

Chapter 5

Structure, financing and risk management in large port infrastructure concessions: The Chilean case

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The success of private sector participation in infrastructure is highly conditioned by the ability of governments to properly shape and control the public-private contractual relationship. Therefore, determining the accurate mechanism to control private participation becomes imperative, both ex-ante (by designing correct contracts, properly assigning risks; designing effective competitive tendering and robust and transparent award criteria, and implementing effective oversight and regulation) and ex-post (post contract award management and careful handling of renegotiation requests). In addition, risk management in private concession processes is a major issue, particularly with very large infrastructure projects where the risks may be an obstacle to private finance.

This paper discusses the options for private participation in a new mega-port initiative in Chile (a port capable of handling 12 000 or 18 000 TEU ships) and argues a generic finding, that in port infrastructure it is sensible to separate the delivery of the breakwater component from the rest of the port infrastructure development (terminals). Due to a lack benefits from bundling, easier access to finance (as a consequence of construction risk), and the potential inability of the private sector to better manage the perceived construction risk in this case, the recommended approach is traditional delivery for the breakwaters and port concessions (PPPs) for the terminals.

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Introduction

The complex industry of transport has traditionally provoked a large number of debates to determine the role that governments and firms play in it. Economic theory has already recognized the advantages of private sector involvement in some industries, but it is also accepted that some sectors require regulation to prevent results which do not increase social welfare. Therefore, the establishment of a proper regulatory framework and mechanisms, which would create adequate incentives for companies operating in the transport market is essential.

The inclusion of private participation in the infrastructure sector seems to improve efficiency, productivity and service quality (Andrés et al, 2007; Trujillo and Gonzalez, 2007). However, from a welfare maximisation perspective, privatisation processes are not given the necessary attention they require. Societies perceive privatisation as if the new owner would achieve full discretion in decisions about the acquired public goods. In fact, that could even be true, if there were no contracts and contractual obligations between the public and the private partner. In this context, the welfare maximisation perspective is crucially dependent on the establishment of a proper regulatory framework for concessions.

Frequently, the negative public opinion on privatisations stems from failures in their implementation. The lack of transparency or an inadequate communication with the public might be some other reasons explaining the current unfavourable stance of the public. Accordingly, as noted before, privatisation in some sectors requires proper economic regulation. The success of privatisations is highly dependent on the ability of governments to control private concessions. Finally, the possibility to renegotiate the initial terms or conditions in case it appears necessary is another important factor at play, which influences the public perception of privatisations (Guasch, 2006).

In some cases where the concessionaries earned huge profits, customers and workers were left at a disadvantage. In others efficiency gains did not materialize. There were also cases, where the workers suffered from adverse employment regulations and wage cuts. Therefore, setting up a proper regulatory framework for privatisations is of critical importance, both *ex-ante* (by designing correct contracts; negotiation or auctions) and *ex-post* (renegotiations).

Commonly, privatisations are seen as a trade-off between efficiency and social objectives: those in favour stress that it increases operational efficiency and innovation, and those opposed emphasize its capacity to abuse consumers and/or employees and its tendency to hurt the environment (Cullinane and Song, 2002).

Chile has a successful track record of introducing private finance in infrastructure investments (including ports) through concession contracts. However, under the current concession schemes, there is a high degree of risk associated with very large civil engineering works involved in building breakwaters for this mega-port initiative. This report presents the experience on private participation in ports, including in Chile, and addresses a number of issues relevant to the implementation of mega-ports (*Puerto de Gran Escala*) in Chile. These include questions such as: Should the concession model be modified and should we consider underwriting this risk or finance the breakwaters by the public sector? What type of concession should be granted? How should the tendering of terminals be structured to secure the desired level of competition?

Port reform process

In recent years a significant number of countries have implemented policies directed at reforming their port industry, with the idea to improve efficiency and to reduce the heavy financial burden placed upon governments. During the 1960s and 1970s, the port infrastructure was badly maintained and often poorly managed in most developing countries and in some developed ones. Against this background, from the early 1980s onward, technology advances like cargo containerization pushed the maritime transport industry into a fundamental restructuring of its service networks. Suddenly, there was no longer any distinction possible between ports in developing countries and in industrialized nations. Ports worldwide were confronted by the same process of change (Juhel, 2001).

A traditional seaport, before the introduction of reforms reflecting changes in the maritime transport industry, could be described by the following characteristics:

- National or local government budgets are used to finance the building of most large infrastructure construction costs, but public budgets are becoming tighter.
- Port authority (generally public) finances the costs of maintenance and repairs for infrastructure and it is financed partly with public funds, and the rest by port tariffs and fees from private firms operating in the port.
- There is an excess of employees working in the port, who have a high degree of unionization and strong positions at collective bargaining.
- Port efficiency in terms of costs and waiting times for ships is relatively poor (Trujillo and Gonzalez, 2011).

As a consequence, there is currently a great need for large capital investments in the seaport industry to accommodate the growing demand. In addition past maintenance and renewal levels have often been inadequate, thus creating a maintenance backlog which is an additional cause for the need of required investment.

This is especially true in the context of reduced public subsidies, which are due to tighter fiscal conditions among governments. In this context, private finance becomes an important option.

The current trend observed worldwide is the general adoption of the landlord model as an organisational scheme for ports. Such arrangements have a long tradition in North America and Western Europe. Since 1980, more than a hundred ports in developing and transitional countries has also reorganized in this way. In this model, the port authorities retain the ownership of the infrastructure in order to avoid the risk of monopolisation of essential assets by private firms. The private firms are in charge of operations in the port. Concession contracts between port authorities and private firms are the most common instrument to implement this type of private participation in ports.

The role of port authorities is thus transformed from institutions traditionally in charge of all port activities to one in which they are only a coordinator of these activities. Introducing private firms in seaports thus requires the design of new regulatory systems to monitor their behaviour. The regulation takes place in asymmetric information conditions as firms know their costs and market conditions better than the regulator does. However, it is not strictly required that port authorities perform this regulatory task, and another independent institution could also be used instead.

The previous description of stylised facts does not aim at reflecting the exact situation of all seaports in the world, but to identify the main questions that those seaports that have started introducing reforms have already faced (such as containerisation of cargo and development of larger and more specialised ships, as already noted above). Moreover, technological changes, introduced in the last decades, such as

containerisation of cargo and development of larger and more specialized specialised ships, have forced seaports to start a fast renewal cycle of their facilities. Specifically, the ports wanted to be able to provide services, which are compatible with the new needs of shipping companies and they wanted to respond to a growing demand for container handling services.

Introducing private participation in ports

There are several alternatives, when introducing private participation in the organisation of port services, depending on port size, initial conditions, and the type of service considered¹. Two main directions emerge from the different possibilities: selling the seaport as a whole (*full privatisation*) or introducing private participation to build/renovate facilities or to provide specific services (*concession/PPP*). With full privatisation, all the assets and liabilities are transferred to the private sector. It is also possible to transfer parts of the seaport to be developed by private operators (e.g. Build, Operate and Own - BOO).

The second option implies introducing private participation for a given number of years. The different possibilities are:

a) Services that require an exclusive use of infrastructure or superstructure port facilities

- Introduction of private participation in the port in order to build or renovate facilities required for service provision (Build/Rehabilitate, Operate and Transfer, BOT or ROT):

In this case, the public sector does not lose ownership of the port infrastructure, and new facilities built by private firms are transferred to the public sector after a specified period of time. This is the case of classical concessions, which is discussed further for the Chilean Puerto de Gran Escala.

- Creation of a new independent company, combining the efforts of two or more firms: *joint-ventures*:

This type of agreement arises when at least two parties with common interests join forces. Thus, for example, in some cases a firm can supply technology and know-how, while another might have knowledge of market opportunities and customer contacts.

