the expected traffic is not enough for the project to be considered viable from a financial standpoint, it will be granted to the company that requests the lowest subsidy.
- Bidding by minimum value of income: this type of bidding awards the project to the company that offers a lower current value of the revenue generated by the concession. This mechanism is especially interesting because it eliminates the traffic risk. If it is lower than the bidding agreements, the concession term is extended until it is equal. If, on the contrary, the traffic is higher, and therefore the revenues are lower, the term of the concession is shortened until it is the same.
- Bidding based on quality: an infrastructure project is bid for, considering the quality of the service at a determined price.

d) Analysis of the concession risks

One of the most important elements in any concession is the detailed preparation of a map of risks associated with the project. Given the importance of this element, we will discuss this in greater detail in point 1.3.3.

e) Control of the execution of the project

Once the bidding has transpired and construction has begun, it is of vital importance that there be a follow-up by the public administrations to verify that quality standards and the terms agreed upon in the contract are being followed.

1.3.3. Risk management in an infrastructure project with private participation

To conduct a good evaluation of the risks involved in an infrastructure project, it is necessary to know these risks and evaluate every dimension. The different nature of these requires conducting a specific analysis of each of them (see point 1.3.3.1). At the same time, the specific treatment that these must receive has different dimensions (see point 1.3.3.2), that range from the proper preparation of the project itself, ranging from the selection of the most appropriate insurance institution, to the use of the most appropriate product for each type of risk.

1.3.3.1. Types of risks in an infrastructure project

The risks observed in private investment of infrastructure projects may appear at any time throughout the various phases of the project. From the very conception of the project itself, to the moment of termination of operations, there are various events that could imply difficulties that affect the project's financial viability. Some of these are common to any economic activity (corporate risks), while others are specific to this type of investment, given its technical complexity, as well as due to its nature as a capital asset with long-term amortization (risks inherent to the project). Finally, public infrastructure projects that are financed by the private sector generally respond to conditions regulated by the public sector. This characteristic adds risks associated with changes in the original status quo of the infrastructure with regards to operating condi-

tions and the contractual relationship with the state, which are commonly referred to as sovereign risks.

The risk-mitigating measures taken in the private financing of infrastructure projects should use cost/benefit and other associated risk studies to determine the demand and feasibility of carrying out investment projects. The concession law and its correct execution will allow selecting the best project and the best promoter, providing greater confidence both to financiers as well as to risk insurers. During the process it is possible to face the following types of risk (see Matsukawa and Habeck, 2007 and Davis, 2008):

- *Corporate risks*
 - Risk of fraud or non-payment: as is true of any company, infrastructure concessionaires may be subject to fraud or non-payment of the rates established for the services they provide; for example, illegal connections to electric power supply lines or water sewage networks.
 - Risk of devaluation: the perception of revenue in a local currency by international investors could depreciate both the value of the assets invested as well as the loss of income when there is a change in the exchange rate.
- *Risks inherent to the project*
 - Risks due to delays in expropriations, permits and licenses: Prior to the beginning of construction of any infrastructure project, there is a series of protocols that it is necessary to comply with in order to begin construction. These depend on very diverse spheres of the public administration that are often not coordinated. For example, the expropriation of land for the construction of infrastructure projects and the resolution of the possible judicial resources derived from this, the reports on environmental impact and their consequent authorizations, diverse permits and construction licenses that are obtained at different administrative levels (local, regional, national) which may not have the same political priority, etc. and many of which may be conditional factors that may not have been sufficiently coordinated. The consequence is that exogenous administrative delays emerge for the promoter, which makes it difficult to advance with the project due to increased costs and problems in the appropriate planning of the project.
 - Construction risks: many engineering projects present unforeseen events that affect construction costs when there are modifications to the project due, for example, to unexpected geological structures or significant variations in the prices of building materials.
 - Traffic or demand risks: the decision regarding the construction of a specific infrastructure project must respond to an in-depth analysis of the cost/benefit ratio. In this analysis, it is therefore very important to calculate the potential demand of the project, given the price structure agreed to by the contract. If real demand does not adjust to that estimated in the construction of the project, there is the risk of non-profitability, which therefore affects long-term financing.
- *Sovereign risks*
 - Risk of variation in prices: In some circumstances, and for fundamentally political reasons, governments could be tempted to reduce the rates applied to certain pub-

lic services that have been financed by the private sector. This leads to an increased risk in the loss of profitability. Also the drop in international prices of some raw materials (energy, mining) could make the necessary infrastructure projects not profitable.

- Political and unexpected risks: a case of extreme sovereign risk is the case of expropriation of the infrastructure, generally with strong losses for the concessionaire companies. Other unexpected risks are for example, the possibility of local or international conflicts deriving in a deterioration of the infrastructure itself or a decline in demand. At the same time, natural catastrophes or epidemics could generate the same effect.

Another issue is that in terms of investment in infrastructure, the same maxims could be established that apply to any type of investment: the greater the diversification of risk, the better, and the risk must be assumed by whomever is best prepared to assume it and manage it. Another element to be considered is that uncertainty (and therefore risk), is directly proportional to the lack of information and transparency in the process. The risk mitigation mechanisms in infrastructure investment that are being adopted in different parts of the world are directed, to the extent possible, to follow these fundamental points.

1.3.3.2. Risk mitigation tools

a) Well-designed projects and their execution

The success of an investment project in infrastructure depends on the conception of its design or purpose from the very beginning. Many risks of subsequent phases would be mitigated if the appropriate studies were undertaken from the beginning. The cost/benefit analysis of the project will provide information to the public authorities on the advisability of undertaking it. The difficulty of this exercise often flows from the lack of statistical information on the relevant aspects of the project, especially those that are derived from factors that are difficult to quantify such as positive and negative externalities.

The credibility of the team that conducted the study is a decisive factor in the assignment of the project's credit rating and, therefore, of the decrease/increase in its financial cost. Such teams should be multidisciplinary and specialized in each of the facets that comprise the project. Typically they should have finance experts, legal experts for preparing contracts and negotiations, technical and engineering experts, as well as insurance and cost control experts.

Some countries have created agencies specialized in the conception, development, and execution of public/private participation or they have a team specialized in the field. Many times these teams do not directly carry out the work but subcontract it to consultancy firms that have the necessary know-how. Some important cases in this regard are those of Australia⁷ and Chile⁸, where well formulated analysis models are being applied and have provided satisfactory results⁹.

7 http://www.partnerships.vic.gov.au/domino/web_notes/PartVic/PVWeb.nsf

8 <http://www.concesiones.cl/>

9 The public-private comparative model used by the Australian authorities is currently an example of good practices.

Once it has been decided to carry out an infrastructure project through private financing, the different countries' concession laws are key to ensuring that the best project with the best promoter will be used.

Government control over compliance with the agreed upon terms of the project's execution (both in terms of aspects that correspond to the public administration as well as those that depend on the promoter), as well as supervision of its costs and quality, are key for ensuring greater credibility for possible investors or insurers of the project.

b) Risk insurance institutions

An important element in the design of the concession process is the search for institutions and/or mechanisms that will allow for greater guarantees to be provided in undertaking the infrastructure project, which are known as risk insurance institutions. In this regard, we can mention governments, bilateral financing, and substitute guarantee mechanisms.

The governments

Public Private Participation (PPP) is characterized by the participation of the state in some type of risk associated with the construction/operation of an infrastructure project with private financing. In this sense, there are different ways in which the state can participate. Governments can play a positive role in insuring *Risks Inherent to the Project* through different mechanisms. For *Construction Risks* and *Risks due to Delay in Expropriations, Permits and Licenses* there are different possibilities that have been applied on certain occasions:

- Assumption of a percentage of the cost of construction of the infrastructure.
- Non-reimbursable subsidies.
- Contribution of old facilities or their sale to contribute to the new project.
- Granting a credit or offer of a guarantee to third party lenders for the period of construction under advantageous conditions. These conditions would allow for the principal and interest to be returned only after the infrastructure project has concluded and is generating revenue.

With regard to traffic or demand risks, the governments can use different compensatory mechanisms:

- Subsidies on rate prices. If it is necessary to decrease the price so that a more intensive use can be made of the facility, the government can subsidize this reduction. It should be scalable to the extent that the increase in demand will allow for an improvement in the project's profitability.
- Guarantee of minimum revenue. In some cases, uncertainty concerning the demand for the service forces the governments to insure a minimum amount of revenue from its operation. This insurance can be total or partial, in the sense that it can be limited in time.

- Debt operation guarantee. The governments can offer guarantees on credit lines associated with the operation of the infrastructure.
- Increase the concession period. There are some infrastructure projects that although they do not involve losses, do not achieve the degree of profitability promised by the government. Given such circumstances, governments can extend the concession period to reach the accepted revenue levels.

In the same way that governments can assume part of the losses generated by the operation of an infrastructure project, they can also establish mechanisms to share in the profits of projects when they are greater than expected. For example, they can sign clauses that allow the profit to be shared in the event that it surpasses a certain level, or for a downward revision of the price applied in the service, or for a reduction/elimination of guarantees offered by the government. At the same time, the government can establish fines and penalties in case the necessary quality standards are not met or delays occur in relation to the date on which the infrastructure project is to begin operating.

In the *Private Finance Initiative* models (PFI)¹⁰ based on availability, that is, those in which the state pays based on a capacity offered to the public independently of the use that is made of them (e.g., a school offers a number of admissions in accordance with its capacity), or the *shadow toll*, in which the state pays based on the number and characteristics of the user of the facility (e.g., users of a freeway whether they are motorcycles, tourism busses, or heavy vehicles), the PFI model provides insurance to the concessionaire based on the financial solvency of the country in question. It is usually the state that articulates a series of conditions for the entire collection of the agreed upon rate based on meeting some quality and service standards, determining, if applicable, the corresponding penalties in case they are not met.

TABLE 1.5: Long term public debt ratings (SEPT. 09)

Country	Rating
Argentina	B-
Brazil	BBB-
Chile	A+
Colombia	BBB-
Mexico	BBB+
Peru	BBB-
Venezuela	BB-

Source: Bloomberg

The mitigation of risks by the state is subordinate to the government's credit quality (see Table 1.5).

¹⁰ Those PPP projects in which the state pays the agreed upon rate, and not the user.

Chile is relatively well placed, but Brazil, Colombia and Peru are at the lowest levels in the investment scale. Venezuela and Argentina are in the speculative investment rating category.

At the same time, the governments are not the most appropriate institutions for covering sovereign risks, since in many cases they could be both judge and jury.

Therefore, to be effective, government guarantees should be complemented with those of other sources, which are known as multilateral financing. In this regard, the development banks and insurance companies have played an important role.

Multilateral financing

The goal of the International Financial Institutions (IFIs) that are associated with infrastructure financing or insurance is to promote countries' economic development. In this regard, we could mention the Inter-American Development Bank (IDB), the Asian Development Bank, or for the case of Europe, the European Bank for Reconstruction and Development and the European Investment Bank. The World Bank group has specialized institutions such as the International Bank for Reconstruction and Development (IBRD), the International Development Agency, the International Finance Corporation (IFC), and the Multilateral Investment Guarantee Agency (MIGA).

These banks or agencies can directly lend/insure governments or private companies. However, the formula that they have increasingly adopted is the multilateral mode of financing/insuring infrastructure projects in which several of these institutions, the government, insurance companies, and the project promoter itself jointly participate. Thus, the risk is diversified and allows new projects to be adopted.

There are also some local institutions that promote investment within their respective countries. In general they are institutions very specialized in development projects that allow the government to act as investor or guarantor of infrastructure projects, without affecting the public sector balance sheets, since they are considered independent. Some cases that can be pointed to in this regard are the Korean Development Bank (KDB), the National Economic Development Bank (NDB) of Brazil or the State Infrastructure Bank (SIB) in the United States.

In recent decades, monoline insurance companies have been very active in risk insurance. However, the financial crisis has had a major effect on them, with their S&P credit rating having been downgraded from "AAA" in 2007 to ratings even lower than those they insure¹¹.

All these institutions can interact, insuring specific risks, especially sovereign type risks, given their international nature and scope.

¹¹ Current rating of the main monoline insurance companies: Financial Guaranty Insurance "CC"; Ambac Assurance Corp. "BBB", MBIA Insurance Corp. "BB" (Bloomberg).

c) Risk mitigation instruments

In this case we are referring to the different guarantee plans mainly aimed at covering credit risk and political risks.

- *Credit guarantees*

- Partial Credit Guarantees (PCG) cover the risk of default on the debt service of a credit or bond independently of the reason behind the nonpayment. The purpose of this instrument is to improve the conditions for accessing government financial or investment projects that could initially have a bad credit rating. This instrument can also cover the return of the principle on investments without recourse. Most international and national financial institutions have this risk mitigation tool.
- Full Credit Guarantees (FCG) or Wrap Guarantees cover the total amount of the debt service in case of default. This product is usually used by bond issuers to achieve higher credit ratings. Monoline insurance companies have been very active using this product, providing their triple A credit rating as the main guarantee. Due to the financial crisis and the downgrading of these companies' credit rating, some projects have also had their credit rating downgraded. This is also a product provided by international financial institutions.

- *Political risk guarantees*

To cover sovereign risks such as currency inconvertibility, expropriations, war or local disturbances, or modifications in contractual provisions, there are two similar mechanisms for risk mitigation.

- The multilateral development banks and some local institutions can provide Political Risk Guarantees (PRG). These cover 100% of the contracted debt and only cover the political risks specified in the contract. These instruments have been used in insuring concessioned infrastructure investments and Project Finance for default risks on commitments acquired by the government.
- Private insurers have a product similar to the previous instrument known as Political Risk Insurance (PRI). This, however, usually does not cover 100% of the investment and is also limited to the specific contingencies established in the contract.

The latest trend in risk mitigation is undertaking specific financial innovations, designing a specific mechanism for each project. In general, they combine several risk mitigation products, with several participants that share a percentage of the risk (see Tables 1.6 and 1.7).

In the case of the "Rutas del Pacífico" concession in Chile, the IDB offered a partial credit guarantee (GCP) together with another presented by a monoline insurance company to comprise a full credit guarantee (FCG). This allowed the infrastructure project to achieve the maximum rating, with access to the best financial conditions.

In the case of the IIRSA Northern Amazon Hub in Peru, the IDB guaranteed the state's commitments in the payment of services to the concession through a partial credit guarantee and political risk insurance with one condition. In the event that the Peruvian Government could not meet the obligations incurred and the IDB had to compensate

TABLE 1.6: Risk mitigation in different projects around the world

Project	Country	Sector	Project Cost	Type of RMI	RMI Provider	RMI Beneficiary	Amount of RMI	Closing Date
Privatization of Banat and Dobrogea Power Distribution Companies	Romania	Energy (distribution)	Private US\$142.6 million	PRG	IBRD	L/G bank (bill given as security)	US\$76.7 million	2005
Joint Kenya-Uganda Railway Concession	Kenya, Uganda	Transportation (rail)	US\$400 million	PRG	IDA	Rift Valley Railways Consortium (concessionaire) for Uganda	US\$45 million for Kenya US\$10 million for Uganda	2006
Phu My 2.2 BOT Power Project	Vietnam	Energy (generation)	US\$480 million (financing requirements including contingencies)	PRG	IDA, ADB (private insurance companies)	Lender	US\$ 100 million	2002
West African Gas Pipeline Project (WAGP)	Benin, Ghana, Nigeria, Togo	Energy (gas pipelines)	US\$590 million	PRG, PRI	IDA, MIGA, Zurich/OPIC	WAPCo (equity investments; shareholder debt)	US\$250 million	2005
Proyecto de Gas Regional de África del Sur	Mozambique and South Africa	Energy (Natural gas pipelines and development)	US\$572 million (debt)	PRG, PRI	IBRD (enclave), MIGA (SACE/EFIC), ECIC	Lender	US\$ 0.23 bn (local currency)	2004

Source: Matsukawa y Habeck (2007)

the company holding the concession, this compensation would become a loan from the IDB to the Peruvian Government.

USAID backed 50% of the principal on some bonds issued by a pool of municipal governments belonging to the Tamil Nadu’s Municipal Urban Fund. This grouping facilitated the application of the risk mitigation instrument.

Meanwhile, there are private capital providers (venture capital, etc) that can assume the risks associated with the development of the project and its construction, but that do not wish to assume any type of sovereign risk. In a natural gas infrastructure project in South Africa and Mozambique, a company assumed all the commercial risks but refused to accept Mozambique’s political risks, over which it had no control. These risks were insured through World Bank political risk guarantees (PRG) and political risk insurance (PRI) with the MIGA, where they, in turn, were reinsured with private insurers.

TABLE 1.7: Risk mitigation in different projects around the world

Project	Country	Sector	RMI Type	RMI Provider	RMI Beneficiary	RMI Coverage	Lender	Debt	Maturity	Capital Repayment	Interest Payments	Rating	Closing Date
<i>Philippines Power Sector Assets and Liabilities Management Corporation (PSALM)</i>	Philippines	Energy	Partial credit guarantee (PCG)	Asian Development Bank (ADB)	Debt (bond investments)	Capital at the end of the maturity date	PSALM	JPY 61.75 bn (class A: JPY 24.75bn; class B: JPY 37 bn)	Class A: 18 years maturity 2010 Class B: 20 years maturity 2022	Without Recourse (Bullet)	Class A: 3.20% semi-annual Class B: 3.55% semi-annual	Baa1 (Moody's)	2002
<i>Philippine Power Trust I (Napacor – Nacional Power Corporation)</i>	Philippines	Energy	Political risk guarantee (PRG)	Overseas Private Investment Corporation (OPIC)	Debt (bond investments)	Complete capital and interest	PP Trust I (core lender is Napacor)	US\$250 million	15 years maturity in 2018 only period)	Average life of 10 years (4-5 year interest only period)	5.4%	AAA (S&P)	2003
<i>Tlalnepantla Municipal Water Conservation Project</i>	Mexico	Water	Partial credit guarantee (PCG) (local currency)	Internacional Finance Corporation (IFC), Dexia Crédito Local	Debt (bond investments)	90% of the capital and interest pending; up to US\$8.2bn	Trustee (return of revenue to the Municipality of Tlalnepantla/Ci. de Agua	US\$9.1 million	10 extendible for one year	Equal semi-annual payments beginning the first year	UDIS+5.5%; semi-annual	AAA (local) S&P, Moody's	2003
<i>City of Johannesburg</i>	South Africa	Multi-Inf.	Partial credit guarantee (PCG) (local currency)	IFC, Development Bank of Southern Africa (DBSA)	Debt (bond investments)	40% of the capital and interest pending	City of Johannesburg	US\$153 million	12 years	6 equal semi-annual payments beginning for the next 3 years	11.9% semi-annual	AA (zaf) Fitch (local)	2004
<i>AES Tieté</i>	Brazil	Energy (gton.)	Political risk guarantee (PRG) and FX liquidity	OPIC	AES Tieté	Up to US\$85 million for PFI and US\$30 million for liquidity facilities	AES Tieté Certificates Grandor Trust	US\$ 300 million	15 years; average life of 10.11 years	N/A	11.5% annual	Baa3 (Moody's); BBB (Fitch IBCA)	2001
<i>Tamil Nadu Pooled Financing for Water and Sanitation</i>	India	Water and health services	Partial credit guarantee (PCG) (local currency)	Tamil Nadu government, USAID	Debt (bond investments)	50% of the principal and interest pending; up to US\$3.2 million	Water and financial group of health – 13 small to medium size municipalities	US\$64 million	15 years	Equal annual payments beginning year one	9.2% annual	AA (local) Fitch	2002

Source: Matsukawa y Habeck (2007)

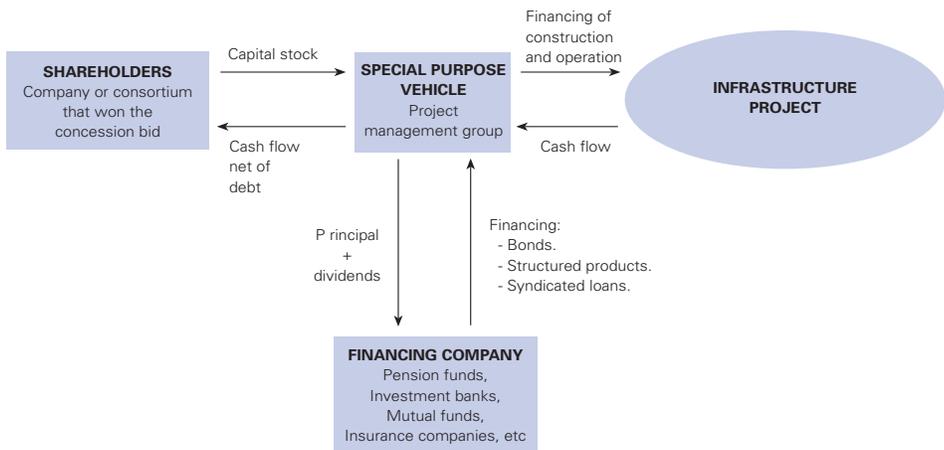
1.3.4. Project finance operation

A common characteristic of infrastructure projects is the need of strong financial resources that should be available in the short term in order to cover construction costs. At the same time, returns should be perceived as accruing in the medium-long term. This temporary lag in time between spending and revenue leads companies holding concessions to look to the capital markets to obtain these resources, assuming with it important risks and high leverage.

As an alternative formula a relatively short time ago the Project Finance model emerged. It consists of an investor, or group of investors, contributing the necessary funds for infrastructure construction with the only guarantee being the corresponding cash flow generated by the project.

In Chart 1.4 we can see how a Project Finance plan functions.

CHART 1.4: Project finance plan functioning



Source: SEE BBVA

The company awarded a concession for the construction and operation of a project constitutes a special purpose vehicle (SPV) (of which it will be the main shareholder) for purposes of operating the infrastructure. This SPV has its own legal status, usually as an incorporated entity, and its capital stock is paid by the company awarded the bid. If the concession model used is Build-Operate-Transfer (BOT), which is the most common, the SPV is owner of the rights to operate the infrastructure associated with the concession. The SPV builds and exploits the infrastructure project with its own resources provided by the shareholders, but above all, with the resources furnished by the financial backers of the project. The latter are usually constituted of pension funds, insurance companies, investment banks and funds.

A basic characteristic of these plans is that the financing of the SPV by a third party does not have guarantees from the shareholders promoting the project. Only in some

cases where the risk is very high, creditors can demand additional guarantees, although these are usually limited.

Based on the asset selected for the financing and contractual agreements that determine the amortization of the principle and the return, the financial backers will receive their payments from the cash flow generated by the operation of the infrastructure. The shareholders of the SPV will receive their dividend once the principle and the pending debt service have been discounted.

From the promoter's (shareholder) point of view, this formula presents advantages and disadvantages:

Among the advantages are:

- The capacity to safeguard the assets of the company, since they are not the guarantee for financing the project.
- Redistribution of the risks to other financial entities.
- Allowance for a greater borrowing capacity or greater availability of resources by limiting the contributions that they can make to the project.

Among the disadvantages that can be mentioned are:

- It complicates structuring the project by requiring additional studies and a complicated contractual structure with the infrastructure's financial backers.
- The financing costs are higher because the contracts contain "limited liability" clauses.

For the financial backers, the key variable of the entire model is the project's cash flow, since it usually does not have another guarantee. This is precisely what presents greater uncertainty in terms of its estimate. This is why investors should have a group of specialists such as engineers, legal, environmental, and financial advisors to evaluate the project as a whole.

The uncertainty in estimating demand for the use of the infrastructure projects can lead the financial backers to perceive an excessive risk in Project Finance investments. It can also be the case that they agree to finance the project, but that given the high perceived risk, they demand very high interest to the extent that this formula is no longer interesting for the infrastructure promoter.

To alleviate these problems there are two formulas that lessen risk. Either the state guarantees a minimum cash flow, given the possible public interest in the construction of such infrastructure, or an insurance policy is contracted with a monoline insurance company that guarantees a final cost for the work project and/or a certain level of cash flow. In both cases, the rating agencies would minimally assign the same risk level that the government and the insurance company have respectively. If this rating is high and

the cash flow is insured, the investors will agree to contribute their resources at a much more competitive price.

1.3.5. The public-private partnership (PPP) model

It is difficult to define what the public-private partnership (PPP) model is due to the immense variety of possible types and degrees of cooperation between the two sectors at the present time. The OECD (2008) offers five different definitions from five different institutions. In the spirit of bringing together most of the characteristics of these descriptions, we could say that public-private partnerships are agreements between the public sector and a private promoter for the construction of a specific infrastructure project, where its development is agreed to upon the part of the promoter in exchange for a return and for assuming a certain risk in the investment.

There are several reasons that can lead governments to promote PPP projects:

- There are a series of infrastructure projects that can have a very positive socio-economic effect for each country. However, these are projects that are known with a high degree of certainty to be financially unprofitable. These projects will never be bid upon by the private sector alone.
- At the same time, there exists the possibility that the public sector might not have the necessary resources to undertake new infrastructure projects, and/or might not have experience in operating them, and the government may therefore decide to transfer this expense and part of the risk to a private promoter. There is no international consensus on how the financial commitments agreed upon with the private promoter should be assessed. Taking advantage of this situation, different countries exclude these commitments from the public accounts to improve their balance sheets.
- One of the arguments in defense of the PPPs is that there is the assumption that private management of the projects will improve their efficiency and reduce the costs of the infrastructure projects. According to the IMF (2004), this assumption might not be completely true in all cases. It seems that for this relationship to exist it is necessary for risk to be transferred from the public to the private sector, so that the latter has incentives to optimize its operation. In these circumstances, the public sector can have an interest in undertaking a PPP project with a private promoter. At the same time, according to the established profitability/risk conditions of the previously mentioned projects, this type of infrastructure project can be an interesting business for private investors.

In a global macroeconomic scenario involving the quest for budgetary stability in the short and long term, at the beginning of the 1990s the PPP formula began to have great success on an international level. Following the pioneer projects undertaken in Australia and the United Kingdom, numerous countries (developed and developing) have begun to promote projects of this type throughout the length and breadth of the globe. The cases of France, Germany, South Korea, Ireland, Italy, etc. should be pointed out, but also those of other countries such as Mexico and Chile in Latin America (OECD, 2008 p. 12). According to AECOM (2005), between 1984 and 2004 worldwide

some 2,096 PPP projects were undertaken with a value of US\$884,000 million, with the transportation sector having sparked the greatest interest among investors (37% of the total value).

The definition of PPPs has many similarities with the projects concessioned in bidding processes and does not allow a clear line of demarcation to be placed between them, as can be deduced from the previous point. In the OECD (2008) broad arguments have been offered in favor of PPP projects and traditional acquisitions of public goods and services on the one hand, and the system of concessions on the other. In this sense, it could be concluded that the main difference between a PPP project and a concession is the degree of risk that is transferred from the public to the private sector, which is greater in the case of the concessions than in the case of with the PPP. Table 1.8 illustrates the possible formulas that have been used in different countries to carry out PPP projects and their characteristics.

TABLE 1.8: Types of possible PPP projects

	The private promoter designs, constructs, and manages the new infrastructure projects	The private promoter buys or rents, improves already undertaken infrastructure projects	The private sector is owner of the infrastructure	The private sector transfers the infrastructure at the end of the concession period
Build-own-operate (BOO)	YES	NO	YES	NO
Build-develop-operate (BDO)	YES	NO	YES	NO
Design-construct-manage-finance (DCMF)	YES	NO	YES	NO
Buy-Build-operate (BBO)	NO	YES	YES	NO
Lease-develop-operate (LDO)	NO	YES	NO	NO
WRAP-around addition (WAA)	NO	YES	YES	NO
Build-operate-Transfer (BOT)	YES	NO	NO	NO
Build-own-operate-Transfer (BOOT)	YES	NO	YES	YES
Build-rent-own-Transfer (BROT)	YES	NO	NO	YES
Build-lease-operate-transfer (BLOT)	YES	NO	NO	NO
Build-Transfer-operate (BTO)	YES	NO	NO	NO

Source: IMF (2004) and ERD BBVA

As can be seen in the comparison, many of these models have common characteristics with concession bidding, making it difficult to distinguish between the two. Again, it will be the risk assumed by the promoter that defines whether it is a PPP or a concession. These types of risks are comparable to those that a concession would assume, and have been explained in point 1.3.3.1.

1.4. Participation of pension funds in infrastructure project financing

Pension funds, as with other private investors, could feel that investing in infrastructure projects is a good option to maximize the value of their asset portfolio. However, this option should be considered as one investment possibility among many others. Only if the ideal conditions exist, with which pension fund investment in infrastructure would be mutually beneficial, both for the state as well as for the fund, would pension fund managers and governments accept this type of collaboration agreement. If these conditions do not exist and the pension funds were to be invested in infrastructure projects without the necessary and sufficient risk and profitability conditions, the resources of thousands of future pensioners could be put in jeopardy.

At the same time, defining what an investment in infrastructure is can be a complex task due to the numerous elements that enter into play. From our point of view, it is important to adopt criteria to address the way in which the investment is undertaken. Concretely, we would differentiate between what is an indirect investment as opposed to a direct investment:

- Indirect investment: in the financial market, pension funds acquire fixed income or equity assets of companies tied to the construction or management of infrastructure projects. In this case, there is no guarantee that this financing will directly translate into the promotion of new projects. However, in numerous publications, investment in infrastructure projects is considered since the main activity of these companies is the construction and management of already existing facilities. Indirect investments provide the asset portfolio with some particular characteristics of volatility and profitability that are specific to this sector.

Meanwhile, the acquired assets can belong to listed or unlisted companies.

With regard to the listed companies, the successive economic and market crises at the beginning of the 1990s had an important effect on pension funds, reducing their value and, therefore, also the benefits received by those who retired at that moment. Since then, pension funds, especially in Latin America, have sought new assets that would provide alternative sources of revenue and which would help diversify their asset portfolio in order to control financial market volatility risk. In this sense, they began to focus on the possibility of directly investing in infrastructure projects.

With regard to unlisted companies, the valuation of their assets is much more complicated and thus the participation of the rating agencies is necessary.

- Direct investment: the financial agents participate in financing specific projects that have been concessioned to promoter companies. Through a Project Finance or a Public-Private Partnership model, the pension funds acquire assets linked to the return provided by a specific infrastructure, which can more or less be insured by the state, a monoline insurance company or international financial institutions.

In turn, direct investment can adopt two different modalities. According to Inderst (2009) the phase of the project in which pension funds begin to participate is crucial in determining the risks and profitability that can be expected by the funds. If the pension fund associates with the concessionaire in the planning and bidding stage, the risk per-

ceived by the pension fund will be higher (basically, construction and subsequently demand risk) and therefore the expected profitability will necessarily be greater. In this case, we would consider a primary direct investment and the law of concessions and the prior project study would be shown to be a key factor in determining the profitability and even viability of the project. Meanwhile, pension funds are considered participating in secondary direct investment projects when they incorporate the financing of the project in which the infrastructure is already built and so they mainly face demand risk.

1.4.1. The advantages of pension fund participation in the financing of infrastructure projects

If the conditions that are necessary and sufficient for pension funds to invest in infrastructure projects exist, numerous positive effects could result for the revaluation and security of the managed funds. This model has been successful in numerous countries around the world.

- Given the long term nature of the investment projects, and through (public or private) mechanisms for insuring appropriate revenue levels, the assets invested in infrastructure projects allow for good long-term portfolio planning (Inderst, 2009).
- It is expected that the participation of pension funds in infrastructure investment projects reduces political and regulatory risk. Greater discipline should be expected on the part of the governments with regard to the contracts and the rules of the game if resources are involved that will finance the pensions of local workers (Vives, 2000).
- The financing of a long term, correctly designed investment project normally provides a good risk/benefit ratio.
- The participation of pension funds in local investment projects eliminates some financial risks such as the fluctuation of the exchange rate. Also, many contracts include review clauses for increases in inflation.
- At the same time, public opinion can be more favorable to the participation of private pension funds if they see that the investments in infrastructure projects generate improvements to society's quality of life here and now (e.g. investment in electric power facilities, management of drinking and waste water and water for irrigation, transportation networks, etc.), at the same time that it improves the portfolio's risk and profitability profile.

1.4.2. The advantages for the state from the PFMs' contribution in investment projects

The participation of pension funds in financing infrastructure projects generates the same advantages for the state that funding from any other private party would.

- It helps the fiscal consolidation of the public budget, facilitating resources for other social expenditure items or by reducing the fiscal pressures of the respective country.
- It improves the allocation of resources, transferring the cost from the infrastructure projects to the user or beneficiary.

- If the national budget were not able to execute the project due to cyclical problems, private sector participation could offset the opportunity cost.
- Greater probability of improvements in quality at a lower cost than with public resource allocations, given the greater transparency of the incentives for the interested parties.

Additionally, the social nature of pension funds offers an added advantage. The potential benefits of private management of infrastructure projects, with the financial support of pension funds, translate into improvements in the well-being of the population itself by increasing the living standards of retirees.

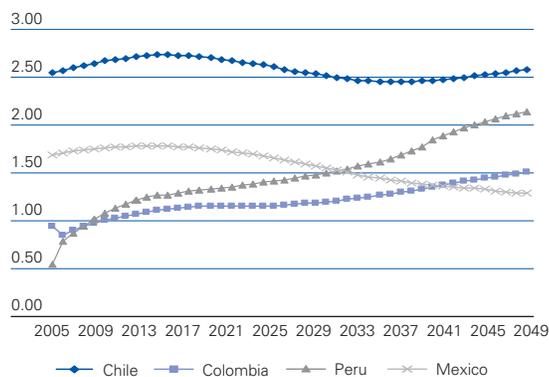
1.5. An estimate of pension fund contributions to economic growth through investment in infrastructure

According to what we have reviewed thus far, it appears that there are arguments that well designed PPPs provide mutual benefits to both the public and private sectors.

The recent reform of the pension systems in several Latin American countries, specifically those undertaken in Chile, Colombia, Mexico, and Peru, which establish either a single capitalization pillar or one shared with another based on distribution, will increase the stream of savings significantly, to the point that they will reach very significant levels. In the case of Chile, which was a pioneer in these reforms decades previously, this phenomenon is already more than clear.

This stream of domestic financial savings should be invested in assets that meet some conditions of profitability/risk that are appropriate to the purposes for which they were created. In this sense, direct investment in infrastructure projects by private pension companies can be a very valid option if the necessary and sufficient conditions are present. With this in mind, factors such as regulations, risk coverage, assets, and adequate financial markets are elements that need to be optimized so that these conditions are met. At the same time, each of these countries would benefit from these investments that would improve their level of development. In this sense, Chart 1.5 illustrates the projections on the fees paid into the private pension systems of Chile, Colombia, Mexico and Peru as a percentage of GDP.

CHART 1.5: Annual fee payments to pension funds (as % of GDP)



Source: Favre *et al* (2006), Muñoz *et al* (2009), Albo *et al* (2007).

These fee payments have been calculated in very detailed actuarial models for each of the countries¹². Of particular importance are the current figures for Peru and Chile, which will reach 2.15% and 2.56% respectively within approximately forty years. Meanwhile, the percentages of fee payments made in Colombia will grow until 2050, finally reaching 1.52% thanks to the maturation of the system, demographic trends and the evolution of the labor market. In the case of Mexico, the indicator will be around 1.5% on average. The investment of a higher percentage of these resources in new infrastructure assets, instead of being undertaken in other assets with different characteristics, could lead to higher living standards in the country thanks to the positive effects that infrastructure has on growth and development. Therefore, in this chapter we will seek to measure to what extent the Latin American countries can improve their living standards in case the necessary and sufficient conditions were to occur for pension funds to increase their investments in infrastructure projects.

Concretely, we will conduct an experiment in which we will calculate the difference in the evolution of the per capita GDP of Chile, Colombia, Mexico and Peru, based on the assumption that they will earmark the same percentage of pension fund fee payments to invest in infrastructure as is currently the case, compared to the alternative hypothesis that presupposes an increase in this percentage until reaching an adequate and feasible level in accordance with the current legislation.

We will measure this effect based on an augmented neoclassical growth model, in which GDP depends on the accumulation of the traditional factors plus the introduction of the infrastructure capital stock, which partially depends on pension fund contributions.

In order for there to be consistency between the fees paid into the pension systems and the projection model, all the macroeconomic assumptions specified in the projection models of the pension systems whose methodologies appear in the studies conducted by BBVA between 2006 and 2009¹² have been adopted¹. These have been calibrated to the same date in order to recover the same results in terms of potential GDP growth rate calculated for these countries in the medium term by a recent study of the BBVA Economic Studies Department (2009).

However, a limitation exists that the currently available model cannot resolve. It is not possible to measure the effect on the fees of those affiliated with the PFMs in a situation in which part of their funds might be invested in infrastructure projects, and therefore, could improve labor productivity and boost wages. Consequently, additional increases in pension fund fees should occur. This virtuous circle would add greater benefits to the economy of the countries than the model used in this research can process.

Table 1.9 shows the percentages of fee payments to pension funds for each country with earmarks for infrastructure investment in the inertial and higher scenario.

¹² For the projections of the pension systems of Chile, Colombia, Mexico, and Peru see Favre *et al* (2006), Muñoz *et al* (2009), Albo *et al* (2007), Bernal *et al* (2008), respectively.

TABLE 1.9: Scenarios of PFM investment in infrastructure
(% of the fund portfolio)

	Hypothesis: Inertial scenario	Hypothesis: Higher scenario
Colombia	0%	20%
Chile	1.8%	18.8%
México	1%	10.7%
Perú	3%	20%

Source: Economic Research Department (ERD) own data and SSE (2009)

In the case of Colombia, in Alonso *et al* (2009) it is indicated that at the present time there are no direct investments in infrastructure projects. For the higher hypothesis we consider as a working assumption the possibility that such pension fund investments could reach a level that is in the range allowed by current regulations given Colombia's great investment potential and we feel that 20% could be a possible and desirable percentage.

In the Chilean case, the inertial scenario shows the current situation of direct investment in infrastructure projects by the PFMs. The higher scenario (18.8%) results from its own estimate based on the investment possibilities in the country.

For Mexico, in the inertial scenario we use the zero value, since to date there is no direct investment on the part of the Pension Fund Managers (AFORES). The superior scenario assumes that in the future an investment level equivalent to the maximum allowed by the law will be reached (see Alonso *et al*, 2009).

The hypothesis of the Peruvian inertial scenario (3%) involves its own estimates based on information from the superintendent of banking, PFAs and insurance regulatory agency on current direct investment in infrastructure. The higher hypothesis assumes a reasonable percentage and one that is within the maximum limit of investment in this type of asset.

It should be emphasized that the experiment that we conducted involves a partial investment reallocation using fees already paid into pension funds to finance new infrastructure projects, and does not use additional resources. Therefore, any gain in living standards achieved is not the result of more funds being earmarked for investment in general, but the optimization of already existing resources.

1.5.1. Growth accounting in Colombia, Chile, Mexico and Peru

As was commented in point 1.2., there are several factors in the economy that have been identified as contributing to long-term GDP growth. Growth accounting seeks to identify the extent to which each factor contributes to the increase in a country's

output. Jan Tinbergen's seminal work (1942), and the later writings of Fabricant (1954) and Abramovitz (1956) emphasized the importance of total factor productivity (TFP) as the key element that contributes to growth in total labor productivity. It was Solow (1957), however, who clarified this understanding of growth accounting using the current nomenclature with the Cobb-Douglas function based on equation 1.1.

The GDP of year t (Y_t) can be explained by the capital accumulation (K_t) of the same period, the labor force (L_t) and the so-called Solow residual (A_t), also known as total factor productivity (TFP). This function presents constant returns to scale for the accumulable factors as a whole ($\alpha + \beta = 1$) and the diminishing factors for each of them ($\alpha < 1$, $1 - \beta < 1$).

This model provides a long-term outlook that is certainly disturbing. The law of diminishing returns of the accumulable factors poses a future without growth. Therefore, the only way to grow in the long term depends on an increase in the Solow residual¹³ (A). This factor is known as this because it encompasses all the non-measurable elements that positively affect growth, the most important of them being technological change.

To the extent that less developed countries are farther from the stationary state, the contributions to growth from the capital and labor factors will be more positive. In this sense, papers such as Barro (1999), Easterly (2001), Easterly *et al* (2001) among others, quantified the contributions to increases in GDP for different countries and periods with growth accounting models. In the case of Latin America, the work of Santella (1998), Faal (2005), and Corbo *et al* (2003) should be highlighted.

As has already been commented, Ashauer (1989a, 1998b, 1989c) broke down the accumulation of the fixed capital stock into two different categories: the infrastructure project stock G_t , and its corresponding elasticity χ , and the rest of the accumulated physical capital (K_t). Again, constant returns to scale were posted for the series of factors ($\alpha + \beta + \chi = 1$) in accordance with equation 1.2.

Establishing the dynamics of accumulation of A_t , K_t , L_t y G_t , and estimating the participation values of each of the factors in GDP ($\alpha + \beta + \chi = 1$), it is possible to project the future production of each country, and therefore their economic growth.

Table 10 illustrates the participation of each of the factors in GDP. As we commented in previous paragraphs, the data for the assumptions adopted are taken from the macroeconomic scenarios of the projection models for the pension systems of Chile, Colombia, Mexico and Peru. In the hypotheses contained in these models on the participation of physical capital in GDP, the part corresponding to the elasticity of infrastructure project capital has been subtracted, always fulfilling the hypothesis of constant returns to scale for the accumulable factors as a whole ($\alpha + \beta + \chi = 1$) (see Table 1.10).

¹³ Or what is the same, of the TFP.

TABLE 1.10: Percentage share of each productive factor in GDP (1961-2002)

	Elasticity of the capital accumulation (α)	Elasticity of the labor factor (β)	Elasticity of infrastructure projects: (γ) (e)	TOTAL 100%
Chile (a)	31.55%	55%	13.45%	100%
Colombia (b)	28.55%	58%	13.45%	100%
Mexico (c)	26.55%	60%	13.45%	100%
Peru (d)	37.55%	49%	13.45%	100%

Source: (a) Favre *et al* (2006) and SEE
(b) Muñoz *et al* (2009) and SEE
(c) Albo *et al* (2007) and SEE
(d) Bernal *et al* (2008) and SEE
(e) see Appendix B

The elasticity of the infrastructure projects has been calculated in appendix B by means of a meta-analysis exercise. This component is vital for our experiment given that it is the parameter that allows for linking investment in infrastructure projects (and therefore the different contributions that the PFM can make) to the growth of GDP. In total we have consulted 70 studies that relate infrastructure projects with growth. Of these, we have selected 13 that have sufficient model information. The selected studies offer 130 alternative models, those of which we have used in the goal-analysis exercise (see Appendix B).

In addition, for our purposes, we will establish a slight variant of the Ashahuer model. As was commented, according to the neoclassical growth theory, the Solow residual or TFP is intimately associated with technological progress. Therefore, the theory of endogenous growth has based an important part of its foundation on trying to explain how and why TFP has or has not grown. Different factors such as R&D, the improvement in efficiency through learning by doing, the externalities of investment, etc. possibly explain the technical progress. However, the empirical evidence that underpins endogenous growth is limited due to the restrictions on the availability of sufficient and quality data. In the different growth accounting exercises this leads the cumulative dynamic of the Solow residual (A_t) to grow exogenously at a rate that is rationally justified for each economy. In our case, we have tried to uncover the effect that investment in infrastructure would have on the improvement in total factor productivity (TFP), a relation already commented on by Ashahuer in his studies.

Thus, investment in infrastructure projects would have an effect on growth through two main mechanisms:

- The accumulation of one more productive input: (G_t).
- Through an improvement in the efficiency of all the existing productive factors: $A_t = f(c, G_t)$.

The following points will offer an estimation of the dynamics of accumulation of the productive factors of the growth accounting model (see equation 3.2), estimating the different parameters and necessary indicators and the progression of TFP.

1.5.2. Measurement and projection of infrastructure projects in Latin America

a) Projection of the capital stock (K_t)

To undertake the projection of the capital stock of infrastructure projects, we will use the permanent inventory methodology, which is standard for this type of exercise:

$$K_t = sY_{t-1} + (1 - \delta)K_{t-1} \quad (1.4)$$

In which K_t is the physical capital stock of year t, where (s) is the percentage of GDP earmarked for public and private investment in infrastructure projects, Y_{t-1} is the GDP of year t-1. Therefore, the year's gross investment of physical capital would be determined by (sY_{t-1}). By the same token, (δ) is the annual depreciation rate of the capital stock and K_{t-1} is the capital stock of the previous year (see Kamps, 2006).

The assumptions on the value of the parameters that the equation (1.4) uses can be seen in Table 1.11. The capital depreciation rate is taken from the macroeconomic scenarios of the pension system projection models of each country. The savings rate for investment in physical capital (without infrastructure) is taken from the ECLAC (2007), from which the part corresponding to the savings rate in infrastructure investment has been deducted as we will see in the following point. Finally, the physical capital stock of the initial year has been calculated in appendix A and has been subtracted from the capital stock in infrastructure projects calculated further on.

TABLE 1.11: Hypothesis on capital accumulation

	Depreciation (δ)	Savings Rate (s)	K_{2005} (in billions of 2005 dollars)
Chile (a)	5.3%	19.9%	306 (f)
Colombia (b)	5%	12.3%	309
Mexico (c)	10%	19.2%	2300
Peru (d)	4%	18.1%	115

Source: (a) Favre *et al* (2006) and SEE
 (b) Our estimate
 (c) Albo *et al* (2007) and SEE
 (d) Bernal *et al* (2008) and SEE
 (e) CEPAL (2007)
 (f) Banco de Chile and SEE

b) Projection of the capital stock of infrastructure projects

The dynamics of capital stock accumulation in infrastructure also adopts the permanent inventory model.

$$G_t = sY_{t-1} + AP_t + (1 - \delta)G_{t-1} \quad (1.5)$$

In which is the capital stock in infrastructure of year t, (s) is the percentage of GDP earmarked for public and private investment (without pension funds) in infrastructure, Y_{t-1} is the GDP of year t-1 and AP_t is the contributions from pension funds slated for

new infrastructure projects. Therefore, gross capital investment in infrastructure projects would correspond to current gross public and private investment plus PFM funds earmarked for investment in infrastructure (AP_t). This latter parameter is key in our experiment since the possible values that they can adopt (according to the inertial and higher hypotheses shown in Table 1.9), will determine growth in GDP due to greater investment in infrastructure projects on the part of the PFMs. In addition, (δ) is the annual rate of depreciation of the capital stock and G_{t-1} is the capital stock of the previous year.

Table 1.12 illustrates the values associated with different parameters comprising the function of the accumulated infrastructure projects stock.

TABLE 1.12: Hypothesis on capital accumulation in infrastructure projects

	Depreciation (δ) (b)	Public and private savings rate (without pensions) (s) (a)	G_{2005} (in billions of 2005 dollars) (b)
Chile	3%	2.5%	70
Colombia	3%	2.5%	73.1
Mexico	3%	3.3%	310
Peru	3%	1.8%	16.4

Source: (a) CEPAL (2007) and ERD.
(c) ERD own estimate.

The corresponding depreciation has been established at 3% in all the countries under the assumption of a lineal 30-year amortization. The savings rate corresponding to investment in each country fluctuates between 1.8% in Peru and 3.3% in Mexico.

The value of the infrastructure projects stock in the 2005 base year has been calculated in appendix A.

c) Projection of the labor force

The labor force considered in the projections is the same as the one used in the pension system projection models for Chile, Colombia, Mexico and Peru. Each model adopts a series of differentiated hypothesis, in accordance with the countries' inherent reality and the data available.

For Chile's case in Favre *et al* (2006), the corrected labor force (FTCt) is calculated as follows:

$$FTC_t = FT_t * (1 - U_n)_t * H_t * E_t \quad (1.6)$$

Where FT_t is the labor force (in thousands of persons), U_n is the natural unemployment rate, H_t is an index of the average hours worked and E_t is an index of the educational level of the labor force, based on the information on the average number of school years of the labor force.

In Colombia's case, following Muñoz *et al* (2009) based on the CELADE population projections, the distribution of the economically active population (EAP) has been done by age range provided by the CELADE and has been projected to reach an average growth rate of 2%, which is the result of various hypotheses regarding the processes of urbanization and the incorporation of women in the labor market. Unemployment is made to converge from 7.42% to 5.5% in the medium term. Employment results as the difference between the EAP and the unemployment level.

Following Albo *et al* (2007), Mexico's demographic projection, used as the basis for calculating the number of employed persons, is based on estimates made by the National Population Council (CONAPO for its Spanish acronym). For projecting the economically-active population (EAP) through 2050, data from the CONAPO projection to date was used, and the data of the intermediate years were linearly inserted. The open unemployment rate (OUR) will go from 3.64% in 2005 to 3.7% in 2050, although this is based on a broader rise in the number of formal workers. The number of employed workers is calculated as the difference between the EAP and the number of unemployed persons.

For the Peruvian case and following Bernal *et al* (2008), the demographic projections through 2050 have been taken from the National Institute of Statistics and Information Technology (INEI for its Spanish acronym), together with the CELADE. The assumptions adopted for the labor market assumed a drop in informal employment from the current 60% to 45% in 2035. The unemployment rate will decrease from 6.2% to 5% in the long term.

d) The projection of total factor productivity

As we set forth in the previous chapters, total factor productivity (TFP) shows the technological/efficiency level of a country. The endogenous growth theory has attempted to explain its growth through diverse factors such as the I+D, the positive externalities of investment, among others. Ashauer (1989a, 1098b, 1989c) proposed infrastructure as a type of capital investment that improved the efficiency of all the productive factors.

In the case of Latin-American countries (as with many others), there is not sufficient information to contrast the relevant factors in the explanation of the growth of TFP. In the epigraph, by structuring an index of its own infrastructure (see APPENDIX A), it is possible to estimate the contribution of infrastructure to TFP growth.

In our model, the dependent variable is the growth rate of the Total Factor Productivity (TFP), which we calculated using data from the BBVA Research Department.

The explanatory variables are the following:

- Growth rate of the infrastructure stock. The infrastructure stock is estimated in Appendix A.
- Growth in middle school attendance as a proxy of the human capital stock. Source: World Bank.

1. Projections of the impact of pension funds of investment in infrastructure and growth in Latin America

- The per capita GDP logarithm as a proxy of the level of development. Source: World Bank.
- The TFP growth rate lagged one period.
- A dummy variable for each period to account for time-fixed effects.

For the estimation we used a dynamic panel, following the Arellano and Bond (1991) methodology, given the strong correlation between the growth rate of the TFP and its lagged value. This methodology allows us to correct the endogeneity problems that the latter correlation generates, by using the lagged values of the endogenous variables as instruments.

For all the variables, the statistical information of 12 countries is available, which contains observations from 1980 up to 2001. In Table 1.13, we can observe the estimation results:

TABLE 1.13: Regression results of the TFP explanatory model

Dynamic Panel Data Estimation, Arellano-Bond			
Number of obs = 145 Number of Groups = 12 Wald chi2(29) = 9883.86			
	Coefficient	Robust Error Est.	P>z
TFP(-1)	0.8269***	0.0245	0.000
Infrastructure growth	0.0139***	0.0047	0.003
Middle school growth	0.0003	0.0023	0.882
LN(PCGDP)	-0.0297***	0.0045	0.000
Intercept	0.0003***	0.0000	0.000

***, ** and * denote significance at a 1%, 5% and 10% levels respectively.

Source: (a) ERD (2009)
(b) Our estimate

According to our results¹⁴ the TFP growth rate depends positively on the infrastructure stock growth rate. The estimated coefficient means that if the infrastructure stock increases by 1%, the TFP growth rate rises 0.014%. Considering that we are saying that 1% is a relatively small percentage increase for infrastructure stock, the results found on total factor productivity are not irrelevant.

Based on the traditional specification in growth accounting in which TFP grows at an exogenous growth rate (*tcptf*), we describe the following equation:

$$PTF_t = PTF_{t-1} (1 + tcptf) \tag{1.7}$$

14 These results should be taken with a certain caution since available information only allows a regression for 12 countries, which is not a very broad sample from the standpoint of the asymptotic properties of the model.

According to the model estimates, we will make the $tcptf$ variable from an *exogenous growth rate* (tce) from the non-explained part of the model plus the explanatory component of the rise in the infrastructure stock (tcG_t):

$$tcptf = tce + (0.014\% \times tcG_t) \quad (1.8)$$

Substituting (1.8) in (1.7), we have the TFP accumulation rule in our model.:

$$PTF_t = PTF_{t-1} (1 + tce + (0.014\% * tcG_t)) \quad (1.9)$$

Where the TFP depends on the TFP of the previous period, $t-1$ multiplied by the growth rate that is exogenous (tce) and calibrated for each country according to long-term assumptions of the model, and the growth rate by the infrastructure growth rate ($0.014\% \times tcG_t$), the parameter being (0.014%), the elasticity of TFP growth compared to the growth rate of the infrastructure stock calculated per equation 1.9.

In Table 1.14, the values of the parameters adopted in (1.9) can be observed. The TFP exogenous growth rate (tce) has been calibrated to recover under all the previous assumptions of the model and using the GDP growth rate estimated by SEE (2009). These growth rates appear in the last column of Table 1.14.

TABLE 1.14: Hypothesis on the accumulation of infrastructure capital

	Tce (2005-2020) (b)	tcG (annual average 2005-2050) (b)		Growth rate of annual average GDP. (2005-2020) (inertial version) (a)
		Inertial version	Superior Version	
Chile	1.9%	2.51%	2.9%	4.42%
Colombia	2.1%	2.9%	3.2%	4.2%
Mexico	0%	3.45%	3.57%	2.78%
Peru	1.8%	4.8%	5.2%	5.45%

Source: (a) SEE (2009)
(b) Our estimate

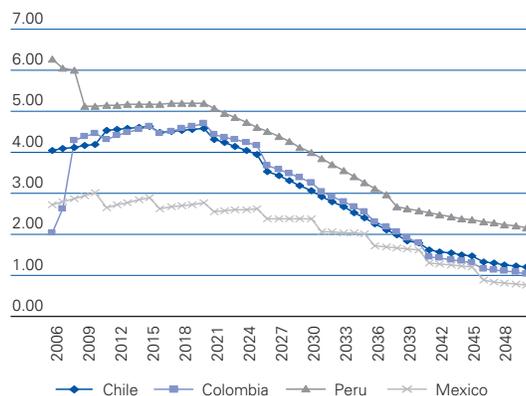
Of note is the value observed by Mexico where the tce (*exogenous growth rate*) does not grow in this period, which is the same performance as in recent decades. This would prove the urgent need to realize important reforms in order to reach superior growth rates in the long term and not lose the course of development. It is foreseeable that they will follow the rest of the Latin American countries.

In the case of Chile, Colombia and Peru up to 2020, the tce will decrease by 0.01 percentage points annually until it converges to a tce of 0%, remaining stationary in said value through 2050.

On the other hand, in reference to the growth rate of infrastructure stock, the additional contribution of the pension funds to said stock per the superior version would add between 0.2 and 0.4 annual percentage points to the growth of infrastructure stock.

The resulting GDP growth rates of the macroeconomic assumptions, brought together in the inertial model, show the dynamics of the transition to the stationary state for Chile, Colombia, Mexico and Peru (see Chart 1.6).

CHART 1.6: Per capita GDP growth rate inertial version (as %)



Source: Favre *et al* (2006), Muñoz *et al* (2009), Albo *et al* (2007), Bernal *et al* (2008)

The assumptions adopted regarding the growth rate of the total factor productivity reduce the growth possibilities for Mexico in the long term. The dynamics of transition depend exclusively on the factors of labor accumulation and savings, with which this country will advance more quickly to the stationary state. The growth rate in Mexico could reach values in the region of 2.5% by early 2030, only to later drop to a rate near 1% by 2050.

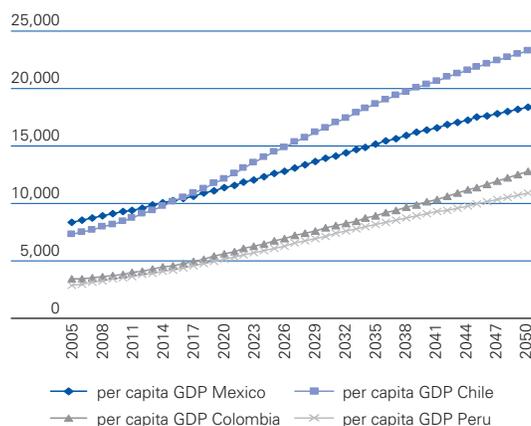
On the other hand, the lower relative per capita GDP of Chile, Colombia and Peru and the assumptions of the rise in TFP will allow growth rates to remain relatively high in the medium and long terms, surpassing 4% by the end of 2020. The growth hypothesis of TFP and the Law of Diminishing Return will give rise to a transition toward a slower stationary state than in Mexico’s case, likely to obtain a growth rate between 1% and 2% in 2050.

The growth rates shown in Chart 1.6 demonstrate the evolution of the per capita GDP of each country in Chart 1.7.

From the per capita US\$8,370 that Mexico currently has, it could reach US\$18,343 in 2050 in real terms.

In the Chilean case, said ratio would rise from its current US\$7,245 to US\$23,289 in 2050, surpassing Mexico in 2016 and reaching values similar to the current OECD average. These values show the strong dynamism in the Chilean economy and its continued “catch up” process to the more developed economies of the world.

CHART 1.7: The Chile per capita GDP inertial version (in US\$)



Source: SEE BBVA

Finally, Colombia and Peru would go from US\$3,378 and US\$2,846 per capita GDP in 2006 to US\$12,809 and US\$10,897 in 2050, respectively. This scenario considers the convergence hypothesis of these less developed countries with Mexico, reaching similar levels to countries that today would be considered of medium income.

1.5.3. Contribution of pension funds to GDP growth

Based on the assumptions of a possible macroeconomic evolution in Chile, Colombia, Mexico and Peru as set forth in points 1.5.1 and 1.5.2 and the result shown in the projections of Charts 1.6 and 1.7, we will simulate what could happen in the economic growth of these countries if private pension funds recognize the advantages of direct infrastructure investment for their affiliates. This is the “superior” hypothesis whereby the pension industry would invest a greater percentage of its funds (as per Table 1.9). A higher supplementary investment in infrastructure projects by pension funds would increase the capital stock and improve Total Factor Productivity.

In Table 1.15, we can observe the differences in the projection of the inertial version compared to the superior one. In 2050, per capita GDP in Mexico, according to the superior version, would be per capita GDP US\$18,543 compared to the US\$18,343 of the inertial version. In this case the difference is lower. If we compare Chile, the difference would increase by almost a thousand dollars per capita (US\$24,119 compared with US\$23,289 in the superior and inertial version). The Peruvian case is also quite notable. Compared to the per capita GDP US\$10,897 that a citizen would receive in 2050 according to the inertial version, in the superior he could receive US\$11,290. Finally, in

TABLE 1.15: Per capita GDP in the inertial and superior projections in constant US\$ and the difference in % of the two versions

	2020	2030	2040	2050
Inertial Version				
PC GDP Mexico	11344	13878	16406	18343
PC GDP Chile	12166	16606	20364	23289
PC GDP Colombia	5574	7827	10119	12809
PC GDP Peru	5076	7134	9059	10897
Superior Version				
PC GDP Mexico	11430	14015	16582	18543
PC GDP Chile	12381	17053	21020	24119
PC GDP Colombia	5624	7936	10302	13085
PC GDP Peru	5154	7300	9327	11290
Difference in % compared to the inertial version				
Diff in % México	0.76%	0.99%	1.07%	1.09%
Diff in % Chile	1.77%	2.69%	3.22%	3.57%
Diff in % Colombia	0.89%	1.40%	1.80%	2.16%
Diff in % Perú	1.55%	2.33%	2.96%	3.60%

Source: SEE BBVA

Colombia the per capita GDP reaches in the middle of the century would be US\$12,809 in the inertial version compared to US\$13,085 in the superior version.

In percentage terms, the superior version in 2050 is 1.09%, 3.57%, 2.16% and 3.60% higher than the inertial version in Mexico, Chile, Colombia and Perú respectively. These are the differences that would be observed in only a year. If we were to try to measure the opportunity cost if pension funds did not invest all of their potentially available resources in infrastructure, we would measure all of the current income that would not be received in present value that has been discounted¹⁵.

In Table 1.16, the cases of Peru and Chile which are in first and second place respectively are noteworthy. The opportunity cost of not investing in infrastructure could represent

TABLE 1.16: Net value discounted from additional income of the superior

Chile	89.3%
Colombia	49.1%
Mexico	24.1%
Peru	103.3%

Source: SEE

¹⁵ As a discount factor, we will use a real interest rate of 4.2% corresponding to that observed as an average of the last 30 years in the U.S. 30-year bond.

103.3% of the 2005 GDP of Peru, although we should consider that the country currently has the lowest GDP and therefore could obtain the highest growth rates. The Chilean case is also important and reaches high opportunity costs due to the fact that the resources it could invest on infrastructure are significant due to the advanced state of its private pension system.

In the case of Colombia, the GDP that would not be produced could reach 49.1%, which is also a significant amount.

Finally, Mexico would observe a lower opportunity cost of 24.1%, although equally important. In this case, the effect is limited due to restrictions by law on investing a higher percentage of pension funds in infrastructure.

We should also point out that the improvements in wellbeing of these countries would only be obtained by improving the framework by which the pension funds could invest in infrastructure assets, without which it might be necessary to withdraw or substitute other types of investments or social expenditures.

1.3. Conclusions

After the review by the various researchers on the current reality of infrastructure in Latin America, we can appreciate the significant deficiencies they present with respect to the target situations. Several studies indicate that the situation got worse as a result of the shocks that the economies of the region were continually exposed to, forcing the governments to make various important adjustments to public investments in infrastructure.

The above adjustments lead to significant funding cuts in infrastructure, and consequently less investment in them. The search for private capital was essential, and with this objective, the presence of private pension systems in Latin America was perceived by some countries as an opportunity to optimize the substantial resources in the investment portfolios of workers' pension funds, while allowing the economy as a whole to take advantage of the use of said funds by investing them in a manner that would enhance the growth of their countries. The main arguments in favor of infrastructure contributing to economic growth come from its impact on increasing capital stock accumulation and productivity growth. Additionally, there are other impacts which can be obtained as a result of expanding infrastructure investment related to improving the quality of life and income distribution.

The conditions under which private pension funds decide to invest in infrastructure should be based purely on market incentives; that is, the investments should strengthen the portfolios of the members and improve their efficiency, while maintaining an acceptable balance between profitability and risk. This last objective implies that all of the processes involved must be transparent and that all possible safeguards are imposed to protect the interests of the owners of the pension funds, the workers.

