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The effect of institutional factors on public–private partnership success in ports

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ABSTRACT

Port public–private partnerships (PPPs) are considered to be an important emerging mechanism for port development and improvement in port performance especially for developing countries. This paper empirically investigates the effect of institutional factors in the success of port's PPPs; the latter defined as the attractiveness of the PPP project for private bidders and the market competitiveness of the facility. The empirical investigation of a large sample of ports finds that 'regulatory quality', 'market openness', 'ease to start a business' and 'enforcing contracts' are important institutional determinants of port PPP success and may ultimately contribute to port development and economic growth. The results are consistent with and add to the theoretical literature whereas practical implications for port authorities, managers and investors are discussed.

1. Introduction

The development and operation of seaports entails the management of highly complex and capital intensive projects. This requires the ability to manage natural resources and invest in infrastructure and superstructure as well as to serve independent shipping and logistics businesses who are the major users of port facilities (De Langen, 2004; Monios and Wilmsmeier, 2012). The participation of public sector authorities is necessary for safety, security and national planning reasons as well as for certain service operations like customs and immigration whereas private sector participation may be sought for superstructure investment and commercial services provision (Rangel et al., 2012; Yuen et al., 2013). In addition, the participation of the public sector may take the form of co-investor with the private sector. Hence, a public–private partnership (PPP) can range from a 100% private investment as in a build–operate–transfer (BOT) scheme to a regular concession agreement with varying public investment contribution (for instance 80% or even 100% of public investment).

The seaport sector plays an important role in facilitating the intermodal transportation of freight and the efficiency of the supply chain (Song and Panayides, 2008). In addition, ports have become important providers of logistics and associated services that add value to the goods processed through them (Lam and Gu, 2013). However, the extent of the services provided and the level of supply chain efficiency gains have been found to depend on the model of port governance adopted and more specifically on the involvement of private sector investment in port development and/or operations (see Brooks and

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Cullinane, 2007). Hence, a PPP in the port sector may contribute to an upgrading of the traditional public port service delivery.

A PPP is an institutionalized form of cooperation of public and private actors, who on the basis of their own objectives, work together toward a joint target (Nijkamp et al., 2002). PPPs can be defined as co-operation between public and private actors with a durable character in which actors develop mutual products and/or services and in which risk, costs, and benefits are shared and mutual added value is created.

Under a public–private partnership, a government institution enters a long-term contractual arrangement with a private supplier for the delivery of some services. The supplier takes responsibility for building infrastructure, financing the investment and then managing and maintaining this facility. The World Bank and the International Monetary Fund encourage developing countries to embrace the system of public private sector participation through schemes of financial assistance. PPPs are being used across Europe, Canada, the US and a number of developing countries as part of a general trend seeing an increasing involvement of the private sector in the provision of public services, under the form of privatization, deregulation, outsourcing and downsizing of government. The trend toward PPPs in developing countries included, in particular, investment in infrastructure projects (i.e. energy, telecommunications, transport and water) and also in the port sector.

Despite the practical interest in private sector participation in the port industry (e.g. Bagchi and Paik, 2001; Handley-Schachler and Navare, 2010; Wiegmans et al., 2002), the theoretical literature has not provided in depth analysis of certain important elements that comprise this area. In addition, the scientific literature has not captured the composite nature of PPPs in ports and their consequent success or failure in this context. This is especially true for developing countries where institutional barriers may alter or even hinder the possibility of port PPPs' implementation and success (De Langen and Pallis, 2007; Olivier et al., 2007). According to Jamali (2004) there is a lingering resistance to conduct systematic policy evaluation taking into consideration the wide range of issues raised in the context of PPPs, including their implications for cost and/or quality performance, value for money, equity, access, accountability, and government regulation.

In this regard, the success of port PPPs has to be treated as a composite theoretical construct not only because of the intrinsically hybrid (i.e. public–private) nature of the transaction (Jamali, 2004; Zhang, 2005; Olivier et al., 2007), but also for the cumulative and somehow discontinuous process of value creation which is generated by such kind of projects over time (Peters, 2001; World Bank, 2007). In particular, PPP financial closure, which enacts the winning bidder after a (long) negotiation period, represents an important "moment of truth" in which the amount of private investments is finally stated by the contract (World Bank, 2012a). Later on, after becoming operational, the PPP project has to compete in the market for attracting customers and getting additional traffic volumes (Tongzon and Heng, 2005). Indeed, the capacity of attracting huge financial resources from private multinationals and the achievement of a solid market positioning (i.e. competitiveness) are widely recognized as major objectives for undertaking successful PPP initiatives (Wiegmans et al., 2002; Olivier, 2010; Notteboom et al., 2012).

With regard to the port sector in particular, various authors have used institutional theory as a base for understanding and developing a port governance system (e.g. Hall, 2003; Ng and Pallis, 2010; Ng et al., 2013; Notteboom et al., 2013). Ng and Pallis (2010) found that newly established seaport governance structures that follow a path largely affected by the local/national institutional frameworks and the political traditions preserve the institutional characteristics of those local/national systems, resulting in implementation asymmetries when different countries seek generic governance solutions. In general the authors contend that institutional theory can be applied to the port sector in the context of understanding and assimilating processes for reform and improving port processes, port management practices and port governance (Ng et al., 2013; Notteboom et al., 2013; Wang et al., 2004). In this context the current paper makes a contribution by investigating port PPP success using an institutional theoretical framework.

The paper is structured as follows. Section 2 of the paper reviews the literature that deals with private sector involvement in port projects followed by a description of the theoretical background and conceptual development of the paper in Section 3. Section 4 describes the methodology and Section 5 presents an analysis of the results. Finally, Section 6 provides a discussion of the results, whereas Section 7 highlights managerial implications before concluding.

2. Public private partnerships in ports

The quest for better port management and performance has led to increasing involvement from the private sector in port operations. Port liberalization and privatization became prevalent since the late 1970s (Juhel, 2001; Peters, 2001). The progressive opening of the port sector worldwide presented opportunities for pure stevedoring companies and shipping lines to expand their market arena in various forms (Olivier, 2005; Parola and Musso, 2007). Despite the variations in private sector participation, the majority of port administration frameworks are founded on the cooperation between a public Port Authority and a private Terminal Operator i.e. port public–private partnerships (port PPPs) (Siemonsma et al., 2012).

The literature shows that decisions on port PPPs should be aligned with the country's settings. Scholars have derived various frameworks for developing port PPPs. Bagchi and Paik (2001) proposed a three-phrase process model, which consists of setting pre-conditions, PPP development and implementation, and performance assessment. The key point is to have strategic vision and proactive commitment within government departments in the process. In another study, Siemonsma et al. (2012) illustrated that particularly for complex port projects early dialogue with candidates in the private sector would lead to enhanced project value by reducing expected transaction costs and increasing expected contract value.