These agreements are not signed exclusively between private firms. There are examples of collaboration between port authorities and private firms, as in the cases of Shanghai (China), Kelang (Malaysia), Sri-Lanka, and other Asian ports with large investment projects, where port authorities have formed many joint-ventures to develop and operate new terminals. In other cases, joint-ventures may be found between several public firms, as in the example of the Singapore Port Authority with the authority of Dalian, to develop and operate a container terminal in the port of Dayaowan (China).

b) Services that do not require an exclusive use of infrastructure or superstructure port facilities

- *Leasing*

In some cases, port authorities simply rent port assets to be used by private operators during a fixed period, and thus obtain income from contract fees. Contrary to concession contracts, the private firms in this case are usually not required to make investments; therefore they only assume commercial risks. Operators under this scheme rent some port facilities, such as storage buildings or cranes.

- *Licensing*

Here the port authority allows the operators to provide some services which only require relatively simple equipment, and thus assets are generally owned by private operators. Infrastructure is provided to these operators to use it, generally for some specified fee, and in some cases they may also use some superstructure elements owned by the port authority. Stevedoring companies, pilots, tug operators or consignees can work under this type of agreements.

- *Management contract*

A simple form of introducing private participation in a port is by contracting out the port management. In this situation, the port authority is the owner of infrastructure and port facilities, but decisions with regard to its management are taken by a private firm which can apply a more commercial approach to operations. Both the investment and commercial risks are faced by the public sector, since managers do not invest their own capital in the port. The port of Bristol (UK) is an example of this type of contract, where the local government owns facilities, but the port is managed privately.

When choosing among the options listed above to determine the best alternative for a particular port, the port objectives must be evaluated, and the constraints that the port authority faces must be considered. The type of service, financing environment, size of projects may determine the possible degree and the specific modalities of private participation

Some experiences in private participation in ports

Traditionally, the UK has taken the leading role in terms of privatisation processes (particularly in the port sector). The total revenue produced from all UK privatisations in the last two decades amounted to more than USD 121 billion and, considering all Europe, the total increased up to USD 641 billion (Baird and Valentine, 2007). Authors noted that port privatisation in the UK was never about developing new and improved port infrastructure and facilities to benefit the economy, which was the aim in other countries; it was simply a mechanism used to remove port assets from public ownership.

Along the same line, Cullinane and Song (2002) emphasised that privatisation provided only a partial cure for the ails of the port industry. Authors also pointed out that the entire port system has to be flexible enough to allow modifications in response to a changing business environment. Brooks (2004), based on the work of Saundry and Turnbull (1997), commented that although “privatisation did not transform the financial and economic performance of UK trust ports sufficiently to justify the private gains of port

management shareholders, and represented a ‘huge public loss’, it is not clear if the outcome would have been better if the UK government had provided greater regulatory oversight post-privatisation”.

Latin America has also been considered a suitable case to analyse privatisation processes. As Guasch et al (2008) noted, the Latin American and Caribbean countries have taken the lead in allowing private sector participation in the provision of infrastructure services. From the first steps in Chile in the 1980s, the region has experienced a wave of privatisations in sectors such as petrol, gas, agriculture and public services, among others (Estache and Trujillo, 2004). This process of privatisations was in full swing especially in the 1990s, with the adoption of the price cap regulatory model. Estache et al (2004) noted that “the infrastructure reforms of the 1990s consisted essentially of vertical and horizontal unbundling of the sectors into multiple business units—when allowed by country size-- and ‘privatisation’ of as many as possible of these business units”.

The proceeds from the large scale privatisations in the 1990s reached 6% of the GDP in 18 Latin-American countries (IDB, 2002). However, in most cases, efficiency gains have been secured and users have seen improvement in the quality and access to the service. The effect on prices has been mixed to some extent due to the initial (prior to private sector participation) price distortions. In a number of cases, private sector participation has been associated with political ideology. Yet that has changed since the late 1990s, when pragmatism (due to the need to improve public services) trumped ideology (Estache and Trujillo, 2004).

Stressing the Latin America case, Estache et al (2003) also noted that privatisation without competition generated few benefits for the economies, showing that price caps alone would not do much for users. The literature on Latin America privatisations processes is vast and extended (Delfino and Casarin, 2003; Barja and Urquiola, 2004; Paredes, 2003; Torero and Pasco-Font, 2003; Ennis and Pinto, 2003; Resende and Facanha, 2002; Mueller, 2001, Engel et al, 2000, among many others).

As Hoffman (2001) showed, after the private participation process, there is less public involvement in port planning, investment and regulation in Latin America than in Europe. However, the public sector has a role to play concerning the monitoring of anti-competitive behaviour and the provision of a legal and regulatory framework, among other functions. The success of privatisations is highly dependent on how they are established according to terms and conditions and, specially, how they are implemented and regulated.

Although not specifically linked to ports and limited to Latin America, the findings and suggestions above are in line with economic theory and evidence with regard to public utilities, which share some of the characteristics of port infrastructure projects (e.g. large capital investments, sunk costs and related obstacles to competition). For example, Estache and Rossi (2010) using a representative sample of 220 electricity distribution companies from 51 development countries for the period 1985-2005 find, that private regulated companies are more efficient than state-owned regulated companies. Similar findings are derived in a major study of World Bank (Gassner et al., 2009) from a sample of 1,200 utilities from 71 developed and transition economies. Using the analogy of Parker (2004) for the case of Great Britain: “... without privatisation, the introduction of competition in some (network) activities would not have been possible at all, or would have been difficult to promote. For example, in the distribution of gas and electricity, and the regulation would remain highly politicised. In other words, increased competition and better regulation are likely to be direct consequences of the privatisation process. In short, the theory recommends competition as the first best choice, and when this is not possible, regulation,² and only after that privatisation (with regulation).”

Finally, some other questions arise about the structure and procedures.³ There is no single procedure or a blue print regarding awarding procedures that could be universally considered as best practice (Farrel, 2012). There has been ample discussion on awarding port terminal concessions in the recent years (Notteboom et al, 2012). The international experience provides a number of different procedures according to country and environment circumstances. Considering the case of one of the fastest-growing economies

worldwide, China, ports operate through joint ventures where the public sector holds 75% of the total share as minimum, while terminal operators work as commercial firms. Other regions, such as Europe, have opted for a bigger role of private partnership through PPP models (Kappeler and Nemoz, 2010). Therefore, some of the main issues are to determine the role of private and public sector, the risk allocation between port authority and operators, and the extent of financial or credit enhancement support.

The international trends on mega-ports: A quick review

The global trade context characterised by the improvement of logistics chains, the development of containerization and hub concepts and the arrival of the new supra-large ships is producing a flurry of mega-ports around the world. They are being considered, launched or are in progress; some are greenfield, while some involve significant expansions around existing ports. Capacity ranges from 2 to 15 million TEU. A number of them do have breakwaters investments components.