Based on the evidence recovered from the other studies regarding the appeal for pension funds to invest in infrastructure, Alonso and Ugarte designed a methodology

to calculate its impact on the growth of countries for this book. They developed an experiment to calculate the difference in the evolution of per capita GDP in Chile, Colombia, Mexico and Peru, under the varying assumptions that the countries' pension funds invest in new infrastructure at the same contribution rates they are doing presently, compared to the higher scenario in which investments increase to levels appropriate and feasible under current legislation. To this end, they used a neoclassical growth model, where GDP depends on the accumulation of traditional factors plus the introduction of infrastructure capital stock, which depends in part on the contributions from pension funds.

A key element in the calculation process is determining that the Total Factor Productivity (TFP) growth rate is the dependent variable, while using the growth rate of infrastructure stock as an explanatory variable, which is estimated with its own index; the growth in high school enrolment is used as a proxy for human capital stock; the logarithm of GDP per capita is used as a proxy for the level of development; the growth rate of TFP lagging one period is used; and a dummy variable is used in each period to account for the fixed effects of time. Through the dynamic panel used, we find that the growth rate of TFP depends positively on the growth rate of infrastructure stock. This interpretation shows that if infrastructure stock increases by 1%, the TFP growth rate increases 0.014%. Given that we are talking about an increase of 1%, which is a relatively small increase for infrastructure stock, the effects found on total factor productivity are by no means negligible.

This variable is then incorporated into the neoclassical model above to find the impact on growth in both the inertial scenario (using existing pension fund participation conditions) and the upper scenario (that would invest pension funds to the maximum allowable amount in the institutional frameworks of each country). The incorporation of these scenarios show that in 2050, Mexico's per capita GDP would be US\$ 18,543, or 1.09% higher than the inertial version, while Chile's would be 24,119 (3.57% higher). In the case of Colombia and Peru, their GDP per capita would reach US\$ 13,085 and 11,290 respectively, representing 2.16% and 3.6% of GDP in Colombia and Peru in inertial version.

It might appear that an annual difference of the magnitude referred to is insignificant, however, considering that this difference would occur every year, the opportunity cost of not carrying out the necessary reforms to promote pension fund investment in infrastructure should reflect all of the lost production during the period considered. The results show that the opportunity cost of not investing in infrastructure could represent 103% of GDP in 2005 in Peru. The Chilean case is also significant and is associated with a high opportunity costs due to the substantial resources they could invest in infrastructure because of the advanced state of their private pension system (89.3%). Colombia observes a lower opportunity cost due to the lower volume of funds managed by private pension funds in the country (49.1%). Finally, in the case of Mexico, the opportunity cost is lower but still significant. In this case, the effect is limited by legal restrictions on greater levels of investment in infrastructure (24%).

2. The Infrastructure gap in Latin America

Javier Alonso and David Tuesta

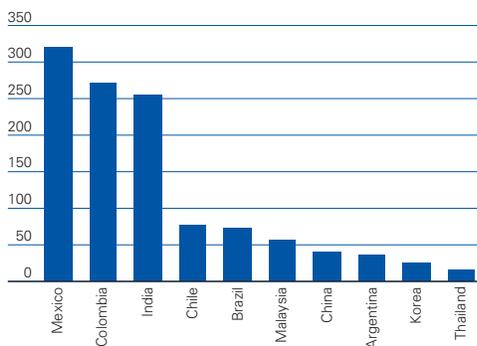
2.1. The infrastructure gap and need for financing in Latin America

Since the 70's, economic literature has shown a special interest in the contribution of infrastructure to growth. The theoretical and the empirical evidence has shown that this type of investment increases the potential GDP in the long term through the improvement of productive *input* and by improving the efficiency of all factors.

Despite the known importance of these factors, since the mid 80's, a generalized plunge in infrastructure investment has been observed in most Latin American countries. As can be observed in Chart 1.1, the primary surpluses of state's budget were achieved by reducing the public infrastructure investment from representing 4.5% of GDP in the mid 80's, to a mean of approximately 1.5% in the 90's.

For several years, and in multiple countries, the decline in direct foreign investment compensated for part of the decline in investment. Nevertheless, due to the decrease in the number of public companies privatizing in the 90's, and the more recent current economic crisis, foreign capital has retracted a great deal, leaving current investment far below desirable levels (see Chart 1.2).

CHART 2.1: Average distance from the three most important economic centers (in Kilometers)



Source: World Bank (2006), DANE Regional Accounts, and ERD BBVA

On the other hand, the geographical features of the interiors of some Latin American countries, meaning those that have significant populations and economic activities far from the coast (like Colombia and Mexico), along with a very difficult orography (the former along with Peru), cause the cost of establishing new infrastructure to be especially high. This, together with the scarce investment mentioned earlier, translates into a smaller amount of money available for infrastructure. For example, Colombia has one of the longest distances between industrial centers and their maritime ports in comparison to other competing countries. The average distance (weighted by population) in a straight line, from Bogota, Medellin and Cali to the maritime port is 271 kilometers (Chart 2.1). This distance is 3.2 times that observed in Chile and 3.6 times that in Brazil and is much further than other competitors like China, Korea and Thailand.

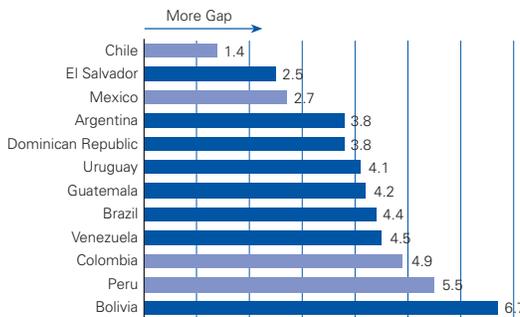
This period of time without sufficient investment has not only increased the differences in infrastructure resources of Latin American countries with respect to the most developed ones, it is also responsible for the increase in the infrastructure gap with respect to their direct competitors in international markets.

In a recent paper from the World Economic Forum, Mia *et al* (2007) introduce a comparison of the perceptions regarding the development of infrastructure in different Latin American countries.

The first indicator analyzed is the *Infrastructure Quality Gap Index (IQGI)* which incorporates diverse types of infrastructures in its calculation. To estimate this indicator, the German development is used as a reference, as it was the country that achieved the best allocation. With respect to the leader, the infrastructure gap in Latin American countries is considerable.

The largest discrepancies were found in Peru and Colombia (5.5 and 4.9). Mexico is in an intermediate situation with 2.7 and Chile is in the best position with 1.4. (see Chart 2.2)

CHART 2.2: Infrastructure gap in Latin American countries



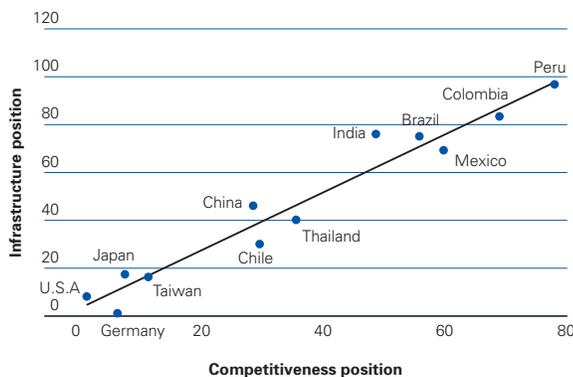
Source: World Economic Forum 2007

2. The infrastructure gap in Latin America

This gap reflects a lack of global competitiveness by Latin American countries (Chile being the exception) with respect to the most competitive countries.

If we compared the *Global Competitiveness Index, WEF, 2009* to 2009-2010, showing the position of infrastructure development for every country in the world with respect to its infrastructure allowance, a large gap between Mexico, Peru and Colombia compared to the countries of Southeast Asia can be observed, in addition to showing the logical positive relationship between infrastructure and competitiveness. It is worth pointing out the case of Chile, which has, to a degree, been able to position itself competitively. Chile also has infrastructure similar to that of China and Thailand, which can be explained in part by the important contributions that pension funds have had on overcoming economic obstacles in that country. With this in mind we will further discuss the important contributions that pension funds have on overcoming economic obstacles in Chile’s corresponding chapter (see Chart 2.3).

CHART 2.3: Relationship between infrastructure and competitiveness



Source: The Global Competitiveness Report 2009-2010. WEF (2009), ERD BBVA

While this lack of infrastructure stock can be a barrier to competition and growth in Latin American countries, it can also be an opportunity for diverse financing entities at the same time, and more specifically, for pension funds. At the World Economic Forum, Mia *et al* (2007) show the degree to which each country is attracted toward private infrastructure investment in a comparison to potential investors in each country through the *Infrastructure Private Investment Attractiveness Index (IPIAI)*. This indicator weighs diverse factors like the regulatory, institutional and fiscal environment, as well as the political risk, macroeconomic factors and profitability of the investment, etc. In Table 2.1 we see the result of the study. This classification highlights that Chile, Colombia, Peru and Mexico are among the top five ranked on the list, with Brazil in the second position behind the leader, which is Chile.

TABLE 2.1: Private infrastructure investment attraction index

Ranking	Country	Gomal Rating
1	Chile	5.43
2	Brazil	4.40
3	Colombia	4.33
4	Peru	4.23
5	Mexico	4.04
6	Uruguay	4.02
7	El Salvador	3.97
8	Guatemala	3.64
9	Argentina	3.41
10	Venezuela	3.37
11	Bolivia	3.34
12	Rep. Dominicana	3.33

Source: Mia *et al* (2007)

In this case, despite the fact that Chile retains the best indicator of infrastructure stock (and as such, the pending projects offer lower returns) the stability of its regulators/institutions and the development of its financial system provides an ideal framework for private domestic and foreign investors to control risks associated with investment allocation.

Despite the opportunities and needs for investment in countries like Colombia, Peru and Mexico, along with the attractiveness that they seem to offer for public and private investors, we should ask ourselves: why are private investors, and more specifically, pension funds, not investing in these countries more heavily, as desired?

In the following chapters, the more diverse circumstances that have affected private investments will be shown, and more specifically pension funds in Chile, Colombia, Mexico and Peru.

What we should point out is the importance of what is being paid in relation to what will be gained by national savings via retirement funds, and that the national competitiveness and wealth could be increased with the attainment of necessary and sufficient conditions for the PFA to consider it appropriate to invest in infrastructure assets (see Alonso *et al*, 2009).

In Table 2.2, we mention some studies which have estimated the investment needs in the short / medium term for Chile, Colombia, Mexico and Peru. It would be necessary to have a minimum investment of 4% of annual GDP during the period considered. If the studies obtained information over a longer period, we would probably see that this amount would be maintained or even increase over time.

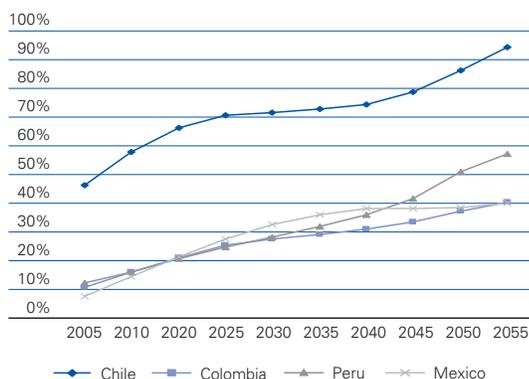
TABLE 2.2: Estimation of infrastructure needs in Latin America

Country	Estimation of Investment Needs (in million US\$)	Period	Source
Chile	25,817	2008-2012	Chilean Construction Chamber
Colombia	90,193	2006-2019	DNP(2006)
Colombia	30,000	2006-2010	DNP (2007)
Mexico	232,293 (22% private)	2007-2012	National Infrastructure Program
Peru	37,760 (gap)	2009-2018	Peruvian Economic Institute (2009)

Pension funds, on the other hand, are going to increase available resources notably as several systems mature (see Chart 2.4). Chile already accumulates assets that reach the around 60% of GDP and it could get as high as 90% in 2050. The remaining countries, (Colombia, Peru and Mexico), with more recent private pension systems than those of Chile, have reached a volume of resources exceeding 10% of GDP and that could go as high as 40% in 2050 (for Mexico and Colombia) and close to 60% in the case of Peru.

This important source of resources could be very beneficial for the country if it could be channeled to direct infrastructure investment. According to Alonso *et al* (2009) these countries could increase their per capita GDP between 1% and 3.6% by 2050 if they invested a higher percentage of portfolios in infrastructure. The opportunity cost resulting from not taking advantage of said resources could be as high as 24% of GDP in Mexico and 108% of GDP in Peru, in discounted present value¹⁶.

CHART 2.4: Outstanding balance of pension funds in relation to GDP



Source: Favre *et al* (2006), Muñoz *et al* (2009), Albo *et al* (2007), Bernal *et al* (2008)

16 The cost of opportunity in Colombia would be 49.1% and in Chile 89%.

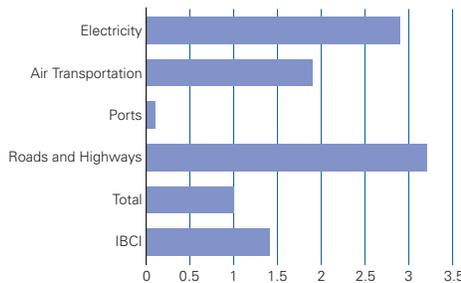
Likewise, important advantages would be derived for pension funds themselves because this type of investment fits very well in pension fund portfolios, given their long term nature and their good relationship between profitability and risk (see Alonso *et al*, 2009).

While Chile has made great progress in this sense along these lines as we shall see, there is still much work to be done in the rest of the countries so that administrators will find the framework absolutely satisfactory, so as to make infrastructure investment convenient.

2.2. The need for financing in Chile

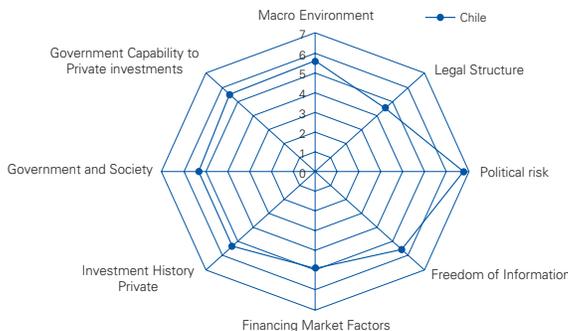
Among Latin American Countries, Chile has been the one that has reached the best competitive position, in great part because their allocation to infrastructure has reached an Infrastructure Quality Gap Index (IBICI, Índice de la Brecha de calidad de infraestructuras) of 1.4. Nevertheless, far from relying on data, the country faces new obstacles to achieving a development level similar to that of the most advanced countries of the world. In this sense, we can highlight the fact that specified shortfalls still persist in the sector of electricity and in streets and roads with an infrastructure quality index of 2.9 and 3.2 respectively according to Mia *et al* (2007) (see Chart 2.5)

CHART 2.5: Quality of infrastructure in Chile (0=Germany)



Source: Mia *et al* (2007)

CHART 2.6: Investment attractiveness (IPIA)



Source: Mia *et al* (2007)

2. The infrastructure gap in Latin America

To meet this goal, Chile has implemented the best general framework in Latin America for the attraction of private infrastructure investment. According to Mía *et al* (2007) the general score of the Index of Private Infrastructure Investment Attraction (IPIA, Índice de Atracción de Inversión Privada en Infraestructura) is 5.43. It is highlighted that in all aspects considered, Chile achieves a good grade, especially in the political stability aspect, for which it achieves 6.75.

The greatest weakness of the system is its legal structure, as its resolution of conflicts and claims by shareholders that the management of company administrators is often slow and inefficient (Mía *et al* (2007)).

In Table 2.3, are shown the estimates for two periods of the Chilean needs for infrastructure investment according to the Chilean Chamber of Construction. One period covered 2006 and the other 2008. The comparison of both reports shows us that in spite of the advances and investments carried out, the need for infrastructure investment has increased, rather than reduced. We also see that in the lapse of two years a new sector was incorporated: hospital and penitentiary infrastructure, with requirements of US\$ 840 million.

TABLE 2.3: Needs for infrastructure investment in Latin America estimates from the Chilean Construction Chamber (in million of Chilean Pesos from 2008)

Sector	2006-2010	2008-2012
Urban roads	1,637,585	3,009,598
Electric sector	2,061,591	2,253,140
Port Infrastructure	292,843	551,922
Sanitation and rainwater management	2,378,459	2,921,940
Railways	225,963	189,601
Connections among cities	4,353,691	3,753,719
Airports	214,276	191,549
Hospital and Prison Infrastructure	–	545,429
Total	11,163,759	13,416,899

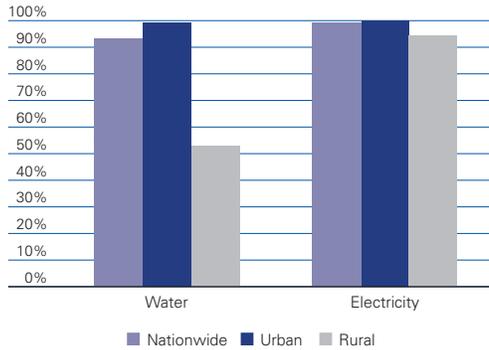
Source: Chilean Construction Chamber (CChC).

For the period 2008-2012, it is estimated that the financing needs of Chile will reach US\$ 25,817 million (CLP 13,416 billion), highlighting the urban roads sector in comparison to the electricity and health sectors.

In 2006, 88% of the Chilean population lived in urban areas, which facilitated a large percentage of the population having access to basic services. As seen in Chart 2.7, in 2006, more than 90% of the population had access to drinking water and electricity in their homes. Nevertheless, the rural zones still pose challenges.

In accordance with the Chilean Chamber of Construction, the minimum investment required for the management of rainwater is approximately US\$ 1 billion, which is an amount that is obtained from a comparison between the cost of flood risk and the cost of avoiding it.

CHART 2.7: Homes with water and electricity availability in 2006

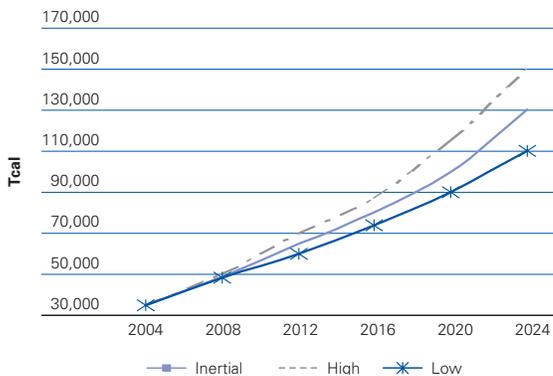


Source: Cepal

Energy

Chile is a country with very small energy resources, and for that reason its needs are high. The country is currently in the process of diversifying the energy matrix and encouraging the efficient use of energy. As can be seen in Chart 2.8, in accordance with data from UNPD, Chile could end up needing 150,000 Tcal of electrical energy by 2025.

CHART 2.8: Projection of scenarios of total electrical energy consumption



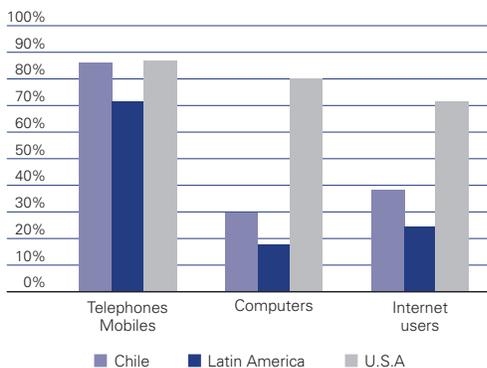
Source: Fundación País Digital (Digital Country Foundation).

The long term policy of the electrical sector is the search for environmentally-friendly generation at a minimal cost.

2. The infrastructure gap in Latin America

On the other hand, and in accordance with data from the Digital Country Foundation, Chile has telecommunication coverage that is far greater than the average in Latin America. Nevertheless, if it is compared to the United States, (except in mobile telephony), a significant gap can be observed, especially in terms of access to computers and the Internet (see Chart 2.9).

CHART 2.9: Telecommunications as a percentage of the total population in 2008



Source: Fundación País Digital (Digital Country Foundation)

Transportation

The transportation infrastructure, as was already mentioned, has experienced important improvements. Currently, thanks to the licensing system, Chile holds several high-level communication networks which connect the country from north to south, from La Serena to Puerto Mont, and is currently expanding further north. There are more than 10 transversal routes in use and another three under construction. These routes connect the country’s main cities, production centers and ports.

12 airports have been licensed, of which 10 are operational and 2 are under construction. There are eight urban freeway concessions in the city of Santiago, where for the first time in the world, *free flow* technology is being applied at a metropolitan level, integrating different operators, and in addition to increasing comfort and efficiency, the system registers a very low level of fraud.

Other Sectors

The challenge for the future is to expand and consolidate the concessions system to other public areas: second generation concessions, which include colleges, hospitals, prisons, ports, public buildings, infrastructure for public transportation, stadiums, among others. There are currently 10 second generation concessions and there are three under construction, among them are a dam, prisons, the Centro de Justicia de Santiago (Santiago Justice Center) and two hospitals, among many others.

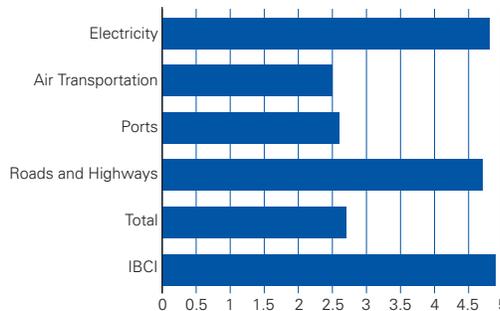
The port sector in Chile holds great importance due to its geography, and currently more than 95% of exports are realized by maritime channels and between 60% and 80% of imports arrive this way. Additionally, in the framework of the diversification of the energy matrix (for example, the importation of liquid natural gas from Trinidad and Tobago), needs are arising for ports with special features.

2.3. The need for financing in Colombia

Colombia is one of the Latin American countries with the highest needs for infrastructure. According to Mía *et al* (2007), the IBCI index that measures the existing gap in infrastructure with respect to Germany is situated at 4.9 points, which places Colombia among the lowest positions in Latin America.

Most deficiencies can be found in the electrical sector and in the roads system with index values of 4.7 and 4.8, respectively (see Chart 2.10).

CHART 2.10: Quality of infrastructure in Colombia (0=Germany)

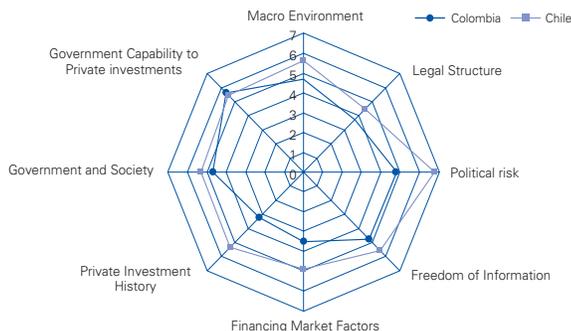


Source: Mía *et al* (2007)

With regard to the factors that determine the index of attraction for private infrastructure investment (IPIA), Colombia reaches a value of 4.33 in global terms, which, although ranking among the best in Latin America, is still far from the case of Chile (see Chart 2.11). Colombia is in a good situation with the right legislation to form PPPs, giving it a grade of 5.63 (even greater than that of Chile). Nevertheless, it has special problems regarding security (despite the large advances of recent years) and with regard to the bad historical experience of the concessions program that is described in detail in chapter 5. Finally, the poor development of the financial market has prevented an effective *Project Finance* program, which is very necessary for the development of infrastructure.

Facing the need for physical infrastructure, the current government is working on an ambitious project development agenda. This medium-term fixed program is described

CHART 2.11: Investment attractiveness (IPIA) in Colombia

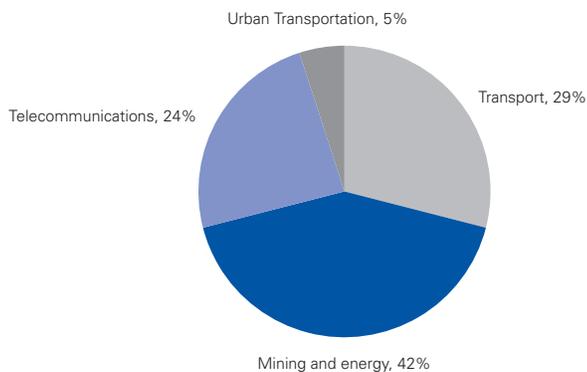


Source: Mia *et al* (2007)

in the 2006-2010 National Development Plan and in the National Planning Department’s Document: Vision 2019, in which different objectives are found that look to improve the capacity for infrastructure through the participation of the private sector. Among the Government’s objectives is increased investment in new freeways, roadways, track consolidation, improvements to river navigation, as well as improvements to airports and port ranges.

According to the PND - Plan Nacional de Desarrollo (National Development Plan) - for 2006-2010, a total infrastructure investment of more than US\$ 30 billion is expected, of which 46% will correspond to investments from the public sector and that will be focused mainly on the sectors of mining, energy and transportation (see Chart 2.12).

CHART 2.12: Private infrastructure investment by sector (2006-2010)



Source: PND 2006-2010

In order to analyze private investment potential and space, here is a brief description of the Government's medium-term project agenda for each of the infrastructure sectors.

a) Mining-energy sector

In the energy and mining sector, the most urgent forms of infrastructure are related to exploiting the hydraulic resources of the country for the production of electric energy. Initiatives are as diverse as the construction of mini power stations to hydroelectric power stations in Huila and Santander.

Therefore, the investment possibilities are both significant and varied (see Table 2.4).

TABLE 2.4: Regional projects in the mining and energy sector

Departamento/Región	Apuesta Productiva
Huila	Build and commission power generation micro stations and, later, develop relevant hydro-electrical projects covering national demand and connection with neighbor countries.
Santander	In 2020, increase participation at least by 13% of total electric energy generation.
Bogotá-Cundinamarca	Mining and coal.
Bolívar	Strengthen, connect and consolidate the gold-bearing productive chain to place jewelry products in the international market.
Boyacá	Boyacá is first-ranked in 2015 at a worldwide level in the production of emeralds and at the national level with production and exploitation of: coal, metallurgicals, steel minerals, limestone, clay, plaster, pozzolan and phosphoric rock.
Cauca	Creation of mining production chains and small-sized chains for strategic minerals such as gold, clay, coal and sulfur, among others.
Cesar	Mining.
Choco	In 2020, extract gold, silver and platinum in a sustainable way and with ecology responsibility.
Cordoba	Remove ferronickel.
Huila	Industrialize processes for removal of phosphate, clay and marble in a sustainable manner and apply high technology to reach international standards.
La Guajira	Diversify mining resources from La Guajira to surpass extraction economy by, way of business processes to obtain different derivatives from salt, natural gas, coal, barite, plaster and limestone. In 2010, place salt industry of La Guajira as top of the country in quantity, quality and price, meeting international standards and in 2020, be top-ranked in Latin America.
North of Santander	To 2015, increase coal production of 8,000,000 t/per year.
Santander	In 2020, gain recognition as a regional center in Northeast Colombia for gold and coal exploitation.

Source: DNP (2007)

2. The infrastructure gap in Latin America

With respect to mining, the great wealth of metals and precious stones would allow for new exploration in Bolivar, Choco and Santander. Other premium materials like coal, phosphate, clay and marble could be competitively exploited in Bogota, Boyaca, Huila and Guajira.

b) Transportation sector

The dispersion of the rural Colombian population and the difficult orography of the terrain have traditionally made the transport of people and goods difficult all over the territory. This has resulted in high transportation costs that make connections to the interior of the country difficult and also makes competition difficult with respect to external markets. Despite the important advances in construction and the road improvements in Colombia, it is evident that a supplementary effort is necessary in order to reach a minimum transportation capacity that will guarantee the development of the country.

In that sense, the main goal in the ground transportation sector is that the main network increase 100% by 2019, resulting in an expansion of 20,000 kilometers of roadways.

At the same time, there will be an effort to modernize, integrate and expand coverage of the airports. In terms of the development of the ports, it is expected that the current 150 million tons/year capacity that existed at the beginning of the century will increase to 285 million tons/year. On the other hand, looking to consolidate waterway transportation, the objective is to develop permanent navigation through rivers and channels, surging from 39% to 80% in the terms of intensity of use, in addition to expanding the mobilization of commercial cargo from 5% to 10%.

Finally, it is expected that rail transportation will carry twice the number of tons in 2019 and that the number of active kilometers will go from 2,141 to 2,501 kilometers (see Table 2.5).

TABLE 2.5: Regional projects in the transportation sector

Department	Sector projects
Amazonas	Make Leticia a logistics center for national and international trade.
Antioquia	Hold a logistic and transportation services chain with the highest quality standards and professional ethic to optimize foreign trade operations.
Atlantic	Make the Atlantic an international trade platform with more port trade.
Bolivar	Increase commercial flow by efficient logistic services in port trade.
Boyaca	Create a water transport system, thus enhancing transportation capabilities.
Cauca	Exploit Caucan Pacific maritime resources, boosting Guapi as an alternate port with participation of the private sector.
Magdalena	In 2010, become the first logistic and transportation service center to foreign trade, especially from at to the center-east of the country.
Risaralda	Public transportation sector.
Valle del Cauca	Implement infrastructure and services in logistics required to convert the valley in an efficient platform, competing with import and export worldwide standards at the national and international level, optimizing the strategic location. Becomes a logistic platform with international standards in commercial activities.

Source: DNP (2007)

c) Telecommunications sector

In 2019, the telecommunications sector should be one of the main driving forces for economic growth through the development of the information age. In order for the sector to periodically incorporate new trends in technology, conditions must be generated which provide grounds for the globalization of services that promote competency in order to offer the greatest efficiency to users, as well as adequate and universal coverage (see Table 2.6).

TABLE 2.6: Regional projects in the telecommunications sector

Department/Region	Production Projects
Amazonas	Optimization of telecommunications and Internet services.
Amazoninoquia	Increase telephony service in the region. Generate business by e-business or e-commerce. Expand and develop connection programs throughout the State.
Antioquia	Massive telecommunications plan at higher speed, capacity and coverage.
Atlantic	Telecommunications Free Sector.
Bogotá-Cundianamarca	Connected Region.
Bolívar	Incorporate Information and Communication Technologies to the Tourist Cluster from the Caribbean region of Colombia-Cartagena Pilot Plan.
Caquetá	Telecommunications, cellular and urban telephony.
	Commercial logistics.
Casanare	Effective telecommunications for Casanare.
Cauca	Formulation of the project to implement phone and Internet centers. Connect High Level Formation Centers of the Region by way of High Sped Networks. Connectivity project for social development and sustainability in Southwest Colombia.
Chocó	Implementation of connection programs in Quibdó and touristic municipalities: Internet connection, local and long distance mobile telephony, by was of the implementation of telecommunication coverage-Telecom and Compartel.
Huila	web access public service: Enhancing Web massive use by implementation of wireless technology (e.g.: Wimax).
Nariño	Expansion and massification of Internet and English language.
Risaralda	Implementation of a network to link touristic services suppliers. Regional service platform (telecommunications, information, consulting services, cargo, among others). Provide necessary resources (telephone, fax, computer, Internet) to the pertinent authorities to carry out their jobs effectively. Strengthen communication in all metropolitan area regions.
Sucre	Provision and expansion of basic telephony service coverage in Coveñas, municipalities and tourist locations of the department. Provision of Internet service by way of basic telephony network already installed and to be installed.
Valle del Cauca	It is essential that Buenaventura holds a permanent communication service in order to guarantee the efficiency in cargo transportation by department as well as to ensure agility and fast data transmission from and to the city. Connection of the national communications system with the submarine fiber optic cable, located in the Malaga area and termination of the fiber optic cable ring to lead to Buenaventura. Expand social telephony programs with broad band technology, with special relevance to rural areas in the subregions of the Pacific, North, Center and Sur of Valle of Cuenca, to improve connection of the people.

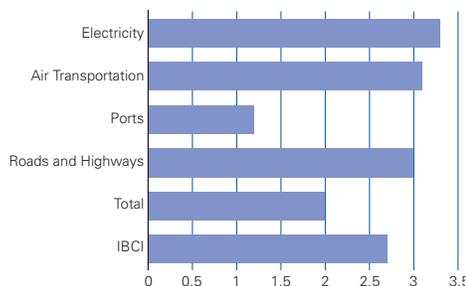
Source: DNP (2007)

2. The infrastructure gap in Latin America

2.4. The Need for Financing in Mexico

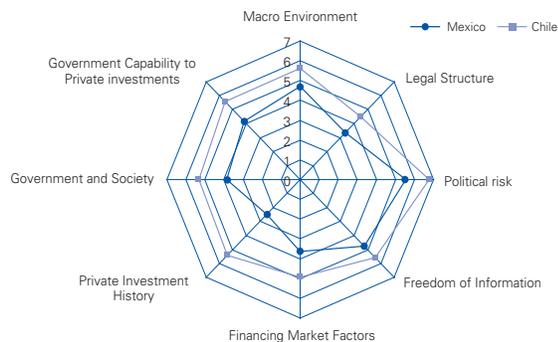
The infrastructure allowance in Mexico is the best after Chile, reaching an IBCI of 2.7. The sectors with the highest need for improvement in allocation are the electricity and air transportation sectors, which register an Index value of 3.3 and 3.1 respectively (see Chart 2.13).

CHART 2.13: Quality of infrastructure in Mexico (0=Germany)



Source: Mia et al (2007)

CHART 2.14: Investment attractiveness (IPIA) in Mexico



Source: Mia et al (2007)

With regard to the attraction for private investment, Mexico comes in behind Chile, Colombia and Peru, with a global IPIA Index of 4.04. Even though the country has relatively good grades in all factors, it has been penalized due to its history of negative experiences with private investments in the old concession programs, which eventually gave way to their nationalization¹⁷ (see Chart 2.14).

The communication and transportation sectors are the focus of 30% of economic infrastructure investment projects. The following are some projects that the current administration is trying to carry out, through the framework of public-private participation and transfers from the public budget:

a) Transportation sector

Roads

- Construct and modernize 17,598 kilometers of highways and rural roads, including 12,260 kilometers that correspond to the completion of 100 road projects.
- Raise the percentage of roads in the federal road network to meet international standards from 72% to 90%.

¹⁷ See chapter 6 for more information.

TABLE 2.7: National infrastructure program 2007-2012
Base scenario for investment in roads through financing sources
 (Billions of pesos in 2007)

Sector	Public Resources	Private Resources	Total
Main corridors	18	86	104
Outside roads	56	22	78
Supplementary Projects	16	-	16
Rural and tributary roads	20	-	20
Conservation	40	-	40
Road studies, projects and rights	10	29	30
Total	159	128	287

Source: National Infrastructure Program and ERD BBVA Bancomer.

b) Railways

An important arena for investment exists in the area of railways.

- To construct 1,418 kilometers of railroads.
- To complete the first stage of Systems 1, 2 and 3 of the Suburban Train in the Metropolitan Zone of the Mexican Valley.
- To construct 64 overpasses, signal 240 level passes and 256 crossings, develop 3 beltway tracks and construct 4 border crossings with beltways.
- Develop 10 new multi-modal corridors, including the construction of 12 intermodal loading terminals and initiate operation of the Punta Colonet project.

TABLE 2.8: National Infrastructure Program 2007-2012
Base scenario for investment in railways through financing sources
 (Billions of pesos in 2007)

Sector	Public Resources	Private Resources	Total
Construction	23	15	38
Modernization	-	2	2
Conservation	-	3	3
Urban coexistence program	2	1	3
Safety program	2	-	2
Intermodal cargo terminals	-	1	1
Total	27	22	49

Source: National Infrastructure Program and ERD BBVA Bancomer.

c) Ports

- To construct 5 new ports and expand or modernize 22 others.
- Increase the capacity installed for the management of 20 foot containers from 4 to more than 7 million.
- To construct 13 cruise ship docks.

TABLE 2.9: National Infrastructure Program 2007-2012
Base scenario for investment in ports through financing sources
 (Billions of pesos in 2007)

Sector	Public Resources	Private Resources	Total
New ports	4	23	27
Expansions	9	32	41
Conservation	3	-	3
Total	16	55	71

Source: National Infrastructure Program and ERD BBVA Bancomer.

d) Airports

- To construct at least 3 new airports and expand 31 others.
- To increase air transport freight capacity by 50%.

TABLE 2.10: National Infrastructure Program 2007-2012
Base scenario for investment in airports through financing sources
 (Billions of pesos in 2007)

Sector	Public Resources	Private Resources	Total
New airports	15	20	35
Expansions	9	3	12
Conservation	2	-	2
Other (equipment)	6	4	10
Total	32	27	59

Source: National Infrastructure Program and ERD BBVA Bancomer.

e) Telecommunications

- To increase fixed and mobile telephone lines coverage to 24 and 78 lines for each 100 inhabitants, respectively.
- To increase broadband coverage until there are 22 users for every 100 inhabitants.
- To increase internet users to 70 million users.
- To reach 5 million users of radio communication services and 10 million users of paid television.

TABLA 2.11: National Infrastructure Program 2007-2012
Base scenario for investment in telecommunications through financing sources
(Billions of pesos in 2007)

Sector	Public Resources	Private Resources	Total
Broad band and fixed telephony	-	118	118
Mobile Telephony	-	106	106
Restricted television	-	24	24
Radio Communication	-	17	17
Others (public telephony and satellite service)	19	-	19
Total	19	264	283

Source: National Infrastructure Program and ERD BBVA Bancomer.

f) Drinking water and sanitation

- To increase the coverage of drinking water to 92% (97% in urban zones and 76% in rural zones).
- To increase the coverage of sewer services to 88% (96% in urban zones and 63% in rural zones).
- To increase the coverage of waste water treatment services to at least 60% of water collected.

TABLA 2.12: National Infrastructure Program 2007-2012
Base scenario for investment in water and sanitation through financing sources
(Billions of pesos in 2007)

Sector	Public Resources	Private Resources	Total
Drinking water supply	59	25	84
Sewer services	26	11	37
Sanitation	23	10	33
Total	108	46	154

Source: National Infrastructure Program and ERD BBVA Bancomer.

g) Hydraulic and agricultural infrastructure

- To modernize and/or increase technology of 1.2 million acres of agricultural irrigation land.
- Incorporate an area of 160 thousand new hectares of irrigation and technical season land.

TABLE 2.13: National Infrastructure Program 2007-2012
Base scenario for investment in the hydro-agricultural sector by financing source
 (Billions of pesos in 2007)

Sector	Public Resources	Private Resources	Total
Hydro-agriculture	27	12	39
Recovery and modernization	18	10	28
Expansion of irrigation land	7	2	9
Others	2	-	2
Flood control	9	-	9
Total	36	12	48

Source: National Infrastructure Program and ERD BBVA Bancomer.

h) Energy sector

The energy sector is dominated by the participation of public companies and the participation of the private sector is limited to only very specific secondary activities that complement the operations of public companies.

1. Petroleum

With regards to petroleum, the Constitution reserves the following activities to the State:

- Exploration, management, refining, transportation, storage, distribution and firsthand sale of petroleum and products that are derived from their refining.
- Exploration, management, and production of natural gas as well as the transport and storage systems that are indispensable for its management.
- Production, transport, storage, distribution and firsthand sale of petroleum derivatives and gas that are considered to be basic petro-chemicals.

With regard to the previous, the PNI (National Infrastructure Program) addresses the following investment projects by the State:

- Reach a production greater than 2.5 million barrels of petroleum per day.
- Maintain the production of 5 billion cubic feet of natural gas per day.
- Raise the petroleum reserve recovery rate to 50%.

TABLE 2.14: National Infrastructure Program 2007-2012
Base scenario for investment in petroleum by financing source
 (Billions of pesos in 2007)

Sector	Public Resources	Private Resources	Total
Exploration and production	822	–	822
Total	822	–	822

Source: National Infrastructure Program and ERD BBVA Bancomer.

On the other hand, modifications to secondary laws since 1995 have permitted a greater participation by the private sector in secondary petro-chemicals and in the transport and distribution of natural gas. In this context, the PNI addresses the following investment projects for the period of 2007-2012.

- To construct, with private resources, at least 800 kilometers of pipelines.

TABLE 2.15: National Infrastructure Program 2007-2012
Base scenario for investment in gas and petro-chemicals by financing source
 (Billions of pesos in 2007)

Sector	Public Resources	Private Resources	Total
Refining	305	-	305
Gas and basic petro-chemicals	46	-	46
Secondary petro-chemicals	28	-	28
Total	379	-	379

Source: National Infrastructure Program and ERD BBVA Bancomer.

2. Electric energy

Same as the case of petroleum, the Constitution considers electricity as falling under the sphere of State reserved activities. Nevertheless, since the Electric Energy Public Service Law was reformed in 1992, the supplementary participation of the private

2. The infrastructure gap in Latin America

sector is allowed in the industry. The modes by which the private sector may participate are the following:

- Generation of electric energy for auto supply, cogeneration or small-scale production;
- Generation of electrical energy performed by independent producers for sale to the Comisión Federal de Electricidad (Federal Electricity Commission).
- Generation of electrical energy for exportation, derived from cogeneration, independent production and small-scale production;
- Importation of electrical energy by individuals, exclusively for personal use purposes; and
- Generation of electrical energy for emergency use arising from interruptions in public electrical energy service.

In the electricity sector, the following infrastructure projects are addressed for the period of 2007-2012:

- Increase the actual generation output by 9 thousand megawatts.
- Make renewable sources represent 25 percent of the actual generation output.
- Place in operation more than 14 thousand kilometers-circuit of lines in different tension levels.
- Increase the national coverage of electrical service to reach 97.5% of the population.

TABLE 2.16: National Infrastructure Program 2007-2012
Base scenario for investment in electrical energy by financing source
 (Billions of pesos in 2007)

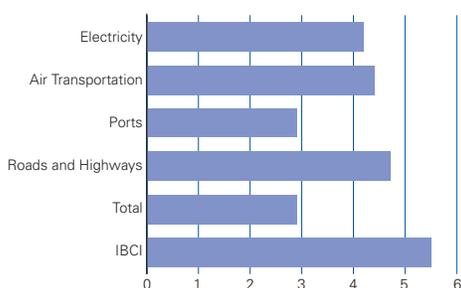
Sector	Public Resources	Private Resources	Total
Generation	161	-	161
Transmission	94	-	94
Distribution	81	-	81
Maintenance	41	-	41
Other sectors	3	-	3
Total	380	-	380

Source: National Infrastructure Program and ERD BBVA Bancomer.

2.5. The need for financing in Peru

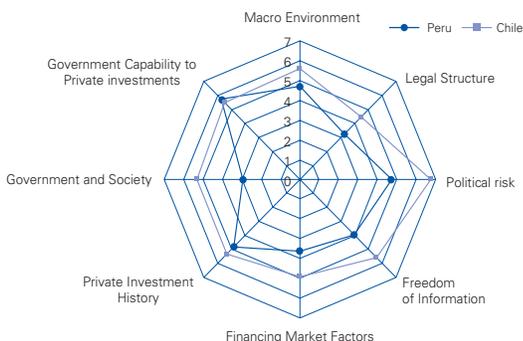
Peru, along with Colombia, is one of the countries with the largest infrastructure gap in Latin America, with an IBCI of 5.5. The sectors that have the highest need for infrastructure are the electricity, air transportation and port sectors.

GRÁFICO 2.15: Quality of infrastructure in Peru (0=Germany)



Source: Mía 2007

GRÁFICO 2.16: Investment attractiveness (IPIA) in Peru



Source: Mía 2007

With regards to the attractiveness of the country for foreign private investment, the Government's position towards private investment and the experiences observed in the past are well regarded. Specifically, Peru is preparing various investment funds with pension funds for infrastructure investment. Based on the rest of the parameters, Peru is a very attractive country for investment, surpassed only by Colombia, Brazil and Chile (see Chart 2.16).

The Instituto Peruano de Economía (IPE) (Peruvian Economic Institute) estimated in 2008¹⁸ that the infrastructure gap in Peru amounts to US\$ 37.76 billion.

It is necessary to point out that more than a third of said deficit corresponds to transportation (roads, ports, airports, railways), that is to say, US\$ 13,961 million¹⁹; the electric sector reaches US\$ 8,236 million, while sanitation amounts to US\$ 6,306 million, telecommunications US\$ 5,446 and natural gas US\$ 3,721 million.

This gap has been increasing over the years despite the increase in investment reported during the last decade, due to the growing needs of the country. In 2001, the infrastructure gap calculated by the IPE amounted to US\$ 18,896 million and for the year 2005 it reached US\$ 22,879 and, three years later, the gap reached US\$ 37,760, concentrated mainly in the sectors of transportation and energy. Nevertheless, it is important to men-

¹⁸ "El reto de la infraestructura al 2018", IPE.

¹⁹ A recent estimate indicates that private investment commitments in transportation infrastructure concessions reached US\$ 4,022.5 million in April of this year, of which 1,488 million have already been executed, and therefore with these levels of investment Peru is on its way to cover the elevated deficit it has in transportation infrastructure.

TABLE 2.17: 2008 investment gap
 (US\$ millions)

Sector	Gap
Transport	13,961
Airports	571
Ports	3,600
Railways	2,415
Road systems	7,375
Sanitation	6,306
Drinking water	2,667
Sewer services	2,101
Waste water treatment	1,538
Energy	8,326
Generation	5,183
Transmission	1,072
Coverage	2,071
Natural Gas	3,721
Telecommunications	5,446
Fixed telephony	1,344
Mobile Telephony	4,102
Total	37,760

Source: Peruvian Economic Institute (Instituto Peruano de Economía), 2009

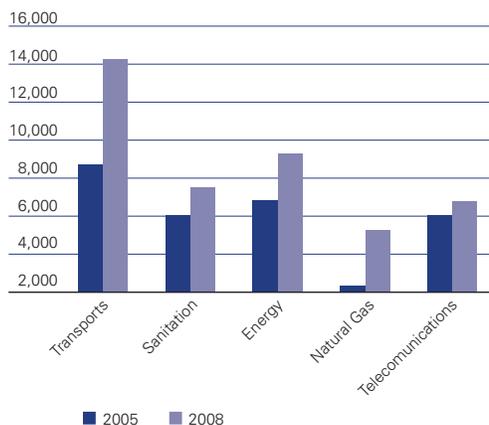
tion that the methodology used to calculate the gap has varied in the three studies performed by the IPE. Hence, the last report attempts to compare indicators of the level of infrastructure in Peru in 2008 to those corresponding to Chile at the same time, which is set as the goal to reach by the year 2018. This methodology is used in three sectors, applying indicators of drinking water and sewer service coverage, density of telephone lines and electricity. In the case of transportation, generation and transmission of electricity and gas supply, the methodology varies and is established by considering pending investments along with those needed by the sector, taking into account the commitments or estimates of investments that originate from concession contracts, from pre-investment and from private approved initiatives, as well as national, departmental and local road plans.

a) Transportation sector

In 2008, the estimated gap for this sector amounted to US\$ 13,961 and was calculated taking into account the estimated investment commitments from recently chartered projects and those that would be completed in the short and medium term.

The gap in this sector makes reference to four sub-sectors: roads, ports, airports and railways. A significant percentage of this gap corresponds to the lack of construction, maintenance and recovery of roads, which is most important as it is the principal means

CHART 2.17: Investment gap by sector, 2005-2008
(US\$ millions)



Source: Peruvian Economic Institute (Instituto Peruano de Economía, IPE), 2009

of transportation for goods as well as people in Peru. In this sense, it is important to mention that from the 2009 budget of the Ministerio de Transportes y Comunicaciones (MTC), (Transportation and Communication Ministry), which amounts to approximately US\$ 1 billion, a large percentage is allocated mainly to projects related to the maintenance and construction of roads and bridges.

Important investments have been made to improve the state of road systems in recent years, with projects that have permitted substantial improvements in the sector. The latest, and most important is the concession granted in June 2009 for the project called Autopista del Sol (highway), that comprises the construction, maintenance and operation of 475 kilometers of a highway in the north of Peru, which will connect the cities of Trujillo, Chiclayo and Sullana. This work will be performed over a period of four years and will begin in approximately January 2011 with an estimated investment of US\$ 365 million.

Although investments have been made, they have not been sufficient to close the significant gap that this sub-sector presents. This is proved by MTC figures, which point out that from the 86,965 kilometers of roads in the country, 80% are consolidated surface roads (69,549 kilometers), and only 16% are asphalt (13,683 kilometers), while the remaining 4% are back roads (3,734 kilometers). Additionally, a recent study by the Universidad del Pacifico points out that the current poor state of roads in the country increases three times the cost of cargo transportation, and this is without taking into consideration that there are many towns where access is impossible due to lack of roads. In recent years, an additional significant deterioration has been produced in paved roads, especially in the national and varied governmental road systems. Due to this, it would be desirable that scheduled investments permit the overcoming of this situation through rehabilitation, maintenance and improvements to road type.

2. The infrastructure gap in Latin America

Ports are also an important means of transportation that are in need of public as well as private investment. Approximately 75% of the country's commercial trade is produced by them, especially the port of Callao, one of the districts of Lima. This is the country's main port and one of the most important in South America, although it presents the greatest need of investment, especially investment providing more efficient cargo transportation.

Since 2005, two important investments have been made for improvement of ports:

1. In 2006, the Muelle Sur concession was executed for the Port Terminal of Callao to the Consorcio Terminal Internacional de Contenedores (International Container Terminal Consortium) of Callao, formed by *International Uniport S.A.* The main purpose of the concession is the construction of the container terminal, designated to be the main import and export point for the port of Callao. The investment commitment for the work is US\$ 218 million, US\$ 256 million for equipment and US\$ 114 million for additional supplementary investment, amounting to a total of US\$ 617 million. To date, large advancements have been made in the execution of the project, in line with the estimated commencement of operations of the new terminal which is set for the second trimester of 2010.
2. In April 2009, Proinversion awarded the concession for the Port Terminal of Paita (second largest in the country), to the Consorcio Terminales Portuarios Euroandinos/TPE (Euro-Andean Consortium of Port Terminals), in the framework of the policy for the modernization of ports and economic development that drives the government for the benefit of the population. US\$ 100.8 million will be invested.
3. Additionally, for the second semester of 2009, there is a plan to grant a concession to two river ports on the Peruvian Amazon (Yurimaguas and Pucallpa) and one maritime port (San Martín de Pisco), with an aggregate investment of more than US\$ 200 million for the three ports.

In the case of airports, these are the second largest means of commercial transportation to the exterior world and an important means of personal transportation. The vast majority of the largest Peruvian airports are managed by CORPAC²⁰, the exception being the country's largest airport, Aeropuerto Internacional Jorge Chávez, in Lima (AIJCH). In this sector, the estimated infrastructure gap in 2005 amounted to US\$ 80.1 million for those managed by CORPAC, while that of AIJCH was US\$ 62.9 million.

In an attempt to improve the quality and infrastructure of air transportation, an important process was launched to promote private investment in the sector, with the transfer in concession of the Aeropuerto Internacional Jorge Chávez (AIJCH) to the Consortium *Lima Airports Partners* in 2001. In this project, the investment amount was calculated at more than US\$ 1 billion.

With the intent to increase investments in this sector, in December 2006, a Concession Contract was signed for the first group of airports with the company *Aeropuertos del*

20 La Corporación Peruana de Aeropuertos y Aviación Comercial (The Peruvian Corporation of Airports and Commercial Aviation).

Peru S.A., which included the airports in the cities of Ancash, Cajamarca, Chachapoyas, Iquitos, Pucallpa, Talara, Tarapoto, Trujillo, Tumbes, Piura, Chiclayo and Pisco, with a total investment of US\$ 38.2 million.

A concession for a second group of provincial airports would be executed during the second half of the year, continuing with investments which began in 2006. The airports that will be included in this second set are: Andahuaylas, Arequipa, Ayacucho, Juliaca, Puerto Maldonado and Tacna. The aggregate approximate investment amount is US\$ 157 million, co-financed by the State and over a concession term of 25 years.

Finally, Peru has two railway lines to pay attention to. One is located in the center of the country and joins Lima-Huancayo-Huancavelica. The other is in the south and joins Arequipa with Juliaca, passing through Cusco. This means of cargo and passenger transportation is more efficient than road transportation, with clear advantages in terms of congestion, energy consumption and pollution, although its effects are not as significant as those means previously mentioned.

For the calculation of the investment gap for the railway system it has not been possible to find the specific information relating to the needs of this sector as there are no studies that include these details. Because of that, an evaluation report regarding the situation of the railway system published by the Asociación Latinamericana de Ferrocarriles (Latin American Railway Association), and the investment plans from the concessionaires themselves that are interested in achieving high quality standards were used as the basis. According to this the investment gap for railways is estimated to be between US\$ 17 to 19.8 million.

Projects currently exist in Congress that support the construction of a railway system that would join Madre de Dios and Puno to the existing network between Arequipa-Puno, which would create an additional track that would join the southern part of the country with Brazil. Likewise, the Government is promoting investment in the construction of a track that would join Piura, Cajamarca, Amazonas, San Martin, Pasco, Huanuco and Ucayali with Brazil. Lastly, construction is planned for the railway system in the middle south (proposed by the MTC) with a length of 1,480 km. The implementation of this project will be linked to the development of various mining projects, with an estimated investment of US\$ 1.2 billion.

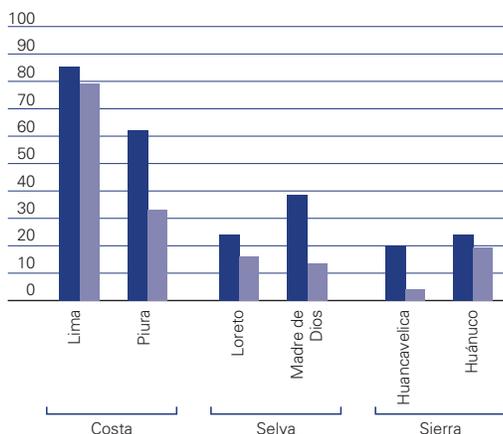
b) Sanitation

In recent years, this sector's situation has been maintained without major changes to the different indicators in coverage, quality, management efficiency and financing, leaving it in a very precarious state.

Differentiated by area, in the urban setting, there are more than 3.5 million people that cannot access drinking water, while in rural zones this number is more than 3 million. However, actual access is much more limited than suggested by the coverage numbers. Hence, in the urban area, almost a fourth of the population has water for less than twelve hours per day, while in rural communities the situation is even more precarious.

If the status of the sector is analyzed by department, it can be noted that coastal cities are best positioned with regard to access and coverage of services. We should cite Lima especially, where the coverage during 2007 was close to 90%, and it is expected to reach 100% in 2011. On the other hand, the rainforest and mountainous cities show a worrisome situation, with indicators that less than 50% of the population has access to drinking water and sanitation services.

CHART 2.18: Coverage indicators, 2007
 (% of population with access to the service)



Source: Instituto Nacional de Estadística e Informática/INEI (National Institute of Statistics and Informatics), 2007

In relation to the investment gap in sanitation, the coverage goals in the case of the urban sector continue to be at the levels presented by Chilean companies, leaving an investment gap of approximately US\$ 6,306 million. In terms of services offered to the population (water, sanitation and waste water treatment), the largest investment corresponds to drinking water services, which represents approximately 43% of the total (US\$ 2,667 million), while the sanitation portion represents 33% (US\$ 2,101 million) and waste water treatment represents more than 24% of the total gap (US\$ 1,538 million).

With respect to this, we can point out that future investments are forecast with the purpose of closing the gap identified for this sector. Hence, Sedapal plans to increase their investment plan to US\$ 300 million for 2010. In July, they plan to initiate the bidding process for work that will be performed in two projects, of which the investment will amount to US\$ 40 million to expand the water and sewer systems in Lima. As large investments are necessary in order to expand the current system, the objective of the company is to create 130 thousand new drinking water and sewer connections in 2010 and 2011 in metropolitan Lima. With these 130 thousand new connections, 100% coverage will be achieved in metropolitan Lima, an objective of the Agua para Todos (Water for Everyone) project that Sedapal is executing.

In total, Sedapal investment during 2009 will allow the installation of 70.000 new water and sewer connections, which, added to the 114 thousand connections installed with the Agua para Todos program, making a total of 180 thousand.

Furthermore, in February of this year, Proinversion awarded the concession of the Taboada Plant, which will treat approximately 60% of waste water in Lima. This new infrastructure, which will require an investment of approximately US\$ 250 million, will benefit around 4.5 million inhabitants in 27 districts in Lima.

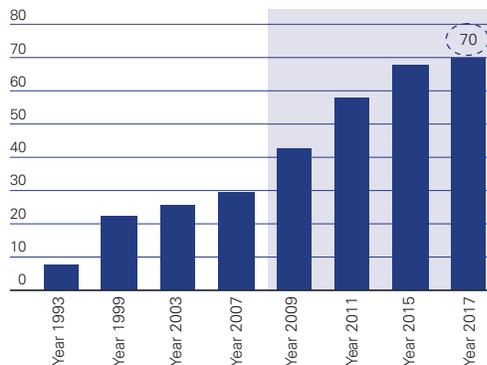
c) Electricity sector

In recent years, the demand for electricity has increased substantially, requiring greater investments to satisfy the needs. As with other countries, Peru could also enter into a crisis caused by an excess in demand that could surpass the potential supply of electricity. It is estimated that between 1999 and 2020, the electrical systems of many economies could enter into a phase of stress due to this imbalance, with Peru being one of the countries that could have major problems. In 2008, the demand for electricity increased by 10% and, according to estimates, this could continue to grow at a considerable rate in 2009 in spite of the effects of the international economic crisis.

The estimated deficit of infrastructure in the electricity sector includes three components: generation, transport and expansion of the coverage of access to service (distribution).

We can see that the main shortfalls in this sector are reported outside Lima. This is reflected in the low level of rural electrification in Peru, which in 2008 was placed at less than 40%. It is hoped, with the investments that are made in the sector, that in 2011 the coefficient will rise enough to place Peru in the top third of the countries in South American, with the execution of 757 different installations. The programs aimed at achieving greater access to electricity have invested more than US\$ 200 million and for 2010 an investment of US\$ 550 million is planned to handle 9,677 locations, where 2.23 million people reside. In the same way, it is hoped that in 2011 the electricity coefficient of Peru as a whole will rise from 78% to 92%.

CHART 2.19: Rural electricity coefficient (%)



Source: Dirección General de Electrificación (General Directorate of Electrification), 2008

2. The infrastructure gap in Latin America

Continuing with the important investments made in past years (US\$ 2,365 million in the last four years), the Ministerio de Energía y Minas (Energy and Mining Ministry) estimates that investments in electricity projects will add up to US\$ 898.3 million in 2009, US\$ 448.6 million of which will be concentrated in private generation projects.

TABLA 2.18: Energy sector investments, 2009
(US\$ million)

Electricity	Type of company	Investments
Generation	Public companies	83
	Private companies	448.6
Transmission	Public companies	–
	Private companies	89.6
Distribution	Public companies	135.1
	Private companies	141.9
Total		898.3

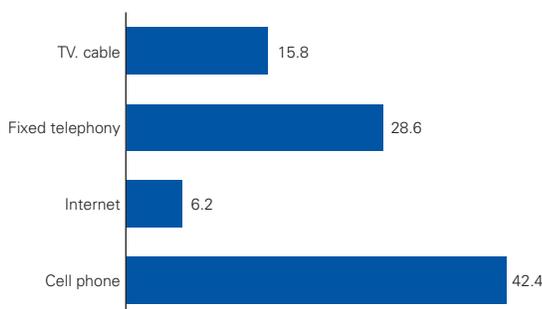
Source: Ministerio de Energía y Minas, 2009

d) Telecommunications sector

The behavior of this sector at national as well as international level, has been substantially modified in recent years, due to large technological advances and new tools of communication.

For the calculation of the gap in fixed telephone lines, we compared it to the density of fixed lines in Chile, which is equal to 20.8 lines every 100 inhabitants. With regard to mobile telephones, Chile does not have information regarding mobile density at the regional level. Therefore, a simulation was performed eliciting that a national density of 100 mobile lines per 100 inhabitants would be reached, a number projected in relation to the growth rate expected from GDP.

CHART 2.20: Telecommunication coverage indicators, 2007
(% of the population)



Source: Instituto Nacional de Estadística e Informática/INEI (National Institute of Statistics and Informatics), 2007

Having established penetration goals for both services analyzed, the investment gap for telecommunications, taking into account only the aspects of expanding fixed and mobile networks, will reach US\$ 5,446 million.

To reduce the infrastructure gap in this sector, (which increased by 18% between 2005 and 2008), the MTC indicates that the positive investment growth path will continue for this sector due to increased national and foreign private investment with a main goal that in 2011 the entire country will have some system of communication. With an investment of more than \$ 8 billion, between national and foreign capital, the category of telecommunications has achieved notable growth, generating thousands of jobs in Peru.

Additionally, it is important to mention that this sector includes a large percentage of the direct foreign investment stock received in recent years, especially by investments by the Spanish firm Telefónica arising from its participation in the process of privatization from the government during the 90's and past expansion investments, as well as investments from cellular phone operators during this decade. The development in this sector has been streamlined by the development of an aggressive concession program targeted at expanding telephone coverage in rural zones and promoting the entry of a fourth mobile telephone operator.

3. Infrastructure investment of pension funds in an international context

Javier Alonso, Ivonne Ordóñez & David Tuesta

3.1. Introduction

Infrastructure investments by the private sector have reached a high growth rate in recent decades. Multiple Public-Private Partnerships (PPPs) models have emerged as the key tool to this development.

Meanwhile, the fact that infrastructure investment projects are of a long term nature, and that there remains a good relationship between profitability/risk observed in many of them, has attracted the attention of pension fund administrators in many countries who have been increasing the weight of this type of investment in their portfolios.

However, not all the results have been successful. This type of project is highly complex and requires specialized multidisciplinary teams to afterwards study each project individually, which has made accurate evaluation difficult in some cases. At the same time, there can be numerous limitations in some countries that make pension fund participation difficult. Among other notable problems, there exists the lack of coverage in the face of specific and diverse risks for each project, bureaucratic and regulatory issues.

Conversely, in other countries, institutional changes have been made to favor infrastructure private financing, modifying regulation, offering diverse types of warranties and making the process of awarding of bids more transparent and effective.

In this chapter we will describe the model of private investment in countries outside of Latin America where a greater participation from the private sector has developed in recent years. Specifically, we will review the cases of Australia, the United Kingdom, Canada, the USA and Continental Europe.