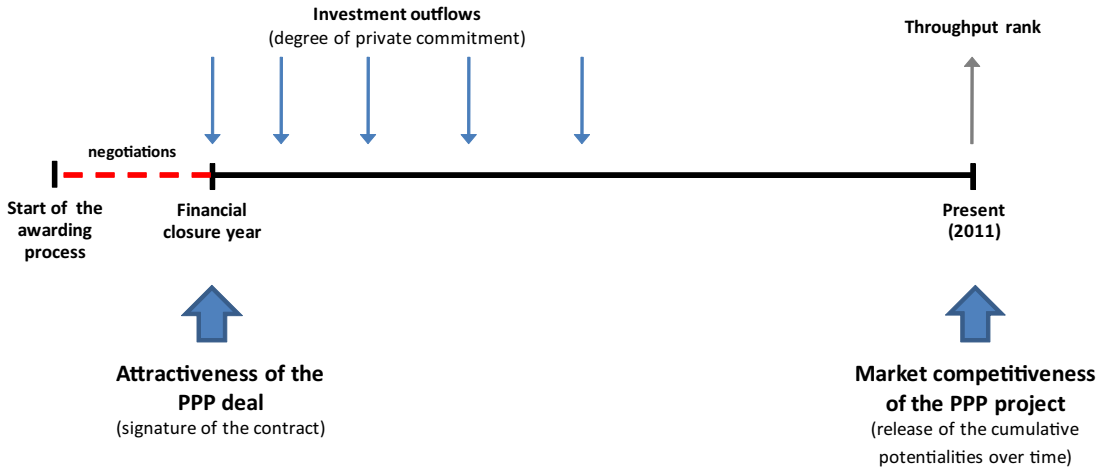

Fig. 1. Conceptualizing port PPP success: attractiveness of the deal and market competitiveness of the project. Source: authors' own elaboration.

Of particular relevance is the definition of port PPP success, which must be analyzed in the context of the multi-faceted and composite (i.e. public–private) nature of the transaction. The conceptualization of PPP success has to take into account some appropriate dimensions able to capture the degree of success in the diverse moments of the overall project timeline (Fig. 1).

First, a PPP is considered as a very effective tool in the hands of public bodies for attracting private funds, managerial expertise, skills and know-how, while still retaining the (public) strategic control over the asset/facility in the long term (Vining and Boardman, 2008). In this regard, the degree of private commitment in the deal, which is agreed at the time of the financial closure, captures the attractiveness of the PPP proposal and the degree of success from a public perspective, reflecting the capacity of public institutions to build up an appealing bid/negotiation.

Second, a PPP must be also evaluated on the basis on its operational performance over time once it has started to face the fierce competition of neighboring facilities (Van Niekerk, 2005). In particular, the physical output which is generated annually (i.e. throughput) and the market share held by the facility, reflect the capacity of the PPP to attract traffic/customers and to (cumulatively) release value to its stakeholders/territory.

Moreover, the notion of PPP failure and non-success deserves attention by practitioners and academics (Guasch, 2004; World Bank, 2012a). The term failure evokes a "no-return" event, commonly materializing in the definitive interruption of the project before the financial closure and the start of operations (Jamali, 2004). Conversely, a PPP non-success may simply refer either to an unsatisfactory awarding process, assigning the facility to second-class concessionaires, or to the poor operational performance of the project, which ultimately unveils a scarce market competiveness (Hodge and Greve, 2007).

Technically, we may have at least three key moments/periods during which a certain degree of non-success can materialize in building up a PPP initiative. First, during the negotiation period preceding the financial closure, i.e. the signing of the contract (Notteboom et al., 2012). During this period, in fact, the PPP initiative can experience a real failure, if the PPP initiative stops (e.g. due to bankruptcy of the winning bidder, lack of public funds) and the project never becomes operational (World Bank, 2007). Following this, at the time of financial closure after the negotiation, non-success may be encountered due to scarce private commitment i.e. if public institutions are not able to attract sufficient private funds. Finally, non-success can materialize once the facility begins its operations, i.e., during the concession period. During the regular commercial activity, in fact, the degree of competitiveness of the PPP project may prove to be rather unsatisfactory with respect to competing facilities and, in extreme cases, either the winning bidders may decide to withdraw from the PPP or the Public Institution (i.e. the Port Authority) may even decide to cancel the concession contract prematurely (Olivier, 2010).

Based on the above literature review, we observe that port PPPs generated considerable interest from researchers. Prior studies, however, focused on the nature of port PPPs without much analytical examination of institutional aspects as determinants of port PPPs initiative success. Most of the prior studies are qualitative or descriptive in nature underpinned by the fact that the case study approach is the most commonly adopted research method. As such, more rigorous empirical analysis would deepen our understanding on the topic and this paper serves to fill this literature gap in particular.

3. Theory and hypotheses

3.1. Theoretical background

Although PPPs provide mechanisms that can exploit the advantages of the public and private sectors, other factors may influence the success of PPPs. Institutional theory has recognized such factors, which are focused in particular on the

involvement of the public sector and its ability to institute an environment where the partnership can flourish. According to Spackman (2002) this is especially true where accountability is critical, cost shifting presents problems, the time frame is long and societal normative choices are more important than costs. The public sector should continue its regulatory role to set standards and establish systems to ensure that the partnership operates efficiently and resources are optimized. As North (1990) has put it, institutions reflect the 'rules of the game' in a society.

Scott (1995) suggests that the institutional environment can be characterized by three pillars: cognitive, normative, and regulatory. Scott and Davis (2007) elaborate that the regulatory component of an institutional environment represents the existing rules and laws that promote certain behaviors and restrain others. The cultural-cognitive component of the institutional environment reflects the shared understanding that creates a 'common cognitive framework' and taken-for-granted assumptions (Scott and Davis, 2007).

One of the most well-known and comprehensive studies of the institutional environment of countries is that of Kaufmann et al. (2009), who have provided measures of national institutional environments through their work on the World Bank's Worldwide governance Indicators (WGI). The WGI project reports aggregate and individual governance indicators for 212 countries and territories annually. The indicators are based on several hundred individual variables measuring perceptions of governance, drawn from 35 separate data sources constructed by 33 different organizations from around the world.

Moreover, another well-reputed data source is given by the Doing Business project, which provides objective measures of business regulations and their enforcement across 185 economies. The Doing Business project gathers and analyzes comprehensive quantitative data to compare business regulation environments across economies and over time covering 11 indicators sets.

3.2. Conceptual development and hypotheses

Based on the institutional framework perspective established by Daude and Stein (2007) and focused on the governance (Kaufmann et al., 2009) and doing business indicators (World Bank, 2012b), it is conceptualized that the success of PPP initiatives in the port sector will be influenced by the following seven institutional factors, viz. (1) voice and accountability, (2) government effectiveness, (3) regulatory quality, (4) market openness, (5) ease to start a business, (6) enforcing contracts, and (7) protecting investors. The conceptual framework is presented in Fig. 2 and the variables are explained below.

'Voice and accountability' reflects the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media (press) (Kaufmann et al., 2009). It also reflects whether citizens can hold governments accountable for the actions taken. The variable includes characteristics of the political process as well as assessments of the independence of the media (Daude and Stein, 2007) and is bound to influence positively a port PPP initiative (Asian Development Bank, 2007; World Bank, 2012a, p. 60). On this basis it is hypothesized that:

H_{1a}. *Voice and accountability will be positively related to the degree of private commitment in a port public private partnership initiative.*

H_{1b}. *Voice and accountability will be positively related to the market competitiveness of a port public private partnership initiative.*

'Government effectiveness' is a measure for the quality of government inputs (Apaza, 2009; Thomas, 2009). It represents, among others, the perceived quality and independence of the bureaucracy. It reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation and the credibility of the government's commitment to such policies. The above reflect the ability