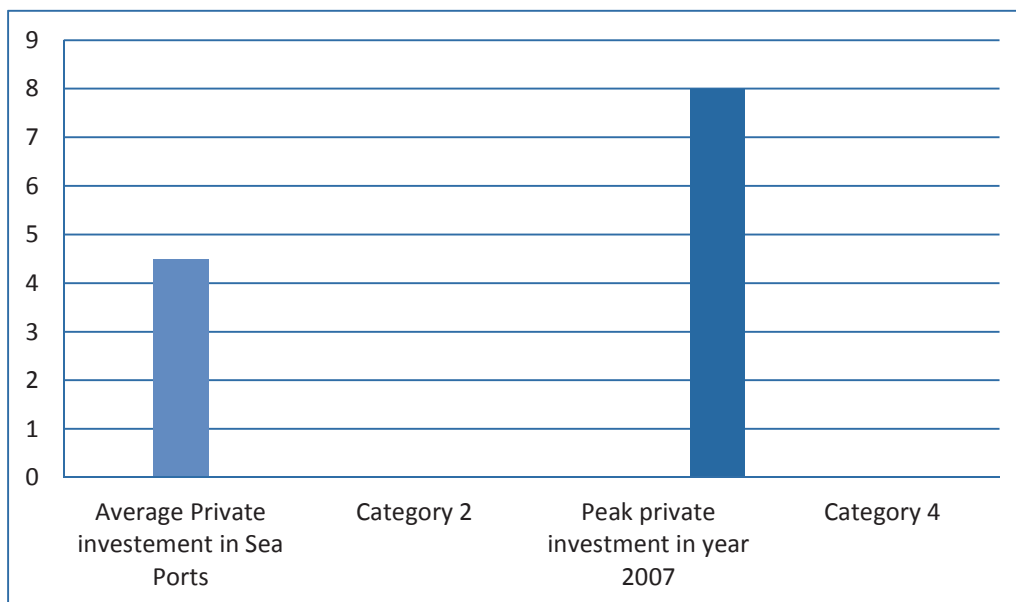
Latin America and the Caribbean area also a part of that trend, with mega-port projects in the works in Peru, Callao (San Lorenzo Island), Colombia (Cartagena), Panama (two, Balboa and Rodman in the Pacific side), Mexico (Punta Colonet, Baja California), Cuba and of course Chile. There are many other mega-port initiatives around the world. In the Gulf countries (Dubai, Kuwait, Qatar and Abu Dabhi-Khakifa Port), Indonesia (Jakarta), Taiwan, Sri-Lanka, Lagos (Nigeria), Kenya, Tanzania, Australia (Gladstone) among others and of course the 26 mega-ports in China and counting.

All those ports are structured under a variety of operational and financial structures but most with a significant participation of the State. In Cuba, the mega-port is an integrated concession where Odebrecht builds, and Singapore Authority operates while financing is shared by Brazil (85%), and Cuba (15%). In Jakarta, the Indonesia Port Corporation develops (three terminals and two fuel berths), then concessions by business unit. In Taiwan, the mega-port is fully state-funded. In Sri-Lanka, the Chinese build, finance, and own 85% of the project, the SRLA Port Authority finances and owns 15%, and the project does include a significant investment for breakwaters components (financed by a loan from the Asian Development Bank (ADB), of USD 300 million).

Some of the projects are greenfield such as Badagry/ Lagos Nigeria to be launched as main stream PPP, the two in Panama and the Qatar new port. Most have significant government participation, either in terms of ownership or financing, while some are fully privately financed (ATM in Lagos, Nigeria). The most common intervention by governments is the financing of “non-productive/non-direct revenue generating” port infrastructure and those components of the project are often undertaken as public works. The level of investment is considerable in most of those initiatives ranges from USD 500 million to USD 7 billion.

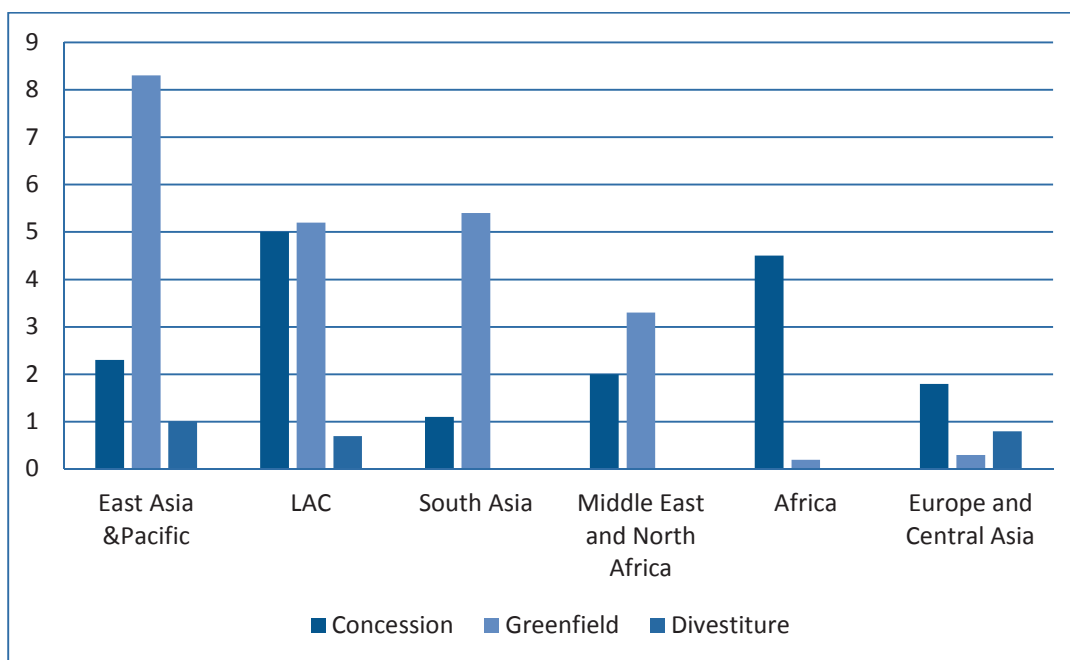
Figures 5.1 to 5.3 below illustrate the trends for the current and past decades in investments in ports around the world (based on IFC-International Financial Corporation and PPIAF- Public-Private Infrastructure Advisory Facility data base). Of note is the increasing share of greenfield (relative to brownfield) port projects, and the high incidence of port projects in East Asia, Latin America and South Asia, but with the Middle East catching up.

Figure 5.1. **Average annual private investment in seaports**
2000-2011 in low and middle-high income developing countries in billions USD



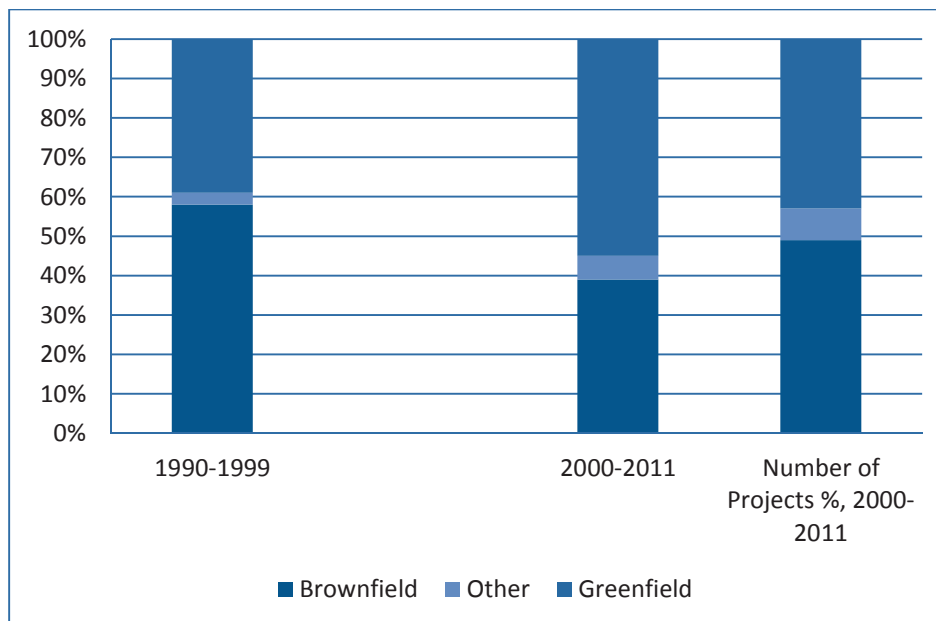
Source: IFC and PPIAF Data Base 2012.

Figure 5.2. **Private investment in seaport projects by region and modality**
2000-2012, billions USD



Source: IFC and PPIAF Data Base 2012.

Figure 5.3. **Percentage of greenfield and brownfield investments**
(in value terms) in two decades 1990-1999 and 2000-2011



Source: IFC and PPIAF Data Base 2012.

Risk management in port concessions

As shown in Theys et al. (2010), one of the most critical issues in the development of a PPP contract is the identification and allocation of risks between the port authority and the private operators.

The huge dimension of some infrastructure projects (for instance ports) involves a number of potential risks. Depending on the definition, project risks can be decomposed to different groups. To facilitate discussion, one possible decomposition is presented below, as summarised in Table 5.1.