3.2. The participation of pension funds in the financing of infrastructure in Australia

3.2.1. Public-private participation and infrastructure

The case of Australia is considered one of the most successful in the world with regards to participation of the private sector in the design, construction and improvement of infrastructure. This is due to the number of projects managed, the volume of capital invested and the numerous follow-up public studies employed to improve the system.

Since the early 80's, Australia has pushed public/private participation (PPP) in the construction and operation of infrastructure, especially in the State of Victoria. Between

1980 and 2005, under diverse forms of PPPs that have been evolving over time, the number of managed projects was 127, which reached a value of US\$ 26,823 million (AU\$ 35,669 million) (English, 2006).

The current definition of a PPP in Australia is that of a long term contract between the public sector and the private sector, where the Government pays a promoter to provide a service based on an infrastructure project in their name. These projects can be of the social type (schools, hospitals, jails) or economic type (roads, ports, airports, etc). (Australian Government, 2008). Some characteristics of PPPs are (see Table 3.1):

- The provision of service implies the design, construction, financing, maintenance and rendering of service by the private sector.
- The Government may contribute assets (land, other existing infrastructure, etc.), share risks and provide other support mechanisms.
- The private sector receives payments from the Government or from the users of the infrastructure once operating.
- The Government only begins to pay when the infrastructure is finished and operating.
- The most common method of concession is BOOT and DBFO for the economic type of infrastructure, and DBFM for the social type.

TABLE 3.1: Phases of a typical project selected and executed as a PPA

Traditional system	PPP
Type of concession: D&C (design and construct) and DCM (design, construct and maintenance)	Type of Concession: – Economic Infrastructures: BOOT (build, own, operate, transfer) and DBFO (design, build, finance, operate). – Social Infrastructures: DBFM (design, build, finance and maintenance)
The Government purchases the assets from the infrastructure	The Government purchases the services from the infrastructure
Short-term contracts (2-3 years) with the private sector for design and construction	Long-term contracts with the private sector for design, construction, financing and maintenance.
Specifications for the project based on INPUT	Specifications for the project based on OUTPUT
The Government assumes the risk from the life cycle of the infrastructure	The private sector assumes all risk from the life cycle of the infrastructure
The Government manages the infrastructure	It may or may not manage the infrastructure
The Government must finance the project from its commencement.	The Government must start paying only when service begins to be rendered.
The projects do not comply with established quality standards	The established quality standards must be complied with, as agreed payment depends on it

Source: Australian Government (2008)

a) Phases of concession for a PPP in Australia

One of the keys to the high level of success that PPPs have had is that good projects have been chosen for them. This implies that this model was only used when it was more advantageous for all parties, that is to say, it provided the best outcome in the cost/benefit analysis (*value for money*). A standard and rigorous mode of evaluation called *Public Sector Comparator* (PSC) is responsible for establishing these criteria.

The following are the functions of the PSC:

- Compare the project under public provision to that under private provision.
- Analyze the discounted *cash flow* of the project.
- Estimating costs.
- Estimate risk and the decision of how many and which should be assumed by the public and private sectors.
- Proposals to measures the control of risks (see Table 3.2).

The phases of a PPP project can be seen in Chart 3.1.

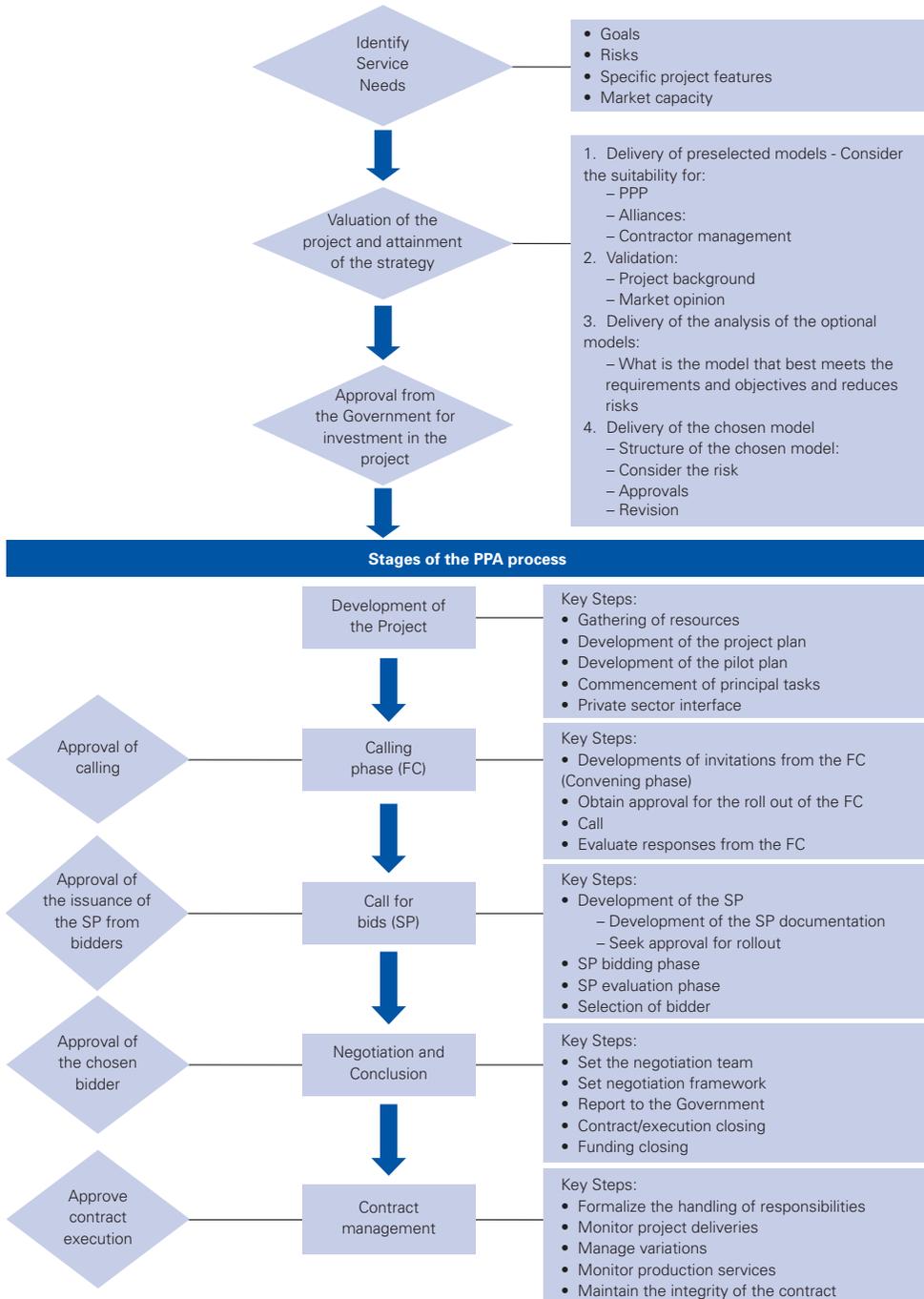
b) Securing risks

Another factor for the success of a PPP project is risk management. On the one hand, the part assumed by the private sector must be limited to the degree that makes investment commercially attractive. On the other hand, the public sector must transfer a part of the risk to the private sector so the PPP formula will look interesting to them. This difficult balance is optimized when the distribution of each type of risk is assumed by whoever is most capable of dealing with it between the public and private sectors. For example, the following distribution could be established:

However, given the differences in each infrastructure project, in Australia there is not one standard with regards to the formula and quantity for distributing risks between the public and private sectors. The PSC determines the quantity and the way in which to address the analysis, the results of which are the object of negotiation with the private sector. To sum up, we could classify PPPs in two large groups that face different risks (*English, 2006*):

- Social type infrastructures (schools, hospitals, etc.): In this group, the Government assumes demand risks, guarantees a minimum level of revenue and pays directly for the provision of services.
- Economic type infrastructures (roads, ports, airports, etc.): In this case, the private sector bears the demand risk and revenue comes directly from users through payment of a fee

CHART 3.1: Phases of a typical project selected and executed as a PPA



Source: National Public Private Partnership Guidelines December 2008

TABLE 3.2: Risk assignment proposal

Category	Risk	Possible assignment
Legislative	Change in law	Government
	Change in regulation	Government
Design, Construction.	Design and Construction	Private
Sponsor	Social Impact	Government
	Property	Government
	Policy	Government
	Legality	Government
	Process	Government
Property Asset	Property	Government
	Defect of supplier	Private
	Intellectual Property	Case by case
	Residual Value	Private
	Technological Obsolescence	Private
Market	Demand	Private
	Market	Private
Operational	Design	Private
	Maintenance	Private
	Operational	Private
	Change of organization	Private
	Performance	Private
	Public risk	Private
	Security	Private
	Update	Private
Site	Environment	Private
	Title	Government
	Project	Case by case
Financing	Finance	Case by case
	Investment	Private
Natural Disaster	Natural	Shared
Industrial Relations	Industrial Relations	Private
Taxes	Status Changes	Private

Source: *Department of Treasury Finance (2002)*

agreed upon in the contract. Theoretically, the design of the project should assure its own financial viability. Nonetheless, if that does not occur, the Government may revise the conditions of the contract in order to ensure a minimum profitability on the investment.

c) Results of PPPs in Australia

- The results of PPPs in Australia have been very good in most cases. In some recent evaluations in which the results of traditional projects (of public provision) were compared to those of PPPs, it was shown that:

- PPPs costs were 30.8% less than the traditional model for the entire project. At the same time, it is estimated that, in the operation of new infrastructure that may be executed in the next decade, the PPP would save contributors US\$ 4,686 million (AU\$ 6,000 million).
- PPP projects were executed 3.4% sooner than foreseen while traditional projects had a delay of 23.5%. The monetary repercussions of this improvement have not been valued.
- PPP projects represent a 9% saving in comparison to the *Public Sector Comparator (PSC)* model (Fitzgerald, 2004).

3.2.2. Instruments of infrastructure investment in Australia

In Australia, private infrastructure investment has continued on a pattern similar to the development of investment in the real estate market. Initially, investors preferred to invest their capital directly in infrastructure projects (direct investment). However, with the passage of time, the need arose to carry out a process of financial innovation that would permit the inclusion of pension funds based on their specific needs (larger volumes of investment, liquidity, terms and leverage), of which the availability of capital was increasing. In this way, during the first decade of 2000, instruments for investing were created that were more flexible and provided better access to the market.

In 2005, two means of investment were facilitated in this sector: companies and funds that could be listed on the stock market (*listed companies and funds*) and funds that were not quoted (*unlisted funds*).

The assignment of investments between listed and unlisted assets depends on the objectives and the preferences of the private investor.

a) Investment in listed funds and companies

Infrastructure investments through companies and funds listed on the Australian stock Exchange have increased in recent years. This has become more evident because of the significant infusion of capital that pension funds have injected into this sector. In contrast to the US\$ 3.6 million (AU\$ 5 million)²¹ in 1997, this market reached US\$ 20,266 million (AU\$ 27 million)²² in 2006. Thereafter, in just one year, the capitalization of these investments increased in listed companies and funds to US\$ 47,089 million (AU\$ 55 million)²³.

The main forces of these instruments arise from: 1) being highly liquid and transparent due to their listing in secondary markets; 2) allowing a high diversification between different types of infrastructure, making it easy to achieve a presence between different regions and sub sectors; and 3) the fact that the minimum investment required is lower²⁴, making it more accessible to minority investors. The principle investors of

21 Exchange rate 1.3594 AU\$ / US\$ 1997.

22 Exchange rate 1.3323 AU\$ / US\$ 2006.

23 Exchange rate 1.168 AU\$ / US\$ 2007.

24 The cost depends on the type of project (there is no minimum established).

these funds are companies like *Macquarie*, *AMP*, *Babcock & Brown*, *Colonial First State* and *James Fielding*. In Table 3.3 we review the characteristics of these funds and companies.

TABLE 3.3: Listed companies and funds

Features	Listed
Minimum Investment	Low
Cash flow	High
Volatility	High
Leverage	Low
Transparency	High
Effective management of assets	Low

Source: CFS Research

In 2006, there were 32 entities accounted for in Australia with investment in assets listed in 8 different sectors (16 are funds and 16 are infrastructure companies). They are divided into toll roads (5 entities), transportation and distribution (9 entities), integrated public service companies (3 entities), airports (2 entities), communication (1 entity), diversified public service companies (1 entity) and energy (11 entities). In 2007, more than 1,800 listed companies were reviewed in order to determine if they belonged to the infrastructure sector or not. In order to identify listed funds and companies, the ASX or UBS (created in 2005) index was used²⁵ and the characteristics taken into account were: year listed, type of infrastructure, total assets, number of assets in infrastructure and activities.

In order to boost participation of pension funds, the Australian market launched a product called *infrastructure securities funds*, which offers the opportunity to access a wide range of global equity stocks and other types of financial instruments (bonds, stocks, securities, and notes) related to infrastructure. These funds allow for a greater diversification of positions toward infrastructure bonds in countries that are still in an early phase of privatizing their infrastructure.

In general, this role is highly important to minority investors due to the fact that the management of funds allows a greater diversification and there are various investment portfolios from which to choose.

In Australia, investments made in infrastructure through listed funds and companies have been made for decades. The sectors involved are varied and include construction,

²⁵ For more index information see www.ubs.com

TABLE 3.4: Infrastructure investment (listed) August, 2006

Infrastructure	Year Listed	Type	Total Assets (million) ¹	No. Of Assests	Activities
Toll Roads (5 entities - US\$ 28,364 million / AU\$ 21,6 billion)					
Macquarie Group	1996	Fund	US\$9,449 /A\$12,404	12	Roads (Toll)
Transurban Group	1996	Company	US\$5,192 /A\$6,815	3	Roads (Toll)
Connecteast Group	2004	Company	US\$842 /A\$1,106	1	Roads (Toll)
Sydney Roads G,	2006	Fund	US\$619 /A\$814	3	Roads (Toll)
Transurban Cars T,	2003	Company	US\$333 /A\$437	1	Roads (Toll)
Transmission and Distribution (9 entities - US\$ 29,93 billion / AU\$ 22,8 billion)					
SP AUSNet	2005	Fund	US\$5,292 /A\$6,947	3	Gas D, ET y D ²
Diversified ,Energy & Utilyly Trust	2004	Fund	US\$4,367 /A\$5,732	4	Gas T and D, ED
Envestía Limited	1997	Company	US\$1,912 /A\$2,521	5	Gas T and D
Spark Infrastructure	2005	Fund	US\$1,824 /A\$2,395	3	ED
Alinta Infrastructure	2005	Fund	US\$1,752 /A\$2,300	9	Gas T, PS
Gas Net Australia Corp,	2001	Fund	US\$735 /A\$965	10	Gas T
Hasting Diversified Utilities Fund	2004	Fund	US\$615/A\$807	4	W, Gas T
Challenger Infrastructure Group	2005	Fund	US\$508 /A\$666	4	Gas T and D, Diffusion
Australian Pipeline Trust	2000	Company	US\$345 /A\$453	6	Gas T
Integrated Public Sector Companies (3 entities - US\$ 19,297 million / AU\$ 14,7 billion)					
Origin Energy Limited	1961	Company	US\$6,106/A\$8,015	10	Exp and Development
Alinta Limited	2000	Company	US\$2,634/A\$3,458	NA	Gas D, ER
Australian Gas Light Co.	1871	Company	US\$2,489/A\$3,268	2	Gas T and D, ED, ER
Airports (2 entities - US\$ 13,652 million / AU\$ 10,4 billion)					
Macquarie Airports	2002	Fund	US\$7,273/A\$9,548	6	Airport
Australian Inf. Fund	1997	Fund	US\$645/A\$847	10	Air, Port, CP
Communications (1 entity - US\$ 6,038 million / AU\$ 4,600 million)					
Macquarie Communications Inf.G.	2002	Fund	US\$3,484/A\$4,573	2	Broadcasting
Diversified Public Sector Companies (1 entity - US\$ 3,938 million / AU\$ 3 billion)					
Babcock and Brown Inf.	2002	Fund	US\$1,981/A\$3,015	6	Gas & Electr. T and D, Train, EG, Coal term.
Generation Companies (11 entities - US\$ 3,413 million /AU\$ 2,6 billion)					
Babcock & Brown Wind	2005	Fund	US\$842/A\$1,105	14	PG (wind farms)
Energy Develop. Lim.	1993	Company	US\$512/A\$672	62	PG
Viridis Clean Energy G.	2005	Fund	US\$396/A\$520	6	CE (wind, gas, hydro)
Energy World Corp.	1988	Company	US\$80/A\$105	9	Gen. Power and gas
Geodynamics Limited	2002	Company	US\$56/A\$74	2	Geothermal Energy
Australian Renewable Fuels Limited	2005	Company	US\$47/A\$62	2	Gen. Biodiesen fuel
Babcock & Brown Environmental Invest. Lim.	1998	Fund	US\$36/A\$47	3	Renewable Energy
Australian Biodiesel G.	2005	Company	US\$18/A\$24	2	Gen. Biodiesel fuel
Pacific Energy Limited	1987	Company	US\$10/A\$13	4	Mining projects (operation and development)
Green Pacific Energy Lim.	1971	Company	US\$9/A\$12	5	Green Waste
Enviromission Limited	2001	Company	US\$6/A\$8	1	Solar Tower

¹ Exchange rate: 1.3127 AU\$ / US\$ August 2006

² D-Distribution, ET-Transmission of Electricity, T-Transmission, ED-Distribution of Electricity, W-Water, PS-Generation Plant

Source: Peng and Graeme Newell 2007

energy, integrated and diversified public service sector companies, communications, electricity generation, transmission and distribution companies, etc. For example: the company Australian Gas Light has a total of US\$ 2,488 million in assets (AU\$ 3,268 million) in the public sector of gas, transmission and distribution of electricity. Notwithstanding, together with two other companies; Origin Energy Limited with US\$ 6,106 million (AU\$ 8,015 million) and Alinta Limited with US\$ 2,634 million (AU\$ 3,458 million) in assets, constitute integrated public sector companies in the arena of exploration and energy development assets totaling US\$ 11,198 million (AU\$ 14,700 million). The sectors that stand out in this type of investment are construction and toll roads and transmission and distribution, with assets totaling US\$ 16,449 million (AU\$ 21,600 million) and US\$ 17,369 million (AU\$ 22,800 million), respectively. The Table 3.4 presents the investments made in infrastructure through listed funds and companies by companies in distinct sectors.

b) Unlisted funds

The value of unlisted fund assets is established through diverse indirect valuation methods that fluctuate less than stocks listed on the securities exchanges. The principle agents, which acquire greater presence in infrastructure through these unlisted funds, are large institutional investors and *Superannuation funds*. The administrators of the largest funds are *AMP Capital*, *ANZ Infrastructure Service*, *Industry Funds Management* and *James Fielding*²⁶. In Table 3.5 the characteristics of these funds are presented.

TABLE 3.5: Unlisted funds

Features	Unlisted
Minimum Investment	High
Cash flow	Low
Volatility	Low
Leverage	High
Transparency	Low
Effective management of assets	High

Source: CFS Research

Unlisted investment funds have experienced significant growth in recent years. At the end of 2005, 19 entities were accounted for in the sector, with capital of US\$ 3,378 million (AU\$ 4,500 million²⁷) invested in 144 stocks of economic (airports, toll roads, trains, energy, etc.) and social (health, correctional, parking, universities, etc.) infrastructure.

²⁶ Mercer 2005.

²⁷ Exchange rate 1.3323 AU\$/US\$ 2006.

TABLE 3.6: Investment in unlisted infrastructure as of december 2005

Infrastructure Funds Unlisted	Administrator	Year Established	Total Assets (million) ¹	No. Of Assets	Activities
Australia Inf. Fund	Industry Funds Management	1995	US\$1,418 /A\$1,893	15	Social Infrastructure
Utilities Trust of Aus.	Hastings	1994	US\$559 /A\$746	16	Air, Ports, Roads, Train
Infrastructure Equity F.	AMP Capital	1995	US\$303 /A\$404	9	Airport, Roads, ET and D, Gas D, W, Schools, Health
Internacional Inf.	Industry Funds Management	2004	US\$255 /A\$340	2	Social Infrastructure
Global Inf. Fund II	Macquarie	2000	US\$150/A\$200	5	Retrieval, ports, W, GD, Diffusion, Airports
Social Infrastructure	Ind. Funds Manag.	2003	US\$112/A\$149	3	Social Infrastructure (PPS)
The Inf. Fund	Hastings	2000	US\$107/A\$143	7	Airport, energy transportation, highways & recycling plants
Aus. Social Inf.Fund	Ceramic	2001	US\$77 /A\$102	57	Childcare
Energy Inf.Trust	ANZ Inf.	2003	US\$71 /A\$95	5	Gas, PS, biodiesel plant, coal, gas
The Inf. Fund of India	AMP Capital	2004	US\$53 /A\$70	2	Everything
CBI Fund	Ceramic	2001	US\$46 /A\$62	11	Police station, court
Strategic Inf. Trust of Europe	AMP Capital	2005	US\$44/A\$58	1	GD, UK secondary PFI
Aus. Sustainable Investment Fund	James Fielding	2004	US\$39 /A\$52	1	Forest, minerals, energy renewable
India Inf. Fund	AMP Capital	1999	US\$37 /A\$50	4	Everything
Diversified Inf. Fund	Perpetual	2004	US\$27/A\$36	2	Airport, train, tunnel
Inf. Yield Fund	James Fielding	2004	US\$24/A\$32	2	Airport, parking lot
Wholesale Inf. Inc. F.	Colonial First St	2003	US\$15/A\$20	2	All avenues to PPP
Diversified Inf. Fund	ANZ Inf.	2005	0	0	Everything
Inf. Growth Fund	James Fielding	2005	0	0	Socially economical & sustainable
	Total		US\$3,335/A\$4,451	144	

1 Exchange rate: 1.3348 AU\$ / US\$ December 2005

2 -Distribution, ET-Transmission of Electricity, T-Transmission, ED-Distribution of Electricity, W-Water, PS-Gen. Plant

Source: Peng and Graeme Newell 2007

To identify the funds that belong this sector, they were classified by type of administrator, the year established, the number of shares and the percentage of those shares that belonged to the infrastructure sector. In order to value the benefits from the development and diversification of this type of investment, the average-weighted index is calculated, constructed using five large unlisted investment funds²⁸. These funds are *Hastings Utilities Trust of Australia* (December 1994), *the AMP Diversified Infrastructure Equity Fund* (September 1995), *the CFS Infrastructure Income Fund* (October 2003), *the Perpetual Diversified Infrastructure Fund* (January 2005) and *Hastings the Infrastructure Fund* (October 2000). In the Table 3.6 all investments made by these and other funds were reviewed.

On the other hand, another product exists in the Australian market: *unlisted wholesale funds*. In general, these are balanced funds that also include assets from other sectors

²⁸ The series are found in Mercer 2005 with the same period used for the indexes used in listed investment.

3. Infrastructure investment of pension funds in an international context

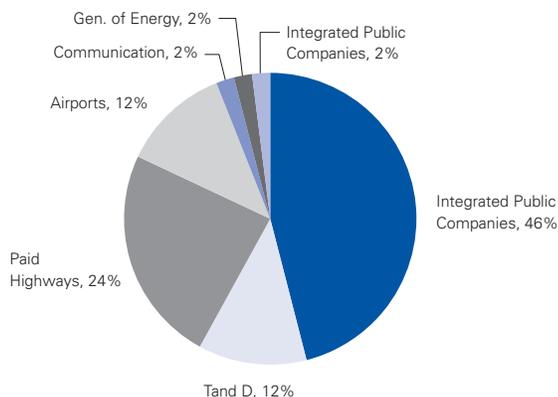
beyond infrastructures. These especially attract the interest of pension funds and other institutional investors, due to the fact that they are especially well diversified long term investments and do not require a great capital contribution. In this type of investment, investors can divide their cost of participation on each project from a standpoint of diversifying their position, with the result being that they obtain a greater degree of diversification and a greater profitability in the long term.

c) Risk-return profile among listed investments

One of the great advantages of infrastructure is that it offers a wide range of investment products (individual, collective, portfolio diversification, investment in different sectors, health funds, majority funds, etc.) to satisfy the different levels of risk tolerance among investors. The factors that influence the risk-return profile of these products can vary among the national, regional and international markets based on levels of leverage and degree of development. The infrastructure market in Australia (one of the most mature globally) offers a wide range of public information about the return on listed investments. In addition, it offers a division of products between those *‘core’* ones (mature products that offer a lower risk and low return) and those *‘opportunistic’* ones (those with a presence in developed and emerging markets whose risk-return profile looks like that of stocks). Some investments in these funds have been taken from stock in the Australian stock market. As of June 30, 2006, 20 infrastructure funds were reported as available, with a combined capitalization of US\$ 26,310 millions (AU\$ 35,500 millions)²⁹.

Chart 3.2 underlines the diversity of sectors present in the Australian index of listed investments, based on capitalization from August 2008. It can be seen that investments in integrated public service companies and toll roads are the ones that hold a greater

CHART 3.2: Listed infrastructure and public sector companies in australia
(market capitalization by sector, August 2008)



T y D - Transmisiones y Distribución - empresas integradas verticalmente
Source: UBS y CFS Research

²⁹ Exchange Rate: 1.3506 AU\$/US\$. June of 2006.

percentage of capitalization and are the ones that offer a lower risk on funds that are invested in these projects.

3.2.3. Pension funds in Australia and their participation in infrastructure

a) A brief historical reference

The Australian pension system is one of the oldest and most consolidated in the world. In the 70's, the country had three well differentiated pension plans:

1. The public system for civil servants.
2. Private employment plans for employees.
3. Pension plans operated by financial institutions available for self-employed workers.

In the 80's, with the purpose of expanding the system, making it more efficient and obtaining greater provisions, a process was implemented to introduce an obligatory contribution agreement for employees' support by the State, associations and unions. In 1984, with the participation of the *Australian Council of Trade Unions (ACTU)* it was decided to expand the provisions for retirement (through a salary agreement) to a pension fund developed for the industry, known as *superannuation funds* or *industry funds*.

In 1986, the development of these funds was enhanced as part of the wage negotiation process. It was agreed that the employer would make *superannuation* contributions to funds approved by the company committees, which would reach 3% of the base salary of the employees.

In 1992, the Federal Government introduced the '*superannuation warrant*'³⁰ which legislated that all employers must make contributions to the fund of their employees, increasing the contribution percentage until it reached 9% of the 2003 salary. However, employers could make additional voluntary contributions under the *superannuation warrant* to other funds that were generally industrial funds. Given that the fiscal incentives of the income deposited in the *superannuation* funds were substantial, the obligatory and voluntary fund contributions were raised and administered in important ways.

In 2008, these pension funds reached the fourth place on the global level in terms of managed funds (Brown and Davis 2009). This system has proven to be very relevant to the investment of pension funds in infrastructure³¹. There are currently five types of *superannuation* funds:

1. *Retail funds*, which offer *superannuation* investments to the general public (including employers that do not wish to establish an occupational fund).
2. *Industry funds*, which propose investment plans to a particular segment of the industry (like construction or sanitation) and generally are associated with unions who negotiate the contribution of employers.

30 For more information about the guarantee visit www.apra.gov.au

31 Nielson, L. (2005) Superannuation investment in Infrastructure.

3. Infrastructure investment of pension funds in an international context

3. *Corporate funds*, which are set up individually by the employer for their employees.
4. *Public sector funds*, directed by the National and State Government for their employees.
5. *Superannuation self-managed funds*, which currently have a reduced number of members.

The funds with obligatory frameworks have reduced the participation schedules of defined benefit systems, while simultaneously expanding those of defined contribution.

b) Reasons that have made infrastructure investment by superannuation funds favorable³² and those that continue to make it unfavorable

The spectacular increase in the participation of Superannuation funds in the financing of infrastructure results from a series of factors that have made the election of this type of shares favorable:

- Consistent yield; infrastructure projects tend to provide a flow of secure and consistent dividends.
- Good fiscal incentives over dividends through the exemption or deferral of tax payments.
- Direct investment in infrastructure is free from the adverse development of other listed shares in the stock market, reducing the volatility of portfolios.
- Long term maturity; infrastructure shares produce returns over a long period of time. This fits in with *superannuation* funds because the commitments for payment of services are over the same time period.

Nevertheless, there are other factors that cause *superannuation* funds not to be invested in infrastructure to the extent that they could be.

- Restriction of liquidity; if the asset is not listed in the stock market, it may have difficulties in finding buyers in case of the need to dispose of positions.
- Difficulty to value projects; in some cases it is difficult to determine the current value of an infrastructure project. The validations are usually made based on the billing or the output of a similar share in the same market (this is always difficult if there are no similar shares or if no applicable statistical information exists).
- Initial investment usually requires large quantities of capital, which means that only large funds can be invested in infrastructure projects that are not listed in the stock market.

32 Idem.

- Unequal offer of the quality of infrastructure shares. A number of projects do not develop as expected.

d) How are superannuation funds invested in infrastructure?

Superannuation funds can be invested in infrastructure in four ways:

- Through the *acquisition* of debt coming from the infrastructure operators;
- Through *unlisted* investment institutions;
- Through *listed* infrastructure funds and companies; or
- Through associations with other companies to be co-owners and jointly operate the investment (*project finance*).

Australian funds were the first to be involved in infrastructure during the 90's, forming part of the process of share privatization that the State kept open in different sectors, mainly energy, transportation, construction and communications. The process involved the participation of financial experts in the structuring of portfolios that were appropriate to the long term objectives of pension companies³³.

At the end of 1989, the State proposed the building and financing of a 10km toll highway to the west of Sydney to the private sector. The (20-year) concession for financing, constructing, operating and maintaining this roadway was granted to *Statewide Roads Limited*. In 1994, *the Officers Superannuation Fund*, managed by the CFS Group³⁴ invested for the first time in an infrastructure project (*M4 Motorway*), representing *the Australian Superannuation Fund (ASF)* pension fund. This group administered the shares of the ASF fund. In 1992, the 22km M5 toll highway to the southwest of Sydney was opened and continues to operate with a concession period of 30 years, that will expire in 2023 (between 1995 and 1998 the shares of the M5 Motorway were purchased by institutional infrastructure investors).

In the case of the electrical sector, in 1992³⁵ the Government of Victoria commenced to implant a series of reforms that would drive the separation of the value chain in three areas of business (transportation, distribution and generation). The reform was carried out between 1994 and 1997, with an approximate cost of US\$ 15,292 million (AU\$ 22,500 million³⁶). In 1996, the CFS Group participated as the principal investor in the electrical generation plant *Victoria Hazzlwood* when it was privatized.

Another interesting case involves the airport industry. In 1994 the Federal Government announced plans to privatize the 22 airports that were operated by Federal airport corpo-

33 For example, the Financial Groups Macquarie and Colonial First State (CFS) have participated in the negotiation of toll highway projects, airport concessions, constructions of seaports, with the capital of some pension funds.

34 Infrastructure research paper by Colonial First State 2006.

35 Investing in infrastructure-the Australian experience by Colonial First State 2006.

36 Exchange Rate: 1.4691 AU\$ / US\$ year 2003.

rations. The process was developed between 1997 and 2003, with a cost of US\$ 5,780 million (AU\$ 8.5 million³⁷). The majority of airports were sold to private entities under the condition that they would be operated under a performance contract for 50 years, with the option to extend it for 49 more. Some small airports were sold in their entirety (including the ground). The CFS group was the principal shareholder of the airports in *Brisbane* and *Adelaide* when they were privatized in 1997 and 1998, respectively.

In 2002 the investment in infrastructure through *superannuation* funds made up approximately 2% of total funding, with US\$ 4,448 million³⁸(AU\$ 8 million). By 2012 it is expected that the investment will rise to US\$ 51,673 million³⁹ (AU\$ 65,000 million), which will represent 5% of the total *superannuation* fund (US\$ 667,907 million - AU\$ 900 million).

The investment in infrastructure has provided a long term life cycle for the assets demanded by *superannuation*⁴⁰ funds. Plus, the reduction in infrastructure expenditure by the Government (that has gone from over 14% in 1970 to 5% in 2005) makes it favorable to increase the participation of *superannuation* funds in infrastructure investment, replacing the State as the primary institutional investor.

TABLE 3.7: Infrastructure investment from Australian pension funds

Companies - Funds	% of the portfolio	Infrastructure assets (millions)*
MTAA Super Fund	18%	US\$610 (A\$820)
WESTSCHEME	12%	US\$126 (A\$170)
STAsuper	8%	US\$417 (A\$560)
UniSuper	6%	US\$706 (A\$950)
HOSTPLUS	4%	US\$89 (A\$120)

* Exchange rate: 1.3448 AU\$/US\$ year 2005
 Source: Peng and Graeme 2007

3.3. The participation of pension funds in the financing of infrastructure in the United Kingdom

3.3.1. PPPs in the United Kingdom

The mechanism for evaluating projects in the UK is very similar to Australian's. The first successful examples in the application of PPPs were carried out in the transportation sector. For example, the *Dartford* Bridge (signed in 1987 and opened in 1991) crosses the River Thames, alleviating highway congestion on M25 Motorway near London. This project was done with private investment under the DBFO (design, building, financing and operation)

37 Idem.

38 Exchange Rate 1.7986 AU\$ / US\$ year 2002.

39 Exchange Rate 1.2579 AU\$ / US\$ July, 2009.

40 Nielson, 2005.

model. Another groundbreaking project was the construction of the *Severn Bridge* (signed in 1990) between England and Wales which implemented a DBFO concession.

Due to the success of the previous projects, in 1992 the British Government announced the creation of the *Private Finance Initiative (PFI)*. The first wave of projects began in 1994, involving the construction sector participating in the design, building and operation of new roads.

In 1997, the PFI model was restructured and a more complete program was developed, at which point the term PPP came into use. The PFI projects carried out between 1987 and 2005 are cited in the Table 3.8.

TABLE 3.8: PFI projects, 1987-2005

Year of Contract	No.	Value (US\$ million)	US\$ 100 million
1987	1	294	Dartford River Crossing
1990	2	597	Second Severn Crossing
1992	5	911	M6 Toll Highway (construction did not start until 2002)
1995	11	1,053	London Subway (North Line) the Birmingham Subway
1996	38	2,651	A1-M; A1-M1 Roads; Docklands Light Railway, Croydon Tralink, Road Services in Northern Ireland
1997	59	4,051	Manchester Metrolink ; King's College Hospital; Defense Ministry; Armed Forces Agency.
1998	86	4,587	London and Taquillas Subway; Hospital in Norwich, Bromley, Lanarkshire and Edinburg, Employment Department, Inland Revenue Office, A55 Highway.
1999	87	4,106	Guilford, Metro de Londres red de radio, Hospital en Swindon y South Tees, Desperdicios de Aguas en Almond Valley.
2000	105	5,897	A13 Thames Gateway, Nottingham Light rail, Hospital del Univerity College, Escuelas en Glasgow, Edificio del Ministerio de Defensa, Edificio del Tesoro.
2001	86	3,221	Hospital de Dudley; Inland Revenue/Customs & Excise Offices
2002	71	11,595	Desperdicios de East London; Metro de Londres (líneas Jubilee, Northern y Piccadilly); Hospital de Coventry; Home Office offices; Ministerio de Defensa.
2003	57	24,282	Customs & Excise IT; East Sussex waste; Metro de Londres (líneas de Bakerloo, Central & Victoria) & líneas de sub-surface; Al Darrington-Disforth, Docklands Light Railway; Extensión del aeropuerto de la City; Hospitales en Blackburn, South Derbyshire y Oxford; Escuelas primarias del Norte de Irlanda; Ministerio de Defensa agua y desperdicios de agua; Satélites Skynet.
2004	74	136	Ministerio de Defensa agua y desperdicios de agua (2da. Fase); Mantenimiento del highway Portsmouth; Hospitales in Barking, Leeds y Manchester; Armada de Colchester
2005	51	93	Servicio de Telecomunicaciones en carreteras nacionales, Docklands Light Railway- Externsión de Woolwich; Escuelas en Nottingham, Northampton, NorthLanarkshire y Renfrewshire; Hospitales en Newcastle, Nottinghamshire y Portsmouth; Hospital de Oxford Radcliffe-centro de cáncer; Casas públicas en Leeds; Ministerio de Defensa "C" vehículos.
TOTAL	720	95,046	

Source: Public-Private Partnerships E. R. Yescombe

3. Infrastructure investment of pension funds in an international context

The PFIs / PPPs, as they are commonly called in the United Kingdom, are increasingly involved in the development of infrastructure, particularly in the sectors of transportation, health, education, housing, defense, telecommunications (IT), and the management of urban waste, water and sanitation.

Other data coming from the *IFSL Research 2008* shows that between 1990 and 2007 more than 900 projects were signed under the PPP model at a value of US\$ 106.029 million (£53 million)⁴¹.

TABLE 3.9: Governmental departments in the United Kingdom with PFI/PPP. (Annual value of contracts, US\$ million)

Departments	2003	2004	2005	2006	2007	2008
,Armed Forces	1,510	1,648	1,189	4,918	2,001	6,584
Education	609	835	1,361	2,750	3,029	3,227
Healthcare	1,089	4,813	1,814	5,536	3,413	1,040
ODPM	802	114	738	776	1,140	900
Scottish Gov.	341	317	685	1,845	2,213	790
Northern Ireland	171	110	33	717	764	250
DEFRA	237	64	---	774	350	196
Home Office	225	136	69	---	92	28
Transportation	573	1,346	1,856	276	1,454	---

Source: IFSL Research febrero 2009, ODPM: Office of the Deputy Prime Minister; DEFRA: Department for Enviroment, Food and Rural Af-faire; Home Office: Immigration Department.

According to IFSL Research, the largest participants in PFI projects in 2008 were the armed forces, education and healthcare (see Table 3.9). These have been the most prominent departments during the five years since 2004, with contracts that add up to around US\$ 15 billion (£8 billion) between defense and healthcare and close to US\$ 11 billion (£6 billion) in education.

3.3.2. The participation of pension funds in infrastructure

In the **United Kingdom** there are approximately 50⁴² public and private funds currently investing in infrastructure. Some of the largest public pension funds are:

1. *The London Pensions Fund Authority (LPFA)*. This fund can be characterized by having 15% of its portfolio allocated to infrastructure investments. It utilizes various instruments, like direct investments and unlisted funds, and it also has positions in listed funds.

41 Exchange rate used (mid-year 2007) 0.5 £ / US\$

42 For more information refer to www.preqin.com.

2. *Universities Superannuation Scheme (USS)* is the second largest fund. USS is a frequent investor in infrastructure shares through its *pool* of private capital. 90% of its capital is placed in unlisted funds while the rest is directed to direct investments. USS does not invest in listed funds, because they prefer to contract with experienced managers that are capable of managing the volatility of the market. This fund has gained presence in the sectors of renewable energy, transportation and industrial recycling as well as urban waste management, in addition to having PPP/PFI projects with *Henderson PFI*. USS admitted in the second trimestre of 2009 that it will continue its infrastructure investments and, in the long term, plans to invest between US\$ 822 million (£500 million) and US\$ 1.645 million (£1 million)⁴³ in infrastructure in a maximum of four infrastructure funds.
3. *Greater Manchester Pension Fund (GMPF)* is the largest domestic pension fund in the United Kingdom, made up of 10 localities in Manchester and around 200 associated organizations. Its capital is currently more than US\$ 14,802 million (£9 million)⁴⁴. The GMPF invests in infrastructure shares through new underwriting initiatives (NIA⁴⁵). These new initiatives were established in 2001 and are focused on investment opportunities through PFI/PPP and different infrastructure instruments. NIA's have an objective of underwriting from US\$ 99 million (£60 million) for infrastructure funds, US\$ 49 million (£30 million) in contracts with primary funds and another US\$ 49 million (£30million)⁴⁶ for investing in the secondary market.

3.4. The participation of pension funds in the financing of infrastructure in Canada

3.4.1. PPPs in Canada

It is difficult to talk about PPPs in Canada in general way. As is the case in Australia, infrastructure competencies are relegated to each province, and in some cases, vested at the municipal level. In this way, there are diverse legislation and models within the country. The region that has most clearly wagered on PPPs has been British Columbia, while the province of Quebec is making great progress toward adapting regulation and attracting new investments. The region of Ontario, however, is in a special situation. Some recent experiences in PPPs (controversial from a political point of view) have brought about a definitional modification which has resulted in a newly inaugurated term, *Alternative Financing and Procurement Strategies (PFA)*, in order to become more acceptable to the general public.

In general, the different regions try to adapt their legislation to make it as close as possible to looking like the *best practice* models of Britain and Australia.

Canada has been carrying a heavy infrastructure deficit since the 70's and 80's due to the fiscal consolidations carried out during that era. In 2002, some estimates of need,

43 Exchange rate used for (mid-year 2009) 1.64 £ / US\$.

44 Idem.

45 New Initiatives Allocation.

46 Exchange rate used for (mid-year 2009) 1.64 £ / US\$ three investments of GMPF.

according to the Canadian Federation of Municipalities, reached US\$ 54 billion (C\$ 57 billion), while in 2007 they stated it would reach US\$ 104.225 billion (C\$ 110 billion). This deficit comes from the need for new infrastructure as well as from a lack of maintenance on existing infrastructure (ICEX, 2005).

Investments that were declared by the Federal Government as priorities are in the areas of border crossings, sustainable urban development, access to and quality of water, infrastructure in the northern zone, transportation and communications.

PPPs are a relatively recent phenomenon in Canada; the first projects are dated to the second half of the 90's. This country shows an idiosyncrasy that is somewhat special for the region, where the presence of public services (education, healthcare, etc.) is funded by taxes whose access is universal. This element differentiates it from its southern neighbor, imposing a certain preference regarding the public provision of vital services, and as such, the breakthrough of the private sector in the provision of these services is seen by the population with a certain degree of skepticism. Nonetheless, budget restrictions in the provinces obligate them to look for ways in which to collaborate with PPPs. The result of these circumstances is that the PPPs in Canada receive mixed reviews regarding their desirability, especially from political and social points of view. The most emblematic case is that of Highway 407 in Ontario, where the conservative Government granted a concession to a highway road from Toronto to a group of national and international investors for a period of 99 years. In the signed contract, a clause stated that if traffic surpassed a certain volume, the licensee company could increase its fees for the use of the highway. The company exercised this right in 2004, which was very unpopular among its users. This was used by the opposition as a way of gaining a political advantage by proposing a decrease in the fees (an issue that was not provided for in the contract). The liberal Government filed a claim against the concessionaire (which as of today they have lost) and the proceedings are being carried on in the judicial sphere. This event has generated legal insecurity in PPP investments in Canada, and it poses (surprisingly) the possible need to utilize regulatory risk mitigation tools for investments, which were themselves developed in Canada (ICEX, 2005).

3.4.2. The participation of pension funds in infrastructure in Canada

In Canada, between public and private pension, there are more than 15 funds⁴⁷ currently investing in infrastructure. According to the *Pension Investment Association of Canada*⁴⁸ (PIAC), aggregate assets invested in infrastructure amounted to US\$ 27.733 billion (C\$ 29.27 billion), which represents 3.67% of total managed assets.

The principal public funds are:

1. *Ontario Teachers' Pension Plan (OTPP)*; one of the largest public pension funds to have invested in infrastructure since 2001, mainly through direct investments in infrastructure companies and projects. Over the years, this fund has gained experience in investing directly in diverse projects without the need to appeal to an intermediary.

⁴⁷ For more information consult www.preqin.com.

⁴⁸ <http://www.piacweb.org/publications/index.html>.

In this way, unlisted funds represent a limited part of their infrastructure portfolios and an expansion of this type of investment is unlikely in the coming years. Listed funds also have a limited presence, represented through its investment in *Macquarie Airports*. Overall, the pension plan has an 8% allocation in infrastructure. A 45% global limitation exists for investments that are susceptible to inflation, which include infrastructure, real estate and commodities. The fund has invested US\$ 71.677 million in infrastructure assets, to be divided 32% in energy projects, 18% in water installations, 18% in toll roadways, 17% in airports and 15% in ports. In 2009 the fund plans to make more direct investments in infrastructure.

2. *Ontario Municipal Retirement System (OMERS)* was created in 1962 for employees of the Government of Ontario. In the 1st quarter of 2009, investment in infrastructure assets represented between 15% and 16% of its portfolio between direct investments and investments in equities of companies in this sector. They currently plan to increase their participation to between 31% and 35%. Historically, OMERS had invested in infrastructure only through *Borealis*, but in the last trimester of 2008 the fund launched a new branch of investment that will invest in private companies involved in the development of real assets like airports and energy. *OMERS Strategic Investments* will help to diversify the funds' portfolio and will include its own private capital, as well as infrastructure investment from the division of *Borealis Infrastructure*.
3. *Canadian Pension Plans (CPP)* began investing in infrastructure in 2005 and since then has developed a portfolio of direct investments and commitments to unlisted funds. By the end of 2010, they plan to have 6.5% of their portfolio allocated to infrastructure, and to increase this percentage by 2.2 percentage points during the year.

3.5. The participation of pension funds in the financing of infrastructure in the USA

3.5.1. Public-private participation and infrastructure.

The PPP model in the USA has been concentrated in the transportation sector, which includes roads, bridges, trains and ports. There are many examples of privately built infrastructure in the USA, such as the *Chicago Skyway*, the *Indiana Toll Highway* and the *Pocahontas Parkway*. Even though their PPP model is not different than those in the rest of the world, the fragmented nature of the federal government system does not permit extracting just one regulation for PPPs. Recently, the US Transportation Department published in a pilot program with the intent of promoting, financing and studying new infrastructure using the PPP formula in a federal news report. This proposal is also a positive starting point for being able to come up with common regulations for the entire country. The following section proposes a unique program for PPPs in the US.

a) PPPs in the US

The main PPP projects realized in different states are seen in Table 3.10.

The State of Virginia, after considering the sale of the *Pocahontas Parkway*, has introduced new highway projects in their budget, like the *Capital Beltway*, *I-95* and *Hwy 460*.

The bidders are Macquarie/Skanska, Lane/Tidewater/DMJM Harris, Itinere/Sacyr/Citi/Clark-Shirley/Louis Berger and Cintra/Ferrovial/Earthtech.

TABLE 3.10: Large PPP Roadway projects in the US

Project	State	Public Authority	Commencement of the Project	Opening	Project Cost (US\$ million)
State Route 91	CA	Caltrans	1993	1995	126
State Route 125	CA	Caltrans	2000	2007	722
Route 3 North	MA	Mass. Highways	1999	2006	385
Southern Connector	SC	S. Carolina DOT	1998	2001	217
Dulles Greenway	VA	Virginia DOT	1993	1995	338
I-895 Pocahontas Parkway	VA	Virginia DOT	1998	2002	377

Source: Yescombe (2007)

In Texas, the Department of Transportation has entered into a master development plan with the Cintra-Zachry Consortium for the development of a high priority mega-project known as the *Trans-Texas Corridor (TTC-35)*. The TTC-35 is a 600 mile roadway that joins the borders of Mexico and Oklahoma. The capital cost is estimated at US\$ 7.5 billion and is developed under concession contracts with a private consortium.

Colorado is a popular example of investing in *brownfield* assets. 11 consortiums were selected to participate in the bidding process to acquire, manage, operate, maintain and fund the acquisition of the *Northwest Parkway*. In the end, Brisa from Portugal and CCR from Brazil won the bid.

In Missouri, the Department of Transportation selected a number of consortiums to bid on PPPs to design, upgrade, operate and maintain more than 800 local bridges all over the State. This transition project is expected to serve as a future model for maintenance efforts for infrastructure all over the country. The project, which is called "Save and Cure", will be completed at the end of 2012 and the maintenance period is 25 years.

In Florida, the Department of Transportation is in the process of selecting a company to build a 3.1 mile toll road called *North Tampa's East-West Road*, connected to I-75 and I-257 and valued at US\$150 million. This will be the first construction project funded by the private sector in the State.

In Georgia, they are currently evaluating four proposals to construct two toll lanes for trucks in each direction over the largest corridor in Atlanta. The project requires only one winning bidder in order to plan, permit funding, design and implement the project in the northeastern quadrant of I-285 toward the west over I-20 to *Thornton Road*.

b) Unique PPP program in the US

In order to harmonize the PPPs among the different States, the Federal Department of Transportation proposed a series of measures to promote the participation of the private sector in the funding of infrastructure.

- To establish a PPP Commission or Unit

Establishing a unique program for PPPs may be complex and initially expensive. Therefore, it is very important to control the coordination of project implementation and to control the costs. Because of this, the public sector should consider establishing a high level administration that:

1. Coordinates the policies applied to PPPs with public entities;
2. Identifies and prioritizes the projects;
3. Oversees the procurement and implementation of the projects;
4. Ensures a standardization of the required documentation; and
5. Controls costs.

- Introduce Pilot Projects

Before proposing a PPP, the public sector should adopt pilot projects in order to verify that the PPPs are the best option for carrying the project to fruition. One of the main keys to obtaining a cost/benefit analysis in PPPs is to promote and maintain an open and competitive bidding process and in that way attract the best possible bidders. In addition, the pilot projects should have a value of around US\$ 150-200 million in order to attract the interest of domestic and international bidders.

- To Define the Objectives of the Public Sector

The public sector needs to define their objectives for introducing a PPP program and then consider the following:

1. Ensure that there is strong political support for PPP programs.
2. Prioritize essential and affordable projects.
3. Review the legal considerations and, if necessary, remove barriers established by law in order to establish long term contracts with PPPs and the private sector.
4. Propose long-term contracts with PPPs in order to obtain the best cost/benefit in terms of the efficiency of the project during the investment period, and that the developers, as well as the investors, can obtain satisfactory returns on their investment (infrastructure assets generally require long payment periods to cover their capital costs).
5. Develop a public private comparative model.

3. Infrastructure investment of pension funds in an international context

6. A risk matrix should be developed for observing what risks could be shared by the public and private sectors. However, it should be stressed that participation from the private sector means there will be sufficient returns. The level of returns demanded will be proportionate to the level of risk assumed.
7. A short, clear and transparent bidding process should be defined.
8. Minimum design requirements for each one of the project needs (these requirements should not be so restrictive as to discourage the creativity or innovation of the private sector).
9. Minimum standard outlines. It is necessary to define minimum construction and operation requirements in technical, environmental, political and financial terms.
10. The total cost of formalizing a PPP should be considered.
11. The agreements of the PPP programs should be firm in order to eliminate regulatory risks and promote the participation of the maximum number of competitors in the bidding process.

- Define the scope of the project:

The public sector will need to state, identify and define the scope of the project. The project contract should specify the obligations, responsibilities and returns that the private sector will receive.

- Identify sources of income

When a project is considered eligible for contracting with a PPP, it is important to define the form of payment as different payment mechanisms exist.

We refer to three cases:

1. *Self-financing*: the fees charged to users for the service are adequate to finance the cost of capital of constructing the project as well as the expense for management, in addition to providing an acceptable return to the private sector investors.
2. Payments from the Public Sector: Projects are deemed part of basic public services (i.e., public education, health, etc). In this case the public sector pays an agreed-upon fee for the service rendered. Generally these projects are deemed low risk, because technically, it is not difficult to calculate the associated expenses and cash flow. (For example: the maintenance of schools or Government offices, etc).
3. A combination of both: The State may subsidise a part of the applicable fee.

- Viability and Other Studies

As part of the process of defining the objectives, scope and potential revenue sources of the PPP project, the public sector needs to comply with the researched viability: The following points are required:

1. Processes and legal impediments to introduce to the PPP;
2. Land property rights;
3. Environmental impact studies;
4. Planning and permits; and
5. Revenue protection studies (for example: potential traffic volume).

It is recommended that the public sector employ qualified experts and advisers that have sufficient experience in the management and oversight of projects.

3.5.2. The participation of pension funds in the financing of infrastructure

Recently in the US, the *Maine Public Employee Retirement System* increased its allocation goal for infrastructure projects from 4% to 5% as part of a process of reconfiguring its portfolio (*Liability Driven Investment-LDI*). In a similar case, in September 2007 the *California Public Employee Retirement System (CalPERS)* included an initial allocation of infrastructure investment of more than US\$ 2.5 billion. In November 2007, the *Washington State Investment Board* and *The Teachers Retirement System of Texas* decided to invest 5% of their portfolio in “*tangible assets*” that include infrastructure, agricultural and timber exploitation.

Furthermore, *JP Morgan Asset Management* recently created a new real estate investment unit, in which they consider infrastructure as the fourth best alternative, and as such, have significantly increased their investment in this asset.

3.6. The participation of pension funds in the financing of infrastructure in Continental Europe

3.6.1. Public-private participation and infrastructure

PPPs, with a wide variety of different legal frameworks and models among different countries in continental Europe, began to develop in the last decade. In recent years, there has been a renewed interest in PPPs due to the need for new infrastructure and budgetary restrictions. This has driven legislative reforms that have tended to promote the participation of the private sector in the financing of new infrastructure.

Although projects exist that are funded through the capital market, the utilization of bonds has been relatively scarce. Unlike the United Kingdom where the fixed income market is well established, many of the European PPP transactions have been financed through bank loans. Nonetheless, many countries have introduced new legislation in order to make up for the models’ weaknesses:

1. Some countries have taken a systematic approach to changing the policies and legislation in order to allow PPPs to function, using the conclusions of studies to decide what projects are likely to succeed within the PPP framework.
2. Others have tried to accommodate PPPs within current legislation or begin with pilot projects.

a) The phenomenon of public-private collaboration (PPC)⁴⁹

In the face of a large amount of applicable legislation and PPP formulas in the EU, in 2000⁵⁰ the European Commission proposed the Public-Private Collaboration as a model that integrates the framework of different PPPs on the continent. In general, it refers to the different forms of cooperation between public authorities and the business world whose objective is to guarantee the funding, construction, renovation, management and maintenance of infrastructure. For that reason they published *“Interpretive Communication on concessions and Community public procurement law”*, which addresses the basic principles and rules arising from the treaty and the law. It also defines the concession as a right of the community, and obliges the public authorities to comply with a set of laws when selecting the concession operators. In addition, the new European Parliament and Council directives target modernising and simplifying the community’s legislative framework in order to establish an innovative procedure for awarding projects, especially with regards to adjusting to the specific needs of especially complex contracts. This new procedure, ‘competitive dialog’, allows public authorities to establish a dialog with candidate companies in order to identify solutions to respond to their needs.

PPC operations tend to be characterized by the following elements:

1. A relatively long duration, which involves the cooperation between the public and private partners in different aspects in order to complete the project.
2. The manner of funding the project, guaranteed in part by the private sector. On occasion, this occurs through a complex organization of diverse participants. Nonetheless, private funding may be subsidised with public funding, which may end up being very high.
3. The important role of the financial operator, who participates in different phases of the project (design, production, execution and financing). The public partner essentially concentrates on defining the objectives in the public’s interest, quality of services provided and pricing policy, while guaranteeing the control of compliance with said objectives.
4. The sharing of risks between the public and private sectors, through the transfer of risks that historically have been supported by the public sector. Nevertheless, the PPC operations do not necessarily imply that the private partner will assume all risks arising from operation. The exact sharing of risks is outlined on a case by case basis, depending on the parties’ respective capabilities to evaluate, control and manage said risks.

Nonetheless, some representatives of the sectors interested believed that the community standards applicable to concessionaires lacked sufficient clarity and homogeneity

49 European Commission-Green Paper on Public-Private Partnership and Community Law on Public contracts and concessions April 2004.

50 Idem.

from one Member State to another. This situation created uncertainty among community agents, because it represented a real obstacle for the creation or operational success of the PPC to the detriment of the funding of large infrastructure projects and the development of quality public services. For this reason, the European Parliament invited the Commission to examine the possibility of adopting a Directive targeted at regulating the concessionary sector and other forms of PPCs in a homogeneous manner⁵¹. The European Economic and Social Committee, on their part, also stated that a legal initiative was necessary.

In 2004, the European Commission announced the publication of the “*Green Paper*”⁵², which focused on the operations of PPCs and the communities’ right to public contracting and concession for the purpose of initiating a debate regarding the best way to guarantee that PPC operations are developed competently and legally. The *Green Paper* presents the scope of community standards applicable to the selection phase of the private partner and the previous phase, with the objective of detecting possible uncertainties and analyzing whether the community framework is appropriate for the obstacles and specific characteristics of PPC operations.

b) Infrastructure Projects Carried out in Europe⁵³

Over the course of the last decade, the PPC phenomenon has developed into a large number of public projects. There are various factors that explain this boom. Taking into account the budget restrictions that the different States have had to face, the public sector must turn to private funding for the construction of new necessary infrastructure. Another explanation consists of the desire to take advantage, to the greatest extent possible, of the knowledge and methods used by the private sector in the operation of these types of projects. On the other hand, the development of the PPC model represents the evolution of the role of the State in an economic setting, morphing from direct operator to organizer, regulator and controller.

The public authorities of member states often turn to PPC operations in order to realize infrastructure projects, particularly in the sectors of transportation, public health, education and safety. In the European setting, it has become known that PPC operations can contribute to the creation of trans-European transportation networks, in which there is a huge backlog due to, among other things, the scarcity of investments. In the framework of the growth initiative, the Council has approved a series of measures whose objective is to increase investment in trans-European network infrastructure, as well as the realm of innovation, research and development, in particular through the organization of PPC operations.

Since 2001, US\$ 54.013 million (€37 billion) in projects has been assigned within continental Europe, which represents two thirds of the value reported in the United Kingdom (US\$ 89.048 million; €61 billion).

51 European Parliament Decree in the first reading of the proposal by the COM Commission (2000) 275 of May 10, 2002.

52 Green Paper on Public-Private Partnership and Community Law on Public contracts and concessions April 2004.

53 Idem.

The value of contracts signed in 2008 reached US\$ 7,299 million (€5 billion). The values of PPP agreements signed in 2008 by country are, from highest to lowest amounts, Spain and France (US\$ 5,985 million; €4.1 billion), Italy (US\$ 5,255 million; €3.6 billion), and Ireland US\$ 4,817 million (€3.3 billion).

The most important contracts that PPCs have had to negotiate have developed in the transportation sector, with some pension fund investment in them. In Table 3.11, the largest projects that have been executed in Europe are grouped together by sector.

TABLE 3.11: Largest PPP Contracts executed in Europe
(Value of capital by contract, US\$ million)

Project	Type	Country	Year of contract	US\$ million
Messina Strait Crossing	Source	Italy	2006	3,829
CSB toll road	Road	Greece	2007	2,859
Csurgó City - sport facilities	Sport	Hungary	2007	1,838
Oosterweel Link	Tunnel	Belgium	2004	1,573
HSL Zuid speed rail	Train	Netherlands	2001	1,093
Corinth-Tripoli-Kalamata & Lefktro Sparta	Road	Greece	2007	1,362
Corinth-Tripoli-Kalamata & Lefktro Sparta	Road	Greece	2008	1,460
Devavanya City - sport facilities	Sport	Hungary	2007	1,205
Brescia-Milan Toll Road	Road	Italy	2005	1,058
Szekszard Boly-Pecs	Road	Hungary	2007	1,164
A5 Ostregion	Road	Austria	2006	1,085
A2 Motorway, Nowy Tomysl-Konin	Road	Poland	2004	1,016
Segarra Garrigues-Proyecto de Irrigación	Channel	Spain	2002	776
Phase 1-Thessaloniki Subway	Train	Greece	2005	982

Source: Public Private Finance 2007

Currently, according to IFSL Research at the European level, the largest PPP market is located in Italy, with projects valued at US\$ 40,845 million (€30 billion)⁵⁴, while Germany and Greece have projects valued at US\$ 13,868 million (€9.5 billion) and US\$ 9,197 million (€6.3 billion), respectively. According to *DLA Piper*⁵⁵, these negotiations are intended to be extended in the coming years throughout the continent and as such, fund admi-

⁵⁴ Exchange rate applied to all exchanges corresponding to the year 2007: 1.36 US\$/€.

⁵⁵ International legal services organization made up of different independent legal entities.

nistrators and individual investors are becoming more and more involved in them. Table 3.12 lists the value of contracts made by PPPs by European countries.

TABLE 3.12: PPP contracts in European countries

(Value of contracts, in US\$ million)

Country	2001-04	2005	2006	2007	2008	No. of contracts signed
Spain	1,046	1,420	2,124	422	---	38
France	---	2,200	938	449	1,833	34
Italy	931	2,682	560	75	---	20
Ireland	753	149	795	2,034	443	19
Greece	---	982	2,042	5,306	1,477	8
Germany	460	1,021	226	635	173	40
Belgium	1,360	591	---	410	1,004	6
Netherlands	1,362	---	550	---	1,506	9
Austria	51	---	1,085	---	---	6
Finland	---	861	---	---	---	1
Bulgaria	---	450	368	500	---	6
Hungary	---	---	48	20	738	11
Cyprus	---	615	---	---	---	1
Portugal	291	---	41	191	---	7

Source: Public Private Finance 2007, DLA Piper

3.6.2. Investment of pension funds in infrastructure in Europe

While experience with the PPP formula for infrastructure investment has started to be very successful in continental Europe, we cannot state the same for the participation of pension funds in the funding of infrastructure. One of the reasons that may justify this is that the majority of these countries have had a public distribution system until recently. The funds accumulated in these systems have generally been invested in fixed income assets. In some countries, a percentage of the fixed income assets are allowed to be listed, but in no case would it be possible to invest directly in infrastructure, because among other reasons the different social security administrations do not have teams specialized in this asset class. In some cases, like that of Spain, where the reserve fund reached 57,223 million Euros at the end of 2008, investment allowed in sovereign debt only would be an excellent resource for infrastructure investment.

If the public systems do not invest in infrastructure, the private pension funds will not turn to this important form of action either. Nevertheless, according to Prequin⁵⁶, many countries have introduced some percentages of assets associated with infrastructure into their investment objectives. For example, according to Prequin, *Bayerische Versorgungskammer* invested 300 million Euros in infrastructure shares of listed companies and funds and their goal is to reach 600 million (1.5%).

3.7. Conclusions

The consolidation of infrastructure investments by pension funds in developed countries has evolved over a period of decades. Each one of the countries reviewed, when venturing into this type of investment, has taken up different perspectives in the application and management of the concession systems under the PPP modality as well as the manner in which pension systems are integrated as a channel for resources. In the end, these experiences have shown that the infrastructure-pension binomial can generate significant advantages for members of pension plans as well as for the development of the countries.