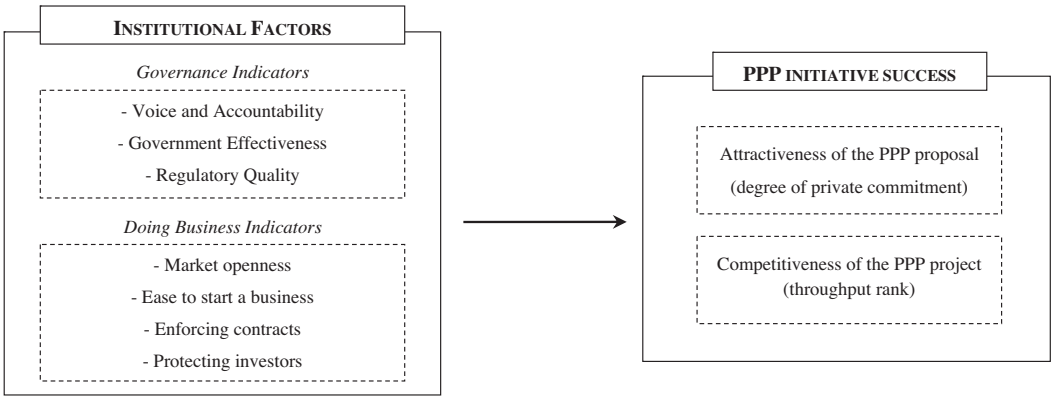

Fig. 2. The conceptual framework.

of government to formulate and implement good policies over the long term. The variable government effectiveness reflects perceptions of the capacity of the government to adopt a managerial behavior/view and to be proactive in performing actions and strategies in various economic sectors (Baltazar and Brooks, 2007). In this regard, we recognize that one of the major drivers of port privatization and reform is represented by the scarce capacity of public bodies (governments, local public bodies and port authorities) to take care (efficiently) of port operations (i.e. to be responsive to market changes, to look for new customers, to be efficient in producing high-quality services, etc.). It is not surprising, therefore, that Port Authorities located in countries where the effectiveness of government bodies (i.e. the Port Authority itself in our case) is low, are often forced to leave the majority of the investment (i.e. the full managerial and executive control) to foreign private investors/operators (Peters, 2001; World Bank, 2007).

On this basis it is hypothesized that government effectiveness would actually reduce success of a port PPP initiative. Hence:

H_{2a}. *Government effectiveness will be negatively related to the degree of private commitment in a port public private partnership initiative.*

H_{2b}. *Government effectiveness will be positively related to the market competitiveness of a port public private partnership initiative.*

'Regulatory quality' focuses on the quality of implemented policies. It includes the perceived incidence of policies that inhibit the market mechanism, and excessive regulation of foreign trade and business development, and as such closely reflects the transaction costs that result from policy intrusion by the state in private trade.

Regulatory institutions are clusters of rules and resources that are sustained across time and space within and among social systems (Giddens, 1984). It is one of the three key "pillars" of social institutions (Scott, 1995). A well-functioning, high-quality regulatory environment exists when rules and laws are formulated and are effectively enforced to ensure both the stability of economic transactions and order of a society. High-quality regulatory systems affect the social capital effects on foreign direct investment (FDI) by providing the basis for the development of social capital. In a weak regulatory environment, distrust is likely to occur (Williamson, 1993) and institutional environments with low regulatory quality cannot effectively contain opportunistic behavior that undermines the value of social capital (Rammal and Zurbruegg, 2006). The regulatory system as a key component of social institutions can act as broad support for the critical mass of trust (Gulati, 1995; Sitkin, 1995) and amplify the general benefits of social capital, such as the protection of individuals' rights and property (Fukuyama, 1995). Regulatory quality will be a positive determinant of PPP initiative success in the port sector (World Bank, 2007). On this basis:

H_{3a}. *Regulatory quality will be positively related to the degree of private commitment in a port public private partnership initiative.*

H_{3b}. *Regulatory quality will be positively related to the market competitiveness of a port public private partnership initiative.*

Market openness refers to a market which is accessible to all economic actors as opposed to a market closed by a monopoly or oligopoly which dominates an industry, and with a protected market in which entry is conditional on certain financial and legal requirements or which is subject to tariff barriers, taxes, levies or state subsidies which effectively prevent some economic actors from participating in them (Romalis, 2008). Market openness is reflected in the amount of government regulation of those markets, the scope for competition, and the absence or presence of local cultural customs which get in the way of trade. In principle, a fully open market is a completely free market in which all economic actors can trade without any external constraint. Hufbauer et al. (1994) showed that market openness manifested through trade liberalization of the host countries plays a significant and consistent role in the investment decisions of the United States and Japan. On the basis of the above:

H_{4a}. *Market openness will be positively related to the degree of private commitment in a port public private partnership initiative.*

H_{4b}. *Market openness will be positively related to the market competitiveness of a port public private partnership initiative.*

The ease to start a business reflects a number of dimensions that relate to the ability of businesses to establish themselves (permits, registrations, funding) and trade (investor protection, international trade, contracts etc). The World Bank provides an average ranking of countries on an ease to start a business index (Kaufmann et al., 2009). The ease to start a business may encourage foreign multinational firms to locate in developing counties (e.g. Disdier and Mayer, 2004; Stein and Daude, 2007). In this context the ease to start a business is bound to contribute to the success of a PPP initiative in the port sector. Hence:

H_{5a}. *Ease to start a business will be positively related to the degree of private commitment in a port public private partnership initiative.*

H_{5b}. *Ease to start a business will be positively related to the market competitiveness of a port public private partnership initiative.*

The concept of contract enforcement assesses via a number of indicators the efficiency of a government to take measures to achieve the enforcement of contracts and in particular the efficiency of the judicial system in resolving a commercial dispute. The data are built by following the step-by-step evolution of a commercial sale dispute before local courts (World Bank, 2012b).

Contract enforcement is crucially important for economic development and the lack of means for enforcing contracts is regarded as the single most important source of economic stagnation and underdevelopment (e.g. Djankov et al., 2006).

Some contracts can be enforced through private mechanisms alone while others will require resort to the courts. Contract enforcement may contain a mix of both public and private institutions. Governments can take a number of actions to foster private mechanisms such as developing rules and regulations pertinent to business processes and to ensure self-enforcing and self-help contracts are permitted. Contract enforcement is relevant to PPPs, as argued in the report by the World Bank (2007, p. 158). Hence:

H_{6a}. *Enforcing contracts will be positively related to the degree of private commitment in a port public private partnership initiative.*

H_{6b}. *Enforcing contracts will be positively related to the market competitiveness of a port public private partnership initiative.*

Protecting investors reflects the procedures, time and cost for a small to medium-size limited liability company to start up and operate formally in a specific country (World Bank, 2012b). In this regard, formal legislation in a country typically has high costs associated with noncompliance (North, 1990). Hence, protecting investors reflects the safeguard against arbitrary rulings in individual cases, and determines the probability that those who commit crimes will be apprehended (Becker, 1968). Protecting investors can vary substantially across countries (La Porta et al., 1997; 1998) with some regulatory structures being more protective of business transactions than other (Hennart, 1986; Williamson, 1991). In a country where investors are scarcely protected, there is greater uncertainty in regards to what is appropriate, leading to increased opportunistic behavior and higher transaction costs (Oxley, 1999) influencing the decisions of private partners such as multinational corporations (Globerman and Shapiro, 2003; Ostergard, 2000; Roy and Oliver, 2009; Yiu and Makino, 2002). In the context of the port sector, protecting investors in the host country is hypothesized to positively influence PPP initiative success (World Bank, 2007, 2012a). Hence:

H_{7a}. *Protecting investors will be positively related to the degree of private commitment in a port public private partnership initiative.*

H_{7b}. *Protecting investors will be positively related to the market competitiveness of a port public private partnership initiative.*

4. Methodology

4.1. Sample

The hypotheses formulated in the previous section were tested on the basis of panel data regarding container terminal projects in developing countries. Within the chosen 1995–2011 timeframe the World Bank monitored over 1150 PPP projects in transport infrastructure, which generated a total investment of around 265 billion USD.