Table 5.1. **Types of risks associated to the development of an infrastructure**

| | | |
|----------------|-------------------|----------------|
| Technical risk | Construction risk | Operating risk |
| Revenue risk | Financial risks | Other risks |

Technical risks concern the engineering and project design failure (Grimsey and Lewis 2002). With regard to construction, the main risks are the possibilities of delays and cost overruns, as is also the case in other (transport) infrastructure projects. During the operating phase, the materialisation of operating risks leads to increased operating and maintenance costs. Usually the risks mentioned above are transferred to the private sector (depending on the cause) under the concession, PPP or privatisation mode, or retained with the government, with caveats, in the case of public works. We have not encountered research which would analyse or review the causes of individual types of risk in greater detail, specifically in the case of port infrastructure projects.

Revenue risks basically depend on the probability of changes in expected demand, due to overestimation or exogenous circumstances – for example, a demand reduction because a new competitive alternative to the port has become available or a major economic/financial crisis. Chile developed 3 risk mitigation mechanisms to make highway concession projects more attractive to bidders: Minimum Revenue Guarantee (MRG), Least Present Value of Revenues (LPVR) and Revenue Distribution Mechanisms (RDM). On the relationship between the operator of the infrastructure and its customers, Klein (1998) pointed out that the risks generally should not be transferred to the concessionaire if he cannot control or assess them more effectively than the customers. In general, demand is difficult to forecast, and transferring this risk to the private side is generally not considered to be a favourable option, especially in case strong competition between bidders is absent⁴.

The materialisation of any one or several of the risks above contributes to the overall risk of project default (Grimsey and Lewis, 2002). In the context of the Chilean case, the revenue risk is a major one given the life span of the project, uncertain characteristics of the demand, and a number of external factors that can affect revenue. That risk is usually assigned to the private sector, with in some cases some sharing from the government through MRG. The other major risk on projects refers to construction, that encompasses cost overruns (on average 75% of projects in Latin America experience cost overruns and the mean of the cost overruns is about 35%)⁵ and project delays (on average in Latin America, 65% of projects do experience significant delays in the six to 18 months range). For public works, those risks are usually allocated to the government with some caveats described in the tendering contract. In the case of concessions, PPP or privatisation that cost is usually borne by the private operator, again with some caveats depending on the underlying causes.

In summary, the main risks usually allocated to the private operator are (the stars illustrate the importance of individual risks):

- Revenue Risk ***** (high variance over predicted demand , and optimism bias much more common-realized revenues often much lower than predicts/expected demand)
- Construction Risk **** (about 75% of projects in Latin America experience cost overruns on average and the mean of cost overrun is about 35%).
- Technical Risk ***
- Financial Risk ***
- Operational Risk **
- Others risks (some possibly shared)

Considering the risk assessment, there is a wide range of techniques employed to assess them in mega-projects such as fault, event or decision tree analyses, Monte Carlo or sensitivity analysis, scenario planning, expected monetary or net present value, among others (Ebrahimnejad et al, 2010).

A proper risk allocation among public and private partners may be crucial in determining the success of the project. As such, it should be explicitly described and stated (the risk matrix and its allocation) in the contract design. The latter should detail the share of risks borne respectively by the public sector and the

private partners, in a range covering from totally public from totally private. The stability or lack of adjustments to the stated risk allocation is indeed the crucial element of the contract to secure the expected benefits of the project. The core of renegotiations entails changes in the risk allocation matrix. Care should be therefore exercised in handling renegotiation requests. The dissuasion of inappropriate renegotiation demands is recommendable, because efforts and demands (by the private sector) to alter the risk allocation can be expected throughout the life of the project (the renegotiations conundrum). On average about 65% of PPP projects have been renegotiated in Latin America since 1990. Thus it is critical to credibly commit to respecting the sanctity of the contract. A high likelihood of contract renegotiations from one side or another may lead to opportunistic behaviour of both, further increasing the cost of finance and reducing the (public) benefit of projects to come.

The case of Chilean ports

Chilean international trade is served by 57 seaports, of which 25 are publicly used and only 10 are publicly owned, and are organized by the public agency *Empresa Portuaria Chilena (Emporchi)*, while 32 are privately used (Table 5.2).

Table 5.2. Number of Ports in Chile

| | |
|-----------------------------|-----------|
| Publicly used ports | 25 |
| Publicly owned | 10 |
| Privately owned | 15 |
| Privately used ports | 32 |
| Publicly owned | 21 |
| Privately owned | 11 |
| Total | 57 |

According to Michea (2013), the reform of the port sector in Chile has been a successful experience expressed through financial results and a quality of service.

In 1978, seaports in Chile were characterized by the split of cargo handling between two different groups of workers. Specialised port workers performed stevedoring operations, while Emporchi employees did operations of loading/unloading. Both groups enjoyed some monopolistic positions. On the one hand, stevedores had strong limitations to the growth of their numbers, as each worker was required to have some special license (*matricula*) to be able to provide stevedoring services. This practice transformed stevedores into monopolists for those services, which resulted in high tariffs and low productivity. On the other hand, Emporchi was by definition a public monopoly, working at the state level and its workers constituted an important pressure group.

In 1980, the government decided to change the *status quo*. Legal changes were introduced in 1981 by passing a new Seaports' General Law, which effectively eliminated the monopoly of Emporchi in cargo loading operations, allowing private participation in those services. Almost simultaneously, a different law abolished the system of licenses for stevedoring, allowing any worker to perform those services for

shipping companies. As compensation, the State made payments to the 2 700 workers that had lost their privileges and who were clearly opposed to any reform. These regulatory changes permitted the significant entry of new private operators and a competitive market for cargo handling was established. The impact on costs was substantial.

At the end of 1997, a law seeking to modernise State ports was passed, which sought to transform the Chilean port system and adapt it to the new needs of maritime transport. The law intended to introduce more private participation to achieve the objective of modernising the ports. The law envisaged splitting Emporchi into 10 autonomous public companies, which would run the 10 state ports, from Arica in the north to Punta Arenas in the south. These new companies will act as port authorities, managing ports' infrastructure, and are not allowed to provide cargo handling or berthing services.

The law also established that the new pier infrastructure had to be developed by private companies and through public tendering.⁶ The idea was that the new port authorities should contract all these services with private operators, through licenses and concessions, including new pier infrastructure.

The “large scale port” in Chile

Description

The law of ports in Chile states that the Ministry of Transport and Telecommunications (MIT) is accountable for proposing “strategic plans”: the MIT assumes the responsibility to coordinate plans for the long-term development of ports. Thus, the MIT is currently developing a national-scale port-planning instrument: the National Ports Development Plan (PNDP). One of the main proposals of this plan, according to its economic impact, is the *Puerto de Gran Escala* (PGE) to address the expected growth of trade and the limited capacity of existing ports to service it in the next decade. The proposed location of the new PGE is in the middle of the country, and will service five of the most economically active country's Regions⁷ (Michea 2013).