To recap what we have seen country by country, we can conclude that the Australian pension investment is the precursor to the world's system, and remains one of the most developed with regard to the participation of the private sector in the design, construction and operation of infrastructure. In the US, the state of Virginia has the highest investments of this type and between 1980 and 2005, under diverse forms of PPPs that had been evolving over time, the number of projects managed reached 127, at a value of US\$ 47,433 million.

In order to boost participation in pension funds, the Australian market launched a product called *infrastructure securities funds*, which offers the opportunity to access a wide range of global equity stock and other types of financial instruments (bonds, stocks, securities, notes) related to infrastructures.

The experience in the United Kingdom is also relevant. The PFIs / PPPs, as they are commonly called in the United Kingdom, continue to have an increased involvement in the development in infrastructure, particularly in the transportation, health, education, housing, defense, telecommunications (IT), urban waste management, and water and sanitation sectors. Between 1990 and 2007 more than 900 PPP projects were signed for a value of US\$ 106,029 million. Currently, in the United Kingdom, there are approximately 50⁵⁷ public and private funds investing in these developments.

Regarding Canada, whose projects date from the second half of the 90's, its' infrastructure experiences differ in each one of its provinces, and in some cases, vested at the global level. As such, it is difficult to consolidate just one regulation for each one of the existing projects. The region that has relied most on these types of investments has been *British Columbia*. In this province there are more than 15 public and private pension funds that have invested in infrastructure relatively recently, and the total of as-

⁵⁶ For more information refer to www.preqin.com.

⁵⁷ *Idem*.

sets invested into infrastructure reached US\$ 27,733 million, representing 3.67% of total managed assets.

With regard to the US, although the PPP model is not different from that in the rest of the world, the fragmented nature of the federal government system does not allow the overarching regulation for PPPs. However, the US Department of Transportation recently published a pilot program with the intent of promoting the implementation of new infrastructure using the PPP formula. Currently, investments from the *Maine Public Employee Retirement System* increased its allocation goal from 4% to 5% for infrastructure projects as part of a process of reconfiguring its portfolio (*Liability Driven Investment-LDI*). In a similar manner, in September 2007 the *California Public Employee Retirement System (CalPERS)* included an initial allocation of infrastructure investment of more than US\$ 2.5 billion. In November 2007, the *Washington State Investment Board* and *The Teachers Retirement System of Texas* decided to invest their resources in ‘*tangible assets*’ that include infrastructure, agricultural and timber exploitation, the latter reaching 5% of their portfolio allocation.

Regarding the experience of continental Europe, PPPs began to develop in the last decade with a great diversity of legal frameworks and models applied amongst different countries. In recent years, there has been a renewed interest in PPPs due to the need for new infrastructure and budgetary restrictions, which has driven legislative reforms that promote the participation of the private sector in the financing of new infrastructure.

In summary, the countries whose experiences we have reviewed in this chapter have incorporated a significant amount of pension fund participation into infrastructure investment. In order to do so they have adopted new financial tools; homogenizing the laws of some independent states, generating systems that shield them from political restrictions, developing markets for new assets and decreasing distrust on the part of investors and individuals in their respective states. The result shows both strengths and weaknesses in the current processes of developing PPP systems.

With respect to emerging countries, we can distinguish the strengths of the most developed systems; first, they have maintained a positive cost/benefit analysis in terms of *value for money*. Second, they have improved throughout the process, reaching equilibrium with respect to the important role of the financial operator who participates in different phases of the project; design, production, execution and financing. Third, in PPP models, the role of the public partner has been most focused on defining strategic objectives and on defining conditions in terms of the quality of services provided and the pricing policy, while guaranteeing compliance to project objectives. Fourth, over the years a greater understanding of how to develop risk management plans has taken form. Fifth, the modes of financing and insuring projects have been adequately secured by assuming the correct risk assumptions on the part of both partners. And finally, sixth, a wide range of investment products have been developed (in the scope of individual, collective, portfolio diversification, investment in different sectors, insurance funds, majority funds, etc.) to satisfy the different levels of risk tolerance among investors.

As for pension funds, experience has shown that this type of project provides them with a regular and definite flow of dividends and profits, and interesting tax incentives.

Furthermore, direct investment in infrastructure is free from the same adverse risks as other assets listed in the stock market, thus reducing portfolio volatility. It is true that there is still work to be done with respect to liquidity restrictions for infrastructure-related assets, the difficulty of appraising projects (in some cases, it is difficult to estimate the current value of an infrastructure project), the demanding submission conditions (the initial investment usually calls for large amounts of capital, though there are special products for retailers), the inequalities in the quality of infrastructure assets and the legal uncertainty for investments. Overall, however, the advances made toward decreasing these risks have been substantial.

4. Pension funds and infrastructure in Chile

Soledad Homazabal

4.1. Introduction

During the early '90s there was evidence of a significant deficit in the infrastructure stock in Chile. In 1993, as emphasized by the Chilean Ministry for Public Works (Ministerio de Obras Públicas, MOP), it was estimated that between 1995 and 1999 the infrastructure deficit increased to approximately 15% of the country's GDP, and that annual losses, due to decreased competitiveness as a result of insufficient infrastructure, amounted to 3% of the Gross Domestic Product.

In 1993, it was decided that the private sector should be included in financing and managing productive infrastructure. For that purpose, a BOT (*Build, Operate and Transfer*) concession system was established, which meant that the company awarded the concession had to fund, build, operate and ultimately transfer the operation from the company to the State. This policy, together with the increase in public investment, has helped the country to significantly reduce the infrastructure deficit that was hindering the country's economic growth.

The Pension Fund Administrators (PFA) of Chile accumulated an elevated amount of resources, approximately 60% of GDP. This availability of domestic capital has increased significantly, which has turned out to be particularly relevant for funding long-term investments.

Chile's pension fund regulations established that they could only be invested in financial instruments. Their participation in infrastructure projects were conducted indirectly, mainly by purchasing stocks and bonds issued by privatized companies from sectors such as electricity, health, and telecommunications companies. These type of investments carried out by the PFAs are significant because by increasing the volume of resources that are invested into the system, they are strengthening the financial and capital markets in Chile. Nonetheless, purchasing these instruments, except at the time they are issued, is not considered infrastructure investment in the economic sense, given that it does not focus on increasing the level or quality of stock of the current infrastructure.

The increased availability of resources that came from individual pension funds enabled the emergence of a new instrument called "infrastructure bonds", which correspond to bonds issued by concession companies intended to finance investments in Chile's public infrastructure.

The Chilean experience is interesting, since both public and private interests joined together to lift the restrictions that limited the use of the pension fund and life insurance industries due to regulations. It was determined that both the concession companies

as well as institutional investors would benefit if the latter were allowed to invest in these bonds without getting rid of the regulations that protected them.

In the case of the pension fund industry, it is essential that regulations prevent individual pension funds from investing in new companies and projects in order to prevent investments in high risk products. Nonetheless, financing infrastructure under concession lacked the typical risks involved in investing in project finance even if, strictly speaking, it was similar to purchasing instruments exclusively backed by the future cash flows of a new company. Finally, a new instrument was created that allowed pension funds (and life insurance companies) to participate without altering the investment regulations.

In the first section we describe the evolution of investments in infrastructure in Chile since 1980. Later, in section 4.3, we will review the current Concession law and describe the modifications that are being discussed. In section 4.4, pension fund investment in the Chilean infrastructure sector will be reviewed, as well as the characteristics of infrastructure bonds. Finally, we will sum everything up in the conclusions in section 4.5.

4.2. Recent development in infrastructure

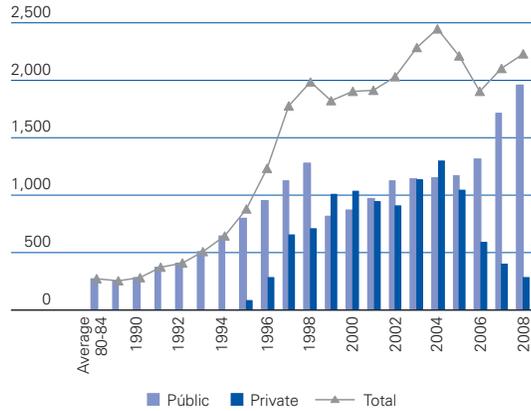
4.2.1. Volatility of infrastructure expenditure in Chile

During the '80s Latin America was affected by the debt crisis. Chile was hit hard by the world recession cycle and in addition suffered an internal financial crisis of great magnitude. Consequently, its GDP dropped 14% in 1982; domestic demand *per capita* fell 25% and the unemployment rate reached 19%, but would have reached 31.3% if it were not for public emergency jobs (French-Davis, 2003). At the same time, the costs to bailout the banking system was considerable. The total cost is estimated to have reached 35% of GDP (Sanchueza, 1999). Breaking down the cost of the bailout, it is estimated that the net cost to liquidate insolvent institutions represented 10.6% of GDP in 1983, while the net cost of purchasing risky assets under repurchase conditions reached 6.7% of GDP in 1983 (Sanhueza, 2001). The crisis meant an abrupt deterioration in the fiscal situation; the government had to reduce expenditure, particularly in investments.

The total amount of investment in public expenditure only recovered from levels in the latter years of the '70s in 1991. The infrastructure situation was particularly critical, especially because between 1970 and 1989 the population in Chile grew 40% and production grew 60%; during the same period, however, the total investment by the Ministry for Public Works decreased 34% (MOP, 2001).

As demonstrated in De Gregorio (2004), growth of infrastructure was very slow in the '70s and particularly in the '80s. According to the Chilean Ministry for Public Works (Ministerio de Obras Públicas, MOP), it was estimated that in 1993 the infrastructure deficit increased to approximately US\$ 12.5 billion during the period of 1995-1999, while annual losses for lack of competitiveness as a result of insufficient infrastructure reached up to US\$ 2.3 billion. Nonetheless, during the '90s, the stock of infrastructure increased to a rate higher than the world average (see Chart 4.1). The most notable progress took place in terms of the quality of infrastructure. The '80s was a decade of general deterioration of infrastructure in the entire world, but particularly in Chile. The

CHART 4.1: Infrastructure investment in transportation
 (US million in 2008)

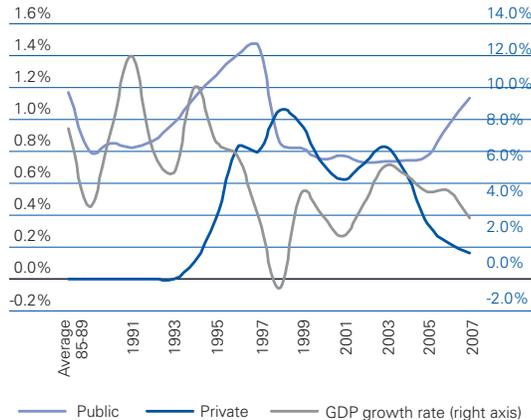


Source: In-house, based on MOP, Midelpan, and CChC.

increase in quality of the infrastructure in the latter half of the decade, however, was so outstanding that during the '90s the quality gap with the world average was closed.

This quantitative and qualitative leap was achieved thanks to macroeconomic stability policies that went along with the recovery after the deep crisis of 1982. In addition, the decision by the government of Chile in 1993 to incorporate the private sector in the investments of productive infrastructure turned out to be exceedingly important. For that purpose, the BOT (*Build, Operate and Transfer*) type concession system was established. This policy, together with the increase in public investment, allowed the country to pro-

CHART 4.2: Infrastructure investment in transportation
 (% of the GDP)



Source: In-house, based on MOP, Midelpan, and CChC and BCCh.

gressively reduce the infrastructure deficit that had accumulated in the country.

4.2.2. Privet sector participation in infrastructure

In the early '90s, several factors led to the infrastructure deficit in Chile, especially in the transportation sector.

There are occasions when different infrastructure sectors demonstrate different investment trajectories, usually because they have had different ownership systems. That is indeed the case with the electronic, telecommunication, distribution and commercialization of gas, and the production and treatment of water sectors.

A process of privatization of public companies began in the mid '70s, which was reinforced during the following decade. By the late '80s, the electric and telecommunications sectors were completely privatized.

The distribution and commercialization of the gas sector has been historically in private hands, except for a brief period between 1972 and 1977. The process to privatize health companies began in 1998, and concessions to the private sector were implemented in 2000 for a period of up to 30 years, in areas of road networks, airports and port operations, which were traditionally reserved for the public sector. The State was the direct developer of public transportation infrastructure until the mid '70s. Later on, the government decided to introduce subcontracting for the construction and maintenance of public works. Infrastructure was generally financed and charged to the State's general revenues, and that did not change when the traditional production structure changed. On the other hand, water has been a private resource since the '80s.

At the same time, a centralized system for social evaluation of projects was implemented on a massive scale. This had the singular characteristic that all public projects from different sectors (such as education, health, and social provision, among others) competed amongst themselves and only those that contributed the greatest social return were executed. Even though this system lead to a significant increase in the efficiency of public investment, the country had serious deficiencies in practically all sectors and budgetary limitations prevented a decisive advance to reduce perceived and foreseen insufficiencies.

4.3. The concession law

4.3.1. Legislative background

The Ministry of Public Works (MOP by its abbreviation in Spanish - Ministerio de Obras Públicas) Organic Law allows for the concession of basically any public work. This law was passed in 1982; however, the regulation was never used.

During the government of President Patricio Aylwin in the '90s and under the strong momentum achieved by Carlos Hurtado (Minister of Public Works), an agreement was made detailing the inadequacies of public infrastructures that needed updating in order to support rapid investment growth. The consensus reached about State resources and that the traditional system for the execution of public works was not enough to

tackle the high infrastructure deficit. The conclusion was reached that the best alternative to finance and manage its infrastructure was through public-private partnerships that applied market mechanisms. That way the process would allow for public resources to be used in investments with high social impact, but low private profitability. The consensus was based on the legal amendments that were carried out and unanimously approved by the National Congress.

Law No. 19,068 was passed in 1991, which created a law that applied to all public works and the processes that intervene in them; the contract bidding system to be applied was structured under a framework of equal protection under the law for all parties.

The first project awarded on a BOT contract basis was the “El Melón” tunnel in 1993. Following this project, a number of deficiencies were identified and corrected in Law No. 19,252 of 1993. For example, the process to be followed in the case of the concessionaire’s bankruptcy was incorporated.

In 1996, Law No. 19,460 was passed, which among other things, improved the treatment of private initiatives, contract bidding systems for concessions and terms, and the protection of third parties responsible for funding the concession companies, granting them special rights and a new legal feature known as a “special pledge for public work concessions”. The special pledge for public work concessions is agreed upon by the company awarded the concession and its creditors and outlines what will happen in the case of bankruptcy, specifically regarding the rights to the public work’s concession, the payment agreed by the State to the concessionaire, and what will happen to the derived revenue. The text was revised, coordinated and systematized in Supreme Decree No. 900 of the MOP (Ministry of Public Works). This legal concept was crucially important since it allowed for the creation of long-term investment guarantees, a fundamental prerequisite for receiving financial resources by issuing bonds, which would be attractive for institutional investors.

4.3.2. Current law

Concessions are a type of privatization which aim to increase efficiency and wellbeing. Since the provision of infrastructure in most large scale economies is derived from existing natural monopolies, it is not possible to create a competitive market. The concession system deals with this limiting factor by introducing competition *for* the playing field rather than competition *on* the playing field.

The bidding mechanism must encourage the most efficient company to be awarded the project; in addition, as the project to be awarded is usually a monopoly, the regulator must attempt to award the project at a competitive price and thus prevent the concession company from obtaining a monopolistic income.

The current Concessions Law—Decree No. 900 of the MOP— stipulates that these projects must be approved by means of open competitive bidding by any national or foreign company⁵⁸. The law is flexible enough so that the concession contract may be adapted to the specific needs of each project. For example, the Law stipulates different

58 If the bidding company is foreign, it must be established in Chile as a company according to the laws of Chile.

variables that may be considered in concession offers: rate structure, terms of the concession, subsidy from the State to the bidder, revenue guarantees by the State, payments offered by the concessionaire to the State (in the event of existing infrastructure), degree of risk commitment that the bidder assumes during the construction or management of the works, rate readjustment equations, the review system, and quality of the technical proposal, etc. The basis for the bid may include one or more of the foregoing elements:

- *The rate that the users shall pay.* The review mechanism for rates can also be stipulated, as well as the readjustment formula. The purpose is to stimulate competitive behavior by awarding the concession to whoever offers the lowest rate. In the absence of another bidding factor to be considered, the technical proposal of the project is not guaranteed. In addition, given that the total amount of project demand risk is assumed by the concessionaire, the bidding is subject to the “winner’s curse” that takes place in the situation in which the bid winning company is not the most efficient, but rather it is the most optimistic in regard to costs and/or the future requirements of the project.
- *The subsidies offered to the bidder by the State.* The State agrees to subsidize the concessionaire, which is necessary when the works to be tendered have a negative private profitability but a positive social profitability. The company which needs the least amount of subsidy from the State shall be the winner in this regard. The amount of the subsidy shall be determined so as to guarantee that the present net value of the project is equal to zero.
- *The term of the concession.* According to this bidding mechanism the State sets a toll and the concessionaires compete to build and operate the works in the least amount of time for the concession. Clearly, the objective is that the most efficient company be awarded the project, however, just like the bidding price, this mechanism is subject to the “winner’s curse”.
- *The minimum revenue guaranteed by the State.* The State guarantees a specific, minimum amount of revenues to the concessionaire. If a concession’s annual revenues are less than the guaranteed minimum revenue, the State shall pay the difference in revenues for the following year. At the same time, the concessionaire will have to share with the State part of higher revenues (approximately 50%) if the project’s profitability exceeds a certain threshold (in general 15%). The flow of guaranteed minimum annual revenues is setup in a way that facilitates debt payment with specific terms and interest rates, and taking into consideration a certain capital/debt ratio. The guaranteed amount is one that insures that, if the only revenues were the minimum amounts guaranteed by the State, the concessionaire could pay the debt, but would lose all its capital; this limits the risk of carrying out projects that lack economic sense. The purpose of guaranteeing revenues for the concessionaire is to transfer to the State the project demand risks, thus facilitating its financing. In addition, it is an incentive to limit the sovereign risk involved in the concession, given that inappropriate performance on the part of the State (for example, rate reduction) would generate a fiscal reserve.

4. Pension funds and infrastructure in Chile

- *The dividends paid by the concessionaire to the State for existing infrastructure.* It usually happens that tendered projects are to remodel and/or expand already existing infrastructure. A clear example of this were the bids for several projects totaling more than 1,500 km on Ruta 5 of the Pan-American Highway that transverses Chile from north to south; the projects included construction over an already existing series of roads that needed revamping such as expansion of the roads, incorporation of two-way roads, maintenance, replacement and construction of bridges, by passes and junctions, service roads, intersection ramps, and pedestrian footbridges, among others. The payment to the State for existing infrastructure should not be a variable included in the bid, but rather should be treated as a fixed payment or sunk costs of the project; alternately, at a theoretical level, it could correspond to monopolistic revenues. A higher payment for the State should not be the factor on which to compete for the appointment, which does not encourage price competitions, and to the contrary, stimulates procurement of revenues with the purpose of increasing the amount offered in payment to the State.
- *The risks assumed by the concessionaire.* It is feasible to include in the bid the degree to which the concessionaire shall assume the risks; for example, before situations of natural disaster or unforeseen circumstances. Even though this mechanism stimulates efficiency by means of containing and spreading out the risks, it is subject to the "winner's curse".
- *The quality of the technical proposal.* The technical aspects should be present in all concession contracts in order to avoid incompetent concessionary companies and fight against incentives to reduce the costs beyond what is beneficial. In order to comply with these objectives it's enough to establish a minimum technical level to participate in the bidding, and it would not be necessary to include it subsequently as a factor on which to bid. The reason to incorporate a total or partial qualification to be obtained during the technical bid and the financial bid is to stimulate and increase the technical proposal in the measure that it will be cost effective. If a company is able to increase the technical proposal of a project without incurring considerably higher costs, it is suitable for said alternative be evaluated.
- *The fraction of revenue that the State or the users shall receive if these exceed a certain threshold.* These types of offers are only compatible if the State offers a minimum guaranteed revenue. This allows the concessionaire to share with the State the demand risk, and in exchange the company will give part of its revenues, if their earnings surpass a certain threshold, which is in general 15% over their equity or assets. Economic compensation can take different forms; for example, a rate reduction for users, a reduction in the terms of the concession, or a direct payment to the State.
- *Total concession revenue.* This bidding factor cannot be used together with the following factors: rate charged from users, period the concession is in effect, or minimum guaranteed revenue.
- *Environmental considerations.* Such as noise, the aesthetics of the works, impact mitigation of projects, environmental, and others.

Subsequently, the MOP (Ministry of Public Works) has offered contracts with additional guarantees related to minimum revenues or overall revenues for the concession. The concession companies have been able to access foreign exchange insurance specifically linked to the repayment of their external borrowings, according to which the State would pay the concession company the excess costs incurred by servicing the debt if the exchange rate increases more than 10%, and based on the same principle, that the concessionaire pays the State the lesser cost of servicing the debt if the currency drops more than 10%.

In 2002, the MOP included an income distribution mechanism for negotiating additional works to the existing concessions. This compulsory compensation mechanism means that the State guarantees the concessionaire a certain level of revenue at present value for the entire concession term. Under this compensation agreement, the total guaranteed revenue, is based on a growth rate which is then discounted at a fixed annual real rate⁵⁹. The concession finishes when the real revenue's present value for the concession reaches the guaranteed value, therefore transforming a fixed-term contract into a variable one. If the concession has not received the guaranteed income by the maximum term stipulated in the relevant concession law, the State will subsidize the difference⁶⁰. The premium for this insurance will vary, based on the guaranteed revenue levels, and shall be payable in the form of additional works for the same concession. During 2003 and 2004, five companies chose to adhere to this revenue distribution mechanism.

Both private companies and individuals may submit proposals to the MOP for consideration and ultimately manage a bidding process to award a concession. The MOP may reimburse bidders for the cost of the proposal or at least a part thereof. Subsequently, if it is approved, the concessionaire receives a compensation for the concession bid.

The MOP carries out the bidding process of a project, in which the relevant companies shall bid; from among the technically accepted proposals, the most attractive proposal will be awarded the project. The awarded company must be an established company with which the State is deemed to have entered into a concession contract⁶¹. The company awarded the concession shall build and fund the infrastructure project; the project will then be operated by the company and a fee will be charged for the service provided for an extended period of time, between 10 and 30 years. Once this period has ended, the infrastructure will be transferred to the State⁶². This system, selected as the most appropriate, is the BOT (*built, operate and transfer*).

The concessionaire must build the project based on stipulated terms and must maintain certain quality standards, providing an uninterrupted service level based on the winning bid; the company awarded the concession will otherwise be subject to fines and even

59 In the contracts for revenues distribution system, a real annual discount rate of 9.5% has been established.

60 This system has been widely questioned (see Engel *et al*, 2008) given that the value of guaranteed revenues is determined in a bilateral negotiation –between the State and the Concessionaire- instead of through a bid, and therefore an efficient result cannot be guaranteed from the perspective of costs.

61 The objective of the obligations is to constitute a concession company to facilitate financial direction and prevent any fraud to the Tax authorities.

62 It is important to state that the State is always the owner of the infrastructure work.

4. Pension funds and infrastructure in Chile

the concession’s suspension or cancellation⁶³. The MOP will supervise and tax the project’s construction and operation, either directly or by outsourcing it to specialized private companies. In the event of a disagreement between the MOP and the concessionaire, the law provides for an arbitration mechanism led by expert witnesses in advance, in order to resolve any potential conflicts.

It must be emphasized that without clearly strengthening the property rights, it is difficult for concession programs to be successful. The reforms carried out in Chile during the ‘70s considerably strengthened the property rights, in such a manner that the legislation has effectively removed the fears of expropriation.

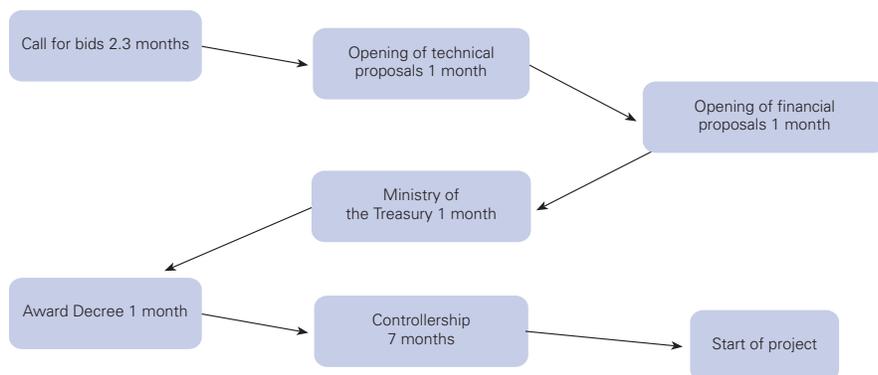
In Chile, charging tolls to use highways has a long tradition which extends throughout the country. Therefore, the residents in Chile have incorporated and accepted being charged to use public infrastructure. The concession system has extended this practice to other types of works such as urban highways, without any major opposition on the part of public opinion. The fact that a paying culture exists among citizens has contributed to reduced risks of these projects⁶⁴.

4.3.3. Current discussion of increased efficiency in the concessions system⁶⁵

a) Delays in infrastructure projects

The time that elapses from the beginning of the bidding process for a road infrastructure project until the operation definitively begins is five and a half years, according to the estimates from the Construction Chamber of Chile, who took the average of four road projects executed in the city of Santiago. It is important to point out that from the beginning of the bidding process until the works begins, a year goes by. The remaining four and half years correspond to the period of construction (31 months), and temporary start-up (24 months).

DIAGRAM 4.1: Infrastructure bidding term



Source: Chilean Construction Chamber (CChC).

63 On August 1, 2008, the MOP set terms for an infrastructure concession for the first time. The concession that dated from 1994 had serious maintenance and safety problems; in addition, due to the high cost of the toll the concessioned road of Camino de la Madera S.A. was rarely used.

64 One of the urban road work concession costs was that its implementation meant presenting a proposal to adjust rates of use of the current road, especially in the areas and times of greater congestion, which potentially would have been a more efficient alternative from the environmental and urban development point of view.

65 A good part of this section is based on the work of Engel *et al* (2008).

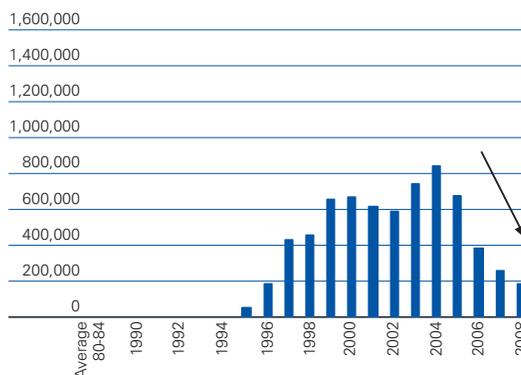
The amount of time needed for a project is unknown by the MOP before calling for bids. This period of time includes the identification of the project to be awarded, coordination with the candidates, development of a business model and the bidding conditions, and approval by the Ministry of Finance, etc. Diagram 4.1 shows the distribution of time in different stages that take place from the bid solicitation to the beginning of the concession project.

Regarding the concession of improvement projects, the Construction Chamber of Chile estimates that on average, from the request for improvements until the beginning of engineering 25 months go by. From that period, 22 months elapse in the MOP, then one more month in Treasury, and finally 2 additional months in Controllershship. In the above case, five improvement concessions were considered.

Although the amount of time is substantial, the complexity of the process limits a process that is excessively quick. However, it is possible to reduce the processing time involved between the call for bids and the beginning of the works.

Nonetheless, the amount of time a project is in the MOP before being called for bidding is of greater concern. From the peak reached in 2004, the amount invested in public works concessions has been decreasing (see Chart 4.3). The need for greater state participation in future projects, either through subsidies or regulations, imposes greater complexity to the contracts and therefore the process. Efficient and flexible mechanisms must be sought, which can set the pace for a renewed drive into the concession system in Chile. On the other hand, it is also evident that this type of project operates with declining performances: the first projects were all of high private and social profitability, but as the more complex bottle necks were resolved, marginal projects were increasingly less transparent.

CHART 4.3: Infrastructure investment in transportation by concession
(in million US)



Source: In-house, based on MOP, Midelpan, and CChC.

b) Fiscal cost for concession system: contingent liabilities

As was previously stated, under the infrastructure concessions system in Chile, that includes PPA, the State has followed a policy of offering coverage for concession companies. This has changed the role of the State in matters of public works, since the State went from providing funding to being a guarantor for projects. This change in status involved the release of resources by means of reducing public expenditure, given that now the net position of the Treasury changes when coverage is offered, not when it is undertaken.

The guaranteed minimum revenues mechanism is protection that the State provides the concessionaires against demand risk, and is activated in case there is not enough to cover a specific level of revenues. The cyclical character of this potential expense should be emphasized; the situation is delicate given that the greatest occurrence of this expense would take place at a time when there is lower level of revenues. An important part of fiscal revenue comes from income and consumption taxes; an expense that is inversely correlated with GDP would be inversely correlated to fiscal revenues.

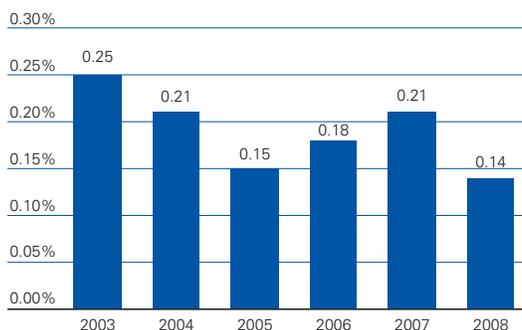
In short, although the concessions system has limited the actual expense carried out with the purpose of increasing the amount and the quality of the infrastructure, an important number of contingent liabilities have been created.

According to the Budget Office (Dipres is its abbreviation in Spanish) of the Ministry of Finance, the maximum exposition of the Treasury for this concept in 2007 and 2008 reached 3.5% and 3.72% of GDP, respectively. These amounts are obtained by calculating the amount the State would have to pay if there was no demand in the concessions that took part in the guaranteed minimum revenues. The Budget Office (Dipres) has also estimated the expected current amount of the current net minimum revenue guaranteed in the participation agreements on revenues, which activate when the demand exceeds expectations. As seen in Chart 4.4, this figure reached 0.14% of GDP in 2008, while it reached 0.25% of GDP in 2003. A reduction of the expected current expense amount for minimum revenues guarantees is due to the high growth rate of the flow of demand of road constructions during the last years.

Finally, it is important to emphasize that Dipres estimates a probability of less than 1% that the current amount of all minimum revenue guarantees in the concession system exceed 0.5% of GDP in 2008.

As required by law, the MOP must make decisions in mutual agreement with the Ministry of Finance regarding guarantees and any other type of financial commitment to be executed under the framework of the concessions system. The MOP should submit to the Ministry of Finance a matrix of fiscal risks identified in the potential concession. In addition, the Ministry of Finance must sign a supreme decree that awards the concession, and sign any amendments to the concession contract. In this manner the institutional counterweights are established that protect the fiscal budget for an unjustified exposure to contingent liabilities.

CHART 4.4: Net contingent liabilities of the concessions system, related with the MRG (% of GDP each year)



Source: Dipres, Ministry of Finance.

c) Renegotiation of concession contracts

It must be kept in mind that the *per se* concessions don't allow the State to save resources or increase social welfare. Only to the extent that the concession system is more efficient than public provision would there be gains for society. In a strict sense, the State could issue debt to carry out the infrastructure project, and would then finance the debt with future revenues that come from tolls, taxes, or any other source of public resources. Whether to undertake major future expenses or limit future revenue has the same effect: reducing the public budget. Indeed, if the private sector is exclusively more efficient than the public sector, than there is an increase in the general social welfare by licensing infrastructure; in addition, it is the State's obligation to guarantee productive efficiency by enlisting the private sector and then transferring the gains to society.

Currently, the National Congress is debating a reform of the Concessions Law, which seeks to perfect some aspects that have been observed as the system has matured. Although, the concessions system thus far has been extremely beneficial for the country, allowing it to considerably raise the stock and quality of infrastructure in Chile; the possibility of improving some aspects related to transparency and conflict resolution is under consideration.

As a result of the significant expansion of infrastructure that the concession system in Chile has produced, new projects could have a lower private and social profitability. Therefore, the errors could lead to the execution of projects with negative social profitability. Many of the new projects will not be privately profitable, and therefore will require state subsidies. That is why it will be necessary to raise the quality of contracts and the concession processes, in order to avoid, for example, excessive subsidies of concessionaires and/or the imposition of expenses and unnecessary investments on the concessionaires. These inefficient situations could eventually prevent social profitability.

Legislation based on current competitive bids has presented some problems. As emphasized by Engel *et al* (2008), the renegotiations of concession contracts have occurred

often and have included significant figures. The authors indicate that on average, each concession has been renegotiated three times and the average transfer to concessionaires has been approximately US\$ 2.81 billion (CLP 1.825 billion). In other words, 25% of all resources invested in infrastructure through the concessions system was added after the project was awarded. Additionally, more than half of the renegotiations and 83% of the amounts granted resulted in bilateral negotiations between the Ministry and the concessionaires. Only the remaining 17% was awarded through conciliatory commissions or mediation.

Frequent renegotiations of significant amounts negatively impact the system's efficiency beyond the general principle that states that "a bilateral negotiation is dominated by a competitive bid"⁶⁶. A bilateral negotiation in which it is not clear how fair compensation for the concessionaire by the authority is determined is by definition not competitive. This encourages the rise of higher payments than those considered as normal. From another perspective, we can argue that the company with the greatest lobbying capabilities will have advantages in the bid, submitting more attractive offers under the premise that they will achieve greater income in future bilateral negotiations. In addition, the MOP could neglect the design of the projects by having a chance to correct it afterwards. In short, renegotiations don't guarantee that a competitive price will be agreed upon, it leads to adverse selection, and encourages the lack of *accountability* on the part of the authority, all of which results in excessive project costs.

Finally, renegotiations allow for greater fiscal irresponsibility since the government can incur debt without going through the budgetary mechanisms stipulated in the Chilean legislature. A renegotiation constitutes a debt to the extent that the State incurs greater economic commitments, for example, by increasing subsidies or directly transferring resources to the concessionaire. Since a concession is a contract entered into by a State and a private entity in which expenses do not arise in the short term, it is not necessary that they are included in the Budget Law nor introduced in a special Law before the Congress, because they are treated the same as any expenditure incurred by the Government in accordance with Chilean legislation. In fact, according to Engel *et al* (2008), during renegotiations only a third of commitments that the State acquires correspond to the obligations for the current government in the administration, and the rest falls on those who follow.

d) Law of concessions amendments

After verifying the shortcomings described in the foregoing points, the government of President Michelle Bachelet, in July of 2007, created a concessions system reform bill. In that document it states that "The public policy's objective is focused on guaranteeing compliance of certain levels of service and technical standards, increasing the transparency of contracts while simultaneously safeguarding the conditions of free competition and equality in the award process, perfecting the mechanism to resolve conflicts, and providing the State with more efficient tools to preserve fiscal interest". The bill, which is currently in the second constitutional process stage, seeks to perfect the current system and not replace it.

66 Bulow and Klrmprrt (1996), cited in Engel *et al* (2008).

Among the main changes included in the project is the emphasis on establishing the concessionaires' obligation to maintain the level of service and technical standards according to the contract executed as the governing principle of the system. In addition, it intends to establish the possibility of conducting pre-qualifying processes of concessionaire candidates, and to be able to limit the number of candidates in the case of very complex projects. The concessionaire can request economic compensation as a result of an action from the authority in only specific circumstances. The objective is to clearly and precisely establish the situations that would give way to economic compensation for concessionaires. If as a result of the amendments, the new investments required exceeds 5% of the initial infrastructure budget of the MOP (Ministry of Public Works) during the period of management, and this is equal to or higher than UF 100,000 (US\$ 4.2 billion), the implementation shall have to be tendered by the concessionaire awarded under the supervision of the MOP.

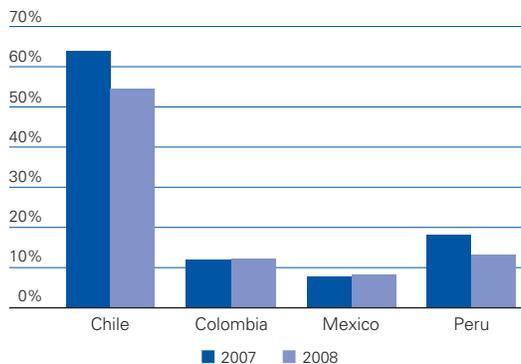
In addition, maximum terms are established to fulfill a series of processes that the MOP must implement. The powers to sanction are extended, as well as the authority to inspect and supervise, and the concessionaire shall have the obligation to provide truthful information in a timely manner.

It is important to highlight that these reforms shall not apply to the bidding concession contracts prior to the enactment of the future law, unless the concessionaire chooses to accept the new law.

4.4. Pension funds and infrastructure investment

In developing economies with shallow capital and financial markets, long-term investments are not usually available. This is why the main sources of national capital are pension funds and insurance companies. These have an important capacity for investment given that the majority has currently available resources, although their obligations are long-term.

CHART 4.5: Pension funds
(% of GDP 2007-2008)



Source: ERD BBVA.

4. Pension funds and infrastructure in Chile

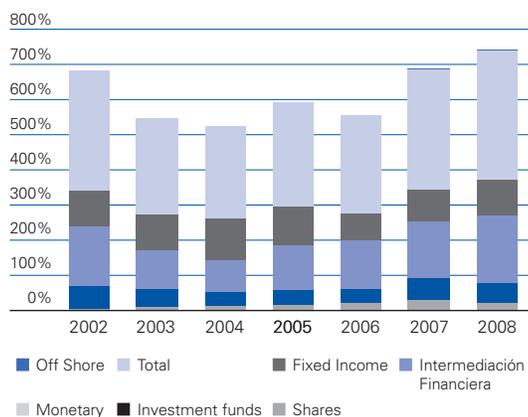
As seen in Chart 4.5, pension funds have accumulated massive amounts of capital in comparison with the whole economy, which relates to the time that has elapsed since the reforms were implemented and the high profitability of these investments (9.19% real annual average since June of 1981 to July of 2009). As already established, Chile was the first country in Latin American to implement an individual pension fund structure, and therefore it is the country with the greatest amount of pension funds as a percentage of GDP⁶⁷.

The pension funds in Chile can invest exclusively in financial instruments and the sole objective with regard to investments from the PFM's is to achieve the maximum returns possible with reasonably limited risk.

There are two ways in which pension funds can invest in the infrastructure sector. The first includes the purchase of stocks and bonds issued by privatized infrastructure companies, such as electricity, health and telecommunications companies (indirect investment). The second corresponds to the purchase of bonds from concession companies of infrastructure projects (direct investment).

The acquisition of stocks and bonds from private infrastructure companies, except at the time the instruments are issued, does not necessarily constitute financing for new projects, or increasing or improving existing infrastructure. That is to say, the acquisition of stocks and bonds from companies is not investment, in the economic sense of the word. This does not imply that pension funds have not contributed to the increase in these types of infrastructure investments (electricity, telecommunications, health, water and gas distribution sectors). The investments made by pension funds have had a positive effect on said sectors in an indirect manner, by deepening the financial system. Pension funds manage huge amount of resources (US\$ 102,221 million in July of 2009)

CHART 4.6: Annual operations in Chilean capital markets
(% of the GDP)



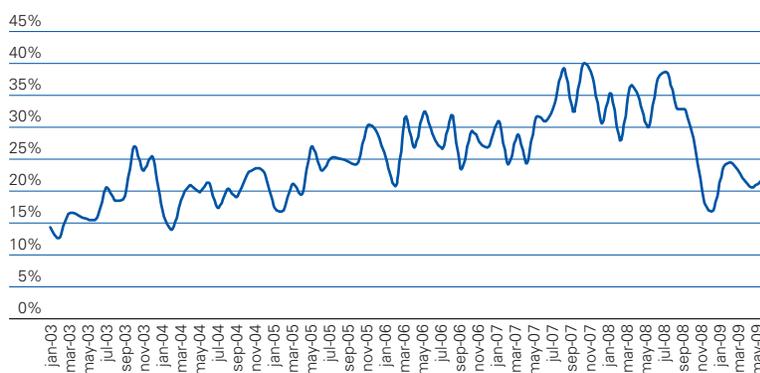
Source: AFP Provida.

67 Chile carried out its reform in 1981, Colombia and Peru in 1993, Argentina in 1994, and Mexico in 1997.

and a large part of these are invested in the domestic market (64.8% to July 30, 2009). This has contributed to stimulating the depth of the national financial markets, increasing the availability and alternatives for capitalization for Chilean companies, and specifically aiding those for who manage or construct infrastructure for a living.

In addition, investment requirements in pension funds materialize over prolonged periods of time, which energizes and provides stability to the market. Although pension funds have been an important catalyst of investments in infrastructures in Chile, the improvements in the individual fund system are closely related to the contributions to the economy in Chile through contributions to improvements in the financial and capital markets. Charts 4.6 and 4.7 demonstrate how, despite the Chilean economy's continuing development, its financial market has reached a certain depth.

CHART 4.7: Forward operations amount (% of GDP)



Source: AFP Provida.

4.4.1. Investment in infrastructure sector companies

According to data from the Pensions Commission of Chile, the investment of pension funds in stocks and bonds of companies in the electrical, telecommunications, and water sectors reached US\$ 9,979 million (CLP 5,640 billion) at the end of May of 2009 (see Table 4.1).

TABLE 4.1: Pension funds investment in stocks and bonds issued by companies from the electricity, telecommunications, natural gas and water sectors (May 29, 2009)

	Shares		Bonds		Total	
	MMUS\$	Pension Funds %	MMUS\$	Pension Funds %	MMUS\$	Pension Funds %
Electric	5,485	5.9	2,133	2.29	7,618	8.19
Telecommunications	864	0.93	325	0.34	1,189	1.27
Natural gas and water	329	0.36	833	0.85	1,162	1.21

Source: Superintendencia de PFA.

Table 4.2 shows the correlation between the share from each of the five types of funds and the stock market sub index in Chile, which corresponds to the utility sectors (electricity, gas and water) and telecommunications between March, 2006 and March, 2009. The correlation between the funds and the share index is low, specifically in the case of the telecommunications sector. It is expected that no instrument will show an elevated correlation (above 0.8) with the pension funds, given that they are highly dispersed. The pension funds in Chile as of December, 2008 had invested in more than 48 thousand different instruments, from more than 500 sources, located in approximately 60 countries. Therefore, no specific instrument should contribute to the reduction of pension funds portfolio risk, given that their portfolio risk is equal to the systematic risk.

TABLE 4.2: Correlation coefficient: IPSA profitability by sector and nominal profitability of the share for each pension fund type

(from March, 2006 to March, 2009)

	A	B	C	D	E
Ipsa sectorial Utilities	0.44	0.50	0.58	0.61	-0.02
Ipsa sectorial Telco	0.22	0.26	0.33	0.32	-0.20

Source: AFP Provida.

4.4.2. Investment in new infrastructure projects

In general, financing infrastructure projects is very complex due to: i) their long-durations (15 to 30 years) that require a deep capital market, ii) the large sums involved, and iii) physical assets that cannot easily be pledged.

As shown, the individual pension fund system accumulates a significant amount of resources that can be invested long term. This happens in a context in which developing economies (either because they lack a dimension or lack the necessary depth of their financial and capital markets) are not able to absorb all these resources without incurring high costs in terms of risk or profitability for the pension funds. While this happens there are unsatisfied investment needs in these economies (such as infrastructure projects) which not only deliver attractive private returns to the funds, but also generate many social benefits by promoting growth, competitiveness, and equality in these countries.

Nonetheless, there are regulations that typically are present in countries that have implemented a private pension system that limit pension fund involvement in private infrastructure projects, particularly in financing new infrastructure projects or through the *project finance* of infrastructure.

The pension fund investment regulations that hinder participation in financing new projects⁶⁸ are:

68 Following Vives, 1999.

- *Rating*: It is required that values are rated by an independent risk-rating agency to assess risk properly.
- *Liquidity*: Broadly speaking, the holding of securities that cannot be traded or lack a significant level of liquidity is forbidden or limited. This is to make portfolio valuations easier and more transparent. There are even regulations that establish specific liquidity ratios.
- *Valuation standards*: The majority of regulations require an estimate of the portfolio at market value, which can produce a bias towards investments that are frequently traded. This makes infrastructure investments difficult, as the instruments used to fund these assets are not often bought and sold.
- *Allowed Investments*: By setting up individual fund systems, this leads to the implementation of fairly restrictive standards in terms of the type of instrument that can be invested in. Subsequently, in a progressive manner, and at the same time as capital markets develop and confidence in the system grows, the regulation starts to allow investment in different instruments.
- *Performance Assessment* The performance of Pension Fund Administrators (PFA) of Chile are assessed by the return reached by each fund every month. The law requires that real annual profitability of each fund is to be at a higher level, established as “minimum”. The minimum profitability is established in relation to the average real annual profitability level of all the same type of funds in the past 36 months. If the real annual profitability of a fund is, during a specific month, lower than the minimum profitability, the Administrator shall compensate the fund for the difference. This encourages mob behavior, where the variation in the composition of portfolios among administrators is very low, given that there is a preference for investment in instruments that are relatively short-termed, with low risk, and thus minimize the possibility of moving away from the average profitability of the system.

The pension funds investment regulation prevents them from being invested in companies without a representative track record, particularly companies that do not have a 3-year record of audited balance sheets, with the last 2 years posting operating profits. In general, pension funds cannot invest in companies that, given the absence of a relevant track record, cannot be rated or given an investment grade.

As it was previously described, Chile’s concession system obligates successful bidders to incorporate as a concessionary company, who shall execute and explore the public works awarded. That is to say, the issuing company does not have a track record, capital, or independent resources apart from the project awarded. Consequently, it does not qualify as an investment acceptable for pension funds.

The logic behind these regulations is to protect the pension funds from taking excessive risks. In *project finance* or new project financing, the risk of investment is equal to the risk of the project, given that the instrument’s backing comes from future returns of the project, as opposed to what occurs when purchasing traditional financial instruments that are backed by an operating company’s assets.

Initially, the participation of pension funds in financing infrastructure concessions was limited. The authorities expressed that even though the regulations' aims were relevant, it must be possible to create alternative solutions or regulations to help pension funds invest in these projects. The Ministry of Finance and MOP (Ministry of Public Works) requested a study in order to assess the feasibility of developing a new instrument to help pension funds take part in infrastructure funding. Such an instrument had to be an attractive investment vehicle for pension funds, but at the same time, a good financing alternative for companies awarded concessions. As a result of this research, the *Infrastructure Bond* was created in 1998.

4.4.3. Bond characteristics for infrastructure concessions

Bonds for infrastructure concessions can be issued both before and after the infrastructure begins operating. In both cases, the bond is backed by the concession's future income, meaning that the main funding element is the flow from tolls and other operational income. Even though there are different ways to structure a project's financing, the specific form that is adopted shall have the characteristics of the concession, access and cost of banking products, the structure of the market in which the financial instruments are intended to be issued, as well as accessibility to the financial market.

The principal client for the infrastructure bonds, due to their higher rates and long term maturity, are institutional investors: life insurance companies and pension funds. These investors don't necessarily coincide fully in their preferences for the fixed interest characteristics of these instruments. While life insurance companies show great interest for instruments that allow them to meet their long term obligations, pension funds do not authorize long term issuances, demonstrating a large bias towards relatively short investments. In addition, the regulation that seeks to be compatible with insurance companies requires a fixed coupon rate for long term bonds rated BBB (or higher) with no prepayments. For their part, the pension funds are evaluating the investments' internal rate of return (IRR), which in the case of bonds translates into not having a preference in relation to the characteristics of each coupon rate or the existence of prepayments. Finally, even though pension funds prefer issuances in UF⁶⁹, the insurance companies require—as a result of the corresponding regulation—that long term instrument terms be stated in UF.

An additional factor to consider is the lower liquidity of the corporate bond market in Chile, which is due to the relatively low frequency of issuances and why the pension funds tend to purchase them and keep them in their portfolio until the maturity date. Both situations have resulted from deep deficiencies in the debt market in the country. The lack of continuity in the market does not have any major effects on the demand from insurance companies, but it does have a negative effect on pension funds.

A fundamental aspect that bond investors assess is the rate of risk. This is particularly significant for institutional investors, given that there are regulations that directly refer to the necessary rating of the financial instruments in their investment portfolios. This risk rating is basically an opinion regarding the probability that the bond issuer will

69 UF is a unit of account that can be continually adjusted to inflation. As to May 30, 2008, a UF was equal to US\$ 42.

comply strictly with the commitments acquired in the bond issue contract. Unlike other risk analyses (such as those used in banking), the rating places special emphasis on the full and timely payments stipulated in the bond. Therefore, a bond that delays its coupon payment immediately falls into *default* and is rated a D, even if the creditors don't necessarily lose their investment. Finally, the risk rating does not place great significance on the existence of guarantees that are not immediately executable.

To rate a bond issued by a road infrastructure concession company, the estimated traffic will be important, given that it will determine the expected capacity to generate income flows to compensate the investment and operational expenses; in other words, the demand will be the most important factor when it is time to rate the project. Typically the future demand for a road infrastructure is one of the most complex estimates that must be done in order to evaluate the project.

If there are subsidies or other state support, such as a guaranteed minimum revenue, these may also be relevant to determining the projected cash flow, and therefore, the investment grade given the instrument that finances this project.

With pre-operative bonds, the risk of the instrument increases given that in addition to the uncertainty regarding future demand, the risk of construction is included. In order for one of these instruments to reach an investment grade rating it must have a legal and financial structure that covers all relevant risks during the construction stage. The alternatives in order to limit pre-operative risks are: buy insurance and/or third party guarantees, or execute lump-sum or turn-key contracts; these solutions transfer the risk of construction to the concessionaire or the financial institutions involved to the building company that executes the infrastructure. Using these mitigation mechanisms, the risks during the pre-operative period are reduced to maintain expense levels in line with the budget, comply with technical demands, and finish the work within the initial stipulated term. A delay in the starting up service, either as a result of construction delays or the need to perfect the works in order to comply with the technical demands may represent a serious obstacle, given that the delays could prevent that the bond comply with the commitments on time, falling in *default*, unless the concessionaire obtains financing for the bond payments until it starts receiving revenues.

The existence of legal structures and contracts that protect the holders of bonds is fundamental in the rating of bonds. According to Standard & Poor's⁷⁰, legal safeguards that are key for this type of bond are:

- *Guarantees for bond holders:* In 1996, "a special pledge for public work concession" is created in Chile that may side with the right of a public works concession regarding the payment agreed to by the State to the concessionaire and regarding the company's revenues.
- *Rate adjustment mechanism:* in Chile the flexibility of rates are limited to a maximum amount per type of vehicle and to levels of traffic established in the concession con-

70 In Feller Rate, 1998.

tracts. However, the rates are indexed to inflation and include an increase in real terms during the period of the concession.

- *Preferred debt:* Chilean regulation forbids the issue of preferred debt.
- *Establishing a reserve account that allows for coverage of obligations for up to one year:* Chilean law considers the possibility of voluntarily stipulating during bond issuance the establishment of a special guarantee fund for the benefit of holders. The majority of bond issuance contracts for infrastructure in Chile have set up reserve accounts to finance bond payments.
- *Structure in which the issuer is the owner or controller of the infrastructure works:* in Chile, the law sanctions detachments of essential assets by title issuers; if that occurs the full bond payment is triggered. The bonds issuer for infrastructure is the concession company that controls the infrastructure project. If the concession company wanted to end the concession, it would have to pay all debt obligations arising from the bonds.
- *Exclusive draft from issuer:* Chile's concession system requires that the concession company incorporate as a concessionary or vehicular company, whose sole purpose would be to build and operate the concession.
- *The issuer's autonomy in the event of bankruptcy:* Chile's legislation establishes that in the event of bankruptcy, the legal security (in this case "special security for public works concession") will be excluded from the net worth of the person who filed for bankruptcy proceedings, for which they may only be attached to by creditors, hence bondholders may collect the total amount owed to them. In the case of infrastructure bonds, the creditors will have to state whether to auction the concession or continue, in effect, with the concession business activity. If there is no agreement, the concession shall proceed to be auctioned in order to reimburse its capital.

In addition, and closely related to the criteria regarding the legal structure for the protection of bond holders, it is fundamental to evaluate the quality of the institutions and the economy of the country in which the concession was granted. The quality of the institutions and its political stability guarantees that legal commitments are effective and not merely nominal. In that regard, it is important to highlight that in March, 2009, during the world economic and financial crisis, Standard & Poor's gave Chile an AA rating with a stable prospective, and cited their fiscal discipline, stability, economic predictability and the solidness of public institutions in their press release.

In the infrastructure bond rating reports, the Chilean State's commitment to the concessionary system has always stood out as a strength, which is evidenced in its efforts to create a defined institutional framework to develop these investments⁷¹.

Taking into consideration the previously described restrictions, the infrastructure bond was developed in 1998 in order to allow funding for concessions. The infrastructure

71 See Ley de Concesiones de Obras Públicas (Public Works Concessions Law).

bond is a debt document issued by companies awarded concessions. As a result of the insurance companies' (one of their primary suitors) matching regulations, the bonds have no pre-payment option. In general, infrastructure bonds are 100% guaranteed by insurance policies issued by international insurance companies⁷², which gives them an external credit backing that enables them to achieve better ratings by replacing the issuer's risk with that of the insurance company.

In Chile, two types of infrastructure bond issuance contracts have been developed:

Pre-operative Bond: The bond is issued once construction on the public work has begun and before it is finished. This is a bond to finance a project or *project finance*, given that the debt will be used to carry out a project and the payment of this debt fully depends on its success. A successful placement should raise funds that allow for financing costs incurred up to the moment of issuance, and those that materialize up until the project is operational. These bonds have been irrevocably and unconditionally guaranteed by international insurance companies, which guarantee full payment of the principal and interests outlined in the issuance contract. The Variante Melipilla concession bonds were issued in June of 2003, with a rating of AA- by Feller Rate; this was the first pre-operative bond that did not have backing from an international insurance company. This bond was structured on the base of subsidies and minimum guaranteed cash flows, estimated net operational expenses⁷³. In addition, it has a *performance bond* type policy in the construction contract, which mitigates the risks during the period the work is under construction.

Operational Bond: This bond is issued during the public work's operational stage, in other words, once permission has been given by the MOP to start operating the infrastructure and the concessionary company is fully entitled to operate and exploit the project. This is a pure revenue bond, since the debt is issued to fund a finished project and, and the debt repayment is exclusively backed by the project's future revenues. The issuance should raise the full investment pre-payment, carried out for the construction of the work. Typically the concession company has turned to bank loans, meaning that the amount issued must cover the repayment of principal, interest, and other related costs.

Table 4.3 shows a list of Chilean infrastructure bonds, with some of their characteristics.

The majority of infrastructure bonds initially issued in Chile have corresponded to expansion and improvement of existing infrastructure, which positively impacts the rating, because it significantly decreases the uncertainty regarding the costs of construction, and thus the demand estimate is significantly simplified, given that there is prior experience on which to project future revenues.

⁷² It has been argued that in the case of Chile, especially with operational bonds, it could lead to a situation of over-reduction of risks.

⁷³ As of July, 2009, the concessionaire has not been able to collect state compensation for minimum revenues guaranteed.

TABLE 4.3: Chilean infrastructure bonds

	Series	U.F. amount	Annual rate	Issue date	Bond duration	Payment frequency
BOND NAME						
Soc. concesionaria rutas del pacifico (concession company)	A	1,000,000	5.50%	09/04/02	11 years	Semi-annual
	B	10,423,000	5.80%	09/04/02	22 years	Semi-annual
	C	1,000	5.80%	09/04/02	22 years	Semi-annual
Soc. concesionaria autopista del sol (concession company)	A	4,325,000	5.80%	09/05/02	16 years	Semi-annual
	B	1,215,000	5.80%	09/05/02	16 years	Semi-annual
	C	970,000	4.00%	28/06/06	12 years	Semi-annual
Soc. concesionaria autopista los libertadores (concession company)	A	1,360,000	5.00%	09/04/03	8 years	Semi-annual
	B	2,252,000	5.80%	09/04/03	23 years	Semi-annual
	C	1,199,200	3.40%	18/01/07	18 years	Semi-annual
Soc. conces. autopista aeroportuaria (concession company)	Single	990,000	4.25%	26/01/06	24.5 years	Semi-annual
Soc. conces. Melipilla, S.A. (concession company)	Single	660,000	6.50%	17/07/03	21 years	Semi-annual
Autopista del Maipo soc. concesionaria (concession company)	A	5,800,500	4.85%	13/10/04	21 years	Semi-annual
	B	6,000,500	3.20%	20/12/06	24 years	Semi-annual
Talca-Chillán soc. concesionaria (concession company)	A	4,821,000	8.15%	13/11/98	9 years	Semi-annual
	B	5,650,500	2.75%	30/06/05	14 years	Semi-annual
	C	1,124,500	3.50%	26/10/06	15 years	Semi-annual
Ruta del bosque sociedad concesionaria (concession company)	A	7,801,000	6.30%	21/03/01	20 years	Semi-annual
	B	1,500,000	3.36%	16/11/06	23 years	Semi-annual
Ruta de la Araucanía soc. concesionaria (concession company)	Single	7,231,000	7.30%	01/08/00	20 years	Semi-annual
Scl. terminal aereo Santiago S. A. Soc. conces. (concession company)	Single UF	2,961,000	4.00%	17/11/04	15 years	Semi-annual
Soc. concesionaria autopista central (concession company)	Single UF	13,000,500	5.30%	25/09/03	22 years	Semi-annual
Soc. concesionaria Vespuccio Norte Express, S.A. (concession company)	Single	16,000,500	5.30%	24/06/04	24.5 years	Semi-annual
Soc. concesionaria Costanera Norte (concession company)	A	1,900,000	5.00%	11/12/03	13 years	Semi-annual
	B	7,600,000	5.50%	11/12/03	21 years	Semi-annual
Soc. concesionaria autopista Vespuccio Sur, S.A. (concession company)	A	5,000,500	4.59%	11/11/04	24 years	Semi-annual
FOREIGN MARKET						
Autopista del Maipo Soc. concesionaria (concession company)	Single US\$	421,000,000	7.373%	29/08/01	21 years	Semi-annual
Soc. concesionaria autopista central (concession company)	Single US\$	250,000,000	6.223%	15/12/03	22 years	Semi-annual
Scl terminal aereo Santiago S.A. (concession company) Soc. conces.	Single US\$	213,000,000	6.95%			Semi-annual

Note: UF is a unit a account that can be continually adjusted to inflation. As of May 30, 2008, a UF was equal to US\$ 42.
 Source: In-house, based on information from MOP.

Operating expenses for road infrastructure concessions are considerably less than operating revenues and are more predictable. The expenses that represent a significant risk during the management stage of the infrastructure project are those pertaining to maintenance, which in general involve higher amounts. The concession companies have established reserve accounts to pay for these eventual expenses independently from the reserve account for servicing the debt. This is usually established starting from the operational revenues, once the financial commitments are met. On occasions, it is also established with part of the resources obtained from the bond issuance.

A very important aspect of the concession system's success, as well as the rating of the infrastructure bond, is the technical and administrative quality of the bidding companies. In general, the Chilean experience has included large international companies devoted to the construction of infrastructure works and administration, which has provided an additional guarantee of security that is related to the concessionaire's capacity to successfully carry out infrastructure projects.

In the case of Chile, it should be taken into account that the MOP (Ministry of Public Works) offers the bidding companies the possibility of benefiting from the minimum guaranteed revenues, in exchange for sharing a percentage of the benefits (around 50%) with the State when they exceed a certain threshold (generally 15% of the assets or equity).

The existence of a minimum guaranteed revenue reduces the uncertainty related with the projection of future demands⁷⁴. This considerably raises the probabilities and conditions to obtain financing, which substantially improve the infrastructure bond. In fact, there are projects in which the presence of the minimum revenue guarantee can be critical for the infrastructure bond to reach investment grade; this happens when the risk of future demand is too high or where periods of lower revenues are expected⁷⁵. On the other hand, if the project presents a higher and more stable demand estimate, the insurance granted by the minimum revenue guarantee shall not be necessary to reach investment grade, although it could improve the risk grade obtained.

The projects that critically depend on the minimum revenue guarantees to insure cash flows must have additional liquid financing mechanisms. In the minimum revenue guarantee scenario, the State pays the difference between the effective annual revenue and the minimum guaranteed revenue for the following year. The concessionaire should be able to settle all the obligations that result from the bonds until the State makes the payment. Even though there is security regarding payment, which is reflected in the high rating achieved by the State of Chile, the contract establishes a one year period between the receipt of the lesser revenues and the payment. In addition, there is the possibility that the State will be delayed, in which case it shall pay the principal plus in-

74 In general, the demand models overestimate actual traffic. According to an analysis by Standard & Poor—cited in Feller Rate, 2003—that took 32 concession distributed throughout the world, and find that in only 4 cases traffic was underestimated, while in all other cases there was an overestimate between 18% and 34% of the average.

75 A project may have unstable revenues if, for example, the demand strongly depends on an economic cycle.

terests related to the delinquency, given that contingent liabilities don't have a legal rating for public debt. To deal with this possible financial imbalance, the concession company will have to set up a reserve account or obtain a bank credit⁷⁶.

The State considers the undertaking of unprofitable, but socially beneficial, infrastructure concessions through its concessions mechanism. In those cases, it is established that the MOP (Ministry of Public Works) pays a subsidy to the concession company. The subsidy assumes a known amount indexed to inflation, which is established in the concession contract. The payment is made no matter what, thereby eliminating the demand risk and replacing it with the risk of the State of Chile. This eventually results in infrastructure bonds reaching investment grade once the estimated reasonable expenses become known. In addition, good administration is indispensable, given that as it was previously stated, there are circumstances that allow suspending the concession.

One alternative that has not yet been implemented in Chile, but which is theoretically feasible, is to issue securitized infrastructure bonds against the rights granted by the concession system to the concessionaire. In Chile, the Superintendencia de Valores y Seguros (Securities and Insurance Commission) established that only credit securities can be securitized, meaning that the right to receive tolls could not be considered as a securitized asset. State subsidies for unprofitable concessions could be considered a credit security, however, since an established payment schedule has been set out in the bidding contract. Chilean infrastructure bonds have been rated AAA when issued, except in the case of Melipilla and Autopista Interportuaria bonds, which were rated AA- and A+ respectively. As the *Feller Rate* rating agency states "all [infrastructure] projects awarded the AAA category have enough strengths to hold an investment grade from a risk perspective, both on a local and global scale; the awarded rating is a result of the issuer having an irrevocable and unconditional guarantee policy, granted by an international insurance company for full payment within the dates set out in the contract".