In recent years, the growth of PPP container facility projects was considerable, because of the key role assumed by container shipping in international trade. This study uses all the container terminal projects reported by the Private Participation in Infrastructure (PPI) database of the World Bank for the period 1995–2011. The PPI database constitutes a leading primary source in the field and it has been extensively utilized by previous studies on PPPs in infrastructure (e.g. Devapriya, 2006; Estache, 2006) and ports privatization (e.g. Olivier et al., 2007; Pallis et al., 2008). Data concerning terminal projects were verified and integrated by information sourced from the Containerisation International Yearbook and Drewry Shipping Consultants. This approach achieves a high degree of completeness and consistency for all the observations.

The final dataset reports 161 new container port projects involving private participations, referring to 48 developing countries, for a total investment size of around 35 billion USD (between 1995 and 2011). Unsurprisingly, China, Brazil and India are the countries which attracted most projects and investments over time. Each PPP terminal project generated, on average, an overall investment commitment of around 215 million USD, and the active involvement of 1.5 private investors on average. In 59% of the PPPs the degree of private commitment is above 90%, while 8% of the PPPs have a private share below 10%. About 65% of PPPs show a degree of private commitment which is above the average value of the sample (78%). Around 70% of the sample projects demonstrated a superior performance as they belong to the 'top 20%' facilities in terms of throughput within their own geographic region.

The total costs estimate takes into account the overall cost of the port facility, including basic infrastructures (quay wall, yard surface, etc.), equipment (quay cranes, yard cranes, etc.), other superstructures (warehouses, rail marshalling yard, etc.), and road and rail connections. Of course, road and rail connections are included only for the portion directly related to the facility. If a 150 km highway originates from a terminal/port, the relative (overall) cost is not included in the port PPP cost.

For our purposes, each record contains the main information related to a single project: the terminal location, the financial closure year, the type of PPP (e.g. management contract, regular concession, BOT scheme), the contract period (i.e. duration), the total cumulated investment, the degree of private commitment, the private bidders' consortium, the current operational performance (i.e. physical output), etc.

In this regard, it is worth to note that big port projects imply a strong financial burden which produces outflows both in the planning and construction phases as well as during the eventual expansion works. Mega port facilities are typically multi-stage projects. Therefore, the sampling process from the PPI database also required the aggregation of all the cumulated financial outlays over time, in order to appreciate the overall magnitude of the transaction.

4.2. Variables and measures

The study investigates the success of port PPP initiatives in relation to seven institutional factors (voice and accountability, government effectiveness, regulatory quality, market openness, ease to start a business, enforcing contracts, and protecting investors) hypothesized on the basis of the extant literature to influence port PPP ventures. The success of a port PPP initiative venture was defined taking into account the composite nature of the transaction and it was measured using two proxies, i.e. the "attractiveness of the PPP proposal" (operationalized as "degree of private commitment in the deal") and the "competitiveness of the PPP project" (operationalized as "throughput rank" of the facility). First, it is assumed that the bigger the private investment, the higher the success of the transaction from a public point of view, reflecting the capacity of public institutions to build up an appealing bid/negotiation and then to attract investors/money in the specific PPP. This is especially true in many developing countries. If a PPP is really successful it must be able to attract bigger sums of private funding for performing new mega-projects, thus creating jobs, attracting cargo and generating value-added on the territory. In this regard, we have introduced a dummy variable (0/1), for taking into account the projects where the private commitment is dominant (over 50% of the total cumulated investment) over public engagement ('PRIV'). Second, we also assumed that the higher the throughput rank (top 20%) of a specific PPP facility within its own geographic region, the higher the competitiveness (and the success) of the PPP project itself. Therefore, a second dummy variable has been constructed ('COMP'), measuring the capacity of the PPP facility to attract traffic/customers and to (cumulatively) release value to its stakeholders/territory over time.

This dichotomist approach is widely applied in the management literature. For instance, many empirical papers dealing with firm's entry modes choice in a foreign market adopt a similar method such as the joint-venture (JV) versus wholly owned subsidiary (WOS) approach by Yiu and Makino (2002).

The selected dependent variables (PRIV and COMP) were operationalized by focusing on two different moments of the overall PPP timeline in which the success can be measured ('PRIV', at the financial closure year; 'COMP', in 2011). Consistent with that, all the regressors were operationalized either in relation to the "financial closure year" of the PPP (models 1a–1d) or to the last available operating year of the facility, i.e. 2011 (models 2a–2d). For parsimony we have avoided the use of "subscripts" (e.g., $GOEF_{PRIV}$ vs. $GOEF_{COMP}$) for differentiating the measurement of the variables in the models 1a–1d versus models 2a–2d (different timeframes).

The institutional factors were operationalized using the WGI aggregate indicators (Kaufmann et al., 2009) and the 'doing business' indicators of the World Bank (2012b). These factors which have been compiled from a variety of credible sources (enterprise, citizen and expert survey respondents) are freely available and have been subjected to scrutiny by academics and policy makers. As such they have been found to be consistent across countries and over time providing additional evidence of their validity and reliability.

A number (8) of control variables were used in the models developed to control for potential influences on the success of PPP ventures in the port sector. The control variables chosen were country-specific (country richness, economic growth, market size, and timeliness) and project specific (concession duration, firm experience, winning bidders and leading private investors). In each model five (out of eight) control variables were selected, according to the assumptions provided by extant academic literature on port and maritime logistics. For parsimony, we make reference to Table A.1 (Appendix), which discloses in-depth explanations on the definition and operationalization of all the variables used in the study.

5. Results

5.1. Empirical findings

Prior to running the binomial logistic regression models we estimated the correlations between independent, control, and dependent variables of the different models. Tables 1a and 1b, which provide the main descriptive statistics and the correlation matrix, show substantial variability in the variables; some of the variables appear to be correlated with others. Further analysis unveiled that multicollinearity does not represent a serious concern, as the tolerance ($T > 0.1$) and the variance inflation factors (VIF < 10.0) are within the acceptable range (Belsley et al., 1980).

The study investigates the determinants of PPP initiative success in ports, represented as attractiveness ('PRIV') and competitiveness ('COMP') of the project. The empirical models developed are composed of seven independent variables and five control variables as explained above. Overall eight binomial logistic models were developed to test empirically the research

Table 1a
Correlation matrix and collinearity diagnostics (models 1a–1d).