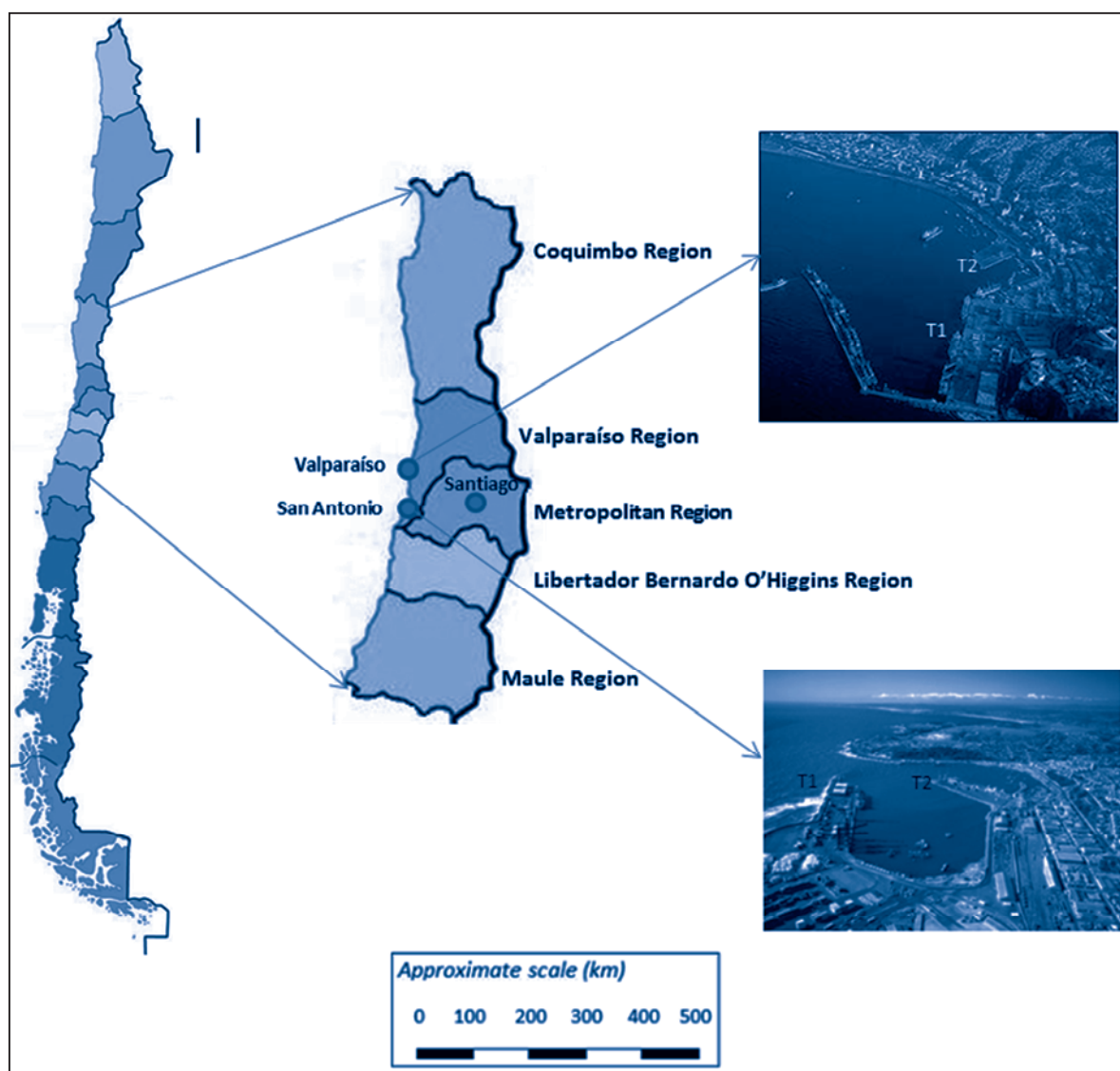
Currently Central Chile is served by two container terminals located in the Valparaíso Region, i.e. San Antonio and Valparaíso (depicted in Figure 5.4). The container transfer capacity currently available in the region is estimated 2.3 MM TEU/yr., which is distributed between:

- Terminal 1 in the Port of Valparaíso, operated by concessionaire TPS.
- Terminal 1 in the Port of San Antonio, operated by concessionaire STI.

The port authorities, *Empresa Portuaria San Antonio* (EPSA) and *Empresa Portuaria Valparaíso* (EPV), have successfully tendered their second container terminals recently. In 2011, EPSA awarded the ‘Costanera-Espigón’ project to *Puerto Central* concessionaire. In 2013, EPV gave the ‘Terminal 2’ concession to *OHL*.

The Puerto Central and Terminal 2 projects are expected to increase the installed capacity in slightly over 2 MM TEU/yr. All this capacity plus small increases, provided by minor infrastructure improvements to the existing terminals operated by TPS and STI should bring the total capacity in the area of influence to approximately 4.9 MM TEU/yr. by 2021.

Figure 5.4. Existing container seaports in central Chile



Source: Authors.

In terms of the demand forecasts, the total nominal capacity in the port system would be exhausted in 2025 by considering an average GDP growth of 4%, whilst at a rate of 5% this would occur in 2021. Therefore, the MIT concluded that at some point in the first half of the 2020s, demand growth in Central Chile would require an additional container capacity and it thus proposed the development of the PGE (Michea 2013).

For that purpose, in 2013 two alternatives are being considered: San Antonio and Valparaíso, as shown in Table 5.3.

Table 5.3. Alternative locations and design specifications PGE

| San Antonio | Valparaíso |
|--------------------------------|-------------------------------|
| New capacity: 6 MM TEU/year | New capacity: 3 MM TEU/year |
| Estimated budget: USD 2 700 m. | Estimated budget: USD1 420 m. |

Source: Michea (2013).

The proposal is to sequentially implement two mega-ports, one in each of those two locations. San Antonio might naturally support (at least) two port operators (terminals) given its technical specifications:

- maximum total dock length 3 560 m in two fronts,
- breakwater length 3 700 m,
- backup area: 170 ha, and
- nominal capacity: 6 MM TEU/yr.

The total investment is estimated at USD 2 750 million.

Valparaíso with only one front would naturally support one port operator (although two could be considered, which would require splitting the terminal) as this is a natural setup, and given its technical specifications:

- maximum total dock length 1 770 m in one front,
- breakwater length 2 300 m,
- backup area 44 ha, and
- nominal capacity 3 MM TEU/yr.

In this case the total investment is estimated at USD 1 420 million.

Regarding the choice between the two identified locations it appears that from the logistics, extent of inducing competition, added capacity, cost basis (economies of scale) and back-up area standpoint, San Antonio might have an edge to be the first mover. This would be the case due to its apparently better intermodal links (in particular railroad), a larger capacity and backup area, and the ability to put in place at least two competing operators (two competing port terminals) and therefore a likely lower cost of services.

Introducing Private Participation in PGE and Financing Implications

One of the main issues here is to define a tendering model and financing implications for this large scale port. Concessions contracts are the dominant modes to introduce private participation in the port services. However, these very large and costly civil engineering works in building breakwaters for a port capable of handling 12,000 or 18,000 TEU ships could prove extremely costly and risky (unbankable) under current schemes. There are variants of the model that might make the project more bankable and attractive, while still generating the benefits sought by the government. In selecting the most appropriate structure for the tendering of the PGE, it is helpful to know what are the objectives of the design and implementation of the port's structure.

With regard to design and implementation, the objectives would be:

- securing the desired increased capacity,
- securing maximum competition in the provision of port services in the region,
- securing the lowest tariffs in port services (somehow linked to the previous objective),
- minimising the government's financial contribution or operational contribution, or quality in the provision of the services,
- reducing the transaction costs and delays in project implementation, government transfers, etc.

Generally speaking, the introduction of private participation is more feasible in already existing larger ports (landlord type) worldwide. In these ports the infrastructure can be split into separate terminals, which generates competition within the same port. Mostly, in these ports some services could be provided by private firms operating under licenses. In particular, for services that are easy to specify in a contract and

do not involve the use of substantial elements of infrastructure. On the contrary, those private operators providing services that require the exclusive use of infra- or superstructure, must be subject to concession contracts, which stipulate under which conditions they can employ assets, and the obligations of the private contractors.

When considering private participation in the specific case of the PGE, the following points should be taken into account.

- Decision to separate the breakwaters component and if so, whether to tender them as public works or as concessions - Private Finance Initiative (PFI) or fee cost recovery.
- The first issue related to this option is whether there are any economies of scale or scope to be gained by bundling breakwater and port operations. In principle, if there are, they might not be too large since they are two very different types of activities and projects that require quite different sets of skills and know-how from the firms involved. In consequence, the number of potential firms that could be interested in a bundled project might be limited, constraining the benefits of competitive bidding. If unbundling of the tasks is selected, then the issue is whether the breakwaters projects should be undertaken as public works or as a concession/PPP. Our quick evaluation suggests that it would be reasonable to separate the breakwaters components from the rest of the port project.
- Another question to consider is whether there are complementary services-other port operations/services- to be added, assigned or/and provided by the breakwaters provider. If not, the sensible decision would be that the breakwaters be delivered as public works. From a value-for-money perspective, if there were any ancillary or related services beyond construction and maintenance (and it appears that that is not the case), the possibility of using a PPP/Concession or hybrid PFI⁸ model could be considered.