Nonetheless, as seen in Table 4.4, the recent *Subprime* economic crisis affected some insurance companies by decreasing their rating on a global scale; this has had a negative effect on some infrastructure bond ratings. Nevertheless, these bonds have maintained their investment grade and a rating above the one reached by the insurance companies in question. In effect, during the crisis, the insurance companies for the majority of these bonds, *XL Capital Assurance Inc* and *MBIA Insurance Corp.*, suffered consecutive declines in ratings until they reached the "BBB-" rating with negative perspectives. The reason for this is that concessions that backup bonds, in the absence of guarantees, have maintained greater strength during the crisis than the actual insurance companies. As emphasized by *Feller Rate* in their press release on June 18, 2008, "despite the insurance bond ratings, in the future these may be affected by a fall, before a possible new rating on a global scale *XCLA*, and according to the current antecedents that *Feller*

76 To the extent possible, given that in general bond issuance contracts establish maximum limits of debt on the issuer. If these limits are not complied there are penalties, such as the activation of the full payment of issued bonds.

TABLE 4.4: Risk rating of infrastructure bonds

Bond name	Issuance	2008	Aug. 09
Soc. Concesionaria Rutas del Pacifico	AAA	AAA	AAA, stable
Soc. Concesionaria Autopista del Sol	AAA	AAA	AAA, stable
Soc. Conces. Autopista Los Libertadores	AAA	A+	A+, negative
Soc. Conces. Autopista Interportuaria	A+	A+	A+, stable
Soc. Conces. Melipilla, S. A.	AA-	A-	A-, negative
Autopista del Maipo Soc. Concesionaria	AAA	AAA	AAA, negative
Talca-Chillán Soc. Concesionaria	AAA	AAA	AAA, stable
Ruta del bosque Sociedad Concesionaria	AAA	A+	A+, negative
Ruta de la Araucanía Soc. Concesionaria	AAA	AAA	AAA, stable
Scl. Terminal Aereo Santiago S. A. Soc. Conces.	AA	AA	A+, stable
Soc. Concesionaria Autopista Central	AAA	AAA	AAA, stable
Soc. Concesionaria Vespucio Norte Express, S. A.	AAA	AAA	AAA, stable
Soc. Concesionaria Costanera Norte	AAA	AAA	AAA, stable
Soc. Concesionaria Autopista Vespucio Sur, S. A.	AAA	A+	A+, negative

Source: In-house, based on information from de Feller Rate, Humphreys, and Standard and Poor's.

TABLA 4.5: PFA Investment in Infrastructure Bonds (as of May 30, 2008)

Bond name	MUS\$	U.F.	Aug.09
Soc. Concesionaria Rutas del Pacifico (Concession Company)	155,143	3,709,949	33%
Soc. Concesionaria Autopista del Sol (Concession Company)	139,82	3,343,572	52%
Soc. Conces. Autopista Los Libertadores (Concession Company)	53,229	1,272,859	27%
Soc. Conces. Autopista Interportuaria (Concession Company)	8,871	212,127	21%
Soc. Conces. Melipilla, S. A. (Concession Company)	0	0	
Autopista del Maipo Soc. Concesionaria (Concession Company)	212,951	5,089,929	43%
Talca-Chillán Soc. Concesionaria (Concession Company)	162,486	3,885,539	34%
Ruta del bosque Sociedad Concesionaria (Concession Company)	199,759	4,776,868	52%
Ruta de la Araucanía Soc. Concesionaria (Concession Company)	125,126	2,992,161	42%
Scl. Terminal Aereo Santiago S. A. (Concession Company) Soc. Conces.	104,273	2,493,490	84%
Soc. Concesionaria Autopista Central (Concession Company)	257,180	6,149,968	47%
Soc. Concesionaria Vespucio Norte Express, S. A. (Concession Company)	301,906	7,219,519	45%
Soc. Concesionaria Costanera Norte (Concession Company)	155,317	3,714,106	39%
Soc. Concesionaria Autopista Vespucio Sur, S. A. (Concession Company)	80,651	1,928,608	39%
Total	1,956,612	46,788,694	42%

Source: In-house, based on information from Standard and Poor's.

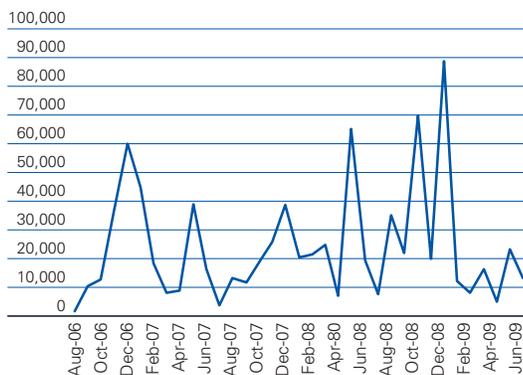
4. Pension funds and infrastructure in Chile

Rate has in regard to the issuance; it is possible to expect that the scope of the potential falls could be delimited by the corresponding subcategories to an “A” rating rank. The latter results from the bond ratings supported by the risk of the issuer, which would be first in a scenario in which the guarantor’s capacity to pay the bonds is lower than the individual capacity of the issuer.”

On May 30th, 2008 the PFAs maintained an investment of US\$ 1,957 million (CLP 1.105 billion) in infrastructure bonds on the national market. As shown in Table 4.5, the pension funds have investments in all bonds except the Melpilla, S.A. Concession Company. The current amount invested is equal to 42% of the amount issued, which constitutes the basis for the total investment carried out by the PFA on these instruments; this is because it has been several years since the majority of bonds were placed -none of them were bullet bonds- and to date, the bonds have already paid coupons, meaning that the total direct investment from the PFAs in infrastructure bonds exceeded 42%.

Chart 4.8 shows the monthly figures that the negotiated infrastructure bonds reached in the Chilean market. It is observed that with certain variability, the infrastructure bonds maintain a scarce presence in the market, which demonstrates its lower liquidity.

CHART 4.8: Infrastructure bonds
(Monthly operations in million US)



Source: AFP Provida

Regarding the contribution that infrastructure bonds could make to diversification, we must state again that pension fund investments are strongly fragmented, and therefore it would be unlikely that one instrument would contribute to the diversification of the pension funds portfolio. The first column of Table 4.6 shows the covariance and correlation coefficient between the profitability of each type of fund and the infrastructure bonds. According to what was expected, the infrastructure bonds appear not to show an analogous movement with the pension funds.

TABLE 4.6: Covariance and correlation coefficient: profitability of infrastructure bonds and the share value of each type of pension funds (September, 2002 to June, 2009)

	Average Bond Profitability	Fund A	Fund B	Fund C	Fund D	Fund E
Covariance						
Average Bond Profitability	1.8807E-05					
Fund A	4.72412-E07	5.27943E-05				
Fund B	5.96557E-07	3.68034E-05	2.62801E-05			
Fund C	9.13953E-07	2.31978E-05	1.68087E-05	1.1236E-05		
Fund D	9.3299E-07	1.2241E-05	9.04188E-06	6.2629E-06	3.83928E-06	
Fund E	1.20378E-06	1.60815E-06	1.31621E-06	1.24671E-06	1.24132E-06	1.39022E-06
Correlation						
Average Bond Profitability	1					
Fund A	0.014992275	1				
Fund B	0.02683371	0.988055203	1			
Fund C	0.06287212	0.952458607	0.978170837	1		
Fund D	0.109797582	0.859801694	0.900160679	0.953551411	1	
Fund E	0.235420866	0.187711875	0.217755936	0.315439814	0.537299546	1

Source: AFP Provida

4.4.4. Real estate funding

Since their inception, pension funds have contributed to finance housing, because of requirements that investments match the payment horizon of mortgage debtors (12-20 and up to a term of 30 years). In addition, very secure real estate investment alternatives exist, such as mortgage notes, which satisfied the need for low risk that the system required at the beginning.

The mortgage notes are documents issued by banks and financial companies to defray the mortgage loans they issue. These instruments readjust with inflation, and cannot finance more than 75% of the value of a house. The notes are handed over by the issuing bank to be traded on the Stock Exchange. They may also be purchased by the actual bank or an associated third-party. The notes pay equal coupons quarterly, and can be issued for terms of up to 20 years. The price obtained by the sale of these bonds varies according to market conditions, so that there may be a variation with respect to a par value difference, which is charged to the debtor.

The notes are guaranteed by the issuing bank, which in turn has the pledge of the property that was purchased with the note. If the debtor does not pay the mortgage, the bank still must comply with the commitments of the note it issued. To recover the

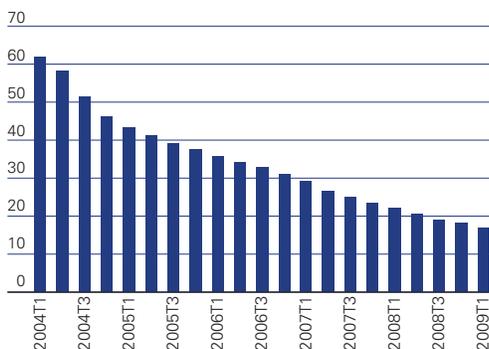
4. Pension funds and infrastructure in Chile

funds, the debtor’s mortgage guarantee will have to be liquidated. This way, the issuing bank is a joint co-debtor. At the same time, the impossibility of financing more than 75% of the house value by means of mortgage notes significantly reduces the risk. In August 2009, the regulation was amended, creating a new category of mortgage notes that allowed financing up to 100% of the house’s value; this type of note can only be issued by banks with high solvency ratios, which thus maintain the low risk of the instrument.

Funding with mortgage notes began in 1977 and was practically the only financial instrument to purchase a home. They had a significant secondary market among institutional investors, and given the differences between the bank bonds and the companies, the mortgage notes were issued frequently, since a continuous market existed.

Since 2005, mortgage notes have been progressively replaced in the mortgage funding market by direct bank loans. Each bank finances the mortgage credits it gives its clients, by issuing bank bonds.

CHART 4.9: Mortgage bonds
(% house issuance)



Source: SBIF and BBVA

There are several stages of real estate investment by pension funds. Starting with the individual funds system in 1981, and during the entire decade of the 80’s, the PFAs concentrated their investments principally in very low risk instruments due to the lack of maturity of the system and the capital markets in Chile, in addition to the serious economic crisis of 1982.

Mortgage notes averaged 30% with a cap rate of 51% in PFAs portfolios in 1983. Investments that finance bank mortgage operations are attractive instruments for the PFAs due to the variety of issues and terms; in addition, they offer a double guarantee and are more liquid than other fixed interest instruments traded in Chile.

PFAs were authorized in 1990 to invest in shares of mutual funds and real estate investment trusts. In turn, this was invested in hotels, office buildings, commercial centers,

mortgage loans, etc. Even though mutual fund shares are riskier than mortgage notes or bank bonds, they experience higher profitability on average. By May 2008, pension funds had US\$ 893,049 million (CLP 430 million) invested in real estate investment trusts.

Currently, PFAs can invest in several types of instruments that are related to the real estate sector such as bank bonds, real estate investment trust shares, and securitized bonds. Direct investment in real estate, investment in endorsable mortgage loans, as well as issuing mortgage loans are forbidden for pension funds. This is because the heterogeneity of direct real estate investment limits the adequate valuation of portfolios, and because the PFA does not have experience managing mortgage loans, so that the gains from the specialization would be lost. Consequently, it is stipulated that pension funds invest in financial instruments that have a high level of homogeneity, and for which there is a deep market that can be invested in through specialized intermediaries. One of the most important reasons to not directly invest pension funds in real estate is that it increases conflicts of interest on the part of retirement-savers, who could affect future pensions by manipulating the housing market.

4.5. Conclusions

During the early '90s there was a significant infrastructure deficit in Chile. According to estimates conducted in 1993 by the Chilean Ministry for Public Works (MOP), the infrastructure deficit for the period between 1995 and 1999 amounted to approximately 15% of the country's GDP and that annual losses due to decreased competitiveness as a result of insufficient infrastructure amounted to 3% of the Gross Domestic Product.

Consensus was reached as to the level and quality of public infrastructure necessary to support a rapid growth process. The traditional system for executing public works was deemed insufficient to tackle the perceived high infrastructure deficit and as such, a technical and political agreement was reached regarding the allocation of the country's resources. In this way, the conclusion was reached that the best option was to incorporate the private sector in the investment of productive infrastructure, which led to the implementation of a concessions system in 1993.

The new concessions system implemented in Chile was the BOT (Build, Operate and Transfer) type, which means that the concessionaire has to fund, build, operate and ultimately transfer ownership to the State. In other words, although the infrastructure is at all times property of the state, the state allows a private company to operate it for an extensive period of time in exchange for constructing it. This policy, together with increased public investment in the industry, helped Chile to progressively reduce the infrastructure deficit that was hindering its economic growth.

Chile's concession laws establish that there must be a competitive bidding process open to any national or foreign company. The law allows for different variables to be evaluated in the bid, such as the fee users would pay, the length of the concession and the fee adjustment mechanisms, among others. The bidding conditions may include multiple variables by which to determine the most attractive offer. The concession company must then be incorporated under the same name that the State signed the concession contract.

Since the pensions system in Chile was reformed in 1981 (setting up the individual pension fund account system), pension funds have accumulated considerable resources, to the point that in 2009 they were equal to 66% of GDP. The enormous availability of resources significantly increased the possibility of financing investments using domestic capital, which is particularly relevant for financing long term investments.

Chile's resource allocation is strict because it is tied to the pension system, which explicitly or implicitly is government guaranteed as workers are required to contribute towards their pensions. With regards to investment, many of these regulations are limited to pension fund participation in financing infrastructure projects. In this regard, Chile's pension funds can only be invested in financial instruments, and therefore their participation in the infrastructure sector is mainly done by purchasing stocks and bonds issued by privatized infrastructure companies in the electricity, health and telecommunications industries. Nonetheless, purchasing these types of instruments is not considered investment in infrastructure in the economic sense, given that it does not imply the creation of new productive capacity. In regards to investment in new infrastructure projects specifically, such as concessions, the regulations forbid pension funds from investing in financial instruments of companies who don't have proven track records, who have low liquidity or who are not investment grade, among other safeguards. Given that the concession laws require the company awarded the bid to be established as a company with the sole purpose of executing the concession, the financial instrument that the company issues lacks the requirements that the regulations demand of investments from institutional investors such as pension funds. As a result, initially PFAs did not participate in financing public infrastructure concessions.

Nevertheless, Chile is a developing country and one of the characteristics of developing economies is that their capital and financial markets are not sufficiently developed; therefore investors with long term horizons are usually not available. Thus the primary sources of long term domestic capital are pension funds and insurance companies, which constitute an interesting alternative source of funding. Similarly, institutional investors not only have considerable funds, but also the majority of their obligations are long term. Just as capital and financial markets in developing economies lack depth, similarly there are not usually enough offers for long term instruments; in addition, these markets tend to be insufficiently large enough to absorb the important volume of resources, without incurring costs in terms of risk and profitability.

Finally, both the concession system as well as institutional investors could benefit if the latter could purchase instruments that would finance new infrastructure. Once again, it is also noteworthy that when the government realized that this partnership was not being taken advantage of, it focused on creating mechanisms to overcome the obstacles of the concession system without reducing the impact of regulations that protect the pension and insurance industry. In order to achieve these goals, the Ministry of Finance and the Ministry of Public Works jointly requested a study for the purpose of developing a solution that represented an attractive investment instrument while enabling concession funding; i.e. assessed the feasibility of issuing an instrument that would allow institutional investors' involvement in infrastructure funding. The result of this research was the creation of a new instrument in 1998: Infrastructure Bonds, which are debt ins-

truments issued by the companies awarded public infrastructure concessions. They have no pre-payment option and are generally 100% guaranteed by insurance policies issued by international insurance companies. Thus a secure instrument was created despite the fact that bonds are issued by the concession company and therefore the only source of revenues supporting the financing structure is the expected future cash flow of the project. The guarantee provided by the insurance company provides external credit support, passing on the risk of the issuer to the insurance company. The bonds issued by Chile's concession companies have been rated AAA, except for two projects which were rated AA- and A+ respectively, and even if they didn't attain the highest possible rating, they were investment grade just the same.

The Chilean experience is interesting in that both public and private powers combined to lift the restrictions that limited the alternative sources of funding due to regulations pertaining to the pension fund and life insurance industries. It was determined that companies awarded infrastructure concessions as well as institutional investors would both benefit if the latter were allowed to invest in these bonds, while maintaining the regulations protecting these industries and the concessions system.

It should be noted that in Chile, pension funds contribute significantly to private project finance by purchasing infrastructure bonds from infrastructure concessions; as of May 30th 2008, PFAs jointly held US\$ 1.957 billion or 42% of the infrastructure bonds issued. Given that several years have elapsed since most of these bonds were issued, that none of them were *bullet* bonds, that their coupons have already been paid up to this date, and that therefore the accounting for the total issued amount underestimates the direct investment made by pension funds in public infrastructure concession financing, this figure represents the total minimum investment that fund administrators made in these instruments.

Finally, in a country with a developing economy like Chile there are many unsatisfied investment needs, such as infrastructure projects, which can not only deliver attractive returns to private parties, but also promote social benefits by increasing competitiveness and equality between countries. At the same time, the individual contribution system allows large volumes of resources to be invested in these projects. Creating the mechanisms that allows pension funds to channel resources towards highly profitable private and social investments such as infrastructure, has enormously benefited the country by reducing the infrastructure deficit and providing workers attractive returns on their investment and ultimately, larger pensions.

The current challenge lies in advancing towards a new stimulus for the concession model. In Chile, the main infrastructure projects have already been awarded, which were obviously the most profitable in private and social terms; in addition, most concessions were formerly state-run public works, which despite the fact that they called for large investments to improve their quality and coverage, their prior existence aided in estimating demand more accurately and, consequently, future revenues. However, many projects are still pending, particularly second generation concession projects, such as hospital and education facilities. In addition to increased uncertainty in regard to future revenues, the less profitable remaining private projects will require careful de-

sign of the concession mechanism, as well as the financing instrument to channel the funds. That said, the availability of pension fund resources to invest in profitable financial instruments subject to reasonable levels of risk will continue and therefore, it is time to take the necessary steps to make sure these resources are used effectively.

5. Pension funds and infrastructure in Colombia

María Claudia Llanes and Carolina Romero

5.1. Introduction

Geographical characteristics and the demands imposed by commercial growth in the country have led the competitive national agenda to give priority to matters of infrastructure improvements. Despite efforts and the obvious need to design an appropriate infrastructure for economic and social growth, adequate infrastructure development, which would completely connect the country has not been achieved.

Infrastructure investment started to become important in Colombia as the country began to open up in the early '90s. This process enhanced the development of a concessions program, which would allowed the advancement of numerous road projects that connected production centers with seaports and built airports and railroads among other projects. This initiative would provide greater room and better conditions for private sector investment which would lead the country to rely on its commercial development by a more competitive infrastructure. Nonetheless, although there were important advances in terms of regulation in the concessions policy, there are still problems that need to be resolved.

Through the National Development Plan and documents such as Vision 2010 drafted by the National Planning Department, the development of an ambitious and detailed agenda of infrastructure projects is being promoted in both the short and medium terms. Furthermore, in association with the Andean Development Corporation (CAF) and the IADB, the National Government recently created the Infrastructure Fund. A large portion of the principal structure of these projects still require improvement and major clarification, however, these are strong indicators of a commitment to developing infrastructure.

Within the potential private sector's investor are the Pension Funds and Severance Administration (PFA), who have gained ground and transformed into an important source of funds. Nonetheless, although the investment flexibility that the pension fund industry has shown is significant, they have not yet complied with the contract demands for infrastructure projects in terms of guarantees, risk-profitability ratio, and regulations, which are needed to spur their participation.

This chapter is organized into four sections in addition to this introduction. In the following section, the needs to develop infrastructure in Colombia is expressed in definitive terms, starting with a description of investment tendencies observed as a percentage of GDP, and analyzing the strategies the private sector uses when participating in infrastructure projects. Section three describes the regulatory framework of the concessions project in depth, which has allowed the private sector to participate, particularly in the development of the transportation sector. Immediately thereafter, the growth of pension funds in the Colombian financial system is analyzed. The incentives and limita-

tions that this industry is currently facing to participate in infrastructures finance is assessed, as well as proposing some guidelines that may help to correct the deficiencies in current infrastructure project contracts, based on recent studies conducted by ASO-FONDOS-Asociación Colombiana de Fondos de Pensiones y Cesantías (Pension Funds and Severance Association of Colombia). In section five the most important weaknesses of the system that difficult the flow resources from the pension funds to infrastructure investment are analyzed. Finally, section six contents the conclusions of this chapter.

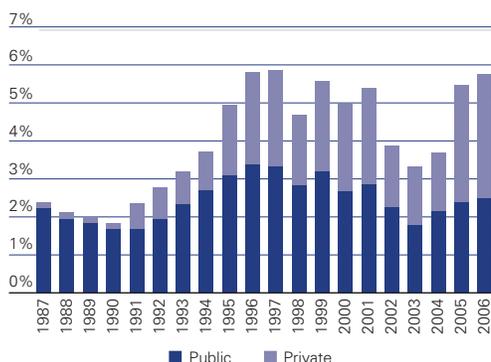
5.2. Recent developments in infrastructure in Colombia

5.2.1. Cyclical characteristics of infrastructure expenses in Colombia

Overall investment in Colombia has grown in the last few years. Specifically, the participation of the investment in infrastructure spending as a percentage of GDP shows a behavior that reflects a boom in concession developments since the early '90s, and which was affected by the economic crisis at the end of the same decade. As can be seen in the following chart (see Chart 5.1) infrastructure investment reached an average of 4.7% of GDP between 1993-2006, showing its highest level in 1997.

Infrastructure as a percentage of GDP has demonstrated volatile behavior. The lowest point was reached during 2003 when it only represented a 3.3% of the national production. The chart also demonstrates the private sector's participation as a whole, which have similar tendencies to the developments in the public sector. Starting in 2005 the private sector started participating significantly, representing approximately 3% of GDP⁷⁷.

CHART 5.1: Public and private infrastructure investment in Colombia 1993-2006 (% GDP constant prices 2006)



Source: Faimboim y Rodríguez (2000), Cárdenas y Sandoval (2008)/Cálculos propios SEE BBVA

77 It is important to mention that given the difference in methodology for this series, the data published for GDP by the International Monetary Fund will be taken as the basis for the period 1993-1999, and from DANE for the years 2000-2006 in nominal terms. Starting from these, the series was built on constant prices up to 2006, over which the investment participation as a percentage of GDP was estimated.

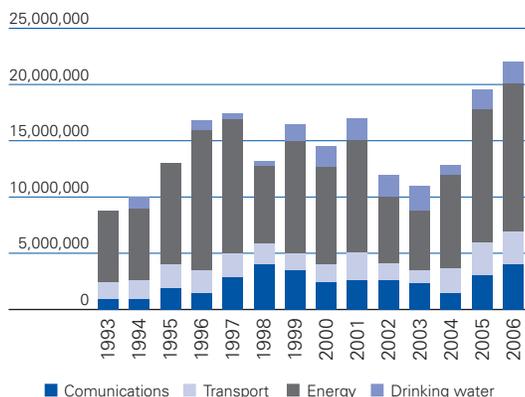
5.2.2. Private sector participation in infrastructure

The 1991 Constitution radically changed the regulatory framework for infrastructure development. Before it was approved, this type of investments was characterized as coming from the public sector. The new Constitution allowed greater participation from the private sector.

Between 1993 and 2006 infrastructure investment, both public and private, was strongly promoted. According to the data from the Departamento Nacional de Planeación (National Planning Department, DNP) (2008), public investment represented an average of near 52% of total participation. Until 2004, public and private investment in infrastructure showed very similar tendencies and levels. However, between 2005 and 2006, private investment started to have greater significance, reaching levels higher than the historical average in Latin America and a participation of around 59% of the total infrastructure investment⁷⁸.

Fainboim *et al* (2000) demonstrates how private investment participation has been different in each one of the sectors, whether through levels of participation or the strategy implemented up to that time. Participation of private investment in infrastructure between 1993 and 2006 increased US\$ 16 billion (39 trillion COP), not including petroleum and coal, whose development has been historically promoted by the State. The sectors with the greatest participation in private infrastructure investment were energy, communications, transportation, electricity and gas, with participations rates of approximately 70.6%, 21%, 7.2%, 7.1% and 5% respectively for the entire period 1993-2006 (see Chart 5.2).

CHART 5.2: Infrastructure investment in Colombia by sector 1993-2006
 (In millions of 2006 Pesos)



Source: Cárdenas and Sandoval (2008) ERD BBVA

78 Estimate based on information from the Departamento Nacional de Planeación (National Planning Department.)

In terms of strategy, private investment has been carried out through concession contracts in general, and in some cases through partnership contracts, particularly in the case of petroleum and gas exploration and management. On the other hand, in the energy, petroleum, and mining sector, privatization has been essential in these sectors. In the latter case, it is worth noting that through the creation and operation of the National Hydrocarbons Agency, a government entity that establishes efficiency standards, private equity was allowed to participate. In the transportation sector, investment by the private sector has mainly focused on highway construction.

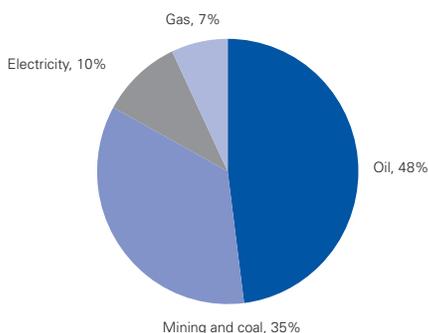
What follows is a brief description of the evolution of private investment in the sectors where this has been most significant.

Energy, petroleum and mining sectors

Between 1993 and 2006, this sector received investments of approximately 50 billion US\$ (123.3 billion COP), of which 55.8% corresponded to investments from the private sector. Sector participation was concentrated in 48% petroleum, 35% coal and mining, 10% electricity, and 7% gas (see Chart 5.3).

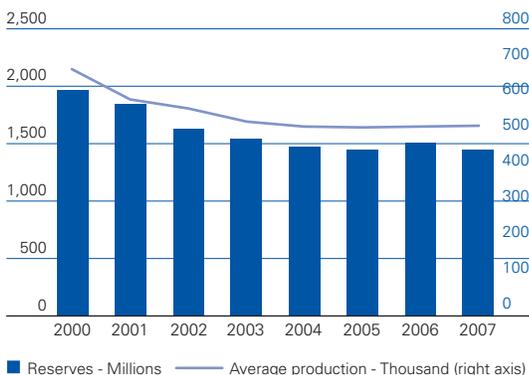
The positive results in the petroleum sector can be explained by significant increases in the number of exploration and management contracts (that went from 14 in 2002 to 44 in 2007), despite a noted fall in the reserve of petroleum in 2007, which was a result of the change in the reserve valuation methodology during the process of capitalization of the Colombian Petroleum Company (ECOPETROL) (see Chart 5.4).

CHART 5.3: Private infrastructure investment in Colombia. Mining and energy



Source: DNP (2008)

CHART 5.4: Oil reserves and production (barrels)



Source: Ecopetrol and DNP (2007) BBVA ERD

In the energy sector, the new regulations based on *Laws 142 and 143* of 1994 determined the separation of functions and development of the market sector. Specifically, it opened the progress of the *spot* market for the electrical sector and the development of long term contracts. The legislation sought to stimulate competition and develop the

sector's own law. Fainboim *et al* (2000) states that infrastructure investment mainly focused on hydroelectric generation, which transformed it into a vulnerable sector during critical hydrological cycles

In 1990, there was strong expansion of the installed capacity, which increased the electrical sector's debt, causing financial insolvency as costs reached up to 30% of the country's external public debt. This situation, paradoxically, happened at the same time as the supply was being rationed in 1992, which led the government to decree an economic and social emergency. All of this clearly shows the need to restructure the sector, and so it was decided to separate the operational chain of the electrical generation business, thus stimulating competition and eliminating the power to control prices, among other changes.

By the end of 1996, the participation by the private sector in the Electrical Interconnection Company (ISA) was approved. The purpose of this was to transform it into a corporation in which the nation would contribute no more than 50% of funds, and whose stocks would be listed in the Stock Exchange if and when it could maintain its status as a company that supplies public services. At the same time, in 1998, national and international bonds were issued and received a AAA rating. In addition, the Energy Exchange was created, which is the 24-hour market in which all registered generators participate, and whose objective is to minimize the cost of distribution.

Fainboim *et al* (2000) concludes that although the intervention of the private sector in the transmission and distribution process are recent developments, they are very attractive for the sector, given that they don't involve construction and technology risks. In addition, these are processes where the rates are regulated and the demand is relatively stable. Similarly, investment participation is one of the strategies that has demonstrated a better cost/benefit ratio, given that with lower levels of investment it is possible to replace networks and improve systems measurement and billing. Finally, there is high expectation in the privatization of regional companies that are not yet efficient. That is how this sector provides different ways through which the private sector can increase its participation, without the need to assume big risks.

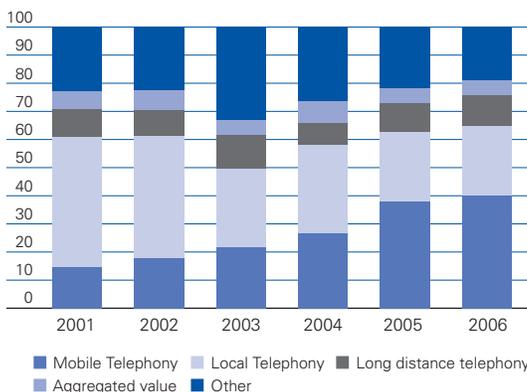
The creation of the Agencia Nacional de Hidrocarburos (ANH, National Hydrocarbons Agency) is one of the experiences that may be considered as successful, as a result of the way in which it brought back competitiveness to the said sector. The Agency was created in 2003 as a response to the decrease in petroleum reserves in Colombia. The ANH assumed the administrative task and petroleum regulation that was previously controlled by Empresa Colombiana de Petróleos (Ecopetrol- Colombian Petroleum Company), who maintained the processes of exploration, production, transportation, and refinery. This restructuring raised the production process to international standards and attracted foreign investments thanks to new royalty contracts, taxes and rights.

Telecommunications sector

During the period between 1993-2006, total infrastructure investments in telecommunications represented approximately US\$ 15 billion (COP 36.3 trillion), of which 55% came from private investment. The latter was concentrated in 68% non-residential private service.

This sector has been characterized by having introduced mobile telecommunication services and Internet during the last few years, which has significantly changed the composition of the market (see Chart 5.5). These services represented 53% annual growth between 1995-2007, and 39% annually during the period between 2002-2007, respectively.

CHART 5.5: Distribution of income in the telecommunications sector 2001-2006 (% of total income from Telecommunications Sector)



Source: CRT, Calculations DNP-STEL BBVA ERD

One of the most noteworthy aspects of development in this sector is the expansion of mobile telephone coverage. By 2007, cell phone coverage reached 77.3%, the second largest in Latin America after Argentina.

The recent participation of the private sector is remarkable in each sector. This form of financing is gaining strength, especially the use of *project-finance* projects, which are being seen in the strategies of the Instituto Nacional de Concesiones (National Concession Institute) (INCO) for projects such as Ruta del Sol, and backed by the World Bank’s IFC⁷⁹. As a result it is imperative to continue developing strategies that stimulate this type of participation.

Transportation Sector

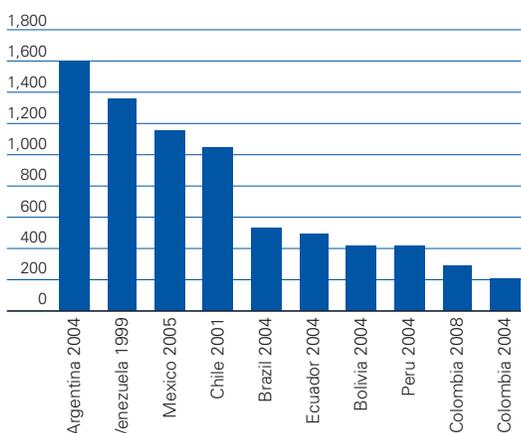
According to the NPD -National Planning Department- (2008) between 1993 and 2006 more than US\$ 12 billion (COP 30.6 trillion) were invested in transportation, of which 77% corresponded to investments by the public sector. Private sector investments in

⁷⁹ The Ruta del Sol (Sun Highway) is designed to communicate the center of the country with the Atlantic seaboard. A network of 1109 kilometers of double lanes and a network of three tunnels have been designed from Villeta (Cundinamarca) connecting with Magdalena Medio, and reaching Bosconia, in Cesar. Construction has not yet begun.

transportation is concentrated in highways, representing 58% of total private investment in transportation, 15% was invested in railroads, 14% in the development of harbors, 8% in massive transportation, and 5% in airport infrastructure.

In spite of the concentration of private investment in transportation starting in highways, the road sector is one of the sectors that shows the least development. The majority of resources have been designated for construction and improvement of roads⁸⁰. Despite the progress of the last few years in comparison to the development of road networks from 2004 to 2008, Colombia remains below the average of other countries in the region (see Chart 5.6).

CHART 5.6: Arterial road network with pavement (Km per million inhabitants)



Source: CIA Factbook, UNFPA, Transportation Ministry and DANE BBVA ERD

Due to the aforementioned gap there are important investment opportunities for the private sector in this segment. Indeed, in the short run, the State shall make contributions of US\$ 4.4 billion (COP 8.7 trillion) in 3 road projects, which shall be developed through concessions⁸¹.

The road development in Colombia will be detailed briefly below.

80 According to the 2008-2009 Competitvity Report , since August 2002 to date, 5,457 kilometers have been paved and repaved. Of this total, 1,103 form part of the highway program Vías para la Paz y Audiencias Públicas (Peace and Public Hearings Highways), 658 correspond to Integral Maintenance Corridors (repaving), 1,337 to Concessions (358 kilometers built and 979 kilometers rehabilitated), 307 kilometers to Heavy Transport Integrated Systems and 2,052 kilometers belong to the Plan 2500. Of these last 1,383 are paved and 669.6 repaved.

81 CONPES 3612 approved 6.3 trillion, 1.5 trillion and 1 trillion for the construction of the Transversal de las Américas, the Bogotá-Villavicencia Highway and the Montaña Highway, respectively..

Roads

The road expansion plan of the Government of Cesar Gaviria during the first half of the 1990s stipulated the construction of a road network of 6.300 kilometers financed by the State during a 9 year period beginning in 1991. Authors such as Vélez (2002) stated that the Government already estimated it only had the 55% of the necessary resources, and this situation was reflected in the balance of the targets and achievements of this initial plan for the period 1991-2000, since only 34% of the total non-offered roads that appeared in the project were developed.

It is now possible to distinguish three generations of road infrastructure development in Colombia.

The first concession phase started in 1994 and was focused on renovation, sidewalk extension and trying to improve the access to the cities. In this first generation, the purpose was to rehabilitate 1,017 kilometers of roads and build 230 additional kilometers, which required an initial investment of more than US\$ 790 million. The first concession generation had 11 national projects and two additional projects allocated by the territorial organizations of the Atlantic and the Valle del Cauca (see Table 5.1).

In this stage, different problems appeared, relating mainly to the lack of planning due to the urgency required for the compliance with the Government's Commercial Opening Program. The detected failures came from the fact that the projects neither had a complete design, nor studies that carried out exhaustive analyses of the expected demand and of the required investments. These neither complied with the requested environmental licenses and the Instituto Nacional de Vías - INVIAS (National Institute of Roads) did not accurately define the location of motorways, which is why the purchase of the property was delayed. These first contracts required many modifications to keep their financial balance, including extending the duration of the projects' stages, contracting additional, related projects and authorizing the collection of tolls, among others. As a result, the final investment of these projects was 25.3% higher than the initial budgeted (see Table 5.2).

Likewise, most of the contracts were carried out by direct negotiation instead of public bidding. Within the contracts, dispute resolution mechanisms were not included, and the financial situation of the companies was not taken into account. Therefore, most of these processes ended in the Government granting guarantees and/or in arbitration courts.

The second concession generation, which coincided with the economic turmoil of the end of 1990s, appeared to be an attempt to solve the problems experienced in the past. The first progress in such sense implied a demand for definitive engineering studies before the hiring process, together with demand studies prepared by international entities. Likewise, the guarantee terms for risk hedging were improved and the World Bank granted a contingent credit to INVIAS. Apart from the different legal adjustments of the projects, it was established that the restructuring and promotion of the projects would be done through investment banks. For this new generation, only the restoration of 353.5 kilometers of roads, the building of 178.3 additional kilometers and the main-

TABLE 5.1: First generation concessions (in millions of US\$ 2009)

	Longitude	Initial Investment
Projects led by Nation		
Armenia - Pereira - Manizales (Autopistas del Café) (Highways)	219 km	292.4
Bogotá - Cáqueza - Villavicencio	90 km	157.2
Bogotá (El Cortijo) - Siberia - La Punta - El Vino	31 km	66.8
Cartagena - Barranquilla	109 km	21.8
Road Development in North Bogotá	48 km	140.3
Road Development of East Medellín and Valle de Rionegro	349 km	163.9
Fontibón - Facatativá - Los Alpes	41 km	60.3
Girardot - Espinal - Neiva	150 km	63.2
Los Patios - La Calera - Guasca and El Salitre - Sopó - Briceño	50 km	13.2
Meta Road	190 km	66.9
Santa Marta - Paraguachón	250 km	57.5
Projects led by territorial governments		
Barranquilla - Ciénaga (Atlantic)	62 km	45.9
Buga - Tulúa - La Paila (Valle del Cauca)	60 km	142.7
TOTAL – FIRST GENERATION	1,602 km	1,292.1

Figures in millions of US of 2009
 Source: Cárdenas et al (2005) and INCO

TABLE 5.2: Compensations of first generation concessions due to contract amendments

Project	Initial Investment	Compensations	%
Armenia - Pereira - Manizales	217.6	4.3	2.0%
Bogotá - Cáqueza - Villavicencio	146.4	40	27.4%
Cartagena - Barranquilla	19.8	14.2	71.4%
Meta Road*	62.30	20.2	32.4%
Road Development in North Bogotá	128.2	65.5	51.1%
Road Development of East Medellín**	146	5.5	3.8%
El Cortijo - Siberia - La Punta - El Vino	47.4	20.8	43.8%
Fontibón - Facatativá - Los Alpes	110.3	11.3	10.3%
Los Patios - La Calera - Guasca y El Salitre - Sopó - Briceño	12.3	8.1	66.2%
Girardot - Espinal - Neiva	57.8	6.4	11.1%
Santa Marta - Paraguachón	52.5	56.5	107.6%
TOTAL – FIRST GENERATION	1,000.6	252.9	25.3%

Figures in millions of pesos of 2009
 Source: Cárdenas et al (2005) and INCO

tenance of 974.8 kilometers of roads were scheduled. Within this generation, only two projects were included, one of which is still active, while the other had complications due to a breach of contract.

Later on, the third concession generation was focused on connecting important production centers with ports without overlooking city access. This generation started the bidding processes in 2000 and had 5 important projects that built 671 kilometers of new roads, restored 1,900 kilometers and performed 2,600 kilometers of maintenance.

According to Cárdenas *et al* (2005), the big advance in this generation of projects was the introduction of criteria that required projects to be expandable and adaptable according to increases in demand. In exchange, revenue guarantees for the debt service were presented, which would help cover the exchange risk during low liquidity periods.

As it has been discussed up to now, the evolution of the framework in which the concession program has unraveled, has been accompanied by a regulatory adjustment that has allowed the improvement of the bidding, planning and execution methods. In the following Table, a gradual change is shown in the risk allocation between the concessionaire and the Instituto Nacional de Vías - INVIAS (National Institute of Roads) over the three generations of projects (see Table 5.3). In this way, the environmental license management, the property purchase and the demand risk went from being the responsibility of INVIAS to the responsibility of the concession company.

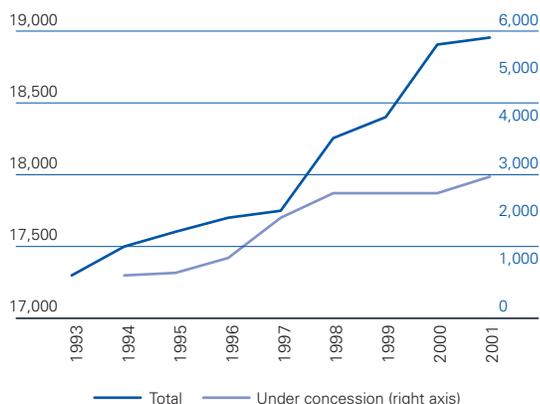
TABLA 5.3: Volution of risk allocation

Type of Risk	First Generation		Second Generation		Third Generation	
	Concessionaire	INVIAS	Concessionaire	INVIAS	Concessionaire	INVIAS
Construction	X	Partial	X		X	
Traffic		X	X		X	
Highway rate		X				X
Facilities		X		X	Management	X
Environment		X		X	Management	X
Taxes	X		X		X	
Exchange	X	X	Partial		X	Partial
Natural Disaster (insurable)	X		X		X	
Financing	X		X		X	

Source: Cárdenas et al (2005), DNP, Document CONPES 3701

The number of kilometers under concession programs represents less than a sixth of the total road network of the country (see Chart 5.7), which may mean that a great development in terms of regulation to stimulate a greater share of the private investment is still needed.

CHART 5.7: Evolution of the primary road network in Colombia 1993-2001 (kilometers)



Source: Cárdenas and Sandoval (2008) BBVA ERD

Ports

The port administration was consolidated into a national company called COLPUERTOS during the 70s. At the same time, the private sector was allowed to participate by means of the private dock and port operation. The monopolist control that COLPUERTOS imposed obliged private docks to pay fees depending on the volume moved. At the end of the eighties, COLPUERTOS suffered administrative and financial problems, which resulted in their bankruptcy. This process was carried out according to the *Port Statute* (Law No. 1, 1991), and ended up creating room for private sector participation.

In this way, between December 1993 and June 1994, Buenaventura, Tumaco, Santa Marta, Barranquilla and Cartagena ports were granted concessions for a 20-year period. Additionally, legislation established that the Regional Port Companies' capital should be made up of 70% private capital and 30% government capital. These companies would carry out the maintenance, administration, loading, unloading and storage services rendered. In this way, the port infrastructure belonged to the Government, but the administration of the investment was the responsibility of the concessionaire.

Cárdenas *et al* (2005) describes some of the benefits of this new organization, highlighting the improvements in the efficiency indicators of the port system. The time that ships remain in the ports was reduced by 85% and port fees by 52%. This author points out that although port development and maintenance have been improved in general, the renegotiation procedure for concessions and the tools to boost greater participation of the private sector are still missing.

Airports

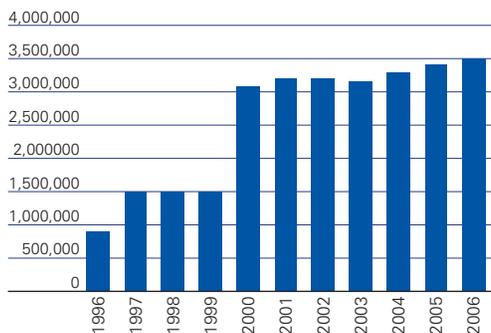
The participation of the private sector was achieved through *Law No. 105 (1993)*, which authorized the public airport authority (Civil Aeronautics) to grant concessions of the ad-

ministration of regional and national airports. In this sense, they were granted control of the airspace, regulation and security.

The first airports to be granted as concessions were Cartagena and Barranquilla, which posed some obstacles in the bidding processes regarding risk allocation between the Government and the concessionaire. These limitations were solved in the concession of the Palmira Airport (serving Cali).

One of the benefits observed in these concessions is the increase in coverage. During a period of 10 years, the number of passengers using airports operated under concessions has tripled (see Chart 5.8).

CHART 5.8: Amount of passengers using airport concessions



Source: Aeronáutica Civil SEE BBVA

5.3. The concession law

The experience of the private sector in infrastructure projects through concessions has been mainly focused on the development of roads. During the first half of the '90s, a development plan was issued for road infrastructure, which was accompanied by an economic boost to the country. That is why in 1992, the road concession program was created, allowing the creation of the Programa de Participación Privada (Private Participation Program or PPP). This was done with the aim of boosting the connection to the private sector, refocusing social investments and releasing the Government commitments. Private participation through the concession program would allow for a greater efficiency in the construction process, in the management of the projects and improvements in the quality of services, making it possible to obtain additional resources and benefit from the competitiveness of the private sector.

Development with regards to infrastructure was an imposing challenge, which first led to restructuring the Ministerio de Obras Públicas y Transporte (Transportation and Public Works Ministry) and the Fondo Vial (Road Fund), which were transformed into the

current Ministerios de Transporte (Transportation Ministry) and the Instituto Nacional de Vías – INVIAS (National Institute of Roads), respectively. The latter is the entity which executes the policies and projects of road infrastructure headed by the Nation. This restructuring process has progressed and in 2003 the Instituto Nacional de Concesiones - INCO (National Concession Institute) was created, which is attached to the Transportation Ministry and has the following goal: *“to plan, structure, contract, execute and manage transport infrastructure businesses which are developed with participation of the private capital, and specially concessions, in the highway, pluvial, maritime, rail and port sectors”*. At the same time, the Consejo Nacional de Política Económica y Social - CONPES (National Council of Economic and Social Policy), also helps to determine the general course of infrastructure projects and the participation of the Government and the private sector⁸².

The standards may be summarized as a gradual evolutionary process which has incorporated the experiences of previous concession processes with the aim of balancing the private sector incentives with the infrastructure needs of the country.

5.3.1. Standard framework

Authors such as Rufián (2002) and Fainboim *et al* (2004) analyze the standards and highlight various instruments which have determined the legal development of the concessions in Colombia. In general terms, there are 4 fundamental laws which constitute the basis to incorporate investment in the private sector. However, there are various decrees, CONPES documents and subsequent laws which have contributed in a similar way to the structure of the standards (see Table 5.4). The most important one is the Constitution of 1991, which gave the Congress the duty to issue general statutes for contracting with the Public Administration, just as it established the contractual legal entity as one of the instruments of the State to comply with its goals.

Subsequently, Law No. 80 (1993) creates the new statute for public contracting, establishing favorable conditions for the participation of the private sector. This Law has been one of the most significant breakthroughs to boosting private investment, since it balanced the contracting conditions between the public sector and the private sector. Additionally, the Law of Transportation (Law No. 105, 1993) established the mechanisms for the recovery of the investment for infrastructure projects, such as tolls, collections for revaluation and long-term financial stock, among others. Finally, the Environment Law (Law No. 90, 1993) established the conditions and requirements that every project must fulfill as regards environmental protection.

From this general legal framework, the conditions and characteristics of the contracts have varied according to the evolution of the infrastructure projects. A large part of these projects has been determined by the Consejo Nacional de Política Económica y

82 CONPES is appointed under the direction of the Presidency of the Republic and formed by the ministers, managers of the Banco de la República and the Federación Nacional de Cafeteros (The National Federation of Coffee Growers). Amongst others, its aim is the development of studies and approval of projects for public policies.

TABLE 5.4: Concession program regulatory framework (Laws)

Law No. 1 (1991): Maritime ports statute	It is thereby provided that public entities and private companies may create port companies to build, maintain, operate ports, terminals or docks.
Law No. 80 (1993): General statute of contracts of the public administration	Extension for the participation possibilities of the private sector, improving conditions and transparency of the concession processes.
Law No. 105 (1993). Law of Transportation	Mechanisms for recovery are established for concession roads, such as use of highways rates and/or collections for value and long-term financial mechanisms such as securitization.
Law No. 90 (1993)	Determines requirements as regards the environment which must be fulfilled by infrastructure projects.
Law No. 185 (1995)	Determines State indebtedness policies.
Law No. 448 (1998)	Adopts pertinent measures to manage contingent liabilities by the Nation, territorial entities and decentralized entities of any nature.
Law No. 1150 (2007)	Requirements for extensions and additional provisions in contracts are established, which must be approved by the CONPES.
Decrees	
Decree No. 1647 (1994), Transportation Ministry	Classifies airports in three main categories according to the annual amount of passengers and allows to grant in concession, the highest category with state participation not exceeding 50%
Decree 423 (2001), Ministry of Finance and Public Credit	Determines parameters to manage the contingency fund and commissions the CONPES to define guidelines of contract risk policies; moreover, distributes functions in furtherance of the compliance with the law.
Decree 1800 (2003)	Creation of the Instituto Nacional de Concesiones – INCO (National Concession Institute), an entity which groups all functions and responsibilities for structure, planning, contract, execution and management of transport infrastructure concession contracts and connection of the private capital to the transportation sector.

Source: Cárdenas et. al. (2005), Rufian (2002) and CONPES

Social - CONPES (National Council of Economic and Social Policy), through decrees subsequent to the standards established at the beginning of the '90s.

The concession process has been a regulatory learning process whose development has been carried out in search of a greater participation of the private sector and with the aim of generating equal conditions between the public and private entities. In turn, this regulatory framework tends to boost transparency, economy and responsibility of

the parties in question. Table 5.5 indicates and briefly describes the standards mentioned above.

TABLE 5.5: Regulatory framework of the concession program
 (Regulation according to the Consejo Nacional de Política Económica y Social – CONPES)
 (National Council of Economic and Social Policy.)

CONPES 2615 (1992) <i>Criteria for the creation of regional port companies in National ports</i>	Provisions for port concession contracts are determined, as well as their term and business structure of Regional Port Companies
CONPES 2648 (1993): <i>New spheres for private investment in Colombia</i>	Infrastructure projects are given priority to be carried out through concessions
CONPES 2727 (1994): <i>Institutional reorganization and airport expansion plan</i>	Determine the need to boost more participation by territorial entities and entities of the private sector to manage airports considering budget limits of the Aerocivil
CONPES 2775 (1995): <i>Participation of the private sector in physical infrastructure</i>	Recognize that significant adjustments are still needed to improve the conditions of the Nation and the concessionaire, specially as regards risk allocation
CONPES 2776 (1995): <i>Strategy for the modernization of railway network</i>	Proposals to reorganize railway sector, among them, to deliver the management of corridors to the private sector by way of concessions.
CONPES 2852 (1996): <i>Participation of the private sector in physical infrastructure – Follow up</i>	Structure the Private Participation Program, which promotes connection of the private sector
CONPES 2928 (1997): <i>Private participation in infrastructure</i>	Analysis of improvements in physical and financial goals for private participation in infrastructure during 1996
CONPES 3405 (1999): <i>Road concesión program 1998-2000. Third concession generation</i>	A new allocation for a third generation of concessions is submitted for the analysis of CONPES.
CONPES 3107 (2001): <i>State contract risk management policies for processes of private participation in infrastructure</i>	Guidelines for private participation in different infrastructure sectors are submitted for analysis.
CONPES 3535 (2008): <i>Previous concept favorable to an extension or additional provisions to contracts of railway and road infrastructure</i>	Evaluation of 21 infrastructure projects for extensions and additional provisions.

Source: Cárdenas et al (2005), Rufián (2002) and CONPES

5.3.2. Bidding and Concession Process

Although the first generation of concessions posed some failures in the bidding process and 7 from the 11 projects were designed directly, this is a valuable mechanism as long as it introduces competition in the awarding of contracts. In some of the contracts the competence is limited (for example, the rendering of public services). The bidding is a public process in which the whole administrative procedure must be carried out in detail. Although the bidding processes have varied depending on the different projects which were granted in concession, there are general features of this procedure.

For every project, bid specifications for the different contracts which state the demands and determine the guidelines for the selection processes are developed.

The Law allows Colombian and foreign individuals, corporations, consortia or temporary unions to participate in the bids. Each bid specification must clearly explain the demands in terms of experience, bid duration, contributions to social security and other pay-roll contributions, as well as the existence of debt and the amount of equity. Thus, these requirements vary accordingly to the project dimensions, so as to be directly proportional to the project size.

Law No. 1150 (2007), however, makes some changes to Law No. 80 (1993) with regards to efficiency and transparency of the contracting of public resources. Within the Law, it establishes that the bidding shall be made publicly so as to aid in the search for the best market offer, except when the characteristics of the work merits a brief recruitment or direct contracting. The brief recruitment stage is used in situations where simplifying the process to obtain greater efficiency is possible, as in the cases where the public bidding has been declared void. Contracting via merit bids relates to the processes where there are filters due to experiential criteria. Finally, direct contracting is allowed in extreme cases where, for example, the project is of some urgency.

It is important to point out that the development or design of a project starts with the performance of a concession study by the allocating entity. For this purpose, the project must include an analysis of the investments and costs to be incurred including the property purchase, the place in which the work is being done, the procurement of the environmental permits and the demand or transit flow analysis. These requirements in the project design were not absolutely complied with during the first generation of projects, which significantly affected their performance. These requirements must be taken into account, especially, the property purchase, since in Colombia there is no expropriation law to make this process easier, which may delay construction.

All contracts that constitute monopolies of public services, including the management and concessions of State property, must include amendments and unilateral termination clauses in the contracts. These clauses apply to cases where there is no agreement between the two parties. The reversal clause, which must be included, means that at the end of the management or concession period, the property and management rights are directly returned to the State without any compensation.

Once the design is completed and the requirements of the execution of the contract are complied with, the building stage begins and only ends when the Instituto Nacional de Vías - INVIAS (National Institute of Roads) receives the project and equipment necessary for the road to operate. Finally, the operation process begins which includes the usage of the works and allows the concessionaire to assume the project administration including the income source or "toll" collection to recover the investment made. Once the applicable investment is recovered, the reversibility clause is applied and the infrastructure returns to being State-owned.

It is imperative to mention that Colombian legislation does not established time limits for concession maturation, they cannot, however, be established for an unlimited term.

Although in each contract the characteristics may vary, within the concession contracts in Colombia there are general guidelines that determine the rights and obligations of the parties.

The first contracts did not have a risk and allocation guarantee policy. The risks taken into account are: the building, operation and maintenance risk assumed by the concessionaire and the risk of greater required investments for which INVIAS designs the guarantee mechanism so that the concessionaire does not assume the whole risk. On the same level, the commercial risk, which relates to the expected cash flows of the project, is determined. To mitigate this risk, the minimum income guarantee and the risk of natural disaster are established. The latter relates to natural disaster and unpredictable events that prevent the contract performance. Finally, there is an environmental risk where the responsibility for the compliance with environmental policies is assumed by the concessionaire, and the financial risk that relates to the deficit that can take place during the operation period. In this case, there are guarantees in terms of inflation by means of the gradual increase in the rates, the extension of the operation term or by means of contributions from the national budget.

The guarantee programs established by Law can be classified in two categories: the first is by means of budgetary contributions made by the granting entity when concessionaires do not recover their investment during the expected term. The second is by means of minimum income guarantees using budget resources. These two guarantees show that there is still no strategy that doesn't yet affect the budget of the Government.

Finally, it is important to point out the ways the private sector now finances these projects. They can be financed through capital contributions and/or credit from the national or foreign financial sector. The regulation does not establish a required minimum percentage in order to give greater freedom to concessionaries. The credit applications must be replaced with letters from the creditors for 100% of the value of the loan. This freedom to financing is in contrast to the need to expand the domestic financial market.

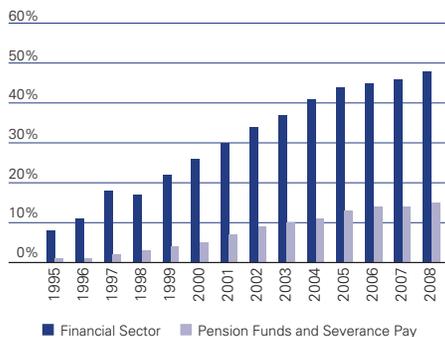
5.4. Pension funds and infrastructure investment

Law No. 100 from 1993 gave rise to the individual retirement savings accounts system, which is compulsorily run by private Pension Fund Administrators. From its commencement, the value of the pension funds has significantly increased, representing almost 15% of GDP today, and boosting the development of the financial sector along with it (see Chart 5.9).

The powerful relationship between pension funds and elements of saving, growth and the development of the capital markets, among other aspects, have been widely studied in specialized publications. These benefits, however, are only obtained through an investment framework that allows the structure of efficient portfolios for pension funds. In Colombia, the challenges for the creation of efficient portfolios are evident. Although this work does not technically study the limitations that pension funds face today in depth for the creation of efficient portfolios, publications such as Muñoz *et al.* (2009),

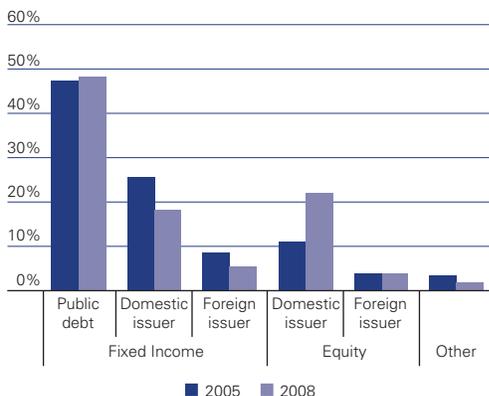
Reveiz *et al* (2008) and Jara (2006) analyze the Colombian case extensively. A common denominator of these studies when analyzing the investment structure of the funds is that they are highly concentrated on public debt securities. In recent years, such investments have represented about 50% of their total portfolios, a percentage that corresponds to the upper limit allowed for this type of investment (see Chart 5.10).

CHART 5.9: Value of portfolios from the financial sector, pension funds and severance pay (As a % of GDP)



Source: ASOFONDOS and Financial Superintendency of Colombia

CHART 5.10: Composition of portfolio. Compulsory pension funds



Source: Financial Superintendencia of Colombia

Faced with this evidence, important efforts have been made with the aim of making the investment framework more flexible. Some examples are the upper limit for investment in foreign securities which was established at the beginning of 2008 (reaching 40%) and the recent introduction of the multi-fund scheme in 2009. From a theoretical perspective, PFAs could be natural investors in infrastructure projects as long as the developed financial vehicle allows for an adequate balance of risks, profitability and duration, which would allow for the optimization of the structure of their portfolios. Although there are a broad range of investment projects in different sectors and activities, there are some aspects which limit the participation of the pension funds in this market.

The following sections examine in more detail how indirect investment occurs in Colombia and the direct investment restrictions that prevent the development of this figure in the country

5.4.1. Indirect investment of PFAs in infrastructure

The investment framework of the Compulsory Pension Funds (CPF) is defined according to the Fourth Title of the Basic Legal Circular of the Financial Superintendencia of Colombia. Currently, it allows indirect investment both in infrastructure projects and in companies related to this industry through 3 different instruments: Private equity funds, stocks and debt instruments.

- According to Decree No. 2175 of 2007, private equity funds are considered investment portfolios of limited capital which use at least two thirds of the contributions of in-

5. Pension funds and infrastructure in Colombia

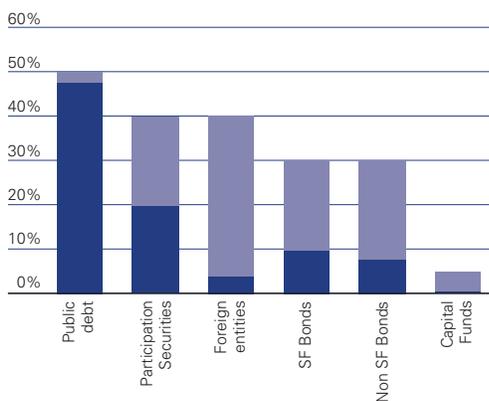
vestors to purchase assets or economic rights different from securities registered on the Registro Nacional de Valores y Emisores - RNVE (National Registry for Securities and Issuers). For investments in private equity funds, there is at present a limit of 5% of the total of their portfolio. The investment policy for this kind of fund shall be clear and shall be previously defined. Within the investment plan, the kind of company or projects in which participation is desired and the selection criteria of the same shall be stipulated; also the analyses of the economic sectors related to the project and the geographical area of its location shall be included.

At the same time, the PFAs shall verify that the manager of the private equity fund or the professional manager has at least five years of experience in the management of this kind of fund or underlying asset, whether in Colombia or abroad. For this kind of investment it is necessary to consider the risk of the project and the experience of the private equity fund.

- The other two ways of investing indirectly in infrastructure are through stocks and debt securities, and the upper limit allowed corresponds to 40% in both cases. For the latter, there is a 10% upper limit on securities issued by the same issuer (including affiliates and subsidiaries), and 30% limit for securities issued in the series, within which there are related securities. For these two kinds of securities, the offering and rating both play an important role in determining PFA participation. For securities of domestic companies, it is required that they are qualified by rating agencies authorized by the Financial Superintendencia of Colombia and that they obtain an investment grade rating. Similarly, for the securities of foreign issuers, they must have the investment grade rating granted by an internationally recognized rating agency.

The investment framework would still offer a margin of greater diversification, if we take into account that except for investments in the public debt, the participation of which is near the upper limit, any other kinds of instrument reaches its investment upper limit (see Chart 5.11). Everything appears to indicate that the offering of market

CHART 5.11: Observed investments and limit (December 2008)



Source: Superintendencia Financiera de Colombia

securities, according to the demands stipulated by the regulator, is one of the greatest limitations to diversifying pension funds portfolios.

According to the current legislation, the pension sector has been participating in an indirect manner in the development of infrastructures in Colombia. Some clear examples are the cases of the Interconexión Eléctrica (ISA) – Company of management, operation and transport services in electric energy markets and telecommunications services markets, Ecopetrol - Colombian Company of Oils and ISAGEN - a company intended to generate and market electric energy, network natural gas, coal, steam and other energy resources for industrial use. This participation was possible through stock issuances of different companies which, in the case of ISA, allowed the PFAs to be majority shareholders (see Table 5.6).

TABLE 5.6: CPF share of equity primary issuances, 2001 and 2007 (%)

	ISA 2001	2007	Ecopetrol 2007	ISAGEN 2007
CPF share	29%	63%	32%	80%

Source: Alarcón (2008)

The increase in indirect participation of infrastructure investments has been gradual, so that in 2004 these investments exceeded COP 115 billion, which coincides with 0,45% of the amount of the funds, an amount which significantly varied from 2008 thanks to the different types of new securities that are found in the market. In June of the same year, indirect investments in infrastructure projects or companies related to the infrastructure sector showed significant contributions, representing 19,4% of the total portfolio and 17.1% at the end of the year, with a greater weight of stocks in comparison with debt securities. The sectors with the greatest participation are the electric and energy sectors, which reached 7.6% and 7% of the total investments at the end of 2008, respectively (see Table 5.7).