Variable	Mean	s.d.	PRIV	VOAC	GOEF	REQU	OPEN	STAR	CONT	PROT	RICH	GROW	SIZE	DURA	BIDD	Tolerance	VIF
PRIV (dep.)	0.7764	0.4180	1														
VOAC	35.9591	22.9453	0.3975**	1												0.1914	5.2260
GOEF	48.4810	16.5375	0.0396	0.4285**	1											0.2239	4.4654
REQU	46.2750	17.8011	0.2503*	0.6195**	0.8146*	1										0.1929	5.1849
OPEN	5.7764	5.5328	−0.0785	−0.2340*	0.1875	−0.0045	1									0.5757	1.7371
STAR	0.2461	0.1501	0.2399*	0.0909	0.1817	0.1803	−0.1794	1								0.8353	1.1971
CONT	0.1802	0.0354	0.4056**	0.5071**	−0.2748**	−0.0626	−0.3904**	0.0779	1							0.3528	2.8348
PROT	0.2043	0.0329	−0.1543	−0.4744**	−0.2906**	−0.3594**	0.2354*	−0.1896	−0.1627	1						0.6415	1.5589
RICH	2498.5131	2202.1391	0.2593*	0.4588**	0.4184**	0.5879**	0.0174	0.0058	0.0647	−0.1157	1					0.5625	1.7779
GROW	6.6943	2.5879	−0.2488*	−0.4745**	0.0873	−0.1419	0.3712**	−0.1239	−0.4934*	0.2199*	−0.2198*	1				0.4681	2.1364
SIZE	12.9671	25.7280	−0.2690*	−0.5372**	0.2219*	0.0088	0.5282**	−0.1270	−0.6420*	0.2383*	−0.0607	0.6908*	1			0.2786	3.5896
DURA	30.6894	12.5838	−0.2296*	−0.4160**	0.3450**	0.0828	0.4914**	0.0452	−0.7054*	0.0047	−0.1685	0.5436**	0.6540*	1		0.3027	3.3041
BIDD	1.4783	0.7753	0.2356*	0.2422**	0.1305	0.2426*	−0.1527	0.1050	0.0923	−0.0761	0.1518	−0.1031	−0.0984	−0.0193	1	0.8709	1.1482

* p-Value < 0.01.
** p-Value < 0.001.

Table 1b
Correlation matrix and collinearity diagnostics (models 2a–2d).

Variable	Mean	s.d.	COMP	VOAC	GOEF	REQU	OPEN	STAR	CONT	PROT	RICH	SIZE	SHIP	EXPE	INTE	Tolerance	VIF
COMP (dep.)	0.7019	0.4589	1														
VOAC	35.9591	22.9453	0.0724	1												0.1981	5.0488
GOEF	48.4810	16.5375	−0.0061	0.4285**	1											0.2003	4.9935
REQU	46.2446	18.2465	0.1290	0.6055**	0.8228*	1										0.1813	5.5151
OPEN	13.1677	5.7687	0.0780	−0.108	0.3655**	0.2126*	1									0.5066	1.9738
STAR	0.2844	0.0518	0.0947	0.0073	0.1442	0.0887	−0.1874	1								0.6573	1.5213
CONT	0.2129	0.0424	0.1145	0.5048**	−0.2794**	−0.0861	−0.4946**	0.0180	1							0.2920	3.4242
PROT	0.2454	0.0631	0.1294	0.3571**	0.2607*	0.3024**	−0.0620	0.1680	0.0779	1						0.7924	1.2620
RICH	3791.0256	2847.6455	0.0655	0.4711**	0.5504**	0.6911*	0.0450	−0.1319	−0.0619	0.1411	1					0.3951	2.5307
SIZE	21.5477	36.8840	−0.0326	−0.6146**	0.2182*	−0.0074	0.4394**	−0.1084	−0.7739*	−0.2185*	−0.0370	1				0.2045	4.8896
SHIP	3.4100	0.3790	0.0732	−0.0230	0.5586**	0.4133**	0.5864**	−0.3004**	−0.4657**	−0.0417	0.3743**	0.5531**	1			0.3317	3.0152
EXPE	9.0373	4.6123	0.2238*	0.2576*	0.2625*	0.3257**	0.2509*	0.0048	−0.0828	0.1207	0.0751	−0.1149	0.1350	1		0.7313	1.3675
INTE	0.4845	0.5013	0.1699	−0.2933**	−0.1111	−0.2536*	0.1468	0.0518	−0.1329	−0.0188	−0.2942**	0.1712	−0.0039	0.0030	1	0.8367	1.1952

* p-Value < 0.01.
** p-Value < 0.001.

hypotheses: four models (1a–1d) have been performed for calculating estimates of variable 'PRIV', while other four models were related to the variable 'COMP'. The results of the models are presented in Tables 2a and 2b. The models provide additional information with regard to the robustness of the results. All models were found to be highly significant.

In particular, model (1a) consists of the control variables only and demonstrates the appropriateness of the control variables chosen for estimating the dependent variable 'PRIV'. Models (1b) and (1c) report the results of regressions between the dependent variable (attractiveness of the PPP proposal), all the control variables and a sub-set of the independent variables, i.e. governance (model 1b) and doing business indicators (model 1c). Model (1d) presents the results of the regression between all independent and control variables with the dependent variable. In five cases the independent variables are significant and correctly signed. Moreover, four out of five control variables are found to exert a significant relationship to the degree of private commitment in the deal except concession duration.

Analogously, referring to the competitiveness of the PPP project, model (2a) consists of all control variables, while models (2b) and (2c) also include as independent variables governance and doing business indicators respectively. Finally, model (2d) presents the outcomes of the regression incorporating all independent and control variables. In five cases the independent variables are significant and correctly signed, whereas all control variables are found to be significant.

The results of model (1d) are indicative of the importance of the institutional environment in determining the attractiveness of port PPP initiative. The findings show that five of the seven independent variables show significant coefficients. The independent variables "regulatory quality", "market openness", "ease to start a business" and "enforcing contracts" show positive coefficients. This confirms a positive association with the dependent variable. These results provide support to H_{3a}, H_{4a}, H_{5a} and H_{6a}.

Conversely, the variable "government effectiveness" shows a negative (and significant) coefficient as hypothesized (H_{2a}). The reason for this negative association is the fact that PPPs are transactions which are mostly needed by countries aiming to improve their processes and efficiency in managing investment processes. This is the reason that countries which are not as

Table 2a
Results of binomial logistic regression models (1a–1d).

Variables	Model 1a	Model 1b	Model 1c	Model 1d
Intercept	−0.6582	−1.8511	−11.5961***	−12.4811***
	(1.1303)	*(1.3030)*	*(3.6876)*	*(4.1825)*
VOAC		0.0377*		9.78E−05
		(0.0198)		*(0.0317)*
GOEF		−0.0759***		−0.0997***
		(0.0289)		*(0.0353)*
REQU		0.0578*		0.0929**
		(0.0330)		*(0.0400)*
OPEN			0.1353*	0.1714*
			(0.0826)	*(0.0886)*
STAR			13.4110***	13.8869**
			(5.1741)	*(5.6503)*
CONT			35.9318***	35.8844***
			(12.3200)	*(13.2147)*
PROT			−2.8346	−1.9816
			(9.3995)	*(12.8871)*
RICH	0.0006	0.0004*	0.0006**	0.0006*
	(0.0002)	*(0.0003)*	*(0.0003)*	*(0.0003)*
GROW	0.0211***	0.0654*	0.1921	0.3229*
	(0.1324)	*(0.1504)*	*(0.1754)*	*(0.1932)*
SIZE	−0.0209*	−0.0103	−0.0273*	−0.0340*
	(0.0125)	*(0.0145)*	*(0.0163)*	*(0.0189)*
DURA	−0.0120	0.0193	0.0109	0.0201
	(0.0244)	*(0.0333)*	*(0.0455)*	*(0.0501)*
BIDD	1.1245**	1.1467**	1.1538**	1.2645**
	(0.4586)	*(0.5012)*	*(0.5524)*	*(0.6108)*
Number of observations	161	161	161	161
Cox and Snell R^2	0.1930	0.2571	0.3343	0.3759
Nagelkerke R^2	0.2949	0.3929	0.5108	0.5743
−2 Log-likelihood	136.5899	123.2622	105.6022	95.2134
Pearson chi-square	34.5305***	47.8582***	65.5182***	75.9070***
p-Value	<0.0001	<0.0001	<0.0001	<0.0001

This table reports estimates of the relation between port PPP attractiveness (i.e. success) and country institutional factors between 1995 and 2011. All variables are defined in Table A.1 (Appendix). Model (1a) reports estimates using only the control variables. Models (1b) and (1c) report estimates of governance and doing business indicators respectively, individually regressed with the control variables and the dependent variable (PRIV). Model (1d) reports estimates all independent and control variables with the dependent variable. Standard errors are in parenthesis below the coefficient. *, ** and *** denotes 10%, 5% and 1% level of significance, respectively.