Given the points stated above, three different schemes/options present themselves:

I. One single private operator and integrated concession.

This is the integrated concession model. In this case the private sector (one party) has to build and operate the whole port. The main advantage of this approach is to lower the transactional costs on tendering and coordination. Some of the disadvantages would be:

- A more complicated tendering process as it seems reasonable to assume a low number of tenders able to deal with the huge initial investment.
- A potentially excessive risk premium for the breakwater component, due to the probable inability of the concessionaire to price the construction risk.
- A more complicated financing structure.
- Tariffs alone are unlikely to support full cost recovery of investment.

This will result in i) some risk of monopoly power due to the duration of the concession (larger than usual due to the initial investment)⁹; and ii) the need of government financial support either directly (hybrid PFI) or through schemes like minimum revenue guarantees (MRG). Some other competition concerns such as the existence of collusion due to the low number of bidders can also be taken into consideration.

II. Two or more private operators, several options.

Through this scheme, some of the previous risks could be diminished thanks to the split of the different services between different operators. Private firms operating under licenses or concession contracts could provide all of the port's services. One of the operators could build one part of the main infrastructure, recover costs as a PFI type project or through the other port operators paying fees for its use (either linked to traffic or set-up fixed monthly fee) or a hybrid.

The main characteristic in favour of this scheme is, that the market power could be better measured by the regulator. A negative aspect is that the transactional costs could be higher than in the previous model. The operator in charge of the construction would assume a huge initial investment, along with a less clear bankability of the project which depends on the type of cost recovery. It is likely that there would be a need for the financial support of the government for the breakwaters projects. However, at the same time it would lessen the need of a MRG.

A second possibility within this option is to separate the infrastructure component into two separate projects, one for the construction of the breakwaters and the other for the construction of the terminals. The latter then can be bundled with the terminal operations component or not. Here there are two further options. In the first there would be two infrastructure projects and private firms and a third component and firm for port operations. In the second there could just be two firms, one for the breakwaters construction and the other for the integrated port terminal construction and operations.

III. Public and private operators.

This refers to the landlord model, the most extensively used model worldwide for large ports, where the public sector builds and operates the infrastructure while the private sector runs all the port services and might finance or construct the residual infrastructure.

Two options could be considered in the Chilean case: i) the government builds all the infrastructure and then concedes the operations and services to the private sector; and ii) (if feasible) the government builds only the breakwaters infrastructure and then concedes the terminals and operations to the private sector. The main advantage is that the regulator could control the market power and the public sector would carry out the initial investment and then recover the fees from the operator and the shippers (or through taxes to facilitate bankability). The main disadvantage is the opportunity cost of the investment. If the breakwaters component could be separated from the port terminal component, the public sector would take care of the breakwaters component through traditional procurement. It could then tender the remaining part of the project (integrated port terminal construction and port operations) to the private sector or even separate the task to be tendered to two separate firms.

This scheme also allows the creation of an independent company, from the combination of efforts of two or more entities in joint-ventures. The partnership between the public and the private sector would lead to recover the initial investment through cooperation.

It has to be noted that the different models commented above depend on the port law, which states that the new pier can only be developed by private firms. One question that might require a detailed interpretation of the law is whether the development/construction of breakwaters is also covered by the same law. The underlying concern is whether through the presence of a public good component or essential infrastructure, the law, and therefore the obligation that only the private sector can develop it, can be avoided. If such an interpretation is not possible, public participation in the construction of breakwaters might not be possible in Chilean ports, and all the negative aspects related to the absence of the public sector in the project would come into play.

As mentioned before, a possibility, if feasible, would be to split the construction (and tendering) of project works into two components. One component would entail the construction of breakwaters and the other the construction of port terminals (coastal side). That option is indeed quite feasible for the Valparaiso case. For the San Antonio case, although the option in principle is feasible, the port design makes this solution more difficult.

Table 5.4 below summarises the different alternative models listed for the Chilean case.

Table 5.4. **Alternative models**

| | Private Participation – One tender | Private Participation – 2 or more tenders | Public and –Private Participation |
|------|---|--|--|
| Pros | Lower transactional and coordination costs | Competition for the market (more bidders) and in the market | Risk allocation Public sector provides public services (breakwater) |
| Cons | Huge initial investment/financing issues Monopoly risk | A complex bidding process Higher transactional costs among operators Breakwater contract | Chilean law |

Issues to Consider About the Most Desirable Structure and Financing for the PGE

Financial Model and Costing of the Breakwaters Component

It is crucial to have a cost estimation of the breakwaters component of the project and to have an idea of the financial model underlying the options discussed above. In particular it is necessary to estimate the tariff levels or revenue needed, as well as their impact on the demand and cost recovery patterns to assess the relations between all these elements. A simple value-for-money analysis might be useful to guide the discussion and to indicate the appropriate alternative.

Chilean Concession/PPP Law (Ports)

The Chilean Law establishes a general rule under which new pier infrastructure can only be developed by private companies and through public tendering. Nevertheless, the law does not mention new breakwater investments, which technically are but need not be piers. Another interpretation issue is that while the new pier infrastructure can only be developed by private companies, it remains unclear whether the government can pay for it in full or partially through a PFI model. It would appear so, but this should be confirmed. The questions therefore are: Can the government finance/undertake breakwaters investments? Can the government provide subsidies? Is there a need to modify the current Chilean concession model to include the public sector at the time to underwrite the risk and to finance the breakwater if that option proves to be the salient one?

A possible scheme could be based on the fact that the public sector assumes the development of the breakwater, due to the public service nature of the port, which would be recovered through taxes from different operators and user fees. The public sector should not expect private companies to assume the cost side of the infrastructure investment, because it does not allow them achieve an appropriate return (and tariff levels that might lead to full cost recovery appear to be unworkable, particularly given the natural uncertainties about the level of demand over the long life of the concession). There appears to be a consensus that the Law does not apply to essential public facilities as is the case for breakwaters, so the government could finance and undertake the breakwater component, if it chooses to do so. Indeed this point is of critical importance, because as long as the Chilean government wants to develop a large infrastructure projects like the PGE, its involvement in the funding of a part of this infrastructure (breakwaters) appears to be necessary.

The un-bundling of port and breakwaters projects/tasks and their allocation

Numerous issues arise when considering this option. Are there any economies of scale or scope to be gained by bundling breakwater and port operations? In principle, if there are, they might not be too large since they are two very different types of activities and projects that require quite different sets of skills

and know-how from the firms involved. In consequence the number of potential firms that could be interested in a bundled project might be limited, reducing the benefits of competitive bidding. Another point to consider is whether other port services could be added, allocated or and provided by the breakwaters providers. If not, the salient decision would be to provide the breakwater components as public works. From a value-for-money perspective, if any ancillary or related services beyond construction and maintenance (and it appears that that is not the case) would exist, then the possibility of a PPP/Concession or hybrid PFI model could be considered. If the unbundling of the tasks is selected, then the question is whether the breakwater project should be executed as public works or as a concession/(PPP). Given all these considerations it appears that the prudent choice is to separate the breakwater component and let the government undertake it as a public works project.

Bankability of the Project and Level of Tariffs Needed for Cost/Investment Recovery

It is critical to assess the level of tariffs needed to support cost recovery and at the same time their relation with demand and competitive pressures. The financing, cost recovery, tariff levels and access fees need to be assessed, as well as any need for credit enhancement or other type of government support such as minimum revenue guarantees.