TABLE 5.7: Indirect infrastructure investment of CPFs

(% of Total portfolio)

	jun-08			dic-08		
	Debt	Equity	Total	Debt	Equity	Total
Water	0.7%	0.0%	0.7%	0.4%	0.0%	0.4%
Communications	0.8%	0.2%	1.0%	0.8%	0.2%	1.0%
Electric	3.1%	4.7%	7.7%	4.2%	3.4%	7.6%
Energy	0.6%	8.3%	8.9%	0.6%	6.5%	7.0%
Mortgage securitization	0.2%	0.0%	0.2%	0.3%	0.0%	0.3%
Road	0.9%	0.0%	0.9%	0.8%	0.1%	0.8%
Total	6.3%	13.1%	19.4%	7.0%	10.1%	17.1%

Source: ASOFONDOS

The analysis developed in previous chapters showed the development needs of the infrastructure of the country. In spite of the economic interest pension funds would have in this type of investment, the regulatory conditions and legal guarantees of the contracts are not properly coordinated. Until now, the PFAs have invested indirectly in the sector through stocks related to the sector, debt securities and private equity investments.

5.5. Obstacles in the direct investment of PFAs in infrastructure

Recently, ASOFONDOS (2009) submitted an analysis which outlined what should be the characteristics of the contracts and securities of the infrastructure projects in order to boost the participation of the pension funds such that they are safe and productive investments. According to this study, the ideal characteristics of the infrastructure projects may be classified by seven variables: quality of the research studies, size of the projects, income sources, terms, financing, incentives and quality regulation. This way, they indicate that the studies which are developed in the infrastructure projects must be viable studies carried out by independent firms so that there is greater objectivity and transparency in the process. Everything indicates that currently there has not been emphasized the need to complete definitive studies before the bidding and development of the projects.

Also, the document indicates that currently the contracts are designed for small, medium or fragmented projects, but they should have greater dimensions and avoid fragmentation, in search of economies of scale. In the case of road concessions, tolls from traffic should be considered as an income source.

In the financial sector, the ASOFONDOS analysis points out that the contracts should correspond to twenty year periods or more, similarly to the characteristics of the capital market securities. This situation contrasts with the fact that today the periods are closer to ten and fifteen years, which does not correspond to the long term savings needs of the pension systems. At the same time, project financing must not be done with short term banking capital or with capital from tolls.

This document concludes that incentives rewarding self-financing capacity and performance experience must be created. For this purpose, it must not be allowed to add new project stages, and that the same are clear from the beginning, from the bidding process. Re-negotiation must only be allowed in very extreme cases. At the same time, quality regulation must demand progressive fines for breaches before the expiration date, plus a strict legal, financial and technical structure.

Ideally, contracts for infrastructure projects must be guided by the project-finance model. This type of contracts allows greater efficiency in the assignment of responsibility and risk, allowing a better design, more transparency and greater control in the project development. By means of this model, it is possible to obtain an efficient risk-responsibility ratio, with which the State will be limited to the regulatory and supervisory body, while the private sector through concessionaires and construction companies will be in charge of an efficient management of the project development and of the services rendered. Likewise, the ASOFONDOS analysis (2009) proposes financing through which it

will be possible to increase the capital market development. Beginning with the experience of Chile and thinking of two types of securities that would help mitigate the different risks that are involved in the infrastructure development process:

1. The first of them relates to bonds/securities designed for the construction and design stage, seeking to cover the risk of cost overruns, term extensions, sanctions due to delays and the expropriation period.
2. Secondly, it would be necessary to articulate types of securities designed for the operational and maintenance stages, allowing the mitigation of the risks of receiving lower traffic flows than the expected, rates increases and reducing the state guarantees.

In sum, the combination of a transparent design and adequate incentives enabling the implementation of adequate contracts, stable rules and clear regulations can foster a framework suitable for the participation of pension funds in infrastructure projects.

5.6. Conclusions

From the beginning of the 1990s, the introduction of a trade openness plan fostered important challenges for the development of infrastructure in Colombia, especially in transport development. The need was immediate and yet there was no legal or financing structure in place to face this challenge. Somehow, as a consequence of the this problem, a concession program was introduced with the aim of boosting private sector participation, seeking greater efficiency both in resource administration and in project performance, among other things.

As it was analyzed in the first part of this chapter, infrastructure investment in the early '90s showed a positive trend, which can be explained by economic openness requirements. Thus, public and private investments increased sharply and the latter accompanied the beginning of the first generation of concessions. Then, due to the financial crisis that took place at the end of the same decade, infrastructure investment went into a significant recession. Now, in the early years of the 21st century, a new upturn in investment corresponding to the third generation of concessions can be seen.

Between 1993 and 2006 infrastructure investment represented, on average, 4.7% of GDP, with public investment accounting for 52%. Until 2004, public and private infrastructure investments were similar in scope and level. However, between 2005 and 2006, private investment started to have greater significance, reaching approximately 59% of total infrastructure investment⁸³, which is a level much higher than the historical average in Latin America.

The private sector has approached infrastructure investment in a variety of ways, but the transportation sector is dominated by concessions in roads, ports and airports.

83 Estimate based on information from the Departamento Nacional de Planeación (National Planning Department.)

Also, the partnership contracts are implemented in the petroleum sector and to a lesser extent, there is some privatization in the energy and electricity sectors.

The regulation of the concession projects in Colombia can be characterized as gradual and evolutionary. The first generation of concessions had varied deficiencies due to the urgency with which the projects were developed. The second generation coincided with the financial crisis, which limited their development and finally the third generation corrected the majority of the legislative imperfections and expanded private sector infrastructure investment incentives.

Today, bids and concessions have some general guidelines. First, with regards to bid participation, the law allows domestic and foreign individuals, corporations, consortiums and even temporary partnerships to participate in bids. Generally, bids must be made publicly. Second, the development or design of a project starts with the private party performing a concession study. Third, the project must include a thorough analysis of: the investment, the costs that will be incurred, the property value, the place in which the work is being done, the procurement of environmental permits and the demand or transit flow analysis. Fourth, all interpretations, amendments and unilateral termination clauses of the contracts must be included in those which carry out any activities that constitutes a state monopoly. Finally, the reversal clause should be included as well. In the case of Colombia, the legislation does not establish time limits for the concessions' maturity, however, these cannot be established for an unlimited term.

The following risks are taken into account: construction, operation and maintenance risks assumed by the concessionaire. In terms of the risk of further investments required, INVIAS designed the guarantee mechanism such that the concessionaire would not assume the whole risk. For commercial risk the minimum income guarantee and the risk of greater force were established. It should be noted that the two guarantee programs established by law affect the Government's budget. In regards to environmental risk only the concessionaire assumes the risk. Within the financial risk category, there are specific guarantees for inflation by gradually increasing the rates, by the extension of the operation term or by contributions from the national budget.

There are still important challenges in the development of infrastructure, and in particular it is important to improve the terms and guarantees of the investments of the private sector. Included in the potential sources of private capital are the pensions funds, which seek investment grade securities derived from a suitable supply of infrastructure projects which coincide with their long-term saving horizons. From a theoretical point of view, PFAs should be natural investors in infrastructure projects, assuming that the financial instruments designed adequately balance risks, profitability and duration, thus enabling them to optimize their portfolios. Although there exists a wide array of investment projects in different sectors and activities, aspects which limit the participation of the pension funds in this market remain.

Currently, infrastructure investments by PFAs are made indirectly through 3 different instruments: Private equity funds, stocks and debt instruments. Investments in private equity funds are notably low due to the restrictions imposed on PFAs, including the re-

quirement that the managers of private equity funds have at least 5 years of experience in the administration of funds with similar underlying assets in Colombia or abroad. By mid-2008, PFAs indirect investment in infrastructure projects or companies related to the infrastructure sector were significant, and were comprised 19.4% of their total portfolios, with greater weight given to stocks (13.1%) than debt securities (6.3%). In regards to their stock investment, PFAs invest in companies such as Ecopetrol, Isagen and ISA, and are the majority shareholders in the latter two companies.

Direct infrastructure investment in the country has been very limited. Its limitations include, according to Asofondos (2009), aspects related to the quality of the research studies, size of the projects, income sources, investment durations, financing, incentives and regulation quality.

On one hand, this is an opportunity for the funds to diversify their portfolios since they currently invest a high concentration (about 50%) of their funds in public debt securities. On the other hand, there is a great need to develop the infrastructure of the country. However, one of the large obstacles is the absence of infrastructure project contracts that grant adequate investment incentives. Consequently, adjustments to the contracts and the concession model are necessary so that the infrastructure supply is brought into line with demand.

According to Asofondos (2009), infrastructure project contracts should ideally be guided by the *project-finance* plan. This type of contract increases efficiency in the assignment of responsibility and risk and allows for better design, transparency and greater control during project development. Using *project-finance* plans it is possible to obtain efficient risk-responsibility allocations, which limit the State to a regulatory and supervisory role, while the private sector, through concession and construction companies, is in charge of efficiently managing, developing and operating the projects. Asofondos (2009) proposes financing reforms based on the Chilean experience. In this sense, we are observing initiatives to strengthen private financing through the use of *project-finance* programs, and that employ strategies similar to those used by the Instituto Nacional de Concesiones – INCO (National Concession Institute). Among the most important projects is the Ruta del Sol, which has the support of the IFC of the World Bank⁸⁴. We believe that these types of initiatives should continue to develop.

In conclusion, the combination of a transparent design process in tandem with commensurate financial incentives will enable the implementation of adequate contracts, stable rules and clear regulations, which can foster a framework suitable for the participation of pension funds in infrastructure projects.

⁸⁴ The Ruta del Sol (Sun Highway) is designed to communicate the center of the country with the Atlantic seaboard. A network of 1109 kilometers of double lanes and a network of three tunnels have been designed from Villeta (Cundinamarca) connecting with Magdalena Medio, and reaching Bosconia, in Cesar. Construction has not yet begun.

6. Pension funds and infrastructure in Mexico

Carlos Herrera

6.1. Introduction

Infrastructure undoubtedly plays a key role in any country's development and wellbeing. Whether in the case of water, electricity, communications or transportation works, infrastructure represents a group of assets that contribute to the long term improvement of society's welfare in areas diverse as health, education, productivity and resource allocation. Furthermore, in countries with high regional income disparities, infrastructure assets can also play a significant role in mitigating poverty and inequality since they contribute to better access to welfare services and provide communication with and mobility to distinct productive factors. Based on the above, it's not surprising that the State typically has a great interest in building and accumulating this class of assets.

Infrastructure assets, however, are not only important to the State. Around the world, pension funds have also registered a growing interest in infrastructure investment, which is considered an "alternative investments" for its somewhat different economic and financial characteristics from bonds and/or stocks. As a result, roads, ports, airports, electricity and/or gas distribution networks represent a few examples of assets that have received investments from pension funds over the last decade. It should be mentioned that infrastructure assets are valuable investments to pension funds for at least two reasons: 1) they increase portfolio diversification because of their low correlation to bonds and stocks, and 2) they provide long term investment horizons that are in line with their goal of accumulating savings for retirement.

Thus, in this context, we begin the chapter by analyzing the Mexican experience of infrastructure formation, focusing on the effects of the infrastructure sector's evolution and its relation to the surrounding economic environment. We also review the legal and institutional framework that governs public sector development of public works and the opportunities that the public sector offers the private sector to contribute to the development of infrastructure projects today.

In the second part of this chapter we explore the opportunities that Mexican pension funds have with Bond Holding Companies Specialized in Pension Funds (Siefore) to participate in and benefit from the infrastructure projects stated below. Thus, first we review the investment framework and vehicles Siefore is authorized to make infrastructure investments in, and secondly, the limits and challenges of the current model for participating in infrastructure investments on Siefore and their managers, the Retirement Fund Administrators (AFORE).

6.2. Infrastructure development

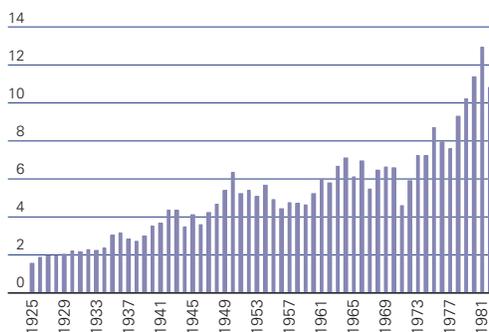
6.2.1. The cyclic characteristics of public expenditure in infrastructure

In Mexico, the 1917 Constitution gave the State full powers to guide the country's economic development process and since then, the public sector has played a transcen-

dental role in creating infrastructure through public works. In this important government role, two periods can be observed: the first, characterized by the direct and dominant role of the public sector in the development of public infrastructure, and the second period, which also saw strong public participation, but that no longer sought to dominate infrastructure development and thus left room for private sector participation.

During the first period, from 1920 to 1980, the State had the objective of boosting the country's industrialization by providing the raw materials and constructing the infrastructure. As a result, the public investment as a percentage of GDP registered a remarkable expansion that went from 1.6% to 12.9% as depicted in Chart 6.1. Furthermore, during this period of time (six decades), the State also created several companies, organizations and financial institutions to support the sectors related to infrastructure projects, such as communications, transportation and energy. Based on this, the number of State-owned companies and organizations was of 1155 in 1981. Among the most important public entities created during this period which had a strong connection to infrastructure works are: National Railways, Telephones of Mexico, Mexican Petroleum (Pemex) and Luz y Fuerza del Centro Company (LYF) (Central Light & Power). Other government agencies that were included during this period include: the Comisión Nacional de Caminos (National Road Commission), the Comisión Nacional de Irrigación (National Irrigation Commission) and the Comisión Federal de Electricidad (Federal Electricity Commission).

CHART 6.1: Public investment in infrastructure (As a GDP %)

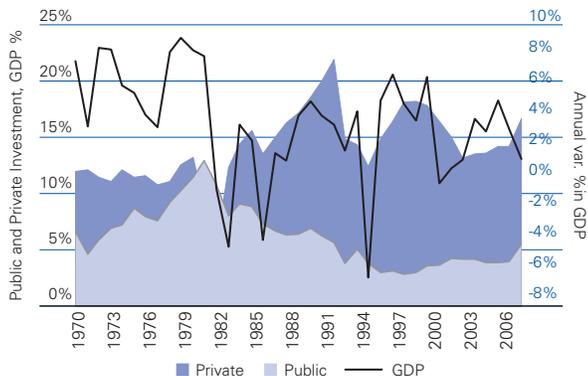


Source: SEE BBVA Bancomer con Información de INEGI, Estadísticas Históricas de México.

The economic turmoil of 1982 marked the beginning of the second period of less State intervention in infrastructure development. This newer period is characterized by a significant reduction in the size of the public sector and by less public expenditure in public works, as shown in Chart 6.2. As explained in the text below, given the need to balance the public budget, the State had to reduce its expenditure of capital and particularly, its expenditure on infrastructure. It has also had to dispose of a series of State-owned organizations and companies through major privatization programs that took place mainly between 1982 and 1994. Many of these State-owned companies were re-

lated to the infrastructure sector, for example, Teléfonos de Mexico (Telephones of Mexico) and Ferrocarriles Nacionales (National Railways).

CHART 6.2: Economic activity and public and private investment



Source: ERD BBVA Bancomer with data from INEGI and Government reports from several years

Privatization of different State-owned companies during this second period also represented an opportunity for the private sector to participate more directly in developing infrastructure. Moreover, after the 1995 turmoil, the State has promoted new models of public-private participation.

However, the above strategy has yet to be consolidated and Mexico registers an important gap in infrastructure competitiveness. As Chart 6.3 shows, the country is ranked 64th out of a group of 125 nations analyzed, and is 7th in Latin America, according to information from the **World Economic Forum (2007)**.

CHART 6.3: Infrastructure competitiveness index (Rising scale 1-7)

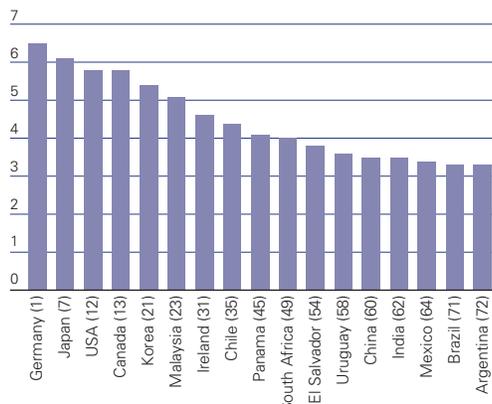
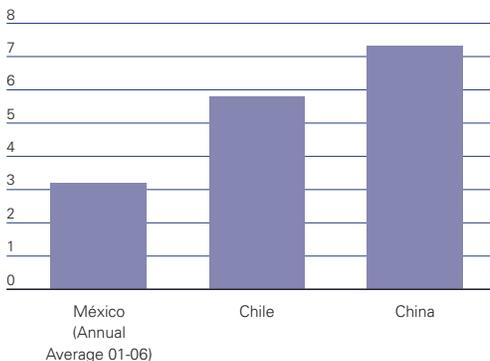


Figure in parenthesis states world rank
 Source: ERD BBVA Bancomer with data from National Infrastructure Program 2007-2012

This infrastructure competitiveness gap in Mexico directly corresponds to the low investment volumes in the country compared to those exercised by other nations. For example, between 2000 and 2006, the country's annual expenditure on infrastructure investment averaged 3.2% of the Gross Domestic Product (GDP), but excluding the petroleum sector, this average decreased to just under 2%. This contrasts with investment levels of other developing countries in Latin America like Chile and Asian countries like China, which both invest more than 5% of GDP (see Chart 6.4).

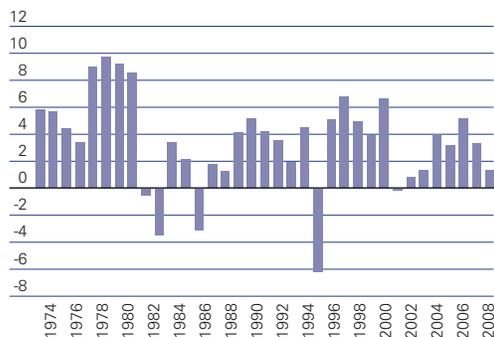
CHART 6.4: Infrastructure investment (% of GDP)



Source: SEE BBVA Bancomer with data from National Infrastructure Program 2007-2012

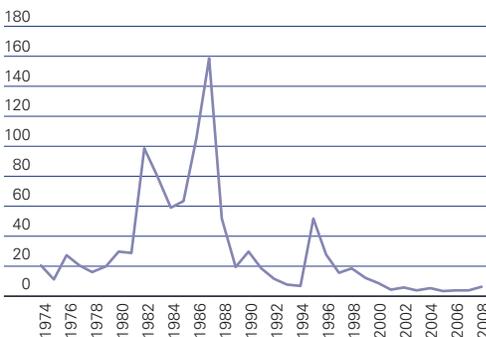
As stated above, the low percentage of public expenditure in infrastructure originated during a major government spending squeeze in 1982 after several episodes of economic turmoil. Crisis such as those of 1983 and 1995 also acted against establishing the conditions needed for long-term private investment, as they were followed by periods of high price instability. (see the following Charts 6.5 and 6.6)

CHART 6.5: Economic activity 1974-2008 (Annual BRL Var. % of GDP)



Source: ERD BBVA Bancomer with INEGI data

CHART 6.6: Inflation 1974-2008 (Annual %)

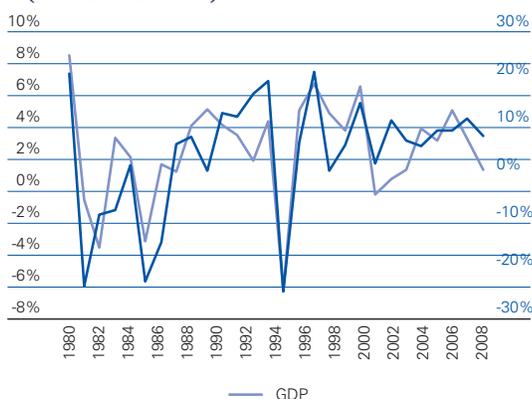


Source: ERD Bancomer with Banco de Mexico data.

Thus, the general delay in infrastructure competitiveness in Mexico is explained by an adverse economic environment, but the effects of a negative institutional framework for long-term investment should also be taken into account. On the one hand, a series of legislative procedures implied a cyclic trend of public expenditure at least until 2006. On the other hand, several legal restrictions on the private sector have limited its possible investment in several economic areas that, in principle, have high potential for developing infrastructure.

As to the public sector, the annual legislative process, by which up to 2006 the Mexican House of Representatives approved the Federal Expenditures Budget (PEF) with an application horizon of just one year, had a strong impact on the cyclical behavior of public expenditure regarding the productive activity as shown in Chart 6.7⁸⁵. After the economic turmoil of the 80's and 90's, and the corresponding declines in GDP and fiscal revenue, infrastructure investment was one the main variables adjusted in public finances.

CHART 6.7: Economic activity and public expenditure
 (annual BRL var %)



Source: SEE BBVA Bancomer con datos de Banco de México

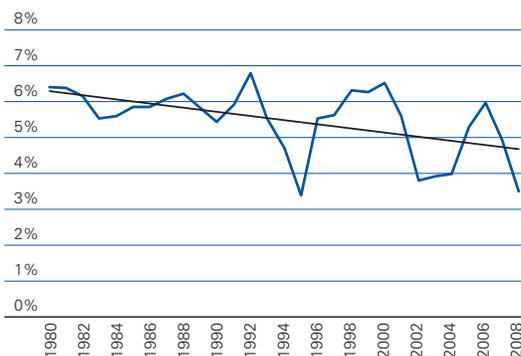
From 1980 to 2008 the correlation between BRL variations of GDP and expenditure projected within the PEF was positive and very high. 0.75 for the whole period (0,78 on average in the 80's and 90's). This high correlation implied that before the turmoil episodes and low GDP growth in the aforementioned decades, expenditure in public works was significantly reduced. It can be seen that, for example, after a GDP decline of 3.5% in 1983, public work expenditure as percentage of the projected expenditure

⁸⁵ In Mexico, the Federation Expenses Budget (PEF) is the legal, accounting and political economy document that stipulates the nature and amount of public expenditure which the central and the directly controlled para-State sector are authorized to spend in one fiscal year. The PEF must be passed by the House of Representatives, at the initiative of the President and in accordance with the Ley Federal de Presupuesto y Responsabilidad Hacendaria, it must be submitted not later than September 8 each year, be passed not later than November 15 and be published on the Federation official gazette not later than 20 after being passed.

was reduced to 6% after having registered 11% at the end of the 70's. Subsequently, public works as a share of the projected expenditure returned to 11% in 1991, but went down to 8% in 1995 after a 6.2% plunge in GDP. Finally, without sustained economic growth, the public work sector has only represented 3% of the projected expenditure since 2000.

With respect to the private sector, the economic activity plunges of the 80's and 90's were also accompanied by major exchange rate depreciations and price instability that constituted a negative environment for capital saving and investment with medium and long term horizons. For example, in the 80's the average annual inflation rate was 69.7% and it was 20.2% in the 90's, resulting in low real interest rates that averaged annual rates of 1.6% and 2.7%, respectively, when using a 28-day CETES reference rate as a reference. Undoubtedly, the above economic and financial environment compares very unfavorably to the conditions of greater stability the Mexican economy has registered in recent years, in which for example, the average inflation rates has been 5.1% since 2000. Thus it's not surprising that in recent decades, private investment in construction has registered high volatility and downward trend as shown in Chart 6.8.

CHART 6.8: Private sector gross fixed capital formation in construction (GDP %)



Source: ERD BBVA Bancomer with INEGI data

There are reasons to think, however, that in the future infrastructure investment could have a greater importance within public expenditure. In 2006 the Ley Federal de Presupuesto y Responsabilidad Hacendaria (LFPRH) (Federal Law on Budget and Treasury Responsibility) was published, one implication of which is that part of the public expenditure can now have a planning horizon of over a year, which helps to subtract part from part of the cyclical characteristic in this trend. In fact, strictly in terms of infrastructure, an amendment to the LFPRH in 2007 specified that multi-year distributions for infrastructure investment projects must be forecast annually in the Federal Budget Expenditure project. The amount contemplated should consider the year in question and the multi-year distributions approved in previous exercises.

It should be stated that term extension for multi-year distributions depends on proof of the contract's economic advantages and that the hiring period does not impact economic competence negatively in the corresponding sector⁸⁶.

Another element that will undoubtedly boost infrastructure investment is that the objective to increase coverage, quality and competitiveness of infrastructures in the country with very specific goals has been explicitly revealed within the National Development Plan 2006-2012. It is precisely in keeping with these goals that the public administration has designed the Programa Nacional de Infraestructura (PNI) (National Infrastructure Program), whose goal it is to rank Mexico within the thirty leading countries in infrastructure according to the World Economic Forum evaluation by the end of 2012. In order to do that, it states two infrastructure financing strategies: 1) to reduce administrative public expenditure through a more efficient application, and 2) to design models of public-private participation in specific arenas.

6.2.2. Participation of the private sector in infrastructure

a) Investment modes

In Mexico, private investment in infrastructure projects has occurred to a greater or lesser extent through each one of the financing and management modalities outlined by Alonso et al (2009). Some of the main investment formulas that have private or semi-public financing are highlighted in this section for offering pension funds the best internationally-accepted investment possibilities.

Traditional-type concessions and more recently, public-private participation models, have been the infrastructure financing and management mechanisms most commonly used by the private sector. A characteristic of both these models in Mexico is that the responsibility for providing public services through infrastructure has always lied in the Government. Thus, some of the most important forms of concession are:

- Design, Construct, Manage and Finance (or DCMF)

This model is used in the transportation and water sectors, mainly. For example, in the case of new road construction, the Secretariat of Communications and Transportation (SCT) calls for public bidding providing all bidders with an executive project. The concession may be up to 30 years and will be awarded to the bidder requesting the least economic support from the Government or, if applicable, to the bidder providing the highest offer. In case the project's social benefit is greater than its private profitability, the Government will make an initial contribution to the project.

Recently, this type of model has been expanded to include the management or use of assets already in existence as well. Namely, in some cases the model has been modified to offer a concession to the management of new assets in conjunction with others in existence. For example, in the case of roads, the SCT integrates "concession packages"

⁸⁶ Reform to the Federal Law on Budget and Treasury Responsibility (LFPRH, Ley Federal de Presupuesto y Responsabilidad Hacendaria). Published in the Official Bulletin of the Federation (DOF 01-10-2007).

of existing highways within the National Infrastructure Fund (FONADIN, Fondo Nacional de Infraestructura), which is described below, with projects of new toll highways that would be constructed by a winning bidder. Namely, under this extended model of private investment, the concessionaire is responsible for operating, maintaining and servicing the existing assets within the package in question, as well as building and later servicing new highways that are part of the package.

- Build, operate/lease and transfer (BOT or BLT)

These are investment models in which the private sector finances infrastructure to later operate/lease and finally transfer to the government after having been used through the long-term Productive Investment Projects model, which previously called Deferred Investment Projects in the Public Expenditure Register (Pidiregas).

Pidiregas is a public investment model with private financing that has been operated exclusively by State-owned companies such as: *Petróleos Mexicanos* (Mexican Petroleum, Pemex) and *Comisión Federal de Electricidad* (Federal Electricity Commission, CFE). Under this model, public work projects are assigned by means of public bidding to private suppliers, who must cover all investment costs. Afterwards, once the works are concluded, the projects are awarded (BOT model) or leased (BLT models) to Pemex and CFE. Under the first model, Pidiregas are direct investments, and under the second as conditional investments. In the latter model, public entities have the option of acquiring the goods in case of any contingency.

Unlike other public-private participation models in which the private sector recovers their investment either through cash flows generated by the project, or by Government payments in consideration of services rendered, in the Pidiregas model there is a cash flow guarantee that is backed up with public debt. Based on the above, the premise for the Pidiregas model to be approved is that the income they generate will be enough to cover all the costs (amortizations, depreciations, interest payment, etc) and still offer a benefit to the State-owned companies⁸⁷.

- Projects for the provision of services or PPS

The PPS model involves holding a long-term service contract between a facility or entity from the public sector and an investment supplier from the private sector. Under this contract, the service provision is performed with assets the investment supplier builds or supplies, including possible assets leased out by the public sector. Ownership of assets with which the service is provided can be the private investor's or the Government's, but the risks associated with the project are distributed between both parties.

Under the PPS model, payments to the investor are made according to the availability and quality of the services provided. Once these criteria are met, the Government has

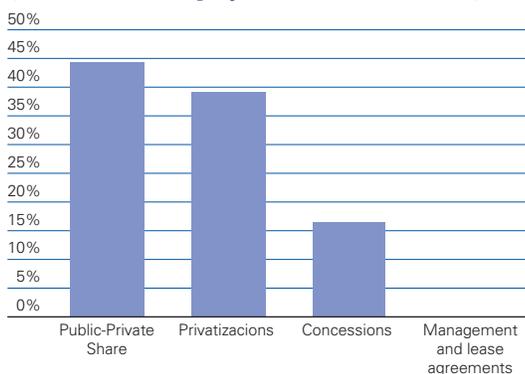
⁸⁷ A reform to the *Ley Federal de Presupuesto y Responsabilidad Hacendaria*, published by the Federation Official Gazette on November 13, 2008, states that as from FY 2009, Pemex will recognize for accounting and budget purposes as direct public debt all funding by third parties and financial vehicles, guaranteed by the entity to finance long-term productive infrastructure projects.

the obligation to cover the corresponding payments, which are recorded as current expenditure.

b) Investments

According to information from the **World Bank (2009)**, the private sector in Mexico has been able to contribute in infrastructure projects MXN 703,916 million (US\$ 86,126 million) of accumulated value between 1990 and 2007. Within these projects, as illustrated in Chart 6.9, public-private participation and privatizations have been the main alternatives selected.

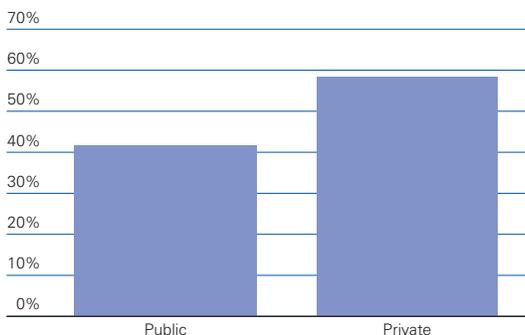
CHART 6.9: Private investment in infrastructure projects by investment model
 (% of total value of projects between 1990-2007)



Source: ERD BBVA Bancomer with World Bank data

On the other hand, with the National Infrastructure Program (PNI), the Federal Government estimates the private sector participates in investment projects in different pro-

CHART 6.10: Investment by funding source estimated for 2007-2012, excluding the energy sector (% of total)



Source: ERD BBVA Bancomer with data from National Infrastructure Program 2007-2012

ductive sectors, for a combined total of MXN 951 billion (US\$ 87.5 billion⁸⁸) in investment, of which the private sector represents 58.3 (see Chart 6.10).

The challenging economic environment that is being registered worldwide since the second half of 2008, has impacted the valuations and horizons for private sector infrastructure projects⁸⁹. For example, one of the most important infrastructure projects to perform with private sector investment during the period 2009-2012 is the construction of a port located in Punta Colonet, close to the US border. The project includes building and operating a public trade station, railways to United States, and the port's administration for an investment estimated by the Secretariat of Communications and Transportation of US\$ 6 billion. Although the project should have started in mid-2009, construction still hasn't been begun and there is no date defined for it, since some authorities and investors have pointed out that the project is being reviewed with the idea of determining if the project is worthwhile to carry out at all and if so, the terms in which it should be performed⁹⁰.

The case of the port in Punta Colonet, of a re-gasification plant in Manzanillo and other delayed projects, all reflect the decrease in financing situation faced by the private sector. Nevertheless, another element working against a more active participation of the public and private sectors in performing infrastructure works is a rigid institutional framework overloaded with paperwork. Common reasons for infrastructure delays range from a lack of rights to pass through property in the case of roads to a lack of environmental permits.

Progress in economic stability conditions in recent years (with the exception of the 2009 turmoil), improvements in legislative processes introduced to the medium and long-term investment horizons in the public budget, and PNI, offer better opportunities for expanding infrastructure investment in the years to come. Furthermore, these perspectives could be reinforced by a new Public-Private Participation Law that, as commented in the text below, has been announced by the Federal Government in order to promote and consolidate infrastructure placements.

c) Sectorial investments

At the sectorial level, private sector investment in infrastructure has been focused on the telecommunication and transportation sectors as illustrated in Table 6.1. As explained below, however, this is primarily a result of a series of legal limitations on private investment in other productive sectors such as energy, which, in principle, could also have a high demand of infrastructure investments.

88 States and exchange rate at the time of valuation of 10,8662 pesos per dollar corresponding to December 2007. FIX exchange rate published by the Bank of Mexico to fulfill obligations in foreign legal tender.

89 According to a press related of Reforma newspaper, from 330 works to be carried out before 2012, a progress of 20% has been achieved. Reforma "Desinflan programa de obras" June 8, 2009. Available at www.gruporeforma.com DocId = 1087053-1066&str = infraestructura.

90 El Universal "Punta Colonet es inviable: Banobras" Monday, June 22, 2009. Available at <http://www.el-universal.com.mx/notas/606415.html>

TABLE 6.1: Private sector investments in infrastructure
 (sectorial distribution 1990-2007)

Investment year	Energy	Telecommunications	Transport	Water and Sanitation	Total	(MXN million)	US\$ Millions
1990	0%	32%	68%	0%	100%	20,032	6,801
1991	0%	92%	8%	0%	100%	14,418	4,695
1992	0%	63%	37%	0%	100%	16,097	5,167
1993	0%	87%	12%	1%	100%	11,197	3,605
1994	0%	80%	6%	14%	100%	19,697	3,699
1995	0%	86%	13%	1%	100%	19,374	2,535
1996	2%	94%	4%	0%	100%	16,385	2,087
1997	10%	27%	61%	1%	100%	41,516	5,136
1998	24%	59%	16%	1%	100%	48,704	4,937
1999	11%	72%	12%	5%	100%	30,398	3,195
2000	42%	43%	15%	0%	100%	50,512	5,277
2001	6%	87%	5%	2%	100%	43,883	4,800
2002	42%	56%	1%	0%	100%	51,645	5,008
2003	36%	61%	2%	0%	100%	39,584	3,523
2004	14%	68%	10%	9%	100%	55,918	4,964
2005	2%	70%	27%	1%	100%	52,401	4,862
2006	11%	43%	45%	0%	100%	64,633	5,940
2007	4%	31%	62%	3%	100%	107,521	9,895
(Accumulated, 1990-2007)	12%	59%	28%	2%	100%	703,916	86,126

Source: ERD Bancomer with World Bank data.

With the National Infrastructure Plan of 2007-2012, it is estimated that the telecommunications and transportation sectors (especially roads) will continue to be the main investment destinations of the private sector as illustrated in Table 6.2.

TABLE 6.2: Base scenario for investment estimated by funding source
 (Billion of pesos in 2007)

Sector	Public Resources	Private Resources	Total
Roads	159	128	287
Railways	27	22	49
Ports	16	55	71
Airports	32	27	59
Telecommunications	19	264	283
Drinking water and sanitation	108	146	154
Hydro-agriculture and Flood control	36	12	48
Total	397	554	951

* Direct impact from inertial scenario. Does not take into account gains in economic efficiency.

Source: ERD BBVA Bancomer with data from National Infrastructure Program

Some of the most important goals proposed by the PNI are organized below by sector:

- Roads

The complete modernization of transversal and longitudinal main communication corridors around the country's major cities, ports, borders and tourist hubs with high quality roads; the development of interregional axes to improve communication between regions and road network connectivity; construction of beltway tracks and access to facilitate traffic flow continuity; and improvements to the physical condition of road infrastructure to reduce the accident rate.

- Railways

Extending the railway system, promoting the replacement of the radial structure by a network structure to improve its connectivity; developing multi-modal corridors to make freight transport more efficient, paying special attention to corridors that join Pacific ports with those in the Atlantic and with borders; boosting the development of suburban passenger trains to significantly reduce the commute duration for workers and students; and improving the coexistence of the railway in urban areas.

- Airports

Extending and modernizing airport infrastructure and services with a long-term vision; developing regional airports and improving their interconnection; promoting airport projects to boost the development of travel corridors; and promoting the development of airports specialized in air freight.

- Ports

Increasing port infrastructure, particularly container management capacity; developing ports as part of an integral multi-modal transport system to reduce logistic costs for companies; promoting the competitiveness of the port system to offer a better service in accordance with international standards; and promoting the development of ports with a focus on tourism.

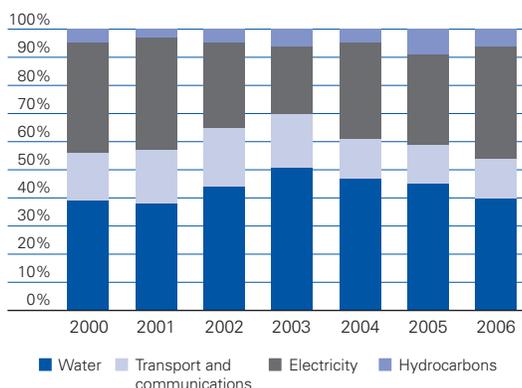
As was anticipated at the beginning of this section, there are institutional and legal limitations that would possible facilitate a greater infrastructure investment by the private sector if they were eased.

On the one hand, in the Constitution as well as the Foreign Investment Law some economic activity sectors are still reserved for the State that could potentially be linked to important public work and infrastructure projects. For example, oil; basic petrochemicals; electricity; nuclear power generation; radioactive materials; radio towers; and telegraphs.

It is therefore clear that among the above activities, those related to the energy sector (oil and petroleum, basic petrochemicals, electricity and radioactive minerals) are the ones associated with the highest potential demand of infrastructure works and in that

sense any progress toward public-private participation models in the sector could result in greater infrastructure investment (see Chart 6.11).

CHART 6.11: Infrastructure investment by sectors
 (% of GDP)



Source: ERD BBVA Bancomer with data from National Infrastructure Program 2007-2012

The legal framework discussed contains clauses that reserve activities to people of Mexican nationality and Mexican companies and as such limits greater private investment. For example, foreign capital cannot participate in the following activities: a) National land transport of passengers, tourism and cargo, not including messaging and packaging, b) Retail trade of gas and liquid oil or gas and c) broadcasting of radio and television services, other than cable television.

By limiting the private sector expansion in areas that intensively use communication and transport infrastructure, potential development of the infrastructure sector is also limited on the demand side.

6.3. The concession law

6.3.1. Legal framework for participation of the private sector in infrastructure

As commented in the section above, the PNI proposes public and private investment as necessary for developing infrastructure in the country, based on the legal framework in force. Therefore, it should be stated that in Mexico there is no Concession Law as a single legal body. Instead, a fragmented legislative framework of concession laws and federal entities exists (though many of them partially reference the Public Works and Related Services Law (LOP)), which regulates actions related to planning, budget, contracting, expenditure, execution and control of federal public works.

Since LOP is the main benchmark on public work regulation in Mexico, this is what is analyzed in greater detail below. For example, in accordance with the LOP, facilities, entities from the federal public sector can contract provision and/or service public works by three proceedings:

1. Public offering.
2. Invitation to at least three bidders.
3. Direct Award.

A Public offering is the procedure by which all public works and services related to them are awarded. To that purpose, a public request for proposals with specifics of the project to be developed or the services to be contracted is carried out so that the interested party may freely submit solvent work proposals. In order to guarantee that the State receives the best available conditions regarding price, quality, funding, opportunity and other relevant circumstances, proposals are delivered in sealed bids, which are later opened publicly.

The LOP establishes that only by exception may public work contracts and services related to them be assigned by invitation (in this case at least 3 bidders) or by direct award. The above cases occur when some of the following conditions are given:

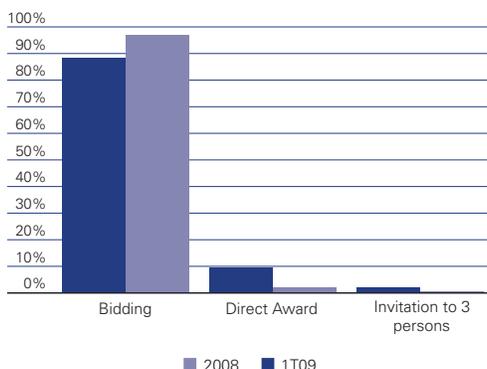
- The contract can only be completed by a single contestant since they are works of art, exclusive patent licensing, copyright or other exclusive rights.
- When it is deemed possible that the social order, economy, public services, health, security or environment of any area or region of the country is jeopardized or altered as a result of an act of natural disaster or unforeseen circumstances.
- There are duly justified circumstances that can produce losses or major additional costs.
- Contracts are performed exclusively for military or naval purposes .
- As a result of acts of natural or unforeseen circumstances, when works cannot be executed by the procedure of public bidding in the term required to attend the contingency in question.
- If the respective contract was rescinded for reasons attributable to the contractor who won the bid.
- With regard to a public bidding that has been declared vacant.
- In the case of maintenance, refurbishment, repair and demolition of infrastructure works, in which the scope cannot be established or the execution of the program cannot be elaborated.
- In the case that works which specifically require farm or marginalized urban labor, and the facility or entity contracts directly with the population of the town or place where the works are to be done, either as individuals or entities.

6. Pension funds and infrastructure in Mexico

- In the case of services related to public works provided by an individual, provided these are performed by him, without requiring the use of more than one specialist or technician.
- In the case of consulting, advisory, study, research or training services, related to public works, having to apply the invitation procedure to at least three individuals, among which higher education institutions and research centers will be included.

If the field of works refers to confidential information, contracting by direct award may be authorized.

CHART 6.12: Contracting schedules for public work
(% of total)



Source: ERD BBVA Bacomer with data from the Secretaría de la Función Pública (Secretary of Public Affairs)

In practice, most contracts are assigned by public bidding as prescribed by Law. For example, in 2008, from a public work contract totaling MXN 202,666 million (US\$ 14,970 million), 88.4% were assigned by public bidding. With regard to the first quarter of 2009, that percentage reached 97.2%, for a total amount contracted of MXN 77,152 million (US\$ 5,383 million) (see Chart 6.12).

Regulations governing the public work contracting system have been inefficient for stimulating infrastructure creation. For example, the **Secretaría de la Función Pública (Secretary of Public Affairs) (2008)** has revealed that the Law’s design under the guideline of administrative control has resulted in granting greater weight to complying with bureaucratic routine than to contracting purposes and results.

Apart from that, the Secretary of Public Affairs has identified that at least until 2008, there have been a series of inhibitors to public contracting:

- Inadequate planning, scheduling and budget allocation. The legal framework did not establish precise criteria for formulating annual programs in terms of public work. In

the case of infrastructure works, delays due to the lack of studies and projects, delays to liberate road rights and delays for permits by the environmental authority have been common.

- Excessive internal regulations from public facilities and entities. The emphasis on checking public infrastructures was focused on at the time reviews based on formal criteria and the evaluations of results were practically inexistent.
- Deficiencies and limitations in the information systems. The Public Sector Information Service “Compranet” was not designed to gather and organize data that contracting processes generate, nor does it allow to be linked to other information systems. Thus there was no record on success or failure in public contracting with data about suppliers, contractors, prices, contract compliance, quality of goods and services, or works executed.
- Inadequate legislation for the application of new contracting schedules. Neither complex contracting public works nor services were contemplated for projects for the provision of services (PPS).

Based on the above problem, the Public Works and Related Services Law was reformulated in April of 2009 to facilitate public investment, and to achieve greater efficiency and results for the State. Among the main objectives and changes to the legal framework are:

- To speed up the application of public expenditure. It may be allocated only once the Federal Expenditures Budget has been approved and there is a corresponding expense schedule. Before, allocation of public expenditure had to have prior authorization by the Secretariat of Finance.
- Speed up execution of public works. Execution of works may be started once the rights allowing them to legally dispose of the property are in place. In the past, it was necessary to wait until having liberated, for instance, the road rights in the case of roads.
- To facilitate the evaluation of public work proposals. Works may be evaluated by points and percentages and correcting errors not affecting the solvency of the proposals will be allowed. In the past, proposals were approved or rejected completely depending on their compliance of formal requirements.
- Participation of the private sector is promoted. Individuals may submit studies, plans and programs to carry out public works associated with infrastructure projects.
- Barriers to enter proposals are reduced. Exemption from granting guarantees for hidden flaws or defects to some service contracts related with public works will be allowed. In addition, the percentage of compliance guarantees (deposits) may be reduced considering compliance track record.

- New contracting schedules will be incorporated. The possibility of carrying out public-private participation in investment projects in terms of public works in which the contractor is obliged to execute, commission, maintain and operate the work is acknowledged.
- Centralization of information. The Information Integral System as a part of CompraNet and the integration of a single registry of contractors is established.

Finally it must be mentioned that on October 1st, 2009, the Federal Executive announced sending a Public-Private Associations Law for Congress to complete the legal framework related with infrastructure works at a federal level. According to the press release from the Secretariat of Finance, approval of this Law by Congress would allow to specifically regulate public-private association projects, and in this way, offer greater legal certainty to investments. The new Public-Private Associations Law would also have an immediate goals to make projects more flexible, as well as to speed up their allocation, abate their costs and accelerate their execution⁹¹.

6.3.2. Granting of guarantees to the private sector

In Mexico, the Government has created funds with bank capital or in association with the private sector to promote private investment in developing infrastructure in different sectors. Under this type of agreement, the Government typically looks to make projects fundable by means of support or guarantees in which private investors can participate and increase the multiplier effect.

The most recent example of a trust schedule to promote public-private participation is the National Infrastructure Fund, FONADIN, (Fondo Nacional de Infraestructura). This fund was created in February of 2008 with the purpose of being the coordination vehicle of the Federal Public Administration for infrastructure investment, mainly in the areas of communications, transportation, hydraulics, the environment and tourism. This fund was established as from the assets of two previous trusts: The Fideicomiso de Apoyo para el Rescate de Autopistas Concesionadas (FARAC, Support Trust for Rescue of Commissioned Highways) and with existing resources in the Fondo de Inversión en Infraestructura (FINFRA, Infrastructure Investment Fund) run by the Banco Nacional de Obras (BANOBRAS, National Bank of Works)⁹².

FONADIN is intended to fund and/or contribute to funding infrastructure projects with social impact and/or profitability. The main activities contemplated by its operating rules are the following:

- Promote the integration of infrastructure project inventory with entities from the public sector.
- Provide advisors to entities from the public and private sectors for the evaluation, structure, funding and execution of projects.

91 See Secretaría de Hacienda y Crédito Público “El Gobierno Federal presenta las acciones a favor de la infraestructura”, Press release dated October 1, 2009. Available at www.hacienda.gob.mx

92 The Fideicomiso de Apoyo para el Rescate de Autopistas Concesionadas (FARAC) is a public trust created in 1997 to undertake liabilities from a group of highways which were assigned to the private sector; concessionaires lost their investment and the FARAC has covered all their obligations from the administration of toll collection powers.

- Promote carrying out studies and contracting advisors, with recoverable and non-recoverable support in order to facilitate the evaluation and structure of projects.
- Grant subordinated and/or convertible loans, guarantees and capital contributions, so as to boost participation of the private and social sector in infrastructure. This area is expected, for example, to support the participation of Mexican construction companies in project proposals with guarantees.
- Promote participation of banking and non-banking financial intermediaries in infrastructure funding. The above contemplates different types of support and subsidies, for example:
 - Grant non-recoverable contributions for carrying out public work projects.
 - Promote carrying out recoverable and non-recoverable support in order to facilitate the evaluation and structure of projects.
 - Grant subsidies to public sector entities to support the profitability of infrastructure projects.

Generally, FONADIN support may be grouped into two groups: a) recoverable, for projects with social and financial profitability, and b) non-recoverable, for projects which only have social profitability. Characteristics of each of these types of support can be seen in Table 6.3.

TABLE 6.3: FONADIN support to infrastructure investment

Type of support	Specific actions	Features	
Recoverable	Funding – Studies	Up to 70% of study cost	
	Subordinated and/or convertible loans	Up to 15% of investment value or 20% of debt.	
	Guarantees	Credit	Up to 70% of credit value
		Stock market	Up to 50% of issuance value.
		Task	Up to 15% of project investment and up to 40% of projected revenues.
Venture Capital	Political risk	Case by Case	
	Direct	Up to 49% of the concession company capital	
Non Recoverable*	Contributions	Indirect	Up to 20% of mutual funds capital
		Social profitability studies	Up to 100% of expenses
	Subsidies	Public work placements	Up to 50% of investment
			Up to 50% of investment value. However, excesses will be shared if flows offer an internal return rate (IRR) greater than the projected.

* This type of support is conditional to compliance with several requirements: a) have partial or total own source of payment, applicable to projects with contracting under principles arising from Section 134 of the Constitution (efficiency, effectiveness, economy, transparency and honesty), c) projects in which participation of private sector is planned, d) there are feasibility studies that show their social profitability and e) registered before Investment Unit of Secretariat of Finances (SHCP).
Source: BBVA ERD with data from Banobras.

6.4. Pension funds and infrastructure investment

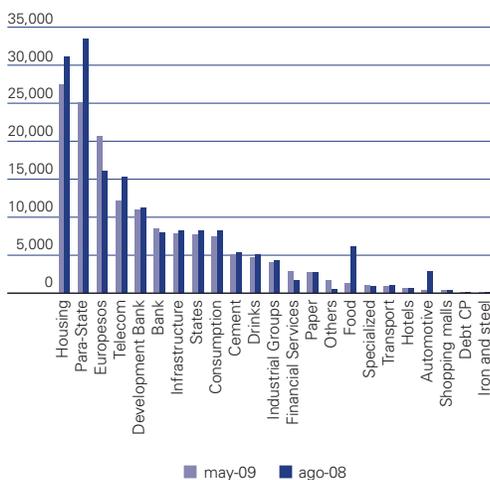
Investment framework of the Specialized Retirement Mutual Funds (Siefore) that manage the Retirement Fund Administrators (AFORE) has historically allowed indirect investment of resources from the SAR retirement savings system in infrastructure projects. However, in 2007, the investment framework was reformulated to open up for the first time the possibility of direct infrastructure investment by way of trusts and financial instruments related to projects directly⁹³.

6.4.1. Indirect investment

Historically, Siefore-AFORE have been able to participate indirectly in funding companies and projects related to the infrastructure sector mainly by means of debt instruments issued by companies, as well as different entities from the public sector. For example, in August of 2009, Siefore-AFORE provided funding for 22.2% of the total debt issued by the private sector in the local market, channeling resources to a great amount of productive sectors ranging from housing and telecommunications, to steel and hotels.

In the infrastructure sector, most resources have been designated to funding roads and highways. However, if funding to local governments (states and municipalities), housing and State-owned companies are also considered, total investment in sectors related to infrastructure could be ten times higher than currently recognized in the infrastructure arena (see Chart 6.13).

CHART 6.13: Siefore investment in private debt instruments (in million of pesos)

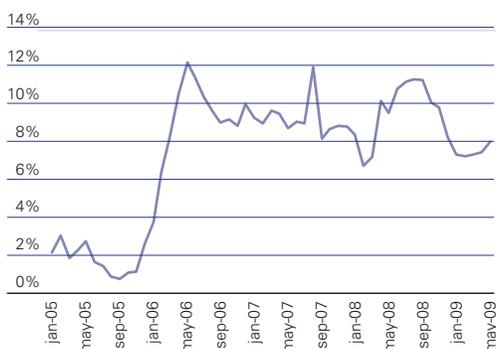


Source: BBVA Bancomer with Consar data

93 A trust is a contract whereby an individual or an entity, named trustor, conveys and sets aside assets (goods or rights) to a trust entity for it to carry out an agreed-upon legal purpose for the benefit of the trustor or a third party. Under this legal function, all trust assets leave the realm of the trustor's net worth to create a separate asset managed by the trustee. The legal purpose is entailed in the *Ley General de Títulos y Operaciones de Crédito*.

On the other hand, investment of Siefore-AFORE in the equity market has been limited and only allowed through structure notes of protected capital⁹⁴. In December of 2007 these investments represented 8,8% of the total holding value and in August of 2008 they reached their record maximum of 11,2%. After the financial world crisis, however, investment percentage were reduced to 7,7% in January of 2009 and since then has been about 8% (see Chart 6.14).

CHART 6.14: Siefore-AFORE share in equity market
(index) % of Siefore total portfolio



Source: BBVA Bancomer with Banco de Mexico data.

The above is explained by less interest in risk by the Siefore-AFORE in the reference period, but also by less exposure to international markets due to a voluntary agreement that AFORE signed to support economic reactivation in Mexico. Based on the agreement of "AFORE'S actions to support economic reactivation, investment and employment creation in Mexico," AFORE committed to, for instance, designate new resources payments, contributions and returns to investments in domestic stocks and assets to the development of infrastructure projects compatible with its investment framework, which has resulted in giving preference to other kinds of investment assets above equity indexes⁹⁵.

6.4.2. Direct Investment

As for the changes to the Siefore investment framework in 2007, Siefore-AFORE may now invest in UDI trusts and instruments related to infrastructure projects since March

94 A structured note of the protected capital is a financial instrument combining equity indexes with debt values for the value of investment to be a debt instrument and investment remains protected at maturity. Unlike a pure debt instrument, there is also the possibility to obtain yield from the variable side in case the performance is positive. The possibility of investing in equity instruments linked to equity indexes is available for Siefore-AFORE as from 2005.

95 See Press Bulletin dated March 18, 2009 by the Asociación Mexicana de Administradoras de Fondos de Retiro AC (Amafore): "Acciones de las AFORES para apoyar la reactivación económica, la inversión y la creación de empleos en Mexico". Available at <http://www.amafore.org.mx>

31 of 2008⁹⁶. Reforms proposed under the multiple funds model, consisting of 5 funds or Siefore, allow Siefore to invest in companies and long term projects through Structured instruments and Real Estate Investment Trusts (such as FIBRAS).

Table 6.4 shows the investment limitations that, as a total percentage of its portfolio, Siefore will have to invest in structured instruments and FIBRAS. These investment limitations are applied regardless to whether part or all of the investment vehicles are dedicated to infrastructure investments.

TABLA 6.4: Siefore investment framework
 Maximum % of net assets for structured instruments and FIBRAS

Siefore	Structured instruments % Max	FIBRAS % Max	Total Assets in Siefore septiembre-09 in million pesos
SB1	–	–	116,265
SB2	5	5	258,344
SB3	10	5	324,959
SB4	10	10	308,676
SB5	10	10	65,179

Source: ERD BBVA Bancomer with Consar data

a) Structured instruments

It is worth noting that under the new investment framework, the definition of a “structured instrument” has evolved very quickly from an ad hoc concept which only considered Siefore to another, more general and appropriate for all kinds of institutional investors, which in the future could contribute to the structure of a deeper and more liquid market.

Until August 3, 2009, structured instruments were considered by the regulation as “stocks that guaranteed their nominal value at expiration, and whose partial or total performance was linked to underlying trust assets that granted rights over their performance and/or products.” By this definition, the general schedule of an instrument structured for Siefore involved three elements:

1. A long term (infrastructure) company or project to be funded.
2. Creation of a trust by the company or project to fund⁹⁷. This trust in turn had two main functions: 1) Issue senior bonds (a debt instrument issued through the Mexican

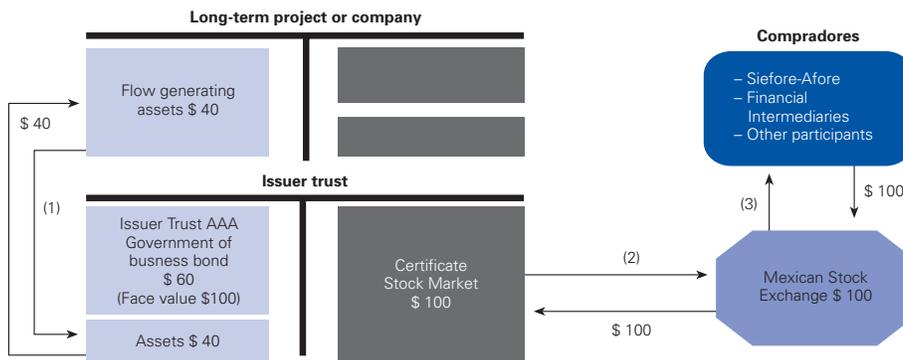
96 See Circular Consar 15-20, “General rules establishing the investment regime to which specialist pension funds investment companies are subject”, published at the Federation Official Gazette on August 1, 2007.

97 See Press Bulletin dated March 18, 2009 by the Asociación Mexicana de Administradoras de Fondos de Retiro AC (Amafore): “Acciones de las AFORES para apoyar la reactivación económica, la inversión y la creación de empleos en Mexico”. Available at <http://www.amafore.org.mx>

Stock Exchange) and 2) Transfer resources to the investment company or project according to a schedule established and/or advances agreed.

3. The public investor, including Siefore-AFORE, would buy the senior bonds through the Mexican Stock Exchange. (see Diagram 6.1)

DIAGRAM 6.1: Structured instrument cash flow



Source: ERD BBVA Bancomer with Consar data

It must be stated that under the previous structured instrument schedule the UDI trust had to have two types of assets to cover obligations derived from the senior bonds issuance: 1) rights over performance and/or products of assets in the long term company or project to fund. These assets are the ones remaining in trust thus offering investors the possibility of having a non-guaranteed variable performance, which will be linked to the success in operating that company or project and 2) a debt instrument issued by the company or long term project that would serve to ensure at expiration a minimum performance and total capital invested in the long term company or project.

As of August 4, 2009, however, the definition of a structured instrument changed in such a way so that, currently, those instruments are considered "senior bond trusts"⁹⁸. With this change in the structured instrument definition, Siefore will acquire senior bond trusts from now on, and not the trusts in projects or companies who will have to link them to a debt instrument or foreign debt value that will guarantee, at least, payment of a nominal value at expiration of those certificates⁹⁹.

⁹⁸ In a trust agreement, the following parties act:

Trustor: the person who commits goods or rights to create the trust.

Beneficiary: The person who benefits from the trust, it may be the trustor himself.

Trustee: the authorized entity to carry out trust operations and receives the goods or rights from the client (trust assets) to carry out the determined legal purpose as provided for by the trustor.

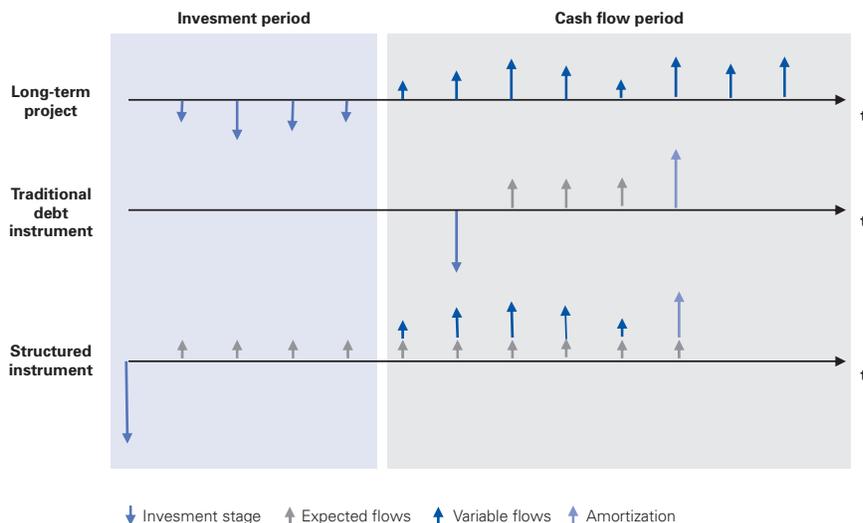
Trust assets: the trustor's goods or rights to create the trust.

⁹⁹ According to the Consar Communication published by the Federation Official Gazzette on August 4, 2009, Structure Instruments are senior trust bonds for investment or funding of activities or projects within national territory from one or more entities issued in accordance with the general provisions applicable to participants of the stock market of the Comisión Nacional Bancaria y de Valores, except for those investing or financing Mexican corporate capital acquisitions from Mexican entities listed in the Mexican stock exchange and non-convertible subordinated obligations issued by Credit entities contemplated by Section 64 of the Ley de Instituciones de Crédito.

For the structured instruments to form part of the Siefore portfolios under the new and wider definition, four requirements must be met: 1) they must have the purpose of funding infrastructure projects in domestic territory, 2) none of the sections or series in their structure will establish extra contributions with charges to holders, 3) in no case will they release the issuer from the obligation of the main payment, even when that main payment is deferred or amortized early, and 4) they must not grant powers directly or indirectly regarding derivatives nor imply structures subject to funding.

Thus, the structured instrument is an investment vehicle that due to its design allows Siefore-AFORE to participate in infrastructure projects from its initial stage, offering in principle greater clarity on possible cash flows of a long term project based on its structure because the principle over capital investment is protected by a debt instrument as long as performance depends on the project operation results. (see Diagram 6.2)

DIAGRAM 6.2: Cash flow profile in structured instruments v. long-term real projects and debt instruments



Source: ERD BBVA Bancomer with Consar data

It must also be stated that on August 10, 2009, the Mexican Stock Exchange introduced a new “senior bond trust” market, which under the new definition of “structured instrument” in Siefore’s investment framework, can be defined as a vehicle for carrying out not only infrastructure, real estate and property investments, but also private equity funds. This new senior bond is known as Certificado de Capital de Desarrollo (Capital Development Certificate) or “CCD”¹⁰⁰.

100 Siefore which have acquired structure instruments under the old definition may keep them until amortization or maturity. Likewise, they may keep until maturity all debt instruments and foreign debt values acquired before the validity of the new rules. See second transitory Consar Communication 15-23, published in the Official Bulletin of the Federation, August 4, 2009.

CCDs are trust securities for a fixed or determinable period that are issued by trusts with variable and uncertain performances, which are partial or totally related to underlying trust assets. The general purpose of CCDs is that the investment allow for developing activities or carrying out projects of companies, or acquiring securities representing social capital of companies.