Table 2b
Results of binomial logistic regression models (2a–2d).

Variables	Model 2a	Model 2b	Model 2c	Model 2d
Intercept	−1.7663	−2.8469	−13.0949***	−22.9846***
	(2.0346)	*(2.0930)*	*(4.0060)*	*(5.1799)*
VOAC		−0.0012		−0.0207
		(0.0161)		*(0.0230)*
GOEF		−0.0831***		−0.1196***
		(0.0255)		*(0.0333)*
REQU		0.0716***		0.0608**
		(0.0264)		*(0.0293)*
OPEN			0.0408	0.1134**
			(0.0431)	*(0.0548)*
STAR			8.5571*	20.8252***
			(4.6453)	*(7.2774)*
CONT			28.2797***	39.8681***
			(8.5558)	*(11.4736)*
PROT			5.2624	10.3476*
			(4.1969)	*(5.7204)*
RICH	0.0001*	1.29E−05	0.0001	0.0003**
	(0.0001)	*(0.0001)*	*(0.0001)*	*(0.0001)*
SIZE	−0.0047	−0.0013	0.0189*	0.0241*
	(0.0062)	*(0.0093)*	*(0.0097)*	*(0.0140)*
SHIP	0.3383	0.8857*	0.3696	1.5987*
	(0.6638)	*(0.7002)*	*(0.8324)*	*(0.9157)*
EXPE	0.1059**	0.1154**	0.1515***	0.2194***
	(0.0430)	*(0.0495)*	*(0.0509)*	*(0.0673)*
INTE	0.9481**	1.2304***	1.1073***	1.2974***
	(0.3856)	*(0.4209)*	*(0.4192)*	*(0.4652)*
Number of observations	161	161	161	161
Cox and Snell R^2	0.0910	0.1603	0.1787	0.2805
Nagelkerke R^2	0.1292	0.2275	0.2537	0.3982
−2 Log-likelihood	180.8203	168.0660	164.4979	143.1946
Pearson chi-square	15.3670***	28.1213***	31.6894***	52.9926***
p-Value	0.0089	0.0005	0.0002	<0.0001

This table reports estimates of the relation between port PPP competitiveness (i.e. success) and country institutional factors between 1995 and 2011. All variables are defined in Table A.1 (Appendix). Model (2a) reports estimates using only the control variables. Models (2b) and (2c) report estimates of governance and doing business indicators respectively, individually regressed with the control variables and the dependent variable (PRIV). Model (2d) reports estimates all independent and control variables with the dependent variable. Standard errors are in parenthesis below the coefficient. ∗, ∗∗ and ∗∗∗ denotes 10%, 5% and 1% level of significance, respectively.

effective in setting and implementing related policies often call private players that can commit significant financial investment (over 50% of the overall transaction), and have the necessary managerial and operational capabilities for taking care of such projects. Finally, the coefficients of the variable "voice and accountability" and "protecting investors" are not significant, thus H_{1a} and H_{7a} are not supported.

In addition, the results of model (2d) provide empirical evidence as to the role of the institutional environment in affecting the competitiveness of port PPP initiatives. The outcomes show that six of the seven independent variables show significant coefficients. The independent variables "regulatory quality", "market openness", "ease to start a business", "enforcing contracts" and "protecting investors" show positive coefficients and lead to acceptance of the corresponding hypotheses. Conversely, H_{1b} and H_{2b} are not supported, because the coefficient of the variable "voice and accountability" is not significant and the variable "government effectiveness" is wrongly signed.

In general it can be deduced that the statistical results emanating from the empirical analysis are consistent with theoretical postulates. The control variables are significant in the majority of the models, whereas the significance and signs of the coefficients of the independent variables provide further confidence in the validity of the results and the support of the research hypotheses.

Regarding the control variables, the following comments can be made. The negative coefficient of the control variable "market size" in regression model (1d) indicates that countries having a least developed container port market (that is to say are at the beginning of their lifecycle in the container business) need a greater private commitment in PPP transactions (Peters, 2001). Usually such nations do not have solid public institutions overlooking port operation and development. On the contrary, PPP projects achieving a higher competitiveness are those located in countries (already) characterized by an enormous container market. In model (2d), indeed, the control variable 'market size' assumes a positive coefficient consistently with such arguments (Olivier, 2010).

All the other control variables (in case of significant coefficient) are positively associated with port PPP success both in terms of degree of private commitment and market competitiveness of the project. These results are fully consistent with the extant academic literature as depicted in Table A.1 (Appendix).

5.2. Robustness checks

Some robustness checks have been performed for validating the empirical results and assessing their consistency. For parsimony, outcomes are not tabulated but they are summarized below. Three directions were followed for assessing robustness. First, for verifying the robustness of the findings related to each independent variable, we developed several models taking into account individual independent variables as stand-alone, together with the selected control variables. Comparing the results of the stand-alone models with those disclosed by the two main (“all-in”) binomial logistic regression models (1d and 2d), significant consistency emerges. With regard to the explanatory variables of the degree of private commitment in PPP initiatives, the variables regulatory quality, market openness, ease to start a business and enforcing contracts have significant and correctly signed coefficients. This demonstrates the pivotal role played by such institutional variables in affecting the attractiveness of the PPP deal for private investors. With regard to the variables affecting the competitiveness of the PPP initiative, mixed results are disclosed. Governance indicators do not unveil significant coefficients while doing business indicators confirm their explanatory role in determining the ultimate success of PPPs.

Second, with specific reference to the dependent dummy variable PRIV we proceeded to a different measurement of the degree of private commitment in the deal, by calculating it as a percentage variable, ranging from 0% to 100%, corresponding to the private equity share involvement in the PPP. Therefore, models (1a–1d) have been re-run adopting OLS regression, and taking into account the newly constructed percentage variable $PRIV_{PER}$. For ironing out any concern of obtaining estimated values ($PRIV_{PER}$) laying outside the acceptable range ($0\% < PRIV_{PER} < 100\%$), the dependent variable has been modified by adopting a logistic transformation. The outcomes of the OLS regression fully confirm those disclosed by the binomial logistic models (1a–1d).

Finally, we tested the robustness of our findings by estimating probit and lo-log (binomial logistics) models as an alternative to logit specifications (models 1a–1d and 2a–2d). Again, the results obtained are consistent with the findings disclosed in Tables 2a and 2b, in relation to both dependent variables (PRIV and COMP) and their regressors.

6. Discussion

Despite the importance of port PPPs, research is mainly confined to qualitative findings of isolated and non-generalizable cases. Although such approaches have generated practical value, this study comes to fill a distinct gap in the extant literature by empirically investigating the determinants of port PPP initiative success from an institutional perspective. In this regard, the manuscript provides a sound and original conceptualization of the notion of PPP success, combining the interests of both public bodies and private firms. In addition, the results of this investigation would be potentially relevant for PPPs in other infrastructural sectors. The theoretical literature indicates that if PPPs are to thrive the host country’s institutional environment and framework must be conducive to this effect. This study analyzes the effect of institutional factors on ports’ PPPs using the well-established WGI framework of Kaufmann et al. (2009) and some ease of doing business indicators provided by the World Bank (2012b).