The required levels of revenue and tariffs can be roughly estimated, performing a simple financial exercise. Assuming identical cash flows every year, a 10% discount rate, a concession lifetime of 30 years and an initial investment of USD 14 200 million for Valparaíso and USD 2 700 million for San Antonio, the table below shows the revenue needs to make the project bankable and based on that the relevant tariffs.

Table 5.5. Cash flows per project

| | Valparaíso | San Antonio |
|----------------------|-------------------|-------------------|
| Investment | 1 420 million USD | 2 700 million USD |
| Traffic (TEUs) | 3 million | 6 million |
| Nº Teus (round trip) | 1.5 million | 3 million |
| Cash Flow per TEU | USD 100.42 | USD 95.47 |

Source: Authors calculations.

As the cash flows are defined as revenues minus costs, the numbers above should reflect the cash flows per TEU (revenue-price times quantity- less operating costs). Thus, the price per container is higher than 100.42 (Valparaíso) and 95.47 (San Antonio), respectively. Because the cost of operation is not included, the price will be higher, and the mark-up will evolve as a function of the operating costs. In addition, it should be noticed that the calculation assumes full operating capacity of the ports from day one, which will not be the case.

These numbers give additional support to the claim that the breakwater component should be implemented by the government to insure a better bankability of the PGE project.

Number of Operators

How many different operators are sufficient to enable a healthy degree of competition? While there is no universal rule, two or three operators (for the PGE terminals) might be enough to elicit a healthy degree of competition among them. Given the current number of 4 operators at the existing terminals at Valparaíso and San Antonio (albeit not PGE type), the competitive market could be substantially enhanced.

Eligibility to Participate in the Tendering of the New Port (terminals)

Should existing operators in San Antonio and Valparaíso be allowed to compete for the operation of the terminals at the new PGE? As long as there is more than one PGE operator (terminal), it does not seem necessary to disallow the current operators to participate in the tendering of the PGE terminals.

Award criteria

The common criteria could be the following:

- Awarder to the bid with the lowest composite transfer (tariff/fee) rate of required services (it will be the maximum tariff charged).
- LVP of revenues.
- Minimum Subsidy (or Largest Transfer). (The minimum subsidy the private partner would find acceptable to make the project bankable).
- Revenue Sharing (the share of the revenues the private partners are willing to share with the government.).

If compatible with a competitive environment, the standard LPV of revenues could fit the case. However, it would need to be aligned with potential risk mitigation or sharing from the government. In addition the criteria would be dependent on the project's structure and the related tendering procedures, i.e. are we tendering a single project or splitting it into various functions and firms. Minimum subsidies for components lacking full financial viability are a natural choice. Tariffs or transfers to government are often used as well but with very different distributional (equity) effects. The Chilean experience has shown that the current method of the integrated transfer/tariff has worked well in the past, so it might be a reasonable choice again.

Credit Enhancement and Government Assistance in the Financing to Make Projects Bankable

The possible options with private partners are:

- PFI model, full or partial (hybrid):

The private sector finances and operates while the government pays an annuity for the life of the concession and bears the demand risk.

- CRPAO¹⁰- payments for progress in Project's construction:

The private sector finances and operates the infrastructure and provides services while the government pays advances on the construction phase cost. For example, if 10 % of the project is completed, the government pays the equivalent amount (usually with a bond).

Additional instruments such as the Minimum Revenue Guarantees (MRG), bond issue with or without guarantees, an equity position and the issues, concerning refinancing and renegotiation also need to be taken into account.

Concluding remarks

As noted, the success of privatisations depends on how they are executed, to what terms and conditions and, especially, how they are regulated.

The introduction of the private sector in ports usually leads to improvements in their efficiency and productivity ratios. However, the privatisation processes per se (and the efficiency gains) do not directly imply better positions for all the agents involved in ports. Without a proper mechanism that enables an adequate economic regulation and considers all the involved parties, the results of the privatisation may fail to meet the expectations of the government.

Latin American experience provides evidence that, although port privatisations (or other forms of private participation) have led to reasonably favourable outcomes, the contracts may not have been well designed, the bids may have been aggressive, and the governments have failed to credibly commit to a policy of no renegotiation and to uphold the sanctity of the bids, as is evident from the magnitude of renegotiations.

In future port concessions, the focus should be directed at auctions as is already the case in Chile. Governments and port agents should consider how to improve the performance of this mechanism by properly aggregating multiple criteria and should also consider the social dimension.

As shown in this paper, concessions are the usual way to introduce efficiency and competition in the port industry. The competition for the market is still the most common tool to reach the benefits of competition in the port industry. Although the optimal way forward appears to be the introduction of competition between ports, which is indeed the case for Chile. The construction of mega-ports will introduce additional private operators, which will be forced to compete among themselves, thereby further strengthening competitive pressures (given the proximity of Valparaíso and San Antonio). The setup of a concession should always consider the competition to be its key objective when designing PPP port projects. However, the achievement of this objective has to be pursued with a high degree of transparency (Guasch, 2006).

This report discussed and presented a number of options in the design of the structure for the Chile Puerto de Gran Escala (PGE) project: division of project components, number of firms, public versus private roles and other aspects. How to select among the various options and move forward is the subject of future steps. In summary, it is of critical importance to identify the key objectives to be secured beyond the obviously desired increase in capacity. If the maximisation of competition were the overriding issue, it would appear that the San Antonio option with (at least) two terminal operators, and a third for the infrastructure component might be a salient one (as this the first project to be implemented). If the transaction costs and coordination issues are the key concerns, the best choice might be to award an integrated concession to a single party to benefit from the internalisation of many problems (integrated tariffs, costs allocations). If facilitating and ensuring financing is a critical factor, a PFI type arrangement (or the CRPAO model) for the infrastructure component with a separate concession for port terminal operations might be an option.

With regard to the discussion on the breakwaters components, given their different asset life cycle (50 years or more versus 30 years for port terminals), lack of complementarities (the breakwaters and the

terminals involve two very different types of business and skills), and easier access to finance, it might be desirable to separate their construction from the terminals. In this case there are two options, the breakwaters works could be done by the government as a public works or as a concession and financed by access fees (if feasible) or as full or hybrid PFI. That choice will depend on the financial model and the extent of value for money. Of the two, the more reasonable choice appears to be a traditional procurement, where the public sector finances and tenders the works for the breakwater component. Taking the legal perspective into account, the current Chilean Law appears to allow such a choice.

In summary, regarding the structure of the project the best choice appears to be the third model presented here. In this model, the government takes upon itself to deliver the breakwater component and then tenders the terminals broken down in two parts (four could also be considered) using the current Chilean award criteria. Regarding eligibility, it would appear that as long as there are two or more PGE terminals to be tendered, the current operators of the Valparaíso and San Antonio could be allowed to participate in the tendering, without having to cancel their current concession. Finally, given the long gestation of the project, the long asset life-cycle and the natural uncertainties about the upcoming demand, the granting of an MRG might be unavoidable.

Regarding the choice among the two identified location options it would appear that from the logistics standpoint, San Antonio does have a significant edge and offers better value for money than Valparaíso. The reasons are its intermodal connections, in particularly railroad, greater capacity and the ability to foster more competition among operators. Our analysis thus points in the direction, that this should be the first project to be implemented.