Under the extended definition of CCDs, these instruments can be employed to promote not only infrastructure projects, but also real estate, business, technology development and private equity projects as well. The main feature of each of these projects to fund is that performances granted by them are not produced by the main payment nor of predetermined interests, but from the enjoyment and benefits of each project. Thus, their flows are variable and uncertain and depend on the results of each project in particular. As stated above, current regulations for Siefore-AFORE would require that those able to acquire them back up the main investment in them with some debt instrument.

Other important features of funding projects via CCD are the following:

- CCDs are not debt instruments, but capital instruments and therefore are not subject to credit ratings. They have fixed expiration terms and must meet the requirements for disclosing Corporate Government information, regulations and standards of companies listed on the Stock Market.
- Companies or projects seeking this type of funding must have a track record of operation and prove the administrator's experience of the company or project to fund.
- Property and ownership of goods and rights that conform to the assets of the project are transferred to the trust.
- Through these instruments, investors must sign a letter as evidence they know the investment risks and its cost schedule.
- CCDs must be distributed among at least 20 investors and minority investors will have protection from minority shareholders of a Stock Market Promotion Company.
- Finally, it must be stated that the trust that must be established with the CCD is responsible of releasing the project resources according to an investment schedule and in order to operate must have three governance branches: an assembly of holders (equivalent to a shareholders meeting), a technical committee (equivalent to a board of directors) and an investment committee.

Table 6.5 shows the structure and activity of the main governance branches of a trust in the CCD in greater detail.

a) Real estate investment trusts (FIBRAS)

The FIBRAS are securities issued by trusts dedicated to the acquisition or construction of real estate goods in national territory that are designated to leasing or purchasing the right to receive revenue from the lease of those goods. Fibras allows listing real estate

TABLE 6.5: Structure and activities of the branches of governance of a trust with capital development certificates (CCD)

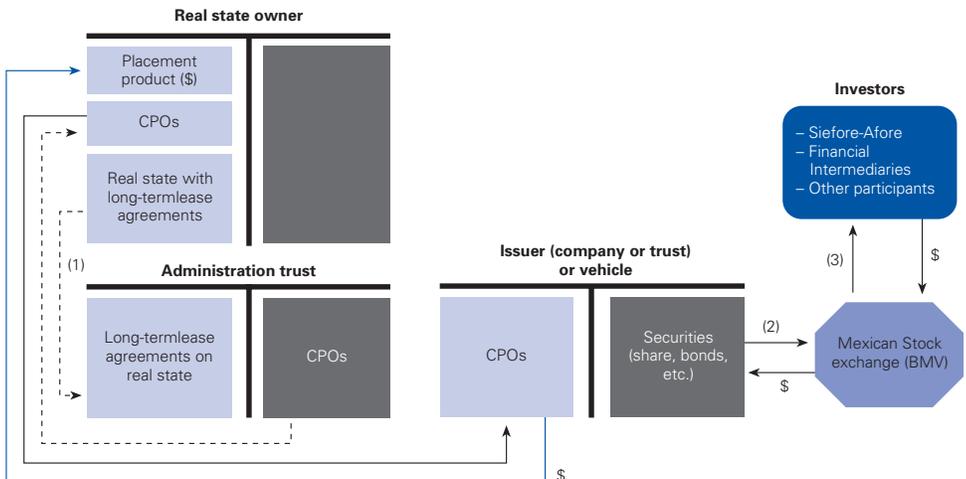
	Holders Assembly	Trust Technical Committee
Structure and participants	<ul style="list-style-type: none"> Holders may appoint one member of the technical committee with 10% of the securities (this may be waived). Holders with 20% or more may legally oppose resolutions. In issues with a trustor, anticipate in bylaws the possibility of appointing a director when the trust operation is equivalent to 10% of the company capital. 	<ul style="list-style-type: none"> Made-up by at least 5, not exceeding 21 representatives 25% of independent members when 100% of the holders are not represented in the committee. One person designated by the common representative
Activities	<ul style="list-style-type: none"> Appoint members of the technical committee Appoint and dismiss the common representative Replace the manager Approve investments and divestments representing 20% of the asset value In case of significant deviations regarding the investment plan, evaluate and decide on: <ol style="list-style-type: none"> early termination, execution of guarantees and un-invested cash; actions regarding assets in operation and, if applicable, an orderly settlement 	<ul style="list-style-type: none"> Holders with 10% may appoint one member of the committee Supervise fund management Propose the assembly changes suggested by the manager to the investment parameters Establish conditions to require the return of resources if investments are not made after a certain period Evaluate and propose the manager's dismissal to the assembly Decide on: <ol style="list-style-type: none"> Off mandate investments, investments with potential conflict of interests, investments and divestments of assets contributing with 5% of the assets and celebrate agreements to exercise the vote of members in the same vein as the manager

Source: ERD BBVA with information from the Mexican Stock Exchange "Capital Development Certificates".

revenue in secondary markets (securitized) and if applicable the capital gain of its transaction.

In the case of FIBRAS there are three participating elements (see Diagram 6.3).

DIAGRAM 6.3: Flow of a FIBRA



Source: ERD BBVA Bancomer with Consar data

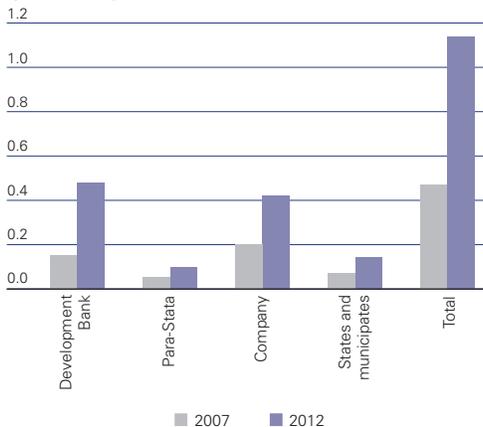
1. A real estate owner with long-term lease agreements.
2. Creation of a management trust by the owner of real estate. The management trust will have the ownership of the lease agreements and will provide certificados de participación ordinaria (common share certificates) (CPOs) in exchange for a debt instrument issued through the Mexican Stock Exchange to the real estate owner.
3. The real estate owner gives the CPOs to another issuing vehicle (it could be another trust or company) which acquires the right over the revenue and the real estate capital gain, and in turn settles the CPOs with the real estate owner through the placement of stocks or stock exchange certificates among the investing public.

6.5. System weaknesses for infrastructure investment

So far, Siefore has funded productive projects at different Government levels, big public and private companies, housing developers and some infrastructure projects mainly by means of different debt instruments. With the structured instruments (senior trust bonds, for example, CCD) and FIBRAs, however, there is a chance Siefore could contribute further to developing new infrastructure and funding small to medium companies. For example, according to conservative estimations of the SHCP, if Siefore maintained the makeup of its portfolios its investment in instruments funding infrastructure projects could reach over 1% by 2012. (see Chart 6.15).

CHART 6.15: Infrastructure investment possibilities

(% of GDO)



Source: ERD BBVA Bancomer with SHCP data

6.5.1. Progress with the new investments vehicles

a) Structured instruments

Up to August 3, 2009, the definition of structured instruments required that long term companies or projects were linked to entities entitled to contribute goods to a trust,

such as stock market promotion companies (SAPI). However, under the old definition of structured instrument, the only issue of senior bonds to be placed by a SAPI which met all the investment requirement imposed by Siefore regulations (Consar Circular 15-22 at that time) was done by Agropecuaria Santa Genoveva S.A.P.I of C.V, on June 26, 2008.

Agropecuaria Santa Genoveva placed MXN 1,650 million (US\$ 160 million) in 20-year senior bonds. The bonds were triple-A rated, which guarantees capital with debt instruments and offers the possibility of extra returns based on the assets' performance. According to information on the Mexican Stock Exchange, the primary issue of bonds was acquired by 5 institutional investors (possibly AFORE) and an individual.

However, due to the new definition of structured instrument for Siefore and the introduction of the CCD in the financial market seemed to offer the best investment perspectives for pension funds in structured instruments. For example, after creating the CCD on August 10, 2009, the first CCD placement between Siefore-AFORE was recorded on October 1. The share, whose collection reached MXN 6,549 million (US\$ 480 million) was placed by the "Red de Carreteras de Occidente" consortium, part of a partnership of Goldman Sachs companies and the ICA Group, and it is expected that AFORE acquired about 30% of the shares. Moreover, at least 3 AFORES would have a place at the Holders Assembly for their stake¹⁰¹.

After this first CCD placement and according to information from the specialized press, in 2009 there are eight other applications by different groups who expect to be able to issue this type of securities and offer them to Siefore-AFORE: 1) Corporación Tres Marías, 2) Inmar del Norte, 3) Macquarie Mexico Infraestructura 1 and 2, 4) Arrachera House, 5) Geo Maquinaria, 6) Lar Group, 7) Wamex and 8) Alasis Mexico de Interés Social¹⁰².

On November 5, 2009, Wamex Capital carried out the first funding operation of a private equity fund with a CCD placement. Placement was for an amount of 750 million pesos, which is designated to fund small to medium sized Mexican companies¹⁰³.

b) FIBRAs

FIBRAs' offer in the Mexican Stock Exchange (BMV) is non-existent so far. The first placement prospectus of a FIBRA was from the company Fibra Mexicana de Inmuebles S.A de C.V. (FIBRAMEX), owner of Torre Mexicana de Aviación. Launch was scheduled for February 2006, but was canceled with no rescheduling date.

Another placement prospectus arose with the Casa Blanca Trust on June 23, 2006, which had five private sports clubs as underlying assets. On November 16, 2007, however, the prospectus was canceled at the BMV so the FIBRA was never created.

101 See Alma Saavedra, "CKD, diseñado para inversores institucionales" El Economista, Section Valores y Dinero, October 5, 2009 and Maricarmen Cortés, "Desde el Piso de Remates", El Universal, October 5, 2009.

102 See Clara Zepeda Hurtado, "Hay 8 solicitudes para invertir en infraestructura con los CKDes". El Financiero, Finance Section. October 14, 2009.

103 Mexican stock exchange, "WAMEX CAPITAL, SAPI de CV, coloca la segunda emisión de CKDes en el mercado accionario mexicano", Press release dated November 5, 2009. Available at www.bmv.com.mx

The last record of a possible FIBRA was that of the self-service store Controladora Comercial Mexicana (COMERCI), which in July of 2008 revealed its plans for structuring a public FIBRA to which some of group's properties would be contributed and in which third party investment would be accepted to support the construction of new stores for the group. After the financial turmoil of 2008 and the company's solvency problems, the structured product has been suspended indefinitely.

6.5.2. Limitations of the new investments vehicles

Investment instruments currently allowing Siefore-AFORE to invest directly in infrastructure present some limitations and challenges for evaluating risks.

a) Structured instruments

With regard to structured instruments, some of the main limitations and risks that are recorded under their old definition were the following:

- There is no secondary market for senior bonds, which means these instruments brought about certain liquidity risk.
- The debt instrument contemplated verified part of the structured instrument exclusively backed up by senior bonds. Based on the above, a partial or total breach in the payments due in that instrument (for example in its coupons) had direct impacts to the payments that holders of senior bonds could receive.
- Evaluation of the variable part of structured instruments always depended on different factors ranging from the trustee's experience and technical capacity for operating and managing an infrastructure project, to time variations of the exchange rate, inflation, taxation and regulatory framework.
- In case the trustee (infrastructure project operator) has to be replaced by a third party, substitutions could be difficult and expensive.
- Senior bonds did not grant ownership rights on assets generating cash flows. However, alteration in the ownership of those assets (for example an expropriation) may affect the achievement of cash flows over which holders of senior bonds have a participation right.

Under the new definition of structured instruments, particularly with the use of CCD, previous limitations and risks may be partially reduced. For example, the new definition of structured as "senior bond trust" facilitates Siefore-AFORE stake in standard products that have a larger market and which could have greater liquidity in the future. In turn, the Siefore-AFORE participation in the Holders Assembly under the trust that contemplates a CCD strengthens the protection of their rights as investors, since it improves their ability to supervise investment/divestment of assets and also offers them the possibility to evaluate the performance of the project manager, replacing him/her if applicable.

The CCD schedule still has different risks that Siefore-AFORE should evaluate appropriately. For example, the eventual replacement of the project operator or manager by a third party could be difficult and expensive.

In turn, a great number of liquidity and non financial risks remain in the structure for these types of investments that have to be evaluated when considering their potential performances. For example, the CCD Placement Prospectus of the “Red de Carreteras de Occidente” SAPI de CV (first CCD placement in the market) shows some of the trust, political and regulatory risks of senior bonds that should also be taken into account¹⁰⁴. With regard to shareholder risks of senior trust bonds, it is specified that: There is no obligation to pay the amount invested by the holders or any type of interest; payment to holders is limited to the resources existing in the trust patrimony; there is no secondary market for senior trust bonds; senior trust bonds have no specific guarantees and there is no chance of evaluating performance of senior trust bonds at the time of their placement.

With regard to regulatory and political risks, as from the aforementioned placement prospectus, unexpected changes may be indicated in the price and fee policy of the public sector, instability in interest rates and exchange rate, as well as variation in the tax system and possibility of social disturbance. It must also be stated that part of these non financial risks could be mitigated through different instruments which, depending on the kind of specific risk, could be covered by insurance, subsidies and guarantees to extend concession maturities in the projects. The subject of guarantees for infrastructure projects is maintained as a key subject to facilitate their expansion and funding by Siefore-AFORE.

At the same time, the use of CCDs to finance placements of private equity include a wide range of uncertainties that AFORE-Siefore will carefully evaluate if required at the time of participating in this type of structure. For example, the placement Prospectus of CCD from Wamex Capital to fund companies indicates the following possible risks identified under this placement structure: 1) There is no predetermined or guaranteed performance on invested capital, 2) There are liquidity risks on investing in companies that are not listed in a stock market, 3) Individual investments are made in companies whose grade of sophistication and institutionalization are typically lower than those observed in companies listed in a public market and 4) Possible non-alignment of interests between manager and holders. With regard to this last point, the issuance of CCDs in Mexico for private equity funds incorporates some elements trying to align incentives and interests between the manager and holders of the instrument: 1) The manager participates with a percentage in each of the investments, 2) The manager’s economic interest is generated once a preferred return for holders is achieved, 3) There is an investment schedule, and 4. Holders participate in an Advisory Investment Committee to define the investment policy of the fund¹⁰⁵.

b) Real estate investment trusts (FIBRAS)

With regard to FIBRAS, some of the main limitations they present are the following:

- These instruments involve risks of double taxation, which have limited their possible structure and offer to market. Although there is a full fiscal frame for the FIBRAS on

104 See CCD placement brochure, “The Bank of New York Mellon, S.A., multiple banking entity, on shares from the Red de Carreteras de Occidente, SAPI de CV (RCOCB 09)”, October 2, 2009. Definite version available at http://www.bmv.com.mx/wb3/wb/BMV/BMV_folletos_de_colocacion/_rid/190_mto/3/_url/BMVAPP

105 See folleto de Colocación de CCD’s “The Bank of New York Mellon, S.A., Institución de Banca Múltiple, sobre los activos subyacentes que aporte Wamex Capital, SAPI de CV”. Available at http://www.bmv.com.mx/wb3/wb/BMV/BMV_prospectos_de_colocacion/_rid/190_mto/3/_url/BMVAPP

the federal level, in the spheres of local Governments there is a potential problem of double taxation with the Impuesto sobre la Adquisición de Inmuebles (ISAI, Acquisition of Property Tax). This is because at State level, the assignment of rights of a trustee, as well as the transfer of property are considered "acquisitions" implying payment of ISAI. In this context, the sale of Common Share Certificates (CPOs) of the FIBRA, can lead to conclusion that ISAI sold the property as well.

- The identified solution to the problem is to reform the tax regulations locally so that the sale of certificates may be considered only as injection of credit securities that do not represent the ownership of goods. Differences in each State and Municipal legislation represent an important challenge for the ISAI. To date, only the local tax regulations referred to the Federal Fiscal Code have been reformed (13 out of 32 federal entities).

6.5.3. Other considerations

a) International asset diversification

Large Pension Funds such as the Canada Pension Plan Investment Board, CPPIB, invest in infrastructure with a global vision so as to maximize their yield and diversify the assets in their portfolios. This is to say, the opportunities in infrastructure investment are analyzed more for the financial and legal stability projections of the Fund than by their geographic location.

In Mexico, all the infrastructure investment possibilities currently available for AFORE and Siefore are restricted only to projects within the national territory. This situation may limit, during a second stage of investment, the potential yield of this type of asset and also requires a more careful selection of risks within the domestic supply of available projects and to diversify these as time goes by.

b) Technical evaluation of projects

Infrastructure investments are highly specialized. For analysis and evaluation purposes, large pension funds that deal in this type of asset globally form specialized units or have recourse to consultants. In Mexico, new financial vehicles and instruments for investments in infrastructure are relatively new, therefore AFORE faces the challenge of putting together teams of specialists to seize new investment opportunities.

As to the private sector, it is not clear if currently there is personnel specialized in infrastructure in the country. First, the participation of the private sector in this industry is very limited in relation to the experience of other countries, and secondly, the experience of the private sector with assets of this type has failed in the past.

For example, between 1989 and 1995, in order to expand the federal road network, and guarantee its maintenance and efficient operation, 52 highways were granted in concession to the private sector for a term of up to 50 years. In 1997, however, in face of the financial problems that affected the companies operating the highways granted the concession (caused by the 1995 financial crisis and also by problems in traffic flow estimation) the Federal Government decided to rescue 23 of the 52 highways granted in

concession, assuming a debt of MXN 57.7 billion (US\$ 5.3 billion). From this amount, MXN 36.6 billion (US\$ 3.4 billion) was bank debt for the Programa de Rescate Carretero (Road Rescue Program) and MXN 21.1 billion (US\$ 2 billion) were for payments of Pagars de Indemnización de Carreteras (Road Indemnity Promissory Notes) (PICs)¹⁰⁶.

For this reason, it is not surprising that even with new investment instruments available for the participation of Siefore-AFORE in infrastructure investment, the allocation of resources to this type of asset is still cautious and below allowable limits. The latest information available as of September 2009 reveals that according to a broad definition, only 6.9% of the total portfolio of Siefore-AFORE is allocated to cover sectors related to infrastructure (this definition includes roads, 0.7%, financing of local governments, 0.7%, para-State governments, 2.5%, and housing, 2.9%) when the maximum limit for the system of five Siefores as a whole is 10.7% (see Chart 6.16).

CHART 6.16: Siefore-AFORE investment framework
 (maximum % of assets allowed for infrastructure with structured instruments and FIBRAs)



Source: ERD BBVA Bancomer with Consar data

There are elements that lead us to believe that infrastructure investment may have the necessary foundations for further expansion today. On the one hand, technical assessment of infrastructure projects could be carried out with initial public sector support. The Fondo Nacional de Infraestructura (FONADIN) (National Infrastructure Fund) holds resources available to participate in the assessment, structure and execution of projects and BANOBRAS, the bank for development, for the Federal Government, has 75 years experience in consulting, project assessment and technical assistance for the development of infrastructure projects and the financing of public works at all government levels.

On the other hand, it is encouraging that on October 1, 2009, the Federal Executive made the "Anuncio de Reformas al Marco Legal y Acciones para Incrementar la Finan-

106 Centro de Estudios de las Finanzas Públicas, "El Programa de Rescate Carretero: FARAC". Submission for the House of Representatives. July 2007

ciación en Infraestructura” (Announcement of Reforms to the Legal framework and Actions to Increase Infrastructure Financing)¹⁰⁷. This may stimulate greater public sector support for projects through more efficient regulation and guarantees for specific projects, especially considering that the pension resources in AFORE may play a key role in promoting infrastructure development.

6.6. Conclusions

In this chapter we analyzed the Mexican experience in the formation of infrastructure assets. Our analysis specifically focused on three aspects: 1) Reviewing public sector activity in the construction of public works and infrastructure, 2) Showing opportunities offered in the legal and institutional framework for the private sector to contribute to the development of infrastructure, and 3) Identifying opportunities for pension fund administrators (AFORE) to finance, and benefit from, infrastructure investments.

In reference to the first point, our analysis reveals that the public sector in Mexico has played a vital role in the development of the country’s infrastructure and will undoubtedly continue to lead the country in this respect. In this sense, there is a series of reforms and important steps which will facilitate construction of public works. For example, the implementation of multi-year budgets for the allocation of public expenditure in infrastructure, a reform of the *Public Works and Related Services Law* which in principle increases the speed of public expenditure, clear investment targets for the public sector over the next few years under the National Infrastructure Program (PNI), as well as the creation of a public pool of assets to finance these projects (FONADIN).

Facing the constant need to adjust expenditure to public revenue, it is clear that the private sector will have to increasingly share in public sector investment. Furthermore, this trend could be consolidated in the near future by means of the recently announced Public-Private Associations Law, which provides greater legal clarity for the private sector in its joint investments with the public sector.

According to the National Infrastructure Plan, Mexico requires annual infrastructure investments of 3.5% to 4.5% of its GDP over the next few years to achieve a level and quality of infrastructure similar to that of Chile. It is estimated that to achieve this financing, 58.3% of the resources must originate in the private sector, which will undoubtedly make for interesting investment opportunities not only for construction and development, but also for commercial banks and investment institutions such as pension fund administrators (AFORE).

With this in mind, in the second part of this chapter we showed how the investment framework of AFORE has undergone important advances in that it increased its range of investment instruments to allow administrators to obtain better risk-performance ratios for their portfolios of pension funds (Siefos). With respect to infrastructure investments specifically they concentrated mainly on public debt and private enterprises

¹⁰⁷ See Secretaría de Hacienda y Crédito Público “El Gobierno Federal presenta las acciones a favor de la infraestructura”, Press release dated October 1, 2009. Available at www.hacienda.gob.mx

in the infrastructure sector. As of March 2008, however, new investment opportunities arose due to modifications in the investment framework that made it possible for AFORE to invest directly in infrastructure projects according to the *Project Finance* model, which allows the use of structured finance instruments and real estate investment trusts (fibras).

It must be pointed out, however, that it was not possible to consolidate the *Project Finance* model in Mexico for a variety of reasons: a) there has been a lack of infrastructure investment projects since the mid-90s, and although in recent years great efforts have been made to stimulate infrastructure expenditure, the 2008 financial crisis has delayed the largest projects, b) there exists limitations on private sector participation that could potentially give rise to large infrastructure investments such as in the power sector, c) there is a lack of a unified legal framework which comprehensively regulates public-private partnerships, which, as was already mentioned, the current concession regulation distributed to different government agencies, and d) a variety of obstacles, which, in practice, have restricted new investment vehicles for institutional investors (AFORES, insurance companies and investment firms) to invest in infrastructure. As such, there has been a lack of projects organized according to the framework of structured instrument and there have even been problems relating to the double taxation of real estate investments.

Furthermore, it must be pointed out that the slow evolution of AFORE'S investment framework has limited, to some measure, investors' interest in infrastructure investments. In Mexico, the investment framework has slowly evolved to include a wider range of investment instruments such as index protected investment notes. However, this passive investment strategy could limit the capability of institutional investors to assess new types of assets (infrastructure, real estate, private capital, etc.) and thus could slow the development of Mexico's financial markets. For example, AFORE authorized investment in the derivatives market in 2002, but to date it is still not in wide use.

With an aim of further developing the financial markets and determining the basis for AFORE to invest in new instruments and asset classes, it may be convenient to permit the investment framework to include AFORE'S direct participation in the stock market. This is the direction taken by pension funds in more developed countries such as Australia and Canada, which is also being followed by Chile and Peru in Latin America. In addition to the possible short-term benefits of allowing pension funds to follow active investment strategies, the long-term benefit to the financial markets in which they operate is that it would allow them to gain the necessary experience and capacity to analyze new instruments and subsequently participate in transactions involving new asset classes such as infrastructure investments.

Along these lines, a major short-term investment from pension funds in infrastructure also requires that these investors have a wide range of investment instruments available, and specifically, instruments that are better suited to their risk analysis and management capabilities. Therefore, in consideration of international experience, it is advisable that Mexico is allowed to use debt instruments such as so-called "infrastructure bonds", which have been very successful in countries like Chile.

7. Pension funds and infrastructure in Peru

Jasmina Bjeletic

7.1. Introducción

In Peru, it is possible to identify two periods in the evolution of infrastructure investment during the last few decades. The first of these, which includes the period from the beginning of the 80s to the beginning of the 90s, was characterized by a preponderance of construction and infrastructure management by the public sector in comparison with the private sector. During the second period, from the beginning of the 90s until present times, private participation has increased considerably with the privatization process that took place during the last decade of the 20th century. After the peak in 1999 (4.5% of GDP), however, investment participation as a percentage of GDP went down to 1.7% in 2005. This trend is a major concern due to the growing infrastructure gap facing the country. In 2005, the gap was calculated to be US\$ 23 billion, whereas in 2008 it was somewhere around US\$ 38 billion or about 30% of GDP.

With the aim of stimulating pension fund infrastructure investment, the Superintendencia de Banca y Seguros (SBS, Superintendencia of Banking and Insurance) allowed pension funds to purchase concession project financial instruments beginning in the year 2000. In spite of successive legislative initiatives since the year 2000 that had the aim of stimulating this financial model, the participation of pension funds in infrastructure financing has not been as successful as desired. According to figures from August 2009 published by SBS, investment in the sector reached 14,8% of total administered funds. This figure includes direct investment in infrastructure projects and, to a greater extent, the purchase of debt instruments or stocks issued by companies awarded the projects or of their affiliate companies. In the case of the latter, it should be remembered that the funds invested into these companies are not necessarily used for investment in infrastructure development. If we consider that direct investment is 3.5% of the total of funds administered by the PFA, it is easy to understand the need to develop mechanisms that allow for greater resource allocation to infrastructure projects.

With this objective in mind, during the past year the PFA, in coordination with the State, have created a specialized fund to channel resources from the PFA by means of Public-Private Partnerships and by establishing a trust fund to invest at least an additional US\$ 300 million. Furthermore, PFA, in coordination with multilateral organizations and the State, continue searching for alternative mechanisms to provide greater flexibility to their investments in these projects.

7.2. Recent infrastructure development

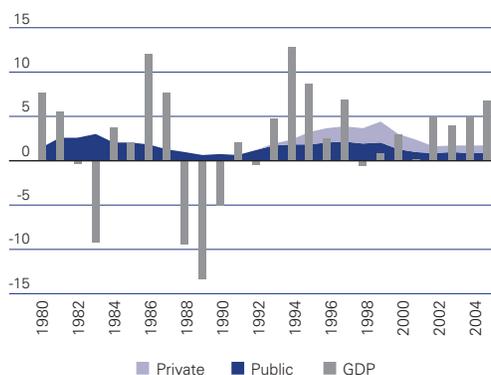
7.2.1. Cyclical nature of infrastructure expenses in Peru

In Peru, it is possible to identify two clearly different periods in the evolution of infrastructure investment during the last three decades. The first of these, which includes

the period from the beginning of the 80s to the beginning of the 90s, was characterized by the development of large infrastructure projects mainly by the State, with little private sector intervention. During the second period, which began at the beginning of the 90s and continues up to present times, the private sector has achieved growing importance due to the privatization process (see Chart 7.1).

An item worth highlighting in reference to the participation of the private sector in infrastructure investment is that partial compensation for cyclical processes of fiscal consolidation are allowed, which is normally associated with cutbacks in public capital expenditure. The greater presence of the private sector in the total investment in infrastructure has exerted a dampening effect on the cycle that, in great measure, reduces volatility and generates positive effects related to greater long term growth. Studies such as those performed by Paliza (1999) and Abusada *et al* (2004) show this positive impact of private infrastructure investment on the efficiency and growth of the Peruvian economy.

CHART 7.1: Public and private infrastructure investment in public services, 1980-2005 (GDP %) and GDP growth



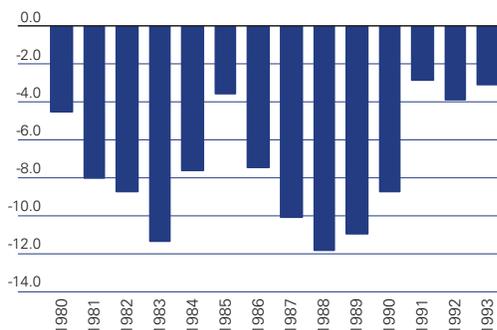
Source: MEF, MTC, VMCS, MINEM, OSIPTEL, OSITRAN, and Calderón and Servén (2004). Produced by: IPE

a) 1980-1993 Period

This period was characterized by the weakness of public finances (see Chart 7.2), marked by an inappropriate composition of public expenditure (concentrated in current and financial expenditure), the lack of financing and also significant political instability. All these were limiting factors in the accumulation of physical capital by the State (see Chart 7.3).

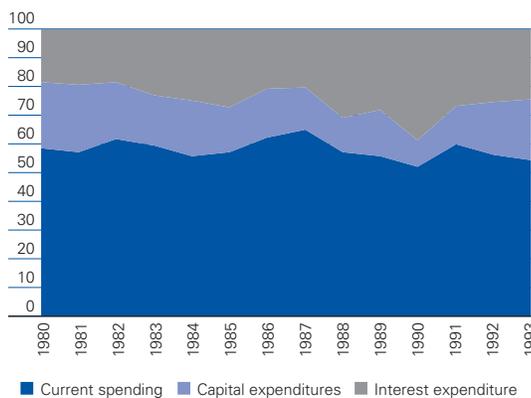
At the beginning of the 90s, a reform process was initiated that had the aim of achieving the economic stability of the country and ensuring greater efficiency in the use of resources. The aim was to generate the necessary incentives to achieve greater private sector participation in productive activities, in which the public sector had played a major role during the two preceding decades, but with poor results. Measures were implemented to achieve greater commercial liberalization, stimulate the development

CHART 7.2: Non-financial public sector overall balance, 1980-1993 (GDP %)



Source: Banco Central de Reserva del Peru (BCRP) (Central Reserve Bank of Peru)

CHART 7.3: Total central government expenditure according to type, 1980-1993 ((% of expenditure))



Source: BCRP

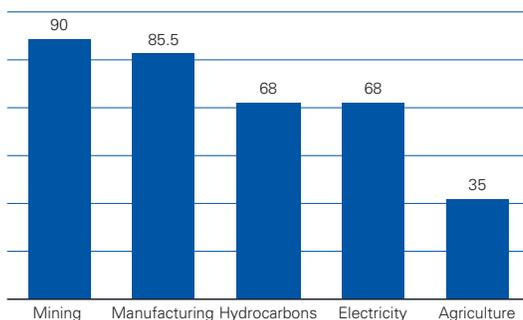
of the financial market and reform the taxation system and the labor market. Additionally, in 1993, the Pension System was reformed and a parallel Private System to the Public System was created, and in 1994, the privatization of Public Enterprises began.

b) The period between 1994-present

The second stage of reforms began in 1993 and 1994, in which participation of the private sector in the management of the economy accelerated, especially with regards to infrastructure development achieving greater sustainability of public finances. Ac-

According to the Ministerio de Economía y Finanzas (MEF, Ministry of Economy and Finance), in the period between 1991-2000, 228 companies were privatized for a total value of US\$ 9,221 million (PEN 22,803 million), and a further commitment to invest US\$ 11,779 million (PEN 29,129 million), concentrated in large projects, especially in the telecommunications and energy sectors (see Chart 7.4).

CHART 7.4: Privatization by sector, 1990-2001 (%)



Source: Ministry of Economy and Finance, 2002

Since 2002 investments have decreased significantly, from about 4.5% of GDP (public and private investment) at the end of the 90s, to 2% of GDP today. This level is very far from the percentage achieved by other countries of the region such as Chile, which allocates almost 6% of its GDP to infrastructure investment¹⁰⁸. In spite of this, the private sector continues to make almost the same amount of investment as the public sector, which shows the important role it may continue to play in the future.

7.2.2. Private sector participation in infrastructure

According to Grade (2002), positive results have been obtained with the privatization process. Their conclusion is that private companies are more efficient and profitable than comparable public companies. Especially in the more competitive sectors, like financial services, it has been demonstrated that privatized banks showed results that converged towards similar ones obtained by leading private banks. Privatization was a positive phenomenon for the country, and inefficiently State managed public service enterprises passed into better management in private hands.

Furthermore, during this second period different mechanisms were created to promote private investment in infrastructure. Some of the most significant positive experiences were:

- 1) Agencia para la Promoción de la Inversión Privada (Proinversión, Agency for the Promotion of Private Investment):

¹⁰⁸ As per data from CG/LA Infrastructure Strategy Group.

In 1992, Decreto Legislativo N° 674 “Ley de Promoción de la Inversión Privada en las Empresas del Estado”, (Legislative Decree No. 674 “Law for the Promotion of Private Investment in State Enterprises”) created a Comisión de Promoción a la Inversión Privada (COPRI, Private Investment Promotion Committee) and the Comité Especial de Privatización (CEPRI, Special Privatization Committee), agencies which were in charge of the promotion of private investment in the privatization process. This new institutional framework made it possible to carry out more relevant privatizations during the decade of the 90s, enabling a large flow of investment commitments. These were mainly concentrated in the telecommunication, energy and mining sectors.

Due to the convergence of different political and economical factors, the privatization process slowed down notably at the end of the decade with the fall in the volume of associated investments. On the one hand, dissatisfaction and criticism by the population increased in relation to some privatization processes that had been carried out (mainly related to the subject of tariffs), a phenomenon that was channeled through different political entities. Furthermore, since late 1997, the country suffered a series of negative events that had a marked economic impact, such as the ‘Niño’ phenomenon and the economic-financial crises that originated in Asia and Russia. Lastly, the resignation of the President at the end of 2000, caused an internal institutional crisis that lasted longer than was desirable, significantly contributing to the fall in private investment¹⁰⁹.

Once the political and institutional framework was re-established, the Agencia de Promoción de la Inversión Privada (Proinversión, Agency for the Promotion of Private Investment) was created in 2002 by Supreme Decree No. 027-2002-PCM. This entity had the aim of uniting all the efforts made by private investment entities, absorbing, amongst others things, the COPRI and different investment institutions, with the main objective of stimulating concessions. Under this new model, between 2002 and March 2009 Proinversión achieved 32 concession projects with an associated investment commitment of US\$ 4,300 million (PEN 14,126 million).

2) Public-private participation (PPP):

One more action taken during this decade was the implementation of Public-Private Participation (PPP) models, as an alternative to achieve investments in large infrastructures. Since 2002 (the year these PPP began operating) up to the present time, only 16 contracts have been signed, which is not a very high number (see Table 7.1). The main explanation is related to the lack of transparency and clarity of the related regulatory framework for the concession system in Peru. In fact, regulation of the PPP Law that had the aim of promoting private investment in basic services and infrastructure (roads, drinking water, irrigation, ports, etc.) did not come into force until the end of 2008.

In summary, the greatest participation of private investment since the beginning of the 90s amounted to a total of 55 infrastructure investment projects (see Table 7.2),

¹⁰⁹ However, in spite of that, some concession processes to the private sector may have been led to good course as the case of Jorge Chávez international airport, delivered to consortium Lima Airport Partners at the onset of 2001.

TABLE 7.1: Relationship of concession contracts under PPP model
(in US\$ million)

Concession	Type of concession	Investment (Reference)	Term	Contract subscription
Roads				
4 Road Network: Pativilca-Trujillo Trench	Self-sustainable	360	25 years	feb-09
5 Road Network: Ancón -Huacho-Pativilca Trench (Panamericana Norte)	Self-sustainable	73	25 years	jan-03
6 Road Network: Puente Pucusana-Cerro Azul-Ica Trench (Panamericana Sur)	Self-sustainable	229	30 years	sep-05
North IIRSA: Paita-Yurimaguas	Co-financed	220	25 years	jun-05
South IIRSA Trench 1: San Juan de Marcona-Urcos	Co-financed	99	25 years	oct-07
South IIRSA Trench 2: Urcos-Inambari	Co-financed	263	25 years	aug-05
South IIRSA Trench 3: Inambari- Iñapari	Co-financed	332	25 years	aug-05
South IIRSA Trench 4: Azángaro-Inambari	Co-financed	215	25 years	aug-05
South IIRSA Trench 5: Matarani- Azángaro and Ilo-Juliaca	Co-financed	183	25 years	oct-07
1B Intersection-Buenos Aires-Canchaque (Costa Sierra)	Co-financed	31	15 years	feb-07
Ovalo Chancay-Huaral-Acos (Costa Sierra)	Co-financed	34.2	15 years	feb-09
Airports				
First airport group of provinces of Peru	Co-financed	78	25 years	dec-06
Ports				
New Container Terminal in Port Terminal of Callao-South Area	Self-sustainable	734	30 years	jul-06
Sanitation				
ENFAPATUMBES- Drinking water and sewer service in Tumbes	Co-financed	73	30 years	sep-05
Huascacocha- Rima- Drinking water supply for Lima	Self-sustainable	77	20 years	jan-09
Irrigation				
Olmos-Trasvase	Co-financed	185	20 years	jul-04

Source: Proinversión, MTC. Preparation: MEF

TABLE 7.2: Private infrastructure participation, 1990-2007
(Number of projects and amount in US\$ million)

Sector	Sub-sector	Nº	Investment
Energy	Electricity	26	5,365
	Natural gas	2	990
	Total energy	28	6,355
Telecom	Telecom	8	9,770
	Total Telecom	8	9,770
Transport	Airports	3	430
	Railways	2	62
	Ports	2	426
	Road systems	11	1,988
	Total Transport	18	2,906
Sanitation	Treatment plant	1	80
	Drinking water	1	72
	Total drinking water	1	152
Total		55	19,183

Source: PPI Database, World Bank.

with the energy and telecommunication sectors being the biggest beneficiaries with more than 80% of the total associated investment of US\$ 19 billion (PEN 54,537 billion).

a) Economic stimulus plan and infrastructure in 2009

With the aim of dampening the impact of the international crisis on the Peruvian economy at the beginning of 2009, the Government launched a Plan de Estímulo Económico (PEE, Economic Stimulus Plan) focusing on stimulating productive activity, social protection and infrastructure investments. The objective was to increase productivity and promote long term growth. As in all situations of crisis, the current moment has served as the mechanisms that will allow a search for greater effectiveness of the current infrastructure development processes in the country, with greater private sector participation.

In regards to infrastructure, the PEE has, as its main objective, the completion of twelve large infrastructure projects that require a total of approximately US\$ 627 million (PEN 1,977 million). Other measures to strengthen national infrastructures have also been contemplated, such as:

- Creation of a fund for infrastructures of US\$ 500 million (PEN 1,576 million), to finance projects carried out by PPP. This fund will have an initial State contribution of US\$ 100 million (PEN 315 million) and the rest is expected to be completed with contributions by multilateral organizations and private, local and/or international financial institutions that wish to participate.
- The formation of regional trust funds, one per region, that should generate resources of US\$ 850 million (PEN 2,680 million), to be invested during 2009 and 2010.
- Temporary suspension (during the period 2009-2019) of the application of the public-private partnership method to some investment projects, with the aim of facilitating the participation of PPPs in the execution of large works. Applicable to PPP projects with budgets of more than US\$ 116 million (PEN 366 million) approximately, which require co-financing greater than 30% of the estimated cost.

It must be highlighted that in the Plan de Estímulo Económico (PEE, Economic Stimulus Plan) the component dedicated to infrastructure investment is an important item, not only in the allocations the State must contribute directly, but also in the concession processes that would be allocated during the year. Thus, approximately 63% of the total value of the PEE is allocated to infrastructure works, with special participation of investment projects and regional trust funds (see Table 7.3).

With reference to investment projects, they are concentrated in small activities in projects with rapid maturity, which would have short term effects on production and employment. For the same reason, priority investment was given to certain productive sectors or branches that have relevant impacts on the real sector (see Table 7.4).

TABLE 7.3: Economic stimulus plan and infrastructure investment

Item	In millions of Soles	US\$ million
Investment Projects	1,967	627
Infrastructure investment fund	320	100
South IIRSA	773	245
Regional trusts	2,600	825
Costa Verde Project	16	5
Investment permanence	1,765	560
Investment permanence - Tarma	60	19
Highway maintenance	300	95
Santiago de Chuco Shorey Highway	20	6
Total	7,821	2,482

Source: Ministry of Economy and Finance, January 2009

TABLE 7.4: PEE: Forecast investment, classified by amount and sector (US\$ million)

Range	Amount	Sector	Amount
Less than 3.3 million	14	Transport	
From 3.3-16.7 million		Education	40
From 16.7-33.3 million	178	Healthcare	
More than 33.3 million		Sanitation	49
Total	627	Defense and justice	0
		Total	627

Source: Ministry of Economy and Finance, 2009

The PEE was also accompanied by greater government agency activity to attract private sector participation in investment processes. Proinversión awarded concessions to different sectors such as the Huascacocha water transfer project (December 2008, US\$ 76.9 million), the Road Network 4 (December 2008, US\$ 360 million), the Taboada waste-water project (February 2009, US\$ 170 million), the construction of Puerto de Paita (Paita Port) (April 2009, US\$ 128 million), the construction of the Sol freeway (June 2009, US\$ 360 million), etc. The total sum of these projects was US\$ 1,192 million (PEN 3,758 million) in investment.

The infrastructure projects pending allocation in 2009 are a series of sea and river ports, amongst which the following stand out: San Martín (US\$ 62.3 million) in Ica, Pucallpa (US\$ 16.7 million) in Ucayali, Salaverry (US\$ 159.1 million) in La Libertad, Yurimaguas (US\$ 61 million) and Iquitos (US\$ 15.7 million) both located in Loreto. Furthermore, it is expected that in the last quarter of the year the concession of the second group of regional airports (US\$ 237 million) will be awarded and before December the concession of the Interocéánico Centro will be awarded, a work that has been paralyzed for three years. These projects, that have a commitment of investments for approximately US\$ 550 million (PEN 1,734 million), which will serve to decrease

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7.3. The concession law

7.3.1. Regulatory Framework

During recent years, a significant boost has been given to infrastructure investment by means of a greater number of concessions. The main objectives pursued with these concessions is the improvement and development of infrastructures in the country with private sector participation and the final achievement of an appropriate supply of services in quality, coverage and access for a greater number of users.

An appropriate legal framework is one of the indispensable elements to promoting greater investment in this type of project. This has changed over time due to the passage of different laws and currently it is still somewhat vague and confusing. The regulatory framework must ensure that concessions be awarded with transparency and that there should be a clear model to prevent possible distortions.

In 1991, the first laws promoting the investment process was passed. The Ley de la Estabilidad Jurídica de las Inversiones Extranjeras (Law of Legal Stability for Foreign Investments) passed in August 1991 by Legislative Decree No. 662 guarded foreign investments. This was complemented by the Ley Macro para el Crecimiento de la Inversión Privada (Macro Law for the Growth of Private Investment) approved by Legislative Decree No. 757, which gave foreign investors access to most economic activities and recognized their rights to the same opportunities as national investors.

In September of the same year, Legislative Decree No. 674 was passed, which promoted private investment in public-owned companies. Furthermore, the Comisión de Promoción

a la Inversión Privada (COPRI, Private Investment Promotion Committee) was created, which was subsequently replaced by Proinversión.

In 1996 the legal framework of the Texto Único Ordenado (TUO, Unique Ordered Text) regulations established laws that regulate the awarding of infrastructure and public services concessions, and was approved by Supreme Decree No. 059-96-PCM 190 and regulated by Supreme Decree No. 060-96-PCM. This shows the great effort made to establish transparent rules and the necessary guarantees for investors, both foreign and national, so that they allocate resources to infrastructure works in the country. The regulations contained in the TUO promote private investment in infrastructure and public services works. They also regulate their management for the purpose of possibly awarding concessions to legal persons, national or foreign born, for the construction, repair, preservation and management of public infrastructure or public works.

Subsequently and due to the success of the PPP model, it became fundamental to establish an appropriate legal framework for PPPs, with clear directions for infrastructure investment and how to achieve good performance in the PPP model. Thus, in May 2008, Legislative Decree No. 1012 was passed which served to streamline the Ley Marco de Asociaciones Público - Privadas (Framework Law for Public-Private Partnerships) for the generation of productive employment and the promotion of private investment processes. By way of this Decree, the participation of the private sector in public infrastructure works and public service provisions were regulated. According to this new Law, PPPs will be the means of private investment participation in infrastructure projects where the State cannot completely finance them alone. In general, these projects are very profitable from the social perspective, but not sufficiently profitable from the financial perspective. The State, through one or more public entities, and one or more private investors participates in PPPs. By means of this law, PPPs were classified in the following way:

- 1) Self-sustainable Projects: they are paid off with their own tariffs and have to comply with three requirements:
 - They do not require financing by the State.
 - They do not require financial guarantees¹¹⁰ by the State exceeding 5% of the total investment.
 - If non-financial guarantees should be necessary¹¹¹ for the project to be considered self-sustainable, they must have a probability of less than 10% during the first five years of project operation. Thus, the State guarantees the concessionaire a minimum income, in a contingent manner, to fund the project.

¹¹⁰ Those ensurements of unconditional character and immediate execution whose granting and contracting by the State is meant to back private obligations derived from bond loans issued to fund PPP projects or to back State payment obligations

¹¹¹ Ensurements as provided for in the contract which derive risks of a PPP project.

The first two requirements are easy to prove, however, the third requires the assumptions regarding the future cash flow scenario. Guarantees are usually granted in the form of Ingreso Mínimo Anual Garantizado (IMAG, Guaranteed Annual Minimum Income) or guarantee of a minimum demand (that once it is multiplied by the tariff is equivalent to a guarantee of a minimum income). To determine the self-sustainability of a project it is necessary to calculate the probability of the occurrence of IMAG activation (probability that the expected income will be greater than IMAG), that is to say the probability of a negative difference between expected income from tolls and IMAG.

2) Co-financed Projects: these require co-financing or the granting or contracting of financial or non-financial guarantees by the State. They must comply with the requirements and procedures detailed in the Ley del Sistema Nacional de Inversión Pública (SNIP, Law of the National System of Public Investment) and the Ley del Sistema Nacional de Endeudamiento (Law of the National System of Indebtedness) and have the favorable opinion of the Controller General of the Republic.

Currently, most concession projects pending are of this second type, that is, cofinanced projects¹¹². This means that they require a State contribution and therefore, must undergo technical evaluation by a regulatory entity and the SNIP. This assessment is indispensable to preventing private investors from transferring certain risks to the joint project, since the State must only accept necessary costs that are justified from the social point of view.

Furthermore, the new regulations explain in detail the following points, which are of special interest in order to correctly award the concessions:

- For a project to be co-financed by the State, its total cost must be greater than US\$ 30 million (PEN 93.4 million). This minimum limit has been determined taking into account the existing universe of public investment projects, those that are being promoted by means of Proinversión. An infrastructure investment or public service project can be exempted from the application of this minimum threshold by a MEF resolution.
- The regulations consider projects of national relevance that will be assigned by a Supreme Resolution to Proinversión, those projects with a total cost greater than US\$ 47 million (PEN 146.4 million) and which are multi-sectorial.
- In this regard, it has been proposed that public service infrastructure investment projects shall be executed by a PPP with co-financing if it has a contract term (between the State and the private investor) greater than five years.

112 The following projects to be granted in concession are co-financed: Proyecto de afianzamiento hídrico de Majes – Siguan II. Chavimochic Irrigation Project. Banda Ancha Rural Juliaca – San Gabán – Puerto Maldonado Banda Ancha para el VRAE Banda Ancha Camisea - Lurin Implementación de Servicios Integrados de Telecomunicaciones Buenos Aires-Canchaque-Terminal Portuario de Yurimaguas Terminal Portuario de Iquitos Aeropuertos Regionales– Segundo Grupo Ferrocarril Huanca-cayo – Huancavelica. The only project considered self-sustainable is the building of Amazonas Axis IIRSA – Ramal Centro.

- There is a possibility of modifying the signed contract, even during the execution of the project, by means of its re-negotiation if this does not involve an additional sum that is greater than 15% of the total cost of the project. Regulations establish that no addenda may be added to PPP contracts during there are errors because of requirements allowed by creditors related to the financial stage of the PPP contract. After this term has finished, however, the addenda may be carried out in PPP contracts prior to the agreement of the corresponding regulatory entity. Modifications must also favor the MEF to the degree that co-financing or the guarantees are changed.
- It has been determined that in the case of the National Government, private investment projects will be allocated on the basis of their national importance to the different Ministries' investment committees. In both cases, the projects will be assigned and/or incorporated by means of a supreme resolution. For local and regional Government public agencies, the private investment promoting entity exercises its powers directly through local and regional Government agencies designated for this purpose, and with the maximum authority with respect to the regional or municipal council.
- Public agencies shall identify the level of service they hope to achieve, based on the current situation's diagnosis, determining its importance with relation to local, regional, sectorial, and national priorities, according to each case, and developing the investment project within this framework.
- Public agencies have the responsibility to present a cost-benefit analysis to determine if private participation in the public infrastructure or public service provides a greater net benefit for society versus if it were a completely State financed public work.

7.3.2. Preparation for bidding

Proinversión shall establish these rules based on technical and economic studies, of the public infrastructure and public services, where applicable, when direct concession will be granted to the private sector following the procedures established by Law.

The bids for the concession of infrastructure projects, although there may be slight variations, follow this schedule:

- Notice and publication of the request for proposal documentation prior to approval of the grantor.
- Payment of fees to participate in the bidding process for the concession.
- Base document consultation.
- Exemption of base document consultation.
- Prequalification Rating:

7. Pension funds and infrastructure in Peru

- Presentation of credentials by those interested in bidding (Envelope No. 1)
 - Corrections to comments made in Envelope No. 1.
 - Announcement of pre-qualified bidders.
- Contract:
- After receiving suggestions on the original version of the contract and these being resolved, the final version of the concession contract is given to the pre-qualified bidders prior to approval by the Consejo Directivo de Preinversión (Pre-investment Board).
 - Presentation of Proposals:
 - Presentation of Envelopes Nos. 1 and 3 (technical and economic proposals).
 - Announcement of the results of the assessment of technical proposals.
 - Opening of Envelope No. 3 and granting of good pro.
 - Closing date.

These dates may be modified prior to communication published by Proinversión.

7.3.3. Prequalification and candidate selection processes

The investors interested must present Envelope No. 1 which will allow them to pre-qualify for this concession process before the expiration date announced by Proinversión. After which a certain time period for the final list of pre-qualified bidders is announced; this must comply with certain financial, technical and legal requirements:

- Financial requirements: minimum net capital of the legal entity or the sum of the net capitals of each of the shareholders or partners. If the bidder is a consortium, each member or shareholder may present, for the consolidated calculation of the bidder's capital, the capital of a related company.
- Technical requirements: this refers to the bidder's experience in relation to the execution of similar works.
- Legal requirements: the bidder's has powers to a legal representative. Furthermore, statements of responsibility are necessary and other requirements that will be established by the assembly.

Qualified bidders will maintain their condition, and no further documents will be required from them. The date for presentation of envelopes No. 2 (technical proposal) and No. 3 (economic proposal) will be announced once the financial structure of the concession is approved by the respective agencies. The financial structure of the concession has been previously defined by the transaction consultant whose report contains the reference value of the investment, the risks and the model of guarantees for the concession, which is the same as the one being assessed by the State¹¹³. Proinversión receives technical and economic offers, envelopes No. 2 and No. 3 respectively, within the allo-

113 To develop this project, the State must deliver the necessary contributions and guarantees to make the concession scheme viable.

cated time frame. Subsequently, envelope No. 2 is assessed and after this the envelopes with the economic offers of the bidders is opened.

One of the aspects that will be taken into account to define the winner is competence, which varies according to the project¹¹⁴. The competence factor will be used to determine qualification of the economic proposal of each of the bidders by means of a formula, which also varies according to the concession. Based on this method of evaluation and the previously performed technical assessment, the winning bid for the project is announced.

7.3.4. Bidding mechanisms

Concessions are granted by two different mechanisms:

- Special Public offering, which takes place when the grantor previously determined the work to be executed and already has all necessary studies and projects.
- Total Public offering, which takes place when the grantor does not already have the required studies and projects for the execution of the works or the management of the service. In this case, the proposals presented by the bidders will detail the contract, technical, economic and financial conditions of the works to be executed or managed by the respective project.

7.4. Pension funds and infrastructure investment

The beginning of PFAs participation in infrastructure investment goes back to October 2001 when, by means of Resolution *SBS No. 725-2001*, SBS allowed purchase of investment instruments for concession projects. This resolution provided the first guidelines for the Peruvian PFAs to invest in infrastructure projects. The minimum amount to finance these projects was PEN 173.1 million (US\$ 50 million).

Subsequently, with the purpose of increasing the range of investment instruments and improving the participation of the private pension system (PPS), Resolution *SBS No. 643-2004* was passed, which authorized PFAs to invest in different private sector projects (infrastructure, roads, mining, housing, amongst others)¹¹⁵. This new flexibility measure was positive since it allowed the financing of infrastructure projects with PEN 65.6 million (US\$ 20 million).

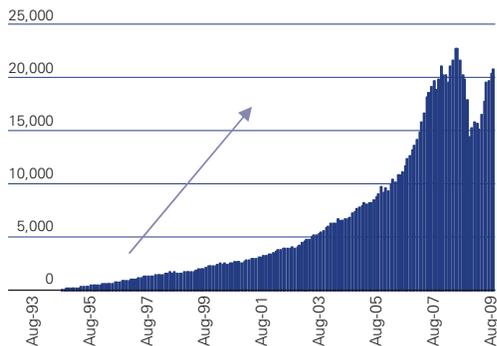
Subsequently, in September 2006, the supervising agency reduced, by means of Resolution *SBS No. 1152-2006* (currently in force), the minimum limit for investment, which became PEN 32.5 million (US\$ 10 million), with the purpose of increasing bids for small and medium projects.

The total capital managed by PFAs has increased since 1992, reaching approximately US\$ 20,777 million (PEN 62,166 million), part of which has been allocated to financing infrastructure projects (see Chart 7.5).

114 For example: for the concession of Eje Amazonas Ramal Norte and Eje Amazonas Ramal Centro roads the following were used as competing factors: less contribution by the State and less present value of income, respectively.

115 To date, it may only be carried out in projects from privatized companies.

CHART 7.5: Pension funds administered by PFAs (in US\$ million)

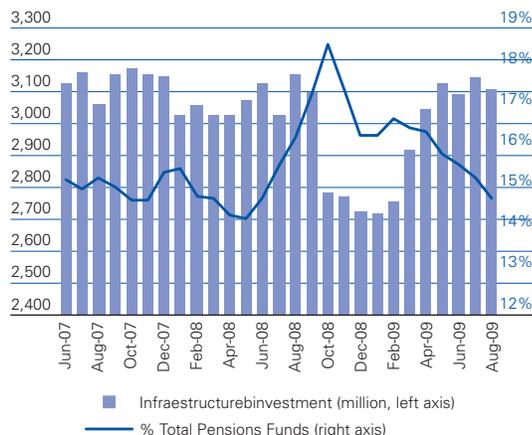


Source: Superintendencia of Banks and Insurance, October 2009

As of June 2007 (date since information is available), PFA investment in infrastructure has remained stable at a mean balance of US\$ 3 billion (PEN 9,064 billion) per month, although this suffered a slight fall during the last quarter of 2008 and first months of 2009, as a consequence of the reduction in value of pension funds due to the international economic crisis.

Data from August 2009 reveal a certain recovery of the investment of PFA in this arena of US\$ 3,117 million (PEN 9,325 million) (see Chart 7.6). Additionally, it must be mentioned that participation in infrastructure projects in the PFAs portfolio is 14,8% of the

CHART 7.6: Infrastructure investment balance of PFA (US\$ million)

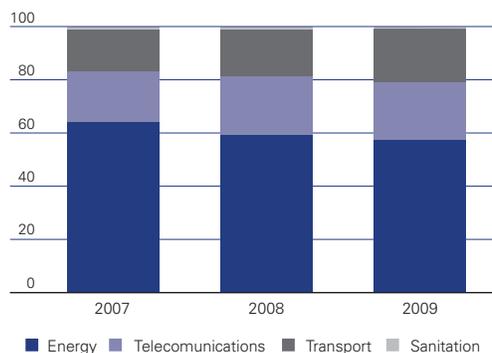


Source: Superintendencia of Banks and Insurance, October 2009

total sum of pension funds¹¹⁶. This percentage would be reduced if this figure reflected the purchase of financial instruments in companies that develop infrastructure, but whose use of financing does not necessarily correspond to physical investments actually carried out by the issuing companies.

Analyzed by sectors, it is possible to see that the greatest concentration of investments have been in companies in the energy and petroleum sectors¹¹⁷ (70% in June 2007), although this proportion has decreased during the last few years and other sectors have gained ground, such as telecommunications and transport. In August 2009, investment in the energy and petroleum sectors decreased to 57,6%. Therefore, it is possible to speak of major diversification when referring to the sectors in which the PFA are investing in infrastructure (see Chart 7.7). The main projects in which pension funds have invested are those related to electricity generation, by purchasing stocks and bonds issued by companies in this sector (Electroandes, Enersur, Edegel, amongst others). Other projects of major relevance include those developed in the sanitation sector, such as Consorcio Agua Azul and Concesión Transvase Olmos (See Table 7.5).

CHART 7.7: PFA Investment by economic sector
(% of total)



Source: Superintendencia of Banks and Insurance, October 2009

The road network initiative for the Integration of South American Regional Infrastructure (IIRSA), which aims to stimulate the integration and modernization of regional infrastructure in South America, has also been an important recipient of investments made by the Peruvian PFA over the last few years.

Furthermore, infrastructure investment is channeled by means of infrastructure investment funds: AC Capitales SAFI and Larraín Vial Energía Latinoamericano investment funds.

116 As per SBS data. Figures published by the regulating entity are taken into account for document: Investment in Infrastructure managed portfolios.

117 As per SBS data, as of May 2009, 60% of PFA infrastructure investments were concentrated in specifically this sector.

TABLA 7.5: AFP: Participation in main infrastructure projects

Company	Sector	Operation description
Consortio Agua Azul	Water and Sanitation	Superficial and underground water intake of the Chillón river basin, treatment and delivery to SEDAPAL for later distribution to approximately 800,000 inhabitants in the Northern Districts of Lima
Concesión Transvase Olmos	Water and Sanitation	Interbasin construction for the transport of Huancabamba river water from the Atlantic to the Pacific watershed
Pluspetrol Camisea Electroandes	Energy and Petroleum Energy and Petroleum	Exploration and management of Lot 88 of Camisea 168 MW of Hydro generation capacity, 4 hydroelectrical. Transmission, owner of 25 substations.
Duke Energy Internacional EGENOR	Energy and Petroleum	Energy generation and transmission. Plants located in the north area of the country with a production capacity of 150 MW Thermo and 360MW Hydro.
Enersur	Energy and Petroleum	Energy generation and transmission. Plants located in the Center and Southern areas of the country. 836 MW Total Capacity
Edegel	Energy and Petroleum	Energy generation and transmission. Plants located in the Center and Southern areas of the country. 1500 MW total capacity
Maple Energy Red de Energía del Perú	Energy and Petroleum Energy and Petroleum	Gas and oil exploration, Etanol project ISA Group member. The most important electric transmission company in Perú.
Southern Cone Power Perú Transportadora de Gas del Perú	Energy and Petroleum Energy and Petroleum	Owner of 21.4% of Edegel stocks Transport by natural gas pipes (GN) and natural gas liquids (LGN). From the Camisea deposit to Pisco (LGN) and Lima (GN).
Consortio Transmantaro	Energy and Petroleum	Energy Transmission. US\$ 93 million investment in the expansion of the transmission capacity of the Mantaro-Socabaya Line
IIRSA Sur (Trenches 2, 3 and 4), Interoceánica V	Road systems	Financing of road corridors IIRSA South (Interoceanic) and North
Fondo de Infraestructura de AC Capitales	Infraestructure	Infrastructure specialized fund, with investments in different projects: Agua Azul Consortium, ISA Peru Electric connection, Redesur, Electrica de Piura, Lima Airport Partners, Maple Gas, Agua Azul Consortium, Coricancha agency, Andean Railway.
Fondo Larraín Vial SAFI	Energy and Petroleum	Focused in energy sector investments.

Source: BBVA.

Pension fund financing of infrastructure projects in Peru is carried out in two ways:

a) **Direct Investment:** By purchasing debt instruments or bonds issued by concession companies of infrastructure projects.

b) **Indirect Investment:** This type of investment refers to:

- Purchasing participation bonds from firms specialized in infrastructure investment funds

- AC Capitales SAFI¹¹⁸.
 - Fondo de Inversión Energético Americano de Larrain Vial focused on investments in the energy sector.
 - Furthermore, recently, infrastructure funds and the trust funds for the same purpose were created.
- Purchase of bonds or debt instruments issued by companies related companies to those who participate in infrastructure projects. These companies' incomes are not necessarily assigned to the investment in infrastructure development.

Based on data published by the regulatory agency and our own estimations, Peruvian infrastructure investment by the private PFAs can be broken down into direct investments, which represent 22.6% of the total infrastructure investments made by private institutions, whereas the remaining 77.4% represent indirect investments.

7.4.1. Direct investment of pension funds in infrastructure

This investment represents most of the total amount invested by the PFAs in infrastructure and is diversified in the purchase of bonds and stocks from infrastructure companies (95%), mostly in companies which are part of the energy sector, as well as the purchase of stocks in the previously mentioned infrastructure funds.

a) SAFI AC capitals funds

This infrastructure fund has investments in different projects, some of the most important being: Consorcio Agua Azul, ISA Peru, Redesur, Eléctrica de Piura, *Lima Airport Partners* (LAP), Maple Gas, Inmobiliaria Koricancha and Ferrocarril Andino. The investment carried out by the PFAs in the infrastructure fund of AC Capitales has increased since its constitution in 2004. At the end of 2005 this investment reached US\$ 12 million, but it has grown significantly during the last three years, reaching a figure above US\$ 100 million in December, 2008.

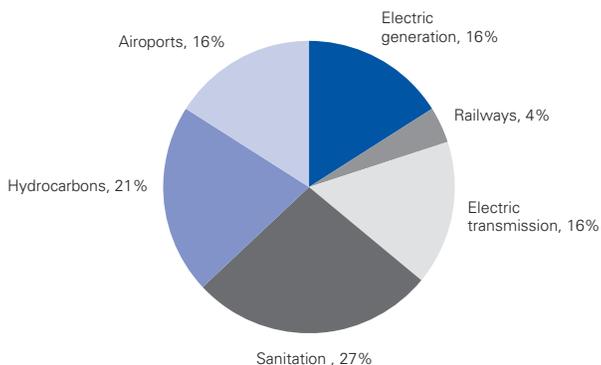
The investment of this fund is mainly focused in the energy sector, with high percentages designated to the electrical generation and transmission sub-sectors, as well as to petroleum. These three groups make up 53% of AC Capitales' funds. Financing has also been designated to the transportation sector through projects related to the operation and maintenance of airports and railways (see Chart 7.8).