The study demonstrates the significant relationship between port PPPs and institutional environments, i.e. governance and doing business indicators. In particular, the study finds that port PPP initiative success is influenced positively by the institutional variables ‘regulatory quality’, ‘market openness’, ‘ease to start a business’ and ‘enforcing contracts’. The empirical findings support previous qualitative findings in the port literature. For instance, the ‘ease to start a business’ and ‘market openness’ variables, which refer to the general regulatory and institutional environment, corresponding to the ‘degree of openness’ of foreign markets which influences opportunities of private entry in the port sector (Olivier et al., 2007). According to this study such institutional factors determine to a large extent the strategic choices that may be possible in any given context.

In addition to the above Bagchi and Paik (2001) and Siemonsma et al. (2012) highlighted the importance of having an official process model with set pre-conditions for PPP development and implementation as well as proactive commitment from government departments and reduction in transaction costs with early dialogue. The findings from this study support the notion that regulatory quality which would encompass issues of PPP pre-conditions as well as procedural aspects for agreeing and concluding PPPs would enhance the completion of such partnerships. Moreover, regulatory quality was demonstrated to be an important determinant positively affecting the market competitiveness of the project.

We find that regulatory quality has a significant, positive and substantial impact on port PPP initiative success. A country that is highly unpredictable in regulations normally manifests frequent and unforeseen changes in government policies, extensive government intervention in business operations, and inadequate mechanisms to enforce laws and contracts (Luo, 2005; Slangen and van Tulder, 2009).

Government effectiveness which reflects the quality of public services, policy formulation and implementation and government credibility as to the implementation of such policies is found to be negatively related to PPP initiative success in ports. This may be attributed to the fact that the government is so effective in developing and implementing policies with respect to port investment and management that there is no need for private sector involvement. The Port of Singapore provides a good example. According to Cullinane et al. (2007) there is limited involvement of the private sector in the Port of Singapore and that is restricted to joint ventures with a few shipping lines. Another example is the case of Hong Kong-based Hutchison Port Holdings which has been successful in capturing Mainland China's container port market share through a network of joint ventures. The firm's regionalization drive, in addition to traditional economic factors, is explained by socio-cultural and political factors within the context of Mainland China's economic articulation with the global economy (Airriess, 2001). There is also a negative and significant relationship with Government effectiveness. These results support the thesis that institutional variation is an important determinant of port PPP initiative success. The negative correlation between port PPP initiative success and government effectiveness gives rise to an explanation of why high-income countries are less likely to engage in port infrastructure partnerships with the private sector, while the same does not hold for low-income countries.

The impact of institutions on investment, either domestic or foreign, can be related to two different perspectives. First, the absence of institutions such as regulatory quality might act as a tax by increasing the cost of doing business. Second, imperfect ability to engage in business even in the presence of regulation might also increase uncertainty regarding future returns and thus have a negative impact on the level of investment. Thus, for example, corruption may deter investment by increasing the cost and reducing the ease to start a business, as investors need to identify the process and bribe officials in order to obtain licenses and permits. In our sample of developing countries the 'ease to start a business' variable has been found to be conducive to the development of co-operation between government and private enterprise for port projects. Our results are in line with studies of foreign direct investment such as Daude and Stein (2007) who found that the unpredictability of laws, regulations and policies and excessive regulatory burden play a major role in deterring FDI.

A comment must be made on the governance variable 'voice and accountability' which did not bring empirical support to the hypothesis. The finding may be explained by the sample chosen for this study. Our sample of developing countries is characterized by a lack of 'voice' due to the fact that such PPP projects are considered as a springboard for the socio-economic development of the country. Fawcett (2007) indicates that the attitudes of its people affect the country's ports governance decisions in general. This would correspond to the variable 'voice and accountability' which reflects the perceptions of the extent to which a country's citizens are free to select and participate in government as well as a free media.

Finally, the doing business variable 'protecting investors' has provided mixed results. It has not been found to influence with statistical significance the degree of private commitment in the port PPP initiative, whereas it positively affects the market competitiveness of the facility. Roy and Oliver (2009) argued that rule of law within the host-country institutional environment affects MNC decisions and behaviors. A lack of adequate legal protection increases uncertainty with respect to legitimate returns (Delios and Henisz, 2000) and may not have appropriate legal recourse for victims of opportunism (Roy and Oliver, 2009). However, port partnerships with the public sector of the host country would alleviate such fears as well as reduce the uncertainty and the monitoring costs that would be present in the case of private sector alliances without the involvement of the public sector. Our results do not provide direct support to such assumptions probably because of the specific legislative environment in which ports may operate. In the early stage of their reform process, in fact, developing countries normally select some major ports for developing best practices and pilot projects. In doing so, governments establish ad-hoc territorial legislative regimes in a few selected port domains, thus protecting (at least partially) foreign investors from the lack of legal protection in the rest of the country. Indeed, further studies dealing with other transport sectors may investigate further the effect of the variable 'protecting investors' on PPP success in the context of this idiosyncratic environment.

7. Managerial implications

The study provides insightful managerial implications for policy makers, port managers, as well as managers of private multinational firms.

In terms of practical implications it can be suggested that policy makers of countries wishing to increase the propensity of foreign private investors to invest in port projects with the public sector should improve their institutional framework, especially by establishing a predictable framework for regulatory and economic policies and enforcement. Such an approach would definitely have positive spillovers to other economic activities that are key to economic growth and development. Port development would not only facilitate trade but also enhance logistics and industry as both domestic and foreign firms may engage in the investment, development and provision of ancillary services that would contribute to the country's economy (Lam et al., 2011). In the supply chain era, port development would also mean enhancement of the logistics capabilities of the host nation, seen as a key determinant for investment of foreign multinationals in developing countries. The results of our paper are clearly in line with the empirical growth literature that has stressed the importance of institutions for logistics systems (Kinra and Kotzab, 2008) and economic growth (e.g. see Acemoglu et al., 2001; Hall and Jones, 1999). In particular,

this study highlights one channel through which institutions might affect growth by increasing public private partnerships in the port sector. In addition, raising the institutional quality would also have a positive effect on domestic investment as Mauro (1995) and Stasavage (2002) have shown.

The outcomes also contribute relevant implications both for port authority managers and managers of private firms operating as port concessionaires. First, the port authority can reasonably exploit the "degree of private commitment" as leverage for attracting investors (World Bank, 2007, 2012a). If from an institutional (i.e., governance and doing business factors) viewpoint the country appears weak at the eyes of (foreign) bidders, the port authority might be forced to increase the public share of engagement, because private parties are not commonly attracted by countries characterized by very unstable socio-political backgrounds and where the conditions for doing business are difficult. In this case, the port authority is driven to attract the investors by accepting a low share of private commitment. Conversely, if the port authority can rely on a strong institutional background, it may easily get the attention of many potential bidders. The competition arising among bidders is commonly expected to strengthen the role of the port authority in the negotiation and, in this case, the port authority can reasonably ask for a (much) higher degree of private commitment.

In this regard, an in-depth analysis of the institutional factors characterizing (potential) host country markets would also allow private managers to undertake more aggressive and conscious negotiation strategies during the awarding procedure, thus exploiting the weak points of the counterpart (i.e. the port authority).

Along this line, empirical findings suggest that managers of multinational corporations contemplating the partnership with the public sector for overseas port investment in developing nations must carefully consider the institutional environment and in particular issues like regulatory quality, market openness, ease to start a business and enforcing contracts prior to engaging in such ventures in addition to the process of private investment in port projects and the mechanism of the operation per se.