Annex 1. Tendering process

| | |
|-----------------------|--|
| International Bidding | |
| Bidder requirements | <ul style="list-style-type: none"> • Minimum Equity. • Qualified Operator. |
| Award criteria | <ul style="list-style-type: none"> • Minimum Average Tariff. • LPVR. • Criterion tiebreaker: maximum payment (validate value business). |

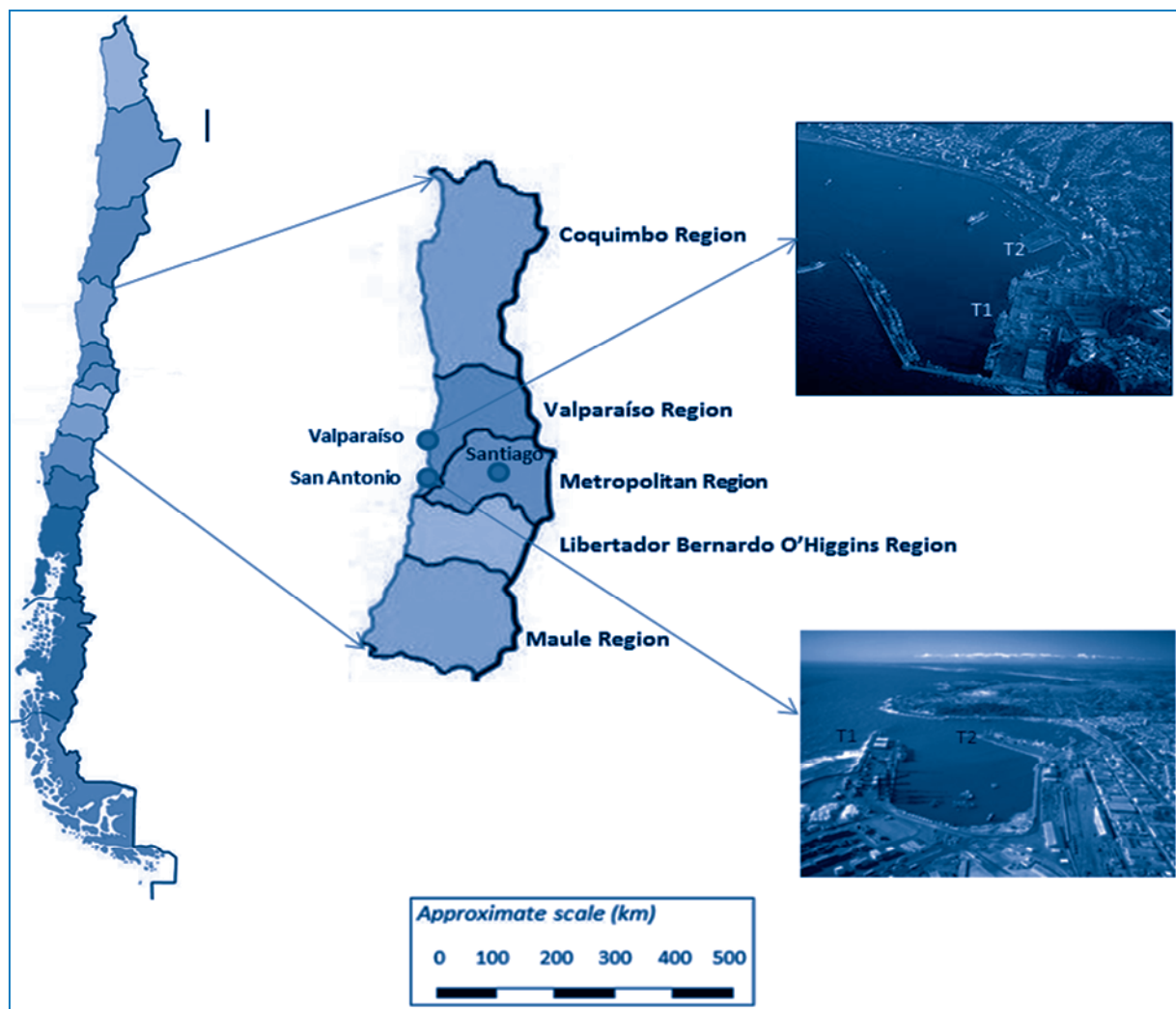
Source: Araya Mena (2006).

Annex 2. Concessions scheme

| | |
|---|--|
| Concession Contract | <ul style="list-style-type: none"> • Known ex-ante by bidders. • It is an instrument that contains all of the rights and obligations of the parties, including mechanisms for dispute resolution. |
| Concession Companies | <ul style="list-style-type: none"> • Governed by rules of public companies. • Consortium bidder must have at least 51% of the concessionaire. • Qualified Operator must own 35% of the concessionaire at least in the first five (5) years. |
| Object of Concession | <ul style="list-style-type: none"> • Development, maintenance and exploitation of the berthing front, including the provision of infrastructure, cargo handling and cargo storage. |
| Duration | <ul style="list-style-type: none"> • Between 15 and 20 years for the multipurpose terminals, extendable up to 30 years in case an investment into an expansion of the infrastructure is defined. |
| Labour Regime | <ul style="list-style-type: none"> • The concessionaire is free to hire its own employees. • Regime applicable: Labour Code. |
| Rates and Quality of Service Levels | <ul style="list-style-type: none"> • Public rates without arbitrary discrimination. • Rates for handling, loading and provision of infrastructure may not exceed the maximum weighted average fare offered. • Fees for other services: Tariff freedom. • Compliance with transfer speeds of minimum load to nave. • Compliance with transfer speeds of average load in four (4) previous quarters (Not applicable in the case of Arica). • Compliance with timeouts. |
| Rules to limit exercise of dominant position: established by the antitrust commission and reviewable after a certain period (5 years) | <ul style="list-style-type: none"> • Shareholdings in companies awarded other concessionaires in state ports or privately operated ports in the same region subject to maximum levels (restriction on horizontal integration). • Shareholding in concessionaire serving “relevant users” in other activities is subject to maximum levels (restriction vertical integration). |
| Mandatory initial investment | <ul style="list-style-type: none"> • First Stage: Not contemplated. • Later stages: Terminal in each case and terminal for the shipment of bulk minerals in the case of Antofagasta and Arica. |
| Obligations of the port companies to the State | <ul style="list-style-type: none"> • Provision of common public goods and general administration of the port, including terminals not concessioned. • Minimum rates for the services for the provision of infrastructure and cargo storage: Not lower than those registered by the operator with maximum upper limit. • Maximum fare, applicable to the service provision of common goods (port user charge). • Tender of new fronts of berth. • The only economic factor for the award and use will be the amount of money offered. • Port companies retain the right to bid and/or grant the right to operate other fronts of berth of the port. |
| Labour Aspects | <ul style="list-style-type: none"> • Programs of forced lay-offs for workers under state owned ports/operations. • Workers of the Empresa Portuaria de Chile. • Worker service providers to private stevedoring companies, without a contract or relationship with the company. |

Source: Araya Mena (2006).

Figure 5.5. Existing container seaports in central Chile



Notes

1. See Trujillo and Nombela (2001) for extension of this issue.
2. In the sense, that the professional capacity of the economic regulator cannot be developed overnight.
3. Theys et al (2010) provides a description of recent issues emerging in the awarding process.
4. The transfer of risk to the private side does not mean it is dissolved, but that the private sector calculates a premium for accepting that risk. Because information asymmetry is present, the premium might be disproportionate to the actual risk if there is no competition to reduce it to an efficient level. The consequences are less favourable bids or substantially higher cost of financing, respectively.
5. It should be noted, that this is a crude assessment of cost overruns, as it involves traditional and PPP projects alike, with contract value as reference estimate and is therefore not comparable with academic studies, which deal exclusively with the magnitude and sources of cost overruns (and benefit shortfall) and consider the two types of procurement strictly separately. But the incidence and level of cost overruns is significantly higher in traditional public works than on PPP (Guasch 2006)
6. Annex 1 and 2 provides more-detailed information on tendering and contracting procedures in Chile.
7. The regions of Coquimbo, Valparaíso, O'Higgins, Maule, and Metropolitana of Santiago.
8. For example a model in which the government participates with its own equity, but where the private sector still retains the majority ownership or the project company/port.
9. This could be potentially mitigated by the existence of the two neighbouring ports of Valparaíso and San Antonio, but nevertheless it will end with a quasi-capture of demand as the new generation large ships is unable to dock at these ports. However here again a possible mitigation effect could play through the developments of the (forthcoming) port of El Callao/San Lorenzo in Peru.
10. *Certificados de Reconocimiento de Derechos del Pago Annual por Obras* - Certificates Acknowledging the Right to Collect the Annual Construction Payment.

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