It is important to highlight the appeal of the performance obtained by AC Capitales' Fund during the last few years. This is how we know that both nominal and real investment profitability on the above mentioned Infrastructure Fund during 2005-2008 has been positive, which compares favorably to the negative profitability attained by all three funds controlled by the PFAs of the Peruvian Private System during 2008 (see Chart 7.9 and see Chart 7.10).

b) Infrastructure investment fund

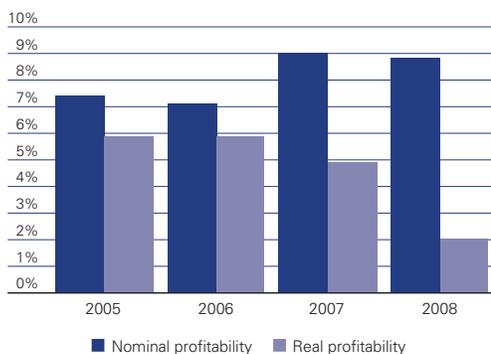
¹¹⁸ This is a Infrastructure, public service and natural resources investment fund with resources reaching US\$ 50 million in 30 years, created in 2004 to invest mainly in infrastructure projects.

CHART 7.8: AC Capitals' infrastructure investment fund by sector (december 2008)



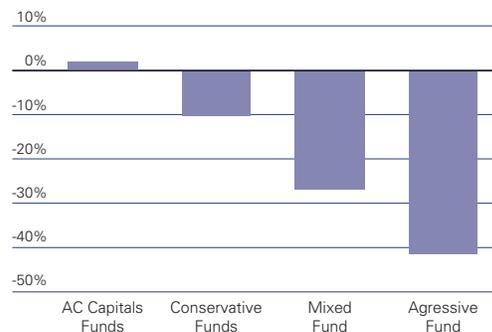
Source: BBVA

CHART 7.9: AC Capitals fund: annual profitability (%)



Source: BBVA

CHART 7.10: AC Capitals' multifund system annual real profitability (%)



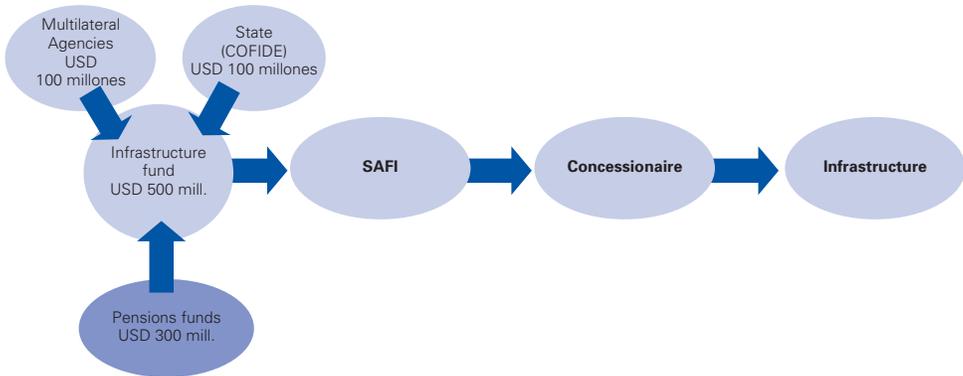
Source: BBVA

At the beginning of 2009, due to the need for greater investments in infrastructure, and bearing in mind the impact of the international economic crisis on the local economy, the government of Peru authorized the establishment of an infrastructure investment fund¹¹⁹ totaling US\$ 500 million (PEN 1,619 million), which had the main objective of boosting investments in large projects. The first step has been taken with a capital investment of US\$ 100 million (PEN 324 million) by the Ministry of Economics to the Corporación Financiera de Desarrollo (Financial Development Corporation) (COFIDE). Multilateral organizations such as the Corporación Andina de Fomento (Andes Development Corporation) (CAF) and the International Development Bank (IADB) will invest US\$ 100 million (PEN 324 million) between both of them. On the other hand, the remaining US\$

119 http://www.mef.gob.pe/NORLEGAL/decretos_urgencia/2009/DU018_2009.pdf.

300 million will be contributed by PFA, thus becoming the main funding source of this infrastructure fund (see Diagram 7.1).

DIAGRAM 7.1: Infrastructure investment fund structure



Source: Ministry of Economy and Finance and BBVA

The main characteristics of the infrastructure fund are:

- The money invested by the PFAs will not be concentrated on one project, but will be distributed as projects are approved.
- Most of the financing will go towards roads, ports and airport construction projects, loss provisioning works, and electricity generation and gas projects.
- The investment periods varies between 15 years, which is the minimum investment period for infrastructure funds, and 30 years which is the maximum estimated investment period.
- COFIDE, the State of Peru, IADB and CAF are considering investing resources or providing loans to the fund, but this is subject to analysis of the operation by each institution with respect to their policies and procedures.
- It will not be subject to Contracting Laws or regulations of the PPAs framework law. This means there will not be an obligation to carry out a comparative cost analysis between public and private execution and there will be no limitations to the guarantees given by the State for investors to obtain additional financing.

One of the advances of the Fund has been the election of a manager to an Administrative Society for the Investment Fund (SAFI) who will be in charge of its administration. The announcement that the consortium formed by Brookfield, from Canada, and AC Capitals, from Peru, would be responsible for the administration of the Fund was made on September 28, which would be operational during the first semester of 2010. The consortium

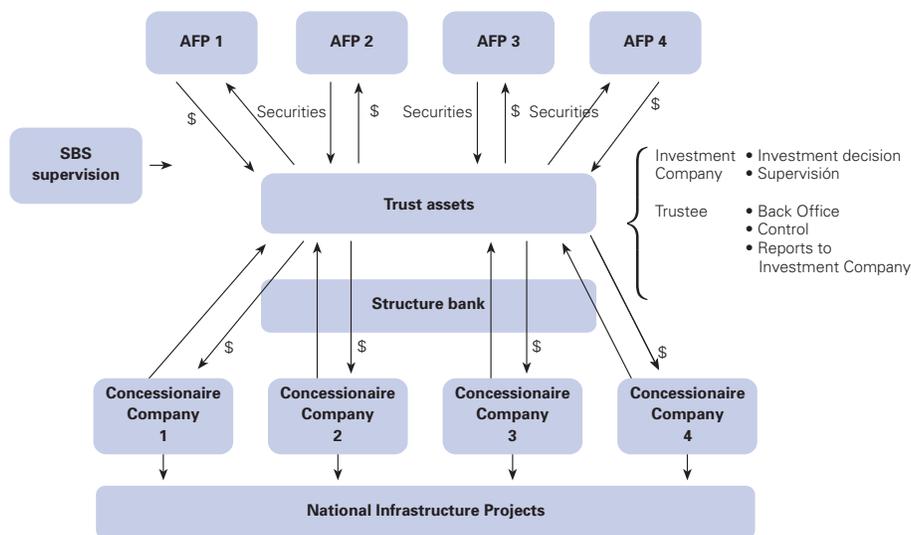
will be in charge of the identification of infrastructure investment alternatives and the channeling of private capital financing towards this branch.

c) Infrastructure investment trust fund

During June 2009, the PFA Association formalized the creation of an Infrastructure Investment Trust, which will begin with a contribution of US\$ 300 million (PEN 898 million) by the four PFAs integrating the Peruvian PPS. Nevertheless, it is estimated that this sum could rise to US\$ 1.5 billion (PEN 4.488 billion), with new contributions by PFA, since the initial resources risk depletion after the first four or five projects. The present model could be implemented faster and could then be integrated into the infrastructure fund developed by the Government once it begins.

The Trust will work as follows (see Diagram 7.2):

DIAGRAM 7.2: Infrastructure trust schedule



Source: Superintendencia of Banks and Insurance, May 2009

- Each PFA shall make cash contributions in exchange for equity certificates. These contributions shall be effective once the investment alternatives are defined.
- Certificates shall not be negotiable by means of any centralized mechanism. The certificates are similar to *private equity*¹²⁰ funds in that the value of the certificates shall correspond to the proportional participation of the value of the assets in which the trust invests.
- The Trust shall invest its funds mainly through debt structures.

¹²⁰ Risk capital investment funds.

- Profitability shall depend on the interest gained by debt structures within the trust. These will be *held to maturity*¹²¹, so there is a risk of unrealized incomes or losses.
- The Fund shall be managed by a company authorized by the SBS to provide fiduciary services. In August, PFAs carried out the fiduciary recruitment, choosing Banco de Crédito del Perú (Peruvian Credit Bank) (BCP), which shall be in charge of *back office* functions, the elaboration of financial states and the assessment of investments. Its investments will have to gain approval by an Investment Committee made up by PFA representatives.

The Trust shall operate under the following structure:

- The Investment Committee shall be integrated by representatives of all four PFAs. Its main objective shall be the assurance of the PFAs control over the investment process, the selection of the most adequate projects, the designation of shared sums and monitoring and supervisory tasks.
- There will be advisers (consulting agencies), experienced in *due diligence* financing and the analysis of infrastructure projects. These represent support to the PFA functions by standardizing the process, defining investment objectives, consolidating the tributary structure, fixing the investment strategies, providing counseling for negotiations regarding financing structures and valuing the project revisions and the development of internal policies and reports for the Investment Committee, in addition to other functions.

The main objective of the trust will be the investment of US\$ 300 million (PEN 898 million) that Proinversión currently holds, which is designated for all 12 projects considered priorities by Urgency Decree 047 (see Table 7.6), for example for the construction of the Taboada sewage treatment plant and the port of Paita (which has been added recently).

In general, the trust model of infrastructure solves some of the difficulties for pension funds to make this type of investments, as identified by the IPE study (2007). It is worth stating that the main reasons for this are:

- Delays and problems on the given concession contracts.
- Lack of external financial advice that guarantees the financing of projects by contracts.
- A larger integration in the information flow between pension funds and agencies in charge of investment promotion.
- The lack of a range in structured instruments which allows an infrastructure investment, duly distributing risk between all involved parties and providing profitability to the PFAs in relation to the risk they would have to assume to carry out this type of investment. Exposing funds to risks before investing in projects with State guarantees or collateral.

¹²¹ Investments held until maturity.

TABLE 7.6: Prioritization of projects year 2009

Project	Description
Paita Port	This project entails design, construction, financing, preservation and management of Paita Bridge. (Awarded in March 2009)
San Martín Port (Pisco)	The project entails the design, construction, financing, preservation and management of Gral. San Martín – Pisco Port Terminal.
Salaverry Port	The project entails modernization, rehabilitation, installation of cranes and terminal operation.
Pucallpa Port	The project entails the design, construction, financing, operation, management and maintenance of the Pucallpa Water Terminal.
Iquitos Port	The project entails the design, construction, financing, operation, management and maintenance of the Iquitos Water Terminal.
Yurimaguas Port	The project aims at improving the offer of a new Terminal Port due to an increase in generation of intermodal chain (North IIRSA)
Autopista del Sol, Tramo Trujillo-Sullana	This project entails the construction, operation and preservation of the current North Pan-American between Trujillo y Sullana. Includes the construction of the avoidance roads along all trench and second road (Awarded June 2009)
Center IIRSA Highway (Avoidance Ramiro Prialé - Ricardo Palma Bridge, La Oroya-Huancayo; La Oroya-Pucallpa)	Concession will entail the rehabilitation, operation and preservation of all trenches and construction of new works: Avoidance Ricardo Palma and La Oroya.
Apuertos Regionales 2º grupo	6 province airport concessions in Peru, located in the Southern area of the country.
Proyecto Especial Majes-Siguas	The hydraulic component is the main and initial component of the process of promotion of private investment at the second stage of the Project Majes – Siguas.
Planta de Tratamiento de Aguas Residuales Taboada	Design, financing, construction, operation, and maintenance of a waste water treatment plant before disposal. (Awarded February 2009)
Proyecto Especial Chavimochic	The project entails promotion of hydraulic resources to ensure permanent irrigation of permanent crops covering 30,859 new hectares.

*Projects in bold are already under concession
 Source: Proinversión, 2009

It is worth highlighting that using this investment vehicle will boost projects that have already been concessioned, without the use of the tools the PFAs use, such as concessionary bonds.

During the second stage, this type of investments will be boosted by the participation of CAF and IADB, so an international operator will be required. Once the infrastructure investment is set up, the Investment Trust will be integrated.

Furthermore, PFAs, in coordination with multilateral organizations and the State, continue searching for mechanisms to lend greater flexibility to their investments in these projects. Since the crisis has aggravated financing difficulties, prejudicing construction plans for large projects, pension fund contributions are even more vital for this type of investments. This is why several propositions have been reviewed to promote mechanisms that will help close the infrastructure gap and, at the same time, provide long-term investment tools that are more predictable for investors.

7.4.2. Direct investment of pension funds on infrastructure

On June, 2009, the PFAs executed investments to companies awarded concessions, like the securitization company *Peru Enhanced Pass-through*, and in two concessions related to the petroleum industry: Pluspetrol Camisea and Transportadora de Gas del Peru, which amounted to US\$ 700.3 million in direct investment (see Table 7.7).

TABLE 7.7: PFA: Participation in main infrastructure projects June 2009

Company	Sector	Operations description	Invested amount June 2009 (US\$ mill.)	Total % investment in infrastructure
Consorcio Agua Azul	Water and Sanitation	Superficial and underground water intake of the Chillón river basin, treatment and delivery to SEDAPAL for later distribution to approximately 800,000 inhabitants in the Northern Districts of Lima	10,508	0.34%
Consorcio Trasmantaro	Energy and Petroleum	Energy Transmission. US\$ 93 million investment in the expansion of the transmission capacity of the Mantaro-Socabaya Line	787	0.03%
Red de Energía del Perú	Energy and Petroleum	ISA Group member. The most important electric transmission company in Perú.	57,579	1.86%
Concesión Transvase Olmos	Water and Sanitation	Interbasin construction for the transport of Huancabamba river water from the Atlantic to the Pacific watershed	63,145	2.04%
Securization companies Perú Enhanced Pass-Through	Infrastructure	Financing of road corridors IRSA South (Interoceanic) and North	341,851	11.02%
Pluspetrol Camisea	Energy and Petroleum	Exploration and management of Lot 88 of Camisea	90,748	2.93%
Transportadora de Gas del Perú	Energy and Petroleum	Transport by natural gas pipes (GN) and natural gas liquids (LGN). From the Camisea deposit to Pisco (LGN) and Lima (GN).	135,666	4.38%

Source: Superintendencia of Banks and Insurance, June 2009

7.5. System weaknesses for infrastructure investment

Bureaucratic holds in the concession process

Important deficiencies have been observed in the concession system which only retract infrastructure investment. Several problems related to bad coordination, diffuse function identification, bad management capacity and deviation from the objectives of the main public actors involved have delayed the concession process. These difficulties have been contrasted with results encountered in Payet (2009), concentrating on the identification of the main obstacles in the concession processes, as well as the elaboration of precise propositions for improving the concession processes.

In order to identify the main obstacles in concessions, the study contemplates a field of work that evaluates the perceptions of the main actors involved, both on the public and private sides. A sample was taken from six concessions granted by Proinversión aimed at identifying the main difficulties brought on by these processes. Finally, an analysis was carried out for this first stage of the “optimum” process, based on the current legal framework, which determines how long a concession process should ideally take.

In order to obtain the opinion of the main agents participating in the concession process, more than 30 executives from different organizations were interviewed, amongst them MEF, Proinversión, several regulatory agencies, private concessionaires and PFAs.

Bearing in mind the three stages that every concession process needs to undergo (identification and design: promotion and endorsement of the contract), the main difficulties were found to lie in the initial phases, and moreover, these deficiencies have affected the project even after it has been awarded, further delaying it (see Diagram 7.3).

DIAGRAM 7.3: Stages in a concession process



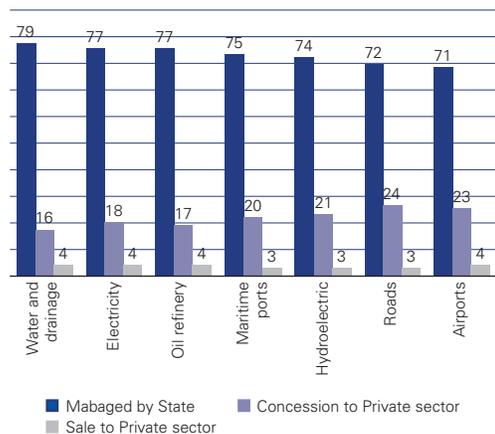
Source: Report “Proyectos de obras de infraestructura” (“Infrastructure works projects”), Payet Firm, 2009.

Officers also stated that they do not feel most of the involved actors are aligned towards a common objective, since, for example, while MEF is showing interest in the control of the expenses, this same aspect was taken as an obstacle to the goals of other sectors to boost the projections.

On the other hand, relationships within the State are complex, and interactions can become slow and complicated. The presence of infinite bureaucratic paperwork and the lack of technical competencies and management capacity also affect the process. A key point revealed by this research has to do with the large number of authorizations

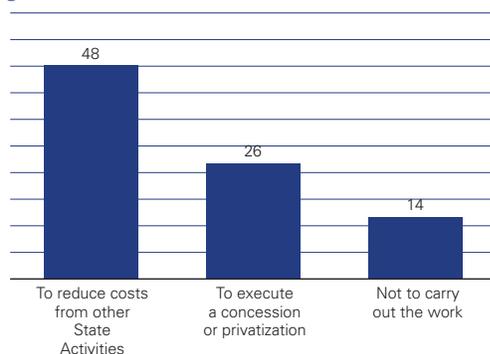
and signatures that are needed to guarantee certain processes. The elongation of administrative processes is initiated by control agencies taking excessive care over decisions by civil servants in charge of approving the projects. So, with the objective of avoiding any type of penal or administrative fine derived from some mistake made in the decision, a civil servant seeks protection through the largest possible number of revisions by other officers or agencies, who are also experiencing similar reactions, which causes a sort of state of paralysis. This possible excessive supervision that can paralyze a civil servant's decisions is observed in the Organic Law of the National Control System, which authorizes the Accounts Office to carry out management audits despite the fact that the Constitution only demands that it keeps vigil over legality. Currently, this entity could even question the technical model of a concession. With all this it is easy to understand why civil servants reveal their preference for the State to administrate projects instead of choosing a process which requires the participation of the private sector (see Chart 7.11). Furthermore, facing a situation of a reduced public budget, the same civil servants consider it best that the state seeks the reorganization of its expense structure prioritizing infrastructure processes under public execution (see Chart 7.12).

CHART 7.11: Do you think projects regarding... should be managed by the State, be granted in concession or be sold?
(preference)



Source: Report "Proyectos de obras de infraestructura" ("Infrastructure works projects"), Payet Firm, 2009.

CHART 7.12: If the Government decides they need a particular infrastructure project, but finds no resources to fund it, what is the best possible solution?



Source: Report "Proyectos de obras de infraestructura" ("Infrastructure works projects"), Payet Firm, 2009.

With regards to the delays in the concession processes, the inquiry found that, on average, they have a duration of 63 months, excluding the project identification and design phases. The sample shows that the project which took the least time from the promotional phase until the endorsement of the contract, was the concession of airport Jorge Chávez (29 months), and the longest was Pucusana-Ica road (90 months) (see Table 7.8).

TABLE 7.8: Sample: six concession processes

Process	Infraestructurae	Type	Duration
Olmos	Water diversion	Co-financed	89
Network Road 5	Road	Self-sustainable	59
Network Road 6	Road	Self-sustainable	90
Lima Airport	Airport	Self-sustainable	29
North IIRSA	Road	Co-financed	58
Emfapa Tumbes	Sanitation	Co-financed	59

Source: Report "Proyectos de obras de infraestructura" ("Infrastructure works projects"), Payet Firm, 2009

One of the problems elongating the concession processes is that the whole process occurs sequentially, that is to say that procedures involving 19 public departments are not allowed to move forward in parallel. Additionally, it is possible that in the middle of a process, a project requires the approval of the President (an unnecessary step since privatization in the 90s), whose opinion should be reserved for more important projects.

According to the report these maturities could be reduced, as the ideal duration of the process is 48 months including all 3 stages (identification and design, promotion and endorsement of the contract). There should be 19 State departments participating in the project, for a total of 48 standardized steps. The ideal duration should be of 36 months for the identification and design phase and 12 months for the following phase. During the first phase, there would be 10 State departments involved, with a total of 22 steps, while during the second phase, 13 State departments should be involved in 26 steps. Nevertheless, as stated in the Payet report, these ideal periods are far from being the reality, especially if we take into account that the conditions of the concession contracts are modified nine times, the schedule is put off ten times, contracts are modified four times, and committee members are changed six times on average¹²².

Bearing in mind that legal and bureaucratic obstacles constitute one of the main difficulties to be solved (although of course, they are not the only ones), the report suggests different proposals oriented towards the speeding up of concession processes, in order to make the investment in this branch far more attractive. This is how the report wishes to establish proposals in order to beat the obstacles and help the development of new projects, promoting higher efficiency and clarity. Amongst these proposals is the creation of a management unit that will design and execute projects, the re-engineering of identification processes and the design of investment projects for co-financed infrastructure projects. The report also recommends the improvement of the promotion phase for infrastructure investment processes and that the interaction between the concessionaire and the State occurs later on.

Regarding the management unit, the report suggests that it is granted certain autonomy in order to reduce a large portion of the identified obstacles. This way, it could authorize

122 From a historical perspective, some examples reflect these delays. In 1924, the Olmos project started to be taken into account, but awarding process was reached in 2006. Camisea gas project was discussed between 1983 and 1987 and adjudication took place in 2004.

the start of design and the incorporation of a project to the promotion process, which would have to be carried out taking into account the following conditions: The parallel prequalification of bidders without the interruption of the schedule, standardization of models and recurring contractual clauses, regulation of consequences in case the periods are not respected by state actors and the normative authorization or recurring subjects related to later financing. These measures, together with an adequate control of the concession process, would help boost infrastructure investments.

b) Sentences in concession contracts

There are several administrative problems that, even after bidding, can cause legal insecurities to potential investors. For example, in February of 2009, a concession was granted to the Taboada Treatment Plant, of which the contract was presumed to contain certain deficiencies. It was therefore expected that the Accounts Office of the Republic issue a report on this subject, with three possible alternatives: i) Declaring the illegality of the process and going back to the initial stage, that is the elaboration of conditions for building the corresponding project; ii) The Accounts Office may declare there are amendable errors, subscribe the contract with the concessionaire after amendment of the identified points and iii) No irregularities could be found in the concession process and therefore the contract is signed. After several types of managements, the State of Peru finally signed the concession agreement for the Taboada waste water treatment plant, since it confirmed, after several revisions, that the bidding and submission procedure in Taboada was in compliance with every legal regulation and requirement. Nevertheless, this whole process produced additional costs for the concessionaire and a bad experience for potential future investors.

c) Social risk

There have been many protests showing a discontented population, in many cases due to irregularities, over concessions in certain sectors. Protests and strikes are difficult and delay the execution of operations for infrastructure projects. The environmental problems involved in this issue, and the lack of reliable evaluations, exacerbate distrust between certain communities. In this respect, publicity of the positive aspects of infrastructure and measures to mitigate negative press is important to social acceptance of new projects.

d) An inadequate framework to change fees

Recently, the concession of Paita port located in the north of the country, has increased controversy due to the associated fee hikes imposed by the concessionaire in the Terminales Portuarios Euroandinos (TPE). According to the contract with the State of Peru, TPE has the authority to fix prices for special services it provides its clients, as well as charge standard fees for services that should not exceed the maximum fees delineated in its contract. An evaluation is being carried out to determine whether the Law allows for changing the fees if the international competitiveness of the port of Paita is affected and radical sectors are demanding the concession contract of the port be made null. It is therefore necessary to reevaluate the fees and determine whether they are aimed towards improving the infrastructure.

3) Inadequate supervision

In some cases, the resources available to supervise the execution or progress of infrastructure projects are not enough. Therefore, the supervising body of Public Transport

infrastructure investment (Ositran) is evaluating the possibility of requesting a supplemental credit from the MEF in order to improve supervision of transportation concessions.

From this we can conclude that Peru has a high level of investment risk, which is raising the price of insurance, and therefore, investments. This type of risk is, in theory, the easiest to control, since it ultimately depends on the regulatory framework and the efficiency of management. Additionally, we would have to add the other risks for this type of investment, which are less controllable and need risk mitigation instruments. In this sense, excessive risk can provoke a raise in costs and a decrease in investment.

7.6. Conclusions

The scarce investment in infrastructure in Peru is still one of the main problems preventing the country from competing with other countries in the region. For the time being, Peru's current level of infrastructure puts it at one of the most backward countries in the field, ranking 113 out of 134 countries analyzed with regards to their infrastructure allocation according to the Global Competitiveness Report of 2008. Additionally, a new calculation of infrastructure gaps in the country carried out by IPE points out this has increased by 65% from 2005 to 2008, reaching US\$ 38 billion, which represents 30% of GDP.

Given the urgent need to expand investment in infrastructure and decrease the current deficit, PFAs constitute a solid source of financing for these types of projects. Since 2000, SBS has adjusted the investment framework for pension funds in order to achieve greater portfolio diversification and higher profitability for retirement-savers. Thus, a greater number of instruments offered and allowed by the regulations allow for greater investment channeling by the PFA's in infrastructure, thus promoting the development of the country.

According to SBS records, by August 2009 PPS infrastructure investment activities rose to US\$ 3,117 million, a figure equivalent to 14,8% of the total funds administered. Such investment has diversified into four sectors: energy, telecommunications, sanitation and transportation infrastructure. The sector that has traditionally received the greatest amount is the energy sector, which saw investments of US\$ 1,860 million, representing 8.6% of the PPS. In the energy sector, the greatest investments correspond to electricity distribution, generation and transmission, as well as hydroelectric energy, oil and gas.

PFAs made that investment through the purchase of corporate stock, common bonds, securitized bonds and through mutual funds specialized in infrastructure, for instance: AC Captales SAFI and Fondo de Inversión Energético Americano de Larrain Vial.

Note that the largest portion of investment in infrastructure projects is made through indirect investment, which is not necessarily aimed at financing infrastructure projects. This type of investment represents approximately 77% of the investments made by PFA in infrastructure, while the remaining 23% corresponds to direct investment, which is effectively made through the purchase of debt instruments or stock issued by con-

cession companies involved in the projects. Therefore, even if the regulatory authority records show infrastructure investment at approximately 15% of the total funds administered, this percentage is reduced considerably to 3.5% when taking into account only direct investment in infrastructure.

Reviewing the current state of infrastructure development and the participation of every pension fund in this survey allowed us to find certain elements within the regulatory framework and the project granting process that should be improved in order for projects to be more appealing to investors. The most significant deficiencies in the concession system that retract and delay infrastructure investment are, among others: i) bureaucratic hindrances, ii) contract defects, iii) social risks, iv) improper pricing rules and v) inadequate supervision.

These difficulties have been compared with the results in the Payet Study (2009), concentrating on the identification of the main obstacles in the concession processes, as well as the specific propositions which will allow for the reduction of obstacles and will improve the concession processes. In order to carry out this analysis, six concession processes were taken as a sample. The inquiry found that, on average, excluding the phases of identification and design, a concession process takes 63 months. In the case that there are no major complications, this type of projects demands 48 steps and the same number of months under current regulations. Meaning, in the best-case scenario, each investment project takes at least 4 years from its identification until the signing of the contract. Additionally, another problem elongating the concession processes is that the whole process happens in sequence, which means that procedures involving 19 public departments can not move forward in parallel.

Reducing the time these concession processes actually take, as well as eliminating the bureaucratic and legal obstacles, would attract greater investment to infrastructure projects. With better normative regulation of concessions, PFAs could channel part of the money from the pension funds, which make up 65% of national savings, towards other projects.

Another important deficiency in the concession systems are the administrative issues that occur after the concession, since, although they have been completed, legal insecurities can potentially still arise from investors. A recent example is the concession of the Taboada treatment plant, which was suspended for a period of time, delaying the contract that should have already been signed with the Spanish company ACS Servicios, which won the bid to build a plant to treat 60% of Lima and Callao's waste water in February. Additionally, there is the risk of protests from citizens who are discontent over some concessions irregularities. Finally, improper pricing rules and inadequate supervision further increase uncertainty in the concession processes.

Despite these limitations, the pension industry has made significant efforts to finance companies engaged in the infrastructure sector, although it is still necessary to establish a regulatory authority suitable for determining how resources should be allocated directly to project development. That nonetheless, seems to be changing since 2009, with the implementation of two participation models through the creation of an infrastructure

fund with the involvement of the State and the PFAs, and the development of a trust model by the industry that has identified relevant projects for promotion in the short run, for which the government has already provided considerable support. With regard to the new infrastructure fund, the Government of Peru authorized the staging of a PEN 1,619 million (USD\$ 500 million) infrastructure mutual fund, out of which US\$ 300 million is expected to be contributed by PFA, making it the main financing source of this infrastructure fund. In June 2009, the association of PFAs formally organized an infrastructure investment trust with an initial contribution of PEN 898 million (US\$ 300 million), but it is estimated that this sum could rise to PEN 4,488 million (US\$ 1.5 billion) with new contributions from PFAs, since the initial resources are at risk of depleting after the first 4 or 5 projects.

Furthermore, PFA in coordination with multilateral organizations and the State, continue to search for mechanisms to speed their investments on these projects. Since the crisis has aggravated financing, causing prejudice towards the construction of large projects, pension fund contributions are even more vital to this type of investments. For this reason several propositions have been reviewed to promote mechanisms that will help close the infrastructure gap and, at the same time, provide long-term investment tools that are more predictable for investors.

8. Final considerations

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Literature on economic growth has highlighted the importance of infrastructure as a determining factor in explaining long term economic progress in many studies. Given the problems observed concerning the availability of public resources to finance the construction of new infrastructure in many countries, however, many countries have sought to encourage private sector participation in such financing. In some countries, public-private partnerships and project finance has become the path to further develop new projects without threatening the balance of public budgets. One actor whose characteristics are intrinsically adept to this model is pension funds. In this work we have produced a compendium of the most relevant information available on the participation of pension funds on financing infrastructure in Latin America, concentrating on the cases of Chile, Colombia, Mexico and Peru in particular. We emphasize the effects on growth that greater involvement of pension funds would have and describe experiences that have proven successful in contrast to those that still pose a problem.

The empirical evidence in the seminal works of Ashauer (1989a, 1989b, 1989c) showed that investment in infrastructure had been one of the main factors that accounted for U.S. economic growth in the second half of the twentieth century. The main argument of this model resides in infrastructure's contribution to increasing the marginal productivity of labor and capital. Moreover, better infrastructure can lower the depreciation of productive capital. Subsequently, other studies have found it more difficult to find empirical evidence when taking into consideration other countries and periods (see Gramlich, 1994). There are some justifications for this phenomenon that allude to the lack of sufficient information and to the same level of quality data. The most accepted theoretical argument, however, is that infrastructure is a type of capital that also exhibits decreasing returns to scale. That is, as the most important infrastructure projects are built, those remaining to be built will have less of an impact on the economy. Therefore, according to Canning and Pedroni (1999), there is an optimal accumulation path for infrastructure. An investment that does not achieve optimal volume restricts economic growth generation. An excess of investment in infrastructure, especially at the lower end of marginal productivity, creates an opportunity cost of devoting those resources to other assets that may prove more productive (e.g. education, R + D + I), etc. In a meta-analysis exercise in this work controlling for fixed effects, we conclude that the consensus of the literature on the elasticity of the stock of infrastructure/growth is 0.10 (see Annex B).

A second effect derived from investing in infrastructure is the improved development of the host countries, which in turn increases the utility of the inhabitants of the region or country involved (e.g. sewage, electrical wiring, better road networks, etc).

You could say that Latin America is at the stage in which a significant volume of investment in infrastructure is still needed. The fiscal consolidation policies of the '80s and '90s are responsible for the significant reductions of public investment in infrastructure in order to achieve balanced national budgets. Ambitious privatization and direct invest-

ment policies by foreign capital markets clearly gave momentum to improving the quantity and quality of infrastructure in the region, however, this flow of resources is not enough to offset the fall in public investment. The result has been the creation of a “gap” or shortfall of provisions in infrastructure compared to other countries. The Peruvian Institute of Economics (El Instituto Peruano de Economía or IPE) estimated in 2008 that Peru’s infrastructure gap exceeded US\$ 37,760 million. In the case of Colombia, the PND estimated that investment needs between 2006 and 2010 would exceed US\$ 30,000 million. For the period 2008 to 2012, it is estimated that Chile would require US\$ 25,817 million of funding and that Mexico would need US\$ 232,293 million (see Table 2.2). These funding requirements (with the exception of Chile) have adversely affected the international competitiveness of Latin American countries compared to their direct competitors (e.g. Asian Tigers) in their natural markets (see Figure 2.5). The current situation is even more worrisome. The end of privatization and the liquidity crisis and confidence in international markets could paralyze the pace of foreign investment in Latin America. This has led to an increased interest in these countries of private sector participation in financing new infrastructure through concession contracts. The need to mitigate risks on the part of private developers has led to the formula known as public-private participation (PPP).

A PPP is a concession contract for the construction and operation of public infrastructure by private investors, in which risks are shared by both the public and private sector to some degree. There are numerous ways to establish a PPP which refer mainly to the concession framework, its form and the risk allocation (see Section 1.3).

One private agent that naturally could be very active in PPP infrastructure projects are pension funds. With the correct PPP design, this relationship can be mutually beneficial to both the State and the funds administered by the PFAs.

From the point of view of pension funds, the long-term nature of infrastructure projects enables optimal portfolio planning coinciding with the life cycle of the affiliate (Inderst, 2009). On the other hand, it is expected that pension fund participation in infrastructure investment reduces political and regulatory risk, because it requires greater discipline on the part of governments with regard to contracts and the rules of the game if the welfare of local workers is involved via their private pensions (Vives, 2000). Another key factor attracting pension funds to infrastructure assets is that they usually offer a good risk / reward profile if well designed. There are also advantages to having local investment denominated in local currency, including eliminating some financial risks such as fluctuating exchange rates and inflation, so long as appropriate clauses that update rates are included. Finally, public opinion of private pension management might be more favorable if citizens observe that investing in infrastructure generates improvements in the quality of life of society, while simultaneously improving the risk profile and profitability of the portfolios.

On the side of the state, the participation of PFAs on financing infrastructure can also yield significant benefits to the country. Since only one PPP project can be awarded to a specialized developer, it is expected that the quality of the construction and the private management of the infrastructure will improve and that this can be achieved at lower

cost than if done through public provision. At the same time, resources allocation will improve by transferring the cost of the infrastructure to the beneficiary who is paying for the use of it. The next advantage is that the volume of resources from domestic savings that has accumulated in the funds (and is thus not dependent on the investment decisions of foreign agents) can represent very significant amounts. The outstanding balance of accumulated funds in Chile could reach 95% of GDP in 2050. In the case of Peru, accumulated resources would exceed 55% of national output in that year, and Colombia and Mexico would total 40% (see Figure 2.6). The partial use of this steady flow of resources in the construction of new infrastructure would help fiscally consolidate the public budget, provide resources for other social spending items, or reduce the tax burden of any country, and would help to reduce the infrastructure gap observed in the region. In that sense, in this work we estimate the opportunity cost of pension funds not investing the full amount of their resources currently allowed by law. Using a growth accounting model (with an augmented Solow model) which includes the additional explanatory factor of infrastructure capital, and where the total factor productivity (TFP) is partially explained by this factor of capital, we calculate the opportunity cost that would be observed in the case that pension funds do not invest the full potential of available resources in infrastructure in the present and the future. That is, we compare the scenario in which the current growth patterns continue, against the hypothesis that pension fund administrators invest to the full potential that the current law allows (see Section 1.5).

In our opinion, the result is quite significant. In Table 1.15 we can see that both Chile and Peru could increase per capita GDP by mid-century by more than 3.5% per year compared with the scenario that things continue as they are now. Mexico could reach an increase in output per capita of 1% by 2050 and Colombia could gain 2.1%. The total discounted present value of the growth differential in constant 2005 prices would be 103.3% of GDP in Peru, 89% in Chile, 49% in Colombia and 24% in Mexico (see Table 1.16). These figures reveal the not insignificant importance for these countries providing the necessary and sufficient conditions to give pension funds access to participate more actively in infrastructure financing.

Given the significant benefits that we observe pension funds can have on Latin American countries by obtaining a greater participation from PFAs in infrastructure financing, it is worth describing the details of the current situation in these countries. Before continuing, however, it is important to highlight a basic condition behind the whole process: The sole objective of the individual capitalization pension system is to provide the best possible returns for pensioners. To meet this objective, investment decisions are taken only in terms of maximizing the expected return of each fund, subject to a prudent degree of determined risk exposure. Therefore, any positive externality that arises from the investments of private pension funds should take this into consideration, and should always be subject to the principal and sole purpose of pensions: to provide the highest pension. Thus the participation of pension funds are only desirable if the necessary volume and sufficient conditions exist to invest in this asset class with an appropriate risk / return ratio, and only when there are worthwhile PPP projects.

We can observe that the formula of public-private participation is enjoying a major boom in the world (see Chapter 3). It should be noted that the most interesting case studies

developed in Australia, Chile and the United Kingdom (US\$ 89,048 million, €61,000 million). Since the early '80s, Australia has encouraged public/private partnerships (PPP) for the construction and operation of infrastructure, especially in the State of Victoria. Between 1980 and 2005, under various forms of PPPs which have evolved over time, the number of projects managed totalled 127, which was valued at US\$ 47,433 million (AU\$ 35,669 million).

Other countries that have constructed some significant infrastructure projects through PPPs are the U.S. and Canada, but the diversity of information sources and legislation among the various constituent states makes it difficult to analyze as a whole. In Europe, given the diversity of applicable laws between countries and the need to standardize all the PPP processes that were opening in Europe transparent, and the number expected to open in 2000, the European Commission proposed a "Public-Private Partnership (PPP) model integrating the different PPP models on the continent. Since 2001 the projects in the community area have totalled US\$ 54,013 million (€37,000 million). Cumulative values for countries with PPP agreements that were signed at the end of 2008 are grouped, from highest to lowest amount, in Spain and France (US\$ 5,985 million; €4,100 million), Italy (US\$ 5,255 million; €3,600 million) and Ireland (US\$ 4,817 million; €3,300 million).

Out of all the experiences of PPPs worldwide the majority of the cases have been successful, however, there have also been sensational failures. The review of the literature in this work has led us to a very simple conclusion, but one which is also very difficult to carry out: the success of a PPP depends on the correct approach. It could be considered a good project when the public-private interaction in financing the infrastructure generates mutual benefits over the alternative of not collaborating, while in all cases complying with the expectations for the project. The objectives of the state, by allowing private sector participation, would be to incorporate an added value (value for money) against the possibility of doing it on its own. Specifically, it expects the new infrastructure construction to be of superior quality at a reasonable price. At the same time, given the expertise of the sponsoring company, it would require a more efficient management of facilities than it could otherwise provide. To achieve these points, some of the risks inherent in the concession must be transferred to the private sector. The expectations of the developer/financier (specifically, the pension funds) is to gain a sufficient return while taking limited risk.

These conditions may seem obvious and simple, yet they are of considerable complexity because they involve the participation of a considerable number of actors (from multi-disciplinary areas) and institutions. If to this we add the obvious technical difficulties from an engineering the point of view, to the issues concerning the economy and finances and so on, there are many factors, any one of which can lead to the failure of the PPP as a whole. Therefore, the possible participation of pension funds in infrastructure funding should only occur when the necessary and sufficient conditions for this purpose are present, which is to say, that to be considered a good PPP project, every dimension and everyone involved must have done a good job.

If we stratify a proposed public-private participation into different phases, the first phase corresponds to the study of a specific infrastructure proposal. This role corresponds ex-

clusively to the State. A model case which is often recognized for its smooth operation is the Australian case. It incorporates a rigorous model of project evaluation and standards called Public Sector Comparator (PSC) (see Point 3.2.1), which in particular:

- Studies the desirability of constructing an infrastructure for the region or country from all possible viewpoints.
- Compares the project under public provision versus private.
- Analyzes the cost/benefit ratio.
- Considers risks, relevant mitigation measures, and the decision of how much and which would correspond to the public and private sectors.

For all this, it is vital for the government to provide specialized human capital in this area or to contract them from the market, and to interact with the private sector throughout the process with to get their opinion. In the second phase, the government would announce a contest granting the construction and operation of the infrastructure. Private developers and financiers considering the project value all aspects of financing and risk mitigation and have the option of proposing an alternative (depending on the type of contract). They also consider other aspects of the country such as the regulatory framework, the terms of securing private property, enforcement of contract terms and the feasibility of solving conflicts, which are inherently structural risks. The quality of the award process itself will involve a greater or lesser number of qualified participants in each country which is related to transparency and efficiency. Finally, the existence of financial markets and financial resources that target infrastructure investments, that incorporate tools of financial risk mitigation appropriate to each situation, will mark the turning point to ensuring the consideration of good projects. Multilateral institutions could provide risk mitigation for the good projects, replacing monoline insurance companies that had serious problems in the last crisis.

In terms of the current status of PPPs in Latin America, the Chilean case is the most developed at this time, and Colombia, Peru and Mexico are generally taking steps in the right direction, but still need major reforms. In terms of the concession laws and the bidding process for the infrastructure in all the countries, there has been an evolution of learning as reforms have improved the legislative framework in each country. However, there are still numerous problems that impede the optimal performance of the process as a whole.

As we noted, the Chilean case is the most advanced. Many reforms have been incorporated to improve the transparency and efficiency, and to promote competition in each project (see Section 4.3). The result is that the projects that have been bid on have been overwhelmingly successful. There are aspects of the process that can still be improved, one of which is reducing the time between the call for bids and starting construction. At the same time, the length of time that projects are in the MOP prior to the commencement of the bidding process is also a concern. Another problem observed in the system is the high number of renegotiations that have occurred in concession

contracts that have involved significant expenditures (Engel et al, 2008). The challenge now is to move towards a new stimulus in the concession mechanism, particularly in second-generation concession projects, such as hospitals and schools. The lower private profitability offered from new projects, plus the greater uncertainty about their future cash flows will require careful design of the mechanism granting financial instruments to channel the funding (see Section 4.3).

In Colombia, concessions systems were consolidated in the mid-2000s as private investment began to assume a greater importance, and eventually reached a share of around 59% of total investment in infrastructure, a level higher than the Latin American historical average. The first generation of infrastructure (mainly roads) were awarded arbitrarily without serious feasibility studies and without proper risk allocation policies. The contract terms were modified repeatedly, implying legal uncertainty for the concessionaires. Act 1150 of 2007 makes some adjustments to Act 80 of 1993 in terms of efficiency and transparency in contracting with public resources. It states that the bid must be made public to encourage competition, however, there are still important repairs to be made, especially in terms of performing cost/benefit studies and adopting the proper risk mitigation tools.

In the case of Mexico, there still does not exist a concessions law as a single legal body. There is a fragmented regulatory framework of laws granted to each state, which makes it difficult to analyze the country's overall position. The problems identified in the LOP can be summarized as: inadequate planning, programming and budget allocation processes, along with a legal framework that does not yet establish clear criteria to develop annual programs on public works. No projects have been analyzed rigorously and environmental authorities have delayed approvals and the release of right of way. With all these problems, the concession system in Mexico has not developed to the extent you would expect. The Law of Public Works and Services was amended in April 2009 and attempts to resolve these problems, but it is still too early to evaluate their results (see Section 6.3).

In the case of Peru, successive amendments to the law have been directed towards solving the deficiencies outlined above. In that sense there has been significant progress (specifically, in May 2008 when legislative decree No.1012 approved the framework for the Law on Public Private Partnerships), which unfortunately did not have a practical mechanism to grant projects. The Payet (2009) report describes problems throughout the concession process associated with poor coordination, diffuse identification of functions and divergence of objectives in the different public sectors involved that are assumed to have caused significant project delays.

All these difficulties that have affected concession project investors have, if anything, increased the special precautions taken by Latin American pension funds to safeguard their portfolios from risk.

In the Chilean case, for example, private pension funds were initially restricted from participating in financing new infrastructure projects, because of the regulatory restrictions in place to protect the savings of pensioners. In the late '90s the authorities

devised a mechanism to overcome this impediment without relaxing the regulations that protected the pension and insurance industries or the concession system. This mechanism is the Infrastructure Bond, which is a debt instrument issued by public infrastructure concessionaires that has no prepayment option, and is usually 100% guaranteed by international insurance companies.

In Colombia, pension funds can invest in infrastructure assets through three different instruments: capital funds, stocks and debt instruments encompassing all indirect investments types. However, improvements to the system are still needed to allow pension funds to invest directly in infrastructure projects.

In Mexico, the public sector has played a major role in the development of infrastructure, however, it seems reasonable that the effort to expand the country's infrastructure could be shared further with private capital. It is likely that they advance along this line with a Public-Private Partnership law that gives greater legal certainty to the private sector in joint ventures with the public sector. Since March 2008, thanks to changes in investment regulations, pension funds have begun to invest directly in infrastructure projects under the Project Finance model through structured instruments and real estate trusts (fibras). However, this has not been consolidated due to lack of relevant projects, and limitations on private participation in sectors that could trigger major investments, such as energy; the lack of a unified legal framework for public-private partnerships; and, due to various obstacles inhibiting the implementation of new investment vehicles for institutional investors.

In 2009, Peru launched two schemes for financing infrastructure projects, which could give new impetus to investment in this sector. The first scheme consists of an infrastructure fund with state participation where it is expected that pension funds will be the main contributors. The second scheme is an infrastructure investment trust developed by the same industry, which has already identified relevant projects to drive it in the short term, and where the Government has provided significant support.

The figures in the table below clearly show the current situation. The indirect investments, namely those represented by equity securities of qualified "infrastructure" companies can represent 17.1% of the investment portfolio in the case of Colombia, 11.5% in the case of Peru and 9.17% in Chile. The country least invested in infrastructure assets is Mexico with 6.9% of their portfolio. It is important to remember that this type of investment does not ensure the construction of new infrastructure, but rather that infrastructure is considered because they are shares of regularly listed companies and that their investment risks and volatility are typical of businesses with construction and concession characteristics.

Direct investment is considerably less than the indirect investment in all cases. Only Chile and Peru have made direct investments of any size, and yet they only represent 1.8% and 3.3% of their investment portfolios, respectively.

Investment in infrastructure assets by pension funds

	Indirect investment		Direct investment		Legal limit on direct investment
	US\$ millions	% of the portfolio	US\$ millions	% of the portfolio	% of the portfolio
Chile	9,969 ⁽¹⁾	9.17%	1956	1.80%	Sin límite
Colombia	4,431 ⁽³⁾	17.10%	0	0	Sin límite
Mexico	5,535	6.90%	0	0	10.7% ⁽²⁾
Peru	2,416	11.50%	700.2	3.3%	Sin límite

Source: SEE

⁽¹⁾ Electricity, water and telecommunications.

⁽²⁾ Weighted average of the investment of SIEFORES

⁽³⁾ December, 2008.

In short, after reviewing the experiences of different countries, we confirm that Latin American pension funds could be natural candidates for investing in infrastructure projects to the extent that the financial vehicles developed are attractive and are structured with an appropriate balance of risk and profitability. This depends largely on the structure and characteristics of the public-private partnerships, as it is absolutely critical that the appropriate property rights are established and fully respected. Therefore, to the extent that suitable regulatory frameworks are created, and that they are both stable and clear, it will facilitate the establishment of transparent contracts with the appropriate incentives. Under these conditions, financial instruments that are attractive to pension funds will be developed, and as a consequence their participation will be a logical outcome.

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10. Appendix

Appendix A

a) The measurement of the synthetic index of infrastructure stock

Based on the data provided in Canning (1998), we structured synthetic indicators of infrastructure stock summarize the information contained in various indicators. To construct these indexes, the Principal Components Analysis (PCA) is used by taking the first principal component of the analysis of the variables as an aggregate index of the infrastructure stock. Thus, the information contained in others can be consolidated as a sole indicator different sizeunits.

The first aggregate index (InfrastA) summarizes the absolute infrastructure stock and is structured based on annual data from the telecommunications sector (number of main telephone lines, from the energy sector (capacity for generating electricity in MW), from the land transportation sector (the length of the highway network in kms.), from the air transportation sector (number of passengers transported), and from the railway transportation sector (length of the railway network in kms.).

The first principal component of the PCA analysis (the absolute aggregate index) summarizes 80% of the information contained in the original variables. As is to be expected, the index is highly correlated with each one of the indicators. Succinctly, the correlation between the absolute aggregate index and air transportation is 0.953, with a capacity to generate energy of 0.989, with the length of the railway lines is 0.869, with the length of the highway network is 0.961, and with the number of telephone lines is 0.931.

The absolute synthetic index depends on the standardized variables according to the following specification:

$$\text{InfraestA} = 0.213 \times \text{TranspAer} + 0.221 \times \text{GenEner} + 0.200 \times \text{ViasFerr} + 0.215 \times \text{Carret} + 0.208 \times \text{Telef}$$

The second aggregate index (InfrastB) summarizes the information of the infrastructure stock relative to population levels or the geographic area. It is structured based on the data of the number of main telephone lines per inhabitant (Telef2), the capacity for generating electric energy in MW per inhabitant (EnergyGen2), the length of the highway network in kms. per square kilometer of area (Highway2), the number of passengers transported per inhabitant (AirTransp2) and the length of the highway network in kms. per square kilometer of railway (Railways2).

The first principal component of the PCA (the absolute aggregate index InfrastB) summarizes 60% of the total changes among the five original indicators. The correlation between the InfrastB index and that of air transportation is 0.834; with the capacity to

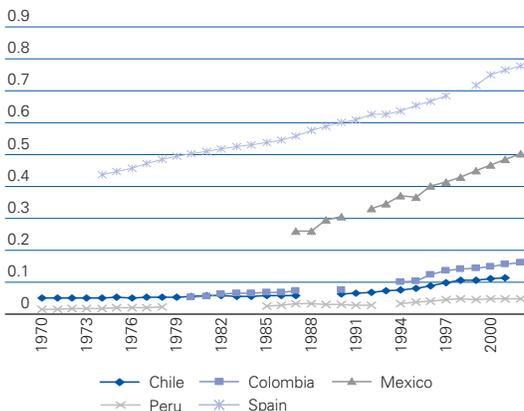
generate energy is 0.843; with the length of railway lines is 0.606; with the length of the highway network is 0.720 and with the number of telephone lines is 0.833.

The relative synthetic index depends on the standardized variables according to the following specification:

$$InfraestB = 0.279 \times TranspAerB + 0.282 \times GenEnerB + 0.203 \times ViasFerrB + 0.241 \times CarretB + 0.279 \times TelefB$$

In Graph A1, the evolution of the estimated indicators is shown for Chile, Colombia, Mexico, Peru and Spain.

GRAPH A1: Infrastructure index in absolute values



Source: ERD BBVA

Based on this evolution and considering the relative differences of the indicators of each Latin American country compared to Spain, we can estimate both the monetary value of the past infrastructure stock and make projections going forward, given that the data for Spain is known (Mas and Cucarella, 2009).

Appendix B

a) Contribution of infrastructure to growth. A meta-analysis exercise

Even though there is an extense empirical literature on the existing relationship between economic growth and investment in infrastructure, the heterogeneity of the various existing studies, both at a methodological level and in terms of results, makes it difficult to choose just one study that reports a trustworthy estimate of the elasticity of the infrastructure stock in its contribution to GDP growth.

The meta-analysis is a collection of statistical methods that are used to review different results of empirical research. If there is information from different independent studies regarding one topic in particular, the meta-analysis combines the different results, using the data bases and other methods together to obtain a clearer view with greater explanatory power than the mere enumeration of individual results.

More specifically, meta-regression is a form of meta-analysis specially designed to examine empirical research in economics (Stanley *et al*, 1989; Jarrell *et al*, 1990). In a meta-regression, the dependent variable is a statistic which, in turn, is an empirical result of each individual study, while the independent variables can include characteristics of the methodology, sample design and the data used in each study.

Thus, meta-regression can help to identify what particular characteristics of each study have an effect on the reported results. It can also help to find out why there is contradictory empirical or inconsistent evidence and to reconcile the results of said evidence. In like manner, it can help to identify which common factors are shared by all the studies.

The objective of the study in our case is to identify the magnitude of the marginal effect of infrastructure on economic growth that is shared or constant through all the empirical studies that have researched the determinant factors of economic growth.

In Table B1, we can observe the main descriptive statistics of the elasticity found in the different studies. In total, we have consulted 70 works that relate infrastructure with growth. Of those works, we have selected 13 that have sufficient available information in their models. The selected works have 130 alternative models which we have used in the meta-analysis.

The simple average of infrastructure elasticity is equal to 0.1004 and the median is 0.0515. However, the standard deviation is quite large, which is to be expected, given the heterogeneity of the estimated models. We can also see that we found values from -0.62 up to 0.53. We can also see that if we weigh the number of observations in terms of each estimate, the average value increases to 0.1129.

TABLE B1: Descriptive statistics of the elasticity

Variable	Observations	Average	Median	Typical Dev.	Minimum	Maximum
Elasticity	130	0.1004	0.0515	0.1449682	-0.62	0.53
Weighted Average		0.1129				

Source: ERD BBVA

Table B2 shows us the main characteristics of the studies that have been considered. We can observe that most of these use data from the panel and the study period. The studies included average around 30 years.

TABLE B2: Summary of characteristics of the studies

Number of study	Authors	Date of the study	Time Period	Number of observations	Number of observations	Type of Data
1	César Calderón and Luis Servén	September 2004	1960-2000	399	All of the countries	Panel Data
2	Norman Loayza, Pablo Fajnzylber & César Calderón	June 2004	1966-1999	350	Geographic Area	Panel Data
3	Gustavo Nombela	June 2005	1976-2002	27	Regional study	Time series
4	Angel de la Fuente Moreno	October 1996	1970-1986	600	Geographic Area	Panel Data
5	César Calderón and Luis Servén	October 2002	1960-1997	101	Several countries Non OECD	Cross-section
6	Balázs Égert*, Tomasz Kozluk & Douglas Sutherland	March 2009	1960-2005	849	Several countries OECD	Time Series
7	David Alan Aschauer	January 2000	1970-1990	920	Several countries Non OECD	Time Series
8	Lars-Hendrik Roller and Leonard Waverman	September 2001	1971-1990	396	Several countries OECD	Panel Data
9	Paul Evans and Georgia Karras	February 1994	1970-1986	768	Regional study	Panel Data
10	Teresa Garcia-Milà, Therese J. McGuire and Robert H. Porter	March 1995	1970-1983	672	Regional study	Panel Data
11	David Canning	November 1999	1960-1990	1348	Several countries Non OECD	Panel Data
12	César Calderón and Luis Servén	September 2008	1960-2005	582	Geographic Area	Panel Data
13	David Alan Aschauer	September 1988	1949-1985	37	Just one OECD country	Time Series

Source: ERD BBVA

b) Specification and Methodology

In most meta-analysis and meta regression studies, the most important objective is to identify the effect of the different methodologies, specifications and design on the results of the statistic of interest (for example, elasticity). Our study's objective is not so much to identify these effects, but to estimate elasticity common to all the estimations found, controlling for the characteristics of each estimate that can make the estimated value differ from the elasticity between GDP and the expense on infrastructure.

It is particularly important to consider the different mathematical transformations, the definitions of the variables and the different econometric methodologies that are used in every different estimation.

Ideally, we should only use studies where the mathematical transformations of the dependent variable and the explanatory variables are the same, and in which the same explanatory (proxy) variables were used to measure infrastructure stock. However, for the purposes of our research topic (and for almost any other topic in economics), it is almost impossible to create a sufficiently large sample of estimations that share those said characteristics. For this reason, our empirical strategy consists of controlling for the differences in the estimation of elasticity through the inclusion of dummy variables for those estimations where mathematical transformations or definitions of the Infrastructure proxy variable differ from a defined base model.

Said base model would include the models in which the log of GDP (or its growth rate) is used as a dependent variable, and the log of the Infrastructure Stock (or its growth rate) as an explanatory variable.

More concretely, in the first analysis, the following control variables are included: The first dummy variable takes a value of one when, in the estimate, the dependent variable and the Infrastructure Proxy are defined in Ratios (Ratios {1.0}). The second dummy variable takes a value of one when the dependent variables of infrastructure have been transformed in some way or another (combination of logarithm and levels, logarithm of a ratio, etc.) (Another transformation {1.0}).

Given that, ideally, the infrastructure variable should be defined as the value of infrastructure stock, we have also included a dummy variable for models that use any other different definition (No Stock {1.0}).

Because we are interested in knowing the differences in elasticity between developed and developing countries, we have included a dummy variable for those estimates that use OECD countries or studies of individual developed countries (OECD or individual country {1.0}).

In addition, we included dummy variables for the different types (groups) of methodologies used in the different studies.

In each analysis, the value that interests us is the constant or intercept of the Meta-Regression, since we can associate this value with a "constant" or common value to all

the empirical estimations, once the effect of the different methodologies or samples have been discounted.

The methodology used is Weighted Least Squares, with the weighting factor being the number of observations used in each estimate. As proof of robustness, we also used Ordinary Least Squares with Robust Standard Errors.

In the third and fourth analyses, we estimate elasticity without considering the geographic factors, that is, not including the OECD variable or the individual country dummy.

TABLE B3: Meta-regression results

	Number of Obs. = 130 F(11, 118) = 31.96 Prob > F = 0 R-square = 0.3989 Root MSE = 0.10331	Number of Obs. = 130 F(11, 118) = 32.47 Prob > F = 0 R-square = 0.4734 Root MSE = 0.11	Number of Obs. = 130 F(10, 119) = 31.59 Prob > F = 0 R-square = 0.3803 Root MSE = 0.10446	Number of Obs. = 130 F(10, 119) = 32.3 Prob > F = 0 R-square = 0.4581 Root MSE = 0.1111
Dependent Variable: Elasticity				
	Weighted (1)	Robust (1)	Weighted (1)	Robust (2)
CONSTANT	0.1092** (0.024)	0.0723* (0.068)	0.1345*** (0.002)	0.0963*** (0.006)
Ratios {1.0}	-0.0456 (0.245)	-0.0185 (0.713)	-0.0221 (0.592)	-0.0138 (0.785)
Other Transformation {1.0}	-0.1063*** (0.001)	-0.0976*** (0.001)	-0.0791*** (0.002)	-0.0715*** (0.000)
No Stock {1.0}	-0.0017 (0.969)	0.0106 (0.735)	-0.0242 (0.531)	-0.0009 (0.977)
Time Series {1.0}	0.2318*** (0.000)	0.2299*** (0.000)	0.2043*** (0.000)	0.2092*** (0.000)
Cross-Section {1.0}	0.0019 (0.980)	0.0184 (0.753)	-0.0146 (0.838)	-0.0104 (0.854)
OECD or Individual Country {1.0}	0.0491 (0.161)	0.0470 (0.133)		
Methodology 1 {1.0}	-0.0575 (0.271)	-0.0500* (0.097)	-0.0382 (0.405)	-0.0267 (0.294)
Methodology 2 {1.0}	-0.1226*** (0.008)	-0.0930** (0.015)	-0.0763** (0.023)	-0.0596** (0.042)
Methodology 4 {1.0}	-0.0181 (0.571)	-0.0017 (0.967)	-0.0227 (0.433)	-0.0113 (0.762)
Methodology 5 {1.0}	-0.0310 (0.270)	-0.0130 (0.201)	-0.0119 (0.585)	-0.0046 (0.564)
Methodology 6 {1.0}	-0.0432 (0.125)	-0.0252** (0.015)	-0.0241 (0.269)	-0.0168** (0.039)

Source: ERD BBVA

In the three analyses, the intercept or constant of the Meta-Regression, which is the elasticity value we wish to estimate, is positive, significant and varies between 0.0723 and 0.1345.

It is important to note that the estimated elasticity (the constant or intercept) is higher in the cases in which we used a weighted MC. In theory, when we use this methodology, more weight is given to studies with better information (higher quality) which is why these estimates would be the most trustworthy.

It can also be observed that if we omit the geographic factor, the elasticity found is greater in both cases (Weighted MCO and Robust MCO). Given that the geographic variable is insignificant, our preferred estimate would be the Weighted Least Squares (2) (Third column).

This book conveniently brings together a cohesive body of research to address the analysis of the role that pension fund investment has had in infrastructure projects in Latin America, as well as their potential impact on growth in the region. This volume emphasizes the need for a competitive and transparent process in order to implement these investments, which should also be oriented towards efficiency and achieving the right balance between private and social benefits.

In this line, identifying the potential for pension funds to act as a resource that can be used for infrastructure development constitutes a first step towards quantifying and projecting how much per capita GDP in Latin America can grow through 2050, by estimating the effect of increasing the participation of pension fund assets related to direct investment in infrastructure.

Given the above, the different chapters give a detailed assessment of the experiences of Latin American pension funds in the financing infrastructure. This serves as a basis for reflecting on potential improvements that would optimize pension fund portfolios, while also contributing a greater amount of provisional savings toward the development of the countries.

In order for the participation of pension funds in infrastructure to be a recommendable strategy for managed portfolios, one of the criteria that must be met is that it is an attractive investment for future pensions, and therefore that the investments achieve an appropriate balance between risk and return. Also, given the importance that infrastructure has on development, we observe that the increased participation of pension funds also constitutes a desirable goal in that it not only increases the private savings of the elderly (the affiliates), but also for society as a whole.

To achieve a complete analysis, we review the evolution and the manner which infrastructure has been financed traditionally, examining the strengths, as well as the weaknesses which must be corrected. We also describe how the existing processes have contributed to a greater or lesser involvement of the private sector through each country's concession laws. Finally, we discuss the various tools available in the existing systems that enable the participation of pension funds, how these processes have been conducted so far, and envision future opportunities.

The research contained in this publication gives additional light to the dual relevance that pension fund investments in infrastructure can have, by complementing the objective of the pension industry which is responsible for managing profitable portfolios with bounded risks, with those of the country as a whole, which will also gain a significant contribution to growth, thus leading to further development of the pension funds. In short, a virtuous circle that is necessary to strengthen.