Moreover, managers entrusted to choose the new projects are invited to carefully monitor the environmental variables which are also capable of conditioning the competitiveness of the facility. Empirical findings, indeed, suggest private managers to focus on those governance and doing business variables, which ultimately determine the success of the PPP venture, i.e. the market competitiveness of the project, for undertaking effective entry strategies in properly selected host (foreign) countries.

8. Conclusion

In this paper, we have shown the relevance of the institutional quality as a factor of success for public private partnerships in the port sector. The impact of institutional variables is statistically significant, and economically very important. Institutions have an essential role in a market economy to support the effective functioning of the market mechanism, such that firms and individuals can engage in market transactions without incurring undue costs or risks (Peng, 2008). These institutions include regulatory quality, the legal framework and its enforcement, freedom of expression and ease of doing business in the host country among others. In the case of port public private partnerships this study has shown that institutions play a key role in supporting co-operation between public and private sectors.

The paper makes a number of contributions to the extant literature. In particular, previous studies have examined qualitatively the effect of institutional factors on public private partnerships in the port sector. This study applies for the first time the world governance indicators in an empirical assessment of institutional determinants and project success in the port sector. The outcomes show that although institutional factors are important there are a number of key variables that are fundamentally imperative for the success of port PPPs. The empirical results employ a novel dataset distinguished by the breadth of country coverage. The appeal of port PPP as a new policy alternative in the context of developing countries is growing. The study is generalizable to developing countries as the sample is comprised of a large number of observations and port projects in fifty countries over a long period. In addition, the results are relevant to other transport industries (road, railways, airports) that share similar characteristics of infrastructure development to the port sector. The study sheds light on issues dominated by conceptual ambiguity and lack of systematic explorations of policy requirement for successful port PPP implementation. The results are consistent with the theoretical arguments made in the relevant literature and discussed herein.

Like all cases of empirical research, this study would benefit from further scholarly work. To enhance the generalizability of our findings to firms of other developing countries, replication elsewhere is welcome. In addition, a potential limitation of the paper is the use of a proxy for the measurement of port PPP venture success. It is generally accepted that proxies are imperfect measures of a variable hence future research may adopt alternative measures of port PPP success. This study has focused on port PPP in developing countries. Future studies may seek to extent the sample under investigation to more developed nations and examine the contribution of strong institutions to the rate of success of port PPP initiative. In addition, future research may examine the institutional variables used in this model across various transport and other infrastructural sectors (railways, airports, roads) to verify the strength of the relationships in such contexts including the variable 'voice and accountability' not found to be significant in the case of port PPPs. Of particular interest would also be the economic contribution of PPP success to the host nation.

Appendix .

Table A.1
Variables, definition and operationalization. *Sources:* Authors' own elaboration from World Bank (1995-2011), WTO, UNCTAD, Drewry Shipping Consultants, Containerisation International and corporate websites.

Variable	Definition	Operationalization	Model 1		Model 2	
			Hp	Predicted sign	Hp	Predicted sign
Dependent variables						
PRIV	Attractiveness of the PPP proposal (degree of private commitment)	Reflects the percent private share of the overall cumulated investment in the PPP project (source: Private Participation in Infrastructure (PPI) Project Database, World Bank)	(PRIV)			
COMP	Competitiveness of the PPP project (throughput rank)	The dummy variable takes value 1 is the PPP project ranks in the top 20% port facilities in terms of throughput (year 2011) within its own geographic regions. Data and the composition of geographic regions are derived from Drewry and Containerisation International			(COMP)	
Independent variables						
Governance indicators						
VOAC	Voice and accountability	Reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media (source: World Bank).	H_{1a}	+	H_{1b}	+
GOEF	Government effectiveness	Reflects perceptions of the capacity of the government to adopt a managerial behavior/view and to be proactive in performing actions and strategies in various economic sectors (source: World Bank).	H_{2a}	−	H_{2b}	+
REQU	Regulatory quality	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development (source: World Bank).	H_{3a}	+	H_{3b}	+
Doing business indicators						
OPEN	Market openness	Reflects perceptions of the extent to which institutions are willing to open and liberalize the port and maritime sector to private and foreign investors. It is measured as the number of year from which the port market has been liberalized at the time of the financial closure of the PPP project (source: own elaboration from Drewry and World Bank).	H_{4a}	+	H_{4b}	+
STAR	Ease to start a business	Reflects the procedures, time, cost and minimum capital to open a new business in a specific country. This index is elaborated from the Doing Business database of the World Bank. A high score means that it is ease to start a business in a specific country. Data have been transformed into a more usable form, by using the natural logarithm of this score.	H_{5a}	+	H_{5b}	+
CONT	Enforcing contracts	Reflects the efficiency of the judicial system in a specific country. This index is elaborated from the Doing Business database of the World Bank. A high score means that the quality and the efficiency of the judicial system in a country is high. Data have been transformed into a more usable form, by using the natural logarithm of this score.	H_{6a}	+	H_{6b}	+
PROT	Protecting investors	Reflects the procedures, time and cost for a small to medium-size limited liability company to start up and operate formally in a specific country. This index is elaborated from the Doing Business database of the World Bank. A high score means that the conditions for operating a business as investors are favorable in a specific country. Data have been transformed into a more usable form, by using the natural logarithm of this score.	H_{7a}	+	H_{7b}	+

Control variables				
Country specific				
RICH	Country richness	Measured as GDP per capita in the host country at the time of the financial closure of the PPP contract (Model 1). Measured as average GDP per capita in the host country in the timeframe between the financial closure and 2011 (Model 2). Source: WTO. References: Peters, 2001; World Bank, 2007.	+	+
GROW	Economic growth	Measured as average annual GDP growth in the 3 years preceding the financial closure of the PPP contract (Model 1). Source: WTO. References: Parola and Musso, 2007; Olivier, 2010.	+	n.a.
SIZE	Market size	Measured as country container throughput (in million TEUs) in the host country at the time of the financial closure of the PPP contract (Model 1). Measured as average container throughput in the host country in the timeframe between the financial closure and 2011 (Model 2). Source: Containerisation International. References: Peters, 2001; Olivier, 2010; Notteboom and Rodrigue, 2012.	-	+
SHIP	Timeliness	Reflects the relative ease and efficiency with which products can be moved into and inside a country, i.e. the timeliness of shipments in reaching destination within the scheduled or expected delivery time. Measured as average value (2007–2011) of the "Timeliness" indicator (composing the Logistics Performance Index) provided by the World Bank. References: Song and Panayides, 2008; World Bank, 2012b.	n.a.	+
Project specific				
DURA	Concession duration	Reflects the length of the concession period during which the concessionaire retains control of the facility. The variable is expressed in terms of number of years (source: PPI database, World Bank). Reference: Notteboom et al., 2012; Siemonsma et al., 2012.	+	n.a.
EXPE	Firm experience	Measured as the number of years from the financial closure of the PPP to last year of operations (2011). Source: PPI database, World Bank. References: World Bank, 2007; Olivier, 2010.	n.a.	+
BIDD	Winning bidders	Measured as number of winning bidders jointly participating at the PPP project (source: PPI database, World Bank). References: World Bank, 2007, 2012a; Siemonsma et al., 2012.	+	n.a.
INTE	Leading private investors	Reflects the presence of at least one of the leading Top 5 International Terminal Operators (ITOs) in the PPP project. The dummy variable takes value 1 if one or more ITOs are involved in the project; it is otherwise 0 (source: Drewry Shipping Consultants and corporate websites). References: Parola and Musso, 2007; Olivier et al., 2007.	n.a.	+